Appendix B Scoping Report

JACOBS

Memorandum

Subject	**Bristol Airport Transport Assessment Scoping Response**
Attention	Steve Thorne / Tom Gaze, North Somerset Council
From	Simon Shapland
Date	12/09/2018

Introduction

Comments below have been provided in line with the headings used in the Transport Assessment (TA) scoping document for ease of reference. Please note that the comments made within this response are made without prejudice and the final recommendations of Highways will be subject to our review of the submitted planning application.

General Comments

Whilst it is understood that this only a scoping note to determine the scoping of the assessment within the TA, there are a number of sections missing which would be expected to be provided within the final submission. The final submitted TA will need to be compliant with current standards for the production of TA's, which includes NPPG and North Somerset's Highways Development Design Guide.

There is considerable analytical data provided within the TA scoping document, which includes a number of tables and graphs. It would be useful to be provided with the spreadsheets that sit behind these tables to ensure that the calculations are correct. This will assist the Authority in the review of the final TA when it is submitted.

It is noted that considerable onus has been placed on CAA passenger survey data recorded from 2015. There are concerns that CAA data may not capture sufficient passenger information in order to demonstrate both historical trends, or provide suitable confidence that the survey data is representative of normal trends and operating conditions. This is expanded on below, but given the numbers of passengers predicted to use the airport, any relatively small underestimations of modal splits or passenger locations will result in a significant difference in the final vehicular generation figures. More evidence will be required by the applicant which demonstrates that 2015 data is representative of expected conditions, along with validation information to support these claims. This is a fundamental underpinning of the assessment within the TA and the Authority requires the confidence that the evidence base is robust.

1.2 Background

There appears to be some missing text from paragraph 1.2.3.

2.3 Passenger Catchment

CAA passenger data from 2015 has been used to determine where passengers who use the airport are arriving from, with the majority arriving from the South West and Wales. Paragraph 2.3.2 states that

annual passenger growth has been achieved primarily from this area, and table 2.2 has used the data from 2015 to predict where passenger in 2017 have arrived from. This indicates that 77.2% originated from South West and 18.8% from Wales. It would be useful to understand if there is any data that provides a more robust evidence to confirm this trend, as using 2015 data only is not robust enough to indicate an on-going trend. This will have a considerable impact on the distribution and modal split of passenger arrivals at the airport in the future. It should be noted that 2015 data is now 3 years old, and the assessment appears to be reliant on this single snap shot for much of the assessment.

It would be interesting to understand the response rate to the CAA passenger surveys, to ensure that there is an adequate sample size to support the assumptions made within the survey. Given these surveys form the basis for the prediction of all trips to the Airport, the Authority will need to have the confidence that a suitably large sample size has been achieved to ensure robust analysis.

Furthermore, there is a requirement to validate the data taken from the CAA data with other data sources to ensure that CAA data is accurately capturing arrivals and departures at the airport. For example a useful check would be to compare traffic counts at the site access against the extrapolated data from the CAA survey data.

There are a number of minor typo issues within this section, for example figure 2.7 does not label all of the bars of the graph, and there is an incorrect statement in paragraph 2.5.3 which should state ‘Bristol’ not ‘Bath’. This reiterates them importance of being provided with the raw spreadsheet analysis.

2.4 Passenger Mode Share

Paragraph 2.4.1 states that passenger mode share varies via catchment area and time of year, which is reflected within the nature of journey purpose and transport options available. Presumably modal choice is also influenced by the time of day a passenger travels – for example for very early morning flights there may not be the same public transport options available as later in the day. This could impact the hourly generation figures and some further clarification is sought here.

Figure 2.7 appears to be missing some of the labels for areas within the South West and Wales. It is expected this is due to the chart being compressed to fit in the report, and reaffirms the importance of providing the raw data for our approval.

The CAA data provides the modal split, which based on the passenger numbers can give an indication of the vehicular generation at the site, but it is not clear whether this has been validated against any other information, for example traffic count data at the car parks and site entrances.

It is not clear how the CAA data deals with people who arrive to use the Silver Zone parking, and how this is recorded. Does the survey data assume that this person drives? Further clarification is sought here.

As you are aware, there are issues with informal parking areas around the Airport. Passengers using these services will arrive at an external site by car, and then transfer to the airport via mini-bus or even by walking. How are these arrivals captured by CAA data? There is an ‘other’ category: does this include such arrivals? The concern here is that the CAA data, and therefore the TA will fail to pick up the use of these external services to the airport. Whilst not controlled by the airport, the passenger ultimately arrives at the Airport and consideration of their impact on the Highway Network is required. As an example, if there is an informal site operating on the A38 south of the airport, and passengers are arriving from the North (from say Bristol), their journey would comprise a trip on the A38 through the site access roundabout, to the external site, and then an hour later the mini bus would constitute another trip through the site access as the passengers are dropped off and return to the off-site car park. Similarly, for their return trip. If the CAA data just assumes that these passengers are a ‘car’ trip, they will only be picked up once, as they arrive at Bristol Airport. Further assessment of this is required within the TA.

2.6 Employee Mode Share

No details have been provided on whether Mode share differs for shift workers as a result of the anti-social times of day that they need to arrive at the site. It is noted there are shift patterns which begin at 2am, and this may have a significantly different modal split profile to arrivals at 8am. Further clarification is sought here.

3.2 Forecast Passenger Annual Profile

The projections for an increase to 10mppa and 12mppa have been based on the recorded data taken from 2017, which is supported by historic trends over the last five years. This data from the last five years should be provided to give confidence that the 2017 data is representative. It would be beneficial to consider what the split in monthly arrivals was considered within the planning application to 10mppa, to determine if there are any differences, and explanations of why the numbers from the 10mppa application may have not been realised. This will give some confidence that using the projections from 2017 data is accurate. As an example, for the month of August, using an 11% monthly split for 10mppa gives a total passenger number of 1,098,181. Projections for the 12mppa, using this 11% monthly split (actual value calculated as 10.98% but it is understood the table has rounded up for simplicity), takes this figure to 1,317,817, a total increase of 219,636 per month, and 7,085 per day.

Should this value increase to say 13% for the 12mppa application for August, this would actually see a total passenger volume of circa 1,560,000 passengers for the month – an increase of 461,819 passengers a month, or 14,897 passengers a day. It is clear that given the scale of the airport, very small changes to percentages lead to a considerable variation in monthly, and daily passenger arrivals. There needs to be careful consideration of this, and more information should be provided by the applicant to support the assumptions that growth will remain uniform from the 2017 data.

3.3 Forecast Passenger Catchment

The assumption is that growth to 12mppa is predicted to come from only the South West and Wales area. Again, as stated above, relatively small increases in percentages from different regions could have a significant impact on the traffic generation at the Airport. Historic trend data will need to be provided to prove that this will be the case in the future. Furthermore, details of how this growth will be realised should be provided. For example, is the increase of 2mppa a function of more people travelling abroad for holidays, or are they in fact ‘transferred’ journeys from other airports in the UK? If it is the latter then evidence should be provided which demonstrates which airport this trade is currently using. This will provide confidence that the assumptions are correct.

3.4 Forecast Passenger Mode Split

Again, for Mode Split it is not clear whether Modal split varies throughout the day, and it has been assumed there is a uniform mode split throughout the day. Further clarification is requested. Furthermore, it has been assumed that car occupancy rates are the same for all time periods in the day. Should there be a lower car occupancy rate during the morning, for example, this would lead to a higher trip generation than if a high car occupancy was assumed.

3.5 Passenger Arrival and Departure Dwell Analysis

The data on passenger dwell analysis is useful to determine likely passenger arrivals and departures on the roads in respect to their flight arrival and departure time. Please clarify whether the graphs presented within figure 3.8 and 3.9 show the actual time of the flight, or flight + 1 hour for arrivals and flight + 90 minutes for departures. It would be useful to be provided with the proposed flight schedule in order to check that the assumptions are correct. Also additional data should be provided which validates these arrivals and departure profiles. Cross checking against vehicular arrivals and departures at the airport will provide additional data here to validate this.

Parahgraph 3.5.2 states that depature dwell times have been provided by BIA, and it would be useful to understand over what period this data was collected, and the sample size used to determine these proportions. The times that people arrive to catch their flight will be a key factor in determining vehicular

impact on the network, and the Authority needs to be convinced that the data used is robust. It would be useful to understand whether in the future these dwell times are likely to reduce as there is a move towards checking in online etc, and if the Airport has any data to reflect this. A reduction in dwell time is likely to result in more passengers arriving at the same time instead of being stretched over several hours and this will require some further consideration.

Furthermore, the analysis assumes a uniform flight schedule for every day of the week, further clarification is required here as there may be days of the week which have a higher proportion of flights that are likely to impact peak periods.

4.2 Vehicle Trip Assignment Methodology

It is proposed to assign trips to the network using a SATURN model based on link speed and distance. This could over simplify the assessment and assign trips away from the current rat runs around the airport. For example, if the model is only considering link speed and distance, it is likely to assign the majority of traffic along the A38 and the SBL, whereas there are multiple route choices in that direction, including Downside Road / A370. Furthermore, the Airport is clearly signed from major strategic routes (such as the M5) and it is expected that trips further afield would follow these signs which may lead to a different assignment than proposed using SATURN alone.

It is not clear how this model will be validated against vehicle assignments for vehicles currently using the airport, and further information will need to be provided in respect of this. The SATURN model will need to be provided for the Authority to review, and this will need to include details of the proposed zones used within the model. The assessment so far assumes that the majority of growth will come from the existing South West and Wales areas, and therefore it is logical to assume that current vehicular assignments will remain. Further clarification is required here – particularly in respect of the proposed validation of the modelling.

The modelling is proposed to consider the traditional network peak hours of 08:00-09:00 and 17:00-18:00. Traffic survey data will need to be provided which confirms that this is the network peak hour around the airport. It is recognised that traffic on a Friday afternoon is particularly busy around the airport, and this will need to be assessed with the TA.

4.3 Assessment Study Area

This was discussed at the recent scoping meeting. Whilst the area seems appropriate at this time, if the TA demonstrates that other junctions are likely to be severely impacted, additional analysis in these locations will be required.

There are a number of smaller quieter roads which have not been picked up in the assessment. Such routes include West Lane / Felton Lane (Winford), as well as Portbury Lane which serves as a rat run from Junction 19 of the M5. There are additional routes from Junction 20 of the M5, including Nailsea Wall which should be included as part of the assessment. These routes are rural in nature, which are characterized with fast vehicular speeds and often impatient drivers. Whilst the absolute volume of traffic increase in these areas may not be substantial, the assessment should be mindful about increasing vehicles on routes which are not of the highest standard. Furthermore many of the quieter routes are popular walking and cycling routes, and increases in vehicles in this location will have an adverse impact on non-motorised users.

4.4 Modelling Scenarios

There are concerns about the proposed modelling scenarios within the TA. Whilst it is recognised that this is not a ‘normal’ development, which can identify opening year assessment, we are concerned that the proposed modelling scenarios may lead to scenario where there is an unacceptable impact on the highway network without mitigation.

The Airport currently has a consent for 10mppa, and there is mitigation in place to ensure this does not have a severe impact on the road network, including Downside Road signals on the A38. From a planning perspective, this impact is 'accepted' and we are only considering the impact beyond this point. However, it is recognised that the network around Bristol Airport is incredibly busy, and the Downside Road signals particularly are reaching capacity. The proposed modelling scenarios only test a 2026 year for 12mppa and mitigation, however there will be an element of growth beyond the 10mppa before the full 12mppa is realised, and this will increase demand on the road network. It is not clear when 10mppa is expected to be achieved, but if the airport were to have a uniform 0.5mppa passenger growth a year it would lead to the following demand:

- 2018 – 8.2mppa
- 2019 – 9mppa
- 2020 – 9.5mppa
- 2021 – 10mppa (end of current consent)
- 2022 – 10.5mppa
- 2023 – 11mppa
- 2024 – 11.5mppa
- 2025 - 12mppa

Using the assessment methodology presented in the TA, this would lead to a gap in the assessment, where there would be no assessment (and no mitigation proposed) for any growth between 10 to 12mppa. In order to ensure adequate mitigation is proposed, there should be an assessment which effectively tests the operation of the network as soon as 10mppa is exceeded under any new consent.

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Memorandum

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Subject	**Bristol Airport Transport Assessment Scoping Response Issue 2**
Project Name	Bristol Airport
Attention	Tom Gaze/Steve Thorne/Paul Paton, North Somerset Council
From	Simon Shapland, Jacobs
Date	09/11/2018

1. Introduction

Jacobs have reviewed the latest technical note provided by PBA and comments are provided below.

2. Traffic Survey Comparisons

In the previous scoping response note we requested consideration of any other data sources which could help act as a comparison to the CAA data methodology being proposed within the TA. Within Table 4.2 of the latest PBA note there is a comparison made of traffic survey data from the Airport against the proposed trip generation methodology using the CAA data.

The table concludes that the recorded vehicle numbers for July 2018 totals 21,877 vehicles, and the calculated total using the CAA methodology is 22,852, suggesting that the TA methodology would overestimate trips by the order of 975 trips. Some caution must be applied to this conclusion. Firstly; the survey data does not include the emergency and freight entrance on Downside Road, and survey data provided by NSC indicates that this entrance is well used.

Secondly, NSC survey data from a single day in July 2018 (Thursday 12th) indicates a much higher daily generation figure at the airport. On this day there were 20,108 vehicles recorded at the main entrance, 4,909 vehicles recorded at the Silverzone, and 2,603 vehicles at the freight entrance. This is a total generation figure of 27,620 which is some 5,743 trips more than the PBA surveys are indicating for the month of July.

Again, a degree of caution is required when assessing the differences between these two figures, as one is a survey from a single day, and the PBA figure is an average for the month of July. There are several reasons why there could be a variation between the two sets of survey data. It is recognised that there are other uses at the airport that may have influenced the data, for example construction traffic. It would be useful to understand the applicants view on this, and whether they have any evidence to indicate why there could be such a variation in traffic flows. The difference between the two data sets does highlight two significant points:

- There is considerable fluctuation of daily flows at the airport, which could equate to thousands of vehicles a day;

- CAA data by virtue of just collecting passenger data may not be identifying all of the trips likely to be arriving at the site accesses, could lead to an underestimation of future trips.

As discussed at the last meeting, the use of CAA data has its merits in the assessment, but some caution and sense checking needs to be completed to ensure that it is robust and adequately predicts the likely impact of the development.

3. Future Forecasting Scenarios

To move discussions forward and give the authority confidence in the assessment; it is recommended that the Transport Assessment uses a number of future forecasting scenarios when considering the impact on the highway network. The 10mppa consent is understood to have a modal split target of 15% for public transport, which would leave the remaining 85% of trips arriving by vehicles (be that cars parking at the airport, drop offs or taxi's). The TA proposes this as the starting point for the assessment and would seem sensible given it is a target of the 10mppa consent.

In addition, the Authority would like to see a sensitivity test which uses a lower modal split toward public transport (as an example 12%) which would provide a worst-case assessment of the operation of the highway network.

Furthermore; it is felt that the applicant should be looking at further measures to reduce the reliance on private vehicles at the airport and should be seeking to push the modal split further towards public transport, and a final assessment should consider the impact of increasing the PT modal split, for example increasing it to 17.5% and look at measures which could be introduced to reach this target.

4. Off-site Car Parking

A key concern of the Authority is the operation of third party airport car parks which currently service the airport, and how this is considered in the assessment going forward. It is recognised that any current traffic generation for these will have been included in the junction turning counts which have already been completed as part of the survey work, as the sites currently operate, and they are therefore existing trips.

Going forward, the clarification provided by PBA in the latest technical note in paragraph 4.10 indicates that the use of these third party car parks will have been picked up by the CAA survey team. Therefore, they would be included within the modal split identified within PBA's assessment of future vehicle trips to the airport.

However; there could still be an underestimation of trips relating to these third party car parks, and also the Silverzone which requires a shuttle bus to access the terminal building. Using the CAA data, the methodology correctly identifies the trip relating to this as a private vehicle arrival at the car park, but then there is a second trip by these passengers on the shuttle bus which travels from the Silverzone to the airport terminal, passing through two junctions on the local road. Again, the existing pattern of these shuttle buses will have been picked up in the turning movement surveys completed for the existing junctions, however a growth in passengers using the Silverzone will presumably require more shuttle buses per hour to transfer them to the airport, which won't have been included within the CAA assessment. The same logic can be applied to the minibuses from the third party car parking areas. Some consideration of this should be provided within the TA.

Furthermore, it would be useful to understand the current capacity of the car parking available at the airport, their levels of current utilization and whether there is adequate spare capacity to cater for the growth to 12mppa.

5. Daily Trip Profile

It is understood that the daily trip profile is based on the predicted flight schedule produced by Bristol Airport. There are concerns that the daily profile is demonstrating relatively few trips around the PM peak, with a very small increase at 3pm. The latest note states in paragraph 6.1 that this information is 'commercial sensitive', however, without access to it, it is not possible for the authority to check the accuracy of this daily profile. Further information is requested so that a proper audit can be undertaken.

6. Junction Modelling

Whilst we appreciate that it is important to identify the fundamental inputs of the models at the scoping stage, before the assessment is provided, we are mindful that following the submission of the completed TA there may still be significant work to agree the parameters, and outputs of the modelling during the consultation period. It would be helpful if the modelling files could be provided at your earliest convenience, so we can comment on these.

Also, we are mindful that we have not been provided with any indication of the likely wider impact of the development on junctions on the network and, as discussed previously, we may require additional assessment at critical junctions depending on the conclusions drawn from the assessment in the TA.

7. Conclusions

The Authority is confident that the assessment of the Airport proposals are moving forward however, there are a number of outstanding concerns which require resolution within the TA, and we look forward to receiving more information in due course.

TECHNICAL NOTE

Job Name:	Development of Bristol Airport to Accommodate 12mppa
Job No:	43321
Note No:	43321/TN005
Date:	October 2018
Prepared By:	Yasmine Hujair
Subject:	**North Somerset Council Scoping Response**

1. Introduction

1.1. Peter Brett Associates LLP (PBA) on behalf of Bristol Airport Limited (BAL) have provided this response to the comments from North Somerset Council (NSC) that were received in memorandum dated 12th September 2018.

1.2. NSC extracts are shown in italics and PBA response are provided in coloured text underneath each of the main comments.

1.3. The methodology set out in the Transport Assessment Scoping Report are considered to provide a robust assessment of the predicted highways impacts of the development of Bristol Airport to accommodate 12mppa based on:

- Forecast flight schedules for 10mppa and 12mppa provided by BAL
- The peak passenger month of August (it is worth noting that this is the typical peak passenger month at most UK airports);
- More detailed CAA passenger survey modal share, which has been weighted by trip origin to reflect an overall 15% passenger modal share for public transport;
- A peak forecast of staff numbers (including shift workers);
- Staff modal share, which has been aligned to the 2017 staff travel survey, although staff on-site parking in the future will be less than the current provision and a targeted reduction in the percentage of trips by single occupancy car is in operation; and
- Baseline traffic surveys have been undertaken prior to the school summer holidays when traffic flows are higher than in the summer months.

2. General Comments

NSC Comment

It is noted that considerable onus has been placed on CAA passenger survey data recorded from 2015. There are concerns that CAA data may not capture sufficient passenger information in order to demonstrate both historical trends, or provide suitable confidence that the survey data is representative of normal trends and operating conditions.

PBA Response

2.1. The CAA passenger survey's is an industry standard data source in the preparation of Transport Assessments (TA) for Airports across the UK, including but not limited to the TA's prepared for;

- London Stansted (Ref. UTT/18/0460/FUL),
- Manchester Airport (Ref 110720/FO/2015/S2)
- The consented 10mppa TA for Bristol Airport (Ref 09/P/1020/OT2).

2.2. The CAA collects data at more than 60 UK airports from a number of sources including individual flights, airlines, airports and a departing passenger survey. The CAA have conducted the departing passenger survey at Bristol Airport in 2008, 2012 and 2015. Airports use this data to assess the type of market served by airports and consequently for forecasting air transport demand and planning airport facilities, including passenger experience and surface access.

2.3. NSC has noted that the sample size represents a small percentage of the number of passengers passing through the airport per year. The CAA follows a stratified sampling methodology based on carrier, route and quarter, and is weighted based on actual two-way air traffic levels, thus accounting for arriving passengers under the assumption they will show the same characteristics as departing passengers. The survey is operated for an entire year and the passengers interviewed are selected using a robust sampling system.

2.4. With regards to the passenger survey CAA state the following:

CAA surveys generally operate for twelve month periods with anywhere from 3,000 to 70,000 interviews being achieved, depending on airport size. The surveys usually follow a stratified sampling design (stratified by carrier, route and quarter), with interviews taking place in the gaterooms. The interviews are then weighted to actual traffic levels'.

2.5. The following points have been quoted from the CAA and outline the sampling methodology used when interviewing in the gate room:

- The interviewing area where passengers are sampled should be clearly defined to all team members present.
- The interviewing area is divided into a number of virtual areas, dependent upon the number of team members available to interview. If there are four team members, the interviewing area should be divided into quarters, where there are only three team members, then the area should be divided into thirds and so on.
- Each interviewer is assigned an area. It will then be that interviewer's responsibility to sample passengers who move into their area.
- It is of key importance that interviewers do not avoid certain passengers or show any favouritism to other groups of passengers.
- On selecting the first passenger (perhaps to the extreme left of the interviewing area) the interviewer will run through the questionnaire in the normal manner. On the completion of this interview, the interviewer will then count three more passengers (in this example, towards the right). The third passenger counted, assuming that they are eligible for interview will then be interviewed. Once this interview has been completed, the interviewer will then count a further three passengers and begin the process again. The same passenger cannot be interviewed twice.
- The interviewing areas can be redefined during busy or quiet periods in line with the number of team members available to work.

2.6. The CAA passenger survey at Bristol Airport captured mode share from 9,053 people across12 months in 2015. This is a statistically significant sample size. Passenger throughput was recorded at 6.4mppa in 2015 and so the response rate was 0.14%. This is a standard percentage captured at each airport, including Heathrow Airport.

2.7. More details on the CAA passenger survey sampling, validation and weighting methodology can be found on the link below:

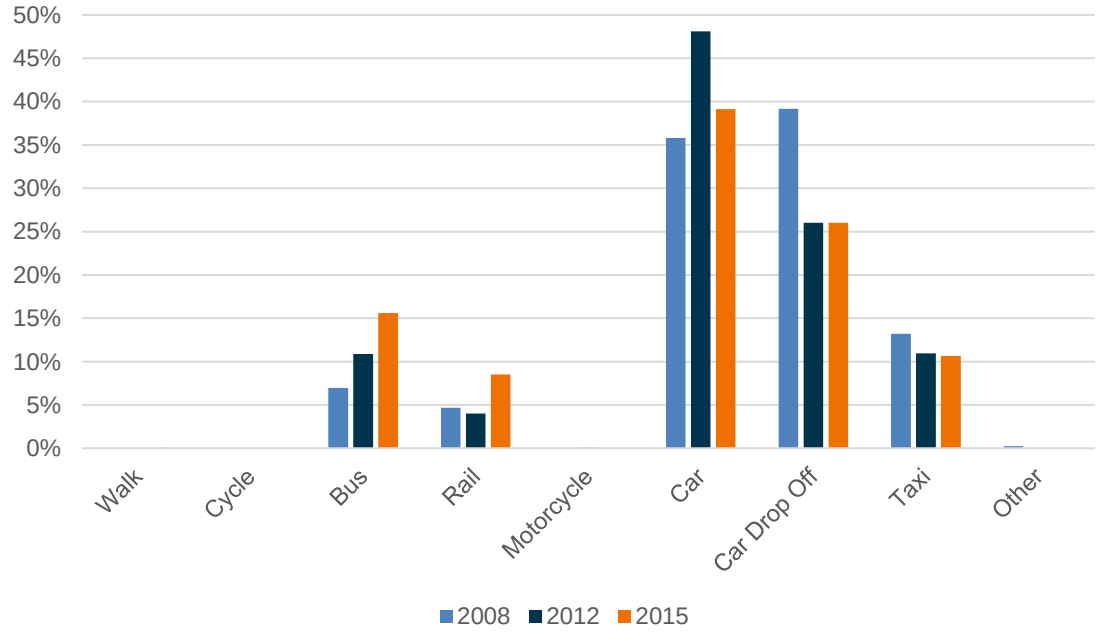
https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Consumer-research/Departing-passenger-survey/Sampling-methodology/

2.8. CAA have undertaken passenger surveys at Bristol Airport three times in recent times; in 2008, 2012 and 2015. **Table 2.1** and **Figure 2.1** present the recorded passenger mode share information in 2008, 2012 and 2015.

Table 2.1: Passenger Mode Share Historic Trends

Mode	2008	2012	2015
Walk	0%	0%	0%
Cycle	0%	0%	0%
Bus	7%	11%	16%
Rail	5%	4%	9%
Motorcycle	0%	0%	0%
Car	75%	74%	65%
Taxi	13%	11%	11%
Other	0%	0%	0%

Figure 2.1: Passenger Mode Share Historic Trends



2.9. This indicates a clear trend relating to the increase of public transport use reflecting the increased investment in this area and the associated decrease of taxi and car drop off. The TA is based on an assumed passenger PT mode share of 15%, even though the trend suggests car trips will have continued to decrease since the recorded mode share in 2015.

2.10. It is evident from the above that the CAA data is robust and representative of the passengers using Bristol Airport. It is unlikely to be skewed, and is the most up-to-date data on passenger mode share and origin/destination for use within the TA.

2.11. Furthermore, BAL have agreed in principle with NSC that annual CAA passenger surveys will be undertaken at the Bristol Airport site to determine passenger trends including mode share and passenger catchment, etc.

3. Passenger Catchment

NSC Comment

CAA passenger data from 2015 has been used to determine where passengers who use the airport are arriving from, with the majority arriving from the South West and Wales. Paragraph 2.3.2 states that annual passenger growth has been achieved primarily from this area, and table 2.2 has used the data from 2015 to predict where passenger in 2017 have arrived from. This indicates that 77.2% originated from South West and 18.8% from Wales. It would be useful to understand if there is any data that provides a more robust evidence to confirm this trend, as using 2015 data only is not robust enough to indicate an on-going trend.

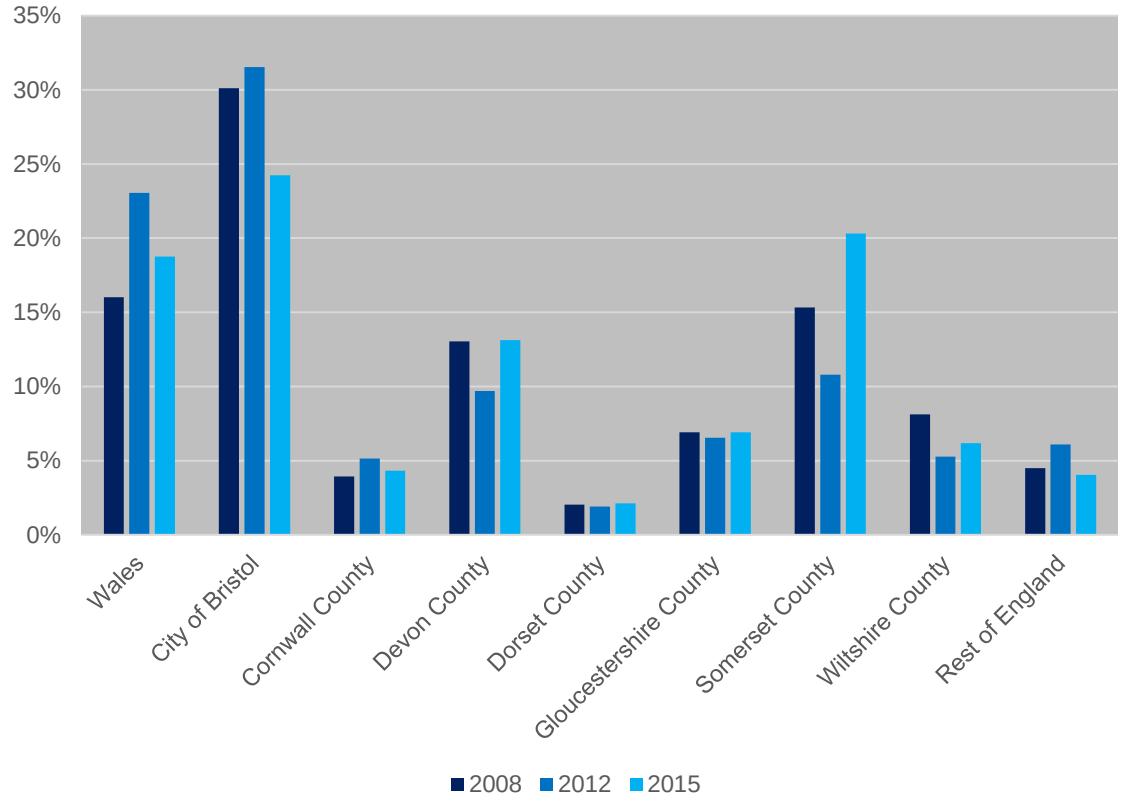
PBA Response

3.1. As highlighted under **Section 2.2** of this TN, the previous consented planning applications for passenger growth at Bristol Airport predicted passenger catchments based on the most readily available CAA passenger surveys at the time of the applications.

3.2. As described in the TA Scoping Report, the most up to date CAA data from the 2015 survey has been used to understand the origin and destination of passenger trips to and from the airport.

3.3. To provide additional information on passenger catchment trends the 2008, 2012 and 2015 catchment have been set out in **Figure 3.1**.

Figure 3.1: Passenger Catchment Trends



3.4. Furthermore, strategic infrastructure being promoted as part of the West of England Joint Spatial Plan (JSP) is also unlikely to be delivered before the predicted 12mppa year of 2026, and will not therefore materially alter passenger catchment before 2026.

NSC Comment

It would be interesting to understand the response rate to the CAA passenger surveys, to ensure that there is an adequate sample size to support the assumptions made within the survey. Given these surveys form the basis for the prediction of all trips to the Airport, the Authority will need to have the confidence that a suitably large sample size has been achieved to ensure robust analysis.

PBA Response

3.5. For clarification, the predicted passenger numbers have been forecast by BAL and the CAA data has been used to build up passenger profiles based on these numbers. The annual passenger numbers have been distributed over the year using the monthly passenger records, and distributed over the average working day using the validated 10mppa and 12mppa flight schedules. The CAA passenger survey has been used to predict passenger mode share, noting that public transport has been capped at 15%, car occupancy (group sizing), and catchment (origin and destination).

3.6. As set out within Section 2 the passenger survey undertaken by CAA follow a strict sampling system. The survey database is also subject to a series of validation checks prior to the weighting process to ensure the integrity of the various aspects of the data.

3.7. The CAA passenger survey at Bristol Airport captured mode share from 9,053 people across12 months in 2015. This is a statistically significant sample size. Passenger throughput was recorded at 6.4mppa in 2015.

NSC Comment

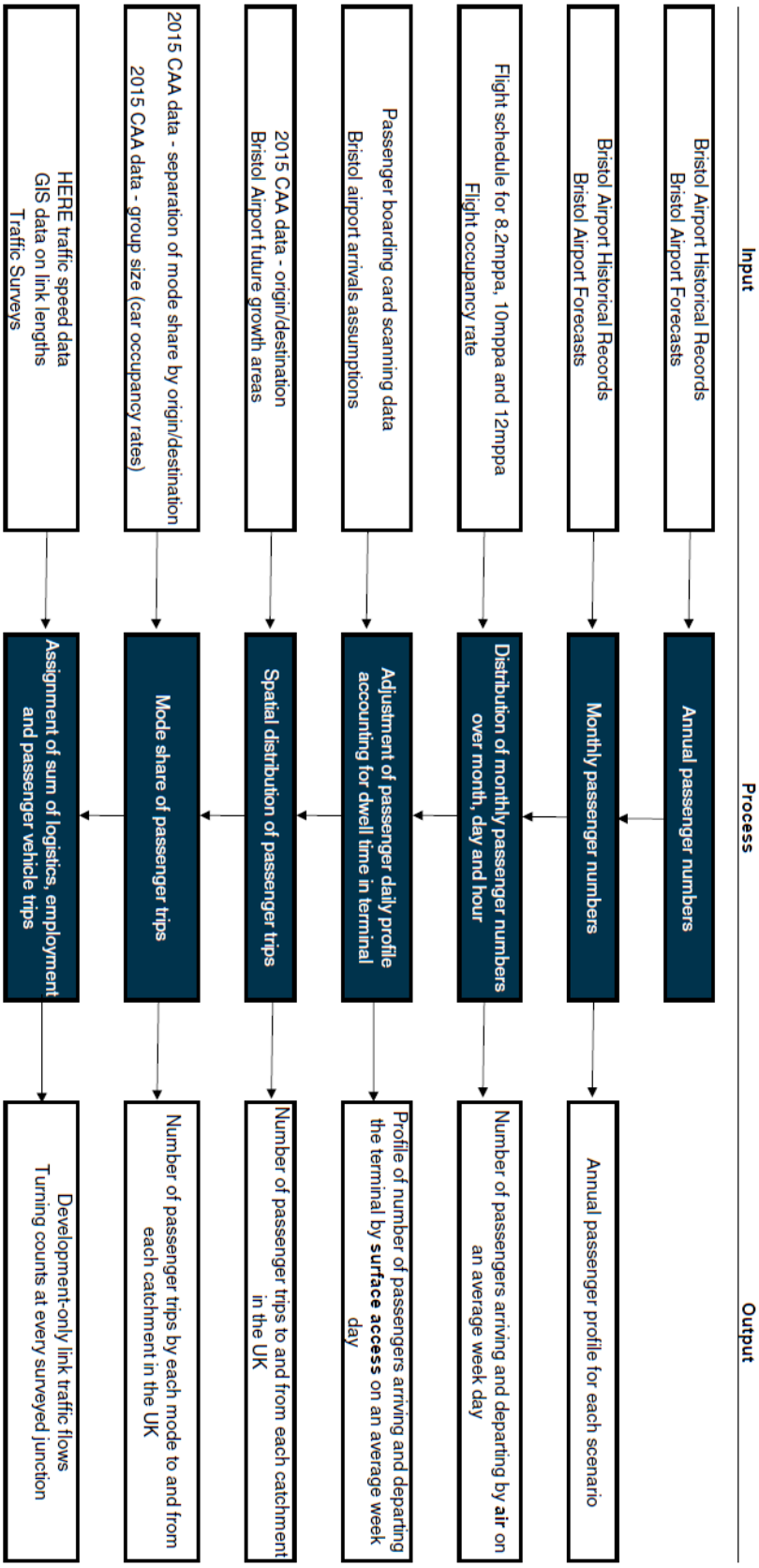
Furthermore, there is a requirement to validate the data taken from the CAA data with other data sources to ensure that CAA data is accurately capturing arrivals and departures at the airport. For example a useful check would be to compare traffic counts at the site access against the extrapolated data from the CAA survey data.

PBA Response

3.8. As highlighted in the previous section, the number of passenger trips has been calculated using the BAL forecasts, historic BAL data and the validated flight schedule. For clarification, **Figure 3.2** sets out the methodology, data sources and outputs for each stage of the assessment.

3.9. It is worth noting this process has been applied to predict the additional passenger growth (additional 1.8mppa up to 10mppa and an additional 3.8mppa uplift to 12mppa) at the Bristol Airport site, which had reached 8.2mppa in 2017.

Figure 3.2: Passenger Growth Methodology



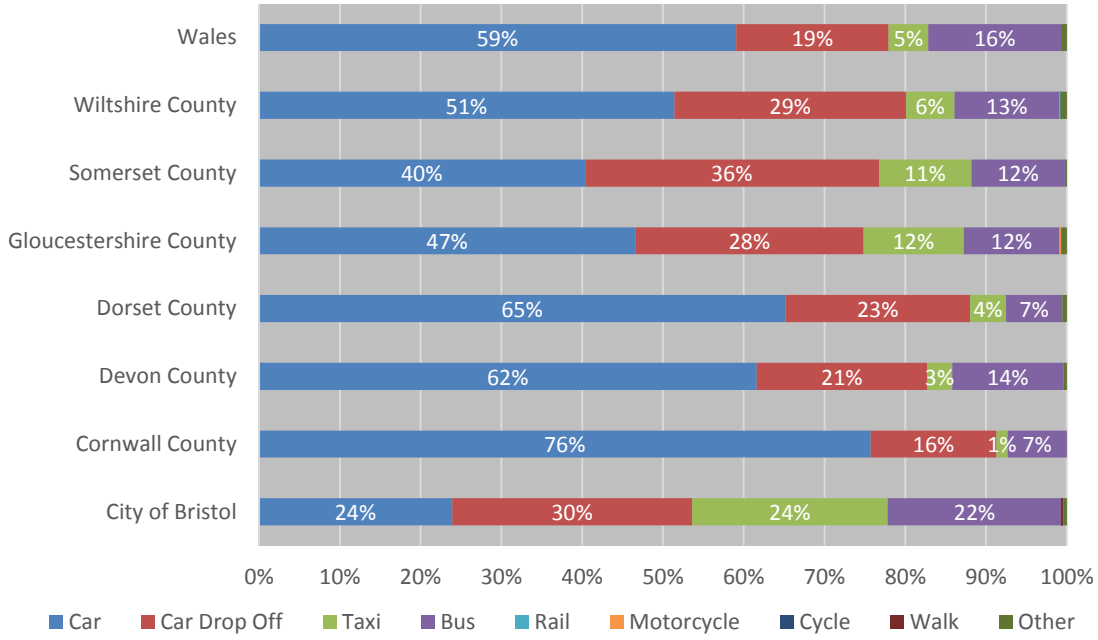
NSC Comment

There are a number of minor typo issues within this section, for example figure 2.7 does not label all of the bars of the graph, and there is an incorrect statement in paragraph 2.5.3 which should state 'Bristol' not 'Bath'.

PBA Response

3.10. The submitted TA will address the above. Figure 2.7 has been updated as shown on **Figure 3.3**

Figure 3.3: Passenger Mode Share by Catchment



4. Passenger Mode Share

NSC Comment

Paragraph 2.4.1 states that passenger mode share varies via catchment area and time of year, which is reflected within the nature of journey purpose and transport options available. Presumably modal choice is also influenced by the time of day a passenger travels – for example for very early morning flights there may not be the same public transport options available as later in the day. This could impact the hourly generation figures and some further clarification is sought here. It is not clear how the CAA data deals with people who arrive to use the Silver Zone parking, and how this is recorded. Does the survey data assume that this person drives? Further clarification is sought here.

PBA Response

4.1. The methodology presented in the TA scoping report provides variable mode share and vehicle occupancy, dependent on the origin/destination of the passenger. The source of which is the 2015 CAA passenger survey data set.

4.2. As has been described previously, passengers are surveyed for the CAA in the gate rooms of the terminal. Therefore, the time the survey is recorded is not equal to the time the passenger arrives at the airport. The passenger dwell time analysis has been carried out within the TA.

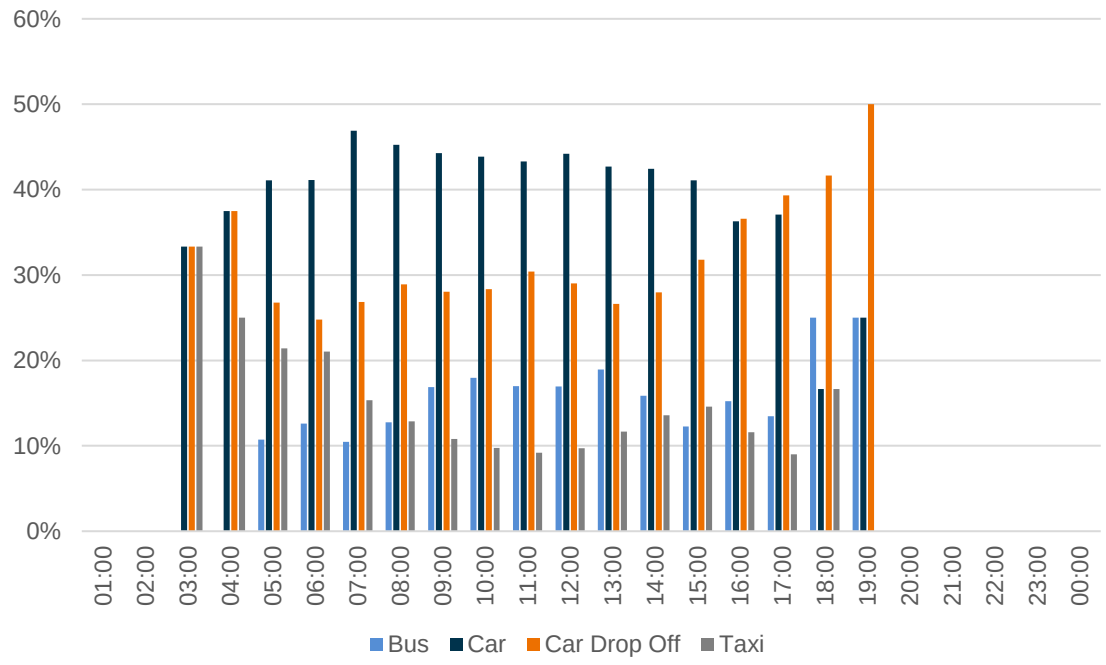
4.3. However, the recorded dwell time, summarised in **Table 4.1**, indicates that approximately 50% of passengers arrive less than one hour before a flight and 50% arrive more than one hour before a flight.

Table 4.1: Summarised Passenger Dwell Time

Minutes	Percentage of Passengers
0-30	17%
31-60	32%
61-90	28%
91-120	13%
120+	10%

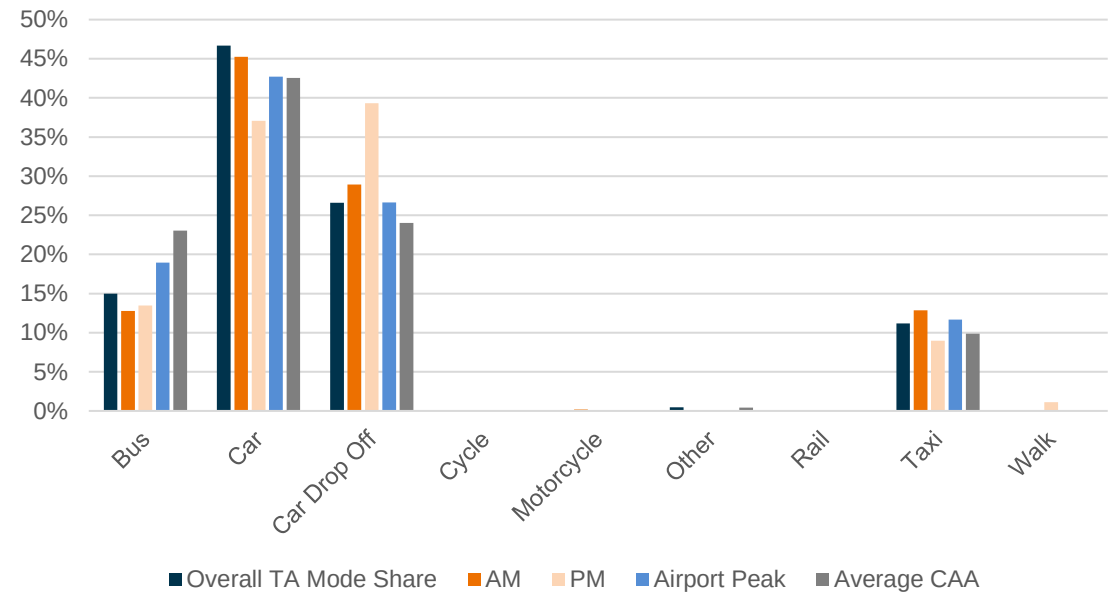
4.4. Therefore, this assumption has been applied to the hourly mode share to produce a more realistic profile. This has been provided in **Figure 4.1**.

Figure 4.1: Daily Variation of Mode Share



4.5. **Figure 4.2** shows a comparison of the overall mode share utilised within the TA, that has been adjusted to reflect the recorded 15% bus mode share, the differing mode shares in each peak and the average over the day.

Figure 4.2: Comparison Between Mode Share used in TA



4.6. In addition, car occupancy rates, which are calculated by catchment using the group size data from CAA, indicate that in the month of August there are more passengers per car than the annual averages. This is summarised in **Table 4.2**.

Table 4.2: Car Occupancy Rates Comparison by Time Period

	City of Bristol	Cornwall	Devon	Dorset	Gloucestershire	Somerset	Wiltshire	South Wales	August Average
Taxi / Minicab	1.5	1.5	2.0	2.0	1.5	1.9	1.6	1.7	**2.2**
Car Parked	1.9	2.1	2.0	1.9	2.0	2.0	2.0	2.1	**2.6**
Car Drop Off	1.6	2.5	1.6	1.8	1.6	1.5	1.6	1.6	**2.0**

4.7. The TA methodology therefore uses a lower car occupancy rate than what has been recorded for the month of August in 2015. This methodology is therefore robust and assumes a worse case for passenger car occupancy.

4.8. Whilst it's acknowledged passenger mode share will depend on availability of public transport, the methodology presented in the TA scoping report is considered to provide a robust assessment as it has been calculated on the annual average mode share and annual average group size per area for the peak passenger throughput month of August. The periods of lower public transport availability occur when the highway network has significantly less volumes of traffic. Furthermore, this approach provides an assessment in the typical highway network peak hour when public transport availability will be higher.

4.9. The CAA data records passenger travel movements using the following question:

Could you tell me in detail how you travelled from (origin) to Bristol Airport today?

4.10. In response to this question the following parking options (where recorded) to answer this question are as follows:

- Car Unspecified
- Hotel bus
- Minicab
- Private car - airport long term car park bus
- Private car - business car park
- Private car - driven away
- Private car - hotel car park bus
- Private car - mid stay car park bus
- Private car – mid stay car park drop off
- Private car - private long term car park bus
- Private car - short term car park
- Private car - short term car park - meet/greet
- Private car - staff car park bus
- Private car - type of car park unknown
- Private car - valet service - Off airport
- Private car - valet service - On airport
- Rental car - hire car courtesy bus
- Rental car - short term car park

4.11. The methodology presented in the TA scoping report determines that all response within these subcategories have a car parked at the Bristol Airport site, including those parked at unauthorised local car parks. Annual average group size per area which is contained with the CAA data set has been utilised to forecast vehicle occupancy ratios. Again, for clarity this has only been applied to the additional 1.8mppa and 3.2mppa forecast passenger demand.

NSC Comment

Figure 2.7 appears to be missing some of the labels for areas within the South West and Wales. It is expected this is due to the chart being compressed to fit in the report, and reaffirms the importance of providing the raw data for our approval.

PBA Response

4.12. This has been addressed in **Figure 3.3**.

NSC Comment

The CAA data provides the modal split, which based on the passenger numbers can give an indication of the vehicular generation at the site, but it is not clear whether this has been validated against any other information, for example traffic count data at the car parks and site entrances.

PBA Response

4.13. The daily vehicle numbers associated with the passenger growth to 12mppa have been calculated using the methodology described in the TA Scoping Report submitted in August 2018. **Table 4.1** highlights the calculated daily additional vehicles in the peak month of August associated with this increase.

Table 4.1: Additional Vehicles Associated with 2mppa Increase in the Peak Month of August (Excluding Operational or Logistics)

Time	Total Vehicle without logistics		
	Inbound	Outbound	Total
00:00	146	279	426
01:00	0	1	1
02:00	33	13	46
03:00	4	1	5
04:00	5	1	5
05:00	125	42	166
06:00	210	99	309
07:00	168	137	305
08:00	122	74	196
09:00	106	93	198
10:00	106	166	273
11:00	107	82	188
12:00	257	226	484
13:00	254	302	556
14:00	103	101	205
15:00	26	10	35
16:00	58	42	100
17:00	161	158	319
18:00	338	300	638
19:00	323	404	727
20:00	91	153	244
21:00	11	31	42
22:00	17	35	52
23:00	0	31	31
Total	**2,770**	**2,781**	**5,552**

4.14. To validate this methodology and the use of the CAA mode share, the recorded two-way vehicle numbers using the northern and southern accesses to the airport from the surveys undertaken in July 2018 have been compared to the above calculated vehicle numbers.

4.15. The calculated uplift in vehicle numbers identified in **Table 4.1** have been scaled up using a growth factor of 4.1 (which represents the growth from 2mppa to 8.2mppa). **Table 4.2** summarises this in comparison with the total two-way vehicle movements per day in July 2018 using the northern and southern accesses.

Table 4.2: Vehicle Validation

	Calculated Vehicle Numbers			Recorded vehicle numbers		
	Inbound	Outbound	**Total**	Northern Access	Southern Access	**Total**
Daily	11,404	11,448	**22,852**	20,014	1,863	**21,877**

4.16. The TA methodology for the 2mppa increase scaled up to 8.2mppa overestimates the traffic generation by 975 vehicles.

4.17. Based on the above, the TA traffic generation methodology is considered to be robust and fit for purpose.

NSC Comment

As you are aware, there are issues with informal parking areas around the Airport. Passengers using these services will arrive at an external site by car, and then transfer to the airport via mini-bus or even by walking. How are these arrivals captured by CAA data? There is an 'other' category: does this include such arrivals? The concern here is that the CAA data, and therefore the TA will fail to pick up the use of these external services to the airport.

PBA Response

4.18. As outlined previously, the CAA data set captures both on-site and off-site parking. The 'other' category, which has a response of 37 people (0.4%), is not attributed to on or off-site parking.

4.19. The methodology for calculating passenger mode share has been undertaken only on the forecast uplift from 8.2mppa to 12mppa. The comprehensive agreed traffic survey package carried out in July 2018 (before the school holidays) has recorded such off-site movements, which have been scaled up to the agreed 2026 assessment year. Therefore, this robust methodology does consider and address the use of these external parking services to the airport.

5. Employee Mode Share

NSC Comment

No details have been provided on whether Mode share differs for shift workers as a result of the anti-social times of day that they need to arrive at the site. It is noted there are shift patterns which begin at 2am, and this may have a significantly different modal split profile to arrivals at 8am. Further clarification is sought here.

PBA Response

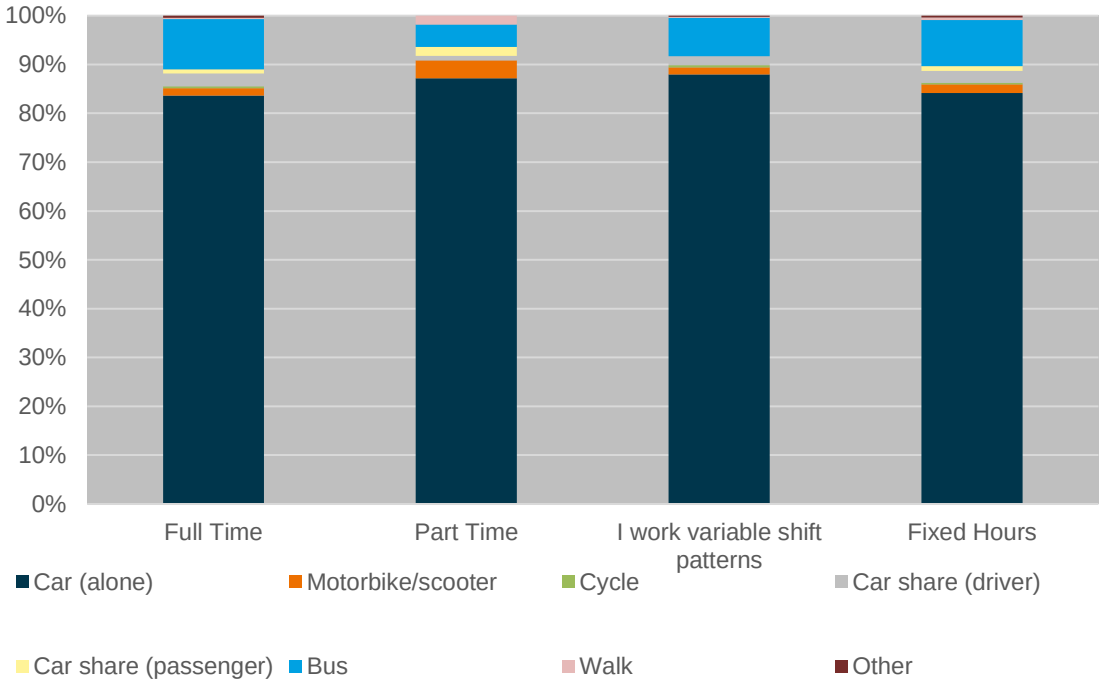
5.1. The data source for the mode share for staff is the 2017 Staff Travel survey, which has a response rate of 850 out of 2,976 Full Time Equivalent (FTE) employees (29%). The staff entry and exit profiles are recorded using the following question:

What is your usual start / end time, to the nearest hour?

5.2. 39% of respondents indicated a typical start and finish time. 61% of respondents indicated that their shift patterns are varied. Therefore, the remaining percentage of employee's entry and exit times have been soured from Bristol Airport business partners.

5.3. **Figure 5.1** indicates the mode share variation between varied and fixed shift employees.

Figure 5.1: Staff Mode Share & Shift Type



5.4. It is evident from **Figure 5.1** that the variation between employment type is minor, and therefore the application of a constant mode share throughout the day is considered acceptable.

5.5. Furthermore, as previously mentioned, the number of staff parking spaces will reduce in the future and the number of FTE's will increase. Therefore, the car driver mode share for employees is expected to reduce, which has not been considered within the TA to present a robust worst case.

6. Forecast Passenger Annual Profile

NSC Comment

The projections for an increase to 10mppa and 12mppa have been based on the recorded data taken from 2017, which is supported by historic trends over the last five years. This data from the last five years should be provided to give confidence that the 2017 data is representative. It would be beneficial to consider what the split in monthly arrivals was considered within the planning application to 10mppa, to determine if there are any differences, and explanations of why the numbers from the 10mppa application may have not been realised. This will give some confidence that using the projections from 2017 data is accurate.

PBA Response

6.1. The forecast flight schedules have been produced by BAL and verified by Mott MacDonald. The Validation report contains commercial sensitive information however an extract of Mott MacDonald Bristol Airport – Forecast Validation (dated August 2018) report has been provided below:

"BRS Management have performed a forecast study of expected growth of passenger traffic. This forecast blended a top-down econometric model with a bottom-up, airline by airline, approach. For the period until 2027 BRS Management have forecast the supply of seat capacity, load factors and based aircraft. This bottom-up approach makes informed assumptions regarding the level of air service that can be expected over the planning period.

BRS Management forecast included detailed assumptions on airline growth plans and fleet renewal. As part of this forecast validation, Mott MacDonald consulted the main BRS airline operators. The airline feedback broadly validated the BRS Management assumptions both in terms of future seat capacity offered and fleet modernisation assumptions. In Mott MacDonald's view, the BRS Management short-term assumptions are reasonable".

6.2. Based on the above information it is considered that the 2017 flight schedules are valid and fit for purpose data sources for predicting future flight trends at Bristol Airport.

NSC Comment

Projections for the 12mppa, using this 11% monthly split (actual value calculated as 10.98% but it is understood the table has rounded up for simplicity), takes this figure to 1,317,817, a total increase of 219,636 per month, and 7,085 per day. Should this value increase to say 13% for the 12mppa application for August, this would actually see a total passenger volume of circa 1,560,000 passengers for the month – an increase of 461,819 passengers a month, or 14,897 passengers a day. It is clear that given the scale of the airport, very small changes to percentages lead to a considerable variation in monthly, and daily passenger arrivals. There needs to be careful consideration of this, and more information should be provided by the applicant to support the assumptions that growth will remain uniform from the 2017 data.

PBA Response

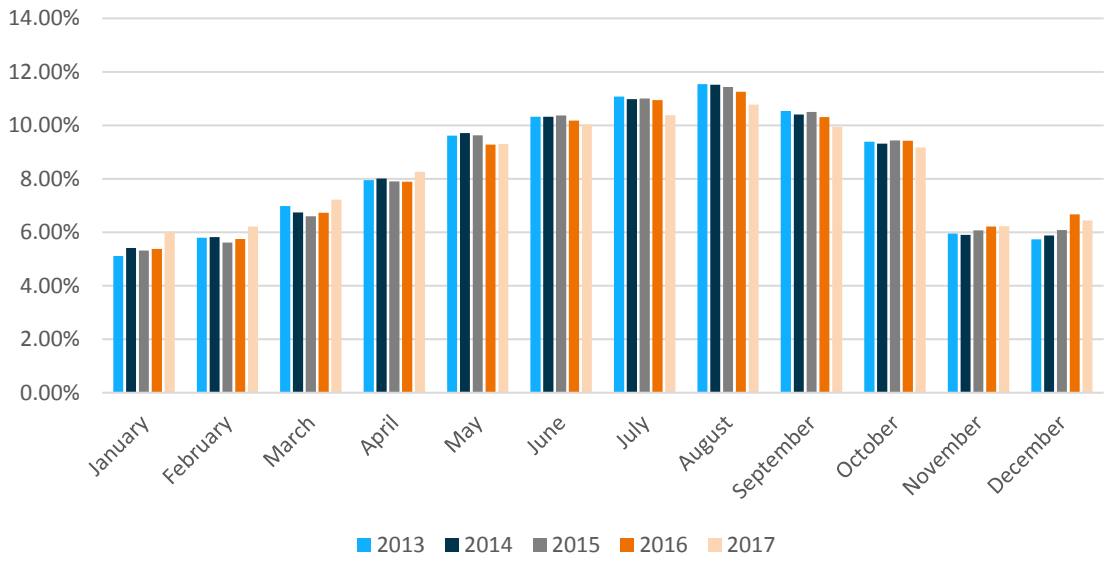
6.3. **Table 6.1** sets out the historic passenger profile at Bristol Airport as reported to CAA. The percentage of passengers using the airport each year in August for the last five years has been within the range of 10.87% - 11.54%.

Table 6.1: Passenger Annual Profile 2013 to 2017

	2013	2014	2015	2016	2017
January	313,393	342,989	360,924	408,792	494,821
February	355,234	368,932	381,531	437,850	512,018
March	428,022	427,151	448,061	511,908	594,481
April	487,744	507,592	536,549	600,657	680,200
May	589,932	615,556	653,430	705,820	766,081
June	632,708	653,994	704,112	774,168	825,952
July	678,886	696,218	747,168	833,071	854,999
August	707,649	730,536	776,246	856,728	887,485
September	646,336	659,657	712,931	784,705	817,823
October	575,763	590,218	640,720	716,834	754,998
November	364,654	374,452	412,322	472,660	513,064
December	351,575	372,560	412,796	507,587	530,708
Yearly	**6,131,896**	**6,339,855**	**6,786,790**	**7,610,780**	**8,232,630**

6.4. **Figure 6.1** shows the monthly passenger profile over the last five years. This data indicates that during the summer months, passenger numbers are decreasing, yet passenger numbers are increasing during the winter months. Therefore, assuming 11% of the annual passengers travel through BAL during August is robust.

Figure 6.1: Historic Monthly Passenger Numbers



7. Forecast Passenger Catchment

NSC Comment

The assumption is that growth to 12mppa is predicted to come from only the South West and Wales area. Again, as stated above, relatively small increases in percentages from different regions could have a significant impact on the traffic generation at the Airport. Historic trend data will need to be provided to prove that this will be the case in the future. Furthermore, details of how this growth will be realised should be provided. For example, is the increase of 2mppa a function of more people travelling abroad for holidays, or are they in fact 'transferred' journeys from other airports in the UK? If it is the latter then evidence should be provided which demonstrates which airport this trade is currently using. This will provide confidence that the assumptions are correct.

PBA Response

7.1. Future passenger catchment has been determined through liaison with BAL and reference to the CAA data. As set out within the TA scoping report passenger growth for 10mppa and the 12mppa is predicted to continue in this trend by introducing new destinations. This will be more attractive to those from the South West and Wales, who would otherwise travel beyond Bristol Airport to make these journeys. For other regions, this is not the case.

7.2. An extract of Mott MacDonald Bristol Airport – Forecast Validation (dated August 2018) report has been provided below with regards to forecast methodology and key assumptions:

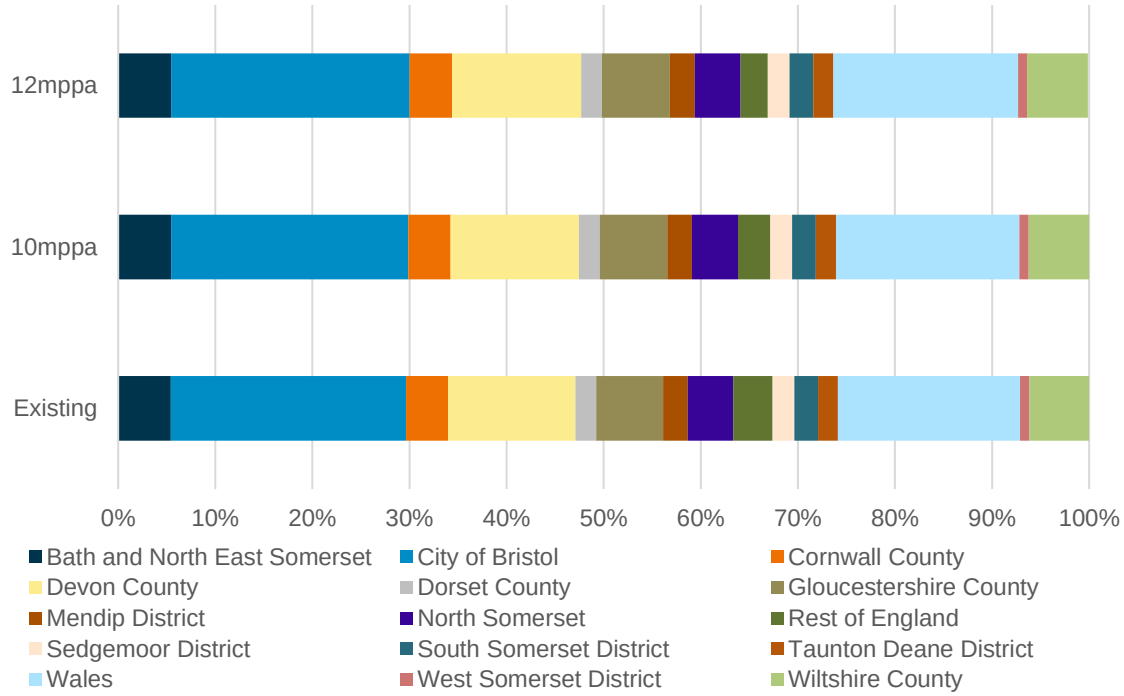
"No new airport in the Southwest England region

The forecast assumes that there will be no new airport or any material changes to any existing airport in the Southwest of England, or the UK, during the forecast period, excluding for the planned Heathrow expansion assumption described below

7.3. The total spill-over traffic of Southwest residents using London airports in 2017 was around 7 million passengers, mostly using Heathrow and Gatwick. It is assumed that increasing capacity constraints at both of these London airports, up to the opening of a third Heathrow runway, will help BRS capture a greater share of this Southwest resident traffic, as well as attract airlines to base aircraft at BRS when London slots are scarce. Following the opening of a new runway in London, it is assumed that Bristol Airport's share of the Southwest market returns to current levels due to increased London competition".

7.4. It is important to note that small changes in passenger catchment are unlikely to have a significant impact on the trip generation associated with the increase in passengers. The catchments have been segmented into 45 zones. **Figure 7.1** indicates the change in catchments under the assumption that the origin / destination of the 2mppa increase will exclusively be the South West and Wales.

Figure 7.1: Catchment Changes with Passenger Growth



7.5. It is evident from the above that even with 2mppa increase, the catchment percentage changes are almost negligible.

8. Forecast Passenger Mode Split

NSC Comment

Again, for Mode Split it is not clear whether Modal split varies throughout the day, and it has been assumed there is a uniform mode split throughout the day. Further clarification is requested. Furthermore, it has been assumed that car occupancy rates are the same for all time periods in the day. Should there be a lower car occupancy rate during the morning, for example, this would lead to a higher trip generation than if a high car occupancy was assumed.

PBA Response

8.1. The CAA data shows that the mode share fluctuates throughout the day, demonstrated by **Figure 8.1**. The CAA does not survey between the hours of 21:00 and 05:00.

8.2. As has been described previously, passengers are surveyed for the CAA in the gaterooms of the terminal. Therefore, the time the survey is recorded is not equal to the time the passenger arrives at the airport. The passenger dwell time analysis has been carried out within the TA.

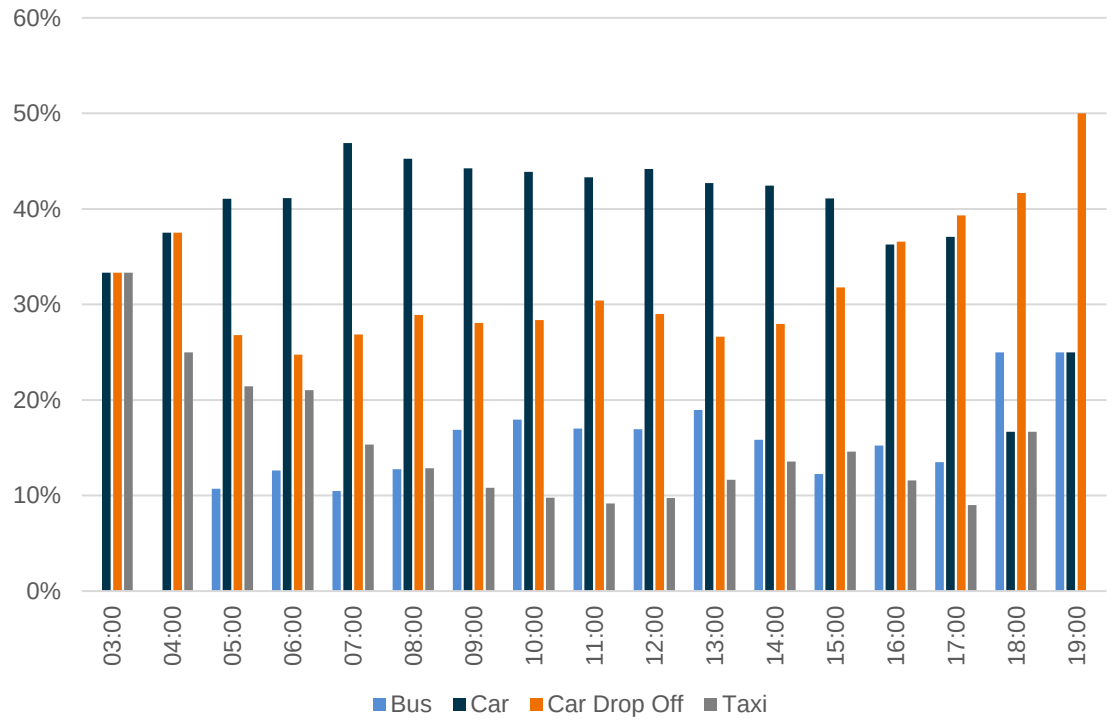
8.3. The recorded dwell time, summarised in Table 8.1, indicates that approximately 50% of passengers arrive less than one hour before a flight and 50% arrive more than one hour before a flight.

Table 8.1: Summarised Passenger Dwell Time

Minutes	Percentage of Passengers
0-30	17%
31-60	32%
61-90	28%
91-120	13%
120+	10%

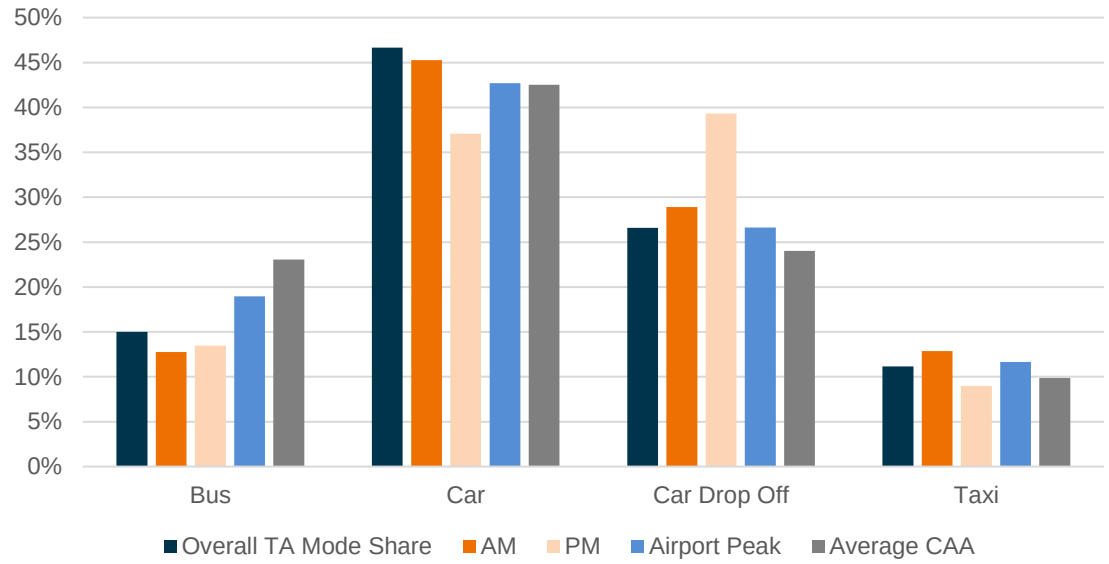
8.4. Therefore, this offset has been applied to the hourly mode share to produce a more realistic profile. This has been provided in **Figure 8.1**.

Figure 8.1: CAA Mode Share Daily Profile



8.5. **Figure 8.2** shows a comparison of the overall mode share utilised within the TA, that has been adjusted to reflect the recorded 15% bus patronage, the differing mode shares in each peak and the average over the day.

Figure 8.2: Comparison Between Mode Share used in TA



8.6. As presented in Table 4.2 car occupancy rates, which are calculated by catchment using the group size data from CAA, indicate that in the month of August there are more passengers per car than the annual averages.

8.7. The TA method therefore uses a lower car occupancy rate than that recorded for the month of August in 2015

9. Passenger Arrival and Departure Dwell Analysis

NSC Comment

The data on passenger dwell analysis is useful to determine likely passenger arrivals and departures on the roads in respect to their flight arrival and departure time. Please clarify whether the graphs presented within figure 3.8 and 3.9 show the actual time of the flight, or flight + 1 hour for arrivals and flight + 90 minutes for departures. It would be useful to be provided with the proposed flight schedule in order to check that the assumptions are correct. Also additional data should be provided which validates these arrivals and departure profiles. Cross checking against vehicular arrivals and departures at the airport will provide additional data here to validate this. Paragraph 3.5.2 states that departure dwell times have been provided by BAL, and it would be useful to understand over what period this data was collected, and the sample size used to determine these proportions.

PBA Response

9.1. The passenger boarding card scanning data has been used to understand the amount of time passengers spend in the terminal before their flight departs.

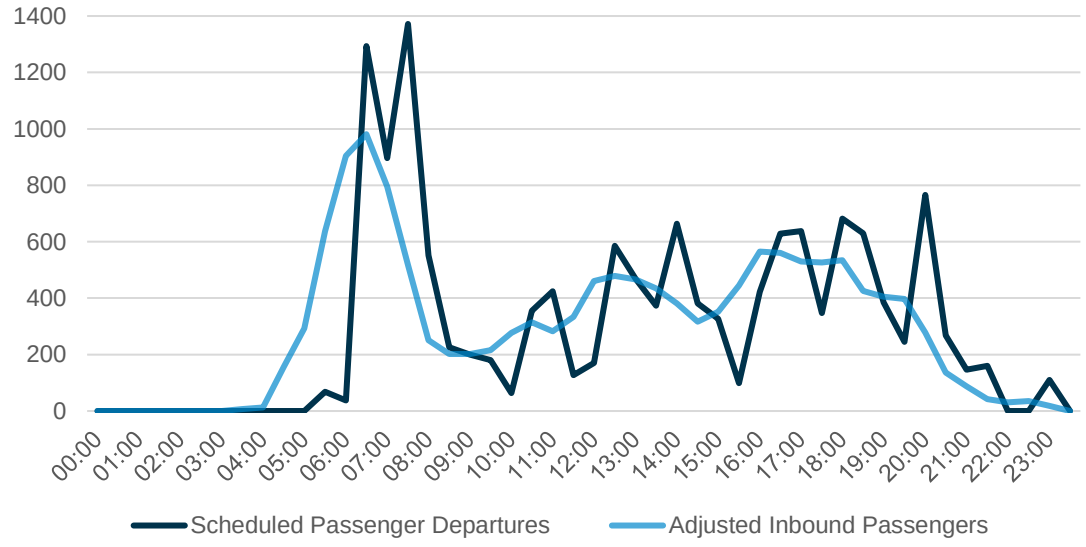
9.2. The boarding card scanning data used for this element of the assessment relates to every flight between 1st January 2017 until 18th June 2018 and is considered to be representative of passenger behaviour. This is a large enough data set to determine the amount of time spent inside the terminal before a flight departure. **Table 9.1** summarises the dwell time parameters.

Table 9.1: Departing Passengers Dwell Time Parameters

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

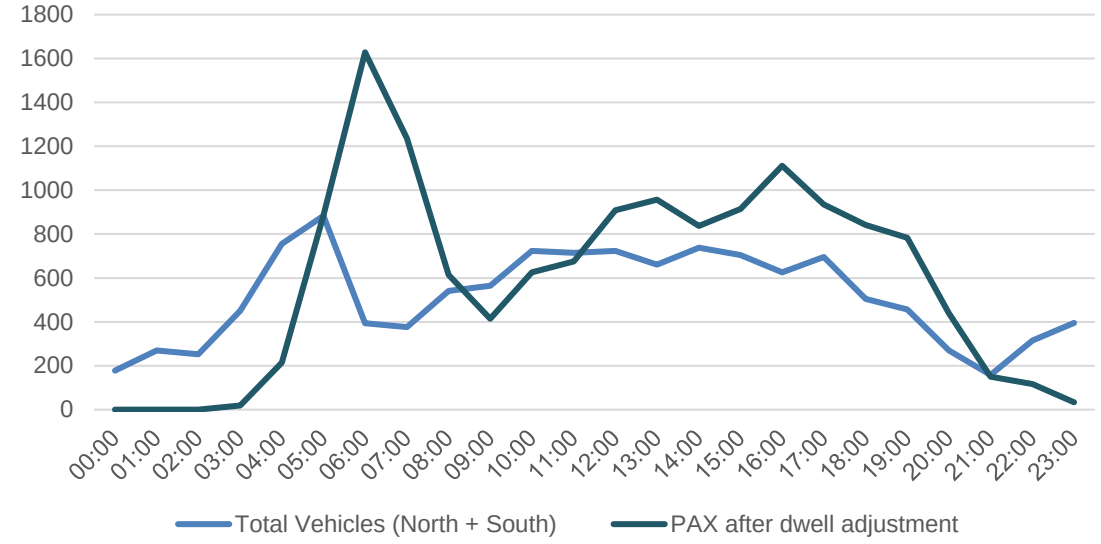
9.3. Based on this assumption of the above dwell time, the likely passenger entry time to the airport has been calculated. **Figure 9.1** illustrates the passenger entry profile to the terminal in relation to the departing flight schedule.

Figure 9.1: Passenger Entry Profile vs Departing Flight Schedule (Average Weekday)



9.4. To validate this dataset profile, the surveyed inbound traffic numbers from Thursday July 12th 2018 have been compared to the adjusted existing flight schedule (of departing flights) from Thursday 9th August 2018, based on the boarding card scanning data. The comparison is shown in **Figure 9.2**.

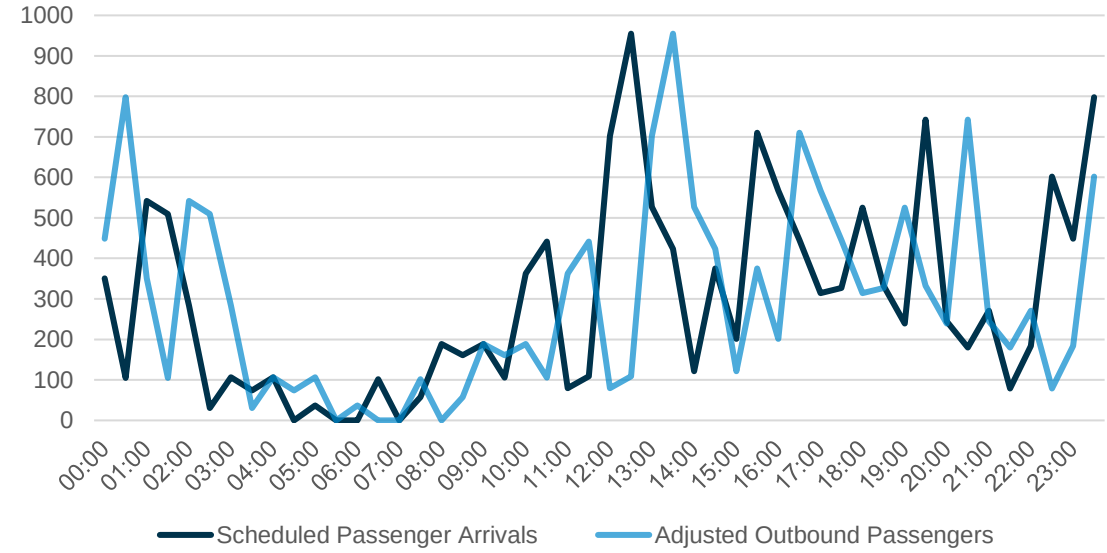
Figure 9.2: Surveyed Inbound Vehicle Numbers Compared with Calculated Passenger Numbers



9.5. It is evident that the profiles show a reasonable correlation. Based on the above, the Bristol Airport boarding card scanning data is considered to be a valid source of data to establish passenger dwell time.

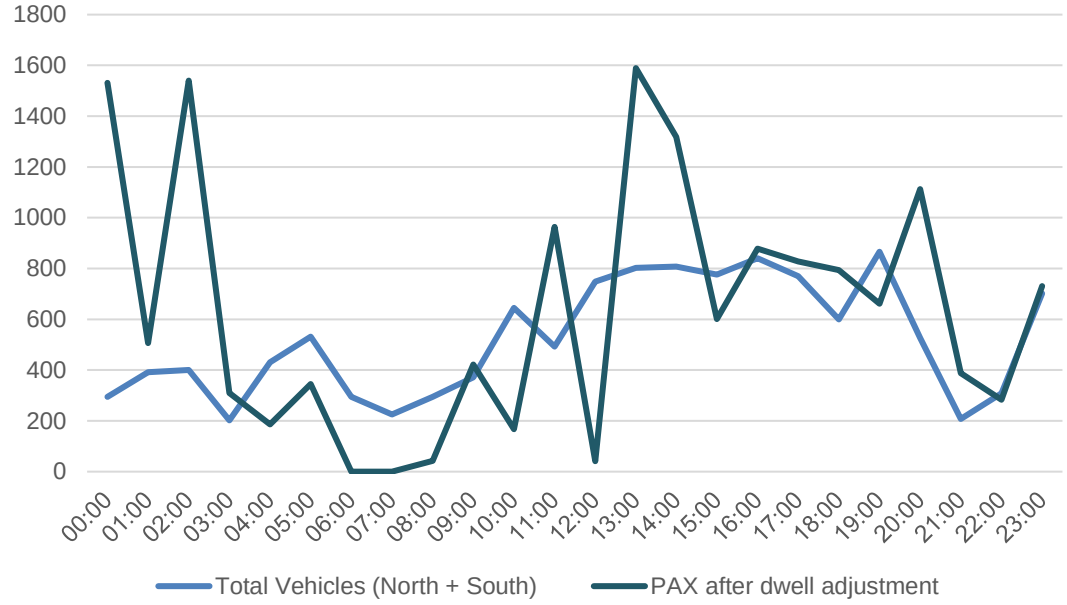
9.6. For flight arrivals, the available data is limited and therefore the dwell time is assumed to be one hour, based on operator knowledge. The passenger exit profile from the terminal has been shown in relation to the arriving flight schedule in the below figure. This acts as a worst case as the passenger exit times show sharp increases in correlation with the flight, as opposed to a flatter profile for passenger entry times, which can be corroborated using the boarding card scanning data.

Figure 9.3: Passenger Exit Profile vs Arriving Flight Schedule (Average Weekday in August 2018)



9.7. For further analysis, the surveyed outbound vehicle numbers from Thursday July 12th 2018 have been compared to the adjusted existing flight schedule (of arriving flights) on Thursday 9th August 2018, shown in **Figure 9.4.**

Figure 9.4 – Surveyed Outbound Vehicle Numbers Compared with Calculated Passenger Numbers



9.8. Once again, it is evident that the two datasets show a broad correlation.

9.9. If a suitable data source had been available for arriving (by air) passenger dwell time, the passenger exit profile would appear less peaky.

NSC Comment

The times that people arrive to catch their flight will be a key factor in determining vehicular impact on the network, and the Authority needs to be convinced that the data used is robust. It would be useful to understand whether in the future these dwell times are likely to reduce as there is a move towards checking in online etc, and if the Airport has any data to reflect this. A reduction in dwell time is likely to result in more passengers arriving at the same time instead of being stretched over several hours and this will require some further consideration.

PBA Response

9.10. As has been previously explained, the boarding card scanning data used for this element of the assessment relates to every flight between 1st January 2017 until 18th June 2018. During this time, online check-in has been a standard process in airports across the UK and Ryan Air has been charging passengers £50 for desk check-in.

9.11. It is possible that check-in times could be reduced but in the main passenger are expected to continue with similar dwell times due to certainty over catching flights and other food / drink and retail offers in the Airport.

9.12. The dataset therefore is representative of the current travel behaviours of passengers and is expected to continue until 2026.

9.13. As has been previously highlighted, the arriving (by air) passenger trip generation has been calculated based on the assumption that all passengers exit the terminal one hour after their flight arrives based on typical baggage collection, border control and access to onward travel times.

9.14. In addition, this methodology is applied exclusively to the passenger uplift between the existing 8.2mppa and the 12mppa. The existing passenger traffic movements are captured within the traffic surveys carried out in July 2018.

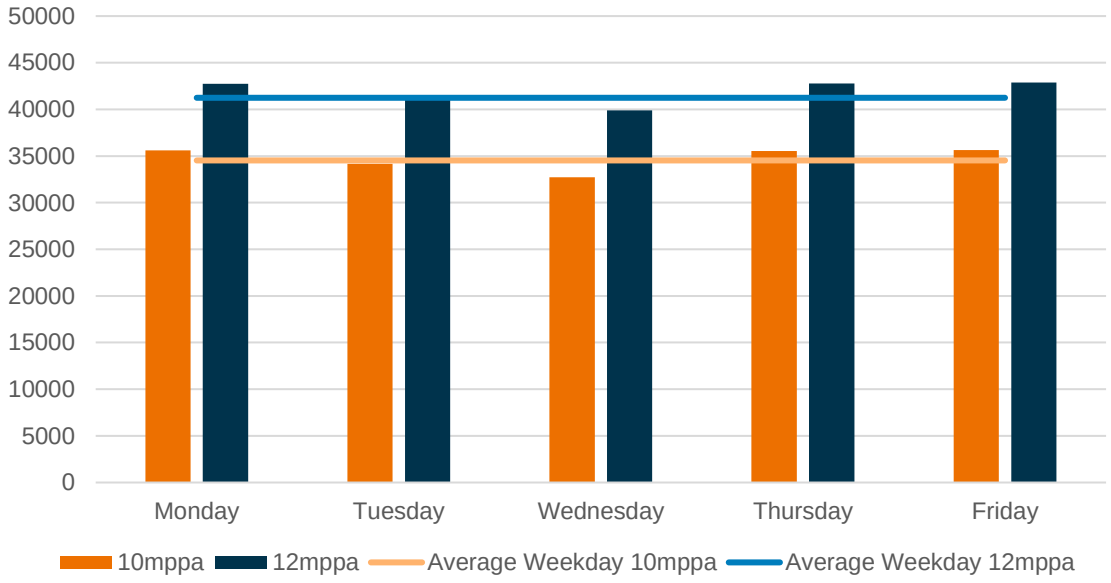
NSC Comment

Furthermore, the analysis assumes a uniform flight schedule for every day of the week, further clarification is required here as there may be days of the week which have a higher proportion of flights that are likely to impact peak periods.

PBA Response

9.15. The TA analysis is based on average week day for passenger numbers. This assumption is consistent with the TA for the 10mppa planning application submitted in 2009. **Figure 9.5** shows the variation of passenger numbers over the week for the 10mppa and 12mppa scenarios in comparison to the average weekday. The flight schedules provided by BAL vary each day and show differing peaks for each week day. The average weekday is considered to be an appropriate base on which to build a robust assessment.

Figure 9.5: Passenger Number Variation for Each Day of the Week



10. Vehicle Trip Assignment Methodology

NSC Comment

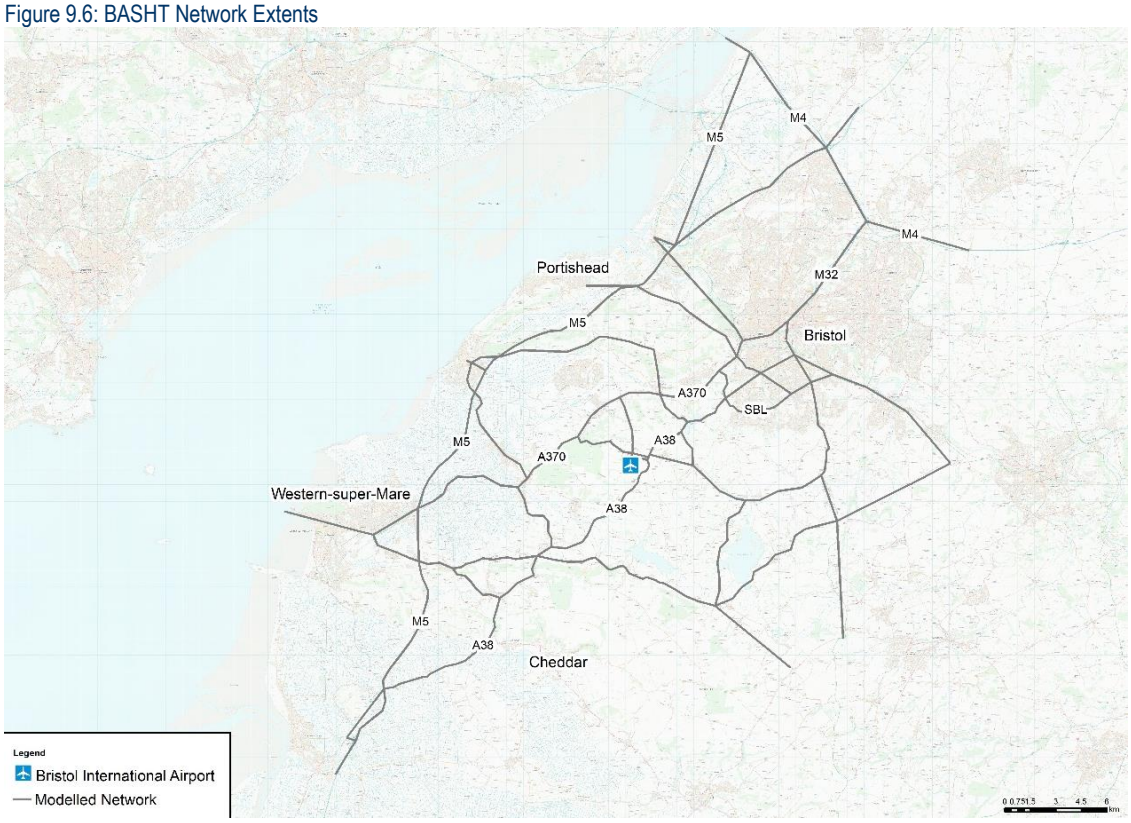
It is proposed to assign trips to the network using a SATURN model based on link speed and distance. This could over simplify the assessment and assign trips away from the current rat runs around the airport. For example, if the model is only considering link speed and distance, it is likely to assign the majority of traffic along the A38 and the SBL, whereas there are multiple route choices in that direction, including Downside Road / A370. Furthermore, the Airport is clearly signed from major strategic routes (such as the M5) and it is expected that trips further afield would follow these signs which may lead to a different assignment than proposed using SATURN alone.

PBA Response

10.1. 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 traffic flow to test the impact on a number of junctions in the vicinity of the airport. The thirteen junctions surveyed have been coded as Dummy Simulation nodes within the network to enable the junction turning movements to be extracted.

10.2. 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. The figure below illustrates the extents of the SATURN network.

Figure 9.6: BASHT Network Extents



10.3. We have also checked the routes used against sign posted routes and local logic checks. It is not intended to increase the use of rat-runs, so assigning traffic to these routes would be counter intuitive, as it might suggest a need for capacity improvements that could perpetuate rat-running.

10.4. The average speeds for the modelled time periods have been isolated per direction and have been assigned to each link within the model.

10.5. 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.

10.6. Two scenarios have been derived using the tool, which were a 10mppa (1.8mppa addition) and 12mppa (3.8mppa additional). The additional trips associated with these have been added on top of the TEMPRO growth 2018 junction counts (8.2mppa), this enabled the total 10mppa and subsequently the 12mppa junction turning flows readily derived within SATURN.

10.7. Assigned traffic network diagrams for each scenario have been provided in **Appendix A.**

NSC Comment

It is not clear how this model will be validated against vehicle assignments for vehicles currently using the airport, and further information will need to be provided in respect of this. The SATURN model will need to be provided for the Authority to review, and this will need to include details of the proposed zones used within the model. The assessment so far assumes that the majority of growth will come from the existing South West and Wales areas, and therefore it is logical to assume that current vehicular assignments will remain.

PBA Response

10.8. This model is purely a tool for extracting passenger flows by trip origin. It is not a validated assignment model.

NSC Comment

The modelling is proposed to consider the traditional network peak hours of 08:00-09:00 and 17:00-18:00. Traffic survey data will need to be provided which confirms that this is the network peak hour around the airport. It is recognised that traffic on a Friday afternoon is particularly busy around the airport, and this will need to be assessed with the TA.

PBA Response

10.9. The surveys undertaken in July 2018 have been interrogated to determine the total amount of traffic recorded through each surveyed junction throughout an average weekday. **Table 10.1** sets out the recorded hourly flow profile for each junction within the agreed study area for a 24-hour period.

Table 10.1: Recorded daily vehicle profile per junction (PCU's)

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

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
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
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

11. Assessment Study Area

NSC Comment

This was discussed at the recent scoping meeting. Whilst the area seems appropriate at this time, if the TA demonstrates that other junctions are likely to be severely impacted, additional analysis in these locations will be required. There are a number of smaller quieter roads which have not been picked up in the assessment. Such routes include West Lane / Felton Lane (Winford), as well as Portbury Lane which serves as a rat run from Junction 19 of the M5. There are additional routes from Junction 20 of the M5, including Nailsea Wall which should be included as part of the assessment. These routes are rural in nature, which are characterized with fast vehicular speeds and often impatient drivers. Whilst the absolute volume of traffic increase in these areas may not be substantial, the assessment should be mindful about increasing vehicles on routes which are not of the highest standard. Furthermore many of the quieter routes are popular walking and cycling routes, and increases in vehicles in this location will have an adverse impact on non-motorised users.

PBA Response

11.1. Airport traffic is encouraged to use signposted routes. Option to reduce speeds or restrict capacity could be considered if supported and promoted by NSC.

11.2. In addition, a Walking, Cycling and Horse Riding Assessment and Review (WCHAR) will be undertaken on the proposed junction improvements to ensure adverse impact on non-motorised users will be avoided.

11.3. NSC have requested that the traffic survey data collected for the purposes of the TA on the week commencing 9th July 2018 is validated against ATC data collected by NSC.

11.4. Table 11.1 summarises the total two-way traffic movements at each Bristol Airport Access

Table 11.1: Comparison between Traffic Data Collected by NSC and Data Collected by PBA

Source	Total Two-way Traffic
NSC ATC data	27,620
TA MCTC data	27,342
Difference	278
% Difference	1%

11.5. It is evident from the above that the data collected for the purpose of the TA is similar to NSC data.

12. Modelling Scenarios

NSC Comment

There are concerns about the proposed modelling scenarios within the TA. Whilst it is recognised that this is not a 'normal' development, which can identify opening year assessment, we are concerned that the proposed modelling scenarios may lead to scenario where there is an unacceptable impact on the highway network without mitigation. The Airport currently has a consent for 10mppa, and there is mitigation in place to ensure this does not have a severe impact on the road network, including Downside Road signals on the A38. From a planning perspective, this impact is 'accepted' and we are only considering the impact beyond this point. However, it is recognised that the network around Bristol Airport is incredibly busy, and the Downside Road signals particularly are reaching capacity. The proposed modelling scenarios only test a 2026 year for 12mppa and mitigation, however there will be an element of growth beyond the 10mppa before the full 12mppa is realised, and this will increase demand on the road network. It is not clear when 10mppa is expected to be achieved, but if the airport were to have a uniform 0.5mppa passenger growth a year it would lead to the following demand:

- *2018 – 8.2mppa*
- *2019 – 9mppa*
- *2020 – 9.5mppa*
- *2021 – 10mppa (end of current consent)*
- *2022 – 10.5mppa*
- *2023 – 11mppa*
- *2024 – 11.5mppa*
- *2025 - 12mppa*

Using the assessment methodology presented in the TA, this would lead to a gap in the assessment, where there would be no assessment (and no mitigation proposed) for any growth between 10 to 12mppa. In order to ensure adequate mitigation is proposed, there should be an assessment which effectively tests the operation of the network as soon as 10mppa is exceeded under any new consent.

PBA Response

12.1. PBA has noted this and this will be addressed in the TA submission by means of delivery timeline for any necessary improvements.

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43321/TN05	Final	19/10/18	Yasmine Hujair	Dan Townsend	Dan Townsend	Scott Witchalls

Bristol Airport Expansion

Transport Assessment Scoping Report

On behalf of **Bristol Airport Limited**

Project Ref: 43321/5501 | Rev: V5 | Date: August 2018

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For and on behalf of Peter Brett Associates LLP				

Revision	Date	Description	Prepared	Reviewed	Approved
V5	15.08.18	Addressing Client Comments	YH	RH	SW

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1 Introduction

1.1 Overview

1.1.1 Peter Brett Associates LLP (PBA) has been commissioned by Bristol Airport Limited (BAL) to provide transport and highway advice towards the delivery of the proposed 12 million passengers per annum (mppa) at Bristol Airport. This represents a proposed increase in annual passenger numbers of 2mppa, up from the currently permitted 10mppa.

1.1.2 This Scoping Report outlines the proposed scope and methodology of the assessment to be undertaken in the preparation of a future Transport Assessment (TA), which will be developed to accompany the future planning application.

1.1.3 We have used the information available from BAL and that available from the Civil Aviation Authority passenger survey (more than 18,000 responses in 2015), to inform the early stages of assessment. This report therefore sets out initial findings on catchment of future passengers, mode share and trip generation in order to provide the highway authorities with an early indication of the scale of transport demand arising from an application for a further 2mppa.

1.1.4 The methodology set out in this note will be followed to build upon the catchment, mode share and trip generation work in order to produce a full Transport Assessment (TA) in support of the application. This scoping report will therefore form part of the supporting information underpinning the TA, and for that reason it is intended to seek agreement with North Somerset Council (NSC), Bristol City Council (BCC), Bath and North East Somerset (BaNES) and Highways England as the transport authorities.

1.2 Background

1.2.1 Bristol Airport is the major airport serving the South West with more than 8 million passengers a year passing through the terminal. BAL were granted planning consent (Ref: 09/P/1020/OT2) in 2011 to increase passenger throughput from 6.2mppa to 10mppa. BAL forecast that the Airport will accommodate 10mppa by 2021 and with continued growth will reach 12mppa by 2026; it is therefore necessary to achieve planning permission to expand beyond 10mppa.

1.2.2 Bristol Airport is an important asset for the local economy, currently supporting an estimated 15,000 jobs and adds £1.3 billion to the local economy. Future expansion is therefore considered vital to the local economy.

1.2.3 While the Masterplan approaches a design freeze and for scoping the transport and wider environmental impact assessment at this stage the development proposals are assumed to be:

1.2.4 This may vary through consultation, but these thresholds are robust for the current purpose of forecasting the transport-related effects of the development.

1.3 Consented 10mppa

1.3.1 As discussed in the previous chapter, BAL have consented to increase passenger throughput to 10mppa. The TA will therefore focus on the forecast impacts of the proposed 12mppa application over and above the permitted 10mppa consent.

1.3.2 As part of the 10mppa consent, a public transport mode share of 15% was expected to be achieved at 10mppa. To reach this target, the following public transport strategy was agreed as part of the Section 106 agreement:

- 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.

1.3.3 BAL have been working towards the agreed public transport package as part of the consented 10mppa application. The following services are currently available from Bristol Airport:

- 6 buses an hour to Bristol;
- 1 bus an hour to Weston;
- 2 buses an hour to Bath;
- 1 bus an hour to Plymouth;
- 1 coach every 2 hours to Cardiff; and
- Public transport fund financial supports the A5 (Yatton and Winscombe) local bus service.

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

1.3.5 BAL are currently constructing the consented multi-storey car park, which has an integrated Public Transport interchange hub and drop off / pick up facility on the top deck of the car park. This will be connected to the terminal building by a covered walk way.

1.3.6 With regards to car parking, the consented 10mppa scheme permits up to 21,109 car parking spaces and up to 550 spaces for hire cars on the Bristol Airport site.

1.4 Structure

1.4.1 As discussed with the relevant authorities, this scoping report focuses on the methodology associated with the potential trip generation of the proposed expansion and the trip distribution as an important component to agree ahead of the submission of the planning application. This is to encourage a focus on the scope of assessment and to demonstrate the methodology is fit for purpose.

1.4.2 The report therefore includes the following:

- **Chapter 2: Current Travel Demand** - presents the current travel demand at Bristol Airport for passengers, employees and logistics. These trends represent a baseline case which shapes the forecast trip generation, modal share, distribution and assignment for the consented 10mppa and the proposed 12mppa.
- **Chapter 3: Forecast Travel Demand** – describes the methodology undertaken to quantify travel demands associated with the increase in passenger numbers of 2mppa. This includes corresponding increases in employee and logistic travel demand.
- **Chapter 4: Assessment Scenarios** – identifies the proposed assessment scenarios for consideration in the TA.

- **Chapter 5**: **Assessment Methodology** – sets out the process previously discussed with the highway authorities in scoping meetings and which we will undertake to determine any impacts arising from the proposals and to inform a suitable mitigation strategy to be formalised through the Airport Surface Access Strategy and Staff Travel Plan.

- **Chapter 6: Summary and Conclusions** – summarises the analysis presented in the report and confirms the proposed approach to taking the transport assessment forward to application.

2 Bristol Airport Current Travel Demand

2.1 Introduction

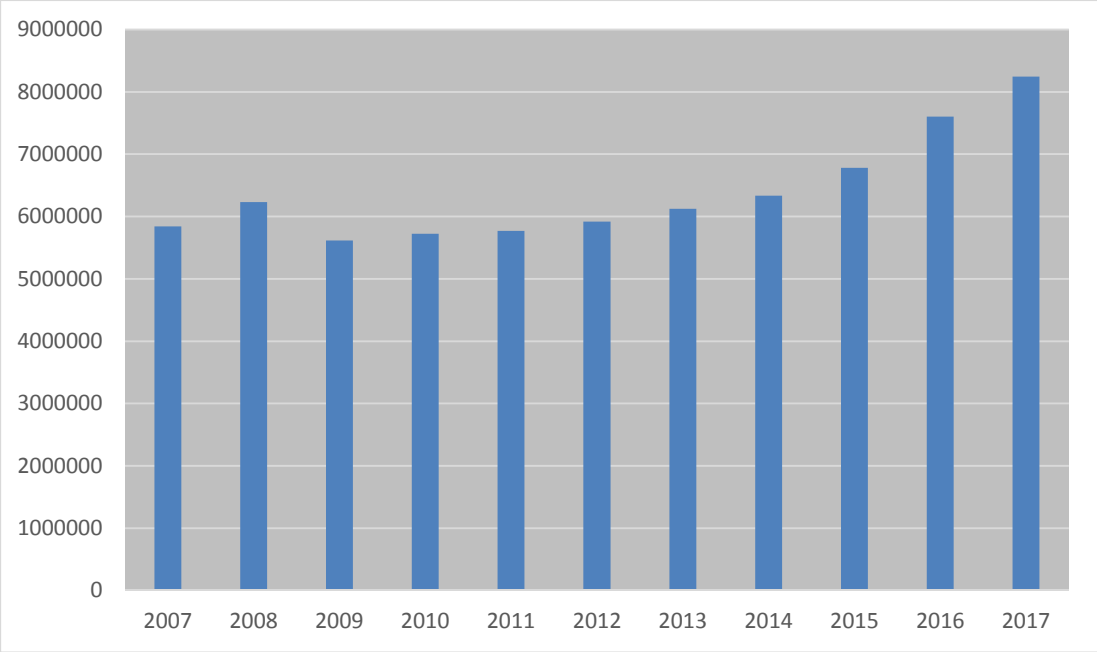
2.1.1 Bristol Airport is the major airport serving the South West of the United Kingdom (UK) with more than 8 million passengers a year passing through the terminal. Bristol Airport is the ninth busiest airport in the UK, and England's third largest regional airport.

2.1.2 A range of low-cost, full service and charter airlines fly from Bristol Airport to more than 120 destinations, including multiple daily services to hub airports with easy onward connections across the globe.

2.1.3 Bristol Airport serves as the operating bases for many of the Airlines (including Easy Jet and Thomas Cook). Flights, therefore are scheduled to take off early in the morning to their destinations and land at the airport late at night.

2.1.4 **Figure 2.1** sets out the annual passenger's numbers at Bristol Airport for the past decade.

Figure 2.1: Bristol Airport Annual Passengers (2007 – 2017)



2.2 Passenger Annual Profile

2.2.1 **Table 2.1** sets out the recorded number of passengers per month at Bristol Airport in 2017. These numbers have been extracted from the Civil Aviation Authority (CAA) monthly data reports for 2017.

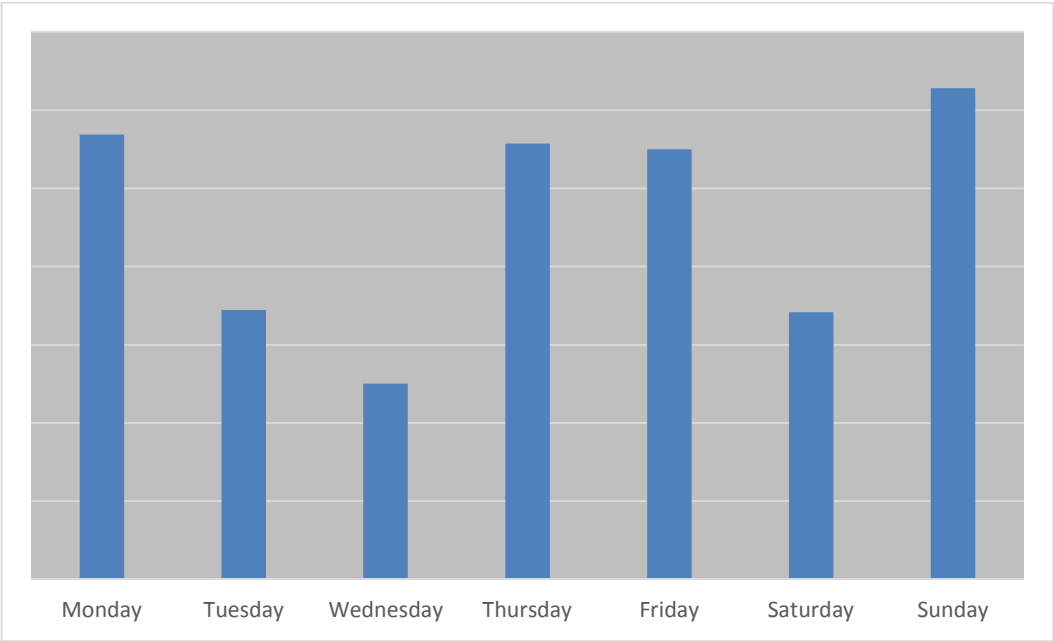
Table 2.1: 2017 Bristol Airport Passenger Profile

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

2.2.2 As can be seen in **Table 2.1** Bristol Airport has the highest passenger numbers during the summer months, peaking in August 2017 with 28,629 passengers per day.

2.2.3 Daily passenger demand varies across the year, although Friday generally represents the busiest weekday, Sunday represents the busies day in the weekend. **Figure 2.2** sets out the average daily variation through a peak summer week in August.

Figure 2.2: Daily passenger variation during a peak week in August



2.3 Passenger Catchment

2.3.1 **Table 2.2** provides the breakdown of UK passengers origins (airport departures) and destinations (airport arrivals). This has been extracted from the latest CAA passenger survey (2015) at Bristol Airport.

2.3.2 BAL have confirmed that annual passenger growth at Bristol Airport has been achieved primarily from the South West and Wales. The overall catchment from the other regions, as an absolute number of passengers, has not substantially grown. Catchment of the other regions as a percentage has therefore reduced, whilst the catchment share from the South West and Wales has grown. This trend is predicted to remain for the consented 10mppa and the Proposed Development for 12mppa.

2.3.3 Based on these catchments, passenger numbers per region have been calculated for 2017 (8,232,628mppa). It is worth noting these are passenger numbers by origins and destinations across all modes of travel.

Table 2.2: 2017 Passenger Origin / Destination (8.2mppa)

Region	Passenger Percentage	Passenger per Annum
East Midlands	0.1%	10,994
East of England	0.1%	11,910
North East	0.0%	1,832
North West	0.2%	13,742
Scotland	0.2%	17,407
South East	1.3%	105,359
South West	77.2%	6,295,708
Wales	18.8%	1,604,012
West Midlands	2.0%	162,161
Yorkshire	0.1%	5,497
Total	**100%**	**8,232,628**

2.3.4 As set out in **Table 2.2**, 96% of passengers at Bristol Airport have an origin or destination in the South West or Wales.

2.3.5 **Table 2.3** presents the passenger catchment for an average day in the peak month of August 2017. This has been based on the information set out within **Table 2.1** and **Table 2.2**.

Table 2.3: UK Daily Passenger Origin / Destination for the Peak Month of August (8.2mppa)

Region	Passenger Percentage	Passenger 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

Region	Passenger Percentage	Passenger per Day in August
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.

2.3.6 It can be seen from **Table 2.3**, 27,469 (96%) of passengers at Bristol Airport have an origin or destination in the South West or Wales.

2.3.7 **Figure 2.3** shows the average UK daily passenger origin / destination for the peak month of August using 2017 data.

Figure 2.3: UK Daily Passenger Origin / Destination for the Peak Month of August

2.3.8 **Table 2.4** present the regional catchment for the South West based on the information contained in the CAA passenger survey. It is worth noting that the CAA survey initially reports the following Local Authorities as Somerset:

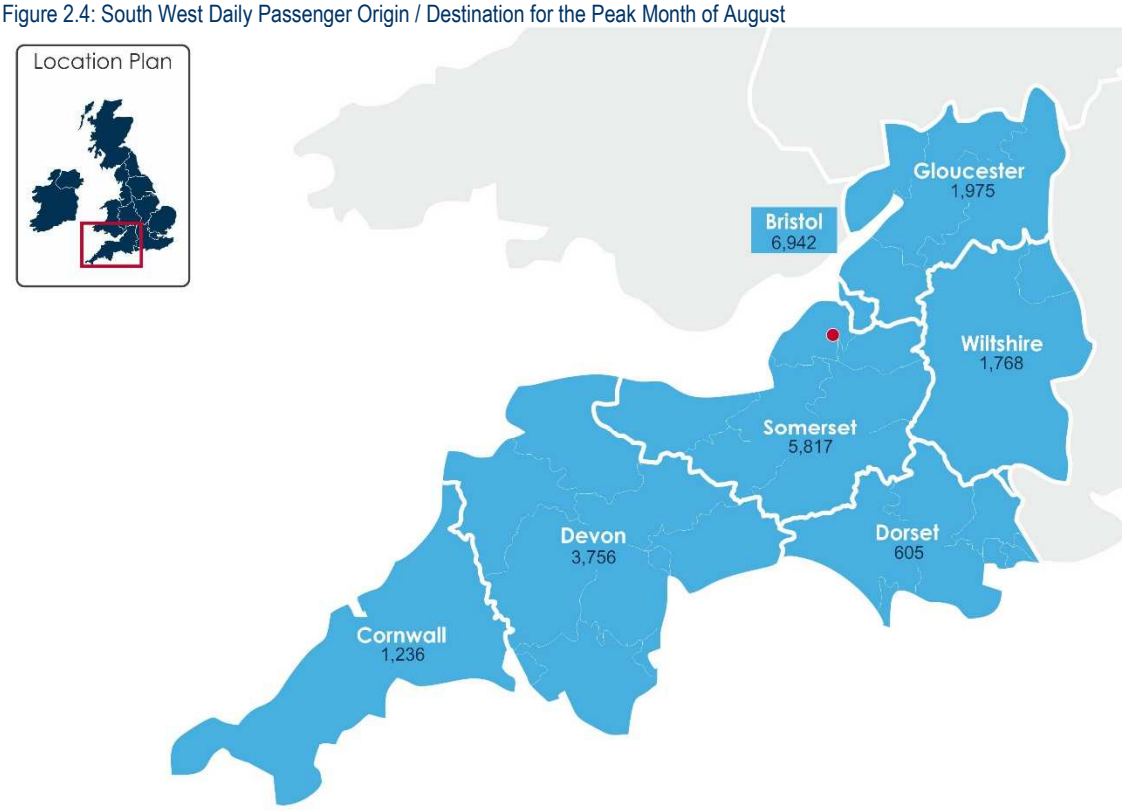
- North Somerset;
- Bath and North East Somerset;
- Mendip District;
- Sedgemoor District;
- South Somerset;
- Taunton Deane and
- West Somerset.

Table 2.4: 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**

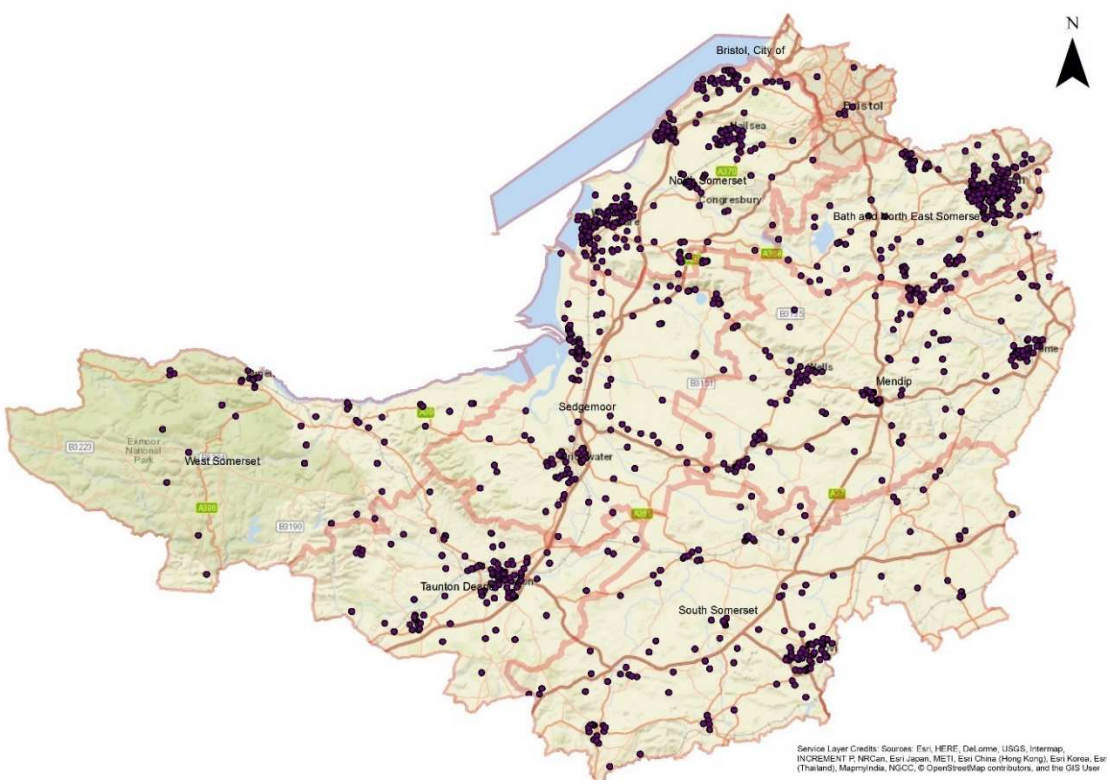
2.3.9 **Figure 2.4** shows the South West daily passenger origin / destination for the peak month of August 2017

Figure 2.4: South West Daily Passenger Origin / Destination for the Peak Month of August



2.3.10 As shown on **Figure 2.5** postcodes of passenger's origin and destination recorded in the CAA passenger report have been plotted within Somerset.

Figure 2.5: Passenger Origin / Destination within Somerset Growth Area



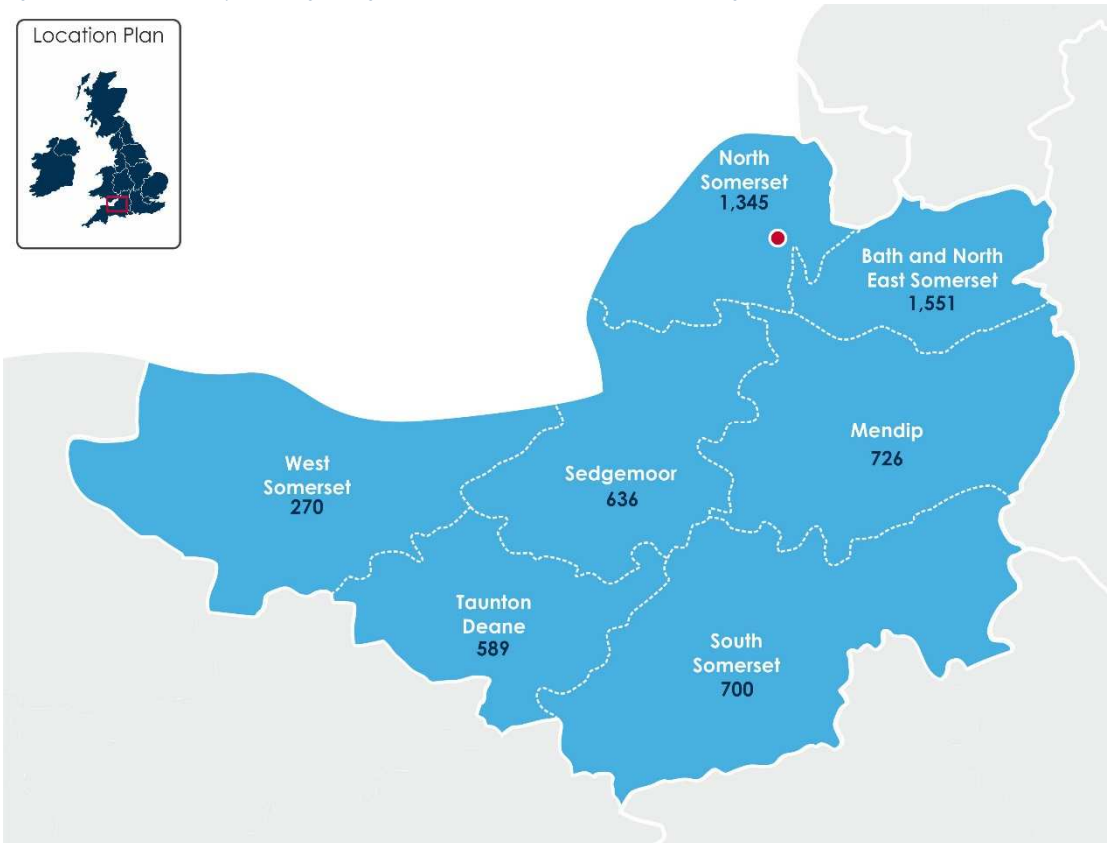
2.3.11 **Table 2.5** presents the passenger catchment within each Local Authority in the Somerset region for an average day in the peak month of August. This has been based on the information set out within **Table 2.4** and **Figure 2.3**.

Table 2.5: Somerset Daily Passenger Origin / Destination for the Peak Month of August (8.2mppa)

Somerset Region	Passenger Percentage	Passenger per Day in August
North Somerset	23.1%	1,345
Bath & North East Somerset	26.7%	1,551
Mendip District	12.5%	726
Sedgemoor District	10.9%	636
South Somerset	12.0%	700
Taunton Deane	10.1%	589
West Somerset	4.6%	270
Total	**100%**	**5,817**

2.3.12 **Figure 2.6** shows the daily passenger numbers from each origin / destination within the Somerset Local Authorities for the peak month of August 2017.

Figure 2.6: Somerset Daily Passenger Origin / Destination for the Peak Month of August



2.3.13 **Table 2.6** shows the daily passenger numbers from each origin / destination within North Somerset for the peak month of August 2017.

Table 2.6: North Somerset Daily Passenger Origin / Destination for the Peak Month of August

	Percentage	8.2mppa (FTE)
Weston-super-Mare	46%	619
Portishead	21%	282
Clevedon	16%	215
Nailsea	17%	229
Total	**100%**	**1345**

2.4 Passenger Mode Share

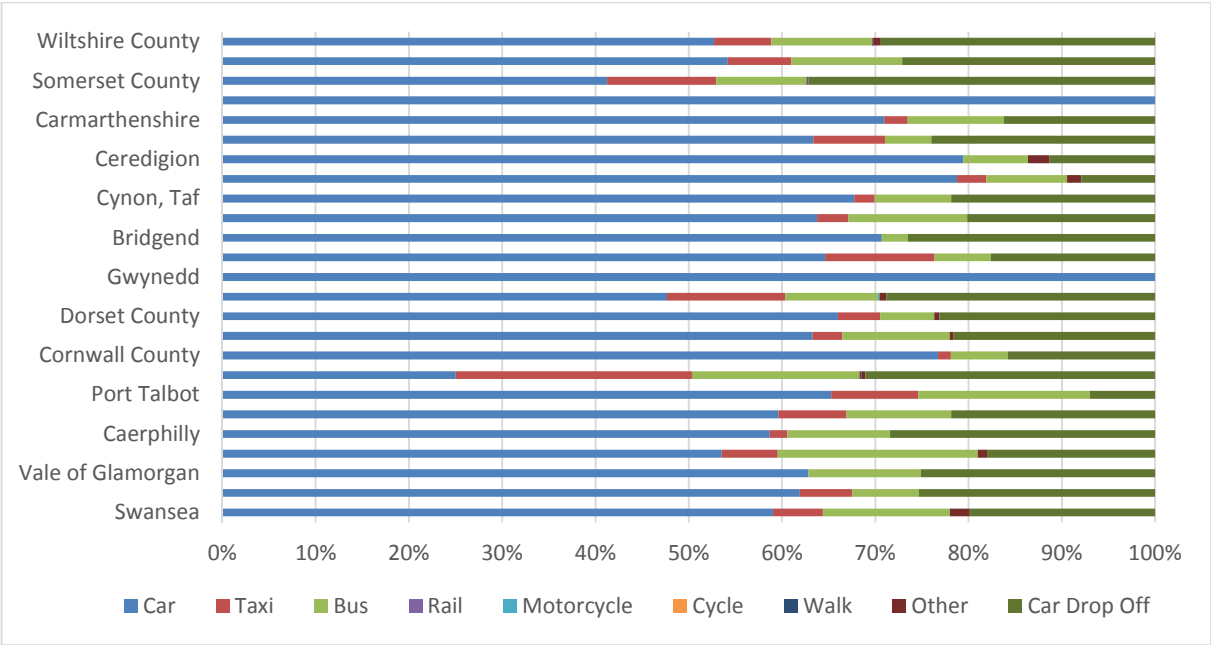
2.4.1 Bristol Airport passenger's mode share varies by catchment area and time of the year, which in turn reflects the nature of journey purpose and the transport options available.

2.4.2 The CAA passenger survey provides data on passenger's mode of travel to and from Bristol Airport as well as origin geographical area.

2.4.3 Bristol Airport has historically monitored public transport mode share using the ticket information for the Bristol Flyer bus service and several other third party providers. The 2017 ticket information indicates that the current passenger public transport mode share is 12.5%. Therefore, the CAA data has been used to understand how mode share varies by journey origin based on the overall public transport mode share of 12.5%.

2.4.4 **Figure 2.7** details the current mode share by catchment.

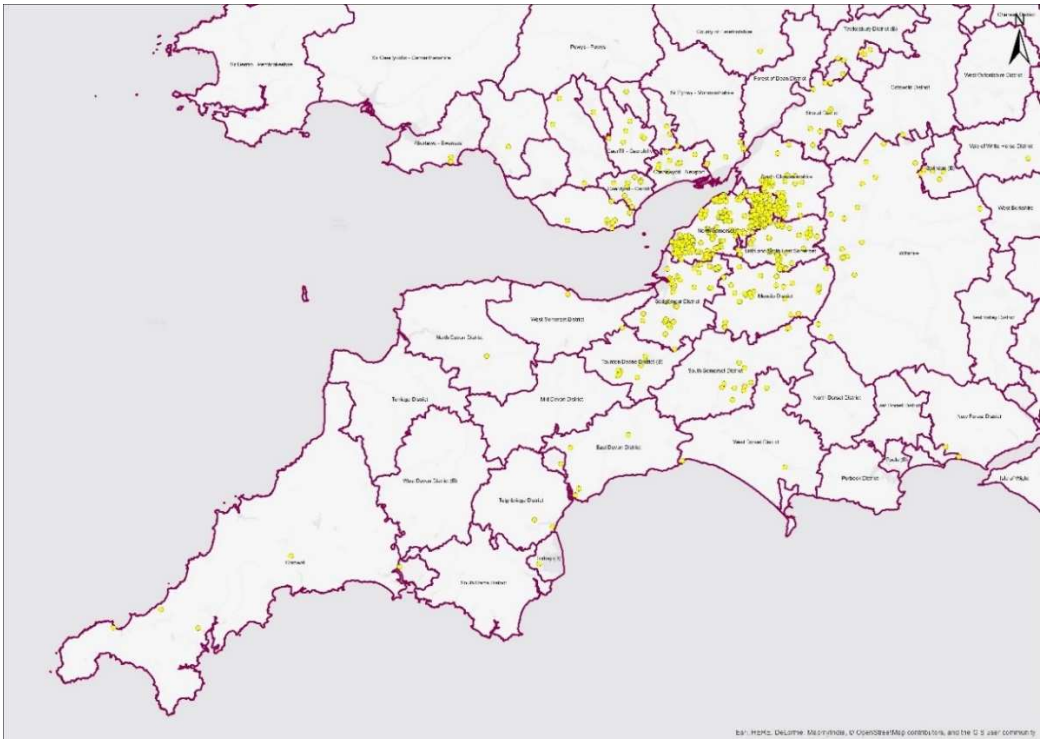
Figure 2.7: Mode Share by Catchment



2.5 Employee Catchment

2.5.1 Currently 3,459 Full Time Equivalents (FTE) are employed at the Bristol Airport site, the majority work shift patterns. BIA carried out a staff travel survey for the Staff Travel Plan for the Bristol Airport site in 2017 which had a response rate of 828 employees, representing 24%. **Figure 2.8** shows the home postcodes of staff at the Bristol Airport site.

Figure 2.8: Employee Home Post Codes



2.5.2 **Table 2.7** presents the percentage of Bristol Airport employees home postcode per Local Authority.

Table 2.7: Employee Catchment by Local Authority

Local Authority	Percentage
North Somerset	31%
City of Bristol	24%
South Gloucestershire	10%
Bath & North East Somerset	7%
Sedgemoor District	7%
Mendip District	4%
Wiltshire	2%
South Somerset District	1%
Caerdydd - Cardiff	1%
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%
Others	6%
Total	**100%**

2.5.3 As shown in **Table 2.7**, 55% of employees have a home postcode in either North Somerset or the City of Bath.

2.5.4 Employees (319) with a home post code in North Somerset has been reviewed to identify percentage split per large residential catchments. This is presented in **Table 2.8.**

Table 2.8: Employee Origin/Destination

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

2.5.5 Bristol Airport is operational 24 hours a day, 7 days a week, 52 weeks of the year. The number of staff present at the Bristol Airport site will therefore vary across the year. As with the passenger annual trends the number of staff present at the Bristol Airport site will peak in the

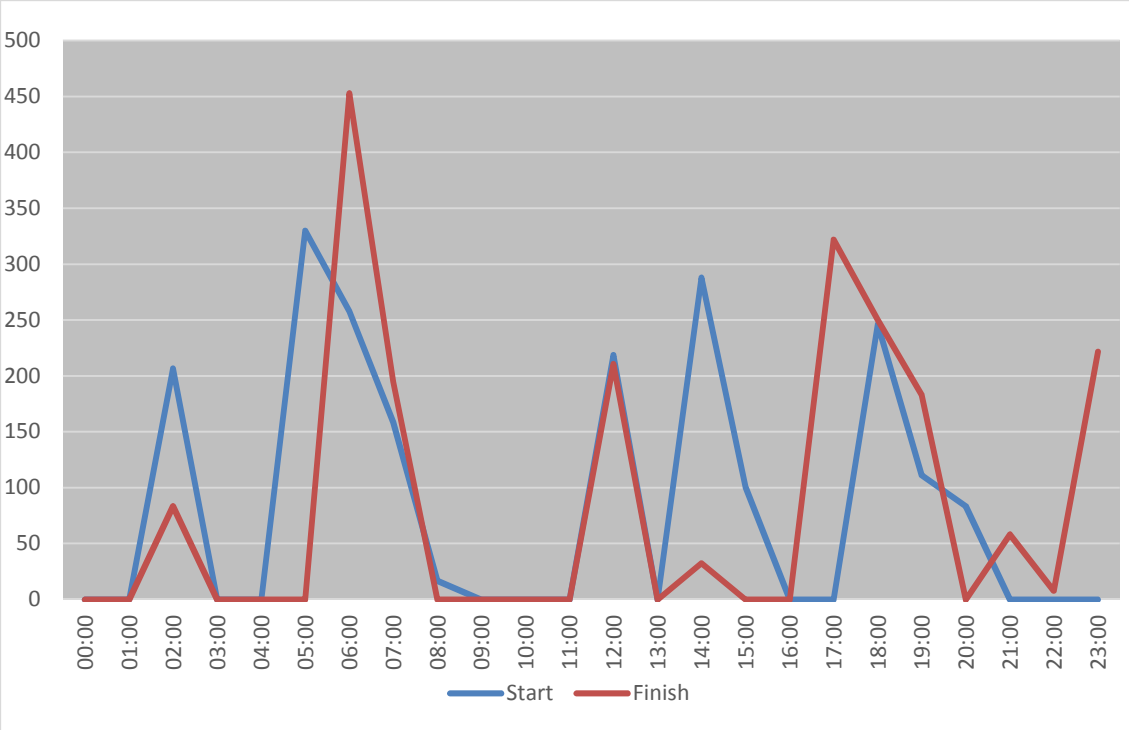
summer months. Similar, to the passenger trends the number of staff present per day will also vary. Friday would generally represent the busiest day for the number of staff present at the Bristol Airport site.

2.5.6 The staff travel survey indicates that 55% of staff work varied shift patterns. BAL have provided typical shift patterns which have been used to calculate staff start and finish times.

2.5.7 Many of the operators at the Bristol Airport site operate on rolling shifts with between three to five days on and three to five days off. BAL have confirmed that on an average day in the peak months 58% (2,108) of the FTE would be working at the Bristol Airport site at one time.

2.5.8 **Figure 2.9** presents the daily staff profile at the Bristol Airport site.

Figure 2.9: Staff Start and Finish Profile



2.5.1 **Table 2.9** presents the current staff shift patterns. This has been calculated on the level of staff present (2,018 FTE's) on any given day during the peak summer months and the current shift patterns recorded in the 2017 staff travel survey.

Table 2.9: Daily Employee Trip Generation Daily Profile in Peak Summer Months

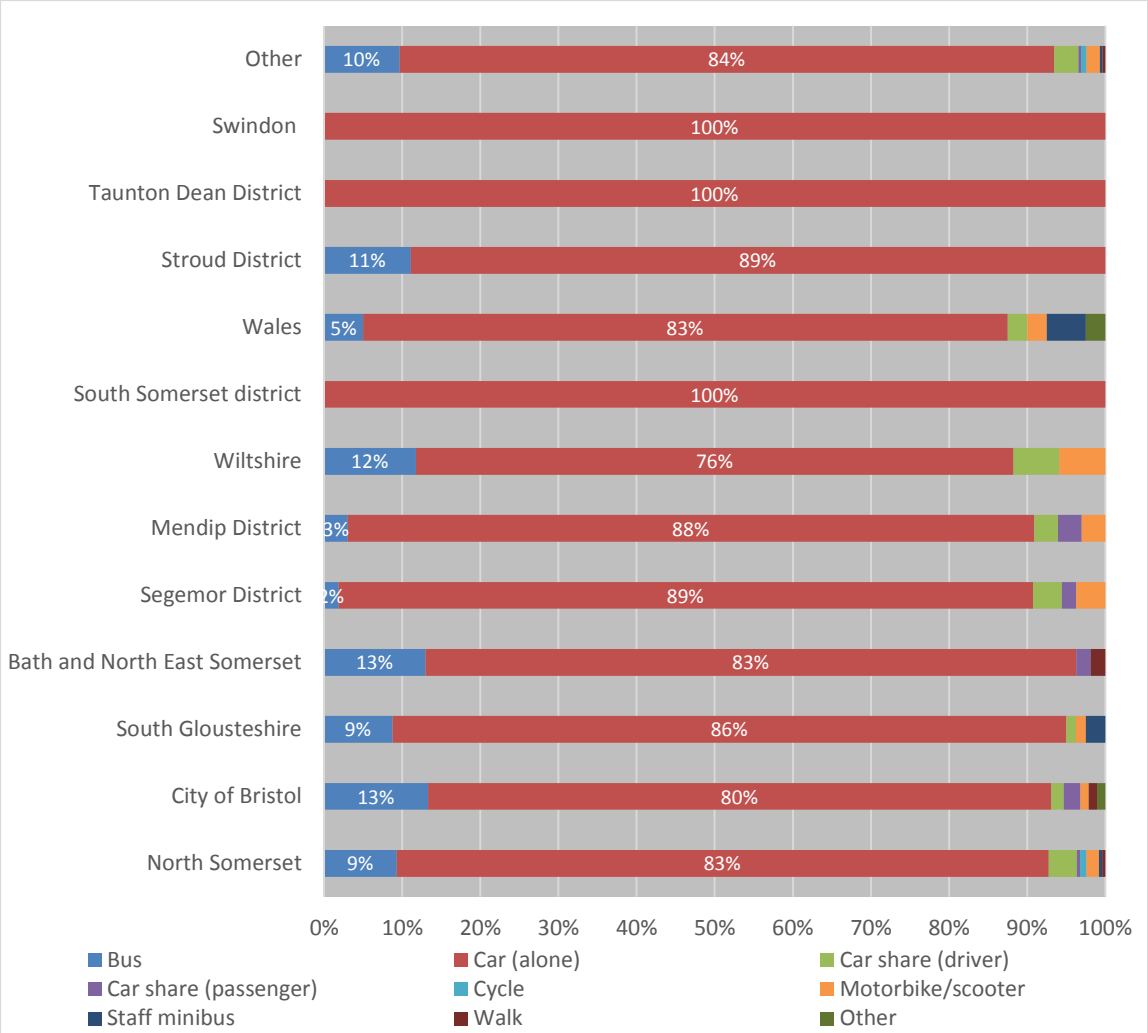
Time	Start	Finish	Total
00:00 - 01:00	0	0	0
01:00 – 02:00	0	0	0
02:00 – 03:00	207	84	290
03:00 – 04:00	0	0	0
04:00 – 05:00	0	0	0
05:00 – 06:00	330	0	330
06:00 – 07:00	258	453	711
07:00 – 08:00	**159**	**195**	**353**

Time	Start	Finish	Total
08:00 – 09:00	**17**	**0**	**17**
09:00 – 10:00	**0**	**0**	**0**
10:00 – 11:00	0	0	0
11:00 – 12:00	0	0	0
12:00 – 13:00	219	211	429
13:00 – 14:00	0	0	0
14:00 – 15:00	288	33	321
15:00 – 16:00	100	0	100
16:00 – 17:00	**0**	**0**	**0**
17:00 – 18:00	**0**	**322**	**322**
18:00 – 19:00	**246**	**250**	**496**
19:00 – 20:00	111	183	295
20:00 – 21:00	84	0	84
21:00 – 22:00	0	58	58
22:00 – 23:00	0	8	8
23:00 – 24:00	0	222	222
Daily	**2,018**	**2,018**	**4,036**

2.6 Employee Mode Share

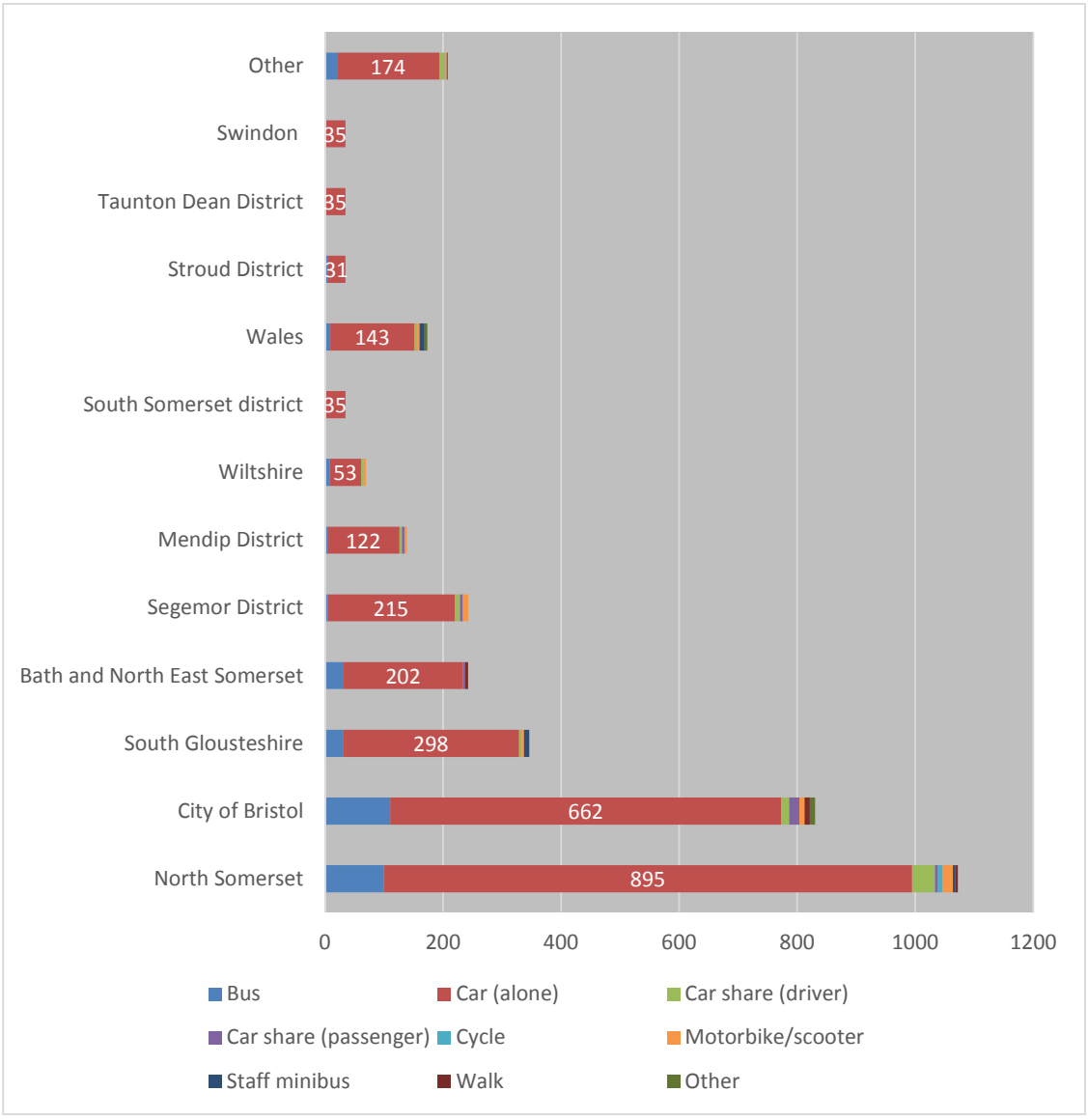
2.6.1 The 2017 staff travel survey also recorded how employees travel to the Bristol Airport site on an average workday. **Figure 2.10** presents the recorded employees modal split per Local Authority.

Table 2.10: Staff Travel by Mode (%)



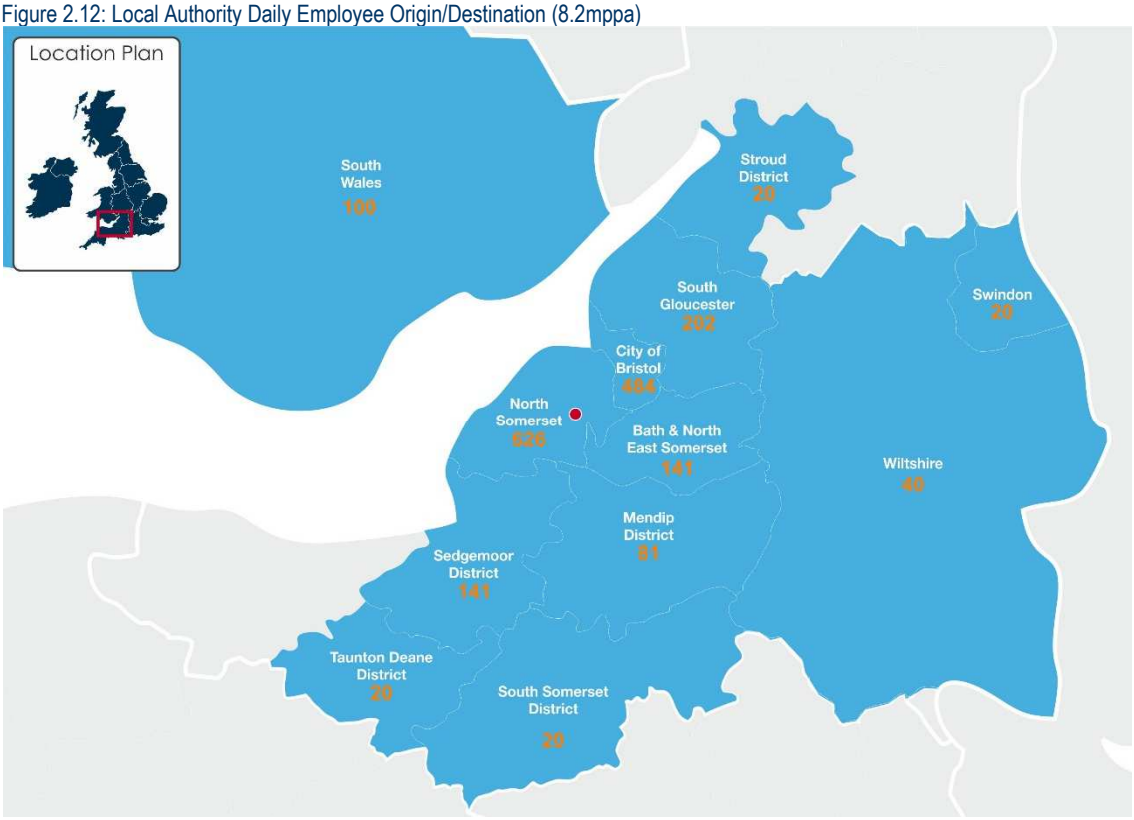
2.6.2 **Figure 2.11.** presents the employees daily modal split per Local Authority. This has been calculated based on **Table 2.6** and **Figure 2.10**.

Figure 2.11: Daily Staff Modal Split per Local Authority



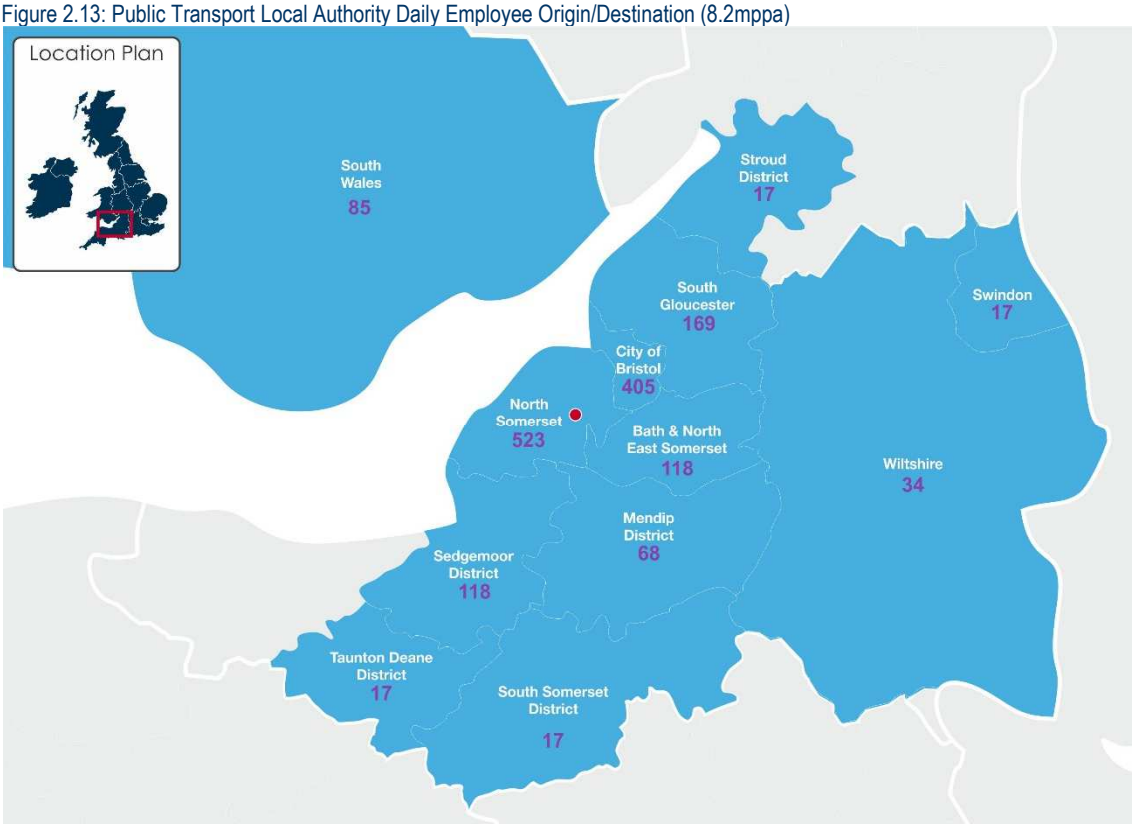
2.6.3 **Figure 2.12** shows the daily employee origin/destination for the peak month in August across local authorities based on 2017 survey data.

Figure 2.12: Local Authority Daily Employee Origin/Destination (8.2mppa)



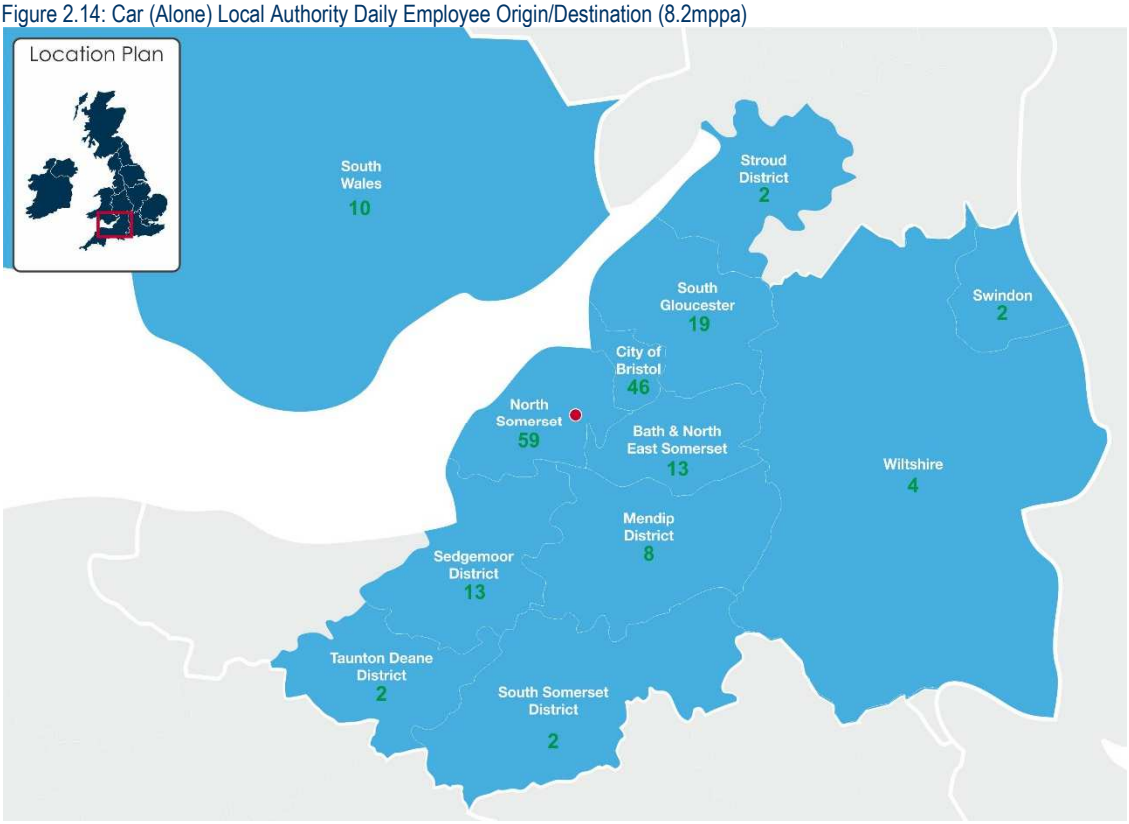
2.6.4 **Figure 2.13** shows the daily employee travelling to the Bristol Airport site via public transport.

Figure 2.13: Public Transport Local Authority Daily Employee Origin/Destination (8.2mppa)



2.6.5 **Figure 2.14** shows the daily employee travelling to the Bristol Airport site via single occupancy vehicle.

Figure 2.14: Car (Alone) Local Authority Daily Employee Origin/Destination (8.2mppa)



2.6.6 **Table 2.10** presents the daily staff shift patterns for employees who travel to work by car (both car alone & car share driver). This has been calculated on the level of staff present on any given day in the peak months and the current shift patterns and mode share recorded in the 2017 staff travel survey.

Table 2.10: Daily Employee Vehicle Trip Profile in Peak Summer Months

Time	Start	Finish	Total
00:00 - 01:00	0	0	0
01:00 – 02:00	0	0	0
02:00 – 03:00	173	70	243
03:00 – 04:00	0	0	0
04:00 – 05:00	0	0	0
05:00 – 06:00	276	0	276
06:00 – 07:00	216	379	595
07:00 – 08:00	**133**	**163**	**296**
08:00 – 09:00	**14**	**0**	**14**
09:00 – 10:00	**0**	**0**	**0**
10:00 – 11:00	0	0	0
11:00 – 12:00	0	0	0
12:00 – 13:00	183	176	359
13:00 – 14:00	0	0	0
14:00 – 15:00	241	27	268
15:00 – 16:00	84	0	84
16:00 – 17:00	**0**	**0**	**0**
17:00 – 18:00	**0**	**269**	**269**
18:00 – 19:00	**206**	**209**	**415**
19:00 – 20:00	93	153	246
20:00 – 21:00	70	0	70
21:00 – 22:00	0	49	49
22:00 – 23:00	0	7	7
23:00 – 24:00	0	185	185
Daily	**1,688**	**1,688**	**3,376**

2.7 Logistics Movements

2.7.1 With regards to the development proposals effects on logistics movements at the Bristol Airport site, BIA have stated that these can be classified in to the following categories:

a. Fuel Tankers

b. Car Rental Deliveries

c. Operational Deliveries

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

2.7.3 Based on the previous 12 months, the Bristol Airport site had 4,631 deliveries of aviation fuel. In the peak month of August approximately 11% of the 4,631 annual inbound logistics movements were deliveries. This relates to 16 deliveries per day.

2.7.4 Bristol Airport is open 24 hours and stores and catering is available between the hours of the first and last departing flight each day.

2.7.5 BIA have provided the delivery schedule for retailers who operate at the Bristol Airport site. In the peak month of August there are 23 deliveries per day associated with these operators.

2.7.6 There are currently eight national car hire companies based in Bristol Airport, all of which receive car rental deliveries daily. There are approximately 60 deliveries per week, 77% of which occur between Monday to Friday. This relates to an average of 10 deliveries per day.

2.7.7 **Table 2.11** sets out a typical week day delivery schedule for each classification of vehicle.

Table 2.11: Existing Delivery Schedule

Time	Fuel Deliveries	Car Rental 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
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**

2.7.8 The 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.

2.7.9 The airport receives a total of 49 deliveries per day on a typical week day.

3 Bristol Airport Forecast Travel Demand

3.1 Introduction

3.1.1 This chapter sets out the approach and methodology adopted for deriving the multi-modal trip generation for the consented 10mppa and the proposed 12mppa scheme at Bristol Airport.

3.2 Passenger Annual Profile

3.2.1 BIA projections to 10mppa and 12mppa 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.

3.2.2 **Table 3.1** sets out the projected passenger profile for 10mppa and 12mppa per month and for an average (mean) day within the month. **Table 3.1** also provides a comparison between the consented 10mppa and the 12mppa proposals.

Table 3.1: Passenger Profile 10mppa and 12mppa

Month	Passenger % per Month	2021 (10mppa)		2026 (12mppa)		Difference (2mppa)	
		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
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**

3.2.3 As can be seen from **Table 3.1** the Development Proposals are predicted to result in a peak daily uplift of 7,085 passengers in the summer month of August.

3.3 Passenger Catchment

3.3.1 As set out within **Section 7.3** historically passenger growth at Bristol Airport has been primarily from the South West and Wales. Passenger growth for 10mppa and the 12mppa is predicted to continue in this trend by introducing new destinations. This will be more attractive to those from the South West and Wales, who would otherwise travel beyond Bristol Airport to make these journeys. For other regions, this is not the case.

3.3.2 Furthermore, strategic infrastructure being promoted as part of the West of England Joint Spatial Plan (JSP) is also unlikely to be delivered before the predicted 12 mppa year of 2026, and will not therefore materially alter passenger catchment before the 2026 horizon.

3.3.3 For these reasons, growth projections achieved from the South West and South Wales only. **Table 3.2** sets out the predicted 10mppa and 12mppa growth per area.

Table 3.2: Passenger Origin / Destination (10mppa & 12mppa)

Region	2021 10mppa	2026 12mppa	Difference 2mppa
East Midlands	9,067	9,067	0
East of England	9,067	9,067	0
North East	1,649	1,649	0
North West	11,540	11,540	0
Scotland	17,309	17,309	0
South East	121,166	121,166	0
South West	7,773,308	9,383,308	1,610,000
Wales	1,882,975	2,272,975	390,000
West Midlands	166,501	166,501	0
Yorkshire	7,418	7,418	0
Total	**10,000,000**	**12,000,000**	**2,000,000**

3.3.4 **Table 3.3** presents the passenger catchment for an average day in the park month of August for both the 10mppa and 12mppa scenarios. This has been based on the information set out within **Table 3.1** and **Table 3.2**.

Table 3.3: UK Daily Passenger Origin / Destination for the Peak Month of August (10mppa & 12mppa)

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

3.3.5 It can be seen from **Table 3.3**, on an average day in the peak month of August an additional 5,646 (80%) of passengers have an origin and destination in the South West because of the Development Proposals.

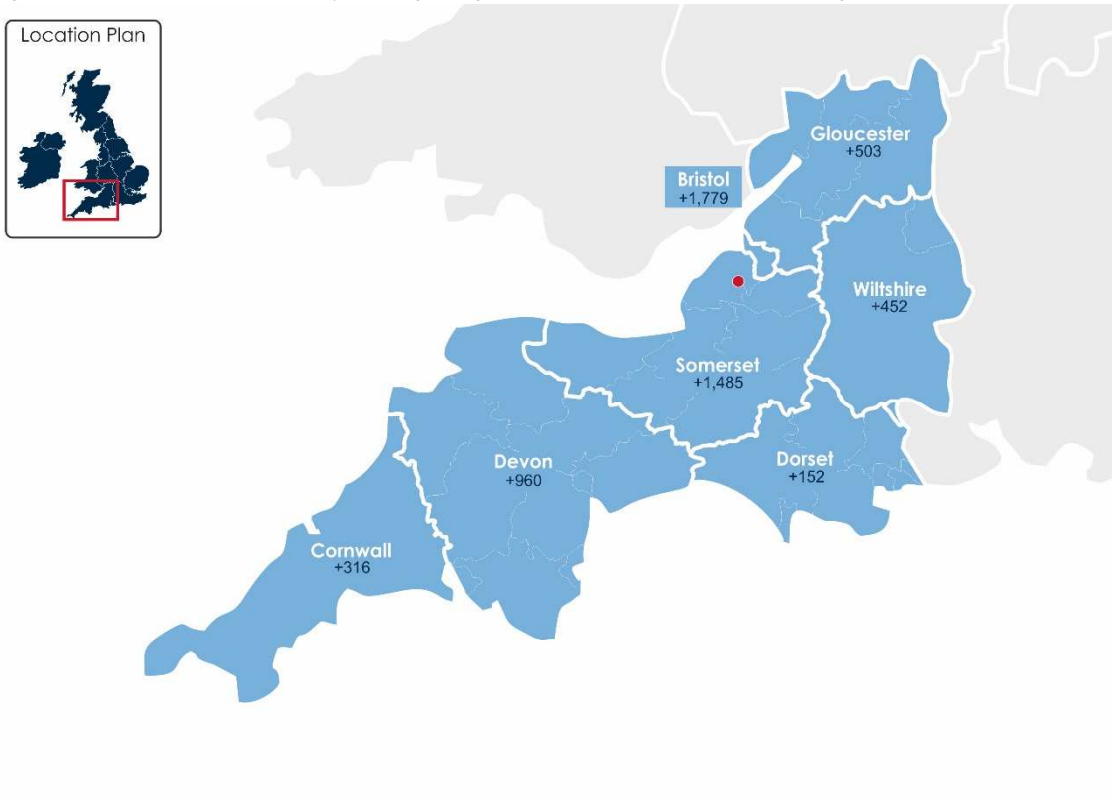
3.3.6 As set out in **Table 3.4** regional catchment for the South West has been determined for the 10mppa and 12mppa utilising the current South West percentages set out in **Table 2.4**.

Table 3.4: South West Daily Passenger Origin / Destination for the Peak Month of August (10mppa & 12mppa)

South West	Passenger Percentage	Passenger per Day 10mppa	Passenger per Day 12mppa	Difference 2mppa
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**

3.3.7 **Figure 3.1** shows the South West and Wales daily passenger increase as a result of the Development Proposals for the peak month of August.

Figure 3.1: South West and Wales Daily Passenger Origin / Destination for the Peak Month of August



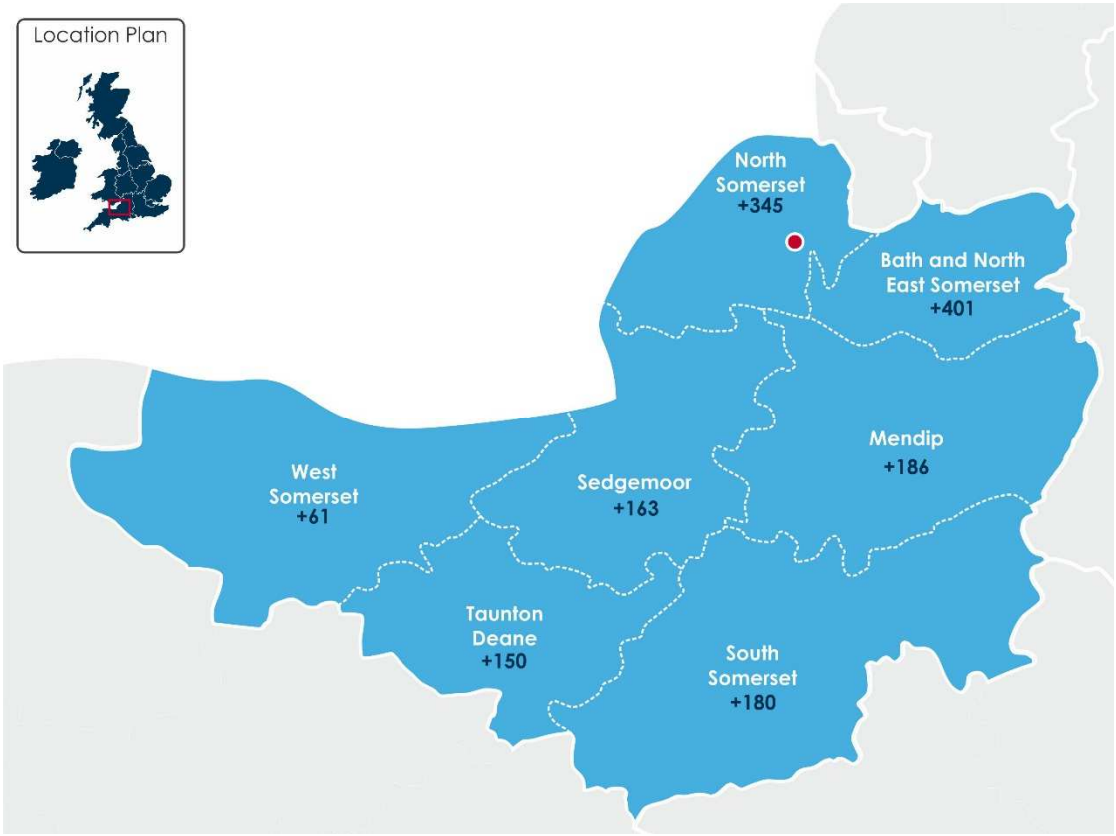
3.3.8 **Table 3.5** presents the passenger catchment within each Local Authority in the Somerset region for an average day in the peak month of August for the 10mppa and 12mppa scenario.

Table 3.5: Somerset Daily Passenger Origin / Destination for the Peak Month of August (10mppa & 12mppa)

Somerset	Passenger Percentage	Passenger per Day 10mppa	Passenger per Day 12mppa	Difference 2mppa
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**

3.3.9 **Figure 3.2** shows the Local Authorities within Somerset daily increase in passenger origin / destination for the peak month of August as a result of the Development Proposals.

Figure 3.2: Somerset Daily Passenger Origin / Destination for the Peak Month of August



3.3.10 **Table 3.6** shows the daily passenger numbers from each origin / destination within North Somerset for the peak month of August 2017.

Table 3.6: North Somerset Daily Passenger Origin / Destination for the Peak Month of August

	Percentage	8.2mppa
Weston-super-Mare	46%	680
Portishead	21%	308
Clevedon	16%	243
Nailsea	17%	254
Total	**100%**	**1,485**

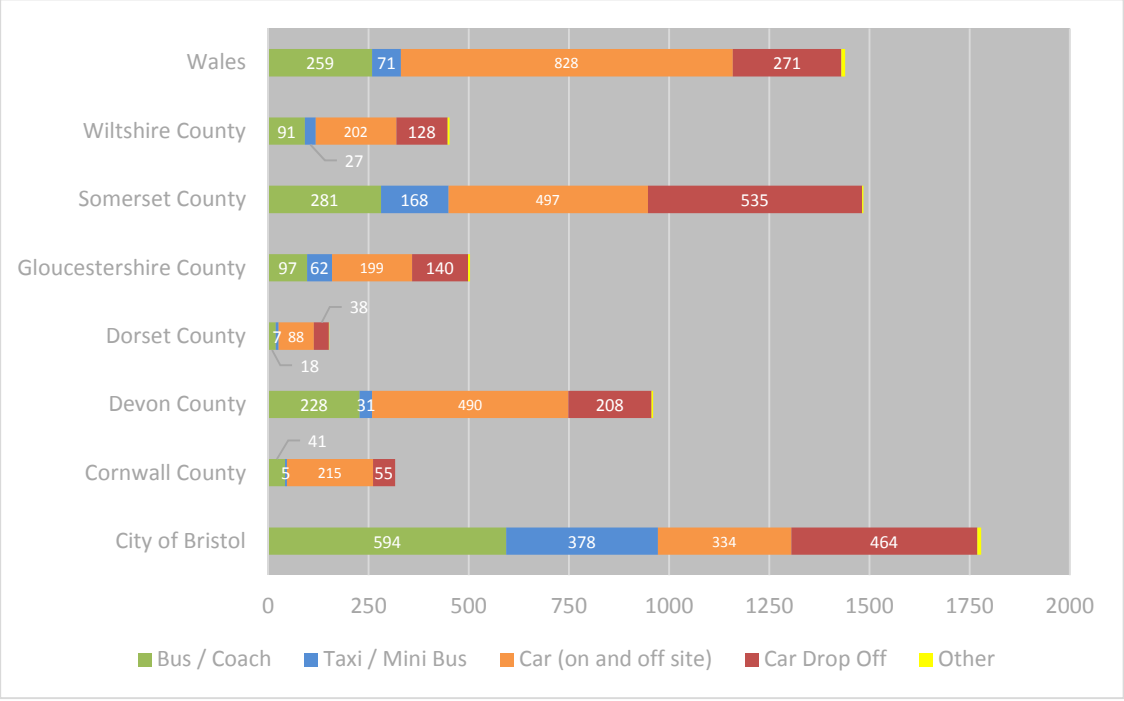
3.4 Forecast Passenger Mode Share

3.4.1 As set out in **Section 2.4**, CAA data has been used to understand mode share characteristics for each catchment.

3.4.2 The consented planning application for growth to 10mppa forecasts that the public transport mode share will reach 15% at 10mppa and therefore for the forecast mode share is based on CAA data to understand how mode share varies by journey origin based on the overall public transport mode share of 15%.

3.4.3 **Figure 3.3** presents the predicted daily passenger modal split for the peak month of August for each growth area. This has been calculated by additional passenger increase set out in **Table 3.3** and passenger modal split presented in **Figure 2.6**.

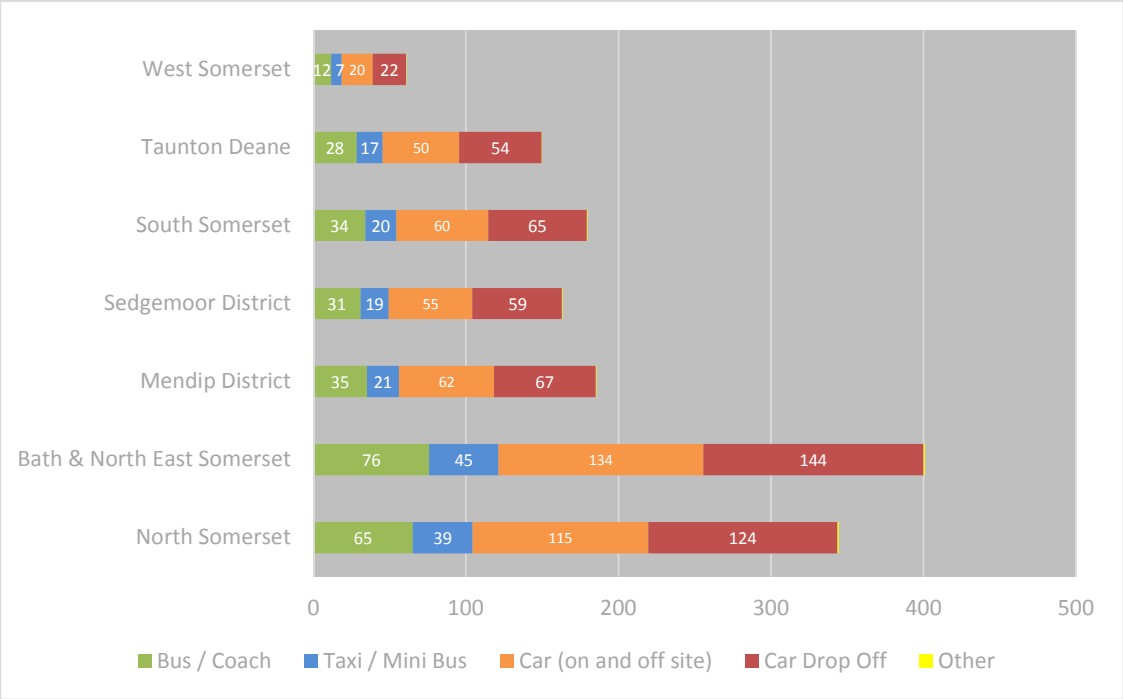
Figure 3.3: Regional Additional 2mppa Daily Passenger Modal Split in August



3.4.4 As presented in **Figure 3.3**, it is predicted that 23% (1,610) of the additional 7,085 daily passengers will travel to/from Bristol Airport via public transport in the peak month of August.

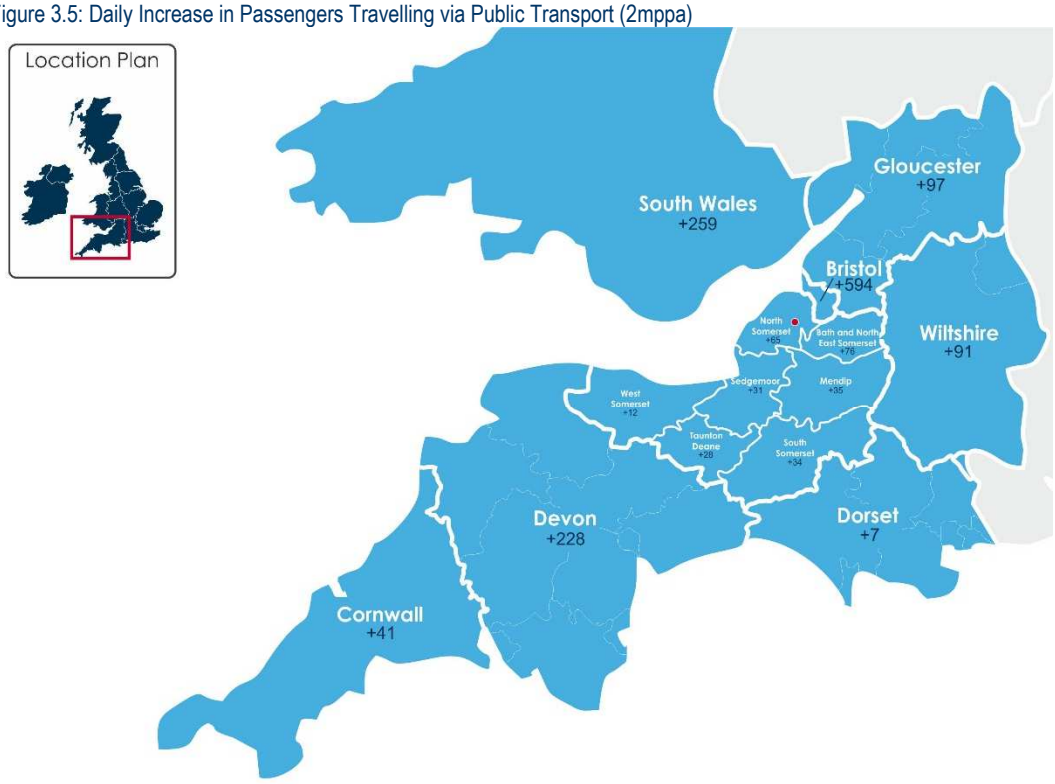
3.4.5 **Figure 3.4** shows the additional passenger modal split for Somerset per Local Authority. This has been calculated by additional passenger increase set out in **Table 3.5** and passenger modal split presented in **Figure 2.6**.

Figure 3.4: Somerset Additional 2mppa Daily Passenger Modal Split in August



3.4.6 **Figure 3.5** shows the additional daily passenger travelling via public transport per Local Authority in the peak month of August.

Figure 3.5: Daily Increase in Passengers Travelling via Public Transport (2mppa)



3.4.7 To establish car movements, it is necessary to quantify vehicle occupancy levels. **Table 3.7** presents vehicle occupancy for the South West and Wales for passenger 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 3.7: Passenger Group Size Analysis for the South West and Wales

	City of Bristol	Cornwall	Devon	Dorset	Gloucestershire	Somerset	Wiltshire	South Wales
Taxi / Mini Bus	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

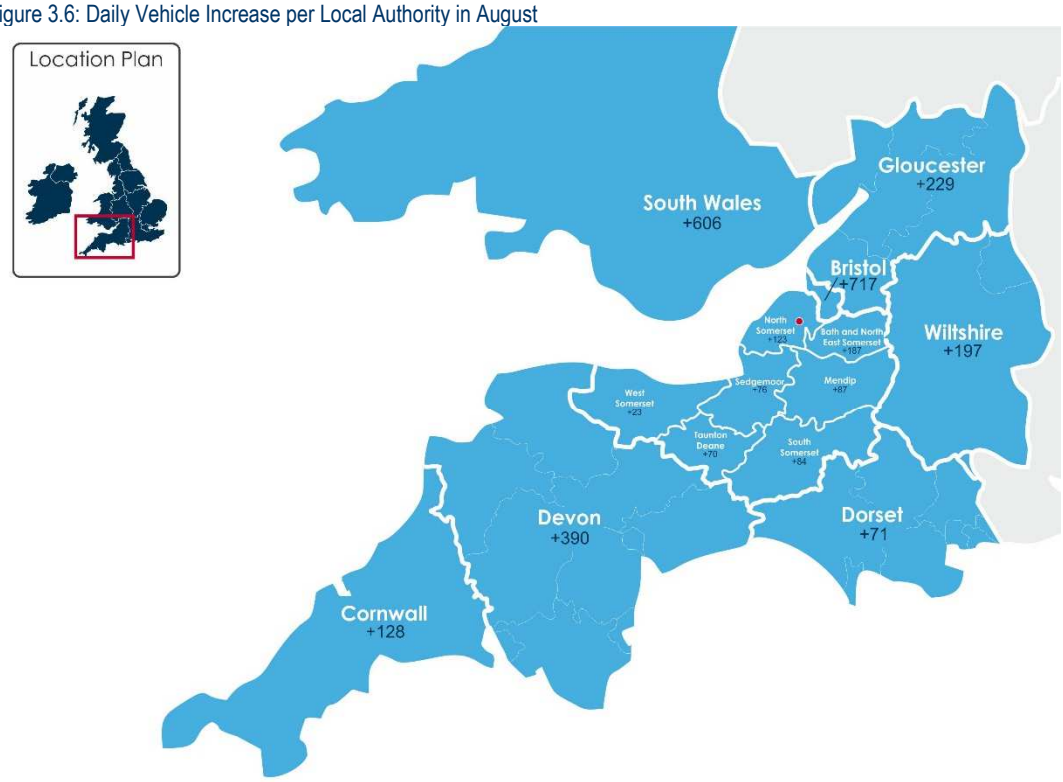
3.4.8 Passengers travelling by car (Taxi, Mini Bus and Car) highlighted within Figure 3.4 have been factored utilising the occupancy rates presented in Table 3.6 per growth area. **Table 3.8** presents the predicted daily vehicle increase during the peak month of August.

Table 3.8: Daily Vehicle Increase (2mppa) per Growth Area in Peak Month of August

	Taxi / Mini Bus	Car Parked	Car Drop Off	Total
City of Bristol	252	176	290	717
Cornwall	3	102	22	128
Devon	15	245	130	390
Dorset	4	46	21	71
Gloucestershire	41	100	88	229
North Somerset	21	20	83	123
Bath & North East Somerset	24	67	96	187
Mendip District	11	31	45	87
Sedgemoor District	10	27	39	76
South Somerset	11	30	43	84
Taunton Deane	9	25	36	70
West Somerset	6	3	14	23
Wiltshire	17	101	80	197
Wales	42	395	169	606

3.4.9 **Figure 3.6** presents the predicted daily vehicle increase by local authority as set out in Table 3.7.

Figure 3.6: Daily Vehicle Increase per Local Authority in August



3.5 Passenger Arrival & Departure Dwell Analysis

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

3.5.2 The busiest times at Bristol Airport in terms of passenger surface access demand is prior to the typical morning network peak period. Passengers arrive to check in two to three hours before their flight is scheduled to take off. BIA 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 3.9**.

Table 3.9: 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%

3.5.3 BIA have also provided the passenger dwell time for arrivals, as set out within **Table 3.10**.

Table 3.10: Average Passenger Dwell Time – Arrivals

	Time (Minutes)	Cumulative (Minute)
Land at Bristol Airport	-	
Taxi's to Gate	5 - 10	5 – 10
Passenger's 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

3.5.4 As can be seen from **Table 3.9** an average arrival dwell time (land to exit terminal) is approximately 1 hour.

3.5.5 Flight schedule for a week in the peak month of August for 10mppa and 12mppa scenarios have been provided by BIA. The difference between a busy day and a peak day typically is the load factor rather than the number of flights in the schedule.

3.5.6 **Figure 3.7** presents the hourly passenger arrival profile for a peak weekday in August. This has been based on the forecast flight schedule (10mppa and 12mppa) and the passenger dwell time summarised in Table 3.9.

3.5.7 **Figure 3.8** presents the hourly passenger arrival profile for a peak weekday in August. This has been based on the forecast flight schedule (10mppa and 12mppa) and the passenger dwell time summarised in Table 3.9.

Figure 3.7: Daily Passenger Exit Terminal (Arrival) Profile in August

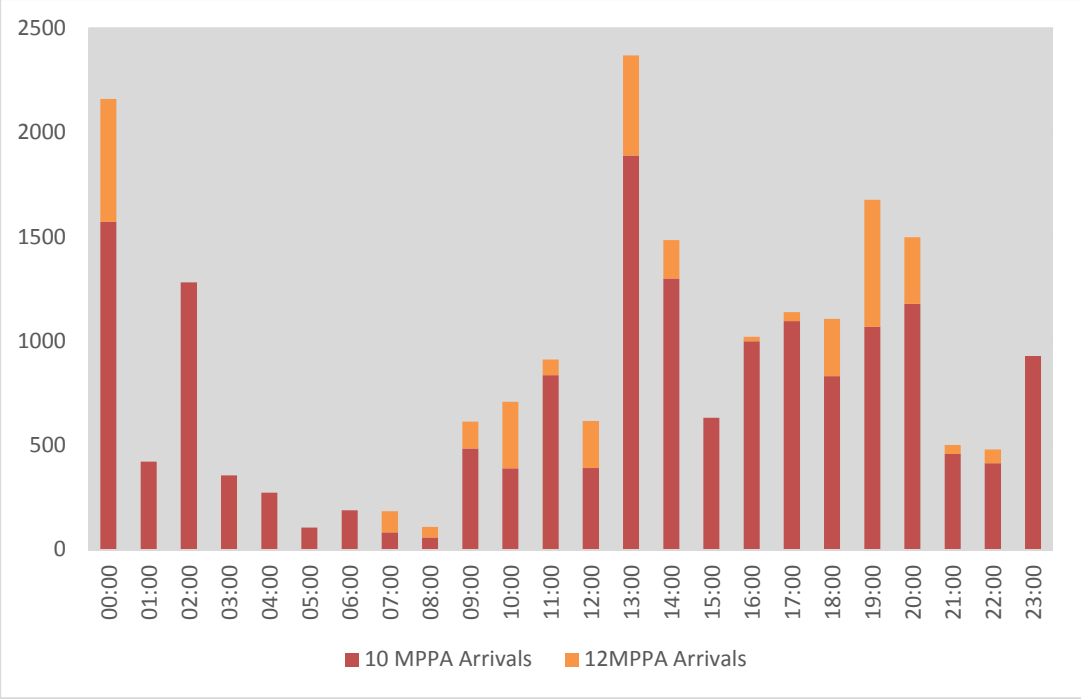
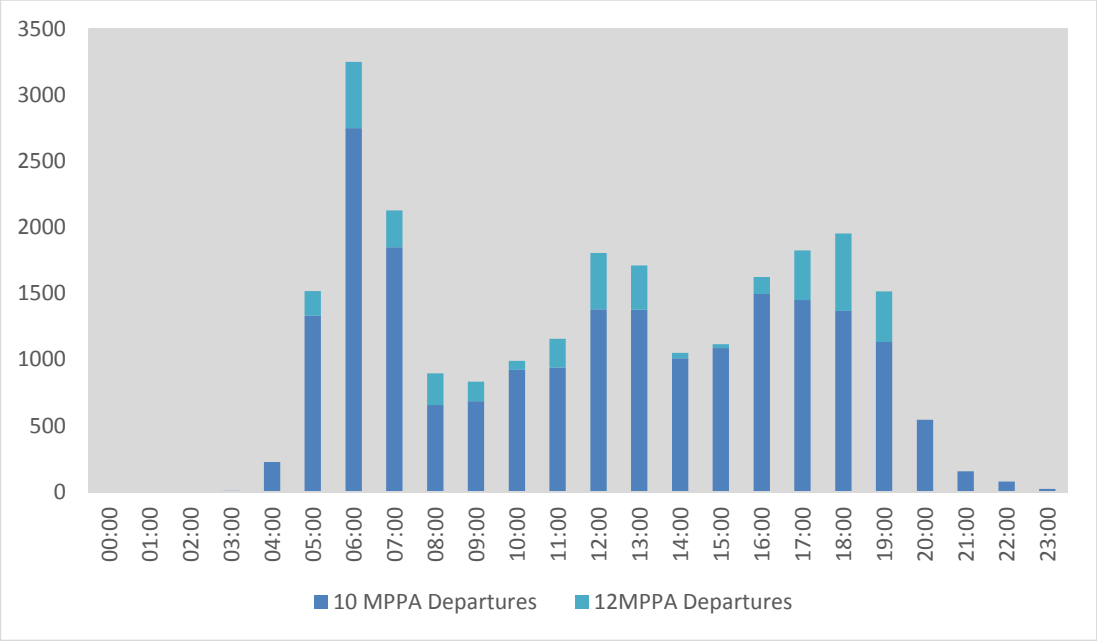


Figure 3.8: Daily Passenger Check In (Departure) Profile in August



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

3.5.9 **Table 3.11** present the daily arrival and departure passenger surface access demand profile for the peak month of August. This has been provided for both the 10mppa and 12mppa scenario.

Table 3.11: 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	1862	0	2335	0	473	0
01:00 – 02:00	499	0	874	0	375	0
02:00 – 03:00	1517	0	1517	0	0	0
03:00 – 04:00	421	8	421	8	0	0
04:00 – 05:00	324	225	510	244	186	19
05:00 – 06:00	126	1331	126	1602	0	271
06:00 – 07:00	224	2750	224	3390	0	640
07:00 – 08:00	98	1849	98	2168	**0**	**319**
08:00 – 09:00	68	656	68	748	**0**	**92**
09:00 – 10:00	573	685	727	711	**154**	**26**
10:00 – 11:00	461	923	461	965	0	42
11:00 – 12:00	991	941	1042	1178	51	237
12:00 – 13:00	464	1380	731	1833	267	453

	10mppa		12mppa		Difference 2mppa	
	Exit Terminal - Arrival	Check in - Departure	Exit Terminal - Arrival	Check in - Departure	Exit Terminal - Arrival	Check in - Departure
13:00 – 14:00	2237	1377	2758	1682	521	305
14:00 – 15:00	1540	1009	1726	1157	186	148
15:00 – 16:00	749	1089	938	1193	189	104
16:00 – 17:00	1182	1497	1209	1717	**27**	**220**
17:00 – 18:00	1298	1451	1535	1765	**237**	**313**
18:00 – 19:00	985	1368	1310	1794	**325**	**426**
19:00 – 20:00	1265	1133	1517	1452	252	320
20:00 – 21:00	1397	544	1961	544	564	0
21:00 – 22:00	543	155	594	155	51	0
22:00 – 23:00	490	77	568	77	78	0
23:00 – 24:00	1100	22	1100	22	0	0
Daily	20470	20412	24405	**24348**	**3936**	**3936**

3.6 Employee Catchment

3.6.1 BIA have provided the projected employee (FTE's) for the consented 10mppa and proposed 12mppa scheme, this is set out within **Table 3.12**.

Table 3.12: Employee Growth (FTE)

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

3.6.2 BIA specifically target local area residential areas for staff recruitment. Recruitment growth will therefore be geographically weighted to the nearby residential areas. For robustness, the staff projection for the 10mppa and 12mppa has been based on the current catchment set out in Table 2.6. **Table 3.13** summarises the 10mppa and 12mppa staff levels per local authority.

Table 3.13: Employee Origin/Destination (10mppa & 12mppa)

Local Authority	Employee Catchment	10mppa (FTE)	12mppa (FTE)	Difference 2mppa (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

Local Authority	Employee Catchment	10mppa (FTE)	12mppa (FTE)	Difference 2mppa (FTE)
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**

3.6.3 **Table 3.14** presents the 10mppa and 12mppa staff levels within North Somerset. This has been calculated from **Table 3.12** and the current North Somerset employee catchment profile.

Table 3.14: Employee Origin/Destination (10mppa & 12mppa)

	Percentage	2021 10mppa (FTE)	2026 12mppa (FTE)	Difference 2mppa (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**

3.6.4 As outlined in Section 7.5 the Bristol Airport site is operational 24 hours a day all year round. Reflecting passenger trends the level of staff also varies across the year, employee's present at the Bristol Airport site in any given day would peak in the summer months.

3.6.5 BIA have identified that the peak level of staff at the Bristol Airport site across a single day in the peak summer months would be 50% of the total FTE's.

3.6.6 **Table 3.15** presents the projected staff shift patterns for the consented 10mppa and the proposed 12mppa. This has been calculated on the level of staff present on any given day during the peak summer months and the shift patterns recorded in the 2017 staff travel survey.

Table 3.15: Daily Profile of Employee Trip Generation (10mppa & 12mppa) in Peak Summer Months

Time	10mppa			12mppa			Difference 2mppa		
	Start	Finish	Total	Start	Finish	Total	Start	Finish	Total
00:00 - 01:00	8	33	40	9	39	48	1	6	8
01:00 – 02:00	0	24	24	0	29	29	0	5	5
02:00 – 03:00	148	41	189	175	48	223	27	7	34
03:00 – 04:00	156	33	189	184	39	223	28	6	34
04:00 – 05:00	164	24	188	194	29	222	30	5	34
05:00 – 06:00	141	82	222	166	96	262	25	14	40
06:00 – 07:00	398	73	471	470	87	557	72	14	86
07:00 – 08:00	343	106	449	405	125	531	**62**	**19**	**82**
08:00 – 09:00	119	0	119	141	0	141	**22**	**0**	**22**
09:00 – 10:00	150	0	150	177	0	177	**27**	**0**	**27**
10:00 – 11:00	8	24	32	9	29	38	1	5	6
11:00 – 12:00	31	24	56	37	29	66	6	5	10
12:00 – 13:00	78	196	274	92	231	323	14	35	49
13:00 – 14:00	8	122	130	9	144	154	1	22	24
14:00 – 15:00	31	41	72	37	48	85	6	7	13
15:00 – 16:00	8	139	146	9	164	173	1	25	27
16:00 – 17:00	16	155	171	18	183	201	**2**	**28**	**30**
17:00 – 18:00	9	148	157	11	174	185	**2**	**26**	**28**
18:00 – 19:00	12	127	138	14	149	163	**2**	**22**	**25**
19:00 – 20:00	86	318	404	101	375	477	15	57	73
20:00 – 21:00	0	57	57	0	67	67	0	10	10
21:00 – 22:00	16	73	89	18	87	105	2	14	16
22:00 – 23:00	8	98	106	9	116	125	1	18	19
23:00 – 24:00	0	0	0	0	0	0	0	0	0
Daily	1,938	1,938	3,875	2,288	2,288	4,575	**350**	**350**	**700**

3.6.7 **Figure 3.10** shows the difference in daily employee origin/destination for the peak month in August across Local Authorities between the 10mppa and 12mppa scenario.

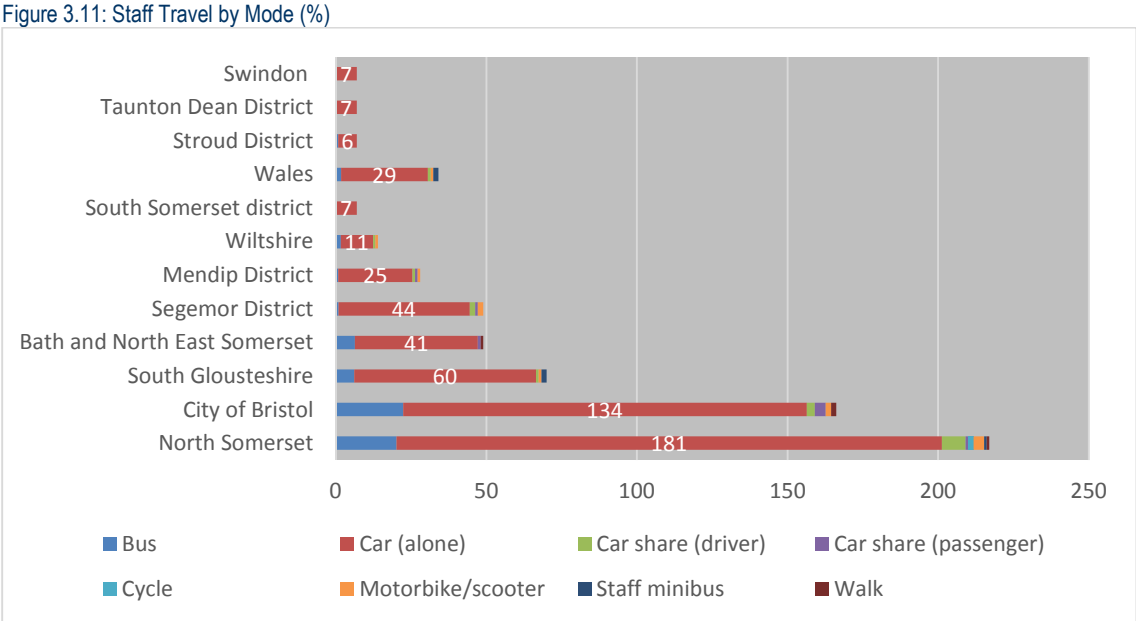
Figure 3.10: Local Authority Daily Passenger Origin/Destination (2mppa)

3.7 Employee Mode Share

3.7.1 To provide a robust assessment the employees catchment and shift patterns will remain as that recorded in the 2017 travel survey. This is considered appropriate as the focus is on the difference between the 10mppa consented scheme and the 12mppa proposals.

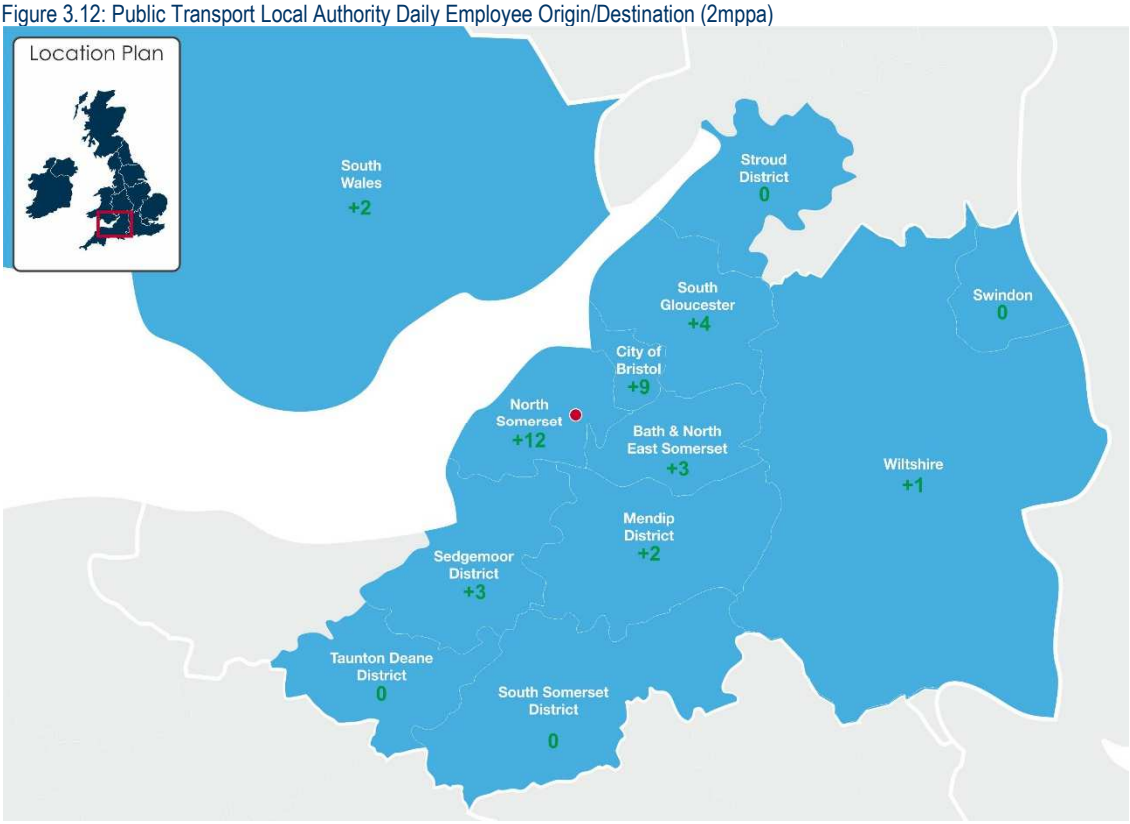
3.7.2 **Figure 3.11** presents the additional (2mppa) employee modal split in the peak summer months this has been based on **Table 2.6** and **Figure 2.11**.

Figure 3.11: Staff Travel by Mode (%)



3.7.3 **Figure 3.12** shows the difference in daily employee travelling to the Bristol Airport site via public transport between the 10mppa consented scheme and the 12mppa scheme proposals.

Figure 3.12: Public Transport Local Authority Daily Employee Origin/Destination (2mppa)



3.7.4 **Table 3.16** sets out the daily staff shift patterns for employees who travel to work by public transport. This has been calculated on the level of staff present on any given day, the current shift patterns and mode share recorded in the 2017 staff travel survey. Importantly this also shows the difference between the consented 10mppa and the 12mppa scheme proposals.

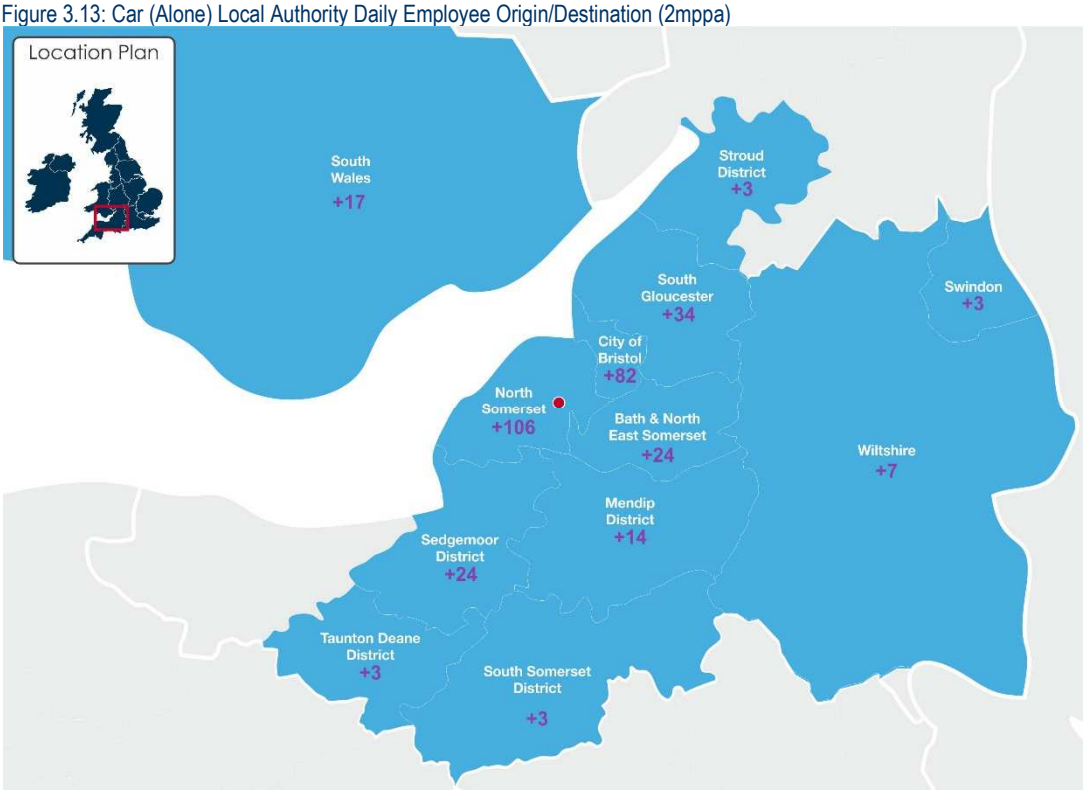
Table 3.16: Daily Employee Public Transport Trip Profile in Peak Summer Months

Time	10mppa			12mppa			Difference 2mppa		
	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	0	0	0	0	0
02:00 – 03:00	24	9	34	27	11	39	3	2	5
03:00 – 04:00	0	0	0	0	0	0	0	0	0
04:00 – 05:00	0	0	0	0	0	0	0	0	0
05:00 – 06:00	38	0	38	44	0	44	5	0	5
06:00 – 07:00	30	51	81	34	60	94	4	9	13

Time	10mppa			12mppa			Difference 2mppa		
	Start	Finish	Total	Start	Finish	Total	Start	Finish	Total
07:00 – 08:00	18	22	40	21	26	47	3	4	7
08:00 – 09:00	2	0	2	2	0	2	0	0	0
09:00 – 10:00	0	0	0	0	0	0	0	0	0
10:00 – 11:00	0	0	0	0	0	0	0	0	0
11:00 – 12:00	0	0	0	0	0	0	0	0	0
12:00 – 13:00	25	24	49	29	28	57	4	4	8
13:00 – 14:00	0	0	0	0	0	0	0	0	0
14:00 – 15:00	34	4	37	38	4	43	5	1	5
15:00 – 16:00	12	0	12	13	0	13	2	0	2
16:00 – 17:00	0	0	0	0	0	0	0	0	0
17:00 – 18:00	0	36	36	0	43	43	0	7	7
18:00 – 19:00	29	28	57	33	33	66	4	5	9
19:00 – 20:00	13	21	34	15	24	39	2	4	6
20:00 – 21:00	10	0	10	11	0	11	1	0	1
21:00 – 22:00	0	7	7	0	8	8	0	1	1
22:00 – 23:00	0	1	1	0	1	1	0	0	0
23:00 – 24:00	0	25	25	0	29	29	0	5	5
Daily	**235**	**227**	**462**	**268**	**268**	**536**	**33**	**41**	**74**

3.7.5 **Figure 3.13** shows the difference in daily employee travelling to the Bristol Airport site via single occupancy vehicles between the 10mppa consented scheme and the 12mppa scheme proposals.

Figure 3.13: Car (Alone) Local Authority Daily Employee Origin/Destination (2mppa)



3.7.6 **Table 3.17** sets out the daily staff shift patterns for employees who travel to work by car. This has been calculated on the level of staff present on any given day, the current shift patterns and mode share recorded in the 2017 staff travel survey. Importantly this also shows the difference between the consented 10mppa and the 12mppa scheme proposals.

Table 3.17: Daily Employee Vehicle Trip Profile in Peak Summer Months

Time	10mppa			12mppa			Difference 2mppa		
	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	0	0	0	0	0
02:00 – 03:00	194	78	272	229	93	321	35	14	49
03:00 – 04:00	0	0	0	0	0	0	0	0	0
04:00 – 05:00	0	0	0	0	0	0	0	0	0
05:00 – 06:00	309	0	309	365	0	365	56	0	56
06:00 – 07:00	242	424	666	285	501	786	44	77	120
07:00 – 08:00	149	183	331	175	216	391	27	33	60
08:00 – 09:00	16	0	16	19	0	19	3	0	3
09:00 – 10:00	0	0	0	0	0	0	0	0	0
10:00 – 11:00	0	0	0	0	0	0	0	0	0
11:00 – 12:00	0	0	0	0	0	0	0	0	0

Time	10mppa			12mppa			Difference 2mppa		
	Start	Finish	Total	Start	Finish	Total	Start	Finish	Total
12:00 – 13:00	205	197	402	242	233	475	37	36	73
13:00 – 14:00	0	0	0	0	0	0	0	0	0
14:00 – 15:00	270	31	300	319	36	355	49	6	54
15:00 – 16:00	94	0	94	111	0	111	17	0	17
16:00 – 17:00	0	0	0	0	0	0	0	0	0
17:00 – 18:00	0	302	302	0	356	356	0	55	55
18:00 – 19:00	231	234	465	272	277	549	42	42	84
19:00 – 20:00	104	172	276	123	203	326	19	31	50
20:00 – 21:00	78	0	78	93	0	93	14	0	14
21:00 – 22:00	0	55	55	0	65	65	0	10	10
22:00 – 23:00	0	7	7	0	9	9	0	1	1
23:00 – 24:00	0	208	208	0	245	245	0	38	38
Daily	**1,891**	**1,891**	**3,782**	**2,233**	**2,233**	**4,465**	**342**	**342**	**683**

3.8 Logistics

3.8.1 As previously highlighted, the logistics trip generators have been classified into the following categories:

a. Fuel Tankers

b. Car Rental Deliveries

c. Operational Deliveries

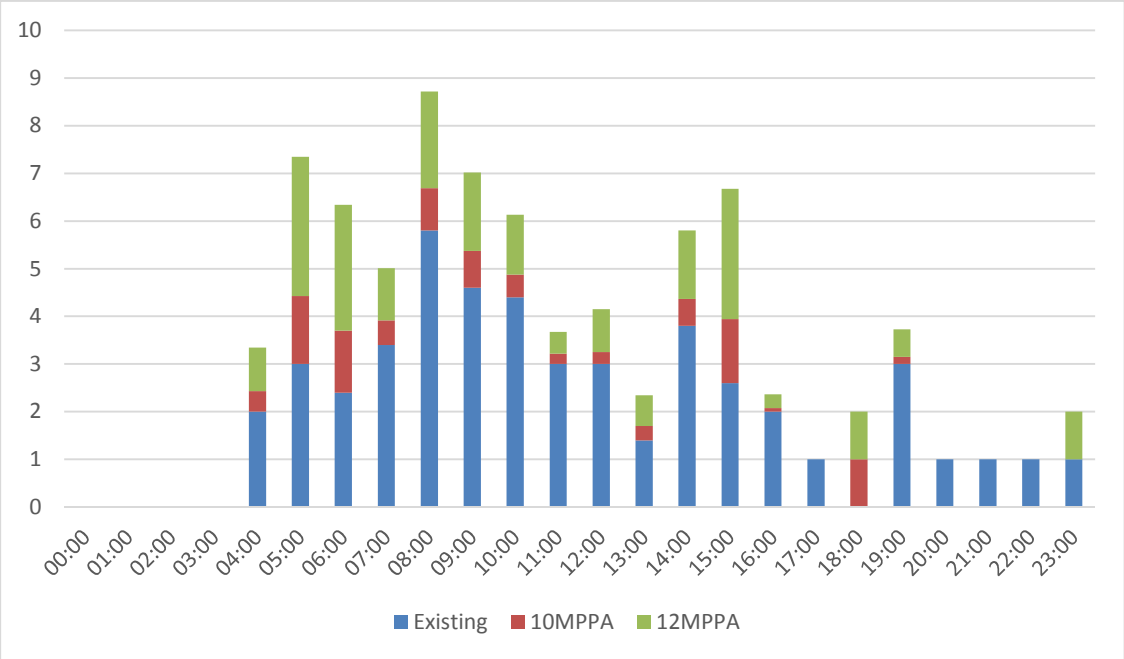
3.8.2 The vehicular trip generation calculated in **Section 7.7** has been scaled up using the passenger numbers to estimate a worst-case forecast. **Table 3.18** sets out the uplift in vehicles for each of the logistics categories.

Table 3.18: Total Daily Vehicles (10mppa & 12mppa)

	Consented 10MPPA			Proposed 12MPPA			Difference		
Time	Fuel	Car Rental	Operational	Fuel	Car Rental	Operational	Fuel	Car Rental	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**

3.8.3 The greatest increase in any hour is one vehicle. In total, there is a daily increase of 12 vehicles between the consented 10mppa scheme and the proposed 12mppa. **Figure 3.14** demonstrates the total uplift in logistic vehicles for the consented 10mppa and the proposed 12mppa scenarios.

Figure 3.14: Daily Increase in Logistic Vehicle Movements (2mppa)



3.9 Total People Increase

3.9.1 **Table 3.19** sets out the predicted daily people increase (passengers and employees) the peak month of August.

Table 3.19: Total Daily People Increase (2mppa) in Peak Month of August

Time	Passengers			Employees			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
00:00 - 01:00	0	473	473	1	6	7	1	478	480
01:00 – 02:00	0	375	375	0	5	5	0	379	380
02:00 – 03:00	0	0	0	27	7	34	22	6	34
03:00 – 04:00	0	0	0	28	6	34	24	5	34
04:00 – 05:00	19	186	205	30	5	35	44	190	240
05:00 – 06:00	271	0	271	25	14	39	292	12	310
06:00 – 07:00	640	0	640	72	14	86	700	11	726
07:00 – 08:00	319	0	319	62	19	81	371	16	400
08:00 – 09:00	92	0	92	22	0	22	110	0	114
09:00 – 10:00	26	154	180	27	0	27	49	154	207
10:00 – 11:00	42	0	42	1	5	6	43	4	48
11:00 – 12:00	237	51	288	6	5	11	242	55	299

Time	Passengers			Employees			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
12:00 – 13:00	453	267	720	14	35	49	465	297	769
13:00 – 14:00	305	521	826	1	22	23	306	539	849
14:00 – 15:00	148	186	334	6	7	13	153	192	347
15:00 – 16:00	104	189	293	1	25	26	105	210	319
16:00 – 17:00	220	27	247	2	28	30	222	50	277
17:00 – 18:00	313	237	550	2	26	28	314	259	578
18:00 – 19:00	426	325	751	2	22	24	428	344	775
19:00 – 20:00	320	252	572	15	57	72	333	300	644
20:00 – 21:00	0	564	564	0	10	10	0	573	574
21:00 – 22:00	0	51	51	2	14	16	2	62	67
22:00 – 23:00	0	78	78	1	18	19	1	93	97
23:00 – 24:00	0	0	0	0	0	0	0	0	0
Daily	3,936	3,936	7,872	347	350	697	4,228	4,229	8,569

3.10 Total Public Transport Increase

3.10.1 Table 3.20 sets out the predicted daily vehicle increase (passengers and employees) the peak month of August.

Table 3.20: Total Daily PT Increase (2pmma) in Peak Month of August

Time	Passengers			Employees			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
00:00 - 01:00	0	131	131	1	5	6	1	136	137
01:00 – 02:00	0	11	11	0	4	4	0	15	15
02:00 – 03:00	0	33	33	22	6	28	22	39	61
03:00 – 04:00	0	9	9	24	5	29	24	14	38
04:00 – 05:00	6	7	13	25	4	29	31	11	42
05:00 – 06:00	62	3	64	21	12	33	83	15	97
06:00 – 07:00	144	-18	126	60	11	71	204	-7	197

Time	Passengers			Employees			Total		
	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
07:00 – 08:00	88	18	106	52	16	68	140	34	174
08:00 – 09:00	52	9	62	18	0	18	70	9	80
09:00 – 10:00	39	32	72	23	0	23	62	32	95
10:00 – 11:00	33	59	92	1	4	5	34	63	97
11:00 – 12:00	56	33	89	5	4	9	61	37	98
12:00 – 13:00	99	45	143	12	30	42	111	75	185
13:00 – 14:00	85	122	207	1	18	19	86	140	226
14:00 – 15:00	32	61	93	5	6	11	37	67	104
15:00 – 16:00	32	16	48	1	21	22	33	37	70
16:00 – 17:00	57	29	86	2	23	25	59	52	111
17:00 – 18:00	92	35	127	1	22	23	93	57	150
18:00 – 19:00	122	63	186	2	19	21	124	82	207
19:00 – 20:00	86	121	207	13	48	61	99	169	268
20:00 – 21:00	14	79	93	0	9	9	14	88	102
21:00 – 22:00	4	18	22	2	11	13	6	29	35
22:00 – 23:00	2	21	23	1	15	16	3	36	39
23:00 – 24:00	1	24	24	0	0	0	1	24	24
Daily	**1106**	**959**	**2065**	**292**	**293**	**585**	**1398**	**1252**	**2650**

3.11 Total Vehicle Increase

3.11.1 **Table 3.21** sets out the predicted daily vehicle increase (passengers and employees) the peak month of August.

Table 3.21: Total Daily Vehicle Increase (2mppa) 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	148	260	407	1	5	6	0	0	0	149	265	413
01:00 – 02:00	-3	-6	-9	0	4	4	0	0	0	-3	-2	-5
02:00 – 03:00	-10	-18	-29	22	6	28	0	0	0	12	-12	-1
03:00 – 04:00	-3	-5	-8	24	5	29	0	0	0	21	0	21
04:00 – 05:00	-5	-6	-11	25	4	29	0	0	1	20	-1	19
05:00 – 06:00	69	38	106	21	12	33	1	1	3	91	51	142
06:00 – 07:00	154	36	190	60	11	71	1	1	3	215	48	264
07:00 – 08:00	132	107	239	52	16	68	1	1	1	184	123	308
08:00 – 09:00	117	82	199	18	0	18	1	1	2	136	83	219
09:00 – 10:00	92	89	181	23	0	23	1	1	2	115	90	206
10:00 – 11:00	102	158	260	1	4	5	1	1	2	104	163	267
11:00 – 12:00	102	74	177	5	4	9	0	0	0	108	79	186
12:00 – 13:00	240	205	445	12	30	42	1	1	1	252	236	488
13:00 – 14:00	254	282	536	1	18	19	0	0	1	255	300	556
14:00 – 15:00	45	72	117	5	6	11	1	1	2	51	79	130
15:00 – 16:00	-7	-10	-17	1	21	22	1	1	3	-5	12	8
16:00 – 17:00	38	19	57	2	23	25	0	0	0	40	42	82
17:00 – 18:00	158	93	251	1	22	23	0	0	0	159	115	274
18:00 – 19:00	324	265	589	2	19	21	0	0	0	326	284	610
19:00 – 20:00	321	370	691	13	48	61	0	0	1	335	418	753
20:00 – 21:00	70	132	201	0	9	9	0	0	0	70	141	210
21:00 – 22:00	6	13	19	2	11	13	0	0	0	8	24	32
22:00 – 23:00	13	25	38	1	15	16	0	0	0	14	40	54
23:00 – 24:00	-8	-13	-21	0	0	0	1	1	2	-7	-12	-19
Daily	**2346**	**2262**	**4607**	**292**	**293**	**585**	**12**	**12**	**24**	**2649**	**2567**	**5216**

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4 Assessment Scenarios

4.1.1 Having established the trip generation associated with increasing the Airport from a 10mppa to 12mppa operation, and having identified the catchment of the additional staff and passengers, it is then necessary to assign these trips onto the surrounding network and identify areas for further more detailed consideration.

4.1.2 This section therefore details the methodology for assigning traffic, establishing where impacts require further consideration and the modelling scenarios where capacity testing is required.

4.2 Vehicle Trip Assignment Methodology

4.2.1 Airport traffic will be assigned to the network using traffic modelling software SATURN (Simulation and Assignment of Traffic to Urban Road Networks). At this stage a simple model has been produced which is being used to assign the development traffic, which will then be added to observed traffic at a junction modelling level where necessary. The model is developed in buffer network, with no junction detail included, therefore assignment is based solely on link speed and distances.

4.2.2 The tool will incorporate HERE traffic speed data to create an assignment of external vehicle trips. Link Distances are extracted from GIS.

4.2.3 This method provides the following benefits:

- Utilising a road network ensures a full route choice is available, highlighting impact on all roads (determining appropriate study area for detailed assessments)
- Traffic calming features can be assessed by lowering traffic speeds on links
- There is flexibility to increase detail within the model in the future, it is possible to validate against journey time surveys.

4.2.4 The following time periods will be considered using the HERE traffic speed data.

- Traditional Peak Times: 08:00 – 09:00 and 17:00 – 18:00
- Off Peak Free Flowing Network Time: 00:00 – 01:00

4.3 Assessment Study Area

4.3.1 Through engagement with NSC a study area has been identified for initial consideration, traffic surveys that have therefore been commissioned to develop the baseline situation in 2018 throughout this study area.

4.3.2 The independent traffic survey specialties Intelligent Data (ID) were commissioned to undertake the following traffic surveys:

- 24 hour Classified Turning Counts (CTC) & Queue Lengths
  - A38 signal junction with A368;
  - A370 signal junction with Brockley Combe Road and Brockley Lane;
  - A370 roundabout with A4174 Colliters Way;
  - A38 roundabout with A4174 Colliters Way;
  - A38 signal junction with Barrow Street;
  - Downside Road junction with Bristol Airport;
  - A38 junction with West Lane;
  - A38 junction with Downside Road;
  - A38 roundabout with Bristol Airport; and
  - A38 roundabout with Silver Zone Parking.
- 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).

4.3.3 The effects of Airport growth from 10mppa to 12mppa on this transport network will be assessed to determine the level of impact across this network. This will include consideration of absolute levels of vehicular impact, in the context of percentage impact and current junction operation. This exercise will be used to identify any junctions where capacity testing should be undertaken to determine whether Airport impact requires highway mitigation.

4.3.4 This analysis will also take into consideration the non-network peak hours, where a comparison will be made between the Airport peak hour impact on junctions to determine whether the influence of Airport traffic is anticipated to bring the level of overall traffic demand above traditional network peak hours. Where this is the case, the Airport peak hour would be assessed if the current operation of the junction indicates a need.

4.4 Modelling Scenarios

4.4.1 Where modelling of junctions is required, we propose assessing the following scenarios:

a.	Baseline Case:	Current airport travel demand of 8.2MPPA Year 2018
b.	10MPPA Reference Case:	Forecast airport travel demand of 10MPPA Year 2026
c.	12MPPA Reference Case:	Forecast airport travel demand of 12MPPA Year 2026
d.	12MPPA Reference Case with Mitigation	Forecast airport travel demand of 12MPPA Year 2026 Mitigation will include PT strategy, junction designs and PT mode share adjustments

5 Summary

5.1.1 PBA has been commissioned to provide transport planning support to Bristol Airport Ltd's application to grow from 10mppa to 12mppa by 2026.

5.1.2 It should be noted that the transport assessment is therefore concerned with the impact of the growth, i.e. that associated with the additional 2mppa, as the impact of growth to 10mppa has already been considered and permitted, with a corresponding transport mitigation package.

5.1.3 This note sets out the methodology undertaken to establish the trip generation of the proposals and is based on Civil Aviation Authority data, which has a sample size of circa 18,000 respondents in 2015, and other data provided directly by the Airport, including responses to the most recent Travel Plan survey.

5.1.4 The growth in passenger and staff numbers, recorded catchments and mode share are all fact based. The future growth, catchment, flight schedules, dwell times etc. have been provided by the Airport.

5.1.5 As a result of the above, we do not anticipate any of the work undertaken to date providing the highway authorities with any points of difference, however we would welcome your input on the methodology and would welcome a discussion on any areas which might be unclear or to which you may wish to suggest alternative approaches.

5.1.6 We would also welcome your input on the proposed approach to taking the assessment forward, with regards to assignment and identification of areas for more detailed consideration.