MOTT MACDONALD

Bristol Airport

Capacity Assessment in support of application for designation as a Coordinated airport

June 2022



Bristol Airport
Amazing journeys start here

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1 Introduction



Introduction

Bristol Airport was the UK's 8th busiest airport in 2019, before the Covid-19 pandemic. It handled 8.96 million passengers per annum (mppa), and had achieved an average growth rate of 4.8% from 2009-2019, compared with an average of 3.1% per annum for the UK as a whole.

Due to travel restrictions during the pandemic in 2020/2021, traffic was about 76% below 2019 levels, which is close to the UK average impact. With the removal of Covid-19 restrictions, traffic is recovering strongly in 2022 and is already exceeding pre-pandemic levels at busy times, placing significant pressure on the airport's infrastructure capacity and ability to deliver desired levels of service.

Annual traffic is expected to exceed 2019 levels by 2023 and to reach 10 mppa by 2024, although 10 mppa could be reached in 2023 under an optimistic recovery scenario. Bristol Airport's baseline forecast reaches 12 mppa by 2030, but this level could be reached as early as 2026 in the high case forecast.

Bristol Airport handles a mix of Low Cost Carriers (84%), charter (12%) and other scheduled carriers (4%). Its largest operators are EasyJet (54%), Ryanair (18%), TUI (12%) and Jet2 (12%).

Bristol Airport is subject to night restrictions limiting the number of flights and Quota Count 'noise points' that can operate between the hours 23:30 – 06:00.

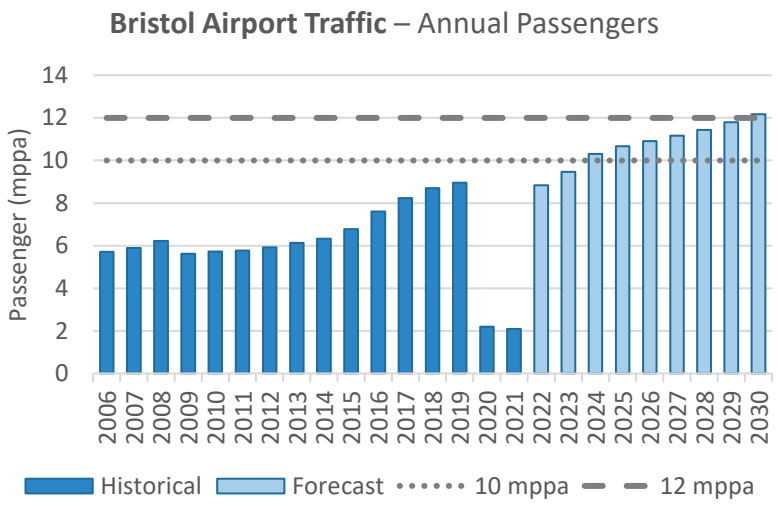
To effectively manage these night restrictions, Bristol Airport was designated as a Level 3 slot 'coordinated' airport for the hours 23:00 to 07:00 local time in summer seasons, with effect from Summer 2018. It is designated as a Level 2 'schedules facilitated' airport at other times in summer seasons, and at all times in winter seasons.

Bristol Airport is also subject to other planning conditions which potentially limit traffic at the airport (as discussed on the following page).

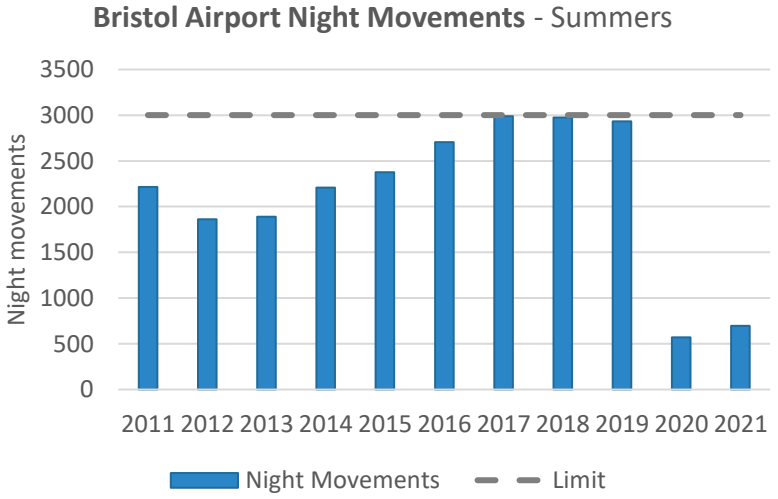
This study is a demand capacity analysis of Bristol Airport undertaken in fulfilment of Article 3 of the UK's 2019 Regulation relating to airport slots.

It assesses any shortfall in capacity considering both the physical capacities of the airport infrastructure (runway, aircraft parking stands and terminal) and Bristol Airport's environmental and planning condition constraints.

It evaluates the need for Bristol Airport's designation as a Level 3 'coordinated' airport to be extended to cover all hours of the day in both summer and winter seasons.



Source: CAA historical data; Bristol Airport forecast



Source: Bristol Airport data

Planning Conditions

New Planning Permission and Conditions

In February 2022, Bristol Airport was granted a new planning permission on appeal(*). The decision supersedes the airport's previous planning permission of February 2011. The 2022 planning conditions take effect after Bristol Airport commences the 12 mppa development. The conditions of relevance to this demand and capacity study are summarised below:

Condition 5: Passenger throughput shall not exceed 12 mppa in any calendar year (January to December). This is an increase from 10 mppa under the 2011 permission.

Condition 12: Passenger throughput shall not exceed 10 mppa in any calendar year unless an application to the Secretary of State to designate Bristol Airport as a fully coordinated airport is submitted.

Condition 13: There shall be no more than 85,990 Air Transport Movements (ATM's) in any calendar year. This shall include commercial and non-commercial flights.

Condition 14: Limits on the areas enclosed by the 57 dB day-time noise contour and the 55 dB night-time noise contours.

Condition 16: Relating to night flying restrictions:

a) Revised aircraft Quota Count (QC) point classification bands – see Annex A of this report

c) Seasonal QC limits set at 1260 points in a summer season and 900 points in a winter season (applicable for flights operating 23:30 to 06:00)

d) A ban on noisier aircraft (QC2 or above) from being scheduled at night (23:00-06:00) or operating at night except in exceptional circumstances

f) Permitted carry-over of unused QC points from one season to the next, up to 10% of unused QC points may be carried over, but

g) The 10% carry-over is phased out at 2% per year, to 0% after 5 years

Paragraphs i) and j) allows night flights to be disregarded by the airport operator in certain exceptional circumstances.

(*) *Appeal Decision APP/D0121/W/20/3259234* (2 February 2022) https://acp.planninginspectorate.gov.uk/ViewCase.aspx?caseid=3259234

Condition 17: An annual limit on night movements between 23:30 to 06:00 of 4,000 movements during two adjoining seasons – summer and winter. This replaces seasonal limits of 3,000 per summer and 1,000 per winter under the 2011 permission.

Condition 18: An annual limit on shoulder period flights (between 23:00-23:30 and 06:00-07:00) set at 9,500 per calendar year.

Planning Decision Review

In May 2022, the High Court granted permission for the Bristol Airport Action Network (BAAN) to request a statutory review of the February 2022 decision allowing Bristol Airport to expand.

The outcome of such a review is not known and cannot be anticipated at this time.

For the purposes of this study, we consider the impact on the airport's capacity if certain conditions were to revert to those contained in the airport's 2011 planning conditions:

- **Condition 5:** annual passenger cap, reverting to 10 mppa
- **Condition 17:** night movement limits, reverting to seasonal limits of 3,000 per summer and 1,000 per winter

The Case for Slot Coordination

This study looks as the case for Bristol Airport's designation as a Level 3 'coordinated' airport, during all hours of the day in both summer and winter seasons, under two scenarios:

Scenario 1: **Under the new February 2022 planning conditions, where passenger throughput (12 mppa), aircraft movements and night flying must be managed on a year-round basis against annual limits**

Scenario 2: **If the 2022 planning permission is changed during the statutory review, and Bristol Airport needs to manage traffic within the 2011 planning permission's cap of 10 mppa**

Under both scenarios, the airport's environmental and physical capacity limitations are assessed.

Conditions for Airport Coordination

UK Regulations

Airport coordination is a process designed to manage imbalances between the capacity of airport infrastructure, including environmental limitations, and demand for air services. The coordination process is governed by:

- The Airports Slot Allocation (Amendment) (EU Exit) Regulations 2019 (SI 2019 No 276) [the "2019 Regulations"]
- The Airports Slot Allocation Regulation 2006 (SI 2006 No 2665) [the "2006 Regulations"]
- The Worldwide Airport Slot Guidelines [the "WASG"]

The 2019 Regulations made necessary amendments to the EU Slot Regulation 95/93 and to the 2006 Regulations to reflect the UK's exit from the EU.

Bristol Airport's Current Designation

Bristol Airport is currently designated as a Level 3 slot 'coordinated' airport for the night hours 23:00 to 07:00 local time in summer seasons and as a Level 2 'schedules facilitated' airport at other times in summer seasons, and at all times in winter seasons.

The 2019 Regulation defines a 'schedules facilitated airport' (Article 2i) as:

> *[…] an airport where there is potential for congestion at some periods of the day, week or year which is amenable to resolution by voluntary cooperation between air carriers and where a schedules facilitator has been appointed to facilitate the operations of air carriers operating services or intending to operate services at that airport.*

Where this voluntary 'schedule facilitation' process is insufficient or ineffective in managing excess demand, an airport may be designated as a 'coordinated airport'.

The 2019 Regulation defines a 'coordinated airport' (Article 2g) as:

> *[…] any airport where, in order to land or take off, it is necessary for an air carrier or any other aircraft operator to have been allocated a slot by a coordinator, with the exception of State flights, emergency landings and humanitarian flights.*

Conditions for Airport Coordination

The conditions for designating a 'coordinated airport' are set out in Article 3 of the 2019 Regulation. Article 3(3) requires that a thorough capacity analysis is carried out based on commonly recognised methods. The analysis is to determine any shortfall in capacity, taking into account environmental constraints at the airport in question.

The analysis must consider the possibilities of overcoming such a shortfall through new or modified infrastructure, operational changes, or any other change, and the time frame envisaged to resolve the problems.

Article 3(5) states:

> *Where capacity problems occur for at least one scheduling period, the Secretary of State may designate an airport as coordinated for the relevant period only if:*
>
> *a) the shortfall is of such a serious nature that significant delays cannot be avoided at the airport, and*
>
> *b) there are no possibilities of resolving these problems in the short term*

This study is a demand capacity analysis of Bristol Airport undertaken in fulfilment of Article 3 of the UK's 2019 Regulation relating to airport slots.

It assesses any shortfall in capacity considering both the physical capacities of the airport infrastructure (runway, aircraft parking stands and terminal) and Bristol Airport's environmental and planning condition constraints.

2 Environmental constraints

Annual Passenger and Movement Limit

Annual Passenger Limit

Bristol Airport's latest 2022 planning permission (Condition 5) allows a maximum of 12 million passengers per annum (mppa) to operate at the airport. This is an increase from 10 mppa allowed under the airport's 2011 planning permission.

- Bristol Airport's forecasts expect the 10 mppa level to be exceeded by 2024, although it could occur by 2023 in the High Case forecast.
- The 12 mppa level is expected to be reached by 2030 in the Core Case, but it could occur as early as 2026/27 in the High Case

In the case where the current statutory review of the airport's 2022 planning permission is successful in overturning permission for expansion, Bristol Airport will need effective processes to manage within its 2011 permission's 10 mppa annual limit.

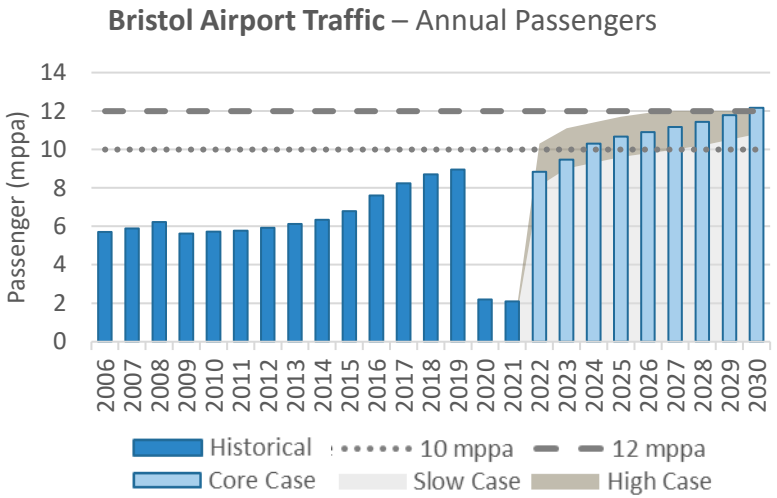
Annual Movement Limit

Condition 13 of Bristol Airport's latest 2022 planning permission limits the number of annual commercial and non-commercial movements to 85,990 per calendar year.

Combined with the 12 mppa passenger limit, this means that the airport needs to achieve an average of 140 passengers-per-movement to make full use of its 12 mppa passenger cap within this movement cap(*). In 2019, the average passengers-per-movement at Bristol was 129, so an 8.5% improvement is required.

Based on continuation of recent trends, this increase in average passengers-per-movements should occur, so the 12 mppa passenger cap is likely to be the primary constraint on the airport's throughput, but the annual movement limit will also need to monitored and managed via the slot process.

(*) *12,000,000 passengers / 85,990 movements = 139.6 passengers / movement*



Source: CAA historical data; Bristol Airport forecast

Annual Passenger Limit Conclusion

- **Bristol Airport will require designation as a 'coordinated airport' for all passenger flights on a year-round basis (summer and winter) to manage an annual passenger cap.**
- **Slot controls would be required from the Summer 2023 season to cater for the possibility of the airport's 2022 planning permission being overturned on review and the limit reverting to 10 mppa.**
- **With the increased limit of 12 mppa, slot controls are likely to be required to manage the passenger cap by 2026.**
- **Slot controls may also be required to manage the airport's annual movement limit, depending on aircraft mix and how quickly average aircraft size increases.**

Night Restrictions

Night Movement Use

Bristol Airport's night flying has been constrained by the 2011 planning permission's seasonal limit of 3,000 movements each summer, which was fully utilised 2017-2019. Winter night flying only averaged 304 movements per winter in these years.

Bristol has much higher demand for night flights in a summer season than a winter season. Summer season night slot controls have been in place at Bristol Airport since 2018, constraining demand. A change to an annual limit of 4,000 movements will allow more summer night flying, but it means that winter night flying will also need to be proactively managed via the slot process to provide a year-round balanced use of the available 4,000 night movements.

As traffic recovers post-pandemic, there is likely to be demand to fully utilise the 4,000 night movement limit on an annual basis (summer and winter) by the time traffic recovers to 2019 levels. This could occur by 2023.

Quota Count Use

QC use exceeded the 1260 QC point limit each summer from 2016-2019, and the airport relied on permitted carry-over of QC from adjacent winter seasons.

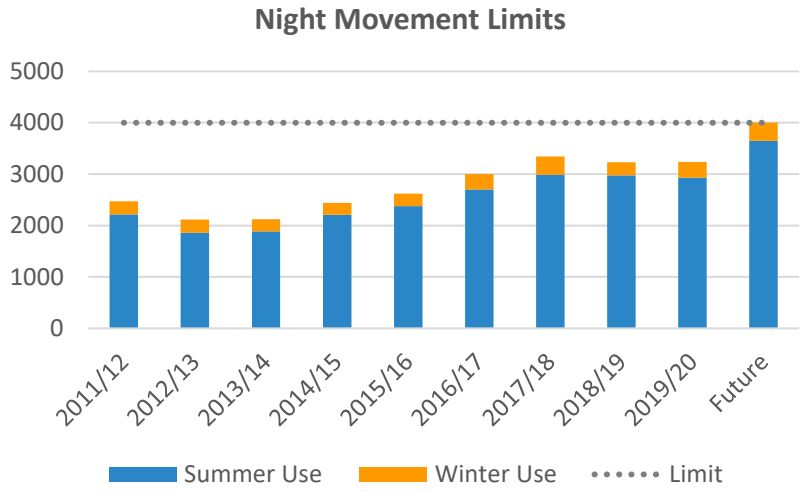
The airport's revised planning permission phases out the seasonal carry-over flexibility over a 5-year period. Therefore, the airport will need to encourage use of quieter aircraft at night to make full use of available night movements, within the permitted number of night noise QC points. The effect of the restrictions is to progressively bear down on night noise.

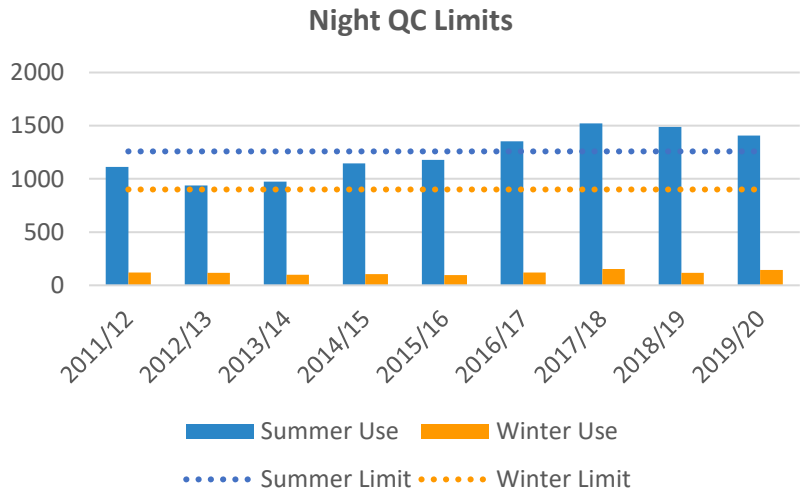
Shoulder Period Movements

Condition 18 limits Bristol Airport's shoulder period movements (23:00-23:30 and 06:00-07:00) to 9,500 movements per year. Shoulder period movements were 4,453 in 2019 when the airport handled almost 9 million passengers. The shoulder period limit appears sufficient to accommodate demand for flights in these hours up to the 12 mppa level of traffic.

Night Restriction Limit Conclusions

- **To manage an annual night movement limit, Bristol Airport should be designated as a 'coordinated airport' for night flights on a year-round basis (summer and winter seasons). This should take effect from the implementation of the new planning limits and be in place for the Summer 2023 season.**





Source: Mott MacDonald analysis of Bristol Airport data

3 Runway capacity analysis

Runway capacity

Introduction

Runway Layout and Operation

Bristol Airport has a single runway oriented in a 09/27 direction. The runway length is relatively short at 2,011m. There is a single parallel taxiway. Most of the airport facilities are located on the north side of the runway, except for the general aviation facilities on the south side. With prevailing winds from the southwest, the Runway 27 direction is in use about 70% of the time.

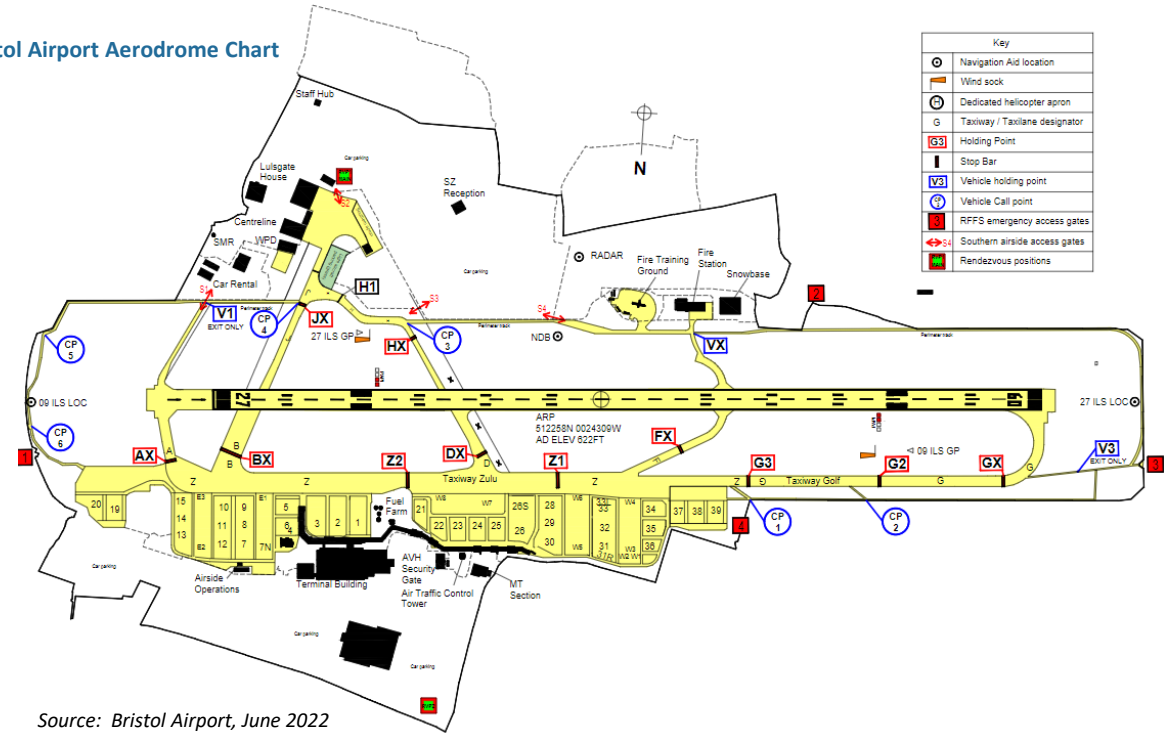
The majority of the airport's operations are short-haul services to points in the UK, Ireland and Europe. The runway length limits long-haul operations without payload restrictions. New aircraft technology, in the form of the Boeing 787, has permitted transatlantic operations (with some payload restrictions) to destinations such as Cancun and Orlando.

The airport has no Rapid Exit Taxiways (RETs). An assessment undertaken for Bristol Airport indicated that the runway length prevents RETs being provided in a location that would significantly reduce runway occupancy times, and hence increase capacity.

In order to maximise the potential capacity of the runway, an additional holding area at the joining point of Runway 27 is required to prevent aircraft queuing during peak periods and impacting on the eastern aircraft stands.

Runway 09 lacks a Cat III ILS, which can result in aircraft diversions during low visibility procedures (LVPs).

Bristol Airport Aerodrome Chart



Source: Bristol Airport, June 2022

Runway capacity

Theoretical Runway Capacity

Runway Capacity Assessment

Bristol Airport commissioned a runway capacity assessment by NATS (the UK ATC service provider)*. This study assessed the theoretical runway capacity based on a peak average hourly delay criteria of 10 minutes (airborne holding delay for arrivals and runway holding area delay for departures).

Airspace and Operational Considerations

The NATS study identified several airspace and operational limitations affecting runway capacity:

- Limited airspace volume (~5nm wide) restricts efficient arrival sequencing
- A single NDB hold serves Bristol Airport and is located in the overhead. Its location adds complexity and workload for the approach radar controller
- Standard Instrument Departure (SID) routes conflict with arrivals from the north and east, adding to controller workload
- All departures climb straight ahead for 4.5nm (Runway 27) or 4.7nm (Runway 09), preventing 1-minute departure separations. Departure separations are generally 2 minutes, or longer if in-trail aircraft have a significant speed differential.

Aircraft Separations

The separations between flights at Bristol Airport are summarised in the table below for the following modes of aircraft sequencing and operation:

- AA – arrival / arrival aircraft sequence
- ADA – arrival / departure / arrival aircraft sequence
- DD – departure / departure aircraft sequence
- LVP – Low Visibility Procedures

Runway Direction		Mode AA Separation	Mode ADA Separation	Mode DD Separation
Non LVP	RWY27	180s (~7NM)	200s (~8NM)	120s
	RWY09	160s (~6.5NM)	200s (~8NM)	120s
LVP	Both RWYs	280-300s (~12NM)	380s (~15NM)	120s

Source: NATS

(*) Bristol Airport Capacity Assessment v2.0 (2017), NATS

Runway Occupancy Times

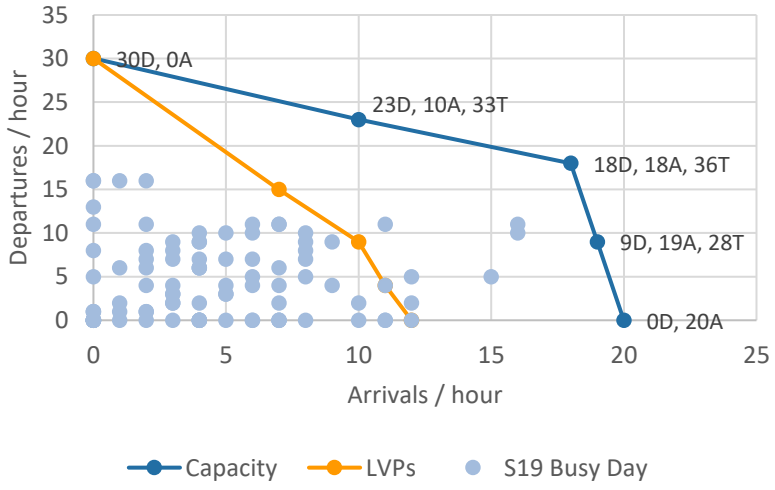
Arrival runway occupancy times (from threshold crossing to clear of runway) are relatively high – jet aircraft (74% of traffic) exit at Taxiway GX with an average occupancy time of 73 sec. This compares with 50-60 secs for other UK airports. Turboprops (11% of traffic) can exit at Taxiway FX with an average occupancy time of 44 secs.

Departure runway occupancy times (from wheels-roll to airborne) average 30 secs for the 98% of aircraft that enter at Taxiway AX.

Assessed Runway Capacity

The assessed theoretical runway capacity is depicted in the chart below. Capacity varies with the mix of arrivals and departures, with the maximum total capacity of 36/hour achieved with a 50/50 mix. The chart also shows the capacity under LVPs, and plots the Summer 2019 busy day hourly traffic mix.

Bristol Airport Theoretical Runway Capacity



Source: MM analysis and NATS data

Runway Capacity

Declared Runway Capacity

Bristol Airport's declared runway capacities for the schedule coordination process is a total of 27 movements per hour for Summer 2022. This is an increase from 25 movements per hour in Summer 2019.

The declared runway capacity is less than the theoretical maximum, as achieving maximum capacity will require development of the airport's supporting infrastructure such as the Runway 27 departures holding area and the airport's stand supply. There is also the need to balance declared capacity with the risk of unacceptable delays, particularly in LVP conditions.

Bristol Airport is progressively increasing declared runway capacity in line with demand in a balanced and prudent way.

Within the total declared capacity for Summer 2022, the arrivals, departures and sub-limits are:

- 17 arrivals per hour (22 arrivals in the 23:00 and 00:00 hours, summers only)
- 17 departures per hour (23 departures in the 06:00 and 07:00 hours, summers only)
- A 15-minute sub-constraint is used to smooth flights within the hour to prevent bunching and the build up of delays.

The higher declared capacities during the morning departures and evening arrivals peak hours (summer seasons) are tailored to meet demand as far as possible without leading to the build-up of sustained delays.

Bristol Airport Runway Capacity Declaration

Hourly Movements (Local Time)

Runway 2-Way Total	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
Summer 2022	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Winter 2022/23	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Runway Arrivals	**00:00**	**01:00**	**02:00**	**03:00**	**04:00**	**05:00**	**06:00**	**07:00**	**08:00**	**09:00**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**	**17:00**	**18:00**	**19:00**	**20:00**	**21:00**	**22:00**	**23:00**
Summer 2022	23	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	22
Winter 2022/23	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Runway Departures	**00:00**	**01:00**	**02:00**	**03:00**	**04:00**	**05:00**	**06:00**	**07:00**	**08:00**	**09:00**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**	**17:00**	**18:00**	**19:00**	**20:00**	**21:00**	**22:00**	**23:00**
Summer 2022	17	17	17	17	17	17	23	23	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Winter 2022/23	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17

15 min Runway Movements

Runway 15 minutes	During all hours
Arrivals	8
Departures	8
Total	12

Runway Capacity

Runway Hourly Capacity Utilisation

The charts opposite show the Summer 2022 peak week's scheduled utilisation of the runway on a rolling hour basis.

Departures Utilisation:

- The departures peak occurs during the busy period for first-wave departures of based aircraft overnighting at the airport, with a prolonged 2-hour peak from 06:00 to 07:59 local time. In a summer season, Bristol Airport is subject to Level 3 slot coordination between 23:00 to 06:59, so this morning peak does not represent unconstrained demand, which is likely to be higher.
- Runway capacity is profiled with a departures-bias in the morning period to accommodate this peak demand as far as possible.
- The current peak of 21 departures is within the declared capacity of 23 movements per hour in this peak, but above the normal departures capacity of 17 per hour.

Arrivals Utilisation:

- Current arrivals demand peaks at 16 movements per hour in mid-afternoon, within one movement of current declared capacity at this time, and at 16 arrivals during the midnight peak.

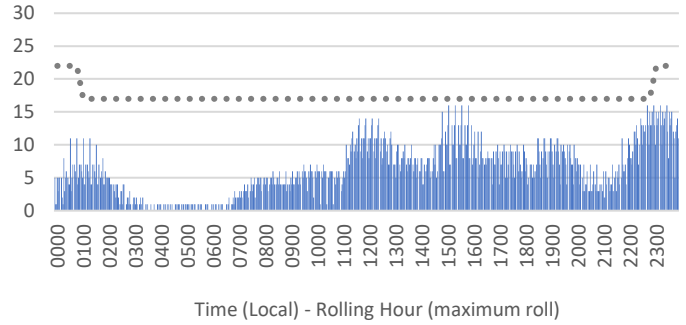
Total (2-way) Utilisation:

- The total (2-way) peak occurs in the 15:00 hour at 24 movements. This is within the declared 27 movement-per-hour capacity in Summer 2022.

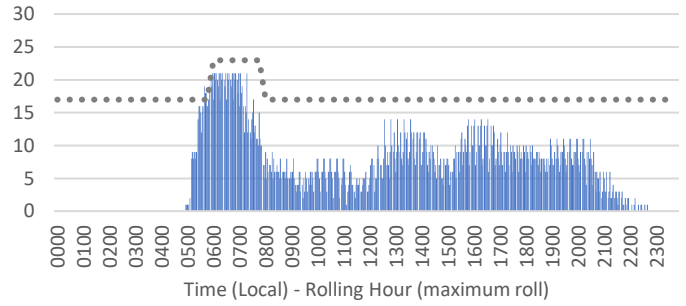
Guide to Histograms

- The capacity utilisation histograms show scheduled utilisation against capacity for a typical peak week.
- Each utilisation bar represents a day-of-week, grouped Mon-Fri for each time period.
- The charts show rolling hour utilisation calculated at 15-minute intervals. Utilisation is displayed on a 'maximum roll' basis, showing the maximum utilisation in each rolling period. This shows the true availability of capacity at a given time of day.

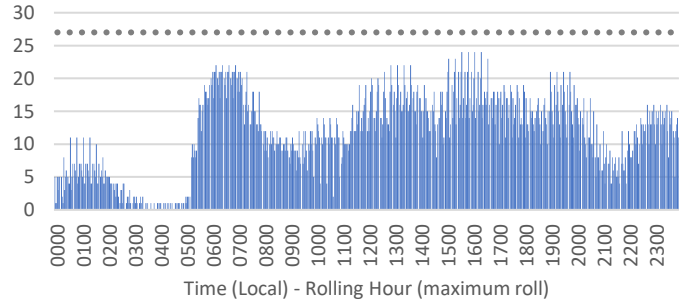
Runway Arrivals – Hourly – Summer 2022



Runway Departures – Hourly – Summer 2022



Runway Totals – Hourly – Summer 2022



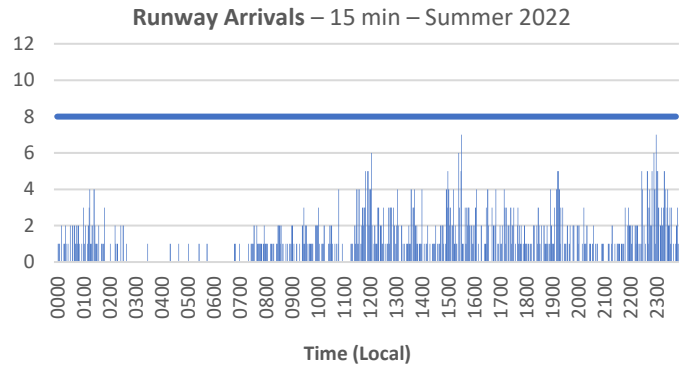
Runway Capacity

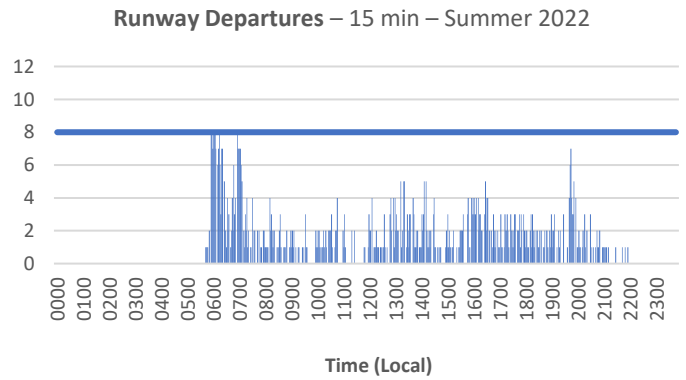
Runway 15-minute Utilisation

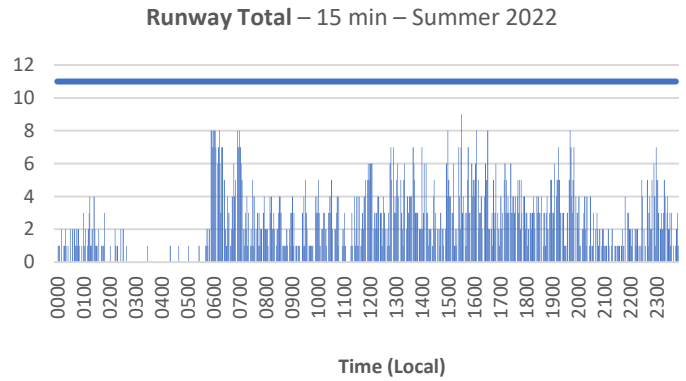
- The charts opposite show the Summer 2022 peak week scheduled utilisation of the runway on a 15-minute basis.
- Overall, capacity at the 15-minute level is sufficient to meet demand across the day for arrivals and total movements, but is constraining departures demand during the peak morning period.
- For Bristol Airport, the key issue is managing bunching of first-wave departures in the 0600 and 0700 hours, where the airport is operating at capacity.

Runway Capacity Conclusions:

- **Runway capacity is not currently the primary constraint on demand at Bristol Airport, and there remains scope to increase runway capacity towards its theoretical maximum in line with demand and in a balanced way (considering other taxiway and stand infrastructure constraints).**
- **Runway capacity alone would not justify the need for Bristol Airport to be designated as a 'coordinated airport', however the availability of formal slot controls would give greater assurance that demand can be managed within capacity. This can ensure efficient airport operations and permit phased increases in runway capacity towards the theoretical maximum.**







4 Stand capacity analysis

Apron analysis

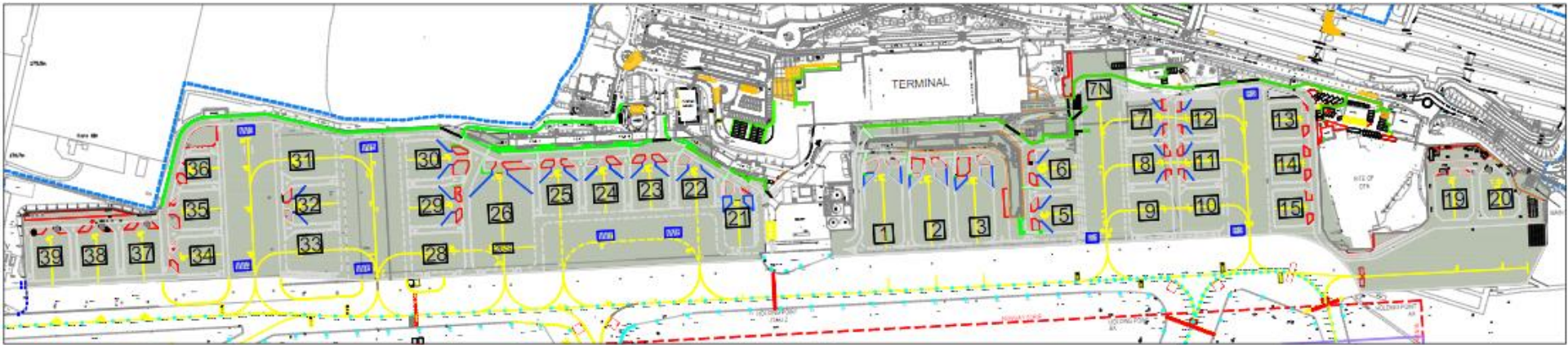
Overview of the apron layout

Apron Layout

- The diagram and table below provide an overview of the Bristol Airport apron layout and stand supply for the main apron areas around the terminal building. There is additional aircraft parking for GA aircraft south of the runway, which is excluded from this capacity assessment analysis.
- Overall, there are 34 designated and active stands, 13 of which are contact stands and the rest are remote.
- There is 1 Code E (e.g., B787) contact stand and 1 Code B (eg, EMB145) remote stand. The other stands are Code C (e.g., A320/B737).

Operating Restrictions:

- Stands 34-37 – no Engine/APU running between 23:00-07:00, so no arrivals/departures during these times
- Stands 38-39 – no Engine/APU running at all times, so no live arrivals/departures (only tow on/off) – used only as contingency stands



Aircraft ICAO Code	Contact Stands	Remote Stands	Total Stands
B (e.g. E145)	0	1	1
C (e.g. A320/B737)	12	20	32
E (e.g. B787)	1	0	1
Total:	**13**	**21**	**34**

Source: Bristol Airport, June 2022

Stand demand analysis

Summer 2019 busy day analysis

Stand demand

The chart presented here shows the stand demand on a typical busy day in Summer 2019.

Summer 2019 was used for stand demand analysis as it provides an assessment of demand before the impacts of Covid-19. Bristol Airport's pattern of demand remains mainly BRS-based aircraft operating short-haul services, so the pattern of stand demand is not expected to materially change as the airport recovers from the pandemic downturn.

Stand demand was analysed based on a schedule linked by arrivals and departures in each aircraft turnaround.

The overall peak stand demand of 33 aircraft for this sample busy day occurs in the overnight period, driven by BRS-base short haul (Code C) and 1 Code E overnighting aircraft. The airport is 'at capacity' for the available 33 stands of Code C or larger aircraft, without allowing for contingencies and stand outages.

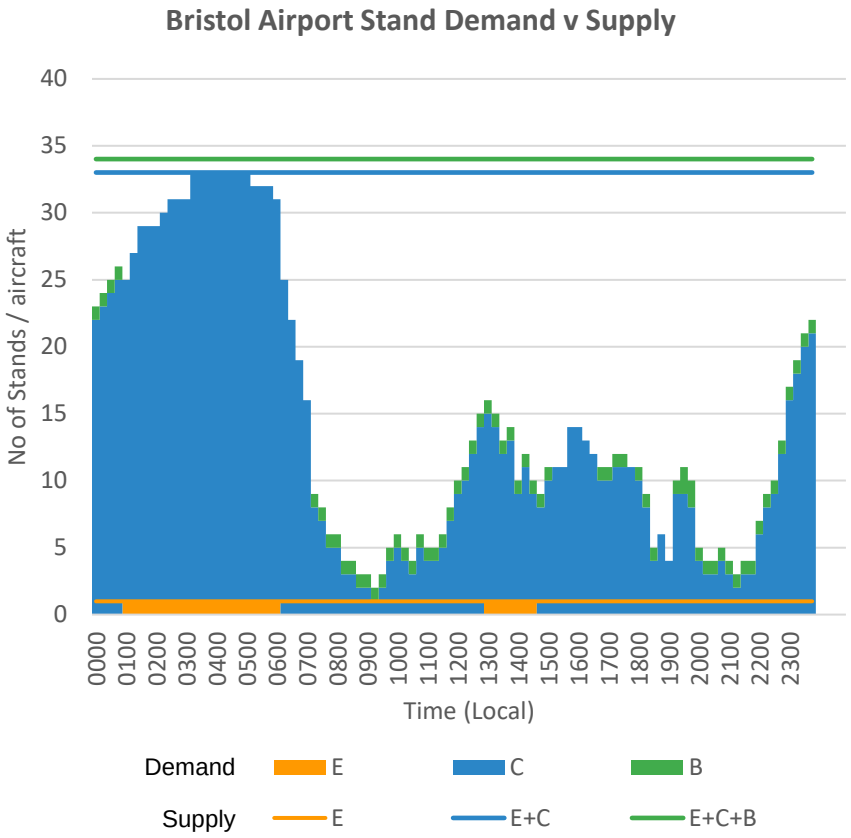
Bristol Airport has only one Code E widebody stand, which is just sufficient to meet current demand for the Boeing 787 operations of TUI.

Given the operating and environmental restrictions affecting some of the airport's stands, stand allocation is a challenge at peak times and the airport is operating at full capacity.

Stand demand can be expected to grow in line with the based aircraft fleet, adding to the peak demand period.

Stand Capacity Conclusions

- **Overall stand capacity is <u>just</u> sufficient to meet current (2019) levels of demand.**
- **Slot controls are required to manage growth in peak stand demand (overnighting aircraft) and any additional Code E aircraft movements to ensure that growth in stand demand is managed within available supply.**



Source: Mott MacDonald analysis of Summer 2019 busy day schedule, representing pre-Covid-19 levels of demand

5 Terminal capacity analysis

Terminal capacity

Introduction

Introduction

- The capacity of the main terminal at Bristol Airport is assessed to determine the passenger throughput that can be processed with the available facilities and space provision whilst at the same time ensuring that 'Optimal' levels of service (LoS) are achieved in terms of passenger experience.
- The terminal capacities assessed cover the following key passenger processing areas:
  - Check-in and baggage make up
  - Central search (Security)
  - Landside departures concourse
  - Departures lounge
  - Immigration
  - Baggage reclaim
  - Landside arrivals concourse
- Information sources / documentation provided for this assessment are:
  - Drawings and passenger processing information provided by Bristol Airport
  - 2022 flight schedules, and pre-pandemic flight schedules
  - Insights collected as part of the site visit
- In addition to the above, and where necessary, data was supplemented by benchmarked processing data by Mott MacDonald.





Terminal capacity

Overview of Terminal Layout and Facilities

Terminal Facilities and Layout

- Bristol Airport has one terminal with check-in and arrivals concourses on the ground floor, and a common central security search area and departure lounge (serving both domestic and international flights) at first floor level.
- A summary of the facility provision is provided in the table below.
- The terminal building ground floor map can be seen below. An overview of the First Floor and Mezzanine levels is provided on the following page.

Summary of Bristol Airport Facilities Provision

Departures	
Check-in	47 desks, of which 21 are auto bag drop 2 Out-of-Gauge baggage inputs 59 Self Service Kiosks (SSKs)
Baggage System	4 Hold Baggage Screening lines 4 Baggage carousels 45 Make-Up Positions 4000 bags/hour capacity
Security	12 lanes (including 2 fast-track)
Departures Lounge (based on BRS drawings)	Shops incl. Duty Free – 1,560 m^2 Catering – 1,150 m^2 General Seating – 1,115 m^2 Circulation – 1,575 m^2
Arrivals – Main International	
Immigration	10 manned desks 10 e-passport gates
Baggage Reclaim	5 belts (International)
Arrivals – Domestic	
Baggage Reclaim	1 belt (Domestic)

Source: Bristol Airport, MML analysis of BRS drawings

Bristol Airport Terminal Building Ground Floor Map



Source: Bristol Airport website, June 2022

Terminal capacity

Overview of Terminal Building Facilities

Terminal Facilities and Layout

- An overview of the terminal building first floor and mezzanine maps can be found below.

BRS Airport Terminal Building First Floor Map



Source: Bristol Airport website, June 2022

BRS Airport Terminal Building Mezzanine Level Map



Source: Bristol Airport website, June 2022

Terminal capacity

Capacity Assessment Methodology

Capacity Assessment Methodology

- The capacity of terminal facilities was assessed using a capacity model based on the IATA Airport Design Reference Manual version 11 (ADRM) methodology. The capacity model is based on commonly recognised methods and has been applied by Mott MacDonald on numerous projects to assess terminal capacities and facility requirements at a variety of airports worldwide. The model takes account passenger flows from one operational area to the next and utilises airport specific processing information such as transaction times and passenger characteristics as well as space planning parameters.
- Capacity was assessed against the IATA Level of Service 'Optimum Average' (Level C). Optimum Average is defined by IATA as being the throughput rate at which a good level of service is provided with conditions of stable flow, acceptable delays and good levels of comfort. Where Bristol Airport has its own Level of Service standards, these have been adopted.
- Capacity was assessed based on the existing provision of facilities on all areas.
- The model was based on data provided by the airport on observed passenger transaction and dwell times, passenger types (e.g. proportion of EU and non-EU passport holders at immigration), and proportions of passengers using each facility (e.g. % check-in, % passengers with hold baggage). This data was supplemented by benchmarked processing data where necessary.
- The model assessed capacity by varying the level of busy hour passenger demand to determine the point at which the Optimal Average level of service was just met for each process, taking into account the number of facilities and/or the space provision in each area.
- This is the level of demand above which excessive congestion and queuing can be expected to occur on a regular basis under normal conditions. The assessment assumed that all terminal facilities were available and adequately manned. It thus represents the capacity capability of the provided facilities, rather than capacity limited by any operational inefficiencies.
- A summary of the terminal capacity assessment is provided on the following pages.

Terminal capacity

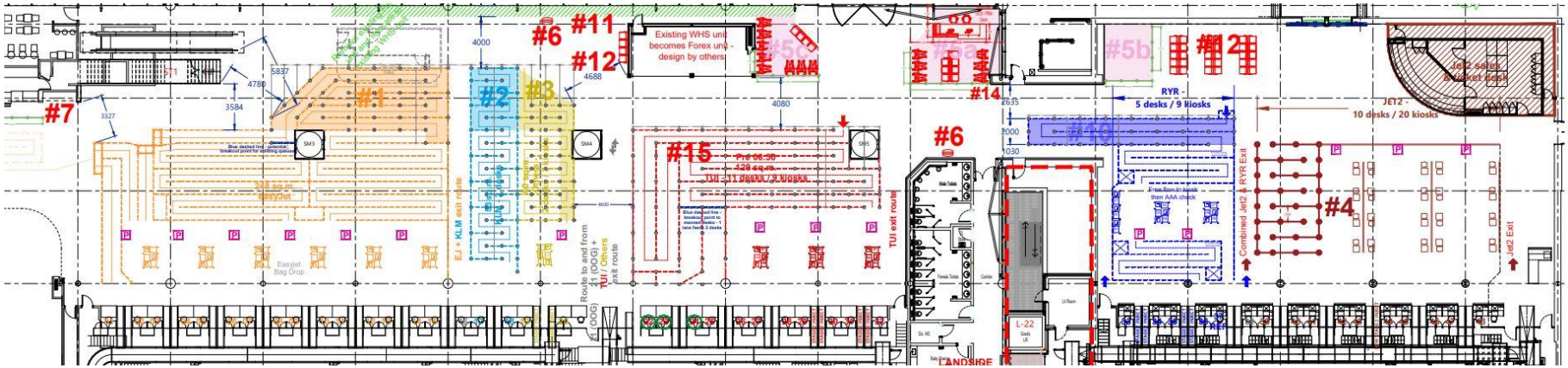
Key Considerations & Findings

Check-in Capacity Assessment

- Check-in is split into the following zones:
  - **Zone 1A** (Desks 1-15): easyJet check-in area with 18 self service kiosks (SSKs) and 6 automatic bag drop desks, plus referral desks.
  - **Zone 1B** (Desks 16-20): 5 desks of which two are bag drop, allocated on a common-user basis and three SSKs.
  - **Zone 1C** (Desks 22-32): check-in area used primarily by TUI with 9 SSKs and 11 desks, four of which are bag drop desks.
  - **Zone 2** (Desks 33-48): used primarily by Ryanair and Jet2. Ryanair have 9 SSKs and 4 bag drop desks. Jet2 have 20 SSKs and 5 bag drop desks.
  - 2 Out-of-gauge bag drops (Desk 21 in Zone 1 and Desk 49 in Zone 2)
- Approximately 75% of passengers use self-services check-in and 25% conventional check-in desks. Average check-in transaction times are 70 sec for the 1st stage SSK process and 20 sec for self-service bag drop, and 75 sec for traditional check-in.
- The maximum check-in queue time standard is 20 minutes. This compares with IATA ADRM recommended 'Optimal' standard of 10-20 minutes.
- **The assessed overall check-in capacity, taking account of desk usage, queue standards and passenger reporting profiles, is 3,300 passengers per hour.**

Baggage Capacity

- The departures baggage system has 4 baggage lines with hold baggage screening feeding 4 carousels with a total of 45 baggage make-up (MUP) positions (plus 2 out-of-gauge lines/MUPs).
- The hourly capacity of the baggage system is 4,000 bags/hour, which is sufficient to cope with the check-in desk throughput. The baggage system does not represent an additional capacity constraint.



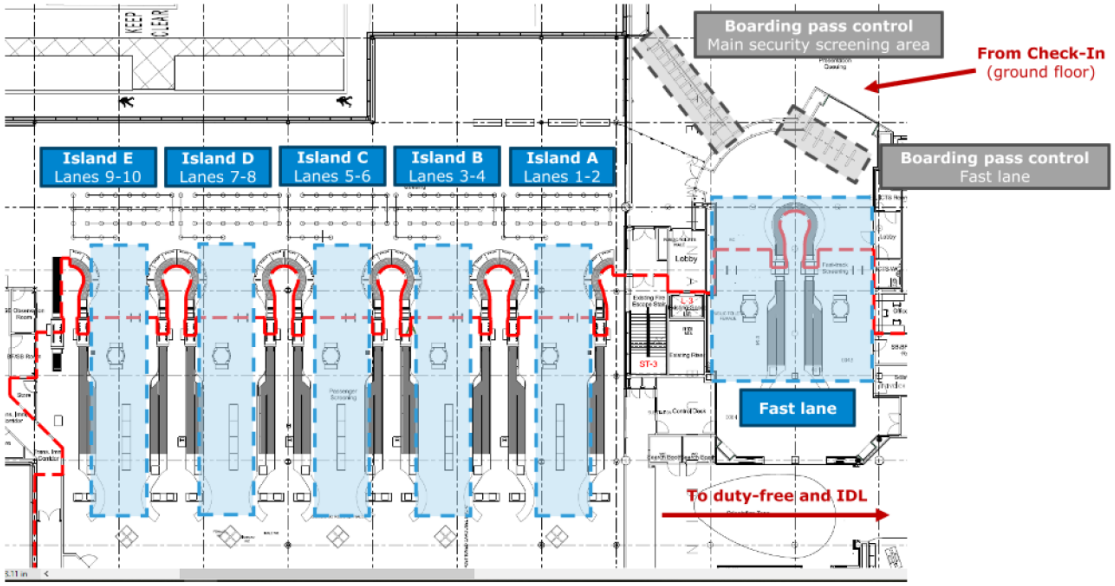
Source: Bristol Airport, May 2022

Terminal capacity

Key Considerations & Findings

Security Capacity Assessment

- Bristol Airport has a single security search area serving both domestic and international passengers.
- The main security area has 10 security lanes with 5 archway metal detectors (AMDs) and 5 body scanners (1 each per 2 lanes). There are also 2 Fast-track security lanes with 1 AMD and 1 body scanner per lane.
- Following recent security process improvements, the processing capacity is 300 passengers/hour per lane.
- The 95th percentile queue time standard for non-Fast-track security is 10 minutes. This compares with IATA ADRM recommended 'Optimal' standard of 5-10 minutes.
- **The assessed security capacity, taking account of queue standards and passenger reporting profiles, is 3,400 passengers per hour.**



Source: Bristol Airport

Terminal capacity

Key Considerations & Findings

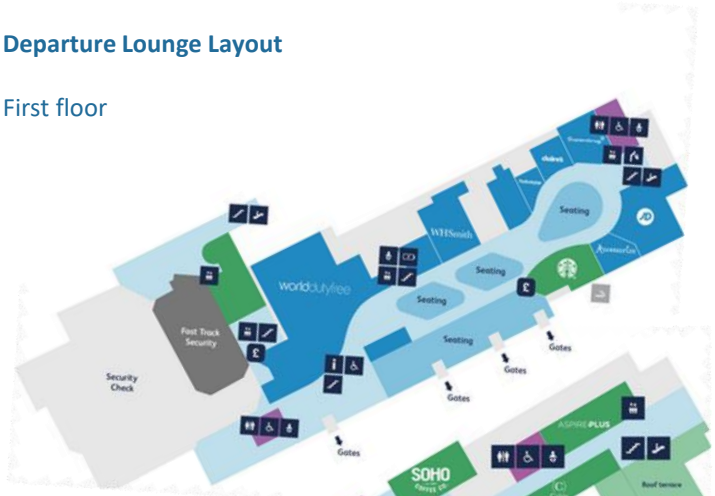
Departures Lounge Capacity Assessment

- Bristol Airport has a common departure lounge serving both domestic and international passengers.
- The total departures lounge area is in the region of 5,400 m^2 of usable passenger space, of which around 1,115 m^2 is seating, 1,150 m^2 catering, 1,560 m^2 shops including Duty Free and the remaining 1,575 m^2 circulation space.
- There are a total of 1,858 seats – 989 in Food & Beverage areas and 869 general seating.
- The average lounge dwell time is 45 minutes.
- IATA ADRM 'Optimal' level of service passenger space standards are:
  - 1.8-2.2 m^2/pax for seating
  - 1.2-1.5 m^2/pax for standing
  - 3.0 m^2/pax for circulation

- **The assessed departure lounge capacity, taking account of space standards and dwell times, is 3,300 passengers per hour.**

Departure Lounge Layout

First floor



Mezzanine floor



Source: Bristol Airport, June 2022

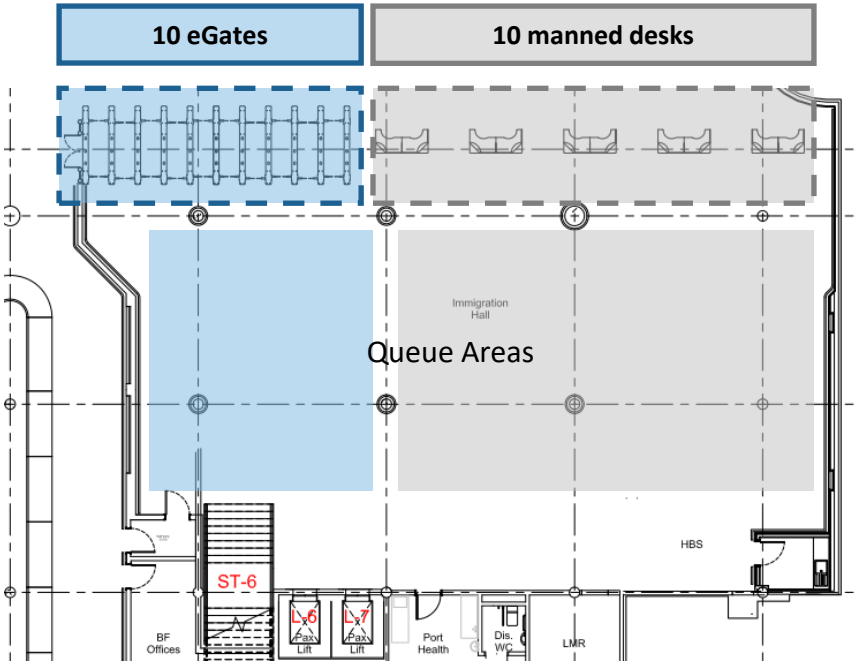
Terminal capacity

Key Considerations & Findings

Immigration Capacity Assessment

- The immigration hall has 10 eGates and 10 conventional manned desks.
- The eGates are used by travellers over 12 years old holding EEA country passports or from 11 other approved countries (Australia, Canada, Iceland, Japan, Liechtenstein, New Zealand, Norway, Singapore, South Korea, Switzerland and the USA)*.
- The manned desks are used by families (with children under 12), passengers with reduced mobility and others not permitted to use eGates.
- Around 85% of international passengers are EU passport holders and 80% of passengers use the eGates.
- Average transaction times are:
  - eGates 20 sec
  - Desk – EU pax 20 sec
  - Desk – Non-EU pax 40 sec
- The Bristol Airport maximum queue time standard is 20 minutes. This compares with the UK Border Force SLA standard of 25 minutes for EEA passengers and an IATA ADRM 'Optimal' level of service recommendation of 5-10 minutes.

- **The assessed immigration capacity, taking account of queue standards, passenger reporting profiles and passenger mix, is 2,350 passengers per hour.**



Source: Bristol Airport

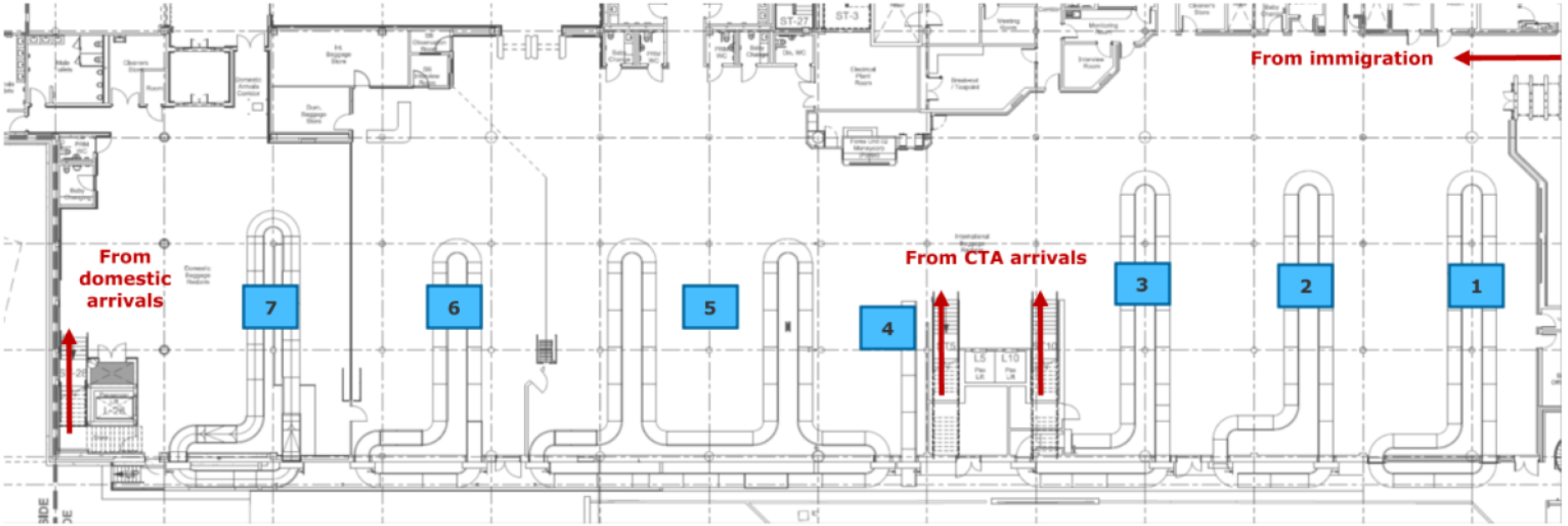
*Guide to faster travel through the UK border - GOV.UK (www.gov.uk)

Terminal capacity

Key Considerations & Findings

Baggage Reclaim Capacity Assessment

- The international baggage reclaim hall has 5 belts with a total length of 225m (plus a short straight-line out-of-gauge baggage belt #4 which is excluded from the capacity analysis). The longest belt (Belt 5) has 60m presentation length and is suitable for wide-body aircraft (e.g., B787s).
- The domestic baggage reclaim hall has a single 35m belt. Belt 6 is a 'swing' belt and may be used for domestic flights, but is normally used for international flights. Currently Belt 7 is only a domestic belt, but the airport plans to modify the area so that it can be used for international flights in peak times. Our capacity assessment is based on typical belt use: 5 international and 1 domestic.
- Average dwell time for passengers waiting for bags is 20 minutes.
- **The assessed baggage reclaim capacity, taking account of average aircraft size, percentage of passengers with bags and passenger dwell times, is 2,600 passengers per hour for International Reclaim and 900 passengers per hour for Domestic Reclaim.**



Source: Bristol Airport

Terminal capacity

Summary and conclusions

Assessed Capacity Summary

- **Departures**
  - The capacities of the departures processes (Check-in, Security and Departures Lounge) are broadly in balance. The overall limiting capacity is assessed at 3,300 passengers per hour.
  - As the departures process is common to domestic and international passengers, with common check-in, security and departure lounge areas, this limiting capacity applies to the total number of departing passengers.

- **Arrivals**
  - On arrivals, passengers from the Common Travel Area (CTA – flights from the Republic of Ireland and Channel Islands) bypass Immigration but use the International Baggage Reclaim facility and Customs channels.
  - The overall limiting capacity for total International arriving passengers (including CTA) is baggage reclaim. Immigration capacity can be a constraint on non-CTA arrivals at peak times.
  - The only constraint on Domestic arrivals is the baggage reclaim capacity, but the capacity of this facility is significantly in excess of current demand.

Summary of Bristol Airport Terminal Capacity Assessment

Departures Process	Capacity (Pax/Hour)
Check-In:	3,300
Central Search	3,400
Departure Lounges	3,300
Limiting Capacity	**3,300**

Arrivals Process	Capacity (Pax/Hour)
Immigration (excl. CTA)	2,350
Baggage Reclaim:	
International (incl. CTA)	2,600
Domestic	900
Limiting Capacity - International	**2,600**
Limiting Capacity - Domestic	**900**

Source: Mott MacDonald analysis

Terminal capacity

Summer Scheduling Limits

Terminal Capacity Utilisation

The charts opposite show the Summer 2022 peak week scheduled utilisation of the terminal capacity on a rolling hour basis. Equivalent charts for the peak week in Winter 2019/20, representing pre-pandemic traffic*, are shown on the following page.

Arrivals Utilisation:

- Domestic arrival capacity, limited by baggage reclaim, is sufficient to meet current demand.
- The International Arrivals capacity of 2,600 passengers per hour (pph), limited by baggage reclaim capacity, is sufficient to accommodate current demand but is likely to reached in peak hours as traffic recovers post-pandemic.

Departures Utilisation:

- The declared capacity for Total Departures capacity, limited almost equally by Check-in, Security and the Departure Lounge, is highly constrained during the morning peak with a peak hour capacity of 3,300 pph and demand for almost 3,400 pph between 06:00-07:59. It is anticipated that this peak hour capacity will continue to be highly utilised and will require careful management through the slot process to avoid excessive congestion or delay.

Winter Utilisation:

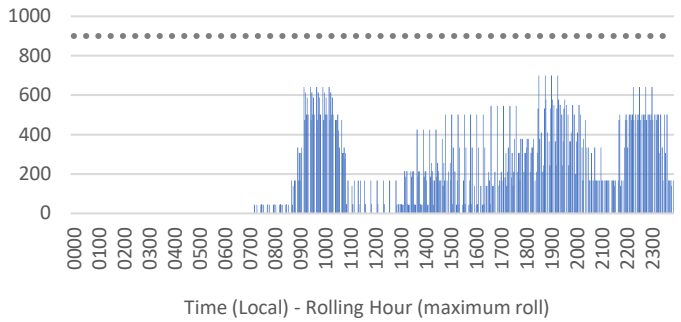
- The Winter 2019 charts on the following page show that capacity utilisation is generally lower in a winter season, with peaks operating within available capacity.

Terminal Capacity Conclusions

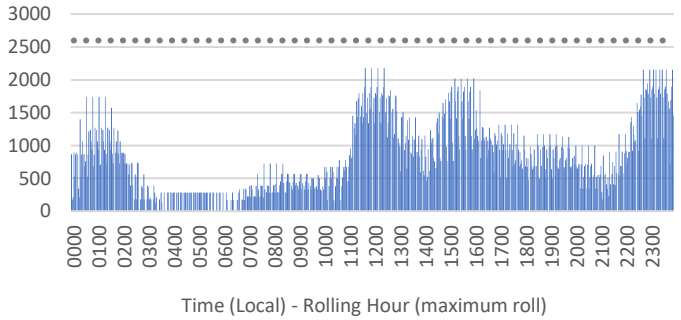
- **Bristol Airport is seeking to optimise and increase capacity where possible to meet demand, but terminal capacity is highly utilised in peak periods, particularly for morning departures and for international arrivals in the midday and evening peaks.**
- **To ensure that growth in demand is managed within capacity, and to avoid undesirable levels of passenger queuing and congestion, effective slot controls are required.**

(*) *Note – the most recent winter (Winter 2021/22) season was still impacted by COVID-19 travel restrictions, so is not representative*

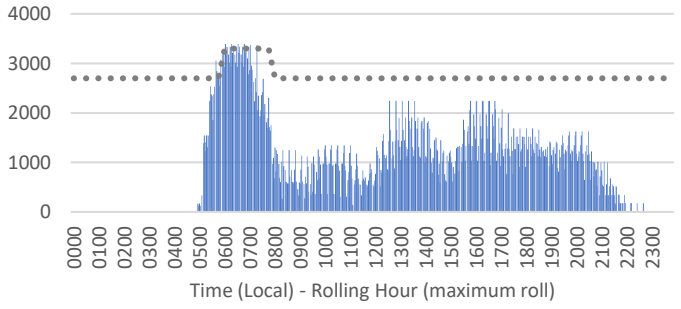
Domestic Arrival Passengers – Summer 2022



International Arrival Passengers – Summer 2022

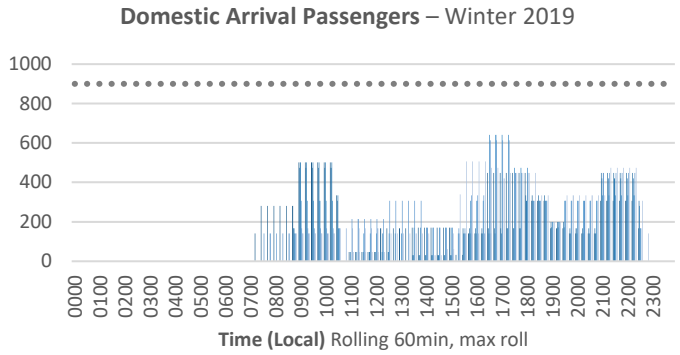


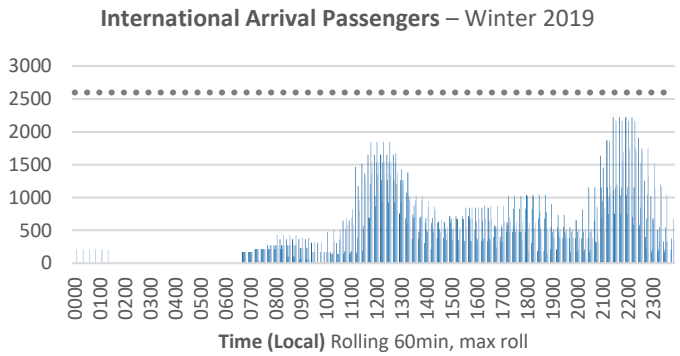
Total Departing Passengers – Summer 2022

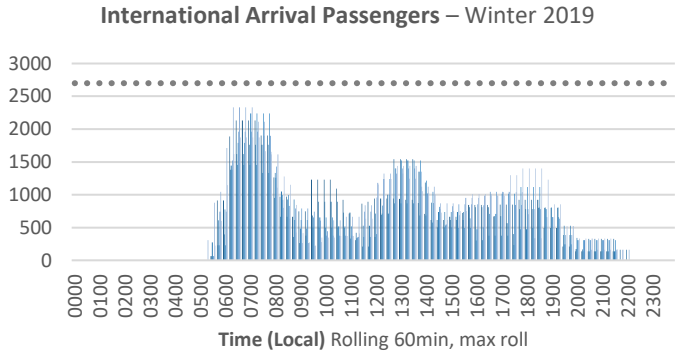


Terminal capacity

Winter Scheduling Limits







6 Other capacity analysis

Review of other capacities

Car parking and surface access

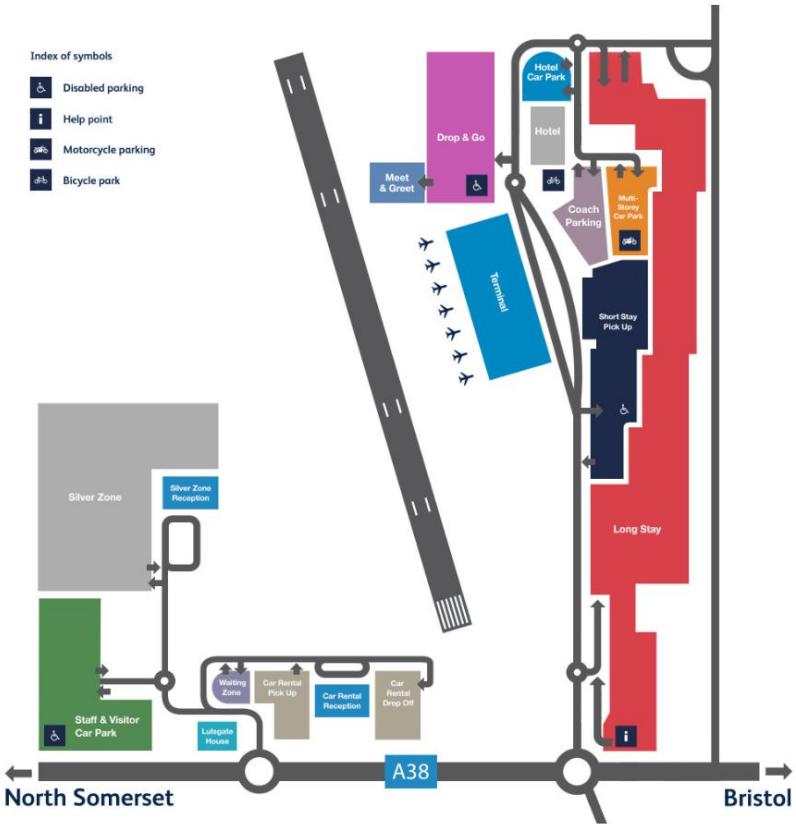
Car Parking

- Short and long stay car parks serve Bristol Airport, and an illustrative map is shown here.
- Short stay and premium / valet car parking is offered at the north of the terminal building. The airport developed a new multi-story car park adjacent to the terminal, which opened in 2018.
- The Silver Zone car park is located on the southside of the airport, offering primarily long stay parking facilities. It also acts as an over-flow car park for valet car parking.
- Car parking is not considered to be a limiting capacity for the purposes of schedule management and the need for slot controls.

Surface Access

- In addition to the express airport bus link services coach connectivity to the surrounding areas, Bristol Airport is pursuing a number of initiatives to promote the use of public transport for both passengers and staff.
- Although surface access to the airport requires improvements to accommodate growth in traffic at the airport, there are significant investments in highways and public transport proposed as part of the airport's plans to grow to 12 mppa.
- Surface access is not considered a limiting capacity for the purposes of schedule management and the need for slot controls.

BRS Airport Car Park Map



Source: Bristol Airport website, May 2022

7 Conclusions

Capacity Shortfalls and Possibilities to Resolve in the Short Term

Having analysed the physical and environmental capacity of Bristol Airport and the current and projected demand for this capacity, the possibilities of overcoming any such shortfalls through new or modified infrastructure, operational changes, or any other change are considered. In accordance with Article 3(5) of the UK 2019 Regulations, we consider whether:

- Capacity problems occur for at least one scheduling period,
- The shortfall is likely to result in significant delays or congestion, and
- There are no possibilities of resolving these problems in the short term

Bristol Airport has planned infrastructure changes to the airfield and terminal linked to the 12 mppa planning application. However, a protracted planning process (application submitted in December 2018, statutory review not scheduled until November 2022) mean that it has not been possible to commence infrastructure development in 2022/23 ahead of the Summer 2023 peak.

It should be noted that Condition 12 of Bristol Airport's 2022 Planning Permission requires the airport to apply for designation as a coordinated airport on a full year-round basis before the 10 mppa annual passenger limit is exceeded. The planning inspectorate considered that this was a necessary tool to manage both the airport's capacity constraints and to ensure compliance with environment limits.

1. **Environmental Limits** – annual passenger and movement limits and night restrictions

These environmental limits are conditions set out in the airport's planning permission, with which the airport is legally obliged to comply. They remain in effect unless changed by a new planning permission decision. A planning application is a multi-year process, so no alleviation from these constraints can be expected in the short or medium term.

The 2022 Planning Permission's annual limit on night movements (rather than seasonal limits) means that night flying now needs to be managed via the slot process for both summer and winter seasons.

In the event that the statutory review of the 2022 Planning Permission is successful, Bristol Airport may be required to limit annual passengers to 10 mppa, a traffic level that may realistically be reached in 2023.

2. Runway Capacity Limits

This study concludes that runway capacity is not currently the primary constraint on demand at Bristol Airport, and there remains scope to increase runway capacity towards its theoretical maximum in line with demand and in a balanced way (considering other taxiway and stand infrastructure constraints).

Runway capacity alone would not justify the need for Bristol Airport to be designated as a 'coordinated airport', however the availability of formal slot controls would give greater assurance that demand can be managed within capacity.

Capacity Shortfalls and Possibilities to Resolve in the Short Term (cont.)

3. Stand Capacity Limits

Overall stand capacity is just sufficient to meet demand as traffic recovers to 2019 levels. Slot controls are required to manage growth in peak stand demand (overnighting aircraft) and any additional Code E aircraft movements to ensure that growth in stand demand is managed within available supply.

The analysis has considered a new stand planned on the site of the Old Terminal, which will be operational by Summer 2023. Bristol Airport did seek greater flexibility of the use of stands on the West Apron during the 12 mppa planning process, but this was refused by the Inspectors. This means that operating restrictions on stands 34-39 which limit their use for live aircraft turnarounds in order to provide noise relief to nearby residential properties. The airport has contingency plans for aircraft parking on the southside (where general aviation flights operate), but this area is not suitable for routine operational use by scheduled airlines.

4. Terminal Capacity Limits

The main terminal capacity constraints are the check-in, security and immigration passenger processes, and departure lounge crowding. Bristol Airport is seeking to optimise and increase capacity where possible to meet demand, but terminal capacity is highly utilised in peak periods, particularly for morning departures and for international arrivals in the midday and evening peaks. To ensure that growth in demand is managed within capacity, and to avoid undesirable levels of passenger queuing and congestion, effective slot controls are required.

The 12mppa approval includes opportunity to improve terminal capacity, but as stated above, this will take some time to design and plan construction, which will not be possible ahead of the Summer 2023 season at the earliest.

5. The Need for Daytime and Year-round designation as a Coordinated airport

Bristol Airport is currently designated as a 'coordinated airport' (Level 3) for summer seasons only between the hours 23:00 to 07:00 local time, and as a 'schedules facilitated' (Level 2) airport at other times. The need to move to year-round (summer and winter) designation as a coordinated airport is driven by (a) the move from seasonal to annual night movement limits, requiring management of winter season night movements as well as in the summer, and (b) the need to manage annual caps on passengers and movements, particularly in the scenario where the statutory review of the 2022 Planning Permission is successful and the lower 10 mppa limit applies.

Furthermore, the analyses of this study show that the airport's terminal and aircraft stand capacities are operating at or very close to capacity during daytime hours, so effective slot controls are required to manage growth within acceptable levels of congestion and delay and to ensure smooth airport operations during all hours of the day.

6. Conclusion

Mott MacDonald's assessment from the above analysis is that the requirements of Article 3(5) are met with regard to limitations in Bristol Airport's environmental, stand and terminal capacity – that there are significant capacity problems likely to result in delays or congestion, and that there are no possibilities to resolve these issues.in the short-term.

Conclusions and Recommendations

Mott MacDonald's assessment and conclusions from this Bristol Airport Capacity Analysis are:

- That the current partial designation of Bristol Airport as a 'coordinated airport' for summer seasons only between the hours 23:00 to 07:00 local time (implemented from Summer 2018) has been effective in managing night flying within available environmental limits, but that full designation as a 'coordinated airport' at all times during both summer and winter seasons is now necessary.
- This conclusion is on the basis that:
    a) The 2022 Planning Permission's annual limit on night movements (set at 4,000 per year, rather than seasonal limits) means that night flying now needs to be managed via the slot process for both summer and winter seasons
    b) In the event that the statutory review of the 2022 Planning Permission is successful, Bristol Airport may be required to limit annual passengers to 10 mppa, a traffic level that may realistically be reached in 2023
    c) The airport's physical terminal and aircraft stand capacities are both operating at or very close to capacity, and slot controls are required to manage growth within acceptable levels of congestion and delay and to ensure smooth airport operations
    d) The airport's runway capacity is not yet a primary constraint, but managing demand through effective slot controls will enable maximum runway throughput to be achieved progressively in line with demand
    e) The voluntary 'schedule facilitation' process currently available outside of the coordinated summer season hours is insufficient to manage demand within Bristol Airport's environmental and physical capacity constraints
    f) There are no possibilities of resolving these problems in the short term through changes to the environmental limits, new or modified infrastructure, operational changes, or any other realistic changes in the use of facilities
- Therefore, it is recommended that the Secretary of State for Transport consider designation of Bristol Airport as a coordinated airport during all hours of both the summer and winter seasons with effect from the Summer 2023 season, following consultation in accordance with Article 3(4) of UK slot regulations.

8 Annex A

New Bristol Airport QC Classification

Bristol Airport QC Classification

QC Classification

- Bristol Airport's 2022 planning permission adopts a new aircraft Quota Count classification system which is broadly aligned with the Department for Transport's system applied at designated airports in London. The Bristol Airport QC ratings have a finer-grained 1 dB banding, instead of the 3 dB banding used under the London scheme

Noise Level Band EPN dB	Bristol Airport	Noise Level Band EPN dB	London Airports
>102	16	>102	16
101-101.9	8	99-101.9	8
100-100.9	6.7		
99-99.9	5.4		
98-98.9	4	96-98.9	4
97-97.9	3.4		
96-96.9	2.8		
95-95.9	2	93-97.9	2
94-94.9	1.7		
93-93.9	1.4		
92-92.9	1	90-92.9	1
91-91.9	0.83		
90-90.9	0.69		
89-89.9	0.5	87-89.9	.5
88-88.9	0.42		
87-87.9	0.34		
86-86.9	0.25	84-86.9	0.25
85-85.9	0.21		
84-84.9	0.17		
83-83.9	0.125	81-83.9	0.125
82-82.9	0.085		
81-81.9	0.045		
80-80.9	0.025		
<80	0.0125		

Source: BRS Appeal Decision, DFT London Night Restrictions

MOTT MACDONALD

Mott MacDonald Global Aviation

Opening opportunities with connected thinking

