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Development of Bristol Airport to Accommodate 12 mppa

Transport Assessment

On behalf of **Bristol Airport Limited**

Project Ref: 44321/5501 | Rev: Final | Date: December 2018

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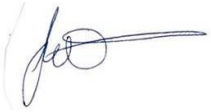
Approved by:	Scott Witchalls	Partner		4/12/18
For and on behalf of Peter Brett Associates LLP				

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0 Executive Summary

0.1 Introduction

0.1.1 As part of an approach to meeting passenger demand, Bristol Airport Limited (BAL) is seeking planning permission to increase the permitted passenger cap from 10 million passengers per annum (mppa) to 12 mppa. To accommodate the additional 2 mppa, existing infrastructure will be improved, new infrastructure delivered and current operations amended (the Proposed Development).

0.1.2 This executive summary provides a concise, high-level overview of the background, purpose, methodology, important findings, conclusions and recommendations of the Transport Assessment (TA) prepared by Peter Brett Associates LLP (PBA) in support of the planning application for development of Bristol Airport to Accommodate 12 mppa.

0.1.3 In 2017, Bristol Airport saw throughput of over 8.2 mppa, making it the ninth busiest UK airport and the third largest regional airport in England. Leading low cost, charter and full service airlines currently fly from Bristol Airport to over 120 destinations across 34 countries.

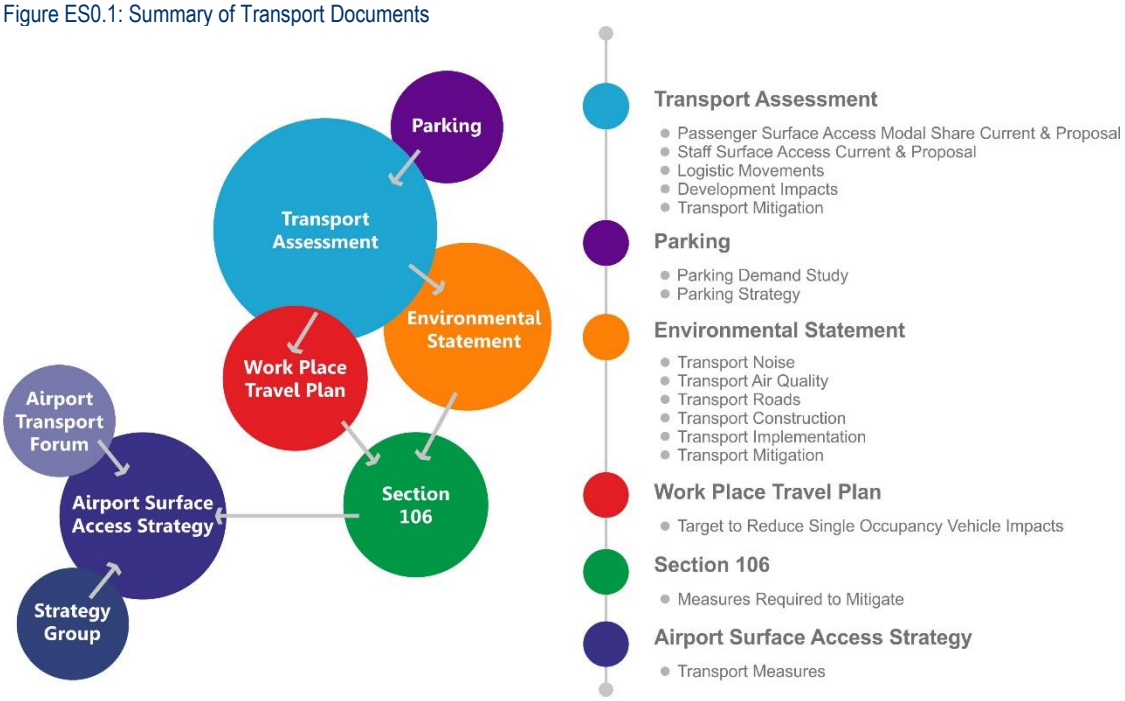
0.1.4 BAL was granted planning permission by North Somerset Council (NSC) on the 16th February 2011 for the development of Bristol Airport to accommodate 10mppa. The consent has the following planning condition:

- *'Condition 65: The passenger throughput at Bristol International Airport shall not exceed 10 million passengers in any 12-month period (to be taken from 1st January to 31st December in any calendar year – unless a different 12-month start and end date is agreed) unless separate planning permission is granted'.*

0.1.5 Between 2010 and 2017, investment totalling over £160 million has been made in a significant upgrade of facilities and infrastructure at the Bristol Airport site.

0.1.6 This TA should be read in conjunction with the suite of planning application documents submitted as part of the application, including: Workplace Travel Plan (WTP), Parking Demand Study, Parking Strategy and Environmental Impact Assessment (EIA). **Figure ES 0.1** provides a description of each transport document and how they relate to one another.

Figure ES0.1: Summary of Transport Documents



Pre-Application Discussions

0.1.7 Scoping and engagement has taken place with key stakeholders including NSC, Bristol City Council (BCC), Bath and North East Somerset Council (BaNES), Somerset County Council (SCC) and Highways England as part of the formal pre-application process.

0.1.8 A TA Scoping Report was submitted to the key stakeholders and was formally commented on by officers. In addition to the TA Scoping Report, a further Technical Note was submitted which sought to address comments raised by officers. It was agreed to base the TA on a core test related to a forecast passenger public transport mode share of 15%, which would be applied to the increase in passengers from 8.2 mppa (2017) to 10 mppa and 12 mppa. It has also been accepted that post-submission, sensitivity testing regarding the forecast passenger modal share would be undertaken and submitted for consideration as part of any officer recommendations on the application.

0.1.9 The TA seeks to support the development of an ambitious Airport Surface Access Strategy (ASAS) that meets the requirements of key stakeholders.

0.2 Bristol Airport Site

0.2.1 Bristol Airport is situated on a ridge of high ground called Broadfield Down, with the A370 Bristol to Weston-super-Mare 4km to the north and the M5 motorway 11km to the west of the site. The A38 carriageway is directly adjacent to the airport, on its eastern extent.

10 mppa Surface Access Strategy

0.2.1 An ambitious target of 15% for passengers to travel to and from Bristol Airport by public transport was agreed as part of the 10 mppa consent. Paragraph 2.1 of the Fourth Schedule to the 10 mppa S106 agreement dated 16 February 2011, amongst other obligations, relates to surface access and states:

'Details of service improvements that BAL will undertake in order to increase the modal share of air transport passengers travelling to and from the Airport by public transport to 15% when

the Airport achieves an air passenger throughput of 10 million passengers per annum through the procurement of improved public transport services to and from the Airport'.

0.2.2 **Table ES 0.1** sets out the key public transport measures to meet this target and progress towards the measures.

Table ES 0.1: Key Public Transport Measures & Progress

Description	Target	Progress To-Date
Bristol City Centre	8 buses an hour	8 buses an hour
Weston-super-Mare	2 buses an hour	1 bus an hour
Bath and Devon	Develop services	2 buses an hour to Bath 1 bus an hour to Plymouth
South Wales	Develop service	1 coach every 2 hours to Cardiff
Public Transport Fund	Support for local bus services	Funds support the A5 (Yatton and Winscombe)

0.2.3 It is evident from Table ES 01 that despite not having yet reached 10 mppa, BAL has made significant progress towards these key public transport enhancements.

0.2.4 The 'Bristol Flyer' buses have recently been upgraded to double decker models with leather seats, additional luggage space, free wi-fi and USB sockets, representing a £3 million investment to enhance the service for passengers and employees.

0.2.5 BAL currently has plans in 2021 for the construction of the second phase of the existing multi-storey car park and the construction of the second multi-storey car park (with associated public transport interchange). Once constructed, the consented public transport interchange, which will be situated on top of the new multi-storey car park, will improve the quality of the passenger waiting environment. The public transport interchange will also be connected to the terminal building by a covered walkway to further improve the experience of passengers travelling via public transport.

0.2.6 BAL have recently opened the Silver Zone Staff Transport Hub, which provides 1,000 car parking spaces, of which 24 are specific car share spaces, 16 cycle parking spaces and a motorcycle parking area.

0.3 Policy & Implementation

0.3.1 The methodology set out within the TA incorporates and follows national, regional and local policies relevant to surface and air transport.

0.3.2 BAL has a well-developed approach to support and develop surface access at the Bristol Airport site. BAL remain committed to a comprehensive ASAS which was produced in 2012 and which is regularly reviewed, updated and shaped by the Bristol Airport Transport Forum (ATF). BAL will commit to produce a new and ambitious ASAS in conjunction with the ATF to be secured through a s 106 agreement as part of this application.

0.3.3 The ATF would be supported by a Steering Group, which meets regularly and includes representatives from BAL and NSC, that will identify a series of transport investment priorities designed to improve surface access at the Bristol Airport site.

0.4 Development Proposals

0.4.1 To support the proposed increase in passenger numbers and ensure safe and efficient passenger movement to and around the Bristol airport site, the Proposed Development

includes a number of new infrastructure components, improvements to existing facilities and a number of operational changes. The components of the Proposed Development related to transport are:

- Proposed A38 Travel Improvements

  - BAL is proposing to undertake a significant improvement of the A38 between the main airport access roundabout and West Lane to accommodate any additional traffic generated by an extra 2 mppa. This incorporates highway widening and junction capacity increases.

  - The existing footway / cycle track will remain on the eastern side of the A38, with a new footway provided north of the West Lane junction. An enhanced footway / cycle track will be provided on the western side of the road between the airport and Downside Road, with a footway provided for the section north of the Downside road tying in with the existing facility north of West Lane.

- Gyratory Road with Internal Surface Car Parking

  - To accommodate vehicle movements and improve flows within Bristol Airport and onto the A38, a two lane, one-way system, gyratory is proposed. This will provide additional capacity onto North Side Road and a connection between the A38 and the northern components of the airport, including the main terminal building, multi-storey car park and surface car parking areas. To the west, the gyratory road serves the airport servicing area and hotel.

  - The gyratory also includes a pedestrian footway along its southern edge, linking the main terminal building with the A38. A new zebra crossing will be located across the dual carriageway to the east.

- Multi Storey Car Park

  - A multi-storey car park (MSCP) to provide approximately 2,150 spaces over five levels will be constructed in the northern area of the Bristol Airport site adjacent to the current MSCP. The MSCP will occupy a footprint of around 1.12ha and be a maximum of 16m above Ordnance Datum (AOD) in height.

- Operational Extension to the Silver Zone Car Park (Phase 1)

  - The Silver Zone car park extension (Phase 1), located to the south of the fire training ground, is an area of approximately 7.8ha and comprises of 3,650 long-stay car parking spaces surfaced by a grid structure with grassed parking bays divided by asphalt isles and access roads. The site includes associated features such as temporary (seasonal) lighting, CCTV and services. Vehicles access the site via the A38 roundabout and report to the Silver Zone reception where cars are then valet parked.

- Extension to the Silver Zone Car Park (Phase 2)

  - An extension to the Silver Zone car park is proposed on agricultural land to the south of the existing Silver Zone car park extension (Phase 1). This extension will provide an additional circa 2,700 spaces for year-round use. These will be located immediately south of the existing Silver Zone car park extension area and will occupy a footprint of circa 5.1ha.

  - The public will not have access to the car park and instead cars will be valet parked by BAL employees from a central reception facility. This feature fundamentally informs the parking layout, which is anticipated to be block parking only.

0.5 Transport Assessment Methodology

0.5.1 The assessment establishes a comprehensive baseline understanding of the transport conditions and utilises this methodology to forecast the 10 mppa and 12 mppa scenarios.

0.5.2 This assessment uses 2017 as the baseline year for passenger throughput at the Bristol Airport site, drawing on the most recent up to date and validated full calendar years' worth of data. Baseline conditions around the Bristol Airport site have been established by desktop research, site visits, comprehensive traffic surveys, Bristol Airport commercial data and Civil Aviation Authority (CAA) data.

0.5.3 The following data sources have been used in the assessment:

- 24-hour classified turning counts carried out in July 2018 by Intelligent Data Collection Limited (ID);
- Collision data has been obtained and analysed for areas within NSC and BCC for the latest 5-year period;
- Employee Travel Survey (2017);
- CAA survey data (2015);
- CAA published data (2017);
- Bristol Airport ticket scanning data (2017);
- Bristol Airport published data;
- Bristol Airport commercial data (2017); and
- Bristol Airport existing flight schedule (Aug 2018).

0.5.4 Travel demand has been determined in the following categories:

- Air passengers;
- Employees; and
- Operational and Logistical movements.

0.5.5 The passenger numbers have been segmented based on origin /destination data from the CAA survey (2015). The areas closest to Bristol Airport have been segmented into the smallest zones to distinguish travel direction.

0.5.6 The 2015 CAA data has been used to understand how modal share varies by journey origin, based on an overall public transport modal share of 12.5% (as reported by BAL using bus ticket information).

0.5.7 In addition, to determine associated traffic volumes with passenger numbers, average group sizes recorded in the 2015 CAA survey have been used for each vehicular mode to understand vehicle occupancy rates.

0.5.8 For employee trips, the Employee Travel Survey (2017) has been used to understand employee catchments and modal share. It is important to note that the trends found within the analysis of the Employee Travel Survey has been applied to the total number of FTEs.

Operational and Logistical Movements

0.5.9 To quantify the effects of the Development Proposals on logistics movements at the Bristol Airport site, BAL have stated that these can be classified in to the following categories:

- Fuel Tankers;
- Car Rental Deliveries; and
- Operational Deliveries.

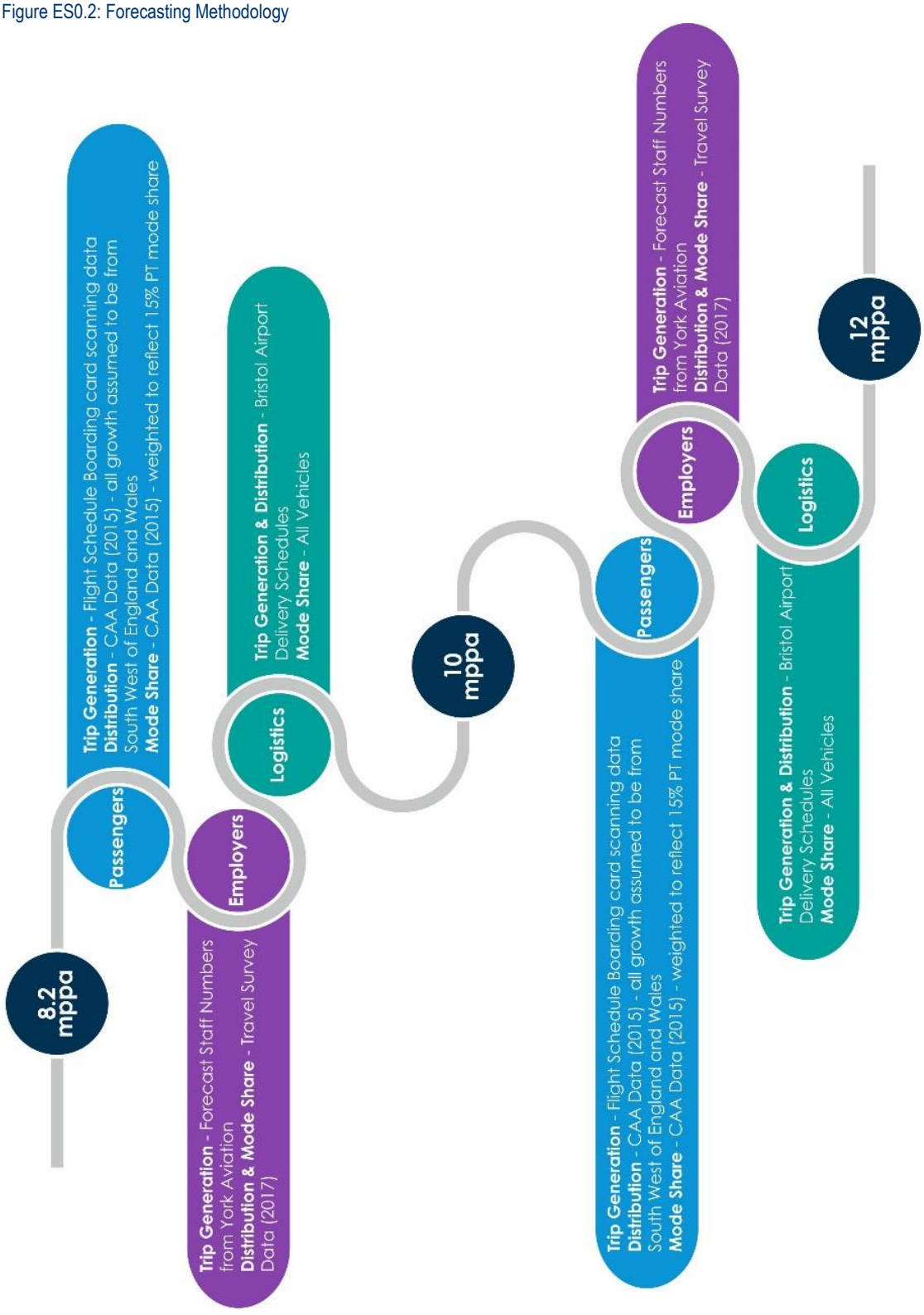
0.5.10 Hourly traffic movements have been derived from delivery and operations information provided by BAL and business partners.

Forecast Travel Demand Methodology

0.5.11 Based on the approach to establish a baseline understanding of the current travel demand associated with Bristol Airport in 2017 (at 8.2 mppa), the future travel demand associated with the 10 mppa and 12 mppa scenarios has been forecast.

0.5.12 **Figure ES.02** demonstrates the forecasting methodology and the relevant data sources used at each stage.

Figure ES0.2: Forecasting Methodology



0.5.13 As BAL have consent for growth up to 10 mppa, the assessment focuses on the transport implications of the growth of Bristol Airport between the 10 mppa and 12 mppa. BAL forecast to reach 12 mppa by the year 2026.

0.5.14 Passenger trips have been calculated using flight schedules and distributed using the most recent CAA data. The assessment in the TA is based on a forecast passenger PT mode share of 15% for the 10 mppa and 12 mppa scenarios. The distribution is based on an assumption that all the passengers associated with the 2 mppa have an origin / destination within the South West of England and Wales, at the same proportions recorded within the 2015 CAA survey.

0.5.15 Employee trips have been calculated using a peak estimation of Full Time Equivalents for August and the mode share and distribution calculated using the most recent Staff Travel Survey results from 2017.

0.5.16 For logistics, information on fuel, car rental and operations deliveries have been quantified by BAL and business partners, which have used to generate vehicle trip profiles for an average day.

0.5.17 The above has been carried out for the existing Bristol Airport operation, and for the consented 10 mppa and 12 mppa Development Proposals.

Assessment Year & Scenarios

0.5.18 The following scenarios have been assessed in the TA:

- 2026 reference case (10 mppa); and
- 2026 test case (12 mppa).

0.5.19 Growth rates have been applied to the recorded traffic volumes using the industry standard tool, TEMPro. To provide a robust assessment, the recorded airport-related traffic and background traffic has been scaled up to represent estimated traffic volumes in 2026. The trip generation associated with 12 mppa has been considered in addition to the forecast background traffic, which ensures that forecasting methodology is robust and accounts for potential variations over the peak week and month.

0.6 Existing Surface Access Options

0.6.1 The current surface access to the Bristol Airport site, including public transport services, walking and cycling, private car (parking and drop off), taxi and hire car have been reported in this TA.

0.6.2 Current bus and coach services that provide access to Bristol Airport are set out in **Table ES 0.2**.

Table ES 0.2: Bristol Airport Bus & Coach Services

Service	Route	Frequency	
		Mon-Sat (daytime)	Evening & Sunday
A1	Bristol Airport – Bristol	10 mins	15-20 mins, 60 mins night
A2	Bristol Airport – Bedminster – Bristol	30 mins	30 mins

Service	Route	Frequency	
		Mon-Sat (daytime)	Evening & Sunday
A3	Weston-super-Mare – Worle – Congresbury – Bristol Airport	60 mins	60 mins
A4	Bath – Saltford – Keynsham – Brislington – Hengrove – Bristol Airport	30 mins	30 mins
A5	Winford – Felton – Bristol Airport – Wrington then either Congresbury – Yatton or Churchill – Winscombe	10 journeys Mon-Fri	No service
U2	Clifton – Lulsgate – Upper Langford	60 mins Mon-Fri (term time only)	No service
216	Cardiff – Newport – Bristol Airport	120 mins	120 mins
404	London – Heathrow Airport – Chippenham – Bath – Bristol Airport – Exeter – Newton Abbot – Torbay – Totnes – Plymouth – Truro – Falmouth – Penzance	No service	1 journey night
Falcon	Bristol – Bristol Airport – Bridgwater – Taunton – Cullompton – Exeter – Plymouth	60 mins	120 mins eve, 60 mins Sun
135	Chew Stoke – Chew Magna – Winford – Lulsgate – Wrington – Congresbury – Weston-super-Mare	1 journey Fri	No service
672	Blagdon – Wrington – Lulsgate – Bedminster – Bristol	1-2 journeys	No service

0.6.3 Further consented enhancements related to surface access, such as the increased bus frequency to Weston-super-Mare and the passenger interchange hub connected to the terminal building via covered walkway will enhance passenger and employee accessibility and public transport experience.

0.6.4 There are no direct rail services to Bristol Airport, however there are several stations that are near, and accessible by bus services. The National Rail stations that provide access to Bristol Airport via bus services are set out in **Table ES 0.3**.

Table ES 0.3: National Rail Stations

Station	Distance (km)	Bus Route	Journey Time (off peak)	Bus Frequency (off peak)
Nailsea & Backwell	4.5	None	n/a	n/a
Yatton	8.0	A5	43 mins	Hourly
Parson Street	8.9	A2	14 mins	Half hourly
Bedminster	10.0	A2	21 mins	Half hourly
Bristol Temple Meads	11.4	A1	29 mins	Every 10 minutes
Worle	14.2	A3	28 mins	Hourly
Weston Milton	16.6	A3	35 mins	Hourly
Weston-super-Mare	18.8	A3	44 mins	Hourly
Bath Spa	24.6	A4	70 mins	Half Hourly

0.6.5 As is commonplace with airports across the UK, walking and cycling trips to/from the Bristol Airport site by passengers – many of which are carrying heavy luggage – are minimal. Employees are more likely to commute to the airport by walking and cycling trips, primarily those living in nearby villages. There are 13 villages/other settlements within a 5km radius of Bristol Airport.

0.6.6 Under a 5-year concession arrangement Arrow Cars has the sole right to private hire services at taking bookings at the Bristol Airport site. This does not exclude other operators who can set down or pick up pre-booked passengers from elsewhere; this is directed towards the drop-off and short stay car parks on site.

0.6.7 A total of 16,366 passenger car parking spaces are currently provided on the Bristol Airport site. Silver Zone Seasonal Car park provides 3,650 of these spaces for use between May and October. BAL have recently obtained consent (Ref: 18/P/4007/FULL) for year-round use of the seasonal car park for a temporary period of one year.

0.6.8 BAL have recently opened Silver Zone Employee Transport Hub. Employees use the frequent bus to travel between the transport hub and the existing administration building and terminal building on the northern side of the airport.

0.6.9 BAL does not provide any off-site parking provision. However, there are a number of off-site parking locations (many of which do not have planning permission), some of which are unauthorised and operate within the green belt.

0.6.10 Although it is not possible to quantify the number of unofficial parking areas, as they are not monitored by BAL, a data collection process has been established to monitor the parking areas going forwards.

0.6.11 Bristol Airport has a 113-space express drop off area located immediately in front of the terminal building. The area is designed to enable passenger drop off, with parking available for up to 10 minutes, which currently costs £1. The short stay car park is located opposite the terminal building and is designed as a vehicle waiting area for passenger arrivals / pick up.

0.7 Highway Network

0.7.1 Bristol Airport benefits from three vehicle access points from the highway network. The two primary access points are roundabouts with the A38. The third access to the Bristol Airport site is via Downside identified for operational and emergency use only.

0.7.2 The extent of the traffic survey area was agreed during the pre-application discussions.24-hour classified turning counts and associated queue lengths were recorded at 10 junctions and week-long Automatic Traffic Counts (ATCs) were undertaken on 16 links in July 2018. These surveys were undertaken in July 2018 prior to the school summer holidays.

0.7.3 The assessment year of 2026 has been agreed with key stakeholders. To present a robust assessment, the 2018 recorded traffic volumes flows, which captured both airport and non-airport traffic, scaled up to estimate 2026 traffic volumes using the industry standard tool TEMPro This approach has added an additional 4,021 daily vehicles directly associated with the Bristol Airport site to the 2018 recorded flows.

0.7.4 A personal injury collision (PIC) review has been conducted across agreed study areas in NSC and BCC. This assesses the most recent five-year study period and determines whether there are any integral highway safety issues where there are anticipated to be increase in vehicular, pedestrian and cycle movements associated with the Development Proposals. Analysis has concluded that there is not an existing highway safety concern which could be exacerbated by the development of Bristol Airport to accommodate 12 mppa.

0.8 Bristol Airport Forecast Travel Demand

0.8.1 Following the forecasting methodology detailed in **Section 5.3**, the additional trips between the 10 mppa and 12 mppa scenarios associated with passengers, employees and operations / logistics have been determined for an average weekday in the peak month of August.

0.8.2 The additional 2 mppa in passenger throughput and additional 700 FTEs employed at the Bristol Airport site relates to an increase in travel demand, which the TA has determined for an average week day in the peak month of August:

- The total two-way increase in person trips associated with the Development Proposals is 7,533.
- The total two-way increase in PT trips associated with the Development Proposals is 1,560.
- The total two-way increase in vehicles associated with the Development Proposals is 5,575.

0.9 Surface Access Improvement Opportunities

0.9.1 To ensure sustainable transport modes are encouraged, a new and ambitious ASAS will be developed as a result of ongoing Section 106 discussions and input from the Airport Transport Forum (ATF).

0.9.2 As highlighted in **Table ES 0.1**, BAL has made significant progress towards achieving the consented 10 mppa public transport strategy. The 12 mppa public transport strategy seeks to build on that progress to enhance accessibility and connectivity further.

0.9.3 The ASAS will set out:

- Proposed improvements to public transport services;
- Travel plan measures designed to encourage access to the Airport by sustainable modes; and
- Improvements to local highway infrastructure and on-site car parking provision.

0.9.4 **Table ES 0.4** summarises the key improvement opportunities that have been identified in TA.

Table ES 0.4: Key Surface Access Improvement Opportunities

Area	Opportunity
Public transport	Improvement to bus services and infrastructure on the A370 corridor
	Enhancement of Weston-super-Mare express bus link
	Extension of the public transport fund to support new routes and infrastructure enhancements
	Promotion and development of longer distance bus and coach services
Taxi and private hire	Consideration of Authorised Waiting Zone

Area	Opportunity
Walking and cycling	An enhanced footway / cycle track will be provided on the western side of the A38 between the airport and Downside Road, with a footway provided for the section north of the Downside road tying in with the existing facility north of West Lane.
Road access	Carriageway widening on A38 between north and south access junctions
	Improved capacity at A38/Downside Road junction
Drop offs	Dedicated drop-off zone with public transport interchange

0.10 Forecast Traffic Assignment

To assess the impact of the increase in patronage to 10 and 12 mppa at Bristol Airport, a basic buffer network has been developed within SATURN, the Bristol Airport Strategic Highway Tool (BASHT). 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 actual journey times at specific times of day.

0.10.1 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.

0.10.2 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).

0.10.3 **Table ES 0.5** 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 ES 0.5: 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	2,480	188	2,668	7.6%
		Airport Peak	2,984	531	3,515	17.8%
		PM	3,299	306	3,605	9.3%
2	A38 / Bristol Airport Southern Roundabout	AM	1,935	63	1,997	3.2%
		Airport Peak	1,774	181	1,955	10.2%
		PM	2,081	98	2,179	4.7%
3	Downside Road / Bristol Airport Service Access	AM	788	13	801	1.6%
		Airport Peak	527	27	555	5.1%
		PM	671	30	701	4.5%
4a	A38 / Downside Road	AM	2,908	154	3,062	5.3%
		Airport Peak	2,910	429	3,339	14.7%
		PM	3,496	254	3,750	7.3%
4b	A38 / West Lane	AM	2,587	141	2,728	5.4%
		Airport Peak	2,637	402	3,038	15.2%
		PM	3,078	224	3,302	7.3%
5	A38 / Barrow Lane	AM	2,572	115	2,687	4.5%
		Airport Peak	2,371	329	2,700	13.9%
		PM	2,893	182	3,075	6.3%
6	A38 / Barrow Street	AM	2,777	115	2,892	4.1%
		Airport Peak	2,459	329	2,788	13.4%
		PM	3,014	182	3,196	6.0%
7	A38 / A4174 SBL	AM	3,816	115	3,931	3.0%
		Airport Peak	3,137	329	3,466	10.5%
		PM	3,952	182	4,134	4.6%
8	A370 / A4174 SBL	AM	3,472	64	3,536	1.8%
		Airport Peak	2,962	185	3,147	6.2%
		PM	3,811	99	3,910	2.6%
9	A370 / Brockley Combe Road / Brockley Lane	AM	1,770	10	1,779	0.6%
		Airport Peak	1,402	27	1,429	1.9%
		PM	1,951	29	1,979	1.5%

Junction Ref No	Junction Name	Time Period	2026 Reference Case	Forecast Development Traffic	2026 Test Case	% Increase
10	A370 / Dark Lane / Station Road	AM	1,797	-	1,797	0.0%
		Airport Peak	1,602	-	1,602	0.0%
		PM	2,081	-	2,081	0.0%
11	A370 / Smallway	AM	2,251	13	2,264	0.6%
		Airport Peak	1,937	27	1,965	1.4%
		PM	2,509	30	2,539	1.2%
12	A370 / High Street	AM	2,433	-	2,433	0.0%
		Airport Peak	2,024	-	2,024	0.0%
		PM	2,633	-	2,633	0.0%
13	A38 / A368	AM	2,333	43	2,376	1.8%
		Airport Peak	1,892	124	2,016	6.5%
		PM	2,415	66	2,481	2.7%

0.10.4 The basis for determining which junctions within the study area require more detailed consideration has been described in **Section 10.3**.

0.10.5 In addition, M5 junctions 18 to 22 requested for consideration and numerical assessment by Highways England show minimal increases in vehicle movements, with a maximum increase of 119 two-way movements, which is in the Airport Peak (13:00-14:00) on Junction 22.

0.10.6 The vehicle increases shown at both junctions are unlikely to be considered 'severe' in the context of the NPPF (2018).

0.11 Residual Impacts

0.11.1 BAL are committed to developing an ambitious ASAS through Section 106 and ATF discussions. These proposals will include measures to improve legibility and safety to reduce congestion on the road network surrounding Bristol Airport.

0.11.2 Not without standing this, and based on the analysis presented in **Chapter 10** of the TA the following junctions would require more detailed consideration:

- Junction 1 A38 / Bristol Airport Northern Roundabout (existing and proposed layout);
- Junction 2 A38 / Bristol Airport Southern Roundabout;
- Junction 3 Downside Road / Bristol Airport Service Access;
- Junction 4a A38 / Downside Road (existing and proposed layout);
- Junction 4b A38 / West Lane (existing and proposed layout);

- Junction 5 A38 / Barrow Lane;
- Junction 6 A38 / Barrow Street; and
- Junction 7 A38 / A4174 SBL.

0.11.3 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).

0.11.4 As detailed in Chapter 11 of the TA the following junction are predicted to operate within capacity in each 2026 scenario assessed:

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

0.11.5 As part of the Development Proposal significant highway improvements at the following junctions have been identified:

- Junction 1 A38 / Bristol Airport Northern Roundabout;
- Junction 4a A38 / Downside Road; and
- Junction 4b A38 / West Lane.

0.11.6 As detailed in Chapter 11 of the TA the improved junction layouts are predicted to operate within capacity in each 2026 scenario assessed.

0.12 Construction

0.12.1 Vehicle generation estimates for each phase of construction has been provided by QuantumCLS Ltd.

0.12.2 The predicted peak construction phase is predicted to result in substantially lower traffic generation than the operational vehicle generation associated with 12mppa. Given the expected lesser effect on driver delay detailed modelling of the construction phase has not been undertaken.

0.12.3 Construction of the highway improvements associated with the Proposed Development at the A38 junctions with Downside Road and West Lane is predicted to result in short term localised delay during the completion of the works. Confirmation of the traffic management associated with these works will be confirmed during the detailed construction planning and the temporary nature of the works mean it is unlikely to have a significant effect.

0.12.4 It is considered that there are unlikely to be any significant effects on severance, fear and intimidation, pedestrian delay and amenity, driver delay and collision or safety during the construction phases.

0.13 Summary & Conclusions

0.13.1 This section provides the main summary and conclusions within the TA (**Chapter 13**) as a useful synopsis of the more extensive TA document.

0.13.2 Analysis of the policy context concludes that the proposed development is consistent with and supports policy aims and objectives at a national, regional and local level. The principle of the expansion of the operation at Bristol Airport is supported at both a national regional level.

0.13.3 An ambitious and updated ASAS will be developed in partnership with the ATF. BAL is committed to continuing to promote more sustainable means of surface access. An updated ASAS will achieve this based on the success of similar recent investments. For example, the recent public transport investment by BAL has increased the frequency of the Airport Flyer to Bristol City Centre to 8 buses an hour, in upgraded double decker buses.

0.13.4 An assessment year of 2026 has been evaluated, since this is the point at which passenger numbers are forecast to reach 12 mppa, subject to the Development Proposals gaining planning consent. The July 2018 traffic surveys, which informs the established baseline traffic conditions, includes airport and non-airport traffic and relates to estimated passenger numbers of 8.6 mppa. The traffic volumes within the survey have been factored up to estimate the future background traffic conditions in the year 2026. A separate trip generation exercise has been carried out which estimates the transport effects of the increase in passengers from the 8.2 mppa scenario to the 10 and 12 mppa. Therefore, the assessment is robust as the background traffic volumes scaled up to the year 2026 include airport-related traffic equivalent to ~1.4 mppa.

0.13.5 There will be a continued growth in demand for bus and coach services to and from the Bristol Airport site for both passengers and employees. BAL has a successful track record in facilitating and promoting additional or new bus and coach services to meet demand as it arises through the new and ambitious ASAS.

0.13.6 The TA has identified a number of mitigation measures which will be implemented or continued in order to offset or reduce the impacts of growth to 12 mppa. Such measures include highway improvements, on-site parking improvements as well as commitments to public transport and sustainable transport improvements.

0.13.7 Overall, this TA demonstrates that the Development Proposals will not have a significant adverse impact on the operation of the wider local or strategic highway network even allowing for the robust traffic flow forecast approach, and that the junction improvements proposed will provide a significant improvement in the local area compared with the currently permitted scheme.

0.13.8 In addition, significant improvements are being made for public transport provision and a comprehensive package of further improvements is being explored through the ATF and ASAS.

0.13.9 The application is therefore considered to be policy compliant and the measures proposed will more than mitigate any potentially adverse impacts compared with the permitted development.

1 Introduction

1.1 Overview

1.1.1 This Transport Assessment (TA) supports a planning application for the development by Bristol Airport Limited (BAL) to North Somerset Council (NSC). The planning application seeks permission to expand Bristol Airport beyond the permitted passenger cap of 10 million passengers per annum (mppa) to 12 mppa.

1.1.2 Bristol Airport is located on the A38, approximately 11km south-west of Bristol city centre and within the local authority administrative area of NSC. Operated by BAL, it is the principal airport and main international gateway for the South West of England and South Wales.

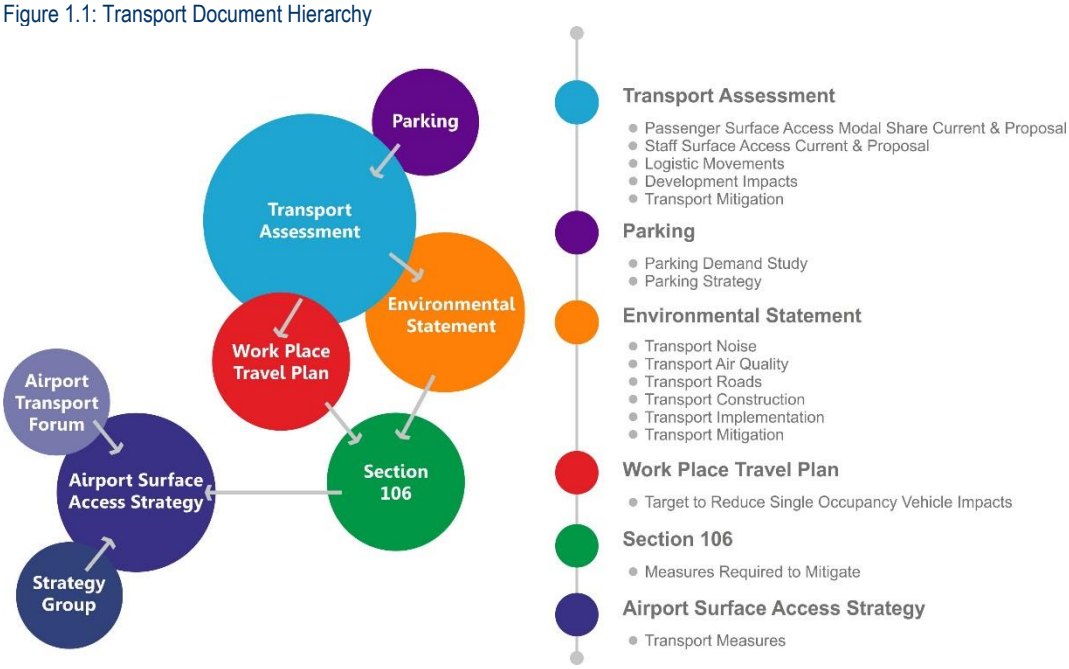
1.1.3 In 2017, Bristol Airport handled over 8.2 million passengers making it the ninth busiest UK airport and the third largest regional airport in England. Leading low cost, charter and full service airlines currently fly from Bristol Airport to over 120 destinations across 34 countries.

1.1.4 BAL was granted outline planning permission by NSC on 16 February 2011 for the expansion of Bristol Airport to handle 10 mppa. Between 2010 and 2017, investment totalling over £160 million has been made in a significant upgrade of facilities and infrastructure at Bristol Airport and passenger numbers have grown by over 40%, from 5.8 mppa to 8.2 mppa. BAL currently forecasts that passenger demand will reach 10 mppa by 2021, beyond which passenger traffic is projected to rise further to 15 mppa by the mid-2030s and to 20 mppa by the mid-2040s.

1.1.5 BAL currently forecast that passenger demand will reach 10 mppa by 2021, beyond which passenger throughput is projected to rise to 12 mppa by 2026.

1.1.6 This TA should be read in conjunction with the suite of planning application documents submitted as part of the application, including: Workplace Travel Plan (WTP), Parking Demand Study, Parking Strategy Planning Statement and Environmental Impact Assessment (EIA). BAL also commits to produce a new and ambitious ASAS secured through a S 106 agreement. **Figure 1.1** illustrates how the transport documents link together.

Figure 1.1: Transport Document Hierarchy



1.2 Background

1.2.1 BAL was granted outline planning permission (Ref 09/P/1020/OT2) by NSC on the 16th February 2011 for the expansion of Bristol Airport to accommodate 10 mppa. Between 2010 and 2017, investment totalling over £160 million has been made to upgrade of facilities and infrastructure at Bristol Airport. During this time, passenger numbers have grown by over 40% from 5.8 mppa to 8.2 mppa. BAL forecast that passenger demand will reach 10 mppa by 2021.

1.2.2 The 10 mppa permission includes the following conditions with regards to passenger throughput at the Bristol Airport site:

- *'Condition 65: The passenger throughput at Bristol International Airport shall not exceed 10 million passengers in any 12-month period (to be taken from 1st January to 31st December in any calendar year – unless a different 12-month start and end date is agreed) unless separate planning permission is granted'.*

1.2.3 Section 2.5 provides further information on the consented 10 mppa scheme.

1.2.4 To ensure that Bristol Airport can continue to meet passenger demand both now and into the future, BAL is currently preparing a new Master Plan. The Master Plan will set out a strategy for phased growth to meet the forecast level of passenger demand by the mid-2040s and in doing so, it will ensure that Bristol Airport contributes fully to enhancing national airport capacity, delivers increased connectivity and supports economic prosperity in the South West and South Wales regions.

1.2.5 The challenges and opportunities Bristol Airport have identified through the consultation process have been set out in an initial discussion document, 'Master Plan – Planning for the Future', which was subject to public consultation between November 2017 and January 2018. A further public consultation on the emerging proposals relating to the first phase of growth, including the proposal to grow to 12 mppa as the first phase of the Master Plan, took place between May and July 2018 with publication of Draft Master Plan expected in the winter 2018/19.

1.2.6 As part of an approach to meeting future passenger demand to ensure that projected passenger growth beyond 2021 can be accommodated, BAL is seeking planning consent for an initial phase of growth beyond the current cap of 10 mppa to 12 mppa.

1.3 Pre-Application Discussions & Consultation

1.3.1 The scope, methodology and assessment contained and presented within this TA and Appendices have been determined through scoping and engagement with key stakeholders including NSC, Bristol City Council (BCC), Bath and North East Somerset (BaNES), Highways England (HE) and Somerset County Council (SCC) as part of a formal pre-application process.

1.3.2 The approach and methodology has been followed to ensure that it accords as far as possible with relevant national, regional and local guidance and policy.

1.3.3 A TA Scoping Report was submitted to the key stakeholders and was formally commented on by officers. In addition to the TA Scoping Report, a further Technical Note was submitted which sought to address comments raised by officers. It was agreed to base the TA on a core test related to a forecast passenger public transport mode share of 15%, which would be applied to the increase in passengers from 8.2 mppa (2017) to 10 mppa and 12 mppa. It has also been accepted that post-submission, sensitivity testing regarding the forecast passenger modal share would be undertaken and submitted for consideration as part of any officer recommendations on the application. The report, comments and responses are contained within **Appendix B**.

2 The Bristol Airport Site

2.1 Introduction

2.1.1 This chapter provides an overview of the Bristol Airport site, including the surrounding area, both in its existing state and the future consented 10 mppa layouts.

2.2 Site Location

2.2.1 Bristol Airport is situated on a ridge of high ground called Broadfield Down, with the A370 Bristol to Weston-super-Mare 4km to the north and the M5 motorway 11km to the west of the site. The A38 carriageway is directly adjacent to the airport, on its eastern extent. **Figure 2.1** illustrates the Bristol Airport site in relation to the wider highway network.

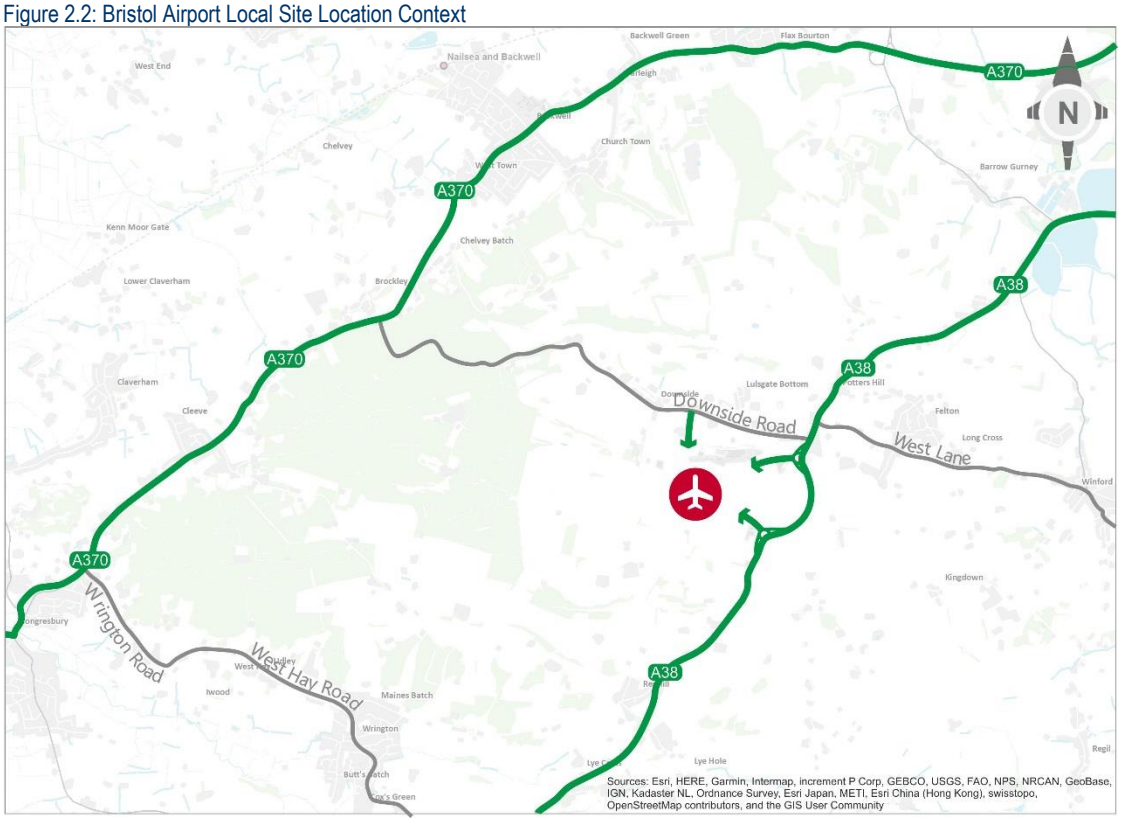
Figure 2.1: Bristol Airport Wider Site Location Context

2.2.2 The area surrounding Bristol Airport is predominately open, undulating countryside. Located within National Character Area (NCA) 118: The Bristol, Avon Valleys and Ridges, the area is characterised by alternating ridges and broad valleys, with steep wooded slopes and open farmland. Extensive wooded areas are located to the west of the site and form a key feature of the wider landscape. These wooded areas are partially designated as ancient and semi natural woodland or ancient re-planted woodland. Goblin Combe, north of Cleeve Hill road, is designated as a Site of Special Scientific Interest (SSSI) and nature reserve. King's Wood, directly south of Cleeve Hill road, is also designated as a SSSI. Beyond the woodland lie the villages of Claverham, Yatton and Congresbury, approximately 5km west of Bristol Airport.

2.3 The Existing Bristol Airport Site

2.3.1 Bristol Airport is situated immediately adjacent to the A38, Bristol to Bridgwater Road, with two roundabout junctions providing access to the airport site. The site location including existing facilities and infrastructure is shown in **Figure 2.2**.

Figure 2.2: Bristol Airport Local Site Location Context



2.4 Consented 10 mppa Public Transport Strategy

2.4.1 As part of the 10 mppa consent, an ambitious passenger public transport mode share target of 15% was agreed. To meet this target, the following key public transport enhancements were agreed at the time of consent:

- 8 buses an hour to Bristol City Centre;
- 2 buses an hour to Weston-super-Mare;
- Develop proposals for services to Bath and Devon;
- Develop proposals for services to South Wales; and
- Set up a public transport fund to support local services.

2.4.2 Despite not having yet reached 10 mppa, BAL has made significant progress towards these key public transport enhancements. To-date, the following measures have been delivered:

- 8 buses an hour to Bristol City Centre;
- 1 bus an hour to Weston-super-Mare;
- 2 buses an hour to Bath;
- 1 bus an hour to Plymouth;
- 1 coach every 2 hours to Cardiff; and

- Public transport fund set up and financially supports the A5 (Yatton and Winscombe) local bus service.

2.4.3 Furthermore, the 'Bristol Flyer' buses have recently been upgraded to double decker models with leather seats, additional luggage space, free wi-fi and USB sockets.

2.4.4 The 10 mppa consent also includes a dedicated public transport interchange, which will be situated on top of the new multi-storey car park. This interchange will be connected to the terminal building by a covered walkway.

2.5 Consented 10 mppa Parking

2.5.1 As part of the 10 mppa consent BAL have permission to provide to c.18,400 parking spaces at the Bristol Airport site.

2.5.2 BAL are currently constructing the second phase of the first multi storey consented car park, which on completion will provide 1.878 parking spaces in total

2.5.3 BAL will complete construction of a new Administration building on the southern side of the Bristol Airport site in Summer 2019. Prior to the new administration building opening, employees and visitors park in the recently opened Silver Zone employee transport hub. Employees use the frequent shuttle bus to travel between the employee transport hub and the existing administration building and terminal building on the northern side of the airport.

3 Policy Context

3.1 Introduction

3.1.1 This TA incorporates the principles and best practices of key national, regional and local policy documents relevant to transport and air travel for the Bristol Airport site. The methodology uses a best practice approach based on these documents and a commitment to encourage sustainable travel.

3.1.2 The policy documents reviewed are as follows:

- National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, July 2018);
- The Future of Air Transport White Paper (2003);
- The emerging Joint Spatial Plan (West of England, November 2017);
- Joint Transport Study (West of England, October 2017);
- Joint Local Transport Plan 3: 2011 - 2026 (West of England Partnership, March 2011);
- North Somerset Core Strategy (North Somerset Council, January 2017); and
- North Somerset Replacement Local Plan Written Statement (2007).
- JLTP 4

3.1.3 The full summary of relevant national, regional and local policy considerations for this assessment is contained in **Appendix C**.

4 Development Proposals

4.1 Introduction

4.1.1 This chapter details the transport related Development Proposals at Bristol Airport and focuses on the parameters considered most relevant to transport appraisal. Chapter 2 of the Environmental Statement contains the full Proposed Development description.

4.2 Development Proposals Overview

4.2.1 To support the proposed increase in passenger numbers and ensure safe and efficient passenger movement to and around the airport site, the Development Proposals include a number of new infrastructure components, improvements to existing facilities and a number of operational changes. The components of the Proposed Development related to transport are described in the following sections.

4.3 Proposed A38 Highway Improvements

4.3.1 BAL is proposing to undertake a significant improvement of the A38 between the main airport access roundabout and West Lane to accommodate any additional traffic generated by an extra 2 mppa. The main carriageway over this length will be increased in width to allow two through lanes to be provided on each carriageway. The widening will be mainly undertaken on the western side of the road providing an overall width of 16m. The improvements taper back to join the existing carriageway width some 130m beyond West Lane. A dedicated lane will be provided for northbound traffic turning left into Downside Road, along with a right turn lane into West Lane. The centre of the carriageway will be hatched or have traffic islands in order to separate traffic flows. Downside Road will be widened to two lanes for 80m prior to the junction with the A38 and new access provided into the Airport Tavern car park.

4.3.2 The junction with Downside Road will remain controlled by traffic signals but will be linked to new signals controlling the West Lane junction. The junctions will monitor traffic approaching the junctions and using MOVA will adjust the timings to enhance traffic flow and reduce queuing. Traffic will only be able to turn left out of West Lane, while traffic travelling southbound will remain unable to turn right into Downside Road and will continue to U turn at the main airport junction with the A38.

4.3.3 The existing footway / cycle track will remain on the eastern side of the A38, with a new footway provided north of the West Lane junction. An enhanced footway / cycle track will be provided on the western side of the road between the airport and Downside Road, with a footway provided for the section north of the Downside road tying in with the existing facility north of West Lane. Pedestrian and cycle facilities will be provided within the Downside Road junction and the design will incorporate drop kerbs. Bus stops will be maintained albeit adjusted for the new alignment. Access will also be maintained to the footpath which runs along the western boundary of the Airport Tavern land towards Lulsgate Bottom.

4.3.4 The proposed improvements are in keeping with the current character of the area. The road will be constructed with an asphalt wearing course and antiskid surfacing will be applied on the approaches to the signal stop signs. All traffic signs, signals and markings will be provided in accordance with highway design standards applicable to the location and type of road. The area will continue to have street lighting in line with NSC standards and local operations including diming at night. Surface water drainage will be enhanced to accommodate the effects of the widened carriageway.

4.3.5 The A38 currently has a verge north of West Lane and the Common has spread onto part of the footway to the east before Lilac Cottages. The proposed improvement seeks to maintain a

verge to the north of west. The nature of the proposed improvement means that there is limited scope for additional landscaping.

4.3.6 The junction designs, associated drawings, Stage 1 Road Safety Audit (RSA), RSA Designer's Response and Walking, Cycling and Horse Riding Assessment and Review (WCHAR) relating to the proposed A38 highway improvements are contained under **Appendix D**.

4.4 Gyratory Road with Internal Surface Car Parking

4.4.1 To accommodate vehicle movements and improve flows within Bristol Airport and onto the A38, a two lane, one-way system, gyratory is proposed. This will provide additional capacity onto North Side Road and a connection between the A38 and the northern components of the airport, including the main terminal building, multi-storey car park and surface car parking areas. To the west, the gyratory road serves the airport servicing area and hotel.

4.4.2 The new road is approximately 0.7km long, with a 35m inscribed circle diameter at either end. The circulating carriageway is approximately 7.5m wide on straight sections, widening to 8m on the circulating sections. In total, it comprises of six arms on the outer edge, with a separate entrance and exit arm within the gyratory itself to serve the central parking area.

4.4.3 The gyratory also includes a pedestrian footway along its southern edge, linking the main terminal building with the A38. A new zebra crossing will be located across the dual carriageway to the east.

4.4.4 Within the gyratory, replacement car parking is proposed for approximately 360 vehicles, with a lay-by for buses to collect users and transport them to the terminal building. This will comprise of impermeable tarmac/asphalt access roads and predominantly permeable crushed stone parking bays, similar to existing. There will additionally be changes to the layout of existing car parking areas to the north of the gyratory. The horizontal and vertical illuminance in this area will be retained.

4.4.5 The new circular route will be constructed in a series of phases to ensure vehicle circulation throughout the works are managed to minimise disturbance. All improvements are in keeping with the current character of the area. The road will be constructed with an asphalt wearing course and antiskid surfacing will be applied on the approaches to the zebra crossing. All traffic signs and markings will be provided in accordance with highway design standards applicable to the location and type of road.

4.4.6 At present, North Side Road has a hedgerow that runs along the majority of the both sides of the carriageway. The proposed improvement seeks to maintain a verge to the south as much as possible. Due to the nature of the proposed improvement, the northern hedges and trees will need to be removed and replaced within the new gyratory road. Within the design of the new gyratory road, there are areas where it is possible to re-provide tree and hedges to improve the aesthetics of the proposals.

Multi Storey Car Park

4.4.7 A multi-storey car park (MSCP) to provide approximately 2,150 spaces over five levels will be constructed in the northern area of the Bristol Airport site adjacent to the current MSCP. The MSCP will occupy a footprint of around 1.12ha and be a maximum of 16m above Ordnance Datum (AOD) in height.

4.4.8 Vehicular access to the MSCP will be directly from the internal Bristol Airport spine road via a roofed entrance/exit plaza at ground level, with access to the other upper car park decks via separate 'up' and 'down' ramps. The car park will have a simple circulatory layout for vehicles and a protected pedestrian walkway leading to a central vertical circulation core. On the top deck level, this central circulation core accesses a retail unit and onward travel centre leading to a glazed bridge linking with the terminal pedestrian forecourt. This bridge link terminates at

a feature canopy, which will house payment machines on the forecourt and covered walkways to the east and west.

4.4.9 The building structure will be based upon a modular steel frame system, with 16.1m spans to match through with MSCP Phase 1. The top deck of the MSCP will align with the top deck of MSCP Phase 1. Wind turbines will also be installed on the top deck, the mast height reaching approximately 12m, extending to 15m when accounting for the rotors.

4.4.10 In contrast to the white metal and green glass aesthetic of the main terminal building, the MSCP will incorporate perforated PPC panels finished with muted and tonal colours. Lapped timber effect planks will encase the stair cores and will also be placed intermittently along the ramps.

Operational Extension to the Silver Zone Car Park (Phase 1)

4.4.11 The Silver Zone car park extension (Phase 1), located to the south of the fire training ground, is an area of approximately 7.8ha and comprises of 3,650 long-stay car parking spaces surfaced by a grid structure with grassed parking bays divided by asphalt isles and access roads. The site includes associated features such as temporary (seasonal) lighting, CCTV and services. Vehicles access the site via the A38 roundabout and report to the Silver Zone reception where cars are then valet parked.

4.4.12 Currently, use of the Silver Zone car park extension (Phase 1) is prohibited outside of the period 1 May to 31 October. To ensure that there is sufficient provision in meeting increased demand for long term car parking, BAL is seeking to remove this restriction. This would allow for year-round use of the car park and provide additional car parking capacity.

4.4.13 It should be noted that no additional or new development is required to facilitate the year-round use of the car park. However, changes to the operation of the car park will require the provision of permanent (fixed) lighting and CCTV.

Extension to the Silver Zone Car Park (Phase 2)

4.4.14 An extension to the Silver Zone car park is proposed on agricultural land to the south of the existing Silver Zone car park extension (Phase 1). This extension will provide an additional circa 2,700 spaces for year-round use. These will be located immediately south of the existing Silver Zone car park extension area and will occupy a footprint of circa 5.1ha.

4.4.15 The public will not have access to the car park and instead cars will be valet parked by BAL employees from a central reception facility. This feature fundamentally informs the parking layout, which is anticipated to be block parking only.

4.4.16 The layout of the car park will be similar to that of Phase 1. No additional road structure is required since access will be via the existing Silver Zone car park entrance / exit facility and through Phase 1 of the Silver Zone car park extension.

4.4.17 Surfacing of the car park will comprise of two finishes, an asphalt access road and aisles and grass parking bays forming from a grid paving system infilled with topsoil and grass seed. Lighting will be designed to minimise light spill, glare and sky glow.

4.5 Workplace Travel Plan

4.5.1 An updated Workplace Travel Plan has also been produced and submitted as part of the suite of planning application documents and should be read in conjunction with this report.

4.5.2 As set out within the NPPF, Travel Plans provide a key tool to facilitate and exploit opportunities for the use of sustainable modes for movement of goods and people.

4.5.3 BAL first launched its Workplace Travel Plan in 2006. Since then the number of employees working at the Bristol Airport site has increased and significant progress has been made towards targets to reduce reliance on the car for journeys to work, in particular for people travelling alone by car. Considering the significant increase in employee numbers since the launch of the first Workplace Travel Plan and the wide variety of employers now based at the Airport, improving the levels of sustainable travel among employees has become increasingly important.

5 Transport Assessment Methodology

5.1 Introduction

5.1.1 This chapter sets out the methodology and data sources used for the TA, and summarises the baseline and future assessment years.

5.2 Baseline Transport Conditions

5.2.1 In order to forecast the transport implications associated with the development proposals, a comprehensive baseline understanding of the transport conditions has been established.

5.2.2 This assessment uses 2017 as the baseline year for passenger throughput at the Bristol Airport site, drawing on the most recent up to date and validated full calendar years' worth of data. Baseline conditions around the Bristol Airport site have been established by desktop research, site visits, comprehensive traffic surveys, Bristol Airport commercial data and Civil Aviation Authority (CAA) data.

5.2.3 The following data sources have been used in the assessment:

- 24-hour classified turning counts carried out in July 2018 by Intelligent Data Collection Limited (ID);
- Collision data has been obtained and analysed for areas within NSC and BCC for the latest 5-year period;
- Employee Travel Survey (2017)
- CAA survey data (2015)
- CAA published data (2017)
- Bristol Airport ticket scanning data (2017)
- Bristol Airport published data
- Bristol Airport commercial data (2017)

5.2.4 This section provides a summary of the approach used to determine the baseline travel demand in the following categories:

- Air passengers;
- Employees; and
- Operational and Logistical movements

5.2.5 **Table 5.1** sets out the recorded number of passengers per month at Bristol Airport in 2017. These numbers have been extracted from the CAA monthly data reports for 2017.

Table 5.1: 2017 Bristol Airport Passenger Profile

Month	Passengers per Month	Passenger % per Month	Average Day in Month
January	494,821	6%	15,962
February	512,018	6%	18,286

Month	Passengers per Month	Passenger % per Month	Average Day in Month
March	594,481	7%	19,177
April	680,200	8%	22,673
May	766,081	9%	24,712
June	825,952	10%	27,532
July	854,999	10%	27,581
August	**887,485**	**11%**	**28,629**
September	817,823	10%	27,261
October	754,998	9%	24,355
November	513,064	6%	17,102
December	530,708	6%	17,120
Year	**8,232,628**	**100%**	**22,555**

5.2.6 August 2017 was the busiest month at Bristol Airport, with an average of 28,629 passengers per day. Therefore, the travel demand associated with an average weekday during this month has been assessed.

Passenger Catchments

5.2.7 **Table 5.2** provides the number of passengers per origin / destination passing through Bristol Airport on an average weekday in August 2017. Based on the CAA passenger survey data 96% of passengers at Bristol Airport have an origin or destination in the South West of England or Wales.

Table 5.2: 2017 Passenger Origin / Destination (8.2 mppa)

Region	Passenger Percentage	Passengers per Day in August
East Midlands	0.1%	38
East of England	0.1%	41
North East	0.0%	6
North West	0.2%	48
Scotland	0.2%	61
South East	1.3%	366
South West	77.2%	22,101
Wales	18.8%	5,368
West Midlands	2.0%	564
Yorkshire	0.1%	19
Total	**100%**	**28,613**

Note: 16 responses indicating Origin / Destination was Ireland or Northern Ireland have been removed to focus on surface access only.

5.2.8 **Table 5.3** presents the regional catchments for the South West of England based on the information contained in the 2015 CAA passenger survey. It is worth noting that the CAA survey reports the following Local Authorities as Somerset:

- North Somerset;
- Bath and North East Somerset;
- Mendip District;
- Sedgemoor District;
- South Somerset;
- Taunton Deane and
- West Somerset.

Table 5.3: South West Daily Passenger Origin / Destination for the Peak Month of August (8. 2mppa)

South West Region	Passenger Percentage	Passenger per Day in August
City of Bristol	31.4%	6,942
Cornwall	5.6%	1,236
Devon	17.0%	3,756
Dorset	2.7%	605
Gloucestershire	8.9%	1,975
Somerset	26.3%	5,817
Wiltshire	8.0%	1,768
Total	**100%**	**22,101**

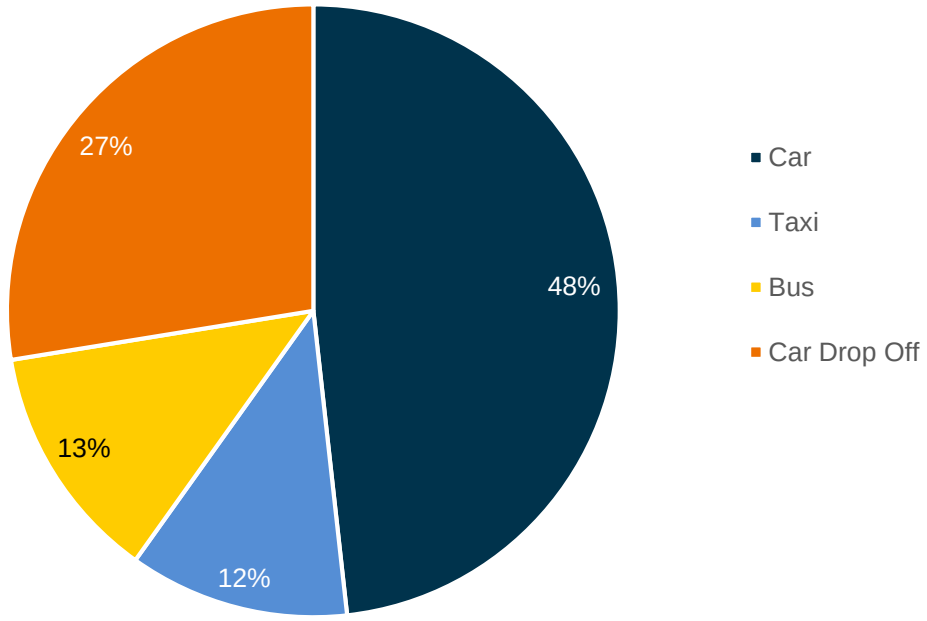
Mode Share

5.2.9 The 2015 CAA passenger survey provides data on passenger's mode of travel to and from Bristol Airport.

5.2.10 Bristol Airport has historically monitored public transport modal share using ticket information for the Bristol Flyer bus service and some third-party bus and coach operators. The 2017 ticket information indicates that the current public transport patronage is 12.5%. Therefore, the CAA data has been used to understand how modal share varies by journey origin, but then factored to an overall public transport modal share of 12.5%.

5.2.11 The overall existing passenger modal share is provided in **Figure 5.1**.

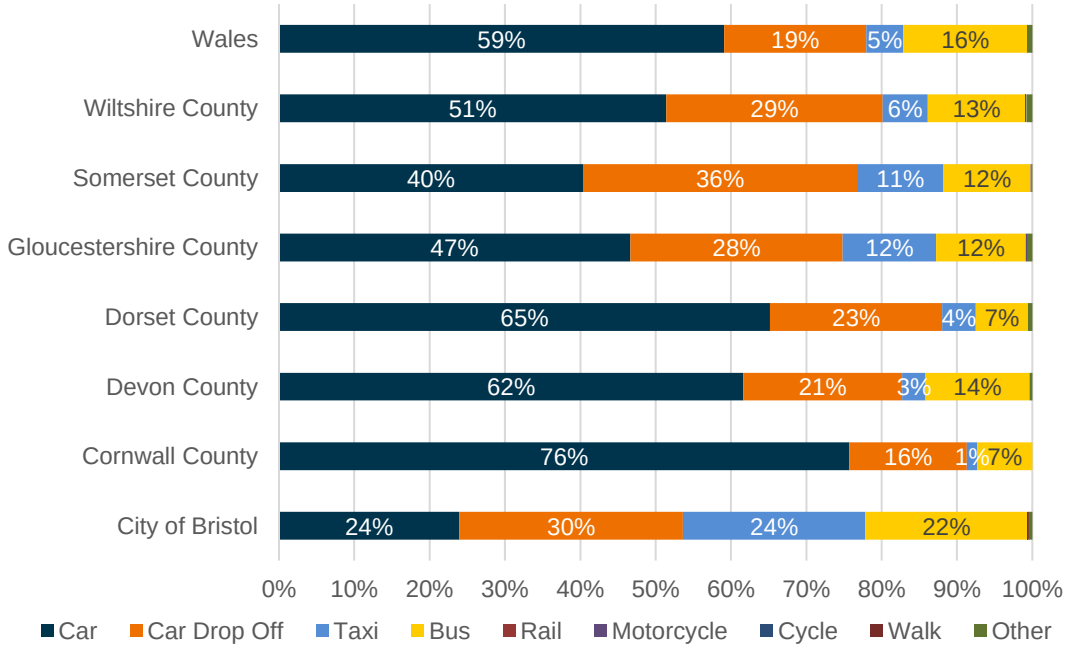
Figure 5.1: Existing Passenger Modal Share



Note: percentages have been rounded to nearest whole number

5.2.12 The assessment methodology has considered the modal share by origin / destination by segmenting the surrounding area into zones. The modal share for each catchment has been applied to the trip generation. **Figure 5.2** details the passenger modal share by origin destination for areas in the South West of England and Wales. It is evident that investment into PT services greatly affects modal share, as the PT modal share of passengers travelling from the City of Bristol is almost equal to that of single occupancy car.

Figure 5.2: Existing Passenger Modal Share by Catchment



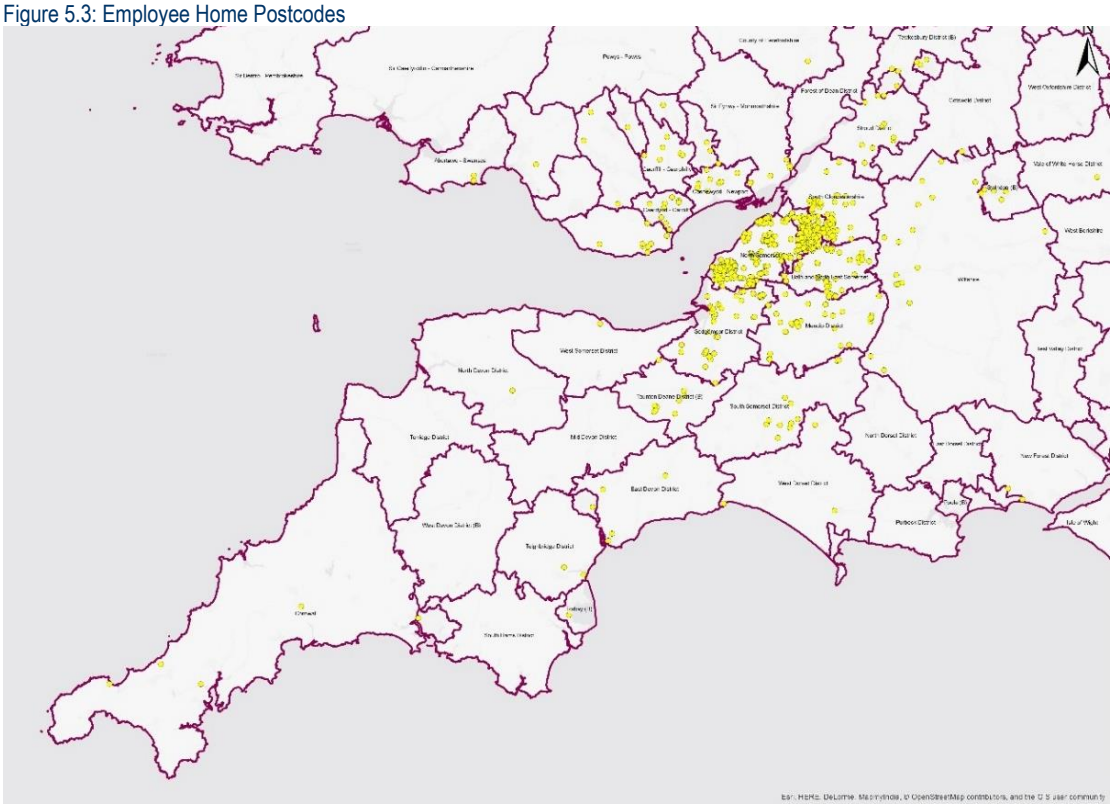
5.2.13 In addition, to determine associated traffic volumes with passenger numbers, average group sizes recorded in the 2015 CAA survey have been used for each vehicular mode to understand vehicle occupancy rates.

5.2.14 The average occupancy rates over the year have been used to ensure the assessment is robust and accounts for variation in trends, as the CAA data indicates that car occupancy rates are much higher during August, which would relate to less estimated vehicle trips.

Employee Catchments

5.2.15 Currently 3,459 Full Time Equivalent (FTE) employees are employed at the Bristol Airport site, the majority working shift patterns. BAL carried out an Employee Travel Survey to update the Workplace Travel Plan (WTP) for the Bristol Airport site in 2017, which had a response rate of 828 employees - representing 24% of the FTE figure. **Figure 5.3** shows the home postcodes of employees at the Bristol Airport site. It is important to note that the trends found within the analysis of the Employee Travel Survey has been applied to the total number of FTEs.

Figure 5.3: Employee Home Postcodes



5.2.16 **Table 5.4** presents the percentage of FTEs home postcodes by area.

Table 5.4: Existing Employee Catchments

Local Authority	%
North Somerset	33%
City of Bristol	26%
South Gloucestershire	11%
Bath & North East Somerset	7%
Sedgemoor District	7%
Mendip District	4%
Wiltshire	2%
South Somerset District	1%
Caerdydd - Cardiff	1%

Local Authority	%
Casnewydd - Newport	1%
Stroud District	1%
Taunton Deane District	1%
Sir Fynwy - Monmouthshire	1%
Bro Morgannwg - the Vale of Glamorgan	1%
Caerffili - Caerphilly	1%
Swindon	1%
Total	**100%**

5.2.17 A total of 55% of employees have a home postcode in North Somerset or the City of Bristol.

5.2.18 **Table 5.5** details the distribution of employees within North Somerset.

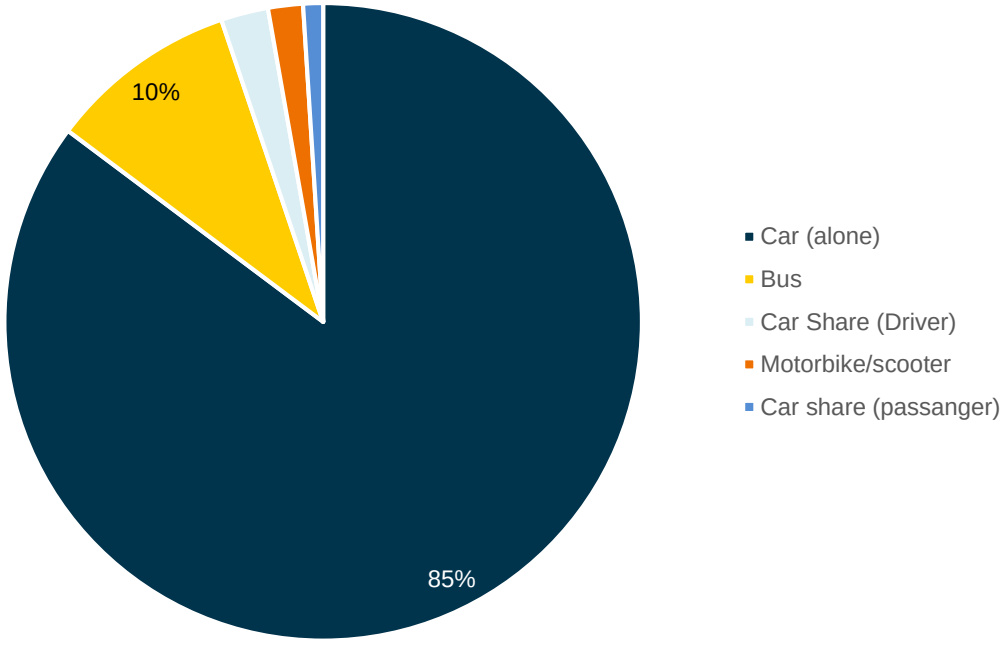
Table 5.5: Employee Distribution within North Somerset

North Somerset	Percentage
Weston-super-Mare	54%
Portishead	16%
Clevedon	4%
Nailsea	14%
Winscombe	5%
Yatton	7%
Total	**100%**

Employee Mode Share

5.2.19 The 2017 Employee Travel survey has also recorded employee mode share on an average workday, which is provided in **Figure 5.4**.

Figure 5.4: Overall Employee Mode Share



5.2.20 As has been carried out for the passenger trip generation, a mode share has been considered by each catchment. **Table 5.6** details the employee mode share by origin / destination.

Table 5.6: Employee Modal Share by Origin / Destination

	Bus	Car (alone)	Car share (driver)	Car share (passenger)	Cycle	Motorbike/scooter	Employees minibus	Walk
North Somerset	9%	83%	4%	0%	1%	2%	0%	0%
City of Bristol	13%	80%	2%	2%	0%	1%	0%	1%
South Gloucestershire	9%	86%	1%	0%	0%	1%	3%	0%
Bath and North East Somerset	13%	83%	0%	2%	0%	0%	0%	2%
Sedgemoor District	2%	89%	4%	2%	0%	4%	0%	0%
Mendip District	3%	88%	3%	3%	0%	3%	0%	0%
Wiltshire	12%	76%	6%	0%	0%	6%	0%	0%
South Somerset district	0%	100%	0%	0%	0%	0%	0%	0%
Wales	5%	83%	3%	0%	0%	3%	5%	0%
Taunton Dean District	0%	100%	0%	0%	0%	0%	0%	0%

5.2.21 This mode share has been applied to the trip generation to determine the baseline travel demand associated with the existing Bristol Airport site.

Operational and Logistical Movements

5.2.22 To quantify the effects of the Development Proposals on logistics movements at the Bristol Airport site, BAL have stated that these can be classified in to the following categories:

- Fuel Tankers;
- Car Rental Deliveries; and
- Operational Deliveries.

5.2.23 As with passenger trends, the number of logistics movements at the Bristol Airport site varies throughout the year and peaks in the summer months.

5.2.24 BAL have provided the latest 12 months of aviation fuel delivery records. These records show the Bristol Airport site had 4,631 deliveries of aviation fuel for the recorded 12-month period. In the peak month of August, approximately 11% of the 4,631 aviation fuel deliveries were undertaken. This represents 16 aviation fuel deliveries per day in the peak passenger month of August.

5.2.25 Bristol Airport is open 24 hours a day and seven days a week. The terminal stores and flight catering is available between the hours of the first and last departing flight each day. BAL have provided a delivery schedule for retailers who operate at the Bristol Airport site, which amounts to 23 deliveries per day for the peak passenger month of August for these facilities.

5.2.26 Bristol Airport is a base for eight national car hire companies. BAL have confirmed that each hire company receives daily car deliveries via a car transporter, equating to approximately 60 deliveries per week, of which 77% occur between Monday to Friday. This relates to an average of 10 deliveries per day.

5.2.27 **Table 5.7** sets out a typical week day delivery schedule for each classification of vehicle.

Table 5.7: Existing Delivery Schedule

Time	Car Rental Deliveries	Fuel Deliveries	Operational Deliveries	Total
00:00 - 01:00	0	0	0	0
01:00 – 02:00	0	0	0	0
02:00 – 03:00	0	0	0	0
03:00 – 04:00	0	0	0	0
04:00 – 05:00	0	0	2	2
05:00 – 06:00	0	1	2	3
06:00 – 07:00	0	1	1	2
07:00 – 08:00	0	1	2	3
08:00 – 09:00	1	1	4	6
09:00 – 10:00	0	1	4	5
10:00 – 11:00	2	1	2	4
11:00 – 12:00	0	2	1	3
12:00 – 13:00	3	0	0	3
13:00 – 14:00	0	0	1	1
14:00 – 15:00	2	0	2	4

Time	Car Rental Deliveries	Fuel Deliveries	Operational Deliveries	Total
15:00 – 16:00	0	1	2	3
16:00 – 17:00	1	1	0	2
17:00 – 18:00	0	1	0	1
18:00 – 19:00	0	0	0	0
19:00 – 20:00	2	1	0	3
20:00 – 21:00	0	1	0	1
21:00 – 22:00	0	1	0	1
22:00 – 23:00	0	1	0	1
23:00 – 24:00	0	1	0	1
Daily	**10**	**16**	**23**	**49**

5.2.28 Bristol Airport receives six deliveries during the AM peak and one delivery during the PM peak on a typical week day during the month of August.

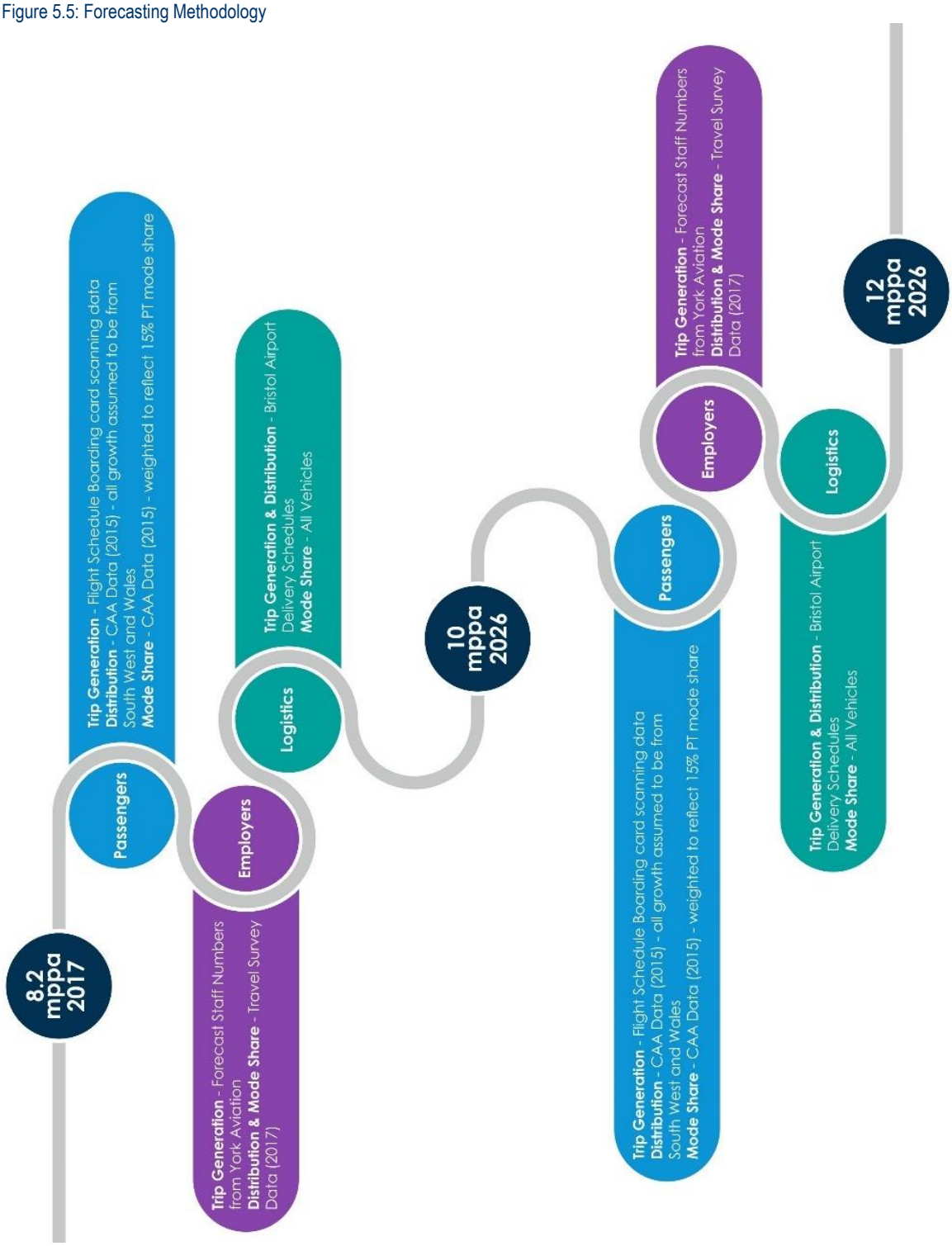
5.2.29 Bristol Airport receives a total of 49 deliveries per day on a typical week day.

5.3 Forecast Travel Demand Methodology

5.3.1 Based on the approach to establish a baseline understanding of the current travel demand associated with Bristol Airport in 2017 (at 8.2 mppa) set out in **Section 5.2**, the future travel demand associated with the 10 mppa and 12 mppa scenarios has been forecast.

5.3.2 **Figure 5.5** demonstrates the forecasting methodology and the relevant data sources used at each stage

Figure 5.5: Forecasting Methodology



5.3.3 As BAL have consent for growth up to 10 mppa, the assessment focuses on the transport implications of the growth of Bristol Airport between the 10 mppa and 12 mppa. BAL forecast to reach 12 mppa by the year 2026.

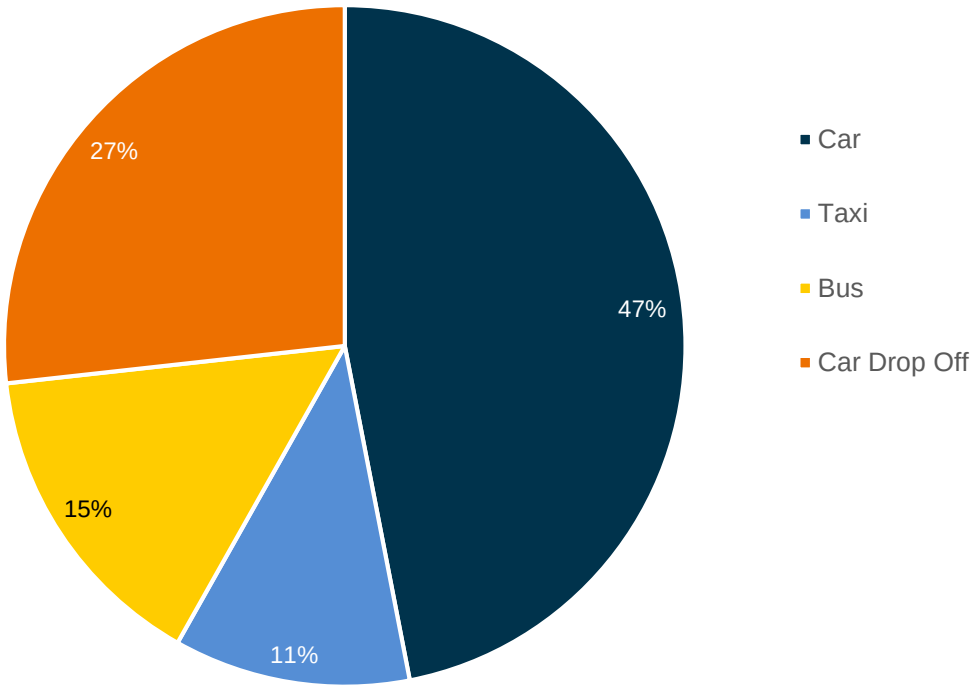
5.3.4 Passenger trips have been calculated using a peak-week flight schedule in August, which provides the number of Arline seats available by hour. This has been used as a trip attractor, and the daily profile has been adjusted using terminal 'dwell time' information – i.e. the amount of time passengers spends inside the Bristol Airport terminal before or after a flight.

5.3.5 The daily profile of passengers has been distributed using the most recent CAA survey data from 2015, which provides surface origin and destination information. The forecast has assumed that the 2 mppa growth will originate solely from the South West and Wales, to present a robust assessment.

5.3.6 Mode share information by origin and destination has been applied to the passenger numbers to determine the number of journeys across the study area by each mode, by hour. The mode share by origin and destination has been adjusted to match the overall passenger PT target of 15%. The assessment has assumed that no improvement

5.3.7 The TA assessment is based on a core test of 15% passenger Public Transport (PT) modal share to reflect the S106 target set as part of the 10 mppa planning consent. The modal shares by origin destination have therefore been adjusted to equal this overall percentage, provided in **Figure 5.6**.

Figure 5.6: Forecast Passenger Modal Share



5.3.8 Employee trips have been calculated similarly, using a peak estimation of Full Time Equivalents (FTEs) for August. Shift pattern information from Bristol Airport business partners has been used to quantify the proportion of FTEs that travel to Bristol Airport on any given day. The start and finish times have been used to create a daily profile of employee trips.

5.3.9 The 2017 Employee Travel Survey provides information on employee origin and destination, and method of travel to work, which has been applied to the FTE daily profile.

5.3.10 For logistics, information on fuel, car rental and operations deliveries have been quantified by BAL and business partners, which have been used to generate vehicle trip profiles for an average day.

5.3.11 The above has been carried out for the existing Bristol Airport operation, and for the consented 10 mppa and 12 mppa Development Proposals. The sections that follow detail the methodology and findings associated with the existing Bristol Airport operations. **Chapter 9** details the forecast trip generation for the 10 mppa and 12 mppa scenarios, to determine the net trip generation resulting from the Development Proposals.

5.4 Assessment Year and Scenarios

5.4.1 The following scenarios have been assessed in the TA:

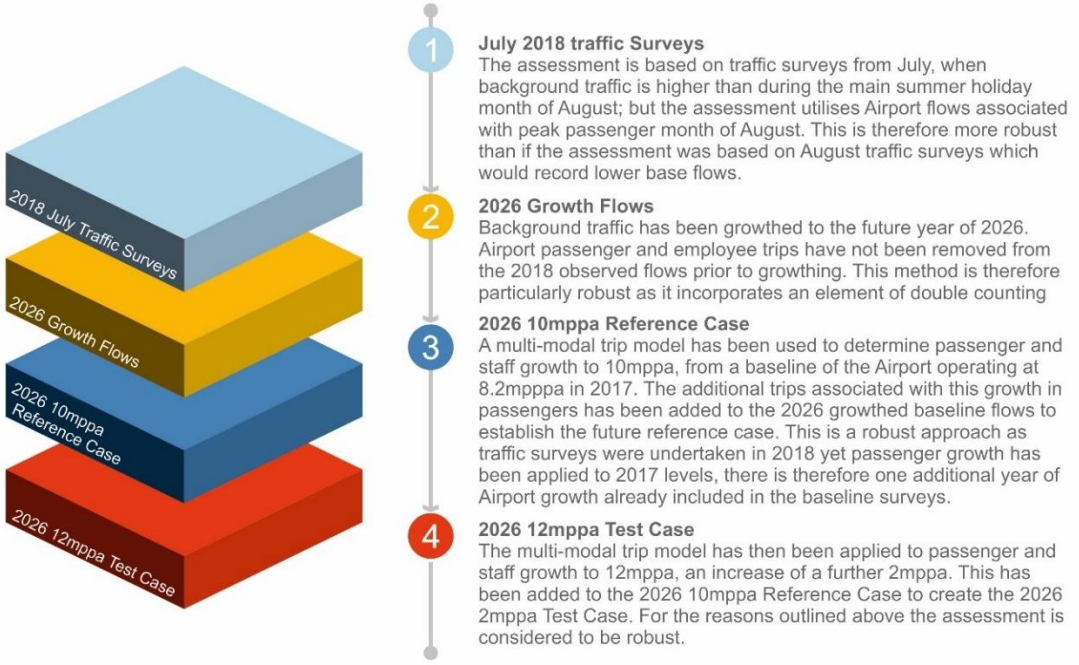
- 2026 Reference Case (10 mppa); and
- 2026 Test Case (12 mppa).

5.4.2 During pre-application discussions, the year 2026 was agreed with key stakeholders as an acceptable assessment year, as it is the forecast year at which Bristol Airport passenger throughput will reach 12 million. As Bristol Airport, will not grow beyond the permitted level, if granted consent, the traffic impact associated with the development, proportionate to the background traffic, will reduce with time as background traffic flows increase.

5.4.3 Growth rates have been applied to the recorded traffic volumes using the industry standard tool, TEMPro. To provide a robust assessment, the recorded airport-related traffic and background traffic has been scaled up to represent estimated traffic volumes in 2026. The trip generation associated with 12 mppa has been considered in addition to the forecast background traffic, which ensures that forecasting methodology is robust and accounts for potential variations over the peak weeks and months. As detailed in **Section 7.6**, the TEMPro factor relates to circa 4,000 (1.4mppa) additional two-way vehicle movements directly associated with the Bristol Airport site. This methodology therefore ensures the assessment is robust.

5.4.4 **Figure 5.7** demonstrates the highway network assessment methodology

Figure 5.7: Highway Network Assessment Methodology



6 Existing Surface Access Options

6.1 Introduction

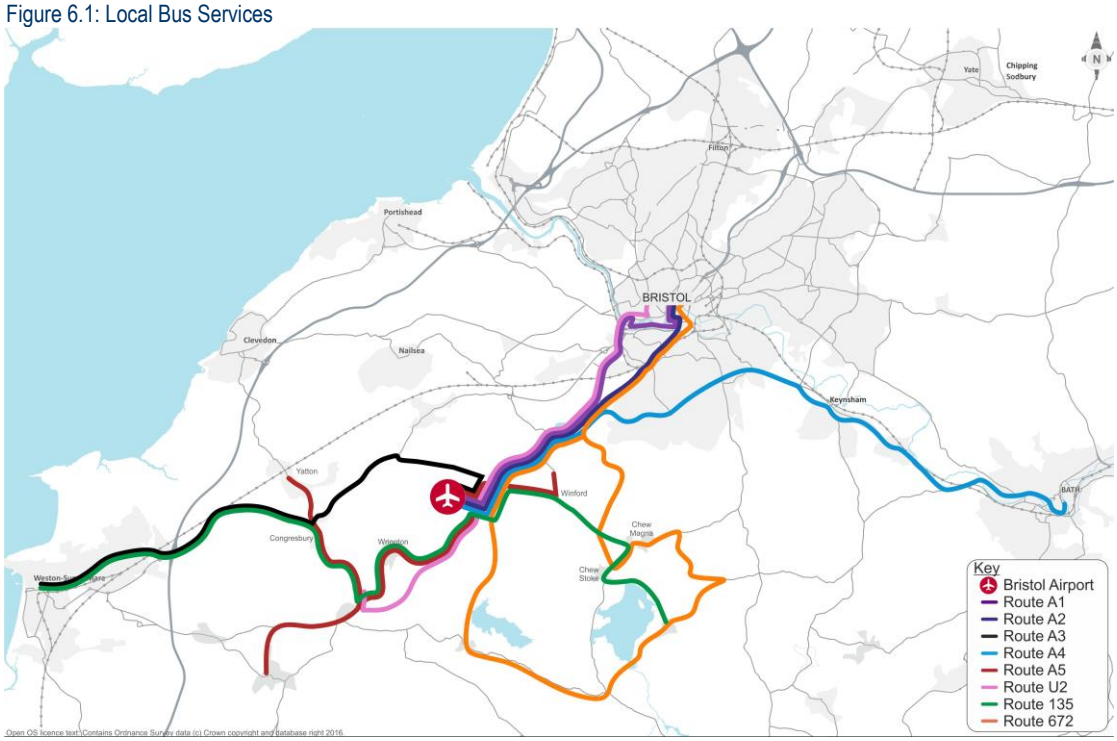
6.1.1 This chapter considers the existing site accessibility across modes for Bristol Airport. The section covers:

- public transport services including rail, bus and coach;
- access for pedestrians and cyclists;
- private car and car parking / drop off arrangements;
- taxi; and
- hire car.

6.2 Bus Services

6.2.1 Bristol Airport is well served by an extensive range of frequent and direct bus routes to Bristol, Bath and Weston-Super-Mare as well as other local towns and villages, as seen in **Figure 6.1**.

Figure 6.1: Local Bus Services



6.2.2 The Airport also acts as an important hub for several local bus routes in North Somerset, where local buses from surrounding villages connect with frequent services to Bristol and Weston-super-Mare. These are set out within **Table 6.1**.

Table 6.1: Bristol Airport Bus Services

Service	Route	Frequency	
		Mon-Sat (daytime)	Evening & Sunday
A1	Bristol Airport – Bristol	10 mins	15-20 mins, 60 mins night
A2	Bristol Airport – Bedminster – Bristol	30 mins	30 mins
A3	Weston-super-Mare – Worle – Congresbury – Bristol Airport	60 mins	60 mins
A4	Bath – Saltford – Keynsham – Brislington – Hengrove – Bristol Airport	30 mins	30 mins
A5	Winford – Felton – Bristol Airport – Wrington then either Congresbury – Yatton or Churchill – Winscombe	10 journeys Mon-Fri	No service
U2	Clifton – Lulsgate – Upper Langford	60 mins Mon-Fri (term time only)	No service
135	Chew Stoke – Chew Magna – Winford – Lulsgate – Wrington – Congresbury – Weston-super-Mare	1 journey Fri	No service
672	Blagdon – Wrington – Lulsgate – Bedminster – Bristol	1-2 journeys	No service

6.2.3 The main bus stops are located directly outside of the terminal building, accessed by a bus lane from North Side Road. The bus lane is controlled by rising bollards and is clearly marked with signage and red surfacing. Less frequent rural routes do not enter the airport itself but instead serve stops at Lulsgate Bottom on the A38, which is a short walk from the Airport.

6.2.4 Service A1, is branded as the 'Airport Flyer', and it is the principal bus route to Bristol Airport. The Airport Flyer operates 24 hours a day, seven days per week, with frequencies up to every 10 minutes (6 buses per hour) from Bristol City Centre.

6.2.5 The A1 service provides the main link with the National Rail network at Bristol Temple Meads railway station, for onward connections to London, the South West, South Wales, the South Coast and the Midlands.

6.2.6 The route is a limited-stop service operated with brand-new vehicles equipped with leather seats, tables, additional luggage space, USB sockets and free wi-fi.

6.2.7 The service has been a considerable success, with the recent enhancement to the frequency and vehicle specification helping to boost passenger numbers significantly. The new double deck buses utilised on the route have increased capacity on the service to up to 828 seats per hour.

6.2.8 The City of Bristol is by far the largest catchment area for Airport users (31.4%) and particularly by those travelling by public transport. With this in mind, the frequency of the main bus services to/from the city centre has been increased to 8 buses per hour by introduction of service A2 in October 2018. This has further increased capacity by 144 seats per hour. Furthermore, and as detailed in **Section 5.2**, the 2015 CAA passenger survey results indicate 22% of passengers travelling from the City of Bristol use PT. With the recent public transport

improvements, PT patronage is likely to improve and therefore indicate that BAL can influence passenger travel modes.

6.2.9 In conjunction with the introduction of service A2, the A1 utilises the MetroBus infrastructure between Bristol city centre and Ashton Vale. This consists of sections of guided busway and on-street priority measures to improve journey times and reliability on the key route into central Bristol.

6.2.10 Service A2 operates as a local bus service calling at all stops, retaining the link between Bedminster and the Airport and therefore ensuring continued connectivity for staff and passengers living in south Bristol. To maximise opportunity for all staff, services operate between 03:00 and 00:00, seven days per week.

6.2.11 Service A3 provides the key link between the Airport and Weston-super-Mare, operating every 60 minutes from early morning (03:00 hours) until late at night (23:00 hours) seven days per week. The route is also branded as 'Airport Flyer' although using single deck buses.

6.2.12 Service A4, branded as 'Air Decker' connects Bath and Keynsham to Bristol Airport. The Air Decker service operates every 30 minutes (2 buses per hour) during the daytime with hourly services in the early mornings and late evenings, seven days per week.

6.2.13 Service A5 is a new route which operates in part replacement of former routes A2 and 97. The service provides 10 journeys per day on Mondays to Fridays between Winford, Felton, Bristol Airport, Wrington and Langford, with alternate journeys either serving Congresbury and Yatton or Sandford and Winscombe.

6.2.14 Service U2 is a new service which commenced in September 2018 which provides an hourly term time link between the University of Bristol's main campus in Clifton and the veterinary campus at Upper Langford. This service stops on the A38 at Lulsgate.

6.2.15 To help to further encourage the Airport's role as a public transport hub where residents of local villages can access the Airport Flyer services, a concessionary scheme for residents of

selected areas of the local community is available for subsidised travel (up to a 60% reduction on fares) on services A1, A2 and A3 between Bristol Airport, Bristol and Weston-super-Mare:

- BS25 - Sandford and Winscombe;
- BS29 - Banwell;
- BS40 - Chew Valley and Blagdon;
- BS41 - Dundry;
- BS48 - Nailsea and Backwell; and
- BS49 - Yatton and Congresbury.

6.2.16 Eligible residents in these areas who are Diamond Card (English National Concessionary Travel Scheme or ENCTS) holders, including the elderly and disabled, can travel free of charge on services A1, A2 and A3 at any time on production of a valid Diamond Card and Bristol Airport's concessionary travel scheme card.

6.3 Coach Services

6.3.1 In common with the bus services, Bristol Airport has a good level of sub-regional coach services which complement the local bus network to provide longer distance travel. **Table 6.2** sets out the coach services currently operating to Bristol Airport.

Table 6.2: Bristol Airport Coach Services

Service	Route	Frequency	
		Mon-Sat (daytime)	Evening & Sunday
216	Cardiff – Newport – Bristol Airport	120 mins	120 mins
404	London – Heathrow Airport – Chippenham – Bath – Bristol Airport – Exeter – Newton Abbot – Torbay – Totnes – Plymouth – Truro – Falmouth – Penzance	No service	1 journey night
Falcon	Bristol – Bristol Airport – Bridgwater – Taunton – Cullompton – Exeter – Plymouth	60 mins	120 mins eve, 60 mins Sun

6.3.2 Stagecoach South West launched their 'Falcon' coach service in February 2016. It provides a 24 hour, seven days a week service from Plymouth, Exeter and Taunton to Bristol Airport and Bristol City Centre. The Falcon operates up to every hour in the daytime and every two hours overnight. Coaches are high specification, branded vehicles with free Wi-fi, USB charging points, power sockets and air conditioning.

6.3.3 The 'Falcon' service also operates as a local bus service, serving all stops, between Brent Knoll and the outskirts of Bristol. ENCTS passes are available for use between Taunton and Bristol city centre, subject to local time restrictions. It does not serve the centre of any towns or cities except Bristol and Plymouth, instead calling at Park & Ride sites or stops on the urban fringe.

6.3.4 National Express commenced operation of coach services to Newport and Cardiff in March 2015. These operate broadly every two hours, seven days per week with services also operating overnight.

6.3.5 National Express also operate one overnight journey on service 404 between London and Penzance which serves Bristol Airport in the early hours of the morning

6.4 National Rail Services

6.4.1 Although there are no direct rail services to Bristol Airport, there are several stations that are near, and accessible by bus services. The National Rail stations that provide access to Bristol Airport via bus services are set out in **Table 6.3.**

Table 6.3: National Rail Stations

Station	Distance (km)	Bus Route	Journey Time (off peak)	Bus Frequency (off peak)
Nailsea & Backwell	4.5	None	n/a	n/a
Yatton	8.0	A5	43 mins	Hourly
Parson Street	8.9	A2	14 mins	Half hourly
Bedminster	10.0	A2	21 mins	Half hourly
Bristol Temple Meads	11.4	A1	29 mins	Every 10 minutes
Worle	14.2	A3	28 mins	Hourly
Weston Milton	16.6	A3	35 mins	Hourly
Weston-super-Mare	18.8	A3	44 mins	Hourly
Bath Spa	24.6	A4	70 mins	Half Hourly

6.4.2 Nailsea & Backwell is the closest National Rail station to Bristol Airport, but there is currently no direct public transport link available. Yatton is served by relatively infrequent service A5, and Worle lies on the route of service A3. All three of these stations have two trains per hour on the Bristol to Weston-super-Mare route, with one train per hour to Taunton and Cardiff; at peak times, some trains operate to/from London Paddington.

6.4.3 Bedminster and Parson Street are both served by service A2 but are local railway stations with a limited hourly rail service between Bristol and Weston-super-Mare. This also applies to Weston Milton on the service A3 route. As such it is not considered that these stations offer significant potential for rail/bus interchange, albeit the re-opening of the Portishead rail link could enhance the importance of Parson Street.

6.4.4 Bristol Temple Meads is the principal rail interchange to/from Bristol Airport, located on the Airport Flyer bus service A1. Services operate from Bristol directly to a variety of national destinations as shown in **Table 6.4**.

Table 6.4: National Rail Destinations from Bristol Temple Meads

Operator	Route	Frequency	
		Mon-Sat (daytime)	Evening & Sunday
Great Western Railway	Swindon, Reading, London Paddington	2 per hour	1-2 per hour
	Newport, Cardiff Central	2 per hour	1 per hour
	Salisbury, Southampton Central, Portsmouth & Southsea	1 per hour	1 per hour
	Weston-super-Mare	2 per hour	1 per hour

Operator	Route	Frequency	
		Mon-Sat (daytime)	Evening & Sunday
	Clifton Down, Avonmouth (some services continue to Severn Beach)	2 per hour	1 per hour
	Frome, Dorchester West, Weymouth	1 per 2 hours	4 journeys
	Worcester Shrub Hill, Great Malvern	1 per 2 hours	5-6 journeys
	Havant, Chichester, Brighton	1-2 journeys	3 journeys
Cross Country	Cheltenham Spa, Birmingham New Street	2 per hour	2 per hour
	Stoke-on-Trent, Manchester Piccadilly	1 per hour	1 per hour
	Derby, Sheffield, Leeds, York, Newcastle, Edinburgh (some services continue to Glasgow)	1 per hour	1 per hour
Great Western Railway	Exeter St Davids, Plymouth (some services continue to Cornwall)	1-2 per hour	1-2 per hour
South Western	Andover, Basingstoke, London Waterloo	3 journeys	1 journey

6.4.5 Weston-Super-Mare railway station is served directly by bus route A3, and offers some connections to the south with direct trains to Taunton and Exeter St Davids. For most destinations in the South West, rail journeys would be more straightforward via Bristol Temple Meads.

6.4.6 Bath Spa bus station is located adjacent to the railway station in central Bath and is connected to the Airport by frequent service A4, although the journey time is considerable (50-70 minutes) compared with access to other stations.

6.5 Walking & Cycling

6.5.1 Bristol Airport is located approximately 11km from Bristol City Centre and 18km from Weston super-Mare, which are the two closest urban areas to the airport. Walking and cycling trips are unlikely to be made to/from the airport by passengers who usually carry luggage. Employees are more likely to commute to the airport by walking and cycling trips, primarily those living in nearby villages. There are 13 villages/other settlements within a 5km radius from Bristol Airport.

Walking

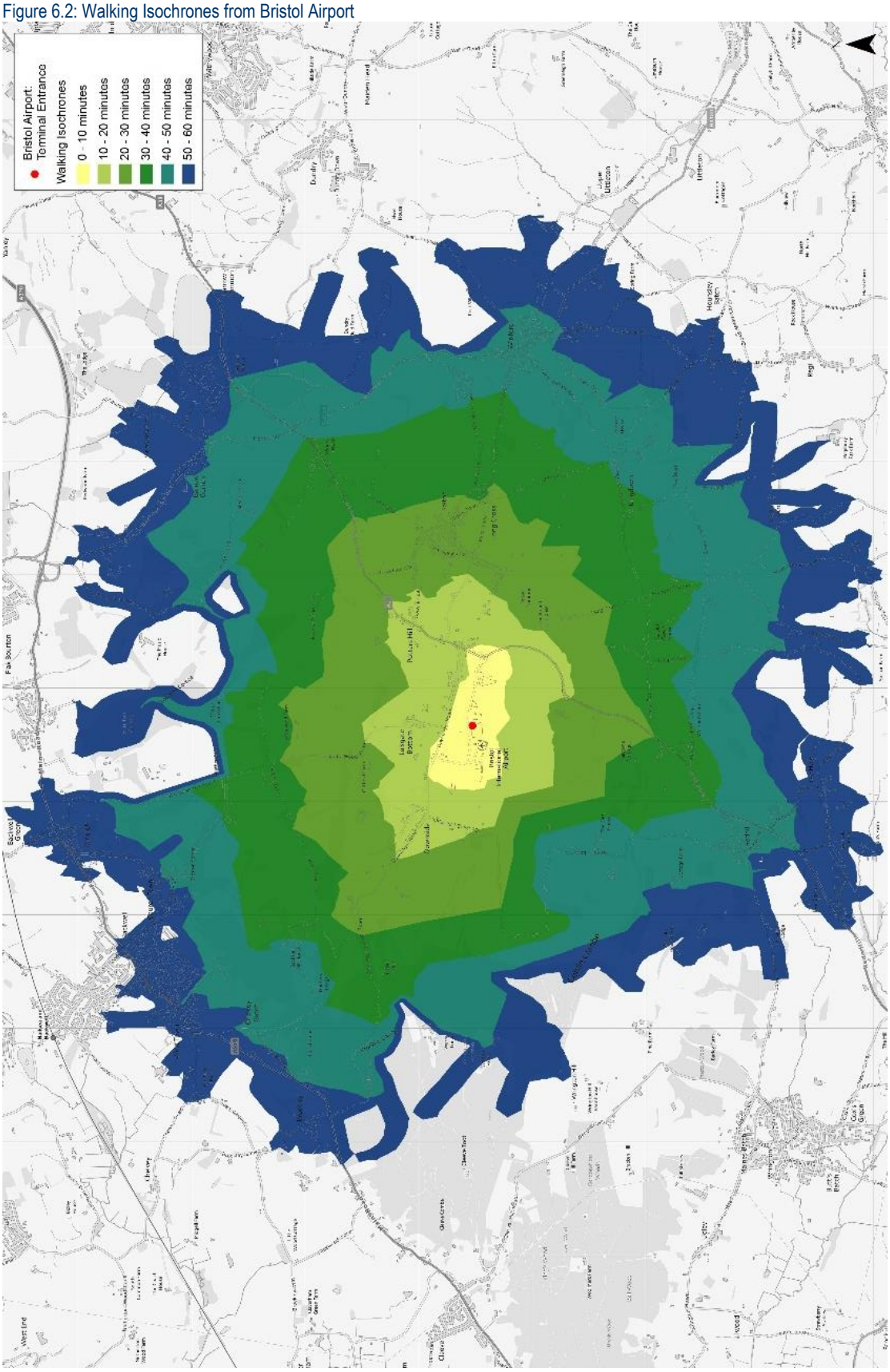
6.5.2 As set out within the submitted Workplace Travel Plan 2018 there are health benefits from increasing walking (even if that is only for bus stops located outside the Bristol Airport site). In addition to economic benefits to both employers and employees and social benefits for everyone.

6.5.3 The topographical nature and relatively rural location of the site mean that walking trips to and from the airport are predominantly likely to occur from the nearby hamlets of Downside, Lulsgate Bottom, Potters Hill and the village of Felton.

6.5.4 A footway is provided on one or both sides of the A38 from Bristol City Centre to the Bristol Airport site although the distance of the journey makes walking trips unlikely. The footpath along the A38 does not extend south of the airport for any significant distance, making walking from Wrington and other villages to the south of the site significantly less attractive.

6.5.5 **Figure 6.2** shows walking isochrones from the Bristol Airport site, for up to 1 hour in 10 minute intervals. These have been created based on a walking speed of 4.5km per hour.

Figure 6.2: Walking Isochrones from Bristol Airport



Cycling

6.5.6 Opportunities for cycling to and from the airport are limited due to the local topography, the busy nature of the A38, and the distance of the airport from major conurbations.

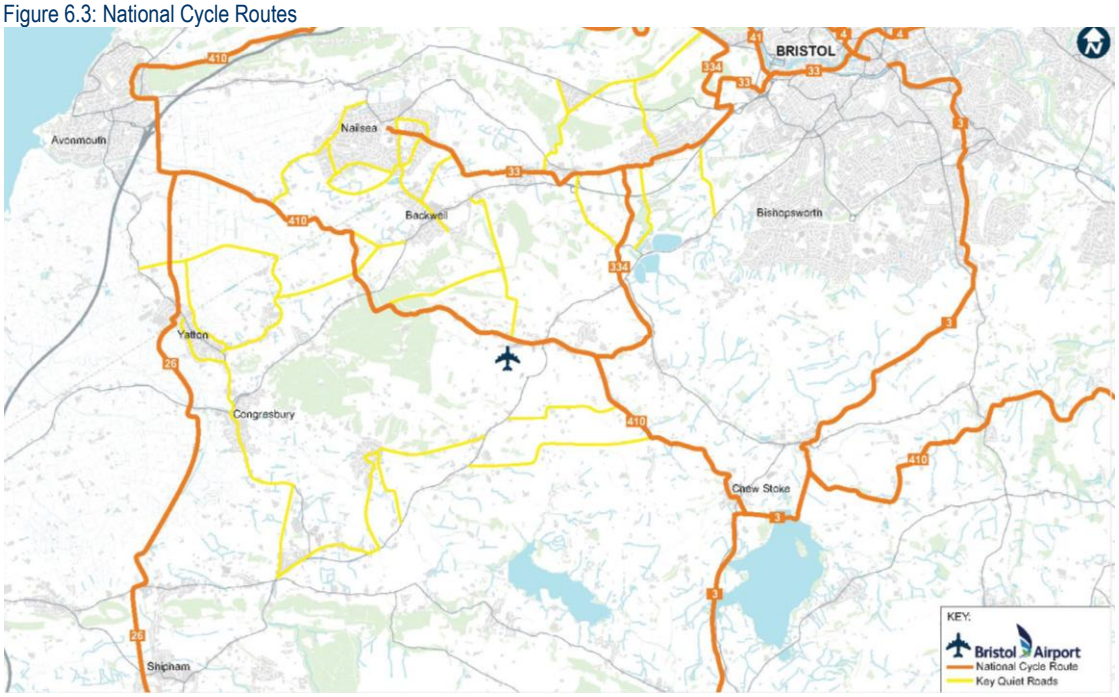
6.5.7 The most likely source of bicycle trips to and from the airport is trips from the hamlets of Downside, Lulsgate Bottom and Potters Hill and nearby villages such as Felton, Winford, Wrington and Backwell although the long hill through Brockley Coombe makes this unattractive for the occasional cyclist. Airport staff from further afield, including Nailsea, Portishead, Blagdon and Bristol, are also known to cycle to work on an occasional or regular basis.

6.5.8 The airport currently provides cycle parking racks and a secure cycle store at the Administration building. Shower facilities are also provided for employees upon request.

6.5.9 The recently opened the Silver Zone Staff Transport Hub also provides 16 space cycle parking area.

6.5.10 Cycling trips are likely to be made by employees and not passengers who usually carry luggage. **Figure 6.3** illustrates the National Cycle routes around Bristol Airport.

Figure 6.3: National Cycle Routes

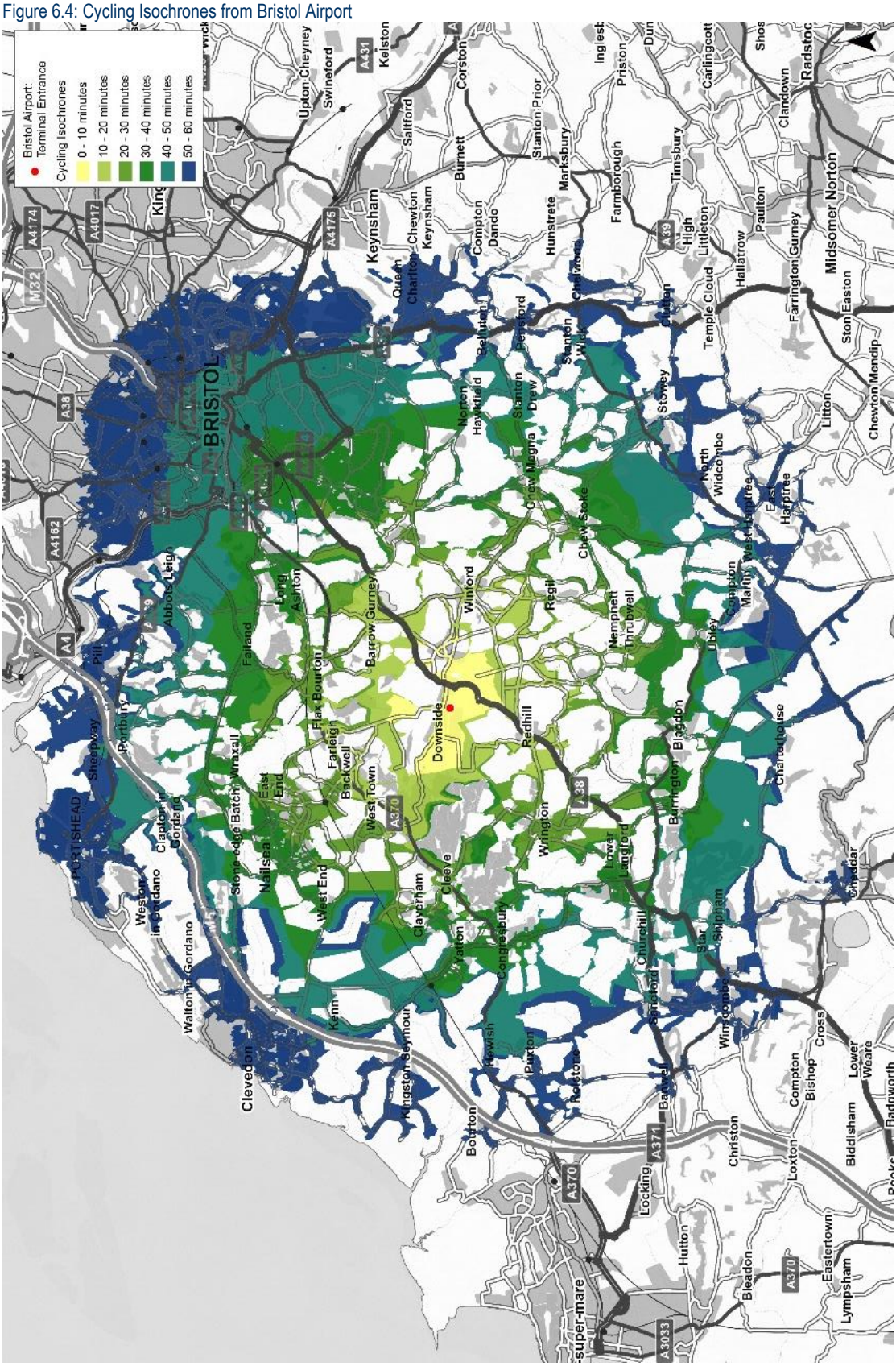


6.5.11 The National Cycle Network Route 410 (NCN410), also known as the 'Avon Cycleway' is a circuit route around Bristol City Centre and connecting to several villages, namely Clevedon, Portishead and Chew Magna. The NCN410 runs north of the site, along Downside Road and connects to other cycle routes including Route 4 (Bristol & Bath Cycle Path) and other routes into the city centre.

6.5.12 National Cycle Route (NCN334) runs north-south, to the west of Bristol, and connects to Sheepway (Portbury). The route links with the southern part of National Route 410. The National Cycle Network Route 3 (NCN 3) runs from Glastonbury to Bristol, through Chew Magna and Chew Stoke. The NCN 3 connects to the NCN 410 which is the primary route providing direct access to the airport.

6.5.13 Cycle journey time isochrones from the site covering journeys which can be made in 10 minute intervals up to 1 hour are shown on **Figure 6.4**. These have been created based on a cycling speed of 15km per hour.

Figure 6.4: Cycling Isochrones from Bristol Airport



6.5.14 As can be seen from Figure 5.5 the following towns / villages are accessible within a 20-minute cycle ride from the Bristol Airport site:

- Barrow Gurney;
- Backwell;
- West Town;
- Redhill;
- Regil; and
- Winford

6.6 Taxi Services

6.6.1 The Airport taxi service is operated under a concession arrangement with Arrow Cars, who were awarded an exclusive five-year contract in April 2015. This allows Arrow Cars sole rights to provision of private hire services taking bookings at the Airport, but does not exclude other operators who can set down or pick up pre-booked passengers from elsewhere; this is directed towards the drop-off and short stay car parks on site.

6.6.2 The concession is operated per a strict set of service standards laid down by the Airport, the objective of which is to ensure that private hire vehicles are readily available to passengers 24 hours a day. The agreement covers a range of issues including availability of taxis, quality of vehicles, maximum waiting time, driver standards and, where possible, avoidance of the B3130 through Barrow Gurney.

6.6.3 The Bristol Airport Surface Access Strategy does not promote an increase in modal share by taxi passengers. It does, however, seek to promote increased efficiency in the airport licensed vehicle operation by combining outward and inward journeys and use of licensed vehicle sharing. In the future, development of schemes such as Mobility as a Service (MaaS) could change the way people access the Airport by small vehicles, including taxis and taxi-bus style services.

6.7 On-airport Car Parking Provision

6.7.1 A total of 16,336 passenger car parking spaces are currently provided on the Bristol Airport site. Of this total, the Silver Zone Seasonal Car Park provides a total of 3,650 spaces for use between May and October; outside of this period, car parking capacity decreases commensurately to 12,686 spaces. BAL has received planning permission (Ref: 18/P/4007/FUL) to allow year-round use of car park for a temporary period of one year.

6.7.2 As discussed in Section 2.4 employees and visitors park in the recently opened Silver Zone Employee Transport Hub. Employees use the frequent shuttle bus to travel between the employee transport hub and the existing administration building and terminal building on the northern side of the airport.

6.8 Off-Site Car Parking

6.8.1 Bristol Airport does not provide any off-site parking provision. However, there are several unofficial off-site parking locations (many of which are not authorised i.e. have planning permission), which provide alternative parking options to that provided by Bristol Airport (see Parking Demand report for further details). It is understood that the majority of these unauthorised car parks operate in greenfield sites in the local area to the airport.

6.8.2 Following the two Master Plan consultations in 2017 and 2018, it was also indicated by local residents that vehicles, primarily taxis and passenger pick-up vehicles are parking on-street in the villages either throughout the period of their trip from Bristol Airport or prior to picking up passengers. It is worth noting this situation is not unique to Bristol Airport as this has been highlighted and reported at other UK airports.

6.9 Drop Off and Pick Up Facilities

6.9.1 Bristol Airport have the following drop off and pick up facilities available:

- Express Drop Off
- Short Stay and Pick Up

6.9.2 The Express Passenger drop off and pick up facility is located immediately in front of the terminal building. It is a barrier controlled area and provides 113 parking spaces. The area is designed to enable a passenger drop off, with parking available for up to 10 minutes, which currently costs £1. Special Assistance passenger drop off is also available in this area, and allows drivers up to 30 minutes of free parking.

6.9.3 The Short Stay and Pick Up facility is located opposite the terminal building. The area is designed to provide a waiting area for flight arrivals and is priced based on duration of stay, starting from £1 for 20 minutes. Special Assistance passenger drop off is also available in this area and allows drivers up to 30 minutes of free parking. A free shuttle bus is available to take passengers from the facility to the terminal door.

7 Highway Network

7.1 Introduction

7.1.1 To determine the potential implications of development on the surrounding highway networks, and therefore what mitigation might be required to address any impacts, it is first necessary to fully understand the existing transport context. This section therefore describes the existing vehicular access arrangements at the Bristol Airport site, existing highway network environment, recorded traffic flows, traffic growth factors and provides a review of personal injury collision (PIC) data.

7.2 Existing Vehicle Access

7.2.1 Primary access to the Bristol Airport site is provided by two roundabouts with the A38. The northern roundabout provides access to the northern parts of the airport including the main terminal building, passenger pick up and drop off areas, current administration building, hotel and operational facilities, and both short and long stay parking areas. This is also the main access for public transport services.

7.2.2 The southern roundabout primarily provides access to Silver Zone long-stay car parking, employee and visitor car parking, aircraft maintenance areas, the Bristol and Wessex Aeroplane Club, Bristol Flying Centre and Western Power Distribution Helicopter Unit. In addition, BAL are currently constructing a new Fire station and new administration building which are predicted to open in early 2019 and will also access from the southern roundabout.

7.2.3 An operational and emergency access is located to the north of Bristol Airport from Downside Road.

7.3 Highway Network

7.3.1 **Figure 7.1** shows the main highway network connecting Bristol Airport.

Figure 7.1: Local Highway Network

7.3.2 The primary road access to the Airport is via the A38 which is proposed to be included within the Major Road Network (MRN). The MRN seeks to improve the middle tier of the busiest and most economically important local authority 'A' roads.

7.3.3 The A38 is a strategic route between Bristol City Centre and Taunton, connecting to the M5 at Junction 22 and enabling connections to Somerset, Devon and Cornwall, to Weston-super-Mare via the A368 and A37 and provides connections to many of North Somerset villages. The A38 is single carriageway with a variable speed limit.

7.3.4 Downside Road, located to the north of the site boundary, connects to the A370 near Brockley. The A370 connects to Weston-super-Mare from M5 Junction 21 as well as local villages and towns.

7.4 Local Highway Network Flows

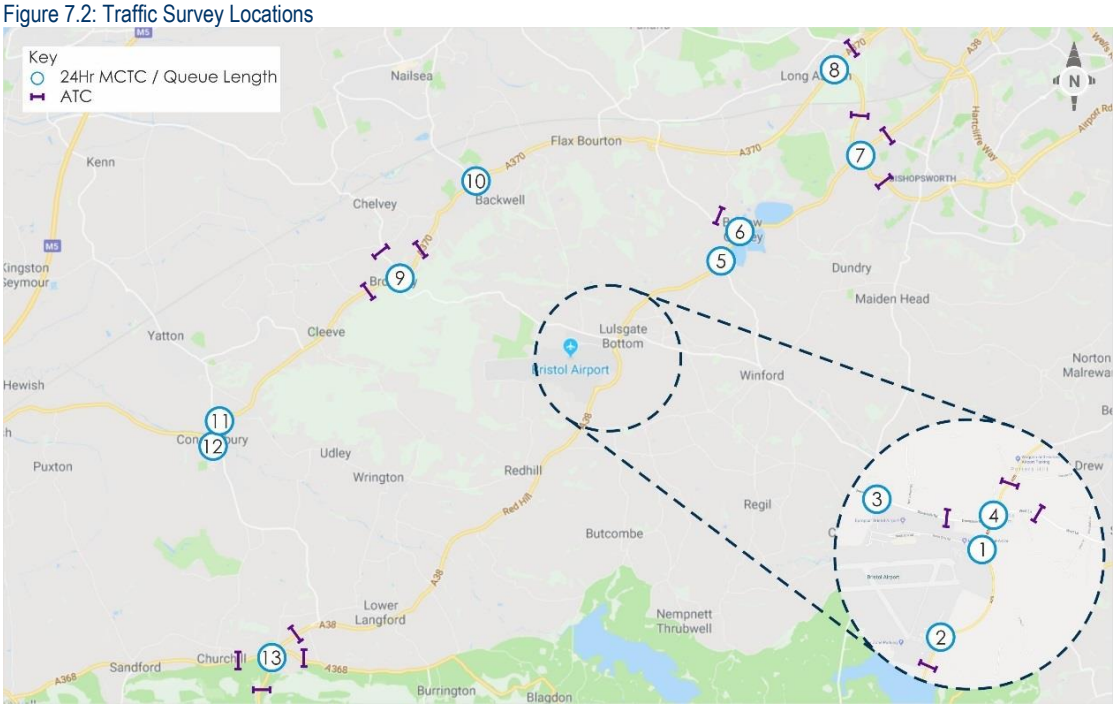
7.4.1 The extent of the traffic survey area was agreed during the pre-application discussions. The independent traffic survey specialists Intelligent Data (ID) were commissioned to undertake the following agreed traffic surveys:

- 24 hour Classified Turning Counts (CTC) & Queue Lengths
  - A38 priority roundabout with Bristol Airport (Northern) Ref J1
  - A38 priority roundabout with Bristol Airport (Silver Zone) Ref J2
  - Downside Road priority junction with Bristol Airport (Service Access) Ref J3
  - A38 signal junction with Downside Road Ref J4
  - A38 priority junction with West Lane Ref J4
  - A38 priority junctions with Hobbs Land & Barrow Lane Ref J5
  - A38 signal junction with B3130 Barrow Street Ref J6
  - A4174 Colliters Way (South Bristol Link (SBL)) roundabout with A38 Ref J7
  - A370 roundabout with A4174 (SBL) Ref J8
  - A370 signal junction with Brockley Combe Road and Brockley Lane Ref J9
  - A370 signal junction with Station Road & Dark Lane Ref J10
  - A370 signal junction with B3133 Smallway Ref J11
  - A370 signal junction with B3133 High Street Ref J12
  - A38 signal junction with A368 Ref J13
- Weeklong Automatic Traffic Counts (ATC)
  - A368 Dinghurst Road;
  - A38 (North of Dinghurst Road);
  - A368 Bath Road;
  - A38 New Road;

- Brockley Lane;
- A370 Main Road (N);
- A370 Main Road (S);
- A370 (North of Colliters Way);
- A4174 Colliters Way;
- A38 Bridgewater Road (N);
- A4174 Colliters Way;
- A38 (North of West Lane);
- Barrow Street;
- West Lane;
- Downside Road; and
- A38 (South of Silver Zone).

7.4.2 **Figure 7.2** shows the location of the agreed traffic surveys and the full raw traffic survey data is contained within **Appendix E**.

Figure 7.2: Traffic Survey Locations



Bristol Airport Daily Vehicle Profile

7.4.3 The recorded hourly vehicle profile and classification at Bristol Airport's two primary access points (north and south roundabouts with the A38) and the emergency access on Downside Road are shown in **Figure 7.3, 7.4** and **7.5** respectively.

7.4.4 The results of the traffic surveys establish the baseline conditions and relate to the existing overall passenger PT modal share of 12.5% and employee PT modal share of 10%.

Figure 7.3: Bristol Airport Northern Access with A38 Daily Profile (J1)

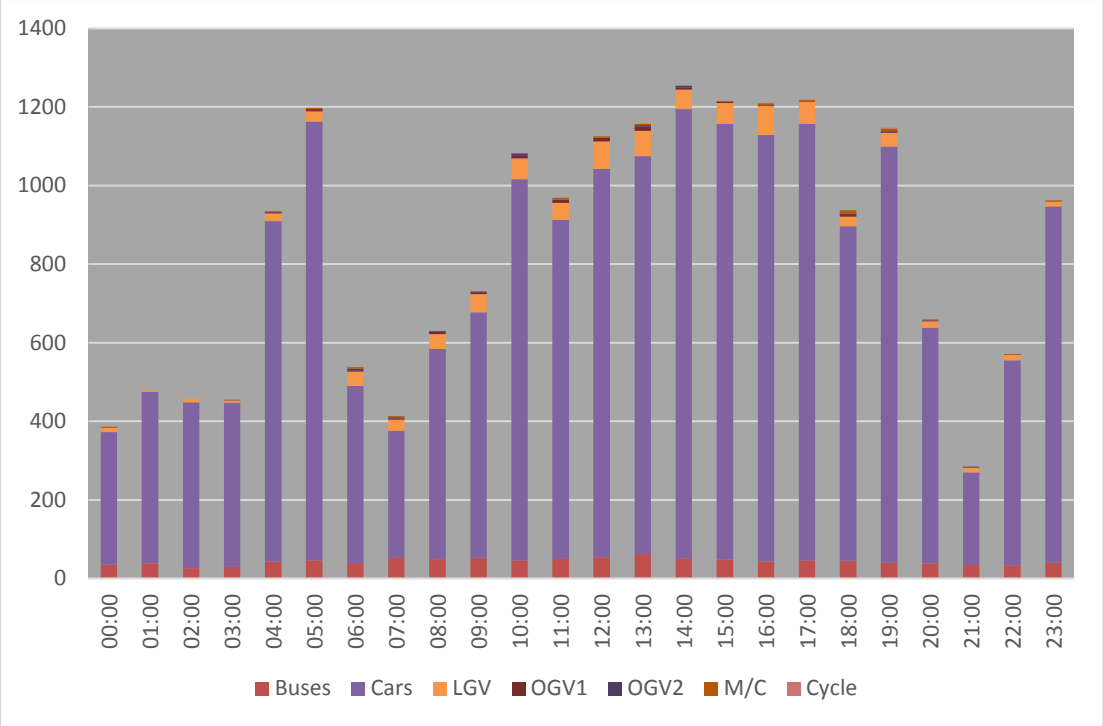


Figure 7.4: Bristol Airport Southern Access with A38 Daily Profile (J2)

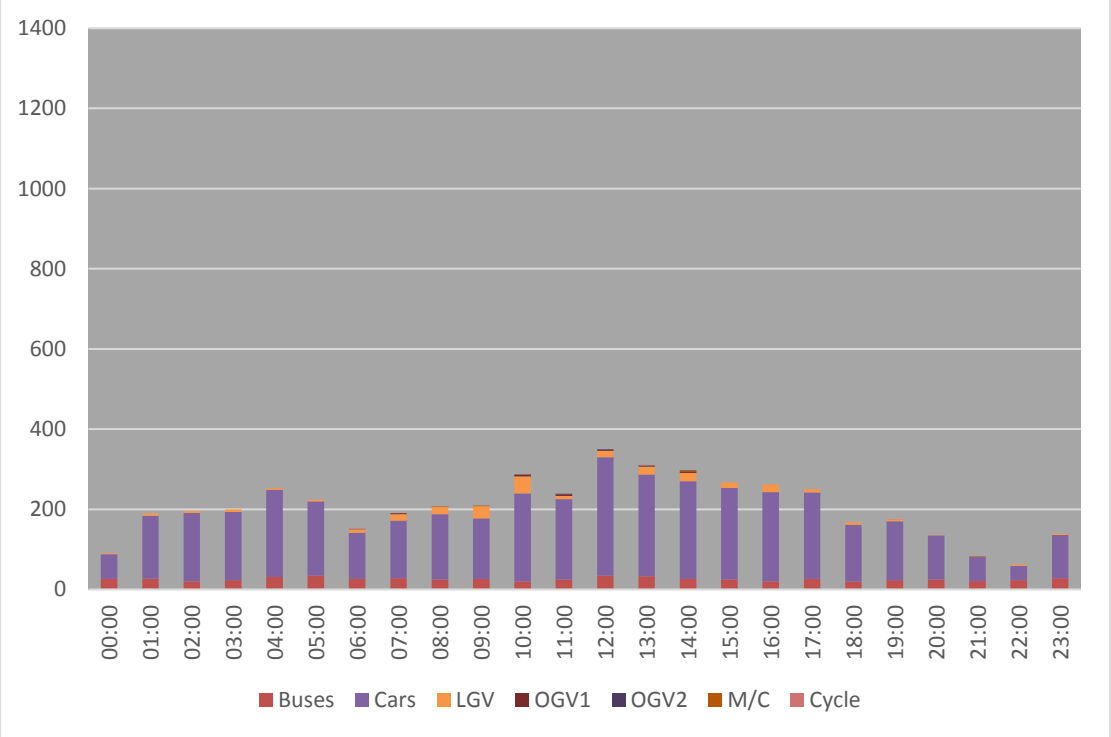
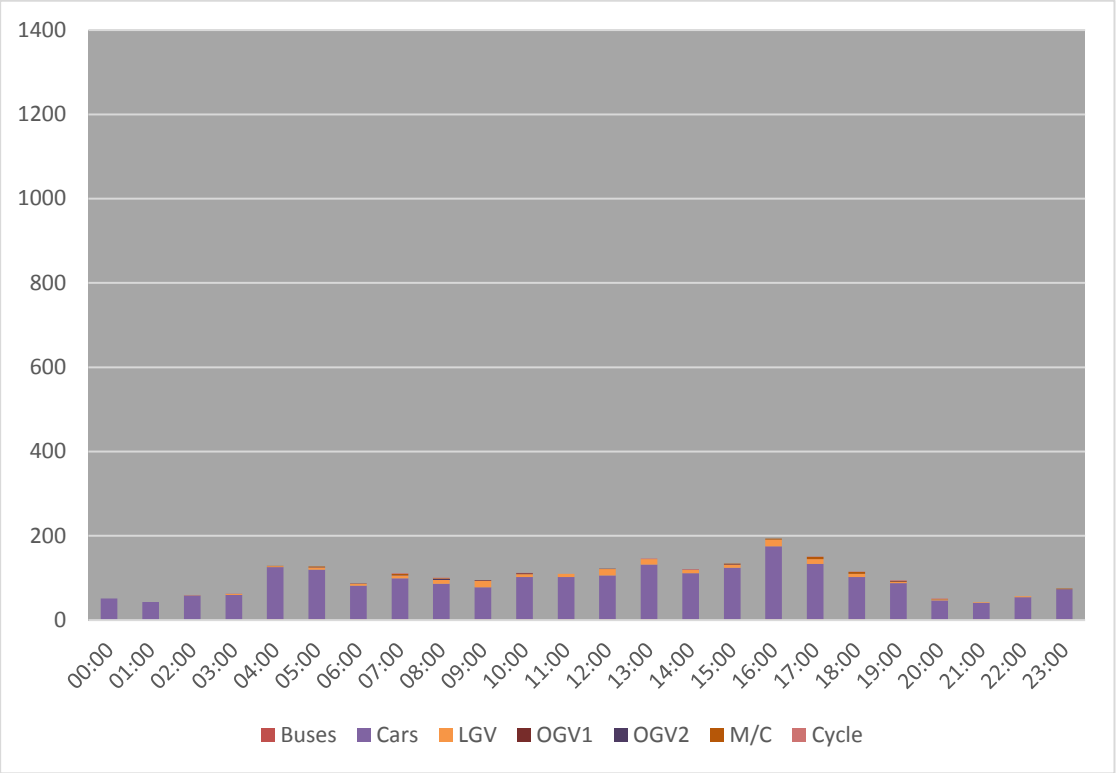


Figure 7.5: Bristol Airport Emergency Access with Downside Road (J3)



Agreed Study Area Daily Vehicle Profile

7.4.5 In order to determine the existing network peak periods, the traffic surveys have been interrogated to determine the total amount of traffic (Passenger Car Units (PCUs)) recorded through each surveyed junction throughout an average weekday. **Table 7.1** sets out the recorded hourly traffic flow profile for each junction (excluding the Bristol Airport site access (Junctions 1 to 3) which are detailed above) within the agreed study area for a 24-hour period.

Table 7.1: Recorded 2018 Junctions Daily Vehicle Profile (PCUs)

Time	J4: A38 / West Lane / Downside Road	J5: A38 / Hobbs Lane / Barrow Lane	J6: A38 / B3130 Barrow Street	J7: A4174 SBL / A38	J8: A370 / A4174 SBL	J9: A370 / Brockley Combe Road / Brockley Lane	J10: A370 / Station Road	J11: A370 / B3133 Smallway	J12: A370 / B3133 High Street	J13: A38 / A368
00:00	504	416	421	453	311	111	92	99	119	200
01:00	431	339	333	329	224	58	53	70	87	161
02:00	567	434	447	422	272	71	42	70	81	184
03:00	586	501	496	470	305	96	57	89	94	216
04:00	1,055	840	826	802	502	158	104	148	169	300
05:00	1,282	1,083	1,093	1,213	842	308	237	380	426	585

Time	J4: A38 / West Lane / Downside Road	J5: A38 / Hobbs Lane / Barrow Lane	J6: A38 / B3130 Barrow Street	J7: A4174 SBL / A38	J8: A370 / A4174 SBL	J9: A370 / Brockley Combe Road / Brockley Lane	J10: A370 / Station Road	J11: A370 / B3133 Smallway	J12: A370 / B3133 High Street	J13: A38 / A368
06:00	1,447	1,332	1,375	1,962	1,954	847	838	1,032	1,085	1,068
07:00	2,400	2,078	2,231	3,292	3,325	1,498	1,476	1,839	1,947	1,924
08:00	2,606	2,166	2,344	3,257	2,996	1,543	1,580	1,976	2,133	2,010
09:00	1,922	1,654	1,739	2,639	2,694	1,201	1,366	1,750	1,804	1,592
10:00	2,149	1,830	1,906	2,444	2,340	1,186	1,349	1,592	1,635	1,516
11:00	2,069	1,716	1,790	2,371	2,380	1,174	1,337	1,654	1,708	1,437
12:00	2,097	1,629	1,682	2,330	2,319	1,234	1,471	1,734	1,762	1,405
13:00	2,074	1,788	1,860	2,448	2,416	1,187	1,379	1,674	1,743	1,533
14:00	2,258	1,893	1,965	2,751	2,665	1,301	1,500	1,713	1,756	1,477
15:00	2,517	2,123	2,196	3,003	2,870	1,481	1,598	1,949	2,080	1,745
16:00	2,694	2,388	2,508	3,559	3,379	1,735	1,729	2,061	2,244	1,855
17:00	2,920	2,398	2,498	3,321	3,267	1,686	1,828	2,211	2,309	2,064
18:00	2,635	2,127	2,182	2,893	2,894	1,366	1,684	1,762	1,873	1,767
19:00	1,605	1,277	1,404	1,802	1,683	787	991	1,148	1,197	1,018
20:00	1,056	929	945	1,254	1,106	491	603	691	715	658
21:00	933	768	792	1,044	938	426	555	637	661	517
22:00	943	776	806	954	852	399	479	466	474	446
23:00	986	758	762	804	622	219	244	218	246	354

7.4.6 The traffic surveys indicated that the junctions within the study area have a defined morning (07:00-10:00) and evening (16:00-19:00) peak period. The network peak hours are between 08:00-09:00 in the morning and 17:00-18:00 in the evening. Therefore, the assessment of vehicular impact on the surrounding highway network, which is set out later in this report, focusses primarily on these peak periods, although checks are made to ensure these represent the highest overall flows.

7.4.7 A summary of the recorded inter-peak periods is provided below:

- 00:00-06:00 network flows are on average 84% lower than the peak hours;
- 10:00-16:00 network flows are on average 21% lower than the peak hours; and
- 19:00-24:00 network flows are on average 65% lower than the peak hour.

7.4.8 The hourly traffic volumes during the afternoon are similar across the study area. Therefore, outside of the traditional network peaks, an Airport Peak will be identified based on the trip generation associated with the Development Proposals.

7.4.9 As the trip generation methodology is based on flight schedules, the assessment will consider the traffic associated with the uplift in passengers, employees and logistics between the 10 mppa and 12 mppa scenarios. The hour with the largest increase in traffic will be considered as the Airport Peak.

7.5 Strategic Highway Network

7.5.1 During the pre-application process, Highways England agreed that the predicted level and timing of traffic on the strategic highway network associated with the Bristol Airport development proposals should be identified at Junctions 18 to 22 on the M5 motorway.

7.5.2 Highways England during the pre-application discussions acknowledged that the peak traffic demand at the Bristol Airport site differs from the traditional network peak periods as highlighted in **Section 7.4**.

7.5.3 As agreed with Highways England a quantitative numerical assessment has been undertaken as set out in **Section 10.5** at the agreed M5 Motorway junctions.

7.6 Traffic Growth

7.6.1 The government's most up to date Trip End Model Presentation Program (TEMPro) V7 is used to estimate the growth of traffic on a national through to sub town scale, for scaling traffic over any number of years between 2001 and 2041. This is an industry standard recognised software. TEMPro has been used with the National Traffic Model (NTM) database for the North Somerset area to identify growth between the identified years.

7.6.2 During pre-application discussions, the year 2026 was agreed with key stakeholders as an acceptable assessment year, as it is the forecast year at which Bristol Airport passenger throughput will reach 12 mppa. Traffic flows to/from the airport will not grow beyond the permitted level, if granted consent, and therefore proportionate impacts will reduce with time as background traffic flows increase. The resulting 2018 to 2026 growth factors are set out in **Table 7.2**.

Table 7.2: TEMPro NTM Adjusted Traffic Growth (2018 to 2026)

Level	00:00-07:00	07:00-10:00	10:00-16:00	16:00-19:00	19:00-00:00
South West	1.1205	1.1295	1.1416	1.127	1.1205
Somerset	1.1248	1.1319	1.1483	1.1307	1.1248
North Somerset	**1.1368**	**1.142**	**1.1628**	**1.1422**	**1.1368**

7.6.3 The July 2018 traffic surveys recorded both airport and non-airport related traffic across the entire study area. To present a robust assessment, the recorded traffic has been factored up to 2026, which includes the traffic associated with approximately 8.6 mppa (the estimated 2018 passenger numbers).

7.6.4 **Table 7.3** provides the number of additional airport-related traffic movements at each access to Bristol Airport that have been inherently included in the background traffic growth calculation.

7.6.5 Within the scaled-up background traffic is an additional 4,021 daily two-way vehicle movements associated with Bristol Airport, which relates to approximate increase of 1.4 mppa at the Bristol Airport site. The traffic and highway assessment methodology is therefore testing

the effects of 13.4 mppa on the highway network in the study area, ensuring a robust assessment and accounting for daily or monthly variations.

Table 7.3: Daily Airport Related Traffic Volume Increase within 2026 Background Traffic

Access	In	Out	Two-Way
J1: A38 / Northern Bristol Airport Roundabout	1,469	1,473	2,942
J2: A38 / Southern Bristol Airport Roundabout	354	374	728
J3: Downside Road / Bristol Airport	163	188	351
Total	**19,86**	**2,034**	**4,021**

7.6.6 **Table 7.4** sets out the 2026 forecast daily flow profile for the junctions within the study area. This has been calculated using the recorded traffic flows presented in **Table 7.1** and the growth factors in **Table 7.2**.

Table 7.4: Forecast 2026 Junctions Daily Vehicle Profile (PCUs)

Time	J4: A38 / West Lane / Downside Road	J5: A38 / Hobbs Lane / Barrow Lane	J6: A38 / B3130 Barrow Street	J7: A4174 SBL / A38	J8: A370 / A4174 SBL	J9: A370 / Brockley Combe Road / Brockley Lane	J10: A370 / Station Road	J11: A370 / B3133 Smallway	J12: A370 / B3133 High Street	J13: A38 / A368
00:00	573	473	479	515	354	126	105	113	135	227
01:00	490	385	379	374	255	66	60	80	99	183
02:00	645	493	508	480	309	81	48	80	92	209
03:00	666	570	564	534	347	109	65	101	107	246
04:00	1,199	955	939	912	571	180	118	168	192	341
05:00	1,457	1,231	1,243	1,379	957	350	269	432	484	665
06:00	1,645	1,514	1,563	2,230	2,221	963	953	1,173	1,233	1,214
07:00	2,741	2,373	2,548	3,759	3,797	1,711	1,686	2,100	2,223	2,197
08:00	2,976	2,474	2,677	3,719	3,421	1,762	1,804	2,257	2,436	2,295
09:00	2,195	1,889	1,986	3,014	3,077	1,372	1,560	1,999	2,060	1,818
10:00	2,499	2,128	2,216	2,842	2,721	1,379	1,569	1,851	1,901	1,763
11:00	2,406	1,995	2,081	2,757	2,767	1,365	1,555	1,923	1,986	1,671
12:00	2,438	1,894	1,956	2,709	2,697	1,435	1,710	2,016	2,049	1,634
13:00	2,412	2,079	2,163	2,847	2,809	1,380	1,604	1,947	2,027	1,783
14:00	2,626	2,201	2,285	3,199	3,099	1,513	1,744	1,992	2,042	1,717
15:00	2,927	2,469	2,554	3,492	3,337	1,722	1,858	2,266	2,419	2,029
16:00	3,077	2,728	2,865	4,065	3,859	1,982	1,975	2,354	2,563	2,119

Time	J4: A38 / West Lane / Downside Road	J5: A38 / Hobbs Lane / Barrow Lane	J6: A38 / B3130 Barrow Street	J7: A4174 SBL / A38	J8: A370 / A4174 SBL	J9: A370 / Brockley Combe Road / Brockley Lane	J10: A370 / Station Road	J11: A370 / B3133 Smallway	J12: A370 / B3133 High Street	J13: A38 / A368
17:00	3,335	2,739	2,853	3,793	3,732	1,926	2,088	2,525	2,637	2,358
18:00	3,010	2,429	2,492	3,304	3,306	1,560	1,923	2,013	2,139	2,018
19:00	1,825	1,452	1,596	2,049	1,913	895	1,127	1,305	1,361	1,157
20:00	1,200	1,056	1,074	1,426	1,257	558	685	786	813	748
21:00	1,061	873	900	1,187	1,066	484	631	724	751	588
22:00	1,072	882	916	1,085	969	454	545	530	539	507
23:00	1,121	862	866	914	707	249	277	248	280	402

7.7 Personal Injury Collision Review

7.7.1 As part of the TA, a personal injury collision (PIC) review has been conducted across agreed study areas in NSC and BCC. This assesses the most recent five-year study period and determines whether there are any integral highway safety issues where there are anticipated to be increase in vehicular, pedestrian and cycle movements associated with the Development Proposals.

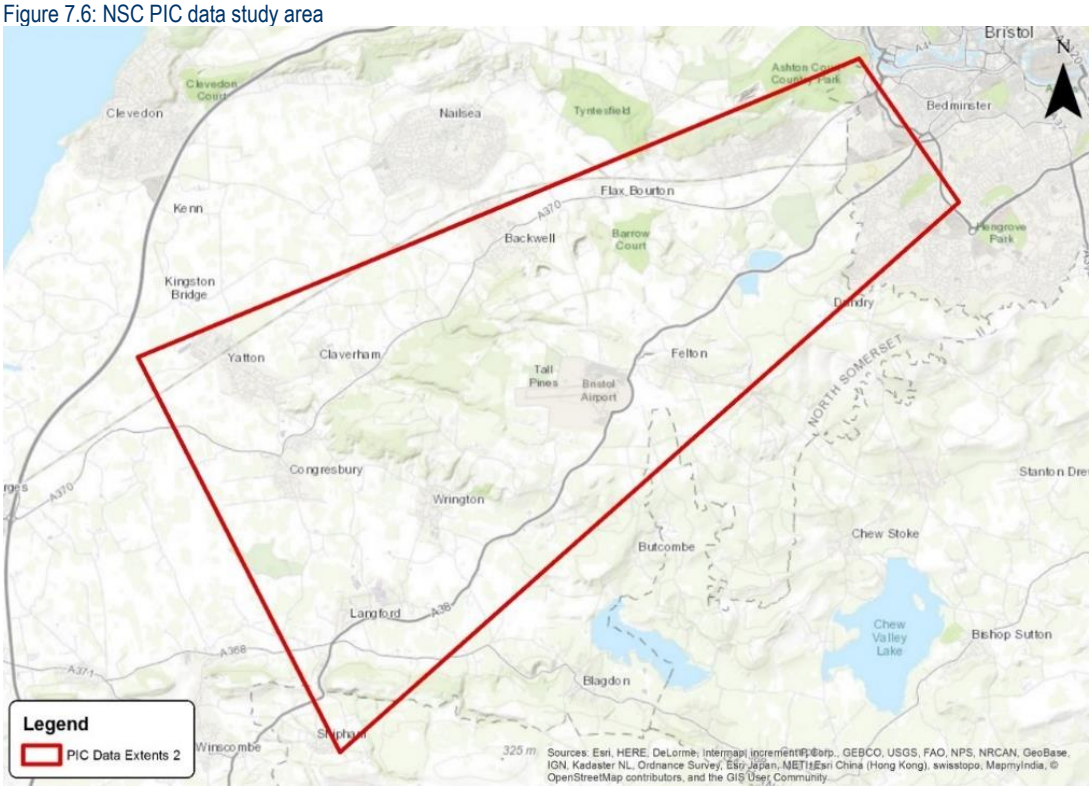
7.7.2 The collisions are classed into three categories: slight, serious and fatal, a definition of which is provided below:

- **Slight Injury**: Injuries of a minor nature, such as sprains, bruises, or cuts not judged to be severe, or slight shock requiring only roadside attention (medical treatment is not a prerequisite for an injury to be defined as slight).
- **Serious Injury**: Injuries for which a person is detained in hospital, as an in-patient, or any of the following injuries (whether a person is detained in hospital); fractures, concussion, internal injuries, severe cuts and lacerations, severe general shock requiring medical treatment and injuries which result in death 30 days after the accident. The serious category, therefore, covers a very broad range of injuries.
- **Fatal Injury**: Injuries which cause death either immediately or any time up to 30 days after the collision

North Somerset Council – Study Area

7.7.3 The latest available five years of PIC data has been obtained for the agreed study area within NSC as shown in **Figure 7.6**. PBA obtained the PIC Data from NSC, who hold and manage the data for this area. The PIC records cover a 54-month period from 01/01/2014 to the 30/06/2018.

Figure 7.6: NSC PIC data study area



Collision Summary

7.7.4 A summary of the annual rolling 54-month collision data (01/01/2014 to 30/06/2018) within the study area is provided within **Table 7.5**. The table is disaggregated to show the total collisions and the vulnerable road users (pedal cyclists and pedestrians) involved in the collisions. The five rolling years are as follows;

- Year 1 - 01/01/2014 – 31/12/2014
- Year 2 – 01/01/2015 – 31/12/2015
- Year 3 - 01/01/2016 – 31/12/2016
- Year 4 – 01/01/2017 – 31/12/2017
- Year 5 – 01/01/2018 – 30/06/2018

Table 7.5: Summary of Collisions (01/01/2014 – 30/06/2018)

Collisions	Injury Severity	Year					Total
		1	2	3	4	5	
Total	Fatal	1	1	0	3	0	5
	Serious	10	10	8	19	3	50
	Slight	74	59	53	67	13	266
	Sub Total	85	70	61	89	16	321
Pedestrian	Fatal	0	0	0	2	0	2
	Serious	2	2	3	1	1	9
	Slight	6	2	8	4	0	20

Collisions	Injury Severity	Year					Total
		1	2	3	4	5	
	Sub Total	8	4	11	7	1	31
Cyclist	Fatal	0	0	0	0	0	0
	Serious	1	1	1	3	0	6
	Slight	10	7	6	10	1	34
	Sub Total	11	8	7	13	1	40

7.7.5 During the 54-month period between the 1st January 2014 to 30th June 2018, there were 321 collisions resulting in 5 (2%) fatal accident types, 50 (15%) serious accident types and 266 (83%) slight accident types.

7.7.6 Over the entire 5-year period, 22% (71) of the recorded collisions involved a vulnerable road user (pedestrian or cyclists) resulting in 2 fatal accident types, 15 serious accident types and 54 slight accident types. For the individual years, the proportion of collisions involving either cyclists or pedestrians are as follows; 2014: 22% (19),

- 2014: 22% (19),
- 2015: 17% (12),
- 2016: 30% (18),
- 2017: 22% (20); and
- 2018: 13% (2).

Casualties Summary

7.7.7 A summary of the casualties across the 54-month period are provided in **Table 7.6**. The table is disaggregated to show casualties including vulnerable road users (pedestrians and cyclists).

Table 7.6: Summary of Casualties (01/01/2014 – 30/06/2018)

Collisions	Injury Severity	Year					Total
		1	2	3	4	5	
Total	Fatal	1	1	0	3	0	5
	Serious	10	10	8	22	3	53
	Slight	105	85	76	105	19	390
	Sub Total	116	96	84	130	22	448
Pedestrian	Fatal	0	0	0	2	0	2
	Serious	2	2	3	1	1	9
	Slight	6	2	8	5	0	21
	Sub Total	8	4	11	7	1	32
Cyclist	Fatal	0	0	0	0	0	0
	Serious	1	1	1	2	0	5
	Slight	10	7	6	12	1	36
	Sub Total	11	8	7	14	1	41

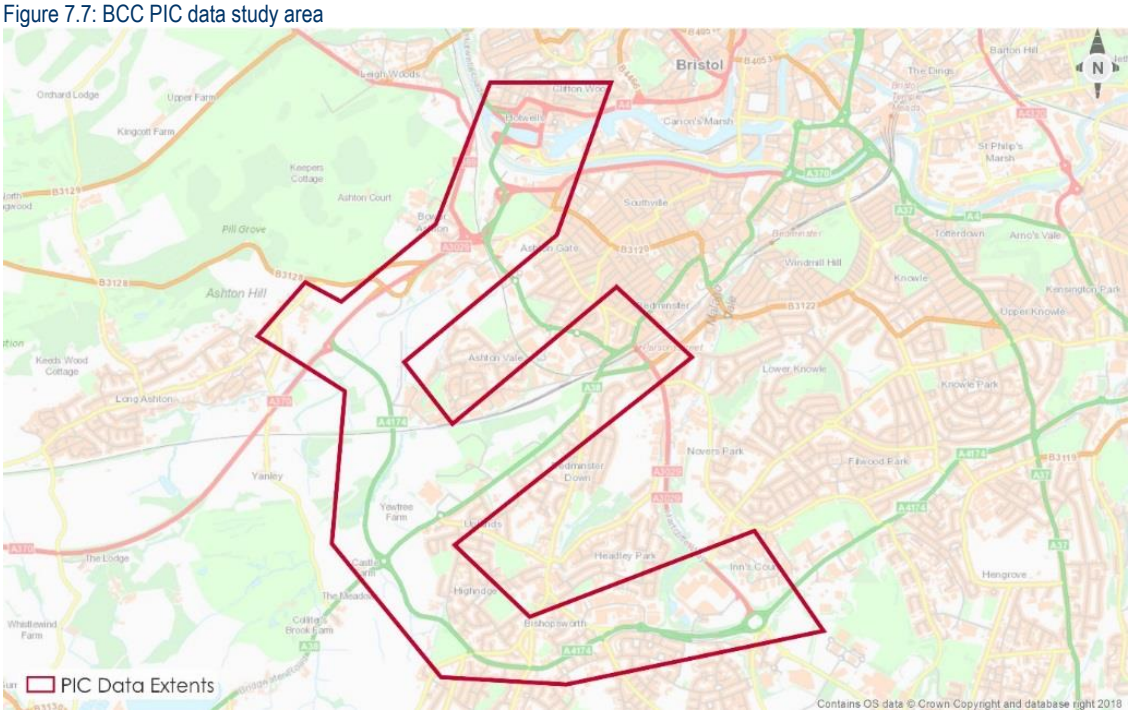
7.7.8 During the 54-month period between the 1st January 2014 to 30th June 2018, there were 448 casualties resulting in 5 (1%) fatal injuries, 53 (12%) serious injuries and 390 (87%) slight injuries.

7.7.9 Over the entire 5-year period, 16% (73) of casualties involved a pedestrian or cyclists, 7% (32) were pedestrians and 9% (41) cyclists. There were 2 fatalities involving a vulnerable road user and 14 serious casualties. The full PIC assessment for the agreed study area in North Somerset Council is provided within **Appendix F**.

Bristol City Council – Study Area

7.7.10 The latest available five years of PIC data has been obtained for the agreed study area within Bristol City Council (BCC) as shown in **Figure 7.7**. PBA obtained the PIC Data from BCC, who hold and manage the data for this area. The PIC records cover a 60-month period from 01/10/2013 to the 30/09/2018.

Figure 7.7: BCC PIC data study area



Collision Summary

7.7.11 A summary of the annual rolling 60-month collision data (01/10/2013 and 30/09/2018) within the study area is provided within **Table 7.7**. This is broken down to show the total collisions and additionally the vulnerable road users (pedal cyclists and pedestrians) involved in the collisions. The five rolling years are as follows:

- Year 1 - 01/10/2013 – 30/09/2014
- Year 2 – 01/10/2014 – 30/09/2015
- Year 3 - 01/10/2015 – 30/09/2016
- Year 4 – 01/10/2016 – 30/09/2017
- Year 5 – 01/01/2017 – 30/09/2018

Table 7.7: Summary of Collisions (01/01/2013 – 30/09/2018)

Collisions	Injury Severity	Year					Total
		1	2	3	4	5	
Total	Fatal	1	0	0	1	1	3
	Serious	5	4	6	4	3	22
	Slight	49	48	36	41	36	210
	Sub Total	55	52	42	46	40	235
Pedestrian	Fatal	0	0	0	1	1	2
	Serious	1	0	3	1	0	5
	Slight	6	4	6	6	4	26
	Sub Total	7	4	9	8	5	33
Cyclist	Fatal	0	0	0	0	0	0
	Serious	2	0	2	1	0	5
	Slight	7	12	7	7	11	44
	Sub Total	9	12	9	8	11	49

7.7.12 During the 60-month period between the 1st October 2013 to 30th September 2018, there were 235 collisions resulting in 3 (1%) fatal accident types, 22 (9%) serious accident types and 210 (90%) slight accident types.

7.7.13 Over the entire 5-year period, 35% (82) of the recorded collisions involved a vulnerable road user (pedestrian or cyclists) resulting in 2 fatal accident types, 10 serious accident types and 70 slight accident types. For the individual years, the proportion of collisions involving either cyclists or pedestrians are as follows; 2014: 19.5% (16),

- 2015: 19.5% (16),
- 2016: 22% (18),
- 2017: 19.5% (16); and
- 2018: 19.5% (16).

Casualties Summary

7.7.14 A summary of the casualties across the 54-month period are provided in **Table 7.8**. The table is disaggregated to show casualties including vulnerable road users (pedestrians and cyclists).

Table 7.8: Summary of Casualties (01/01/2013 – 30/09/2018)

Casualties	Injury Severity	Year					Total
		1	2	3	4	5	
Total	Fatal	1	0	0	1	1	3
	Serious	5	4	6	4	3	22
	Slight	61	64	46	48	55	274
	Sub Total	67	68	52	53	59	299
Pedestrian	Fatal	0	0	0	1	1	2
	Serious	1	0	3	1	0	5

Casualties	Injury Severity	Year					Total
		1	2	3	4	5	
	Slight	6	4	6	6	3	25
	Sub Total	7	4	9	8	4	32
Cyclist	Fatal	0	0	0	0	0	0
	Serious	2	0	2	1	0	5
	Slight	7	12	7	7	11	44
	Sub Total	9	12	9	8	11	49

7.7.15 During the 60-month period between the 60-month period between the 1st October 2013 to 30th September 2018, there were 299 casualties resulting in 3 (1%) fatal injuries, 22 (7%) serious injuries and 274 (92%) slight injuries.

7.7.16 Over the entire 5-year period, 27% (81) of casualties involved a pedestrian or cyclists, 11% (32) were pedestrians and 16% (49) cyclists. There were 2 fatalities involving a vulnerable road user and 10 serious casualties. The full PIC assessment for the agreed study area in Bristol City is provided within **Appendix F**.

8 Bristol Airport Forecast Travel Demands

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 BAL projections to 10 mppa and 12 mppa are based on the recorded monthly passenger profile from 2017. This is supported by historic annual trends at Bristol Airport for the past 5 years.

8.2.2 **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

Month	Passenger % per Month	2021 (10 mppa)		2026 (12 mppa)		Difference (2 mppa)	
		Month	Average Day	Month	Average Day	Month	Average Day
January	5.8%	579,019	18,678	69,4823	22,414	115,804	3,736
February	5.9%	594,475	21,231	71,3370	25,478	118,895	4,246
March	7.0%	695,106	22,423	83,4127	26,907	139,021	4,485
April	8.2%	817,698	27,257	98,1238	32,708	163,540	5,451
May	9.4%	942,090	30,390	1,130,508	36,468	188,418	6,078
June	10.3%	1,034,035	34,468	1,240,842	41,361	206,807	6,894
July	10.6%	1,061,809	34,252	1,274,171	41,102	212,362	6,850
August	**11.0%**	**1,098,181**	**35,425**	**1,317,817**	**42,510**	**219,636**	**7,085**
September	10.2%	1,021,950	34,065	1,226,340	40,878	204,390	6,813
October	9.3%	93,4502	30,145	1,121,403	36,174	186,900	6,029

Month	Passenger % per Month	2021 (10 mppa)		2026 (12 mppa)		Difference (2 mppa)	
		Month	Average Day	Month	Average Day	Month	Average Day
November	5.9%	593,448	19,782	712,137	23,738	118,690	3,956
December	6.3%	627,687	20,248	753,224	24,298	125,537	4,050
Year	**100%**	**10,000,000**	**27,397**	**12,000,000**	**32,877**	**2,000,000**	**5,479**

8.2.3 The Development Proposals are predicted to result in a peak daily uplift of 7,085 passengers in the summer month of August.

8.3 Passenger Catchment

8.3.1 Historically, passenger growth at Bristol Airport has been primarily from the South West and South Wales. Passenger growth for 10 mppa and the 12 mppa is predicted to continue in this trend by introducing new flight destinations. This will be more attractive to those from the South West of England and South 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 and South 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)

Region	Passengers per Day in August 10 mppa	Passengers per Day in August 12 mppa	Daily Difference in August
East Midlands	32	32	0

Region	Passengers per Day in August 10 mppa	Passengers per Day in August 12 mppa	Daily Difference in August
East of England	32	32	0
North East	6	6	0
North West	41	41	0
Scotland	61	61	0
South East	429	429	0
South West	27,262	32,909	+5,647
Wales	6,946	8,384	+1,438
West Midlands	590	590	0
Yorkshire	26	26	0
Total	**35,425**	**42,510**	**+7,085**

8.3.4 This shows that on an average day in the peak month of August, an additional 5,646 (80%) of the number of additional passengers associated with the Development Proposals have an origin or destination in the South West.

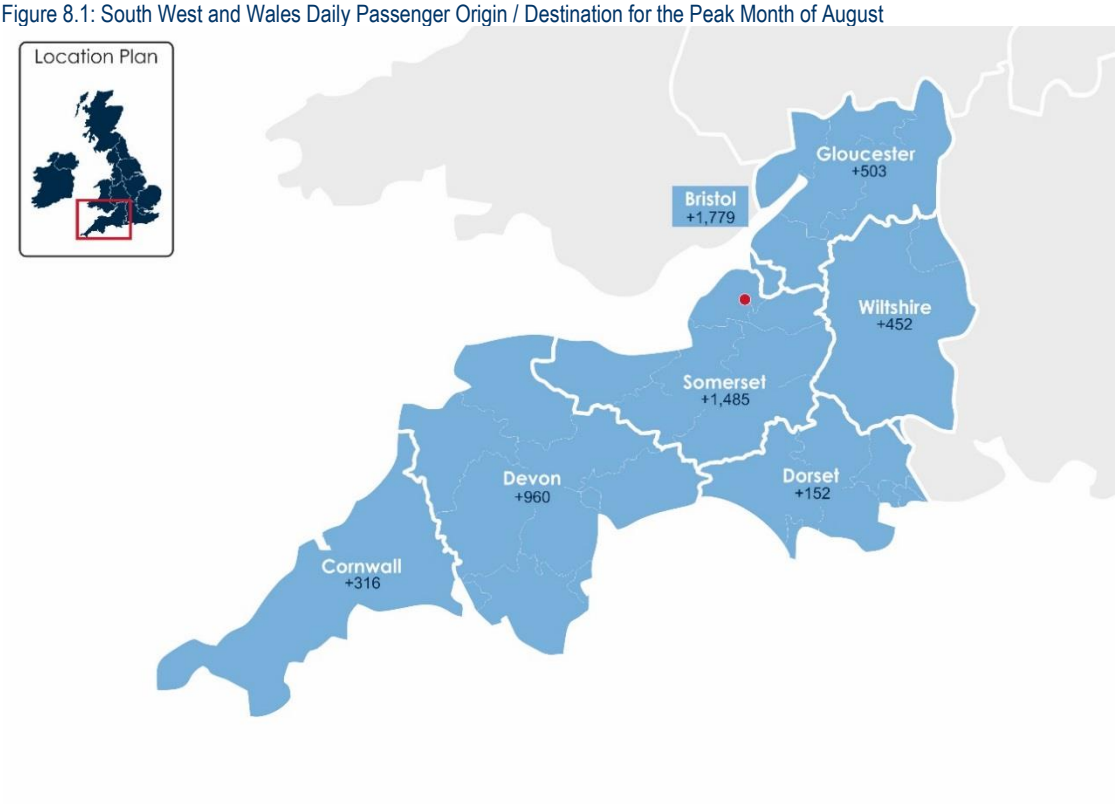
8.3.5 As set out in **Table 8.4**, additional passenger numbers per regional catchment for the South West of England has been determined for the forecast 10 mppa and 12 mppa.

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

South West	Passenger Percentage	Passengers per Day 10 mppa	Passengers per Day 12 mppa	Difference 2 mppa
City of Bristol	31.5%	8,588	10,366	+1,779
Cornwall	5.6%	1,527	1,843	+316
Devon	17.0%	4,635	5,595	+960
Dorset	2.7%	736	889	+152
Gloucestershire	8.9%	2,426	2,929	+503
Somerset	**26.3%**	**7,170**	**8,655**	**+1,485**
Wiltshire	8.0%	2,181	2,633	+452
Total	**100.0%**	**27,262**	**32,909**	**+5,647**

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



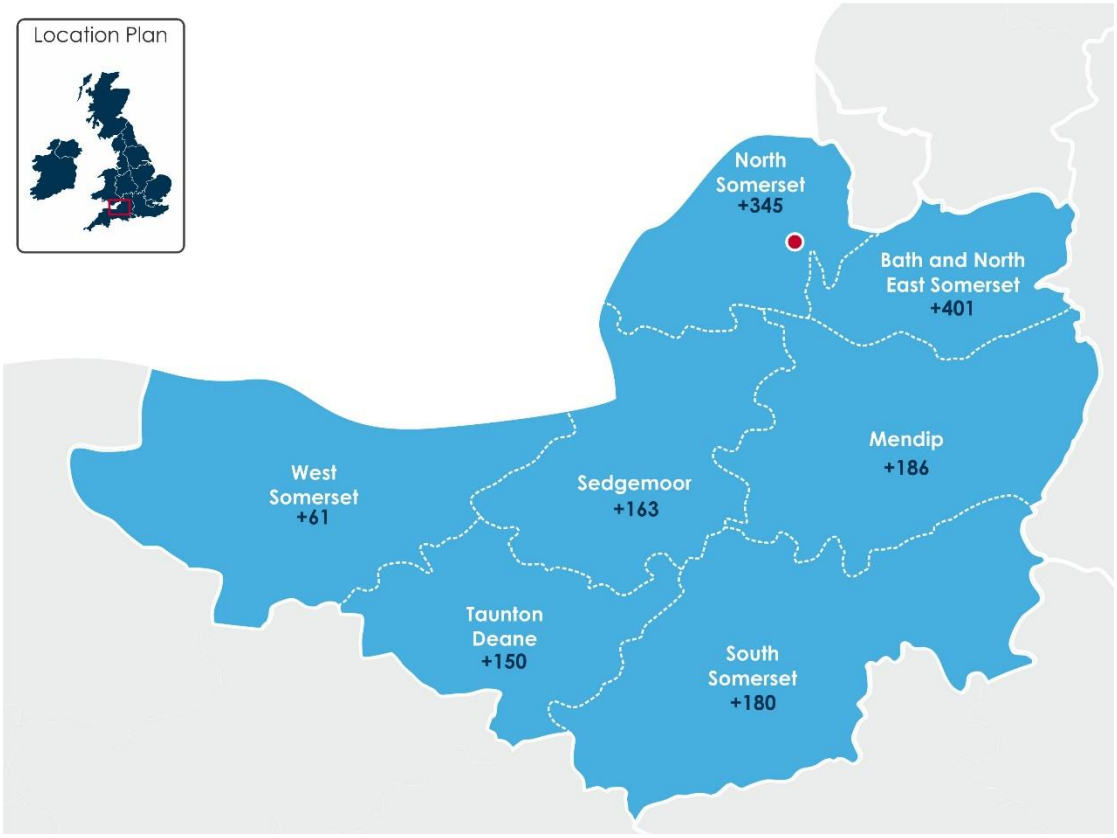
8.3.7 **Table 8.5** presents the additional passenger numbers per catchment within each Local Authority in the wider Somerset area, for an average day in the peak month of August.

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

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

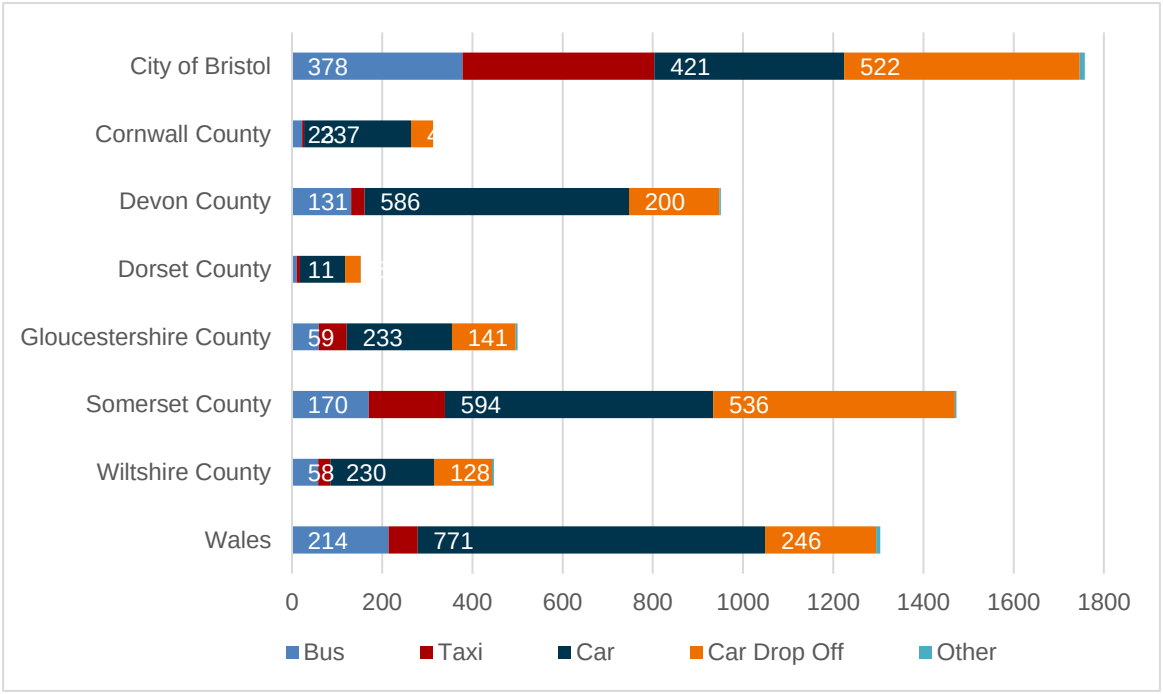
8.4.4 **Table 8.7** presents the predicted daily passenger modal share for each catchment, reflecting the overall 15% public transport modal share, based on CAA passenger survey data. These factors have been utilised for the 10 mppa and 12 mppa scenarios

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%

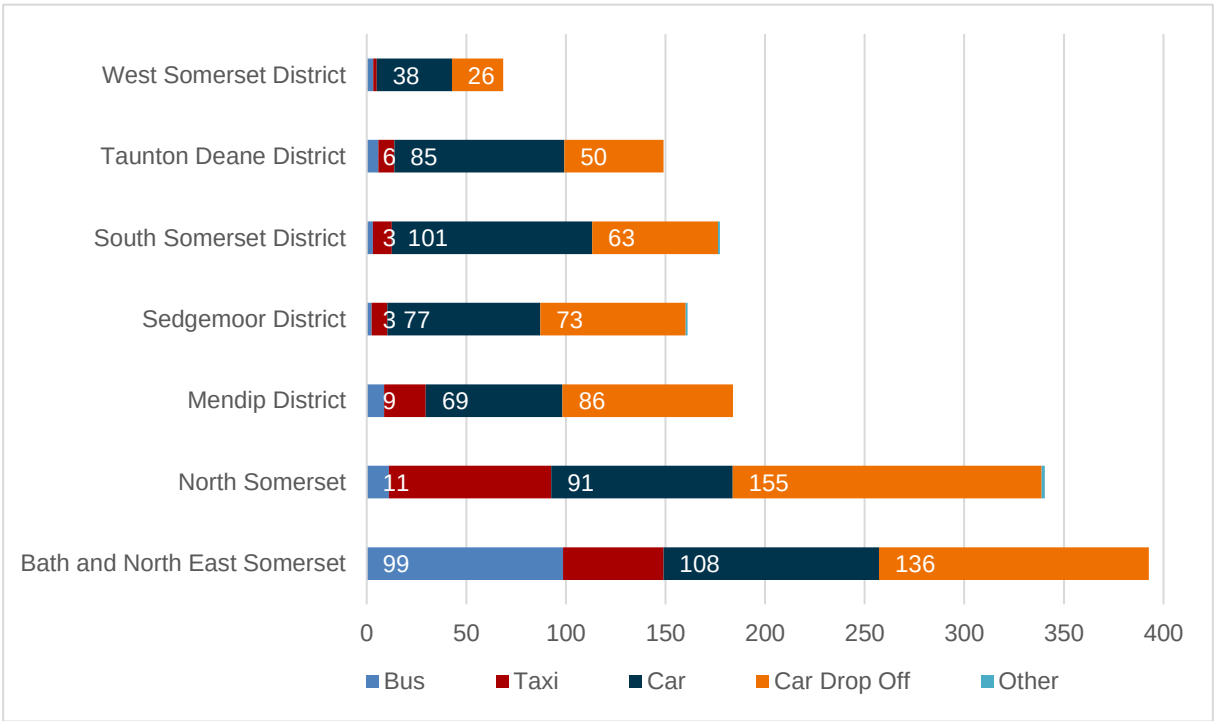
8.4.5 **Figure 8.3** presents the predicted daily passenger modal share for the peak month of August for each growth area.

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



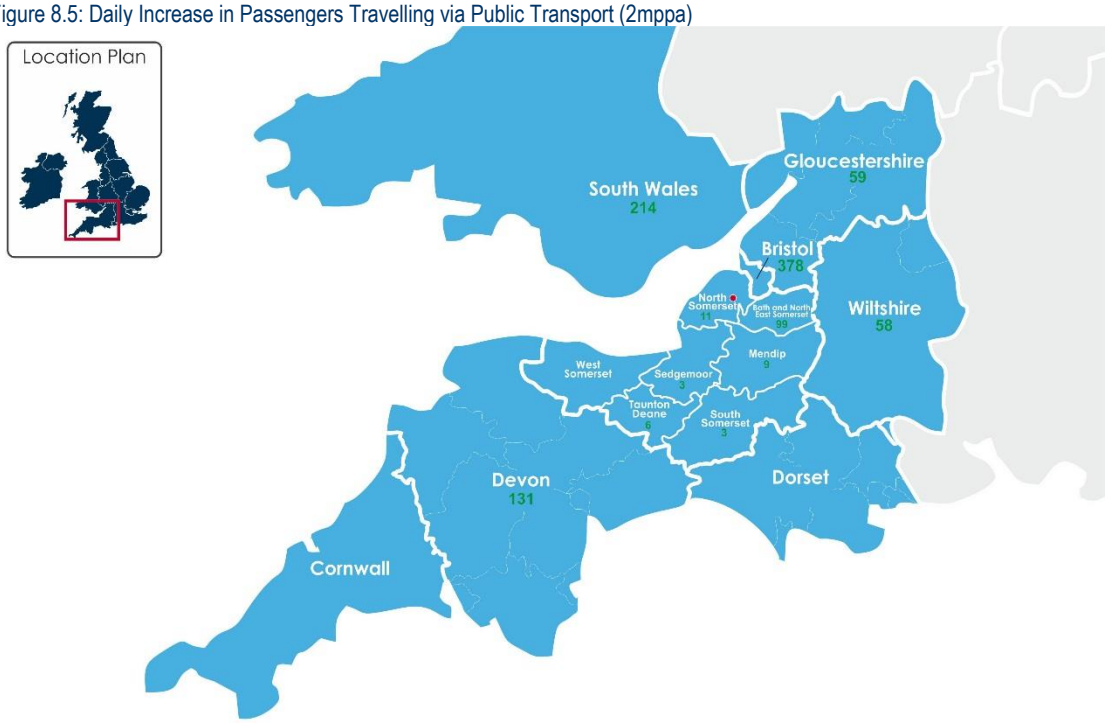
8.4.6 **Figure 8.4** shows the additional passenger modal share for Somerset per Local Authority.

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	South Wales
Taxi / Minicab	1.5	1.5	2.0	2.0	1.5	1.9	1.6	1.7
Car Parked	1.9	2.1	2.0	1.9	2.0	2.0	2.0	2.1
Car Drop Off	1.6	2.5	1.6	1.8	1.6	1.5	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.

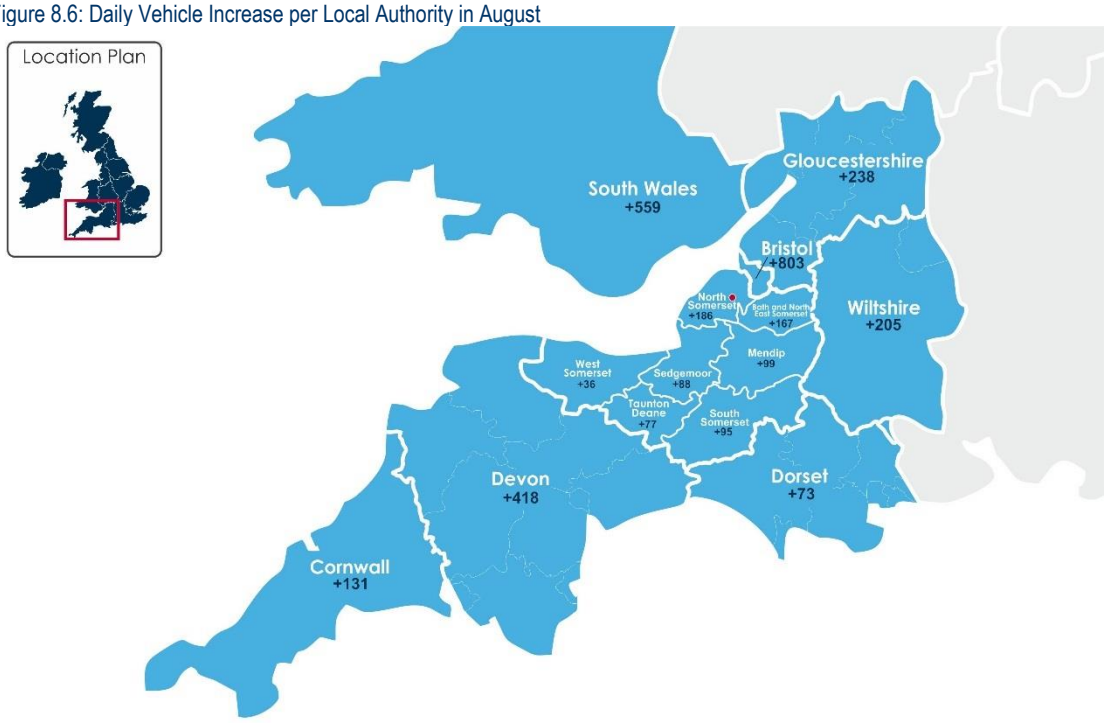
8.4.13 **Table 8.9** presents the predicted daily vehicle increase during the peak month of August, assuming a constant modal split.

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	274	214	315	803
Cornwall	3	109	19	131
Devon	14	283	121	418
Dorset	3	51	19	73
Gloucestershire	40	113	85	238
North Somerset	42	44	100	186
Bath & North East Somerset	26	53	88	167
Mendip District	11	33	55	99
Sedgemoor District	4	37	47	88
South Somerset	5	49	41	95
Taunton Deane	4	41	32	77
West Somerset	1	18	17	36
Wiltshire	16	111	78	205
Wales	38	367	154	559

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

	Time (Minutes)	Cumulative (Minute)
Dwell at Immigration	5 - 20	30 – 60
Baggage Reclaim	5 - 10	35 – 70
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

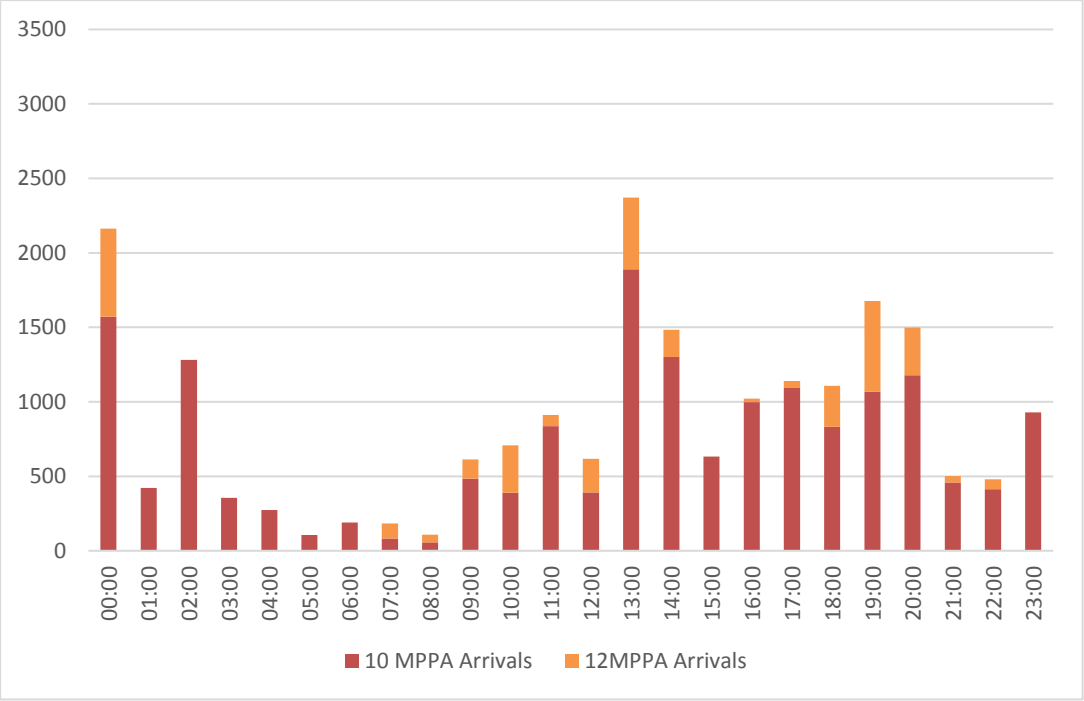
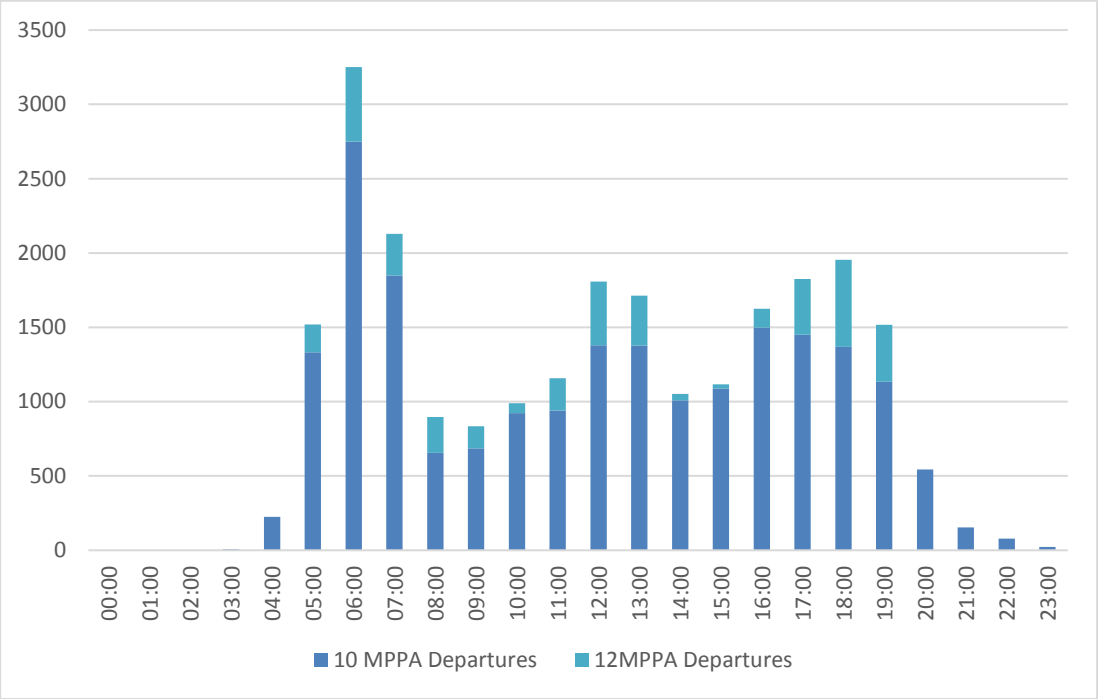


Figure 8.8: Daily Passenger Check In (Departure) Profile in August



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.

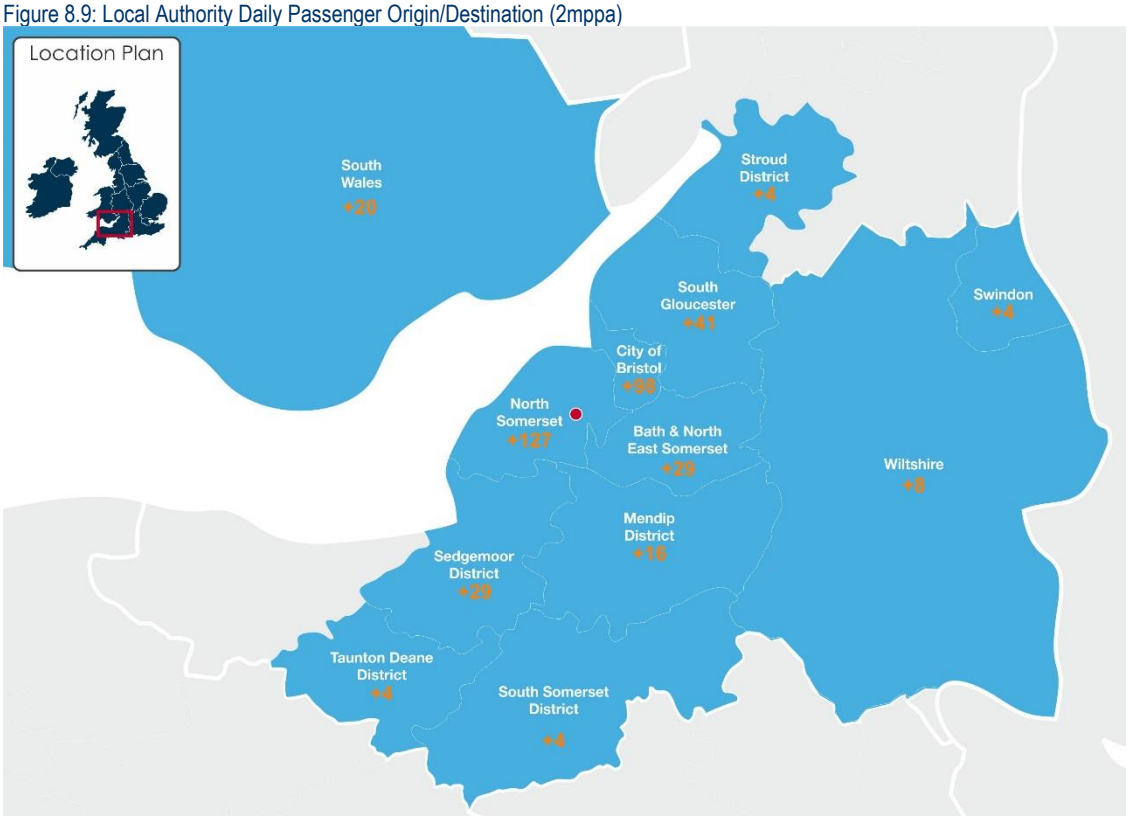
8.6.6 **Table 8.16** presents the projected employees start and finish profiles for the consented 10 mppa and the proposed 1 2mppa. This has been calculated on the level of employees present on any given day during the peak summer months and the shift patterns recorded in the 2017 employees travel survey.

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
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 1 2mppa scenarios.

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

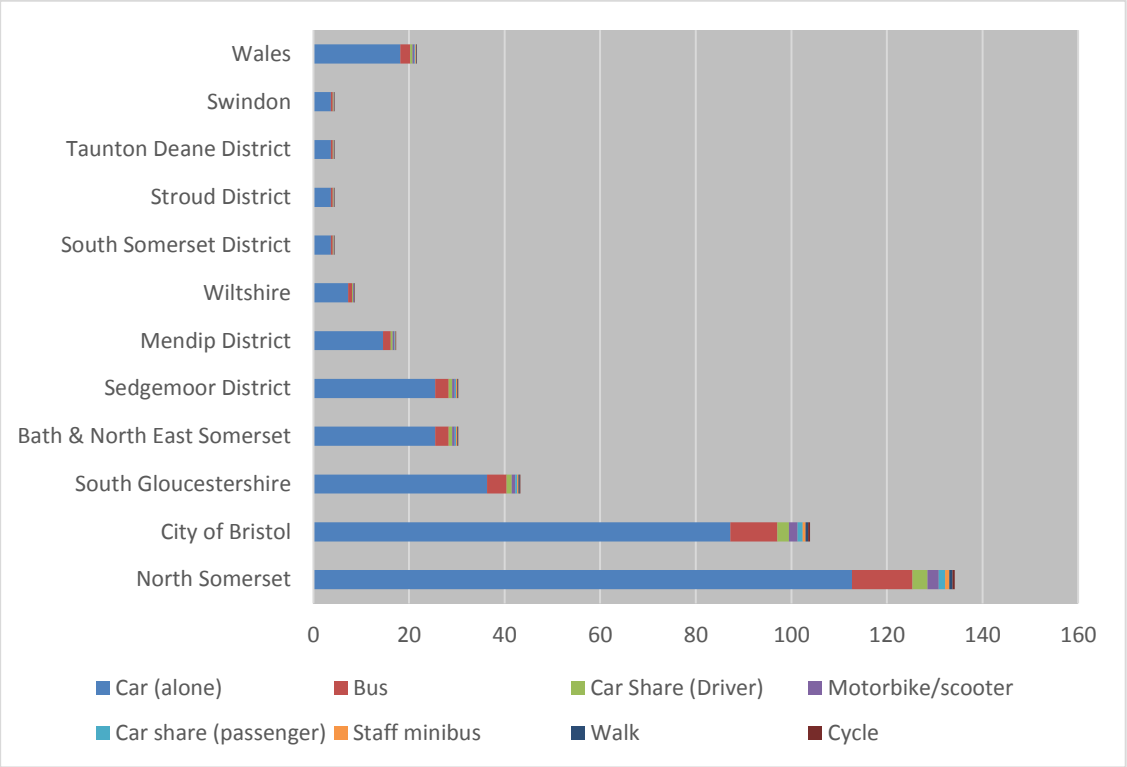


8.7 Employee Modal share

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.

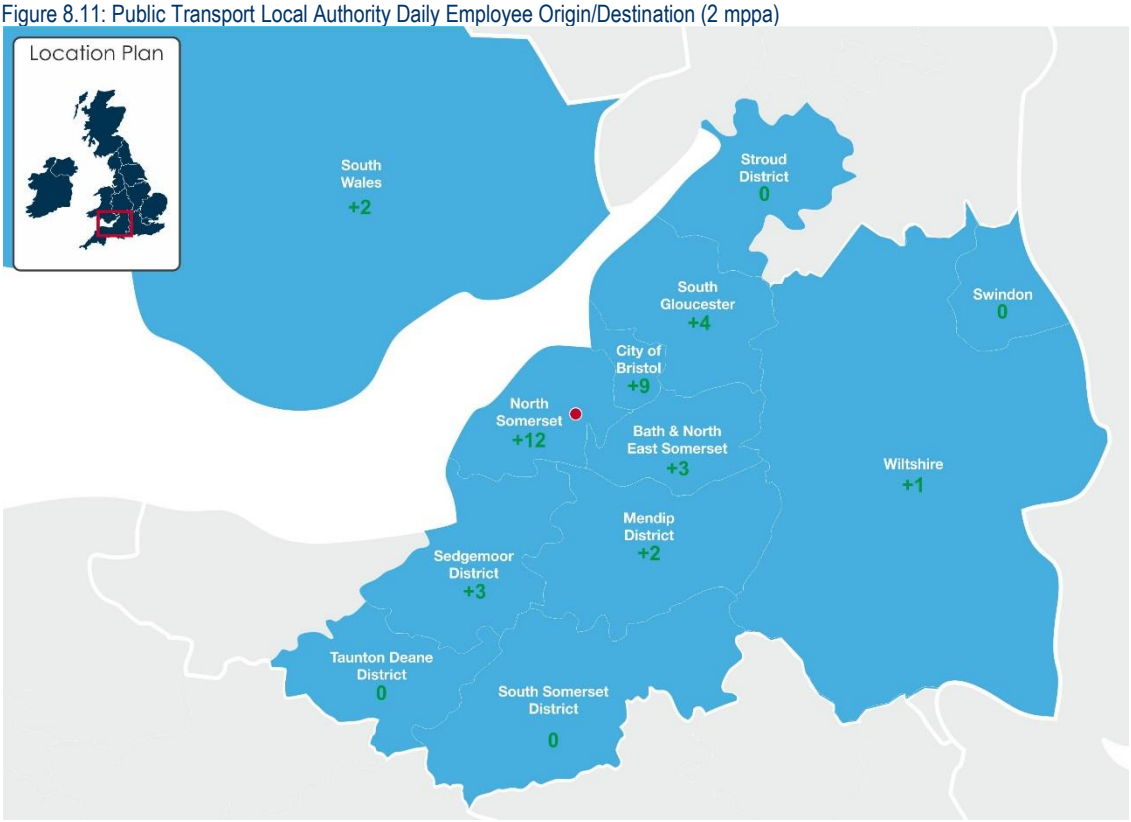
8.7.2 **Figure 8.10** presents the additional (2 mppa) employee modal share in the peak summer months, based on **Table 8.6** and **Figure 8.11**.

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)



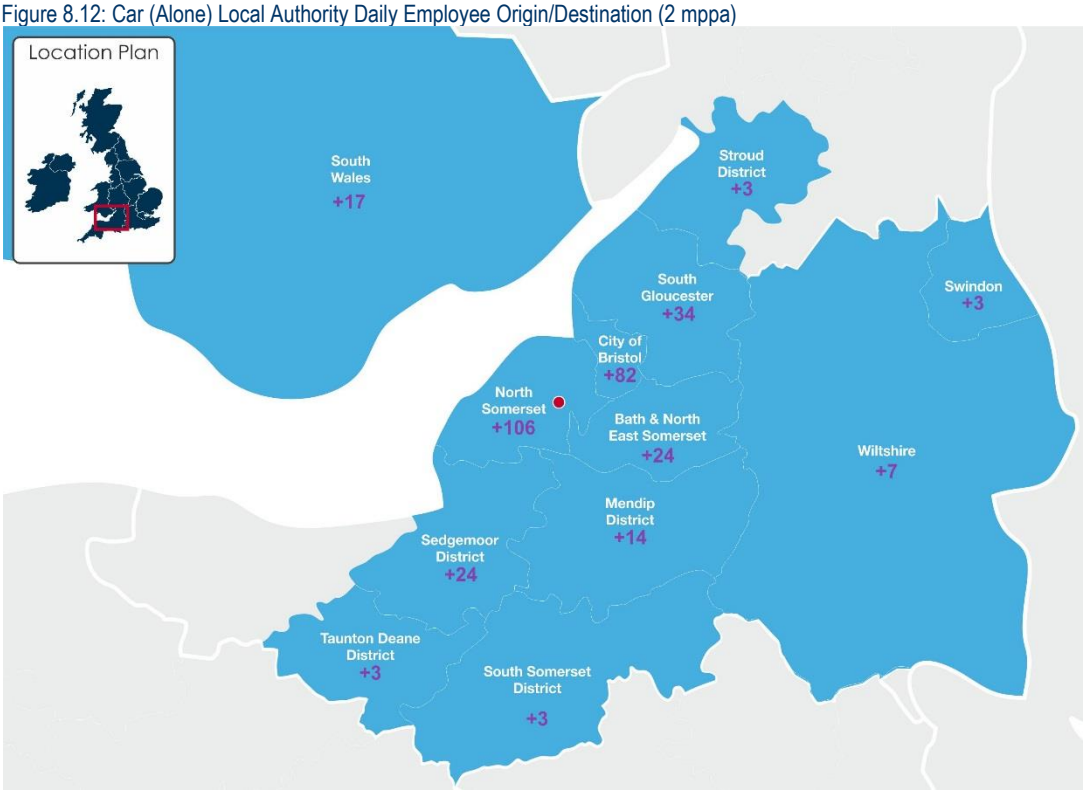
8.7.4 **Table 8.17** sets out the predicted daily additional employees shift patterns for employees who travel to work by public transport. This has been calculated on the level of employees present on any given day, the current shift patterns and modal share recorded in the 2017 employees travel survey. 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
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.

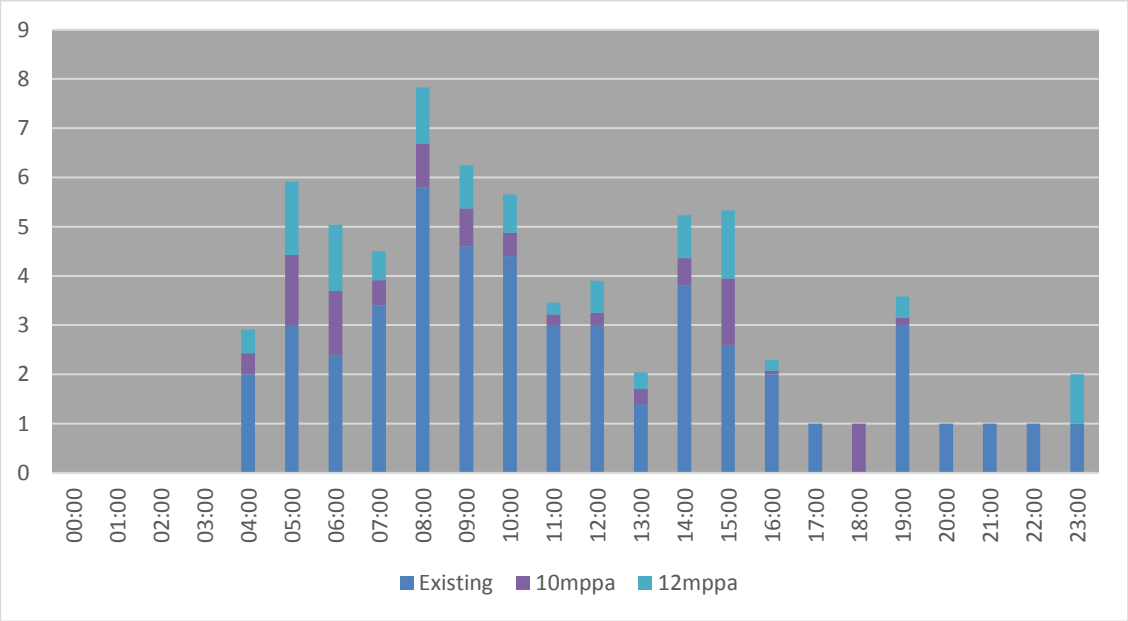
Table 8.19: Additional Logistics Daily Vehicles Profile (10 mppa & 12 mppa)

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
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

Time	Passengers			Employees			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
00:00 - 01:00	0	86	86	1	5	6	1	91	92
01:00 – 02:00	0	0	0	0	4	4	0	4	4
02:00 – 03:00	0	0	0	22	6	28	22	6	28
03:00 – 04:00	0	0	0	24	5	29	24	5	29
04:00 – 05:00	0	0	0	25	4	29	25	4	29
05:00 – 06:00	23	0	23	21	12	33	44	12	56
06:00 – 07:00	61	-22	39	60	11	71	121	-11	110
07:00 – 08:00	34	15	49	52	16	68	86	31	117
08:00 – 09:00	29	7	37	18	0	18	47	7	55
09:00 – 10:00	18	19	37	23	0	23	41	19	60
10:00 – 11:00	8	46	55	1	4	5	9	50	60
11:00 – 12:00	27	11	38	5	4	9	32	15	47
12:00 – 13:00	52	33	85	12	30	42	64	63	127
13:00 – 14:00	41	70	111	1	18	19	42	88	130
14:00 – 15:00	5	27	32	5	6	11	10	33	43
15:00 – 16:00	3	0	3	1	21	22	4	21	25
16:00 – 17:00	16	3	19	2	23	25	18	26	44
17:00 – 18:00	46	6	52	1	22	23	47	28	75
18:00 – 19:00	72	40	112	2	19	21	74	59	133
19:00 – 20:00	47	89	136	13	48	61	60	137	197
20:00 – 21:00	0	46	46	0	9	9	0	55	55
21:00 – 22:00	0	6	6	2	11	13	2	17	19
22:00 – 23:00	0	10	10	1	15	16	1	25	26
23:00 – 24:00	0	0	0	0	0	0	0	0	0
Daily	**484**	**491**	**975**	**292**	**293**	**585**	**776**	**784**	**1,560**

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

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	33	13	46	0	0	0	33	13	46
03:00 – 04:00	0	0	0	4	1	5	0	0	0	4	1	5
04:00 – 05:00	0	0	0	5	1	5	0	0	1	5	1	6
05:00 – 06:00	75	39	114	50	2	52	1	1	3	126	43	169
06:00 – 07:00	163	33	196	47	66	113	1	1	3	211	101	312
07:00 – 08:00	137	106	243	32	30	62	1	1	1	169	138	307
08:00 – 09:00	109	74	183	14	0	14	1	1	2	123	75	199
09:00 – 10:00	92	93	184	14	0	14	1	1	2	107	94	200
10:00 – 11:00	106	165	272	0	1	1	1	1	2	107	167	274
11:00 – 12:00	106	81	187	1	1	2	0	0	0	107	82	189
12:00 – 13:00	227	196	423	30	30	60	1	1	1	258	227	485
13:00 – 14:00	254	298	552	0	3	4	0	0	1	254	302	557
14:00 – 15:00	62	96	158	41	6	47	1	1	2	104	102	206
15:00 – 16:00	11	6	17	14	4	18	1	1	3	27	11	38
16:00 – 17:00	57	38	95	0	4	5	0	0	0	58	42	100
17:00 – 18:00	160	99	259	1	60	61	0	0	0	161	158	319
18:00 – 19:00	303	253	556	35	47	83	0	0	0	338	300	638
19:00 – 20:00	305	369	674	18	35	53	0	0	1	323	404	728
20:00 – 21:00	79	151	230	12	2	13	0	0	0	91	153	244
21:00 – 22:00	11	20	31	0	10	11	0	0	0	11	31	42
22:00 – 23:00	16	31	48	0	4	4	0	0	0	17	35	52
23:00 – 24:00	0	0	0	0	31	31	1	1	2	1	32	33
Daily	**2419**	**2430**	**4849**	**351**	**351**	**702**	**12**	**12**	**24**	**2782**	**2793**	**5575**

9 Surface Access Improvement Opportunities

9.1 Introduction

9.1.1 To ensure more sustainable transport modes are encouraged, a new and ambitious ASAS will be developed as a result of ongoing Section 106 discussions and input from the ATF.

9.1.2 There has already been significant progress towards achieving the consented 10 mppa public transport strategy as outlined in **Section 2.4**. The 12 mppa public transport strategy seeks to build on that progress to enhance accessibility and connectivity further still.

9.1.3 The ASAS will set out:

- proposed improvements to public transport services;
- travel plan measures designed to encourage access to the Airport by sustainable modes; and
- improvements to local highway infrastructure and on-site car parking provision.

9.1.4 These are considered further in the sections below, following a high-level assessment of the existing public transport network which guides the strategy in terms of what level of enhancement will be necessary to meet the continued growth of the Airport.

9.2 Catchment Analysis

9.2.1 Analysis of public transport trip origins and destinations has identified that the current bus network is able to absorb the predicted increase in travel demand from both passengers and employees at the Airport. Origins with the largest number of passengers are the focus of encouraging PT usage. Modal shift is most likely to occur from areas with larger numbers of trips associated with them.

9.2.2 **Figure 9.1** and **Figure 9.2** demonstrate the 12 mppa forecast total people movements by origin and forecast total public transport movements by origin, respectively. This includes both passengers and employees.

Figure 9.1: Total People Movements

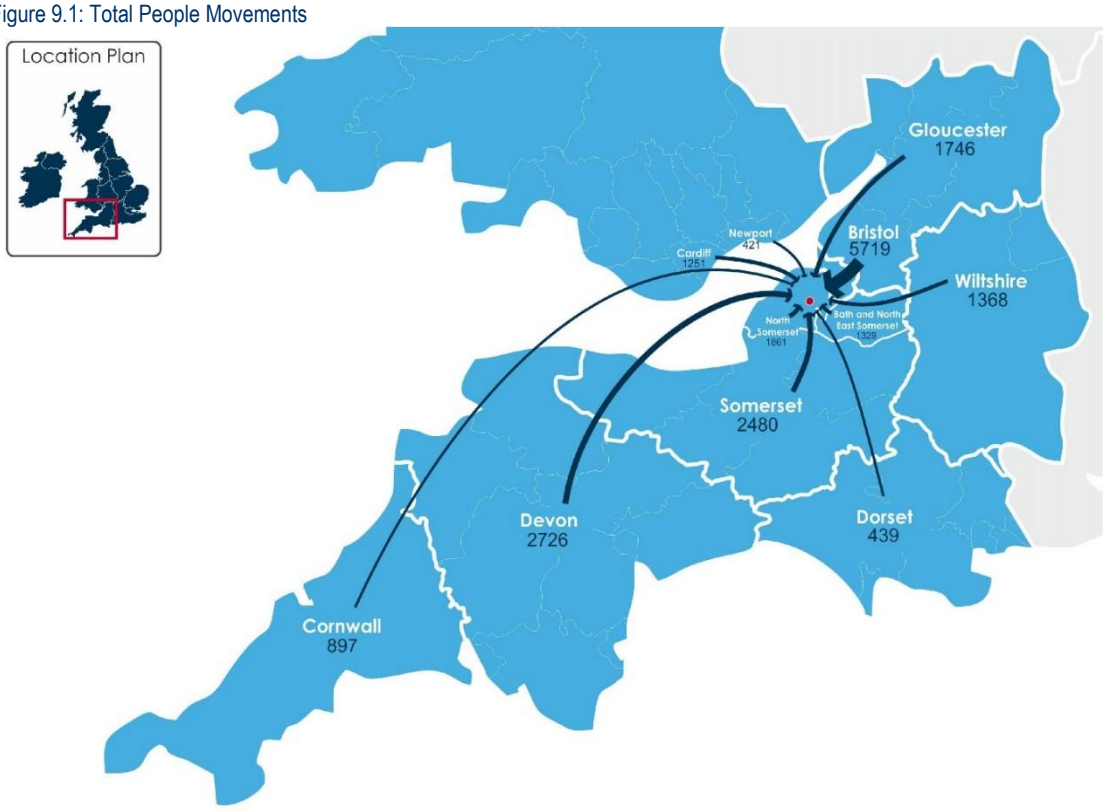
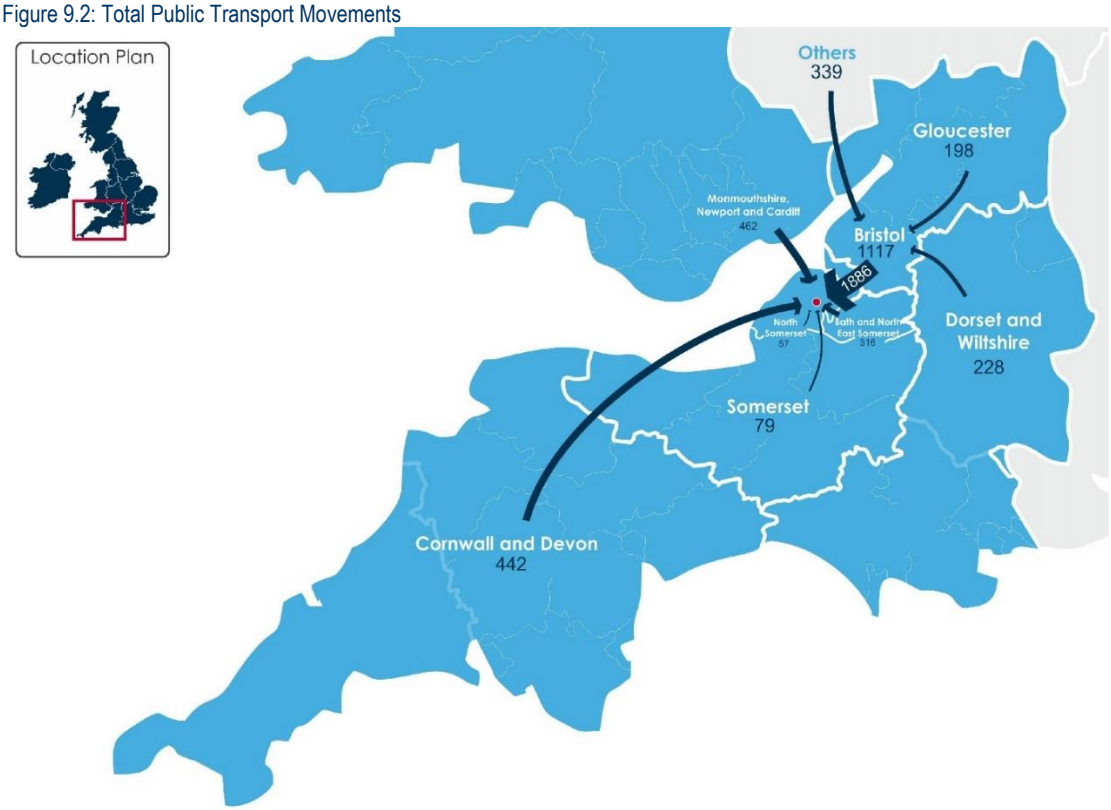


Figure 9.2: Total Public Transport Movements



9.3 Improvements to Public Transport

A370 Corridor Services

9.3.1 At present, the main bus services between Bristol and Weston-super-Mare operate on the A370 corridor. These are as follows:

- ***X1:*** Weston-super-Mare to Bristol via Worle, Congresbury, Backwell and Long Ashton (up to 2 buses per hour);
- ***X2:*** Weston-super-Mare to Bristol via Worle, Congresbury, Claverham and Backwell (up to 2 buses per hour); and
- ***X8:*** Nailsea to Bristol via Backwell (up to 2 buses per hour).

9.3.2 Airport Flyer service A3 provides an additional bus per hour between Weston-super-Mare, Worle and Congresbury.

9.3.3 Journey times between Bristol and Weston-super-Mare are 66 minutes on the X2 and 68 minutes on the X1. This compares unfavourably with the 54-minute journey time achieved by the X1 in 2012, which did not serve Long Ashton or Claverham.

9.3.4 North Somerset Council wish to see the MetroBus network extended to Weston-super-Mare. Subject to further discussions with First, who operate all the existing services on a purely commercial basis, it is considered that a potential opportunity exists to restructure the existing offer on the corridor to provide express limited-stop services between Bristol and Weston-super-Mare. This would be complemented by additional services to Bristol Airport, all utilising MetroBus infrastructure between the city centre and Long Ashton Park & Ride.

9.3.5 Key bus stops on the corridor would be upgraded to receive the guided buses, together with improved facilities for passengers. It is potentially envisaged that between five and ten pairs of bus stops would be served by the new limited-stop express bus services.

9.3.6 Given that the express services would utilise fewer stops than the former X1 service, in the off-peak period end-to-end journey times could potentially be achieved in less than 54 minutes.

9.3.7 Separately, the *West of England Joint Transport Study*, dated October 2017, recommends extension of MetroBus services from Bristol to Nailsea and Clevedon which would potentially

result in infrastructure improvements on the periphery of Bristol and could assist with development of a scheme designed to extend MetroBus towards Weston-super-Mare.

9.3.8 Bristol Airport are actively engaging with First on bus service opportunities and are exploring the potential options for integrating services to the Airport with existing arrangements on the A370 corridor. This may assist with the local authority aspirations of delivering MetroBus services into North Somerset whilst enhancing the attractiveness of the service for both employees and passengers.

Weston-super-Mare Express Bus Link

9.3.9 Service A3 is currently the direct public transport link between Weston-super-Mare and Bristol Airport, currently operating hourly between 03:00 and 00:00 seven days per week. The service is operated by Airport Flyer branded single deck buses with an hourly seating capacity of 72.

9.3.10 This service was introduced in May 2017 and in the eight months of operation to the end of the year carried over 11,000 passengers to and from the Airport. Patronage growth has been encouraging throughout 2018 and it is expected that by 10 mppa there will be sufficient generated travel demand from the Weston-super-Mare area for a higher frequency service to be deliverable.

9.3.11 A service with a frequency of two buses per hour would deliver significant benefits to surface access at the Airport as well as enhancing connectivity between Weston-super-Mare and Congresbury. It would also assist in increasing the attractiveness of the route and increasing bus modal share for Airport journeys within North Somerset.

Public Transport Fund

9.3.12 Bristol Airport currently operate a Public Transport Fund which is utilised to support enhanced local bus services in the area. As part of the 12 mppa application it is proposed to extend this further for the purpose of ongoing development of public transport serving Bristol Airport, which would be managed by the Surface Access Steering Group and would be available for improvements such as:

- Trials of new bus routes, including demand-responsive services;
- Frequency enhancements;
- Service quality upgrades;

- Bus priority measures;
- Passenger interchange improvements;
- Improved passenger information;
- Improved ticketing; and
- Technology innovations and improvements.

Trials of new bus routes, including demand-responsive services

9.3.13 There is considerable potential for delivering increased modal share for the local and regional areas by utilising and enhancing resources already engaged on local bus services to provide new direct connections to the Airport. The Steering Group will consider potential options for new services on a case-by-case basis given the information available on passenger and staff origins overlaid on the existing public transport network.

9.3.14 Some consideration has been given to development of a demand responsive transport (DRT) scheme which would provide more flexible solutions either at off-peak or outside conventional hours or in areas of lower, more dispersed demand. Two potential markets for a DRT-type solution have been identified which are:

- Provision of demand responsive services for staff outside of conventional bus service operating hours; and
- Operation of feeder services to the Airport from the rural hinterland which is currently poorly served by local bus routes.

9.3.15 The provision of services outside conventional hours is often difficult and expensive for commercial bus operators, but is important in an Airport context because of the requirements of staff and passengers who are required to travel early in the morning and late in the evening. As a result, one potential solution to this issue would be to develop a scheme where staff can pre-book transport to and from the Airport from locations where alternative services are not available.

9.3.16 Bath & North East Somerset Council (BaNES) have recently published a study into transport patterns in the Chew Valley – a large and deeply rural area to the east of Bristol Airport. The '*Chew Valley Transport Strategy*', dated October 2017, identified the area as being served by

a significant number of irregular bus services. This may be a future opportunity for joint working on a demand-responsive transport scheme.

Frequency Enhancements

9.3.17 Bristol Airport is served by a comprehensive package of public transport services which meet and exceed the current demand. Analysis indicates that the existing level of service will be sufficient to meet the needs of an expanded Airport, apart from an increase in frequency to Weston-super-Mare.

9.3.18 As the Airport grows, close attention will be paid to the need for additional capacity on the public transport network. The Steering Group will consider each route on a case-by-case basis and utilise the latest data to identify whether an increase in frequency is necessary and/or desirable.

9.3.19 Enhancements, potentially to hours of operation, may be considered on some routes not operating directly to the Airport where there is anticipated demand for connections to the Flyer service (for example, earlier starts on urban bus routes in Bristol to enable early morning travel).

Service Quality Upgrades

9.3.20 Most bus and coach services to the Airport are operated with new, high specification vehicles. BAL will keep under review, via the Steering Group, the need for future enhancements which may tie in to interchange or information improvements being proposed (for example, audio-visual equipment on buses).

Bus Priority Measures

9.3.21 Services to Bristol Airport currently benefit from extensive bus priority on the South Bristol Link and the MetroBus infrastructure into and within Bristol city centre. Further measures may be considered on the A38 corridor where prudent and technically feasible to do so, through such measures as:

- Bus lanes;
- Bus priority roads;
- Signal detection at key junctions; and
- Waiting and loading restrictions.

9.3.22 Such measures would require significant work with stakeholders to identify suitable schemes and take them forward through the usual planning process.

Passenger Interchange Improvements

9.3.23 In addition to providing high quality, comfortable and accessible public transport services, consideration must also be given to the specification of facilities at key interchange locations so that passengers feel comfortable making travel choices that involve a change of vehicle or mode.

9.3.24 Bristol Temple Meads is a significant gateway to the Airport Flyer bus service. As the primary access to the National Rail network serving a wide variety of regional and national destinations, it is considered of significant importance that the bus stop facilities at the station are:

- Easy to locate;
- Maintained to a high standard;
- Equipped with passenger information;
- Secure and well-lit;
- Covered with a shelter or canopy; and
- Not in conflict with high-flow pedestrian or vehicle movements.

9.3.25 The Airport Flyer stop was located immediately outside the main station entrance until the service was converted to double deck operation, upon which it was deemed necessary to relocate the bus stop to prevent a potential collision with the station canopy.

9.3.26 Bristol Temple Meads is a listed building of national importance and the provision of extensive bus passenger infrastructure has traditionally been difficult. As a result, the current bus stop suffers from a poor waiting environment with no shelter, no electronic information and on the main pedestrian route from Temple Gate. It is also the last bus stop on the station approach, has no dedicated provision, and suffers from congestion as Flyer services in both directions must share with terminating city services on other routes.

9.3.27 The Airport are in dialogue with Network Rail and Great Western Railway about the bus stop issues at Bristol Temple Meads. These will be ongoing and a fund has been set aside for improvements to the bus stop facilities should agreement be reached on the type, style and location of facilities to be provided.

9.3.28 In addition to Bristol Temple Meads, other strategic interchanges exist in Weston-super-Mare town centre and at Worle railway station where connections can be made to destinations in Devon and Somerset. The Airport will look to work with North Somerset Council regarding these locations and potential opportunities for their enhancement.

Improved Passenger Information

9.3.29 The Airport Flyer fleet has been designed to a high-quality specification. The brand-new vehicles are equipped with leather seats, additional luggage space and free wi-fi; however, there are additional incremental improvements that could be made to information provision on the service and at the Airport which would provide extra amenity to passengers who may not be familiar with Bristol or who may require additional assistance with their journey.

9.3.30 The public transport fund to be delivered through the Section 106 Agreement may be used in part to deliver information improvements such as installing RTPI capability at the Airport, facilitate the introduction of on-bus screen and audio-visual stop announcements on all bus routes, or the introduction of i-points (information screen and ticket sales) at stops which would speed boarding times and reduce queuing for the bus.

Improved Ticketing

9.3.31 Passengers and staff accessing Bristol Airport via the National Rail network can purchase through tickets via online portals, at booking offices and on trains where applicable. However, such a facility is not available in reverse where passengers arriving at Bristol Airport are required to purchase a bus ticket to Bristol city centre before an onward ticket to a National Rail destination; similarly, there is no facility at the Airport to collect pre-paid online tickets.

9.3.32 As part of the development of an integrated travel centre within the Airport, it is anticipated that tickets for the National Rail network will be available. Further discussions are being held with stakeholders to secure this enhancement for the benefit of passengers and staff.

9.3.33 In addition, the Airport will seek to secure the wider promotion of the dedicated bus services to the Airport across the National Rail network to raise awareness of the access possibilities from the Midlands, South Wales and South West by rail/bus interchange at Bristol Temple Meads and Weston-super-Mare.

Technology Innovations & Improvements

9.3.34 Transport technology is constantly innovating and evolving over time; therefore, it is important that consideration is given to some of the emerging technologies which will shape the future of urban transport. These include:

- Connected vehicle communications;
- Autonomous public transport vehicles; and
- Mobility as a Service (MaaS).

9.3.35 Public transport services are expected to be amongst the first mass applications of autonomy in the sector. Major developments are well placed to offer this as a potential transport solution given the ability to construct and maintain segregated routes around sites which can be used safely with minimal interruption from general traffic.

9.3.36 Small, electrically propelled shuttle services could provide quiet, emission-free transport in areas such as the airside locations and in public zones (e.g. car parks) within the apron of the Airport.

9.3.37 MaaS, short for Mobility as a Service, brings all means of travel together. It combines options from different transport providers into a single mobile service, removing the hassle of planning and one-off payments.

9.3.38 The concept is being trialed in a number of locations, e.g. Birmingham in the UK where the 'Whim' brand offers a number of package options at varying prices where for a fixed monthly fee (taken by Direct Debit) users have unlimited access to bus services, rail services, car hire, bike hire (when available) and taxi use from selected companies.

9.3.39 The service is based around a smartphone app; the user books transport or uses the app as a ticket for public transport services.

9.3.40 Bringing MaaS together successfully requires the support and co-operation of a number of partners such as the major bus operator(s), taxi services, car hire companies, bike hire schemes and rail operators. In Bristol, the EU Replicate project is seeking to support sustainable mobility and some of the key elements required for MaaS are being proposed, such as electric bus services, personalized mobility applications, car clubs and e-bikes.

9.3.41 The Airport will consider the potential opportunities for use of these emerging technologies as and when appropriate and cost-effective market-driven solutions are available.

Promotion of Coach Services

9.3.42 Bristol Airport is currently served by two regular coach routes:

- Stagecoach Falcon: an hourly service from Plymouth, Exeter, Taunton and Bridgwater to Bristol Airport and Bristol city centre; and
- National Express 216: a 2-hourly service from Cardiff and Newport.

9.3.43 The Airport has worked with coach operators to enhance the regional network of destinations available by public transport. The 10 mppa permission included a commitment to work

towards developing such a network and this has been achieved ahead of schedule through the provision of these frequent and attractive coach routes which operate 24 hours a day, 7 days per week.

9.3.44 BAL will continue to work with coach operators to develop the existing routes and to encourage new provision where possible. The existing coach services are well aligned with the key areas of expected patronage growth in the South West and South Wales; therefore, further development of these services is seen as the most beneficial means of securing improved public transport modal share.

9.4 Taxis & Private Hire Provision

9.4.1 BAL recognise the impact that waiting taxis and private hire vehicles can have on local communities. Through engagement with the Airport Transport Forum and from dialogue with other local stakeholders, the Airport are aware that villages and local roads close to the terminal can be subject to a significant increase in parking demand.

9.4.2 As a result, BAL is considering the introduction of an Authorised Waiting Zone for taxis and private hire vehicles as part of the 12 mppa application. This would be a facility where such vehicles can await the arrival of their passengers. Such a facility would be introduced as part of a partnership approach with local stakeholders, including the Police and the local enforcement bodies, to introduce local on-street parking controls in the areas affected.

9.4.3 Heathrow Airport introduced a similar Authorised Waiting Zone on a trial basis in 2018 when local residents and businesses expressed their concerns about the number of private hire vehicles waiting in local residential areas. This is a dedicated area for private hire vehicles and licensed taxis in which to wait for passengers prior to picking up from a short stay car park and meeting at an agreed location within the terminal; open 7 days a week, facilities include vending machines, hot refreshments, a covered smoking area, toilets and litter bins throughout.

9.5 Walking & Cycling Improvements

9.5.1 Walking and cycling improvements as part of the 12 mppa application include:

A38 / Downside Road Junction

9.5.2 As part of the proposed Masterplan and strategy to improve surface access to Bristol Airport, the A38/ Downside Road junction, to the north of the site, is to be upgraded. The scheme is being developed to improve footway and cycleway facilities.

9.6 Road Access

9.6.1 Highway improvements as part of the 12 mppa application include:

A38 / Downside Road Junction

9.6.2 As part of the proposed Masterplan and strategy to improve surface access to Bristol Airport, the A38/ Downside Road junction, to the north of the site, is to be upgraded.

9.6.3 As set out in Section 4.3 BAL is proposing to undertake a significant improvement of the A38 between the main airport access roundabout and West Lane to accommodate any additional traffic generated by an extra 2 mppa. The main carriageway over this length will be increased in width to allow two through lanes to be provided on each carriageway. The widening will be mainly undertaken on the western side of the road providing an overall width of 16m. The improvements taper back to join the existing carriageway width some 130m beyond West Lane. A dedicated lane will be provided for northbound traffic turning left into Downside Road, along with a right turn lane into West Lane. The centre of the carriageway will be hatched or have traffic islands to separate traffic flows. Downside Road will be widened to two lanes for 80m prior to the junction with the A38 and new access provided into the Airport Tavern car park.

9.6.4 The existing footway / cycle track will remain on the eastern side of the A38, with a new footway provided north of the West Lane junction. An enhanced footway / cycle track will be provided on the western side of the road between the airport and Downside Road, with a footway provided for the section north of the Downside road tying in with the existing facility north of West Lane. Pedestrian and cycle facilities will be provided within the Downside Road junction and the design will incorporate drop kerbs. Bus stops will be maintained albeit adjusted for the new alignment. Access will also be maintained to the footpath which runs along the western boundary of the Airport Tavern land towards Lulsgate Bottom.

Drop Offs

9.6.5 The current express drop-off lane that is used by taxis, buses and authorised vehicles will be altered as part of the proposed Masterplan. As part of the 10 mppa consent, a new transport interchange hub, with a dedicated drop-off zone, will be built above the MSCP to the north of the terminal. There will be a footbridge connecting the transport interchange directly into the terminal building. The transport interchange will be utilised by taxis, private hire vehicles, buses, coaches and car drop-offs.

9.7 Employee Travel Plan Measures

9.7.1 The updated Workplace Travel Plan sets out measures to encourage travel by walking, cycling, public transport and car sharing. These are summarised below:

- Management Measures:
  - Travel Plan Co-ordinator

- TPC participation in the Employee forum
- TPC participation in the Airport Transport Forum
- TPC participation in the Surface Access Steering Group

- Car Sharing;
  - Provision of Liftshare Service
- Public Transport;
  - Provision of existing bus services
  - Potential Bus Service Improvements
  - Potential New Bus Services
  - Promotion of Coach Services
  - Discounted Employee Travel
  - Upgrade of Public Transport Travel Information
  - Ticketing Improvements
  - Potential Technology Improvements
- Taxi;
  - Provision of new waiting and drop off zone and local parking control measures
- Cycling;
  - Additional cycle parking at key locations
  - Encouragement to provide shower / changing facilities
- Walking;
  - Provision of incentives
  - Publicization of bus services that are within walking distance to employee home address
- Reduce the Need to Travel;
  - Tele / Video Conferencing
  - Working from home
  - Agile working
  - External visitor hours arranged outside peak hours
  - Servicing / deliveries outside of peak hours
- Electric Vehicles;

- Additional charging points provided
- Future airport logistics vehicles to run on electric

- Information Provision;
  - Marketing Strategy
  - Travel Plan Relaunch
  - Marketing Budget
  - Travel Plan Leaflet
  - Information Pack to new employees
  - Transport information dissemination

9.8 Summary of Surface Access Improvements

9.8.1 **Table 9.1** below summarises the key improvement opportunities that have been identified in this chapter of the report.

Table 9.1: Key Surface Access Improvement Opportunities

Area	Opportunity
Public Transport	Improvement to bus services and infrastructure on the A370 corridor
	Enhancement of Weston-super-Mare express bus link
	Extension of the public transport fund to support new routes and infrastructure enhancements
	Promotion and development of longer distance bus and coach services
Taxi & Private Hire	Consideration of Authorised Waiting Zone
Walking & Cycling	An enhanced footway / cycle track will be provided on the western side of the A38 between the airport and Downside Road, with a footway provided for the section north of the Downside road tying in with the existing facility north of West Lane.
Road Access	Carriageway widening on A38 between north and south access junctions
	Improved capacity at A38/Downside Road junction
Drop Offs	Dedicated drop-off zone with public transport interchange

9.8.2 The proposed package offers a robust and deliverable set of enhancements which will improve connectivity by all surface access modes to the Airport whilst delivering on the commitment to promote sustainable means of travel.

9.8.3 Public transport opportunities are focused on the areas of greatest travel demand and seek to better utilise existing provision as well as make targeted improvements where necessary. The proposed fund will cover a broad range of measures incorporating service delivery and infrastructure, which will be supported by Travel Plan measures to make sustainable travel options a real choice for passengers and employees.

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 it is also necessary to establish the vehicle movements associated with the permitted 10 mppa scheme. Once any vehicle increases are identified it will be possible to compare this with future network flows and information on the operation of existing junctions to determine which areas require consideration in more detail.

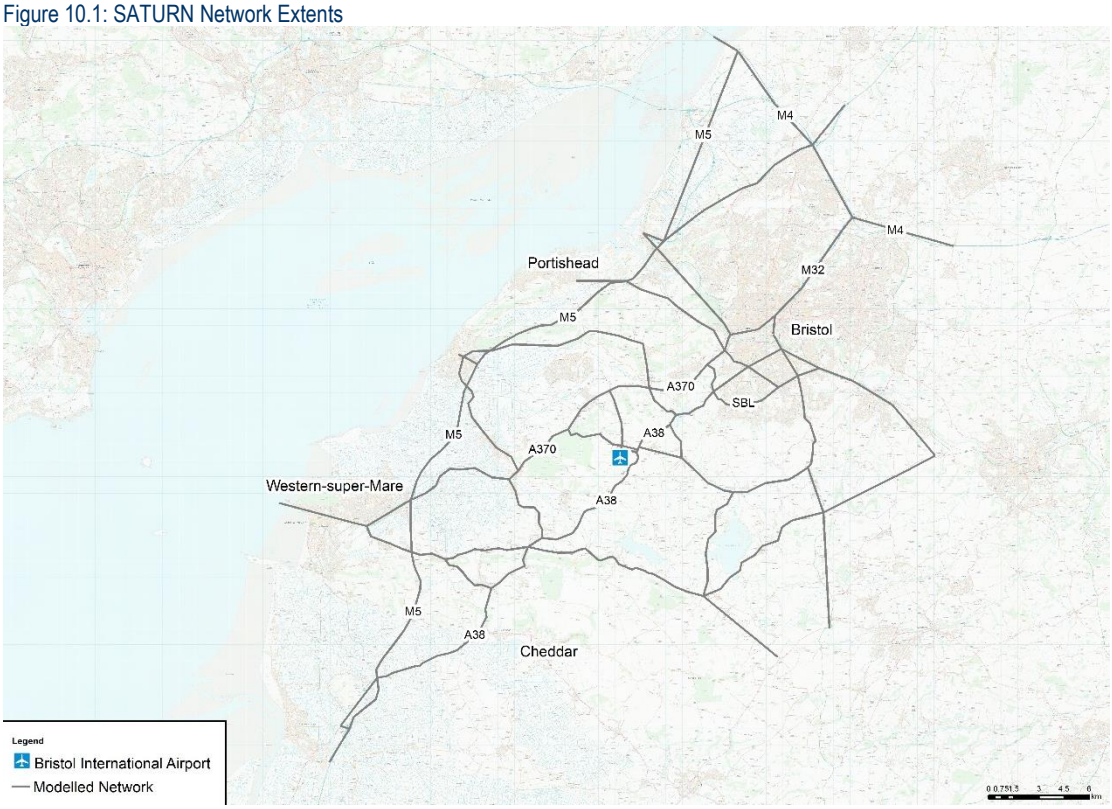
10.1.2 This chapter therefore sets out the approach and methodology adopted for assigning the vehicular trip generation for the consented 10 mppa and the proposed 12 mppa scenarios at Bristol Airport.

10.2 Methodology

10.2.1 To assess the impact of the increase in patronage to 10 and 12 mppa at Bristol Airport, a basic buffer network has been developed within SATURN to identify the impact 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 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 assigned 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 assessed in addition to the 2018 recorded traffic volumes, scaled up to the year 2026 using TEMPro growth rates. This enabled the total 10 mppa and subsequently the 12 mppa traffic volumes to be assigned using the BASHT. The growth assumptions are set out in **Section 7.6**.

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).

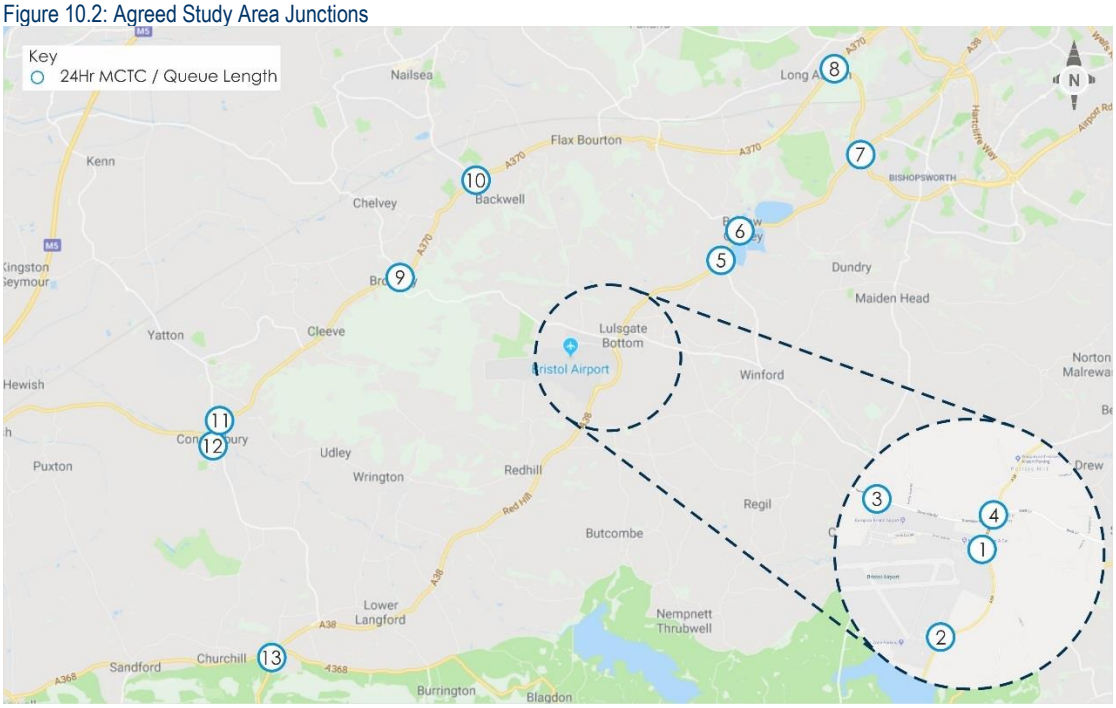
10.2.8 Assigned traffic network diagrams for each scenario and time period have been provided in **Appendix G**.

10.2.9 These outputs have informed 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	2,480	188	2,668	7.6%
		Airport Peak	2,984	531	3,515	17.8%
		PM	3,299	306	3,605	9.3%
2	A38 / Bristol Airport Southern Roundabout	AM	1,935	63	1,997	3.2%
		Airport Peak	1,774	181	1,955	10.2%
		PM	2,081	98	2,179	4.7%
3	Downside Road / Bristol Airport Service Access	AM	788	13	801	1.6%
		Airport Peak	527	27	555	5.1%
		PM	671	30	701	4.5%
4a	A38 / Downside Road	AM	2,908	154	3,062	5.3%
		Airport Peak	2,910	429	3,339	14.7%
		PM	3,496	254	3,750	7.3%
4b	A38 / West Lane	AM	2,587	141	2,728	5.4%

Junction Ref No	Junction Name	Time Period	2026 Reference Case	Forecast Development Traffic	2026 Test Case	% Increase
		Airport Peak	2,637	402	3,038	15.2%
		PM	3,078	224	3,302	7.3%
5	A38 / Barrow Lane	AM	2,572	115	2,687	4.5%
		Airport Peak	2,371	329	2,700	13.9%
		PM	2,893	182	3,075	6.3%
6	A38 / Barrow Street	AM	2,777	115	2,892	4.1%
		Airport Peak	2,459	329	2,788	13.4%
		PM	3,014	182	3,196	6.0%
7	A38 / A4174 SBL	AM	3,816	115	3,931	3.0%
		Airport Peak	3,137	329	3,466	10.5%
		PM	3,952	182	4,134	4.6%
8	A370 / A4174 SBL	AM	3,472	64	3,536	1.8%
		Airport Peak	2,962	185	3,147	6.2%
		PM	3,811	99	3,910	2.6%
9	A370 / Brockley Combe Road / Brockley Lane	AM	1,770	10	1,779	0.6%
		Airport Peak	1,402	27	1,429	1.9%
		PM	1,951	29	1,979	1.5%
10	A370 / Dark Lane / Station Road	AM	1,797	-	1,797	0.0%
		Airport Peak	1,602	-	1,602	0.0%
		PM	2,081	-	2,081	0.0%
11	A370 / Smallway	AM	2,251	13	2,264	0.6%
		Airport Peak	1,937	27	1,965	1.4%
		PM	2,509	30	2,539	1.2%
12	A370 / High Street	AM	2,433	-	2,433	0.0%
		Airport Peak	2,024	-	2,024	0.0%
		PM	2,633	-	2,633	0.0%
13	A38 / A368	AM	2,333	43	2,376	1.8%
		Airport Peak	1,892	124	2,016	6.5%
		PM	2,415	66	2,481	2.7%

10.3.3 To determine which of the junctions in the study area require more detailed consideration, the 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 2 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 1.5 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). 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 2 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 The airport peak time period (13:00 – 14:00) shows the greatest vehicle uplift as a result of the Development Proposals at A38 / A368 signalised crossroad (Junction 13). The overall predicted traffic in the 2026 test case (2,016) is 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. Given the above evidence, no further assessment is required at this junction

10.4 Highways England Junctions Net Trip Generation

10.4.1 During the pre-application process, Highways England requested M5 junctions 18 to 22 to be considered as part of the numerical assessment.

10.4.2 The junctions did not form part of the agreed traffic survey study area, and therefore the existing junction operations cannot be quantified as part of this assessment. However, an overall analysis of traffic volume increase has been undertaken.

10.4.3 As described in **Section 10.2**, the BASHT is an all or nothing assignment tool. Therefore, all traffic to or from the south has been routed through Junction 22 and all the traffic to or from the north has been routed through Junction 18. The SATURN plots have been provided in **Appendix I**.

10.4.4 **Table 10.2** summarises the additional traffic that is forecast to pass through the junctions requested during the AM (08:00-09:00), PM (17:00-18:00) and Airport (13:00-14:00) peaks.

Table 10.2: Forecast Development Traffic Passing through M5 Junctions 18 and 22

Time Period	Junction 18		Junction 22	
	Inbound	Outbound	Inbound	Outbound
AM Peak	19	11	25	15
Airport Peak	27	18	65	54
PM Peak	40	49	25	36

10.4.5 Given the above, the vehicle increases at Junctions 18 and 22 of the M5 motorway are unlikely to be considered 'severe' in the context of the NPPF (2018). Further assessment of the above junctions is not considered to be required.

11 Residual Highway Impacts

11.1 Introduction

11.1.1 BAL intend on developing an ambitious ASAS through Section 106 and ATF 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 & J2)

Existing Layout

11.2.1 The results of the junction capacity assessment at the existing A38 roundabouts with Bristol Airport are summarised in **Table 11.1**.

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

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		RFC	Queue	RFC	Queue	RFC	Queue
2018 Baseline							
A38 / Northern Roundabout	A38 (N)	0.46	0.9	0.46	0.9	0.59	1.4
	Cul-de-sac	0.03	0.0	0.05	0.0	0.09	0.1
	A38 (S)	0.58	1.4	0.39	0.7	0.55	1.2
	Bristol Airport	0.19	0.2	0.39	0.6	0.39	0.6
A38 / Southern Roundabout	A38 (N)	0.32	0.5	0.35	0.5	0.43	0.7
	A38 (S)	0.45	0.8	0.23	0.3	0.34	0.5
	Bristol Airport	0.09	0.1	0.19	0.2	0.19	0.2
2026 Reference Case							
A38 / Northern Roundabout	A38 (N)	0.57	1.3	0.62	1.6	0.73	2.7
	Cul-de-sac	0.04	0.0	0.08	0.1	0.16	0.2
	A38 (S)	0.73	2.6	0.54	1.2	0.72	2.6
	Bristol Airport	0.26	0.4	0.59	1.4	0.54	1.1
A38 / Southern Roundabout	A38 (N)	0.38	0.6	0.44	0.8	0.50	1.0
	A38 (S)	0.53	1.2	0.30	0.4	0.41	0.7
	Bristol Airport	0.12	0.1	0.28	0.4	0.26	0.4
2026 Test Case							
A38 / Northern Roundabout	A38 (N)	0.61	1.6	0.72	2.6	0.79	3.7
	Cul-de-sac	0.05	0.0	0.12	0.1	0.22	0.3
	A38 (S)	0.77	3.3	0.64	1.8	0.79	3.7
	Bristol Airport	0.31	0.4	0.73	2.7	0.62	1.6
A38 / Southern Roundabout	A38 (N)	0.39	0.6	0.49	1.0	0.52	1.1
	A38 (S)	0.55	1.2	0.33	0.5	0.43	0.8
	Bristol Airport	0.14	0.2	0.33	0.5	0.29	0.4

RFC – Ratio of Flow to Capacity

11.2.2 The existing Bristol Airport accesses (A38 roundabouts with Bristol Airport) have been validated against the recorded traffic and queue length surveys.

11.2.3 The existing southern A38 roundabout with Bristol Airport is forecast to operate within 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 H**.

Improvement Scheme

11.2.5 As set out within **Section 4.4**, 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 Roundabouts Improvement Scheme - Capacity Results Summary

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		RFC	Queue	RFC	Queue	RFC	Queue
2026 Test Case							
A38 / Northern Roundabout	A38 (N)	0.57	1.4	0.62	1.7	0.79	3.8
	Cul-de-sac	0.04	0.0	0.08	0.1	0.22	0.3
	A38 (S)	0.73	2.6	0.54	1.2	0.79	3.7
	Bristol Airport	0.14	0.2	0.27	0.4	0.20	0.2

RFC – Ratio of Flow to Capacity

11.2.7 The improved Bristol Airport northern access roundabout 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 roundabouts with Bristol Airport is contained within **Appendix H**.

11.3 Downside Road / Bristol Airport (J3)

11.3.1 The results of the junction capacity assessment at the existing Downside Road junction with Bristol Airport are summarised in **Table 11.3**.

Table 11.3: Downside Road / Bristol Airport Existing Layout - Capacity Results Summary

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		RFC	Queue	RFC	Queue	RFC	Queue
2018 Survey Flows							
Downside Road / Bristol Airport	Bristol Airport Left Turn	0.05	0.1	0.08	0.1	0.12	0.1
	Bristol Airport Right Turn	0.03	0.0	0.07	0.1	0.05	0.1
	Downside Road (W)	0.12	0.2	0.07	0.1	0.08	0.1
2026 Reference Case							
Downside Road / Bristol Airport	Bristol Airport Left Turn	0.06	0.1	0.09	0.1	0.14	0.2
	Bristol Airport Right Turn	0.04	0.0	0.08	0.1	0.06	0.1
	Downside Road (W)	0.14	0.3	0.08	0.1	0.09	0.2
2026 Test Case							

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		RFC	Queue	RFC	Queue	RFC	Queue
Downside Road / Bristol Airport	Bristol Airport Left Turn	0.06	0.1	0.10	0.1	0.14	0.2
	Bristol Airport Right Turn	0.04	0.0	0.09	0.1	0.07	0.1
	Downside Road (W)	0.15	0.3	0.09	0.1	0.10	0.2

RFC – Ratio of Flow to Capacity

11.3.2 The existing Bristol Airport accesses with Downside Road models have been validated against the recorded traffic and associated queue length surveys.

11.3.3 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.

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

11.4 A38 / West Lane & Downside Road (J4)

Existing Layout

11.4.1 The results of the junction capacity assessment at the existing A38 signalised junction with Downside Road and the A38 priority junction with West Lane is summarised in **Table 11.4** and **Table 11.5** respectively.

Table 11.4: A38 / Downside Road Existing Layout - Capacity Results Summary

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		DOS	Queue	DOS	Queue	DOS	Queue
2018 Survey Flows							
A38/Downside Road	A38 (S)	78.8	23.9	65.9	15.2	81.8	24.8
	Downside Road	78.4	10.7	73.5	8.5	96.5	13.9
	A38 (N)	80.6	23.6	72.9	17.9	98.2	53.7
PRC (%)		11.6		22.5		-9.1	
2026 Reference Case							
A38/Downside Road	A38 (S)	92.4	40.7	89.1	36.1	100.7	30.2
	Downside Road	95.3	16.9	93.4	13.8	112.9	77.0
	A38 (N)	97.2	47.8	96.8	47.6	119.9	205.4
PRC (%)		-8.0		-7.6		-33.3	
2026 Test Case							
A38/Downside Road	A38 (S)	95.3	48.2	101.8	83.8	107.7	131.6
	Downside Road	102.1	22.9	108.6	26.3	123.7	41.9
	A38 (N)	103.1	74.5	108.8	118.4	127.2	265.7

PRC (%)	-14.6	-20.9	-41.4

DOS – Degree of Saturation, PRC – Practical Reserve Capacity

11.4.2 The existing A38 signal junction with Downside Road have been validated against the recorded traffic and queue length surveys.

11.4.3 The results indicate the existing A38 signal junction is operating over capacity in the 2018 survey flow evening peak, with the PRC recorded at -9.1%. In the 2018 survey flows morning peak and inter peak the junction is operating within capacity.

11.4.4 All the 2026 scenarios assessed forecast the existing A38 signal junction with Downside Road is predicted to operate over capacity.

Table 11.5: A38 / West Lane Existing Layout - Capacity Results Summary

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		RFC	Queue	RFC	Queue	RFC	Queue
2018 Survey Flows							
A38 / West Lane	West Lane (Left Turn)	0.52	1.1	0.40	0.7	0.84	4.3
	West Lane (Right Turn)	0.15	0.2	0.15	0.2	0.47	0.7
	A38 (S)	0.37	0.6	0.33	0.5	0.60	1.4
2026 Reference Case							
A38 / West Lane	West Lane (Left Turn)	0.78	3.1	0.80	3.6	1.43	59.5
	West Lane (Right Turn)	0.55	0.9	1.83	5.9	-	5.9
	A38 (S)	0.49	1.0	0.54	1.2	0.86	6.1
2026 Test Case							
A38 / West Lane	West Lane (Left Turn)	0.97	9.8	1.03	14.0	1.6	87.4
	West Lane (Right Turn)	3.48	6.2	-	11.7	-	10.1
	A38 (S)	0.54	1.2	0.72	2.7	1.01	22.5

RFC – Ratio of Flow to Capacity

11.4.5 The existing A38 priority junction with West Lane models have been validated against the recorded traffic flows and queue length surveys. The 2018 survey flows models operate within capacity for each scenario assessed.

11.4.6 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 output for the existing A38 signalised junctions with Downside Road and the existing A38 priority junction with West Lane is contained within **Appendix H**.

Improvement Scheme

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

11.4.8 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 11.6**.

Table 11.6: A38 / West Lane & Downside Road Improvement Scheme - Capacity Results Summary

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		DOS	Queue	DOS	Queue	DOS	Queue
2026 Test Case							
A38 / Downside Road	A38 (S) - Left & Ahead	75.1	12.4	71.3	12.8	80.7	11.2
	A38 (S) - Ahead	54.7	9.6	54.7	10.2	59.5	8.7
	Downside Road - Left	71.9	8.1	77.3	8.3	79.5	6.5
	Downside Road – Right	71.9		77.3		79.5	
	A38 (N) – Ahead	60.6	4.1	60.8	5.1	73.4	4.3
	A38 (N) – Ahead & Left	63.4	4.3	62.8	3.8	78.4	4.8
PRC (%)		19.9		16.5		11.6	
A38 / West Lane	A38 (N) – Ahead	67.2	8.6	81.2	12.8	79.6	10.5
	A38 (N) – Left	67.2		81.2		79.6	
	West Lane – Left	54.5	5.7	51.8	6.0	78.4	7.4
	A38 (S) – Ahead	52.0	6.6	55.6	7.6	57.6	6.3
	A38 (S) – Ahead & Right	71.9	14.7	81.1	15.7	77.2	13.8
PRC (%)		25.1		10.8		13.1	

DOS – Degree of Saturation, PRC – Practical Reserve Capacity

11.4.9 The improved signalised A38 junction with West Lane and Downside Road is predicted to operate within capacity in each 2026 Test Case scenario. As summarised in Table 11.6 the PRC is predicted to be above 10% for all scenarios assessed at the proposed A38 signal junctions with Downside Road and West Lane.

11.4.10 In addition to providing additional highway capacity the proposed scheme offers significant improvements to pedestrians and cyclists facilities as detailed in Section 4.3.

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

11.5 A38 / Barrow Lane & A38 / Barrow Street (J5&J6)

11.5.1 The results of the junction capacity assessment at the existing A38 priority junction with Barrow Lane and the existing A38 signal junction with Barrow Street are summarised in **Table 11.7**.

Table 11.7: A38 / Barrow Lane & A38 / Barrow Street Existing Layout - Capacity Results Summary

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		DOS	Queue	DOS	Queue	DOS	Queue
2018 Survey Flows							
A38 / Barrow Street	A38 Bridgewater Road (W)	68.9	9.3	49.1	5.4	66.1	7.9
	B3130 Barrow Street	40.0	4.0	31.8	2.0	43.9	4.2

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		DOS	Queue	DOS	Queue	DOS	Queue
	A38 Bridgewater Road (E)	50.1	5.9	31.6	3.2	57.1	8.0
PRC (%)		30.7		83.3		70.6	
A38/Barrow Lane	A38 Bridgewater Road (W)	54.7	0.6	43.1	0.4	49.5	0.5
	Barrow Lane	55.2	1.6	42.6	0.7	52.7	1.6
PRC (%)		63.0		108.8		36.2	
2026 Reference Case							
A38 / Barrow Street	A38 Bridgewater Road (W)	82.0	12.4	69.6	8.7	77.1	10.3
	B3130 Barrow Street	44.0	4.6	30.6	2.2	50.4	5.0
	A38 Bridgewater Road (E)	85.8	18.9	45.8	5.5	69.1	10.9
PRC (%)		5.0		29.4		16.7	
A38/Barrow Lane	A38 Bridgewater Road (W)	64.6	0.9	58.2	0.7	60.5	0.8
	Barrow Lane	93.5	6.5	75.0	3.1	86.2	4.5
PRC (%)		-3.9		20.0		4.4	
2026 Test Case							
A38 / Barrow Street	A38 Bridgewater Road (W)	87.8	14.5	87.7	12.9	87.3	12.8
	B3130 Barrow Street	41.5	4.5	26.0	2.0	46.5	4.7
	A38 Bridgewater Road (E)	81.3	16.5	57.5	7.7	78.4	134
PRC (%)		2.5		2.7		3.1	
A38/Barrow Lane	A38 Bridgewater Road (W)	66.9	1.0	67.2	1.0	65.0	1.0
	Barrow Lane	99.6	8.6	93.9	6.2	94.2	6.1
PRC (%)		-10.7		-4.4		-4.7	

DOS – Degree of Saturation, PRC – Practical Reserve Capacity

11.5.2 The existing signalised A38 junction with Barrow Street 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 calculated from video data.

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

11.5.4 As can be seen from the assigned traffic plots using the BASHT, none of the traffic associated with the Development Proposals is routed through Barrow Lane or Barrow Street. Therefore, all traffic is passing through the junction on the A38. Although the junction is approaching

capacity, mitigation measures or junction improvements are not considered appropriate given the likelihood this will encourage through traffic.

11.5.5 The full junction assessment output is contained within **Appendix H**.

11.6 SBL / A38 (J7)

11.6.1 The results of the junction capacity assessment at the existing A4174 SBL signalised roundabout with the A38 are summarised in **Table 11.8**.

Table 11.8: SBL / A38 Existing Layout - Capacity Results Summary

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		DOS	Queue	DOS	Queue	DOS	Queue
2018 Survey Flows							
SBL / A38	SBL (N) – Ahead & Left	57.0	5.6	58.4	4.4	73.2	6.9
	SBL (N) – Ahead	31.6	2.8	36.7	2.5	55.0	4.6
	SBL (N) – Circulatory Ahead	26.6	2.7	17.6	1.5	22.0	2.0
	SBL (N) – Circulatory Right Ahead	33.2	3.6	22.6	2.2	28.5	2.8
	A38 (N) – Ahead + Left	56.3	3.2	44.7	2.2	70.9	4.4
	A38 (N) – Ahead	35.9	1.9	18.4	0.8	50.3	2.9
	A38 (N) – Circulatory Ahead	20.6	1.4	21.4	0.7	28.7	1.3
	A38 (N) – Circulatory Right Ahead	30.1	1.2	25.9	0.6	35.3	1.1
	A38 (N) – Circulatory Right	13.0	0.1	12.7	0.1	20.5	0.1
	SBL (S) – Left	44.6	4.3	41.5	2.7	54.4	4.2
	SBL (S) – Ahead	60.9	4.7	43.8	2.5	54.8	3.6
	SBL (S) – Circulatory Ahead	21.4	1.5	20.1	1.0	32.2	2.1
	SBL (S) – Circulatory Ahead	32.2	3.8	25.5	1.2	42.7	2.7
	SBL (S) – Circulatory Right	10.1	0.7	4.6	0.3	13.7	1.2
	A38 (S) – Left	53.0	3.6	47.2	2.4	39.2	2.1
	A38 (S) – Ahead	53.7	3.5	34.9	1.6	45.7	2.5
	A38 (S) – Circulatory Ahead	42.6	4.3	27.1	0.5	42.2	1.1
	A38 (S) – Circulatory Right Ahead	47.9	5.4	34.5	0.9	47.9	2.4
	PRC (%)	47.7		54.1		22.9	
2026 Ref Case							
	SBL (N) – Ahead & Left	65.4	6.8	65.1	5.8	80.8	9.0

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		DOS	Queue	DOS	Queue	DOS	Queue
SBL / A38	SBL (N) – Ahead	35.8	3.4	46.6	3.7	65.0	6.3
	SBL (N) – Circulatory Ahead	32.4	3.3	21.9	2.0	27.5	2.7
	SBL (N) – Circulatory Right Ahead	39.6	4.4	31.5	3.2	34.2	3.6
	A38 (N) – Ahead + Left	69.4	4.3	58.8	3.4	76.3	5.8
	A38 (N) – Ahead	41.0	2.2	20.0	1.0	50.5	3.4
	A38 (N) – Circulatory Ahead	24.7	1.7	26.1	1.1	34.0	1.9
	A38 (N) – Circulatory Right Ahead	35.1	1.5	31.6	1.1	41.8	1.8
	A38 (N) – Circulatory Right	15.4	0.1	17.5	0.1	26.1	0.2
	SBL (S) – Left	50.9	5.0	51.1	3.5	62.3	5.4
	SBL (S) – Ahead	70.7	7.0	52.2	3.1	63.4	4.4
	SBL (S) – Circulatory Ahead	28.2	2.6	28.1	1.5	39.0	2.5
	SBL (S) – Circulatory Ahead	38.9	5.4	34.1	1.8	51.9	3.6
	SBL (S) – Circulatory Right	11.4	0.9	5.1	0.3	15.4	1.0
	A38 (S) – Left	66.2	5.0	61.5	3.8	47.1	2.9
	A38 (S) – Ahead	64.2	4.5	44.5	2.4	52.6	3.2
	A38 (S) – Circulatory Ahead	45.3	2.5	34.6	0.6	49.8	2.4
	A38 (S) – Circulatory Right Ahead	53.5	6.0	41.1	1.3	54.9	5.4
PRC (%)		27.2		38.2		11.4	
2026 Test Case							
SBL / A38	SBL (N) – Ahead & Left	68.6	7.2	70.2	6.5	83.4	9.8
	SBL (N) – Ahead	41.0	3.8	52.6	4.3	68.9	7.0
	SBL (N) – Circulatory Ahead	32.2	3.2	27.5	2.5	29.2	2.8
	SBL (N) – Circulatory Right Ahead	39.6	4.3	32.4	3.3	36.0	3.8
	A38 (N) – Ahead + Left	74.9	4.9	69.6	4.4	82.0	6.7
	A38 (N) – Ahead	41.0	2.2	20.0	1.0	50.5	3.4
	A38 (N) – Circulatory Ahead	25.3	1.7	27.9	1.1	35.0	2.0

Junction	Arm	AM Peak Hour (0800-0900)		Inter Peak Hour (1300-1400)		PM Peak Hour (1700-1800)	
		DOS	Queue	DOS	Queue	DOS	Queue
	A38 (N) – Circulatory Right Ahead	35.7	1.5	33.3	1.1	42.9	4.8
	A38 (N) – Circulatory Right	16.8	0.1	19.8	0.1	27.7	0.2
	SBL (S) – Left	50.9	5.0	51.1	3.5	62.3	5.4
	SBL (S) – Ahead	70.6	7.0	54.1	3.3	64.2	4.6
	SBL (S) – Circulatory Ahead	31.4	3.0	34.8	2.1	43.4	3.1
	SBL (S) – Circulatory Ahead	42.2	6.0	39.4	2.4	55.3	6.5
	SBL (S) – Circulatory Right	11.4	0.9	5.1	0.3	15.4	1.0
	A38 (S) – Left	66.6	5.1	73.5	5.3	52.5	3.4
	A38 (S) – Ahead	64.2	4.5	46.3	2.5	55.6	3.4
	A38 (S) – Circulatory Ahead	47.9	4.9	32.0	0.6	49.2	1.4
	A38 (S) – Circulatory Right Ahead	55.4	6.4	43.5	1.3	55.4	5.7
PRC (%)		20.2		22.5		7.9	

DOS – Degree of Saturation, PRC – Practical Reserve Capacity

11.6.2 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 calculated from video data.

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

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

11.6.5 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 H**.

12 Construction

12.1 Introduction

12.1.1 This chapter details the estimated construction traffic movements for each phase of construction, which have been provided by QuantumCLS Ltd.

12.1.2 The estimated construction traffic movements have been used to derive the total vehicle and HGV AAWT construction traffic flows, provided in **Appendix I**.

12.2 Construction Traffic

12.2.1 Total vehicle AAWT flows during construction are estimated to be 39 vehicles a day and HGV AAWT flows are estimated to be nine vehicles a day. It is anticipated that peak vehicle movements will occur in January 2020; during this period there may be movements of 138 vehicles a day where a number of elements are being constructed concurrently (such as the A38 highway improvement works).

12.2.2 **Table 12.1** sets out the potential increases in traffic associated with construction.

Table 12.1: Potential Construction Traffic Movements

Link	Name	% Change in All Traffic 18hr AAWT (when compared to 2026 traffic flows)	% Change in HGV 18hr AAWT (when compared to 2026 traffic flows)	% Change in All Traffic 18hr AAWT (2026 without development)	% Change in HGV 18hr AAWT (2026 without development)
2	A38 New Road	0.3%	1.4%	0.2%	1.2%
4	A38 (North of Dinghurst Road)	0.2%	0.9%	0.2%	0.8%
10	A38 Bridgwater Road (North)	0..3%	1.6%	0.3%	1.3%
12	A38 (North of West Lane)	0.2%	0.9%	0.1%	0.7%
16	A38 (South of Silver Zone)	0.2%	1.2%	0.2%	1.0%

12.2.3 Vehicle movements associated with construction traffic would not cause an increase of more than 5% in total vehicles or HGVs on any of the identified study links along the A38. Significant effects are not anticipated where traffic increases of <5% are experienced as such variance can occur on a daily basis. It is therefore considered that there are no significant effects in regards to severance, fear and intimidation and accidents and disasters during the construction phase.

12.2.4 The vehicle trip generation during the peak construction phase is substantially lower than the operational traffic predictions in 2026 and is therefore expected to have a lesser effect on driver delay than that considered in 2026 and does not justify detailed junction modelling.

12.2.5 Improvements to the highway network associated with the Proposed Development, such as the upgrading of the A38/Downside Road and A38/West Lane junction, and widening of the A38 may result in a short term localised increase in delays between October 2019 and April 2020 when it is proposed that the improvements will be undertaken. However, this will be

confirmed during detailed construction planning and the temporary nature of the works mean it is unlikely to have a significant effect.

12.2.6 Similarly, during these works there may be temporary disruption to pedestrian delay and amenity such as to users of nearby PRoW (LA2/37/10/XG2, LA2/37/10/X and LA19/77/70). As flows are not anticipated to increase by more than 5% there are unlikely to be any significant effects to delay, however there may be a temporary reduction in amenity in this area whilst improvements works are carried out but it is not anticipated that this would result in a significant effect.

12.2.7 It is considered that there are unlikely to be any significant effects on severance, fear and intimidation, pedestrian delay and amenity, driver delay and accidents and safety during construction. This is due to the small increases in vehicle movements associated with this phase, temporary nature of improvement works on the A38, Downside Road and West Lane and control of HGV movements through the implementation of measures outlined in the CEMP such as controls on HGV routing to avoid smaller local roads where possible.

13 Summary & Conclusions

13.1 Summary

13.1.1 This Transport Assessment (TA) supports a planning application for the Development Proposals by Bristol Airport Limited (BAL) to North Somerset Council (NSC). The planning application seeks permission to expand Bristol Airport beyond the permitted passenger cap of 10 mppa to 12 mppa.

13.1.2 This TA should be read in conjunction with the suite of transport related planning application documents submitted as part of the application, including: Workplace Travel Plan (WTP), Parking Demand Study, Parking Strategy Planning Statement and Environmental Impact Assessment (EIA). BAL also commits to produce a new and ambitious Airport Surface Access Strategy (ASAS) secured through a S 106 agreement, which will seek to implement measures to reduce single occupant car trips and encourage public transport (PT) use where possible.

13.1.3 This report has set out the approach taken to assessing the potential transport impact of the Development Proposals. Chapters 1 – 4 set out the existing context, relevant policy considerations, permitted 10 mppa scheme and the details of the Development Proposals.

13.1.4 The Development Proposals at Bristol Airport support the proposed increase in passenger numbers and seek to ensure safer and more efficient passenger movement to and around the airport site. The Development Proposals include a number of new infrastructure components, improvements to existing facilities and a number of operational changes, including:

- Extensions to the terminal building on its west and southern sides and a canopy over the forecourt of the main terminal building;
- Erection of a new east walkway and pier with vertical circulation cores, pre-board zones and a 5m high acoustic timber fence;
- Construction of a new service yard directly north of the western walkway;
- New and additional car parking, including erection of a multi-storey car park (MSCP) providing approximately 2,150 spaces (Phase 3), extension to the Silver Zone car park to provide approximately 2,700 spaces (Phase 2) and year-round use of the existing Silver Zone car park extension (Phase 1);
- Surface access improvements including enhancements to the A38 between the main airport access roundabout and West Lane and an improved internal road system with gyratory and internal surface car parking;
- Enhancements to airside infrastructure including construction of a new eastern taxiway link and taxiway widening (and fillets) to the southern edge of Taxiway; and
- Operational changes including retention of an annualised cap of 4,000 night flights between the hours of 23:30 and 06:00, albeit with the removal of the current caps on the number of night-time flights during the British Summer and Winter Seasons respectively, and revisions to the use of aircraft stand numbers 38 and 39 so that they operate under the same terms as stands 34-37.

13.1.5 In preparing this TA, key stakeholders NSC, BCC, BaNES, SCC and Highways England have been consulted with as part of the formal pre-application process. This has contributed to the development of the TA methodology which is contained in **Chapter 5**.

13.1.6 **Chapter 6** sets out the current passenger transport, walking and cycling opportunities for passengers and staff at the Bristol Airport site.

13.1.7 **Chapter 7** describes the highway network surrounding the Bristol Airport site, including details of the broad range of traffic surveys carried out in July 2018 prior to the school summer holidays. These form the baseline traffic movement for the 2017 baseline passenger movement of 8.2 mppa.

13.1.8 An assessment year of 2026 has been evaluated, since this is the year at which passenger numbers are forecast to reach 12 mppa, subject to planning consent for the Development Proposals being granted. The 2018 baseline traffic which includes airport and non-airport traffic has been factored to 2026 to reflect this. This presents a robust assessment since these 'scaled-up' flows at Bristol Airport would relate to approximately 1.4 mppa in themselves.

13.1.9 Collision data analysis has not identified any specific concern regarding the geometric design / road layout of the local highway network. There are no re-occurring patterns of the frequency of severity of collisions recorded. The data does not highlight any specific concerns to clustering of collisions or locations within the study area.

13.1.10 **Chapter 8** provides the step by step forecasting methodology for each trip generation category and details the 24-hour trip generation by mode associated with the Development Proposals. This is based on the agreed mode share for the permitted development of 15% of passenger trips by PT. The calculation of vehicle trips has considered drop-offs and vehicle occupancy rates. The resulting total daily increase in two-way person trips (beyond the permitted 10mppa trips) is 7,533, of which 1,560 are PT trips and 5,575 relate to vehicle trips.

13.1.11 A TA Scoping Report was submitted on 15th August 2018 to the key stakeholders. The report was formally commented on by NSC and a response was submitted on 21st October 2018.

13.1.12 The TA has assessed the proposals to increase passenger numbers from 10 mppa to 12 mppa for a typical week day during a peak week in the peak month of August. Detailed junction capacity assessments have been undertaken in the highway network morning (08:00-09:00), and evening (17:00-18:00) and the forecast future Airport (13:00-14:00) peak periods. The TA has therefore assessed the impact of 12 mppa in the peak passenger throughput month of August. This presents a robust core assessment.

13.1.13 The baseline transport conditions have been established using a combination of the most recent CAA survey (2015) results, the most recent Employee Travel Survey (2017) results, PIC data from NSC and BCC, 24-hour traffic surveys (July 2018) and a combination of commercial and published data from BAL.

13.1.14 The travel demand was determined for the existing, 10 mppa and 12 mppa scenarios for the following categories of trip generators:

- Air passengers;
- Employees; and
- Operational and Logistical movements

13.1.15 The forecast travel demand for passengers includes an assumption that the PT mode share target BAL committed to working towards as part of the 10 mppa application, will be achieved as a result of the significant investments already being made by BAL.

13.1.16 The following scenarios have been assessed in the TA:

- 2026 Reference Case (10 mppa); and
- 2026 Test Case (12 mppa).

13.1.17 The July 2018 traffic surveys recorded both airport and non-airport related traffic across the entire study area. To present a robust assessment, the recorded traffic has been factored up to 2026, which includes the traffic associated with approximately 8.6 mppa (the estimated 2018 passenger numbers), an additional 4,021 daily two-way vehicle movements. This relates to approximate increase of 1.4 mppa Bristol Airport. The traffic and highway assessment methodology could thus be viewed as effectively testing the effects of 13.4 mppa on the highway network in the study area, ensuring a robust assessment and accounting for daily or monthly variations.

13.1.18 For a number of reasons, the assessment represents a robust consideration of the impacts of the additional 2mppa on the highway network. This is reflected in the methodology which allows for:

- Growth in all trips up to 2026 using TEMPro factors. This includes the existing airport traffic;
- An assumed passenger mode share of 15% by non-car means to reflect the commitment with respect to the permitted scheme; and
- Employee mode share of 10% by non-car means to reflect the 2017 Employee Travel Survey, even though a target of 25% has been set out in the WTP.

13.1.19 **Chapter 9** describes a package of potential surface access improvement options. BAL is committed to encouraging passengers and employees to travel to and from Bristol Airport by means other than single occupancy car. A new and ambitious ASAS will be developed as a result of ongoing Section 106 discussions and following input from the Air Transport Forum (ATF). The ASAS will set out:

- Proposed improvements to public transport services;
- Proposed improvements to other more sustainable transport modes;
- Travel plan measures designed to encourage access to the Airport by more sustainable modes; and
- Improvements to local highway infrastructure and on-site car parking provision.

13.1.20 **Chapter 10** sets out the highway capacity analysis which has been undertaken on key junctions within the agreed study area. The analysis is based on a 2026 Reference Case representing the permitted 10mmpa scheme, and a 2026 Test Case representing the Development Proposals (12mppa).

13.1.21 The analysis has indicated the A38 roundabout with Bristol Airport Silver Zone, Downside Road junction with Bristol Airport, A38 junction with Barrow Lane, A38 junction with Barrow Street and the A38 junction with the A4174 will operate within capacity at both the 2026 Reference Case and 2026 Test Case without the need for improvement, and that the Development Proposals have a minimal impact on these junctions.

13.1.22 The A38 roundabout with Bristol Airport, A38 junction with Downside Road and A38 West Lane are predicted to operate over capacity in both the 2026 Reference Case and 2026 Test Case without improvement.

13.1.23 An extensive mitigation scheme is therefore proposed as an inherent part of the Development Proposals. This includes:

- Proposed A38 Travel Improvements

- BAL is proposing to undertake a significant improvement of the A38 between the main airport access roundabout and West Lane to accommodate any additional traffic generated by an extra 2 mppa. This incorporates highway widening and junction capacity increases.

- The existing footway / cycle track will remain on the eastern side of the A38, with a new footway provided north of the West Lane junction. An enhanced footway / cycle track will be provided on the western side of the road between the airport and Downside Road, with a footway provided for the section north of the Downside road tying in with the existing facility north of West Lane.

- Gyratory Road with Internal Surface Car Parking

  - To accommodate vehicle movements and improve flows within Bristol Airport and onto the A38, a two lane, one-way system, gyratory is proposed. This will provide additional capacity onto North Side Road and a connection between the A38 and the northern components of the airport, including the main terminal building, multi-storey car park and surface car parking areas. To the west, the gyratory road serves the airport servicing area and hotel.

  - The gyratory also includes a pedestrian footway along its southern edge, linking the main terminal building with the A38. A new zebra crossing will be located across the dual carriageway to the east.

13.1.24 The mitigation which is included as part of the Development Proposals (by means of significant junction capacity improvements), means that these junctions are forecast to operate within capacity at the 2026 Test Case, and significantly better than in the 2026 Reference Case.

13.1.25 The overall proposed mitigation measures therefore include:

- A370 corridor bus service improvements;
- Increased frequency of the A3 Weston Flyer;
- Bus priority measures on the A38 corridor;
- Passenger interchange improvements at Bristol Temple Meads;
- A comprehensive upgrade to the A38 / Downside Road / West Lane junction;
- Improvements to the A38 / Bristol Airport northern access;
- An enhanced footway / cycleway on the western side of the A38 between Bristol Airport and Downside Road; and
- A comprehensive Workplace Travel Plan including measures aimed at meeting a 25% target for trips not made by single occupant car; and
- Commitment to a new and ambitus ASAS which will be developed with the ATF as per Government guidance.

13.1.26 The proposed package offers a substantial and deliverable set of enhancements which will improve connectivity by all surface access modes to the Airport whilst delivering on the commitment to promote more sustainable means of travel.

13.1.27 **Chapter 11** describes the enabling works and construction activity that will be generated in the short to medium-term showing potential increases in vehicle movements. The construction

traffic volumes are relatively minor compared with the existing traffic flows on the network and the impact of construction traffic is considered negligible.

13.2 Conclusions

13.2.1 Analysis of the policy context concludes that the proposed development is consistent with and supports policy aims and objectives at a national, regional and local level. The principle of the expansion of the operation at Bristol Airport is supported at both a national regional level.

13.2.2 An ambitious and updated ASAS will be developed in partnership with the ATF. BAL is committed to continuing to promote more sustainable means of surface access and an updated ASAS will achieve this based on the success of similar recent investments. For example, the recent public transport investment by BAL has increased the frequency of the Airport Flyer to Bristol City Centre to 8 buses an hour, in upgraded double decker buses.

13.2.3 An assessment year of 2026 has been evaluated, since this is the point at which passenger numbers are forecast to reach 12 mppa, subject to the Development Proposals gaining planning consent. The July 2018 traffic surveys, which informs the established baseline traffic conditions, includes airport and non-airport traffic and relates to estimated passenger numbers of 8.6 mppa. The traffic volumes within the survey have been factored up to estimate the future background traffic conditions in the year 2026. A separate trip generation exercise has been carried out which estimates the transport effects of the increase in passengers from the 8.2 mppa scenario to the 10 and 12 mppa. Therefore, the assessment is robust as the background traffic volumes scaled up to the year 2026 include airport-related traffic equivalent to ~1.4 mppa.

13.2.4 There will be a continued growth in demand for bus and coach services to and from the Bristol Airport site for both passengers and employees. BAL has a successful track record in facilitating and promoting additional or new bus and coach services to meet demand as it arises through the new and ambitious ASAS.

13.2.5 The TA has identified a number of mitigation measures which will be implemented or continued in order to offset or reduce the impacts of growth to 12 mppa. Such measures include highway improvements, on-site parking improvements as well as commitments to public transport and sustainable transport improvements.

13.2.6 Overall, this TA demonstrates that the Development Proposals will not have a significant adverse impact on the operation of the wider local or strategic highway network even allowing for the robust traffic flow forecast approach, and that the junction improvements proposed will provide a significant improvement in the local area compared with the currently permitted scheme.

13.2.7 In addition, significant improvements are being made for public transport provision and a comprehensive package of further improvements is being explored through the ATF and ASAS.

13.2.8 The application is therefore considered to be policy compliant and the measures proposed will more than mitigate any potentially adverse impacts compared with the permitted development.