MOTT MACDONALD

Bristol Airport Demand and Capacity Assessment

Updated analysis in support of application for designation as a Coordinated airport

January 2023

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Executive Summary

This study is a demand and capacity analysis of Bristol Airport to assess the need for the airport's designation as a **coordinated** airport during all times of day in both summer and winter seasons. It is undertaken in fulfilment of Article 3 of the retained EU slot regulation [1].

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.

In February 2022, Bristol Airport was granted a new planning permission to expand from 10 million passengers per annum (mppa) to 12 mppa[2]. This decision supersedes the airport's previous planning permission of February 2011[3].

However, 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 this review is not yet known and cannot be anticipated at this time.

Therefore, there are two planning condition scenarios that need to be considered in this demand and capacity study:

- The new 2022 conditions which include a higher 12 mppa annual passenger cap and annual night movement limits; or
- Reversion to the 2011 conditions with the lower 10 mppa annual passenger cap and seasonal night movement limits

The application to become a "coordinated airport" does not alter these planning permissions or their conditions, such as controls on night flights and noise. Nor does it alter restraints on annual passenger numbers or aircraft movements.

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 results in a reversion to the airport's 2011 planning conditions 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 permitted growth within acceptable levels of congestion and delay and to ensure smooth airport operations during all hours of the day.

Mott MacDonald's assessment from the above analysis is that the requirements of Article 3(5) of the retained EU slot regulation 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. Therefore, we 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 Winter 2023/24 season, following consultation in accordance with Article 3(4) of the retained EU slot regulation.

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1 *Council regulation No.95/93 on common rules for the allocation of slots at UK airports ("the retained EU slot regulation")*.

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

3 Decision Notice 09/P/1020/OT2: Major development of Bristol Airport to accommodate 10mppa 16 February 2011

1 Introduction

1.1 Introduction

This study is a demand and capacity analysis of Bristol Airport to assess the need for the airport's designation as a **coordinated** airport during all times of day in both summer and winter seasons. It is undertaken in fulfilment of Article 3 of the retained EU slot regulation [4].

This report is an update to our previous demand and capacity assessment of June 2022[5]. The purpose of this update is to take into account new information about actual operations during 2022 as traffic recovered from the COVID-19 pandemic, as well as new information on planned schedules for the Summer 2023 season.

The new information in this study shows that Bristol Airport is recovering from the pandemic more quickly than any other major UK airport and that the issues driving a need for slot coordination are more acute than presented in our earlier study.

The results of the study are summarised here, while the full details of the demand and capacity assessment are provided in the **Technical Annex** to this report.

1.2 What is Slot Coordination?

The 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*

Slot coordination is the accepted mechanism to manage excess airline demand for flights within available airport capacity. The process works as follows:

- Slots are a **planning tool** to allow the regulation of excess airline demand within an airport's physical **infrastructure capacity** (runway, aircraft parking stands, terminal, etc) and **environmental limits** (passenger and movement caps, night restrictions, noise limits, etc)
- In order for an airline or other aircraft operator to use the airport, it must have a **slot allocated** in advance. Slots are only allocated within the airport's capacity limits.
- **Airport capacity** (physical and environmental) is determined each season by the airport managing body based on an objective assessment of the available infrastructure and environmental constraints, and slots are made available for allocation.
- An **independent slot coordinator** allocates slots to airlines and other aircraft operators in an open, fair, transparent and non-discriminatory manner[6].

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[4] *Council regulation No.95/93 on common rules for the allocation of slots at UK airports ("the retained EU slot regulation")*.

[5] *Bristol Airport: Capacity Assessment in support of application for designation as a Coordinated airport*, Mott MacDonald (June 2022)

[6] Bristol Airport's current independent slot coordinator is Airport Coordination Limited (ACL). ACL also acts as coordinator for all other coordinated airports in the UK

- Slots are allocated on a **seasonal basis** (summer and winter) according to an industry-standard calendar of activities. This allows airlines to coordinate matching slot times at both ends of the route.

- Airlines that regularly use their allocated slots (at least 80% of the time) are entitled to retain these slots as **historic slots** for future seasons. Otherwise, the slots are made available for allocation to other airlines. This is known as the "use it or lose it" rule, and it is intended to ensure that slots are used efficiently.

In summary, the purpose of slot coordination is to manage demand for air services within an airport's capacity limits (physical and/or environmental), to prevent congestion or delay and, in the case of environmental limits, to prevent a breach of these limits or conditions. At the same time, slot coordination seeks to optimise the use of limited airport capacity for the benefit of the maximum number of airport users, and to ensure that scarce capacity is used efficiently.

1.3 Bristol Airport's Current Coordination Status

From the Summer 2018 season, Bristol Airport was designated by the Secretary of State for Transport as a Level 3 – Coordinated airport at certain times.

Bristol Airport's current coordination status is as follows:

- **Level 3 –Coordinated** during the hours 23:00 to 07:00 local time in summer seasons

- **Level 2 – Schedules Facilitated**[7] at other times in summer seasons, and at all times in winter seasons

This designation was driven primarily by the need to control night flying during summer seasons, where the number of summer season movements was limited to 3000 night flights by the airport's 2011 planning permission[8]. Figure 1 below shows the actual use of night movements at Bristol Airport, and demonstrates that slot coordination has been effective in controlling night flying within the 3000 movement limit from Summer 2018 onwards.

The Level 2 schedules facilitation process, applicable during daytime hours in summers and at all times in winters, is voluntary by nature. It is not capable of ensuring compliance with binding capacity constraints (physical or environmental). Therefore, as Bristol Airport experiences physical and/or environmental capacity constraints on a year-round basis, full designation as a coordinated airport will be required.

[7] A Schedules Facilitated airport is *"…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"* (Retained EU slot regulation, Article 2i)

[8] Decision Notice 09/P/1020/OT2: Major development of Bristol Airport to accommodate 10mppa 16 February 2011

Figure 1 Bristol Airport Night Movements – Summer Seasons

Source: Bristol Airport data

1.4 Conditions for Airport Coordination

1.4.1 UK Regulations

The regulations governing slot coordination in the UK are set out in the following regulations and guidelines:

- Council Regulation No.95/93 on common rules for the allocation of slots at UK airports ["**the retained EU slot regulation**"]
- The Airports Slot Allocation Regulation 2006 (SI 2006 No 2665) [the **"2006 Regulations"**]
- The Worldwide Airport Slot Guidelines [the **"WASG"**]

The UK 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.

1.4.2 Conditions for Designation

The conditions for designating a "coordinated airport" are set out in Article 3 of the retained EU slot regulation. Article 3(3) requires that a thorough capacity analysis is carried out based on commonly recognised methods. The purpose of 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 retained EU slot regulation.

2 Demand and Capacity Assessment

2.1 The Need for Change in Slot Designation Status

In February 2022, Bristol Airport was granted a new planning permission to expand from 10 million passengers per annum (mppa) to 12 mppa[9]. This decision supersedes the airport's previous planning permission of February 2011[10].

However, 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 this review is not yet known and cannot be anticipated at this time.

Therefore, there are two planning condition scenarios that need to be considered in this demand and capacity study (as summarised in Table 1 below). Scenario 1 represents the new February 2022 planning conditions, while Scenario 2 represents reversion to the 2011 conditions.

Both scenarios drive a need to extend Bristol Airport's Level 3 coordinated airport designation to cover all hours of the day in both summer and winter seasons, but for difference reasons:

- **Scenario 1** lifts the annual passenger cap from 10 to 12 mppa, allowing more growth in demand for the physical airport infrastructure (runways, stands and terminals). This growth drives the need to manage peaks in scheduled demand via the slot process to keep within the airport's physical capacities and to avoid congestion or delays.

  The new 2022 planning permission also moves to an annual night movement regime (measured over two adjoining seasons), rather than separate summer and winter limits. This will require management of night flying on an annual basis during both summer and winter seasons[11].

- **Scenario 2** reverts to the 2011 planning condition, capping Bristol Airport at 10 mppa. This is a level of traffic expected to be reached by 2024 in the airport's Core Case forecast, but potentially during 2023 in the High Case forecast, as discussed in section 2.2 below.

  Managing the annual passenger cap will require Level 3 coordinated airport slot controls on a year-round basis, whereby it is mandatory for an airline or other aircraft operator to have an allocated slot prior to operating at the airport.

Under both Scenarios 1 and 2 there are increasing physical airport infrastructure constraints driving a need for more effective slot coordination, which are discussed in detail in section 2.4 below.

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

10 Decision Notice 09/P/1020/OT2: Major development of Bristol Airport to accommodate 10mppa 16 February 2011

11 Currently, night movements are fully utilised in summer seasons, but the 1000 movement winter limit in not constraining. In future, the 4000 annual night movement limit would be apportioned between summer and winter seasons more closely to demand, requiring active year-round management via the slot process.

See *Technical Annex*, section 1 for details.

Table 1 Summary of Key Planning Conditions

	Scenario 1 February 2022 conditions	**Scenario 2** February 2011 conditions
Annual limits		
Passenger cap	12 mppa (calendar year)	10 mppa (calendar year)
Air Transport Movement Cap(*)	85,990 (calendar year)	Not applicable
Night restrictions		
Night Movements (23:30 – 06:00)	4000 during two adjoining seasons (summer / winter)	3000 in summer 1000 in winter
Noise QC Points (23:30 – 06:00)	1260 QC summer 900 QC winter	1260 QC summer 900 QC winter
Shoulder period flights (23:00-23:30 and 06:00-0700)	9,500 (calendar year)	10,500 (calendar year)
Ban on noisy aircraft at night	QC2 or above	QC8 or above

(*) Includes commercial and non-commercial flights

2.2 Traffic History

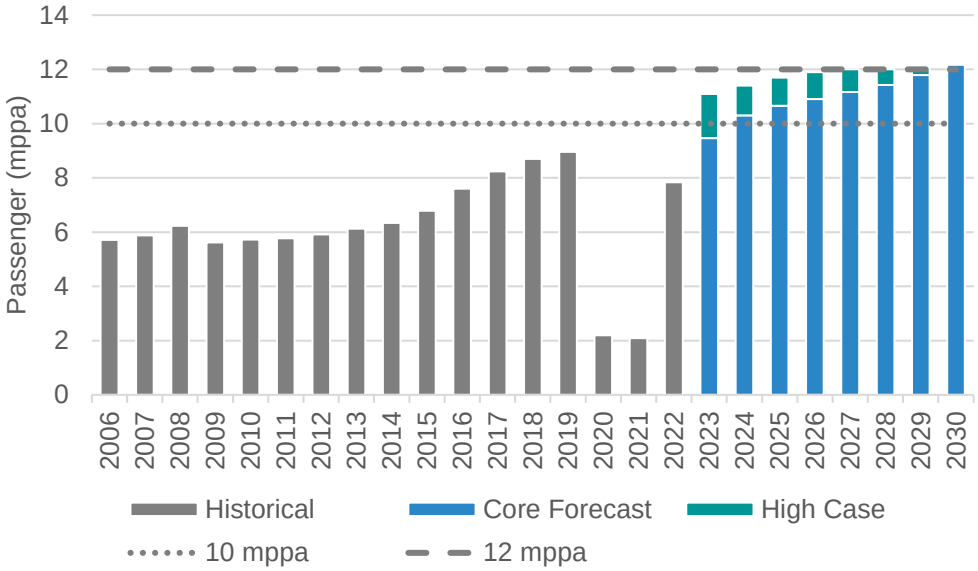
Bristol Airport is the UK's 8th busiest airport. In 2019, before the COVID-19 pandemic, the airport handled 8.96 million passengers per annum (mppa). It had achieved an average growth rate of 4.8% from 2009 to 2019, compared with an average of 3.1% per annum for the UK airports as a whole.

Due to travel restrictions during the pandemic in 2020/2021 traffic was about 76% below 2019 levels, which is close to the average downturn for UK airports. With the removal of COVID-19 restrictions, traffic is recovering strongly in 2022. Full year traffic in 2022 was 7.84 million passengers, or 88% of 2019 levels. Traffic exceeded pre-pandemic levels during Summer 2022 in busy months and at busy times (see Figure 4 below), 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 (see Figure 2 below).

Therefore, to cater for Scenario 2, where the airport's annual planning limit reverts to 10 mppa, Bristol Airport would require designation as a coordinated airport and have slot controls in place during 2023 to ensure that the annual passenger cap condition is not breached.

Figure 2 Bristol Airport Traffic History – Annual Passengers

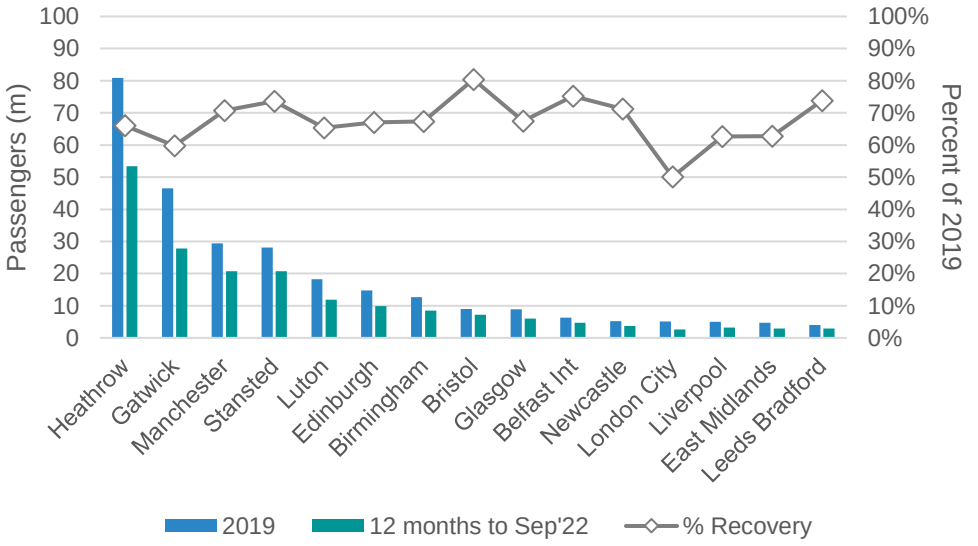


Source: Historic data: CAA Airport Statistics (2006-2021), Bristol Airport (2022); Forecasts: Bristol Airport

2.2.1 COVID-19 Recovery

Bristol Airport is the fastest recovering of the UK's major airports. It reached 80% of its 2019 passenger levels in the 12 months to September 2022, significantly above the UK average of 66% recovery.

Figure 3 Post COVID-19 Recovery Benchmarking

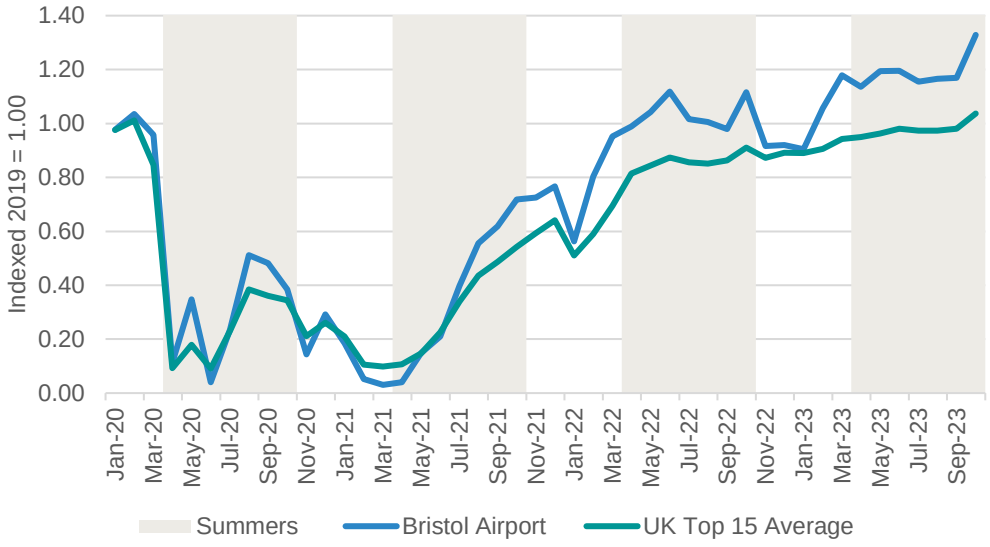


Source: CAA Airport Statistics; UK Top 15 airports based on 2019 passenger throughput

Figure 4 below shows traffic recovery on a monthly basis, indexed against 2019 levels. Bristol Airport's scheduled seat capacity slightly exceeded 2019 levels during Summer 2022, and airline published schedules for Summer 2023 are indicating +19% growth on the equivalent months in

2019. Bristol's recovery is well ahead of the average for the UK's Top 15 airports, where planned Summer 2023 seat capacity is still only 98% of 2019 levels.

Figure 4 Monthly Scheduled Seat Capacity



Source: SRS Schedules (accessed 18 Dec 2022); Indexed values where equivalent 2019 month = 1.0

2.3 Airline Mix

There have been some significant changes in the airline mix since 2019. EasyJet remains the largest airline at Bristol Airport, with a 55% share of the airport's seat capacity, and Ryanair is the airports second largest operator with a 19% share.

Thomas Cook was Bristol's 4th largest carrier before it went bankrupt in September 2019, but Jet2 has since commenced operations at the airport. Jet2 is now Bristol's 3rd largest carrier, and its Summer 2023 programme is more than twice as large as Thomas Cook's 2019 schedule. Jet2's rapid growth is a major contributor to the airport's strong recovery post COVID-19, as well as adding to peak time demand for the airport's capacity.

TUI is Bristol's only major charter operator since the bankruptcy of Thomas Cook. TUI operates a mix of European destinations with narrowbody aircraft as well as longhaul flights with a Boeing B787. Bristol only has one widebody aircraft stand capable of handling the B787, so managing demand for widebody aircraft is critical.

Overall, 85% of the airport's seat capacity is provided by low cost carriers (LCCs), 9% on charter flights, and 6% on other scheduled services.

The LCC and charter flights are primarily operated by aircraft based at Bristol Airport. These aircraft overnight at the airport and depart during a pronounced departure peak in the 06:00 and 07:00 hours, before operating typically three return trips. The aircraft return to Bristol at the end of the day in an arrivals peak around 23:00.

Table 2 Airline Seat Capacity Share and Growth – Summer 2023 vs Summer 2019

	2019 Seats (000s)	2023 Seats (000s)	2019 Share	2023 Share	2023 v 2019 Growth
EasyJet	1,926	2,252	56%	55%	17%
Ryanair	737	770	22%	19%	4%
Jet2	0	464	-	11%	n/a
TUI	326	355	10%	9%	9%
Thomas Cook	218	0	6%	-	-100%
KLM	88	86	2.6%	2.1%	-3%
Aer Lingus	63	42	1.8%	1.0%	-32%
Lufthansa	0	30	-	0.7%	n/a
Wizzair	18	11	0.5%	0.3%	-39%
Aurigny	15	10	0.4%	0.3%	-29%
Loganair	9	9	0.3%	0.2%	-5%
Others	25	47	0.7%	1.1%	91%
Total	3,425	4,077	100%	100%	19%

Source: SRS Schedules (accessed 18 Dec 2022); BRS departing seats during the months April - October

2.4 Demand and Capacity

2.4.1 Environmental Limits

2.4.1.1 Annual Passenger and ATM Cap

The mechanism available to administer a cap on the number of passengers or air transport movements (ATMs) operating at an airport is through the slot process. At a "coordinated airport" it is mandatory for an airline or other aircraft operator to have an allocated slot prior to operating at the airport. The coordination process ensures that slots are allocated in a fair, transparent and non-discriminatory way.

Therefore, Bristol Airport will require year-round designation as a coordinated airport in order to manage its annual cap on passengers.

In Scenario 1, (where the 2022 planning permission increases the cap to 12 mppa) this level of traffic is not expected to be reached until 2029/30 in the baseline forecast, but it could be reached as early as 2026 in the high case forecast.

However, under Scenario 2 (where the annual passenger cap reverts the 10 mppa limit of the airport's 2011 planning permission) the passenger cap could be reached during 2023 with continued robust post-pandemic traffic recovery trends. As a consequence, designation as a coordinated airport is required in 2023 to manage the scenario whereby the statutory planning review re-introduces the 10 mppa cap.

2.4.1.2 Night Restrictions

Night Movement Use:

Night noise is a sensitive issue for local residents, and Bristol Airport's night flying is restricted under both its 2011 and 2022 planning permissions.

Figure 5 illustrates how 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 from 2017 to 2019. Winter night flying only averaged 304 movements per winter in these years.

Bristol Airport has 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.

Under Scenario 1 with the revised February 2022 planning permission, seasonal limits are replaced by a new annual limit of 4,000 night movements. This 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 annual night movements.

Therefore, as traffic recovers post-pandemic, there is a need to begin managing winter season night flying from the Winter 2023/24 season. This will require designation of Bristol Airport as a coordinated airport in winter as well as summer seasons.

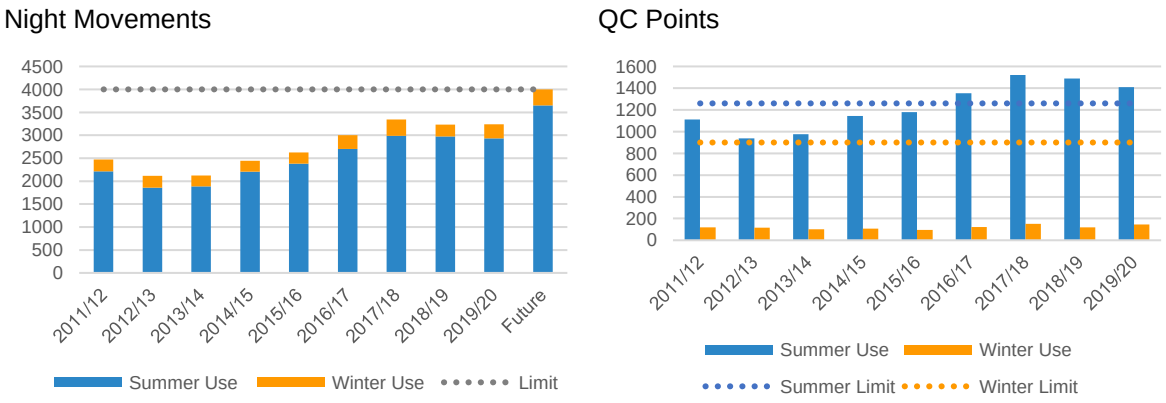
Quota Count Use:

The slot process is used to manage both night movements and QC use. A "slot" is defined as a permission *"…to use the full range of airport infrastructure necessary to operate an air service at a coordinated airport"*[12]. This means that when an airline is allocated night slots, it is also allocated a number of QC points based on the aircraft type it intends to operate.

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 2022 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. The allocation of QC points through the slot process will be necessary to manage and enforce the level of QC use at the airport.

Figure 5 Night Movements and QC Point Use



Source: Mott MacDonald analysis of Bristol Airport data

[12] Retained EU slot regulation, Article 2a

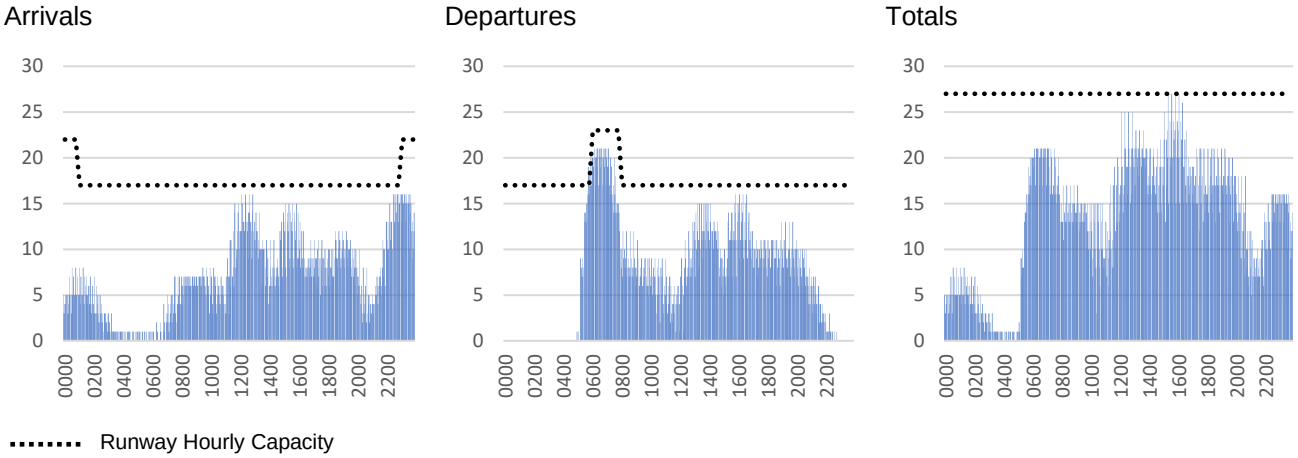
2.4.2 Runway

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.

In summer seasons[13] the normal, sustained capacity of the runway is 27 movements per hour, with up to 17 departures or 17 arrivals within this total limit. To accommodate short-term peaks in demand, up to 23 departures are permitted in the morning (06:00 to 07:59 local time), and 21 arrivals in the midnight period (23:00 to 00:59 local time).

The histograms of Figure 6 below show the typical week utilisation of runway capacity, considering regularly scheduled services. The runway is very heavily used in the morning peak and some taxiway congestion and delay can be experienced at this time. Total runway capacity is fully utilised during the afternoon peak around 15:00 local time.

Figure 6 Runway Utilisation



Source: ACL data (accessed 09/12/2022); Summer 2023 typical week; maximum roll; local times

In addition to regularly scheduled services, Bristol Airport also handles significant volumes of non-scheduled flights such as air taxi flights and general/business aviation activity. These flights are not managed by the airport's current Level 2 schedule facilitation process during daytime hours.

In 2019, non-scheduled movements (excluding airline positioning and training flights) represented 9% of total movements at Bristol. During the COVID-19 pandemic, non-scheduled activity grew by +31% in 2021 over 2019 levels and constituted 25% of BRS movements in 2021[14]. In 2022 (January to October), non-scheduled flights continue to operate at high levels, but their share has dropped to 14% of total airport movements as the airline traffic recovers.

On a busy day, around 51 non-scheduled flights will operate at the airport (excluding helicopters). They mainly operate between the hours 0800-18:59 local time.

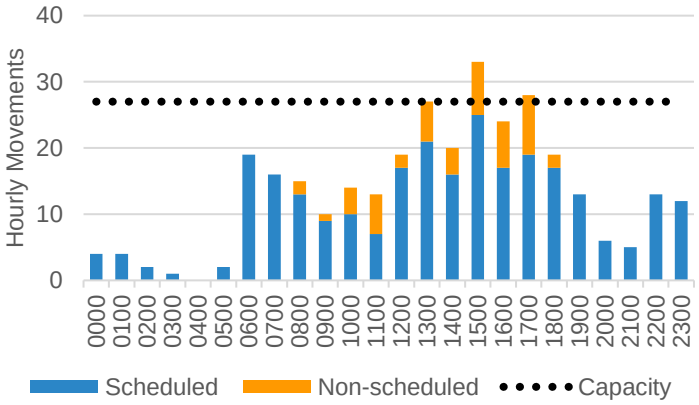
The chart below shows the hourly distribution of non-scheduled flights for a typical busy day overlayed on the regularly scheduled traffic. This shows that Bristol's runway capacity can be significantly exceeded due to this ad hoc demand, leading to potential congestion and delays. Designation of airport as Level 3 coordinated during daytime hours would give assurance that

[13] Winter season runway capacity is 17 arrivals, 17 departures, 25 total movements in all hours

[14] CAA Airport Statistics data

demand can be managed within capacity, and would allow non-scheduled flights to be allocated slots within the airport's capacity.

Figure 7 Busy Day Scheduled and Non-Scheduled Movements



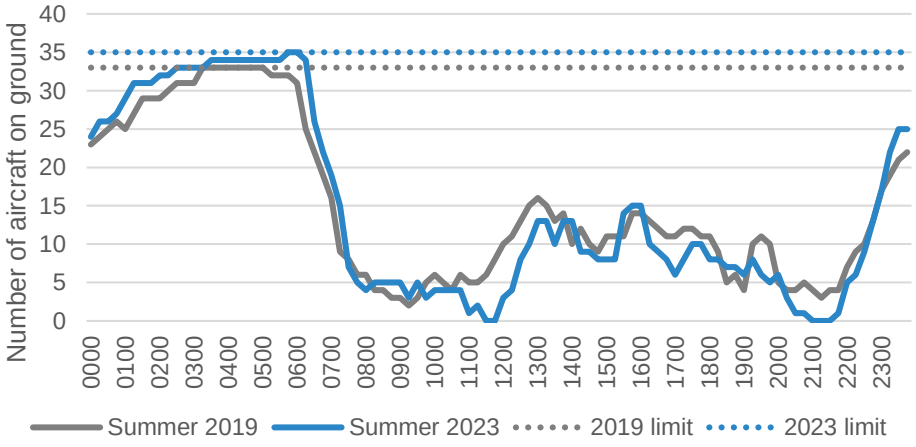
Source: Bristol Airport data, Summer 2022 busy day

2.4.3 Aircraft Stands

Bristol Airport has a total of 35 aircraft stands for Summer 2023, made up of 34 Code C stands capable of parking narrowbody aircraft like the A320 and B737, and one Code E widebody stand capable of parking the B787 aircraft. This 2023 stand supply is an increase of 2 Code C stands since 2019 as the airport reconfigured a smaller Code B stand to be capable of handling a Code C aircraft and built a new stand on the site of the Old Terminal area.

Figure 8 shows how aircraft stand demand has grown since 2019. Stands are fully utilised during the overnight and morning peak with no contingency for off-schedule operations or stand outages.

Figure 8 Aircraft Stand Demand – Summer 2023 vs Summer 2019



Source: ACL data (accessed 09/12/2022)

2.4.4 Terminals

Bristol Airport's terminal capacities are assessed using a capacity model based on the IATA Airport Design Reference Manual (ADRM v11) 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. Full details of the capacity assessment are provided in the Technical Annex, section 4, and are summarised in the table below

Table 3 Bristol Airport Terminal Capacities

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 – Int (excl. CTA)	2,350
Limiting Capacity – Int total	2,600
Limiting Capacity - Domestic	900

Source: Mott MacDonald analysis

Figure 9 below illustrates the pattern of demand at Bristol Airport and how it has changed since 2019. The morning departures peak has become more pronounced, and has grown by about 350 passengers per hour (pph) since 2019, to a peak of 3,365 pph against a peak-hour capacity of 3,300 pph.

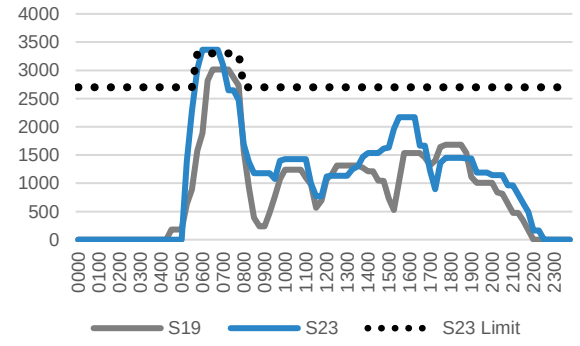
On arrivals, the midday peak in Summer 2023 is at similar levels to 2019, but a new late-evening arrivals peak has developed which is over 900 pph higher than in 2019). Both the midday and evening peaks slightly exceed the 2,350 pph International Arrivals capacity (limited by Immigration capacity).

These morning and late-evening peaks in demand are also critical for the airport's night restrictions during the night period (23:30 to 06:00) and the shoulder period (23:00-23:30 and 06:00-07:00).

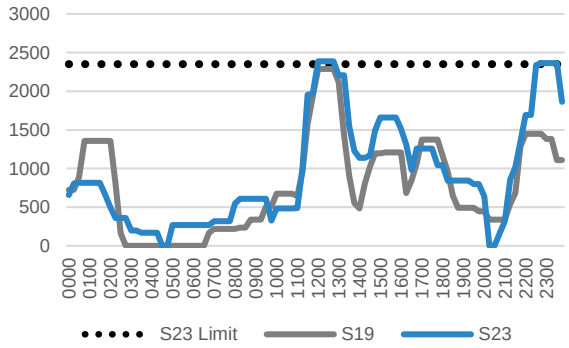
Flights that operate during the night period tend to be late evening arrivals shortly after 23:30. As the number of flights scheduled just before 23:30 grows, it is critical to manage the number of late-evening flights via the slot process, since they risk running late into the night period if there are operational delays.

Figure 9 Terminal Utilisation – Summer 2023 vs Summer 2019

Departures



International Arrivals



Source: ACL data (accessed 09/12/2022)

2.4.5 Congestion and Delay

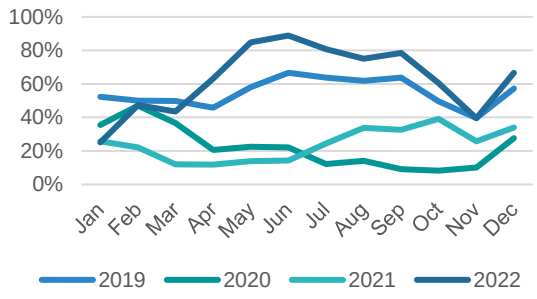
Section 2.2 above discussed Bristol Airport's traffic history and how the airport has recovered more quickly than other major UK airports post-pandemic. This rapid recovery resulted in issues of congestion and delay during the Summer 2022 season.

During the core period of Summer 2022 (May to September), 83% of flights were delayed compared with 63% in Summer 2019 and just 20% during the COVID-19 downturn of 2020/2021 (see Figure 10 below). The airport also experienced queuing and congestion at peak times in areas such as check-in, security and immigration.

Some of these operational issues in 2022 were due to staff shortages, as the airport, airlines and other service providers ramped up staffing levels in line with the recovery in passenger demand. Improved operational performance is expected for Summer 2023, but these data and observations of congestion and delay is indicative of conditions when the airport is operating at or above capacity and helps to illustrate the need for effective schedule controls to smooth peaks in demand.

Figure 10 Bristol Airport – Flight Delays and Congestion

Percentage Delayed Flights



Example Security Congestion (Summer 2022)

Source: Bristol Airport data

2.5 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 retained EU slot regulation, 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 means 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.

Considering scope to resolve capacity limitations in the short term:

1. **Environmental Limits**

   The annual passenger and movement limits and night restrictions 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 needs to be managed via the slot process for both summer and winter seasons with effect from the Winter 2023/24 season.

   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 highly utilised in peak hours, and that non-scheduled flights can result in breaches of capacity and congestion and delay if such ad hoc flights are not managed as part of an overall slot allocation process.

   While there is scope to increase runway capacity towards its theoretical maximum in a balanced way, this requires improvements to taxiway and stand infrastructure. Such improvements cannot be expected within the short term time horizon that could avoid the need for designation as a coordinated airport in 2023.

3. **Stand Capacity Limits**

   Overall stand capacity is just sufficient to meet demand, without any spare stands to cater for off-schedule operations or stand outages. Slot controls are required to manage growth in peak stand demand (overnighting aircraft and in the morning period) 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 there are 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 the opportunity to improve terminal capacity, but as stated above, this will take some time to design and plan construction, which will not be possible in the short term. Significant expansion of the existing Bristol Airport terminal capacity is not expected to be complete before around 2026.

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) of the retained EU slot regulation 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.

3 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 at risk of breaches leading to congestion and delay if non-scheduled traffic is not managed via slot controls

  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 Winter 2023/24 season, following consultation in accordance with Article 3(4) of the retained EU slot regulation.

Technical Annex

MOTT MACDONALD

Bristol Airport

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

Technical Annex

January 2023

Bristol Airport
Amazing journeys start here

100108715 Version 2.0

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1.0	23/12/2022	JC & KJ	NR	JC	Technical Annex (draft)
1.1	23/01/2023	JC & KJ	NR	JC	Technical Annex (final)

Technical Annex

This Technical Annex to the report ***Bristol Airport Demand and Capacity Assessment: Updated analysis in support of application for designation as a Coordinated airport*** (January 2023), prepared by Mott MacDonald.

This Technical Annex provides details of the capacity assessment and demand evaluation of the airport's physical infrastructure and environmental constraints. It is undertaken using commonly recognised methods in fulfilment of Article 3 of the retained EU slot regulation.

Table of Contents

1 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.

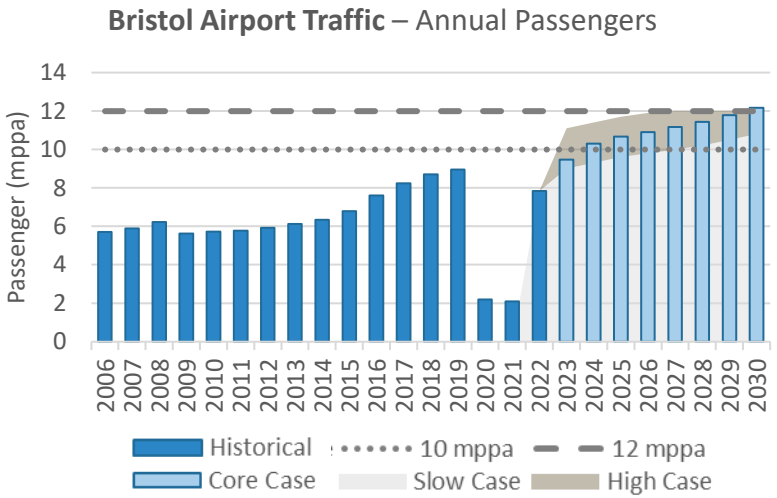
Annual Movement Limit

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 in 2023 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.

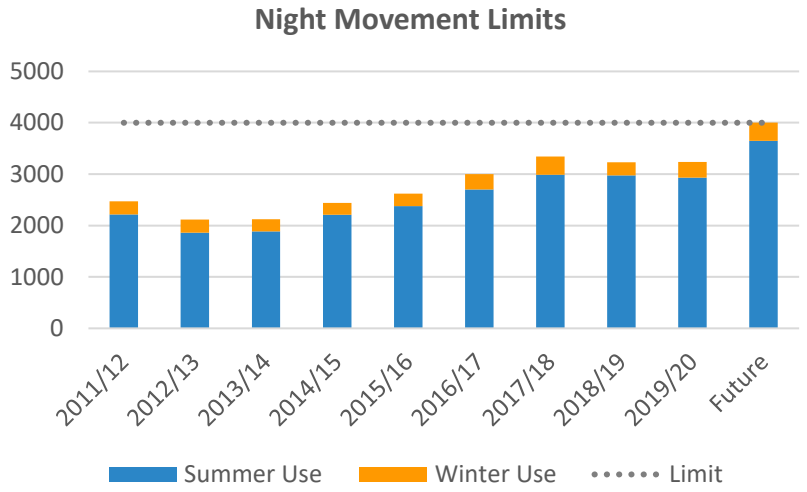
The airport's revised planning permission phases out the seasonal carry-over flexibility over a 5-year period. Therefore, the airport will need to encourage use of quieter aircraft at night to make full use of available night movements, within the permitted number of night noise QC points. The effect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

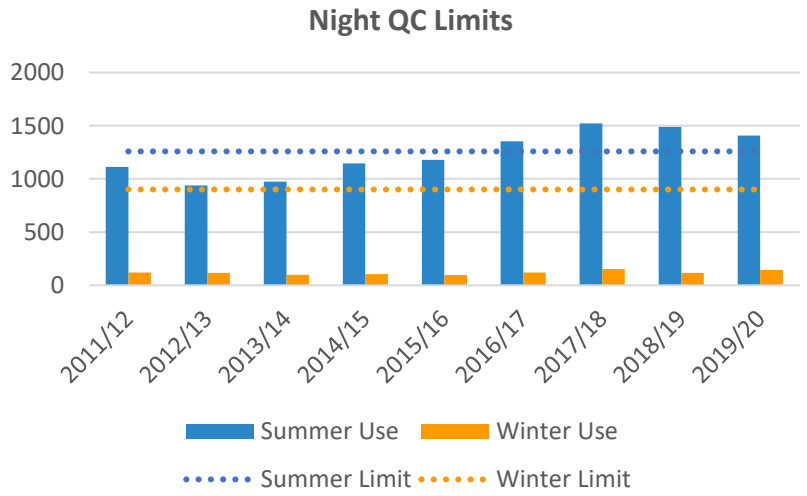
Shoulder Period Movements

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 Winter 2023/24 season.**





Source: Mott MacDonald analysis of Bristol Airport data

2 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.

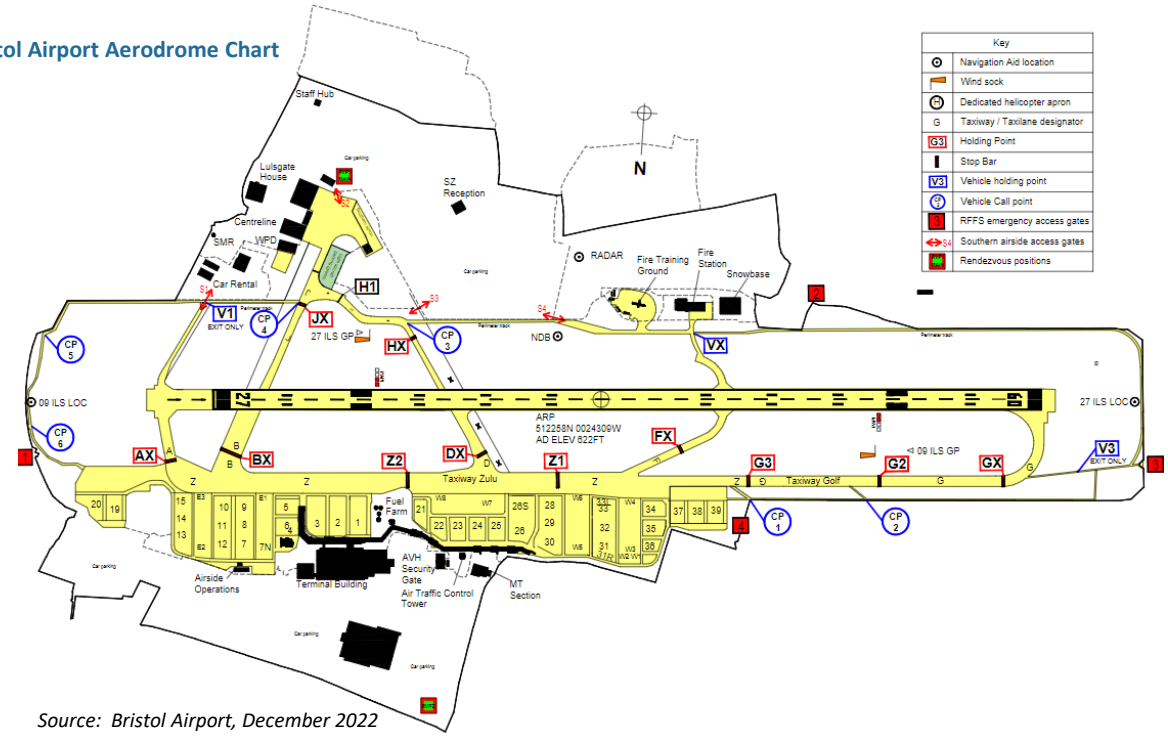
The majority of the airport's operations are short-haul services to points in the UK, Ireland and Europe. The runway length limits long-haul operations without payload restrictions. New aircraft technology, in the form of the Boeing 787, has permitted transatlantic operations (with some payload restrictions)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

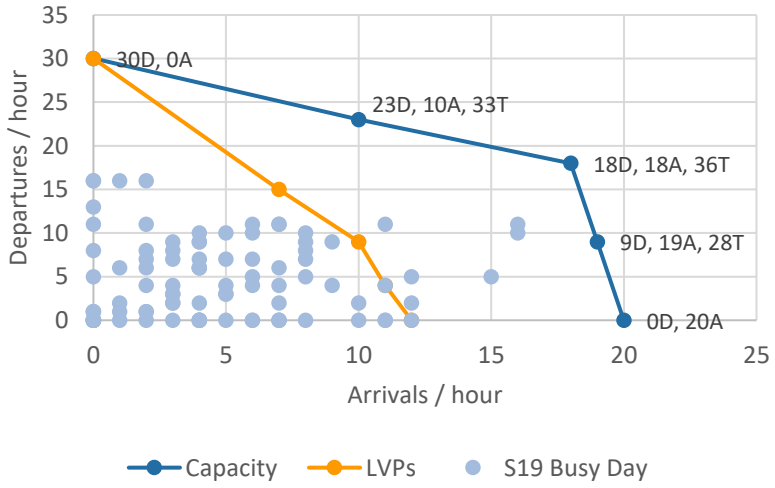
Arrival runway occupancy times (from threshold crossing to clear of runway) are relatively high – jet aircraft (74% of traffic) exit at Taxiway GX with an average occupancy time of 73 sec. This compares with 50-60 secs for other UK airports. Turboprops (11% of traffic) can exit at Taxiway FX with an 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 2023. This is an increase from 25 movements per hour since 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 2023	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 2023	22	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 2023	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	11

Runway Capacity

Runway Hourly Capacity Utilisation

The charts opposite show the Summer 2023 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.

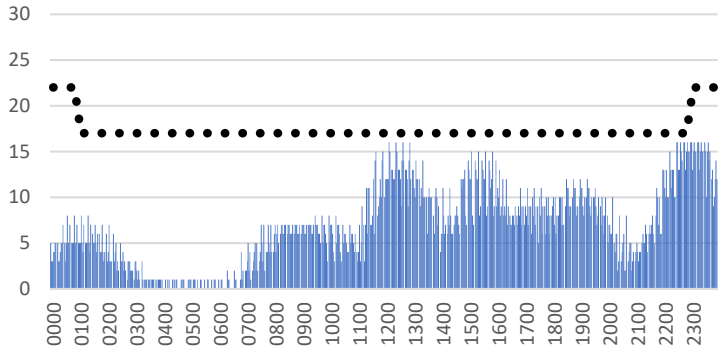
Total (2-way) Utilisation:

- The total (2-way) peak occurs in the 15:00 hour reaching capacity of 27 movements-per-hour capacity.

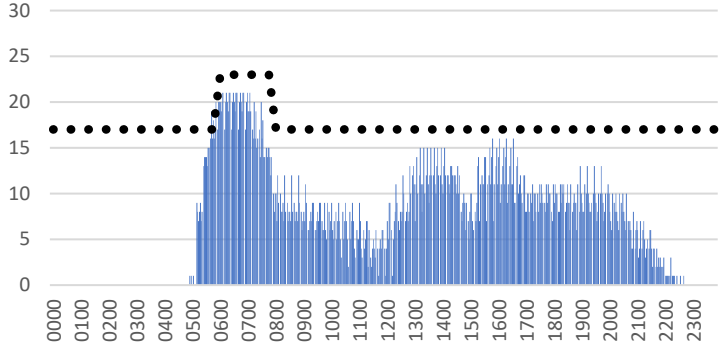
Guide to Histograms

- 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.

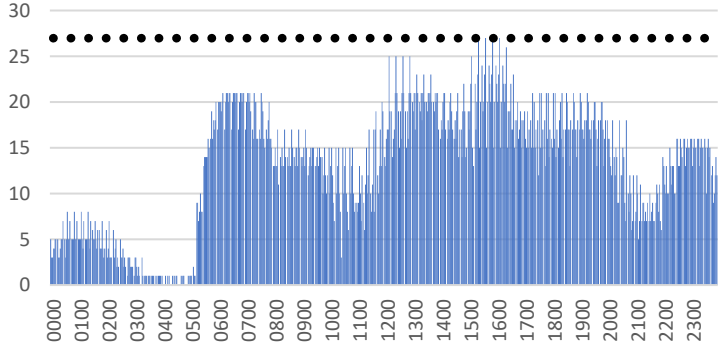
Runway Arrivals – 60 min (local time) – Summer 2023



Runway Departures – 60 min (local time) – Summer 2023



Runway Totals – 60 min (local time) – Summer 2023



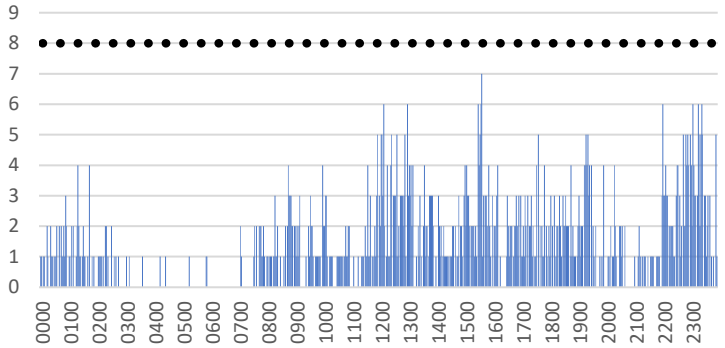
Source: ACL data (accessed 09/12/2022)

Runway Capacity

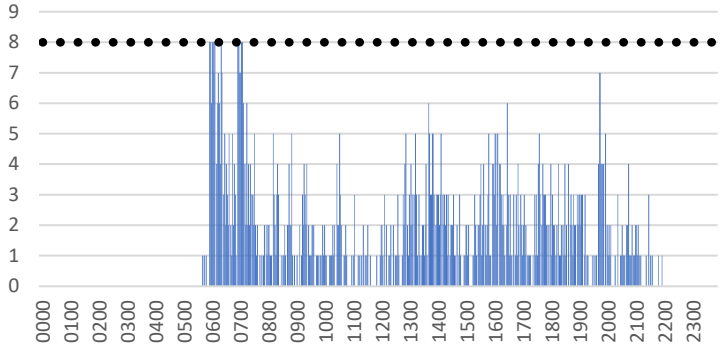
Runway 15-minute Utilisation

- The charts opposite show the Summer 2023 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.

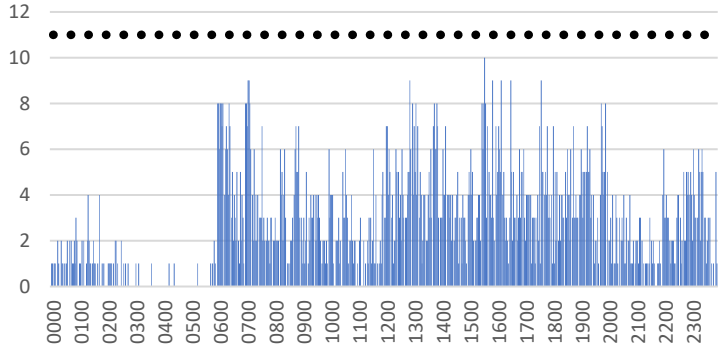
Runway Arrivals – 15 min (local time) – Summer 2023



Runway Departures – 15 min (local time) – Summer 2023



Runway Totals – 15 min (local time) – Summer 2023



Source: ACL data (accessed 09/12/2022)

Runway Capacity

Inclusion of Non-Scheduled Movements

Although BRS runway capacity is currently generally sufficient to meet demand for regularly scheduled flights, the airport also handles significant volumes of non-scheduled flights such as air taxi flights and general/business aviation activity.

In 2019, non-scheduled movements (excluding airline positioning and training flights) represented 9% of total movements at BRS. During the COVID-19 pandemic, non-scheduled activity grew – up 31% in 2021 over 2019 levels – and constituted 25% of BRS movements in 2021.(1)

In 2022 (January to October), non-scheduled flights continue to operate at high levels, but their share has dropped to 14% of total airport movements as the airline traffic recovers.

On a busy day, around 51 non-scheduled flights will operate at the airport (excluding helicopters). They mainly operate between the hours 0800-18:59 local time.

The chart opposite shows the hourly distribution of non-scheduled flights for a busy day overlayed on the regularly scheduled traffic. This shows that BRS's runway capacity can be significantly exceeded due to this ad hoc demand, and leading to potential congestion and delays.

Runway Capacity Conclusions:

- **Runway capacity is heavily utilised in busy hours on a consistent basis. While there is scope to increase runway capacity towards its theoretical maximum in a balanced way, this requires improvements to taxiway and stand infrastructure.**
- **The availability of formal slot controls would give assurance that demand can be managed within capacity, and would allows non-scheduled flights to be allocated slots within the airport's capacity. This can ensure efficient airport operations and permit phased increases in runway capacity towards the theoretical maximum.**

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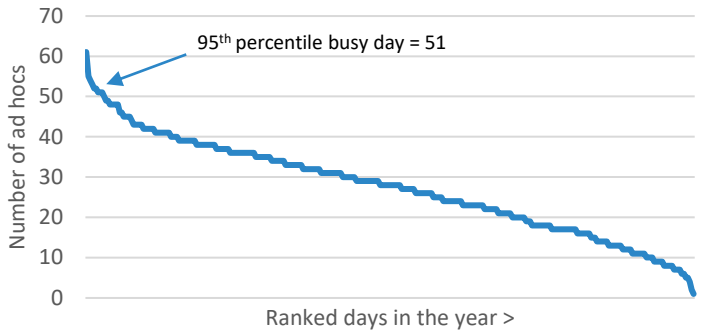
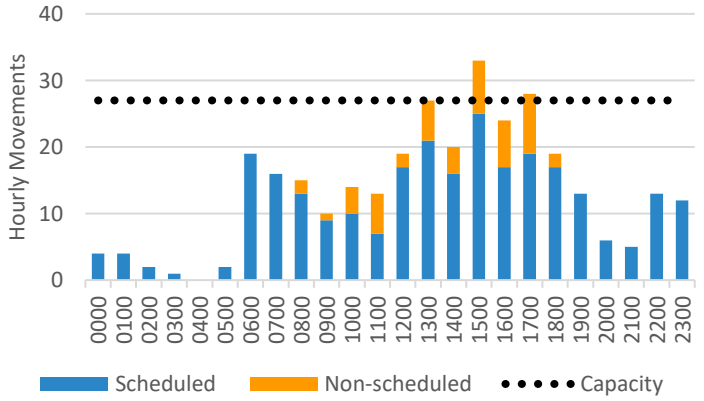
Busy Day Non-Scheduled Movements – 2022 data



Source Bristol Airport data

Busy Day Scheduled and Non-Scheduled Movements – 2022 data



(1) CAA Airport Statistics data

3 Stand capacity analysis

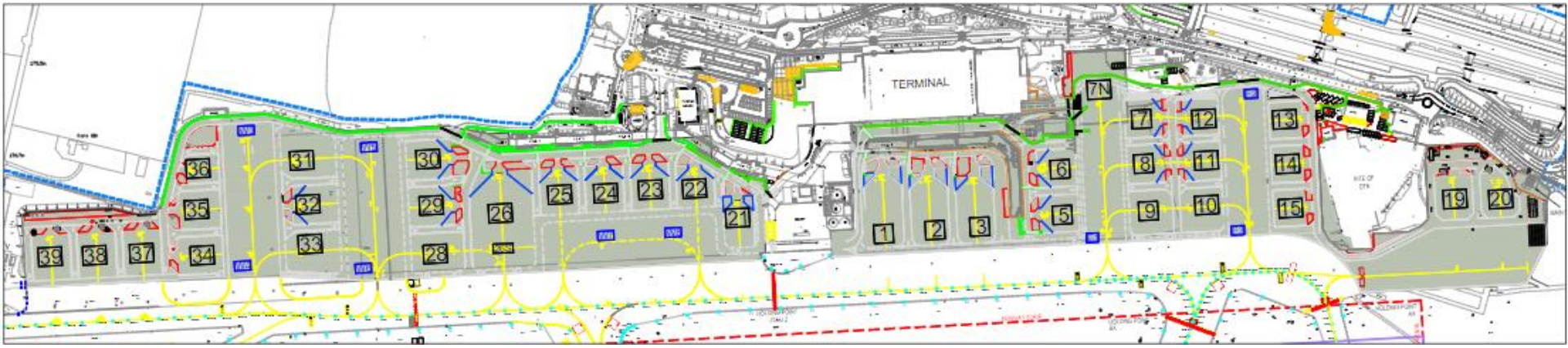
Apron analysis

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 35 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. 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
C (e.g. A320/B737)	12	22	34
E (e.g. B787)	1	0	1
Total:	**13**	**22**	**35**

Source: Bristol Airport, November 2022

Stand demand analysis

Summer 2023 busy day analysis

Stand demand

The chart presented here shows the stand demand on a typical busy day in Summer 2023.

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

Bristol Airport's pattern of demand consists mainly of BRS-based aircraft operating short-haul services. The overall peak stand demand of 35 aircraft for this sample busy day occurs in the early morning period during the overlap between overnighting aircraft and the first arrivals of the day. period. The airport is 'at capacity' for the available 35 stands.

This peak stand demand is an increase from 33 aircraft in Summer 2019. BRS has added 1 new stand since 2019 and reconfigured a Code B stand to accommodate Code C aircraft.

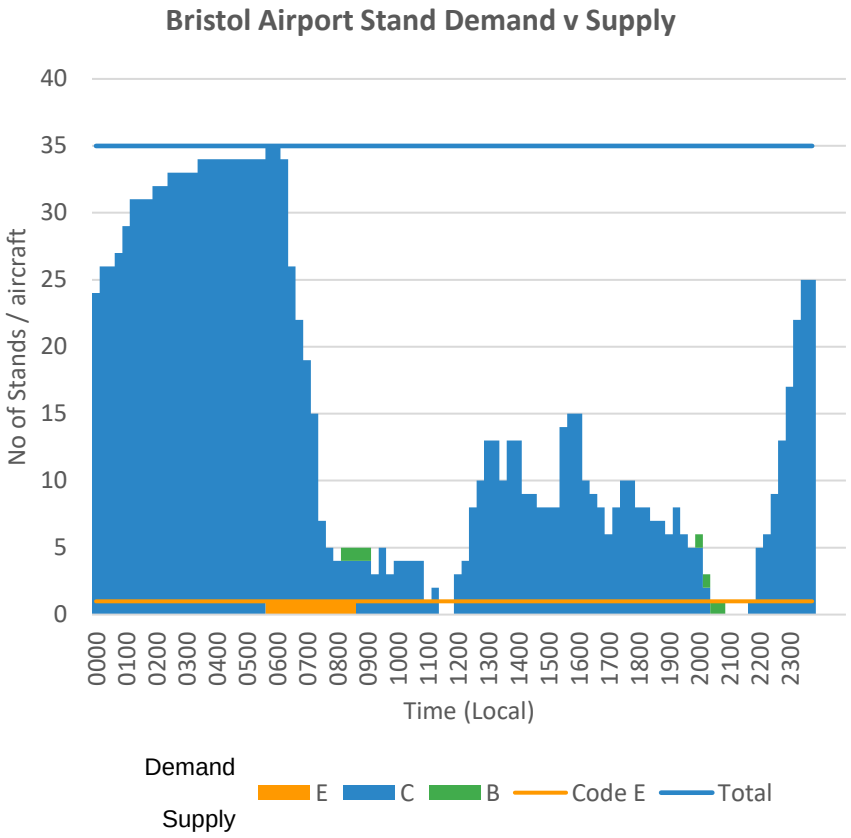
Bristol Airport has only one Code E widebody stand, which is just sufficient to meet current demand for the Boeing 787 operations of TUI.

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 the airports stands are operating at full capacity with no in-built contingency for off-schedule operations or stand outages**
- **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; Summer 2023 busy day, ACL data (accessed 09/12/2022)

4 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

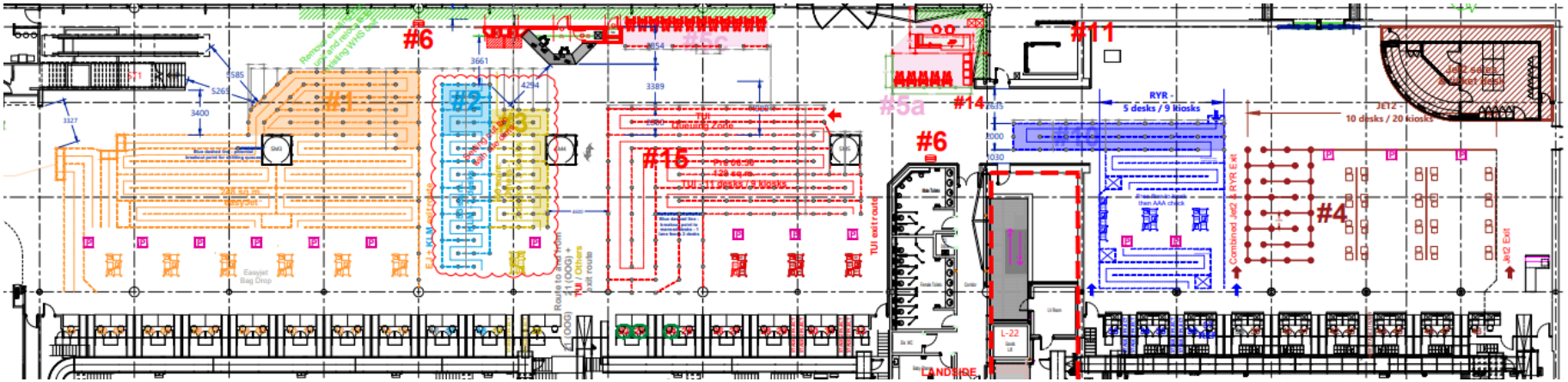
Key Considerations & Findings

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.



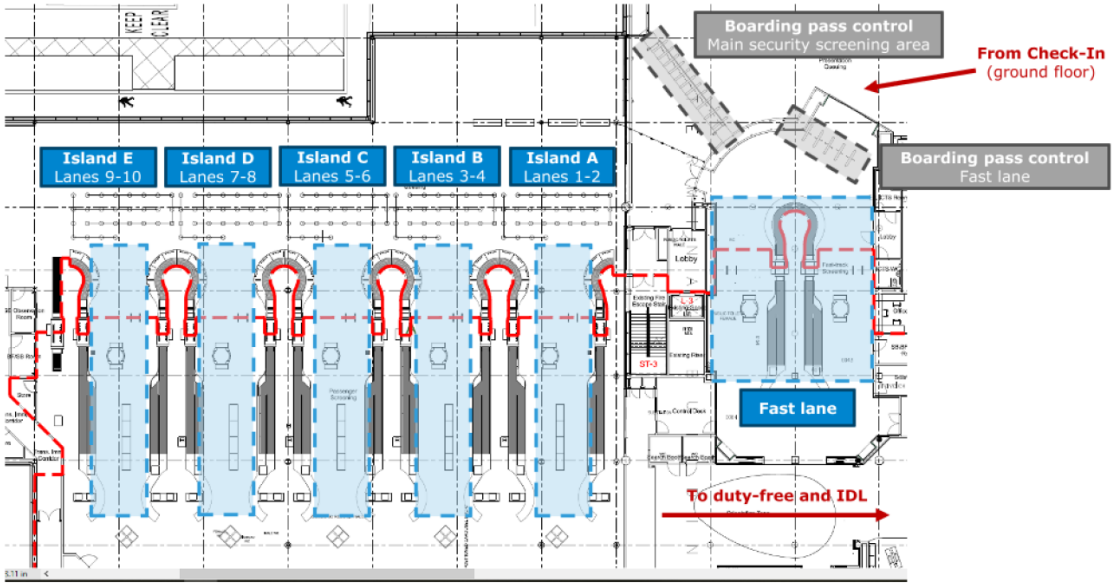
Source: Bristol Airport, November 2022

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

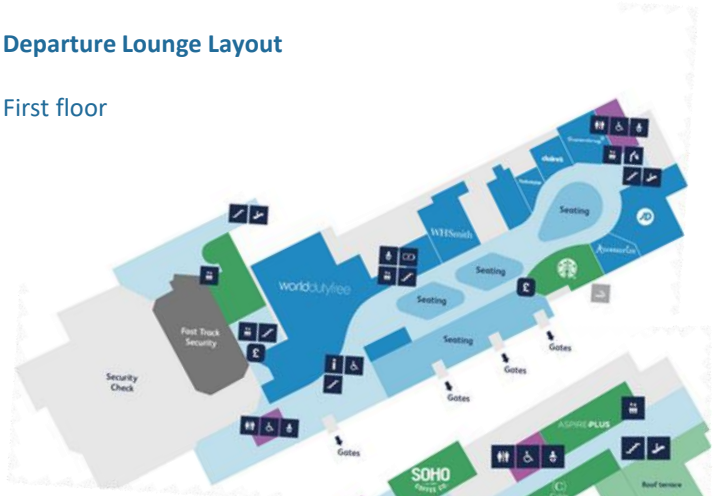
Departures Lounge Capacity Assessment

- 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, December 2022

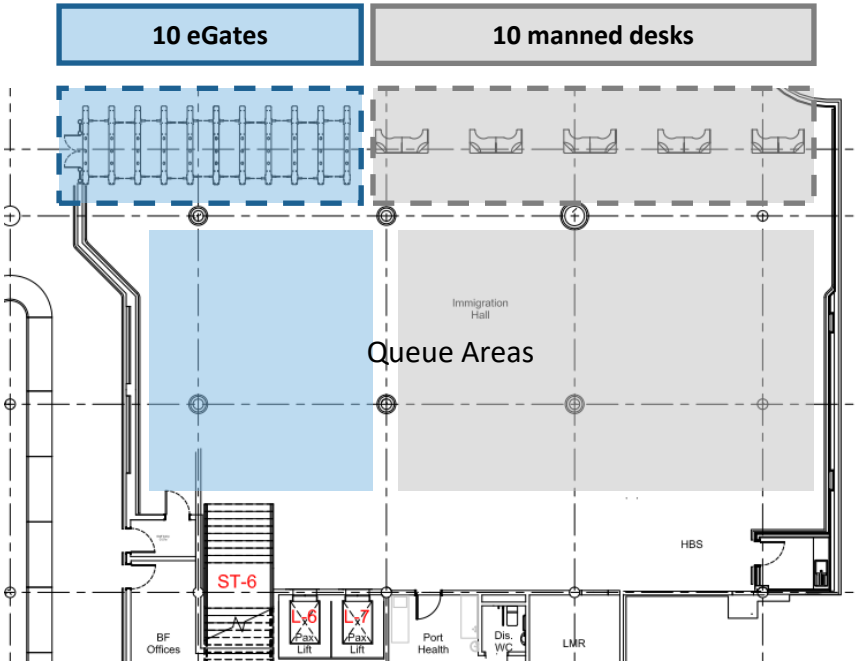
Terminal capacity

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

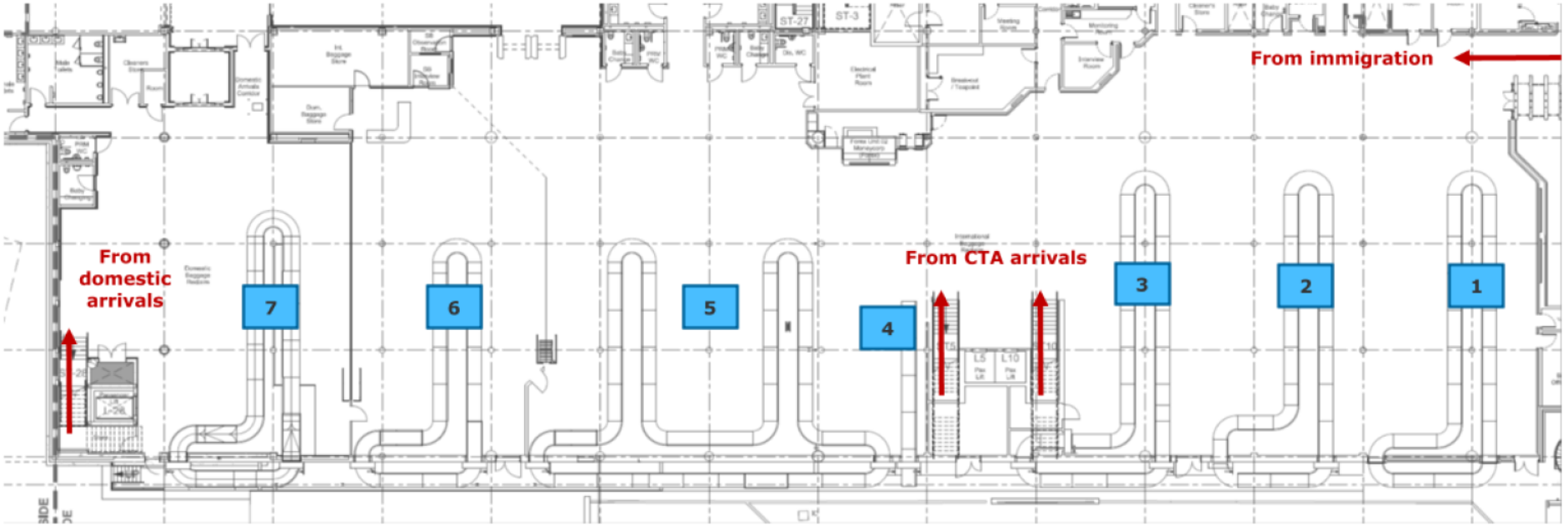
*Guide to faster travel through the UK border - GOV.UK (www.gov.uk)

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 – Int (excl. CTA)	**2,350**
Limiting Capacity – Int total	**2,600**
Limiting Capacity - Domestic	**900**

Source: Mott MacDonald analysis

Terminal capacity

Summer Scheduling Limits

Terminal Capacity Utilisation

The charts opposite show the Summer 2023 peak week scheduled utilisation of the terminal capacity on a rolling hour basis.

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 just sufficient to accommodate current.

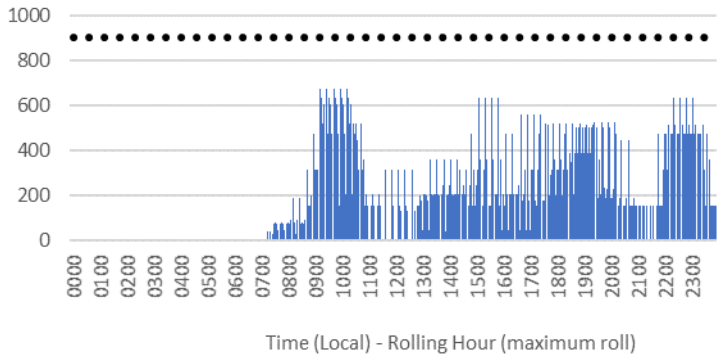
Departures Utilisation:

- 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.

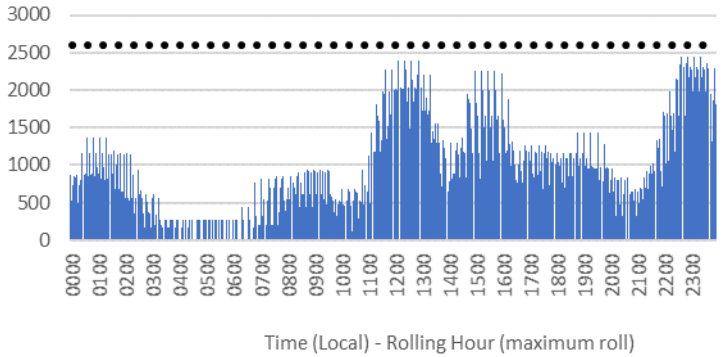
Winter Utilisation:

- The Winter 2022/23 charts on the following page show that capacity utilisation is generally lower in a winter season, with peaks operating within available capacity.

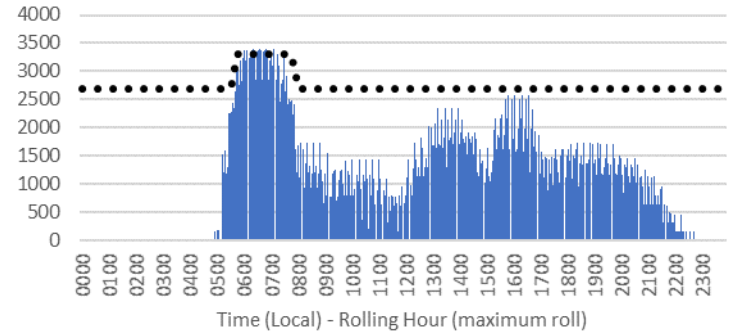
Domestic Arrivals – 60 min – Summer 2023



International Arrivals – 60 min – Summer 2023



Total Departures – 60 min – Summer 2023



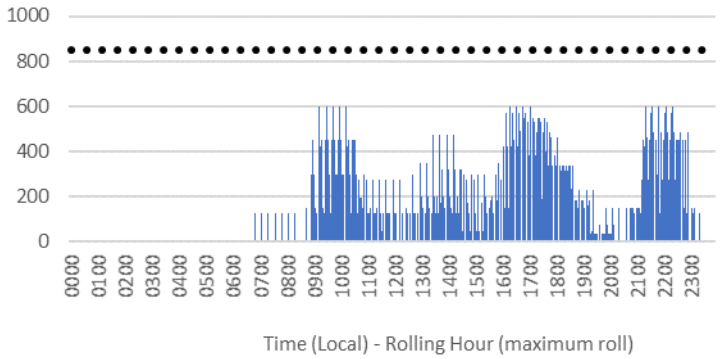
(*) *Note – the most recent winter (Winter 2021/22) season was still impacted by COVID-19 travel restrictions, so is not representative*

Source: ACL data (accessed 09/12/2022)

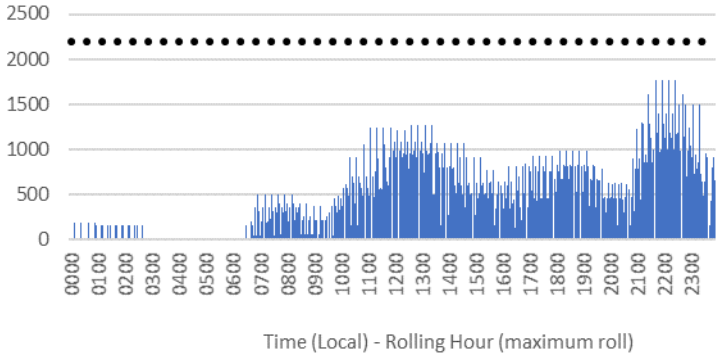
Terminal capacity

Winter Scheduling Limits

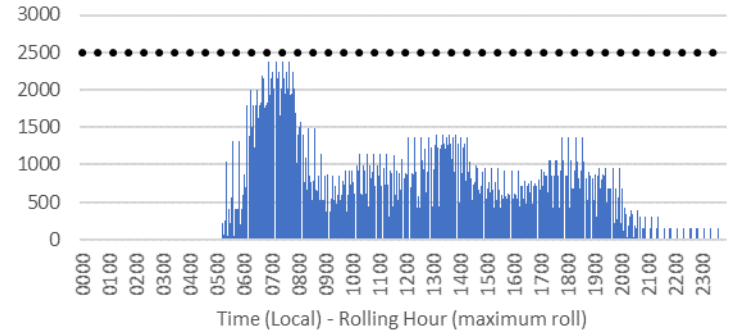
Domestic Arrivals – 60 min – Winter 2022/23



International Arrivals – 60 min – Winter 2022/23



Total Departures – 60 min – Winter 2022/23



Source: ACL data (accessed 09/12/2022)

Terminal capacity

Summer 2023 comparison with Summer 2019

Terminal Capacity Utilisation Comparison

The charts opposite show the Summer 2023 busy day (Friday) scheduled utilisation compared with the equivalent day in Summer 2019, representing pre-pandemic traffic.

Arrivals Utilisation:

- Summer 2023 Domestic Arrivals has seen growth in the 10:00 and 15:00 peaks, but a lower/broader evening peak. All hours remain within capacity.
- Summer 2023 International Arrivals has seen growth in the midday peak by about 100 pph compared with 2019. A new late evening peak has developed around 23:00, just before the night period, when 2023 demand is about 900 pph higher than in 2019.

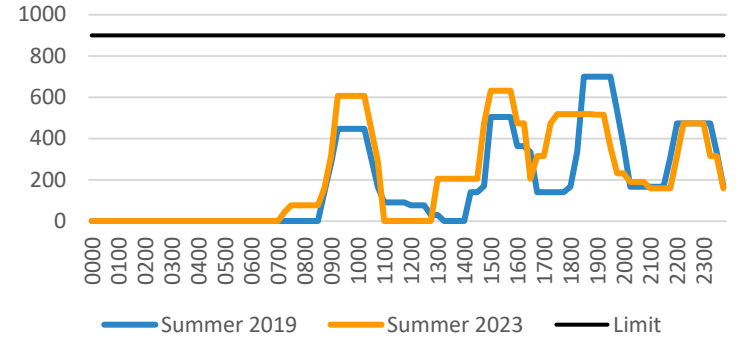
Departures Utilisation:

- Summer 2023 Departures demand has grown in the morning peak by 350 pph compared with 2019, an now peaks at almost 3,400 pph (compared with a declared capacity of 3,300 pph).
- This peak hour growth has only been accommodated by increases in the declared capacity in the 06:00-07:59 period, from 3,000 pph in 2019 to 3,300 pph in 2023.

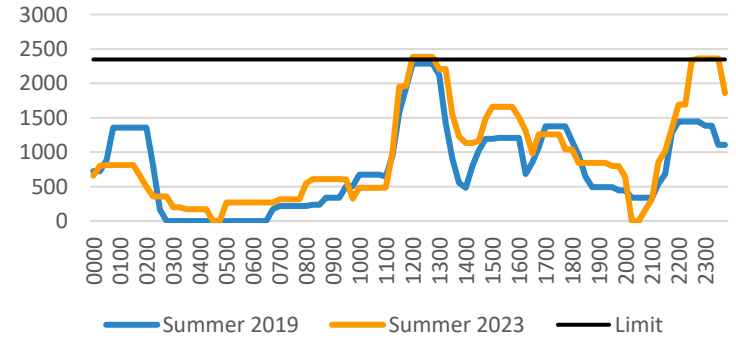
Terminal Capacity Conclusions

- **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.**

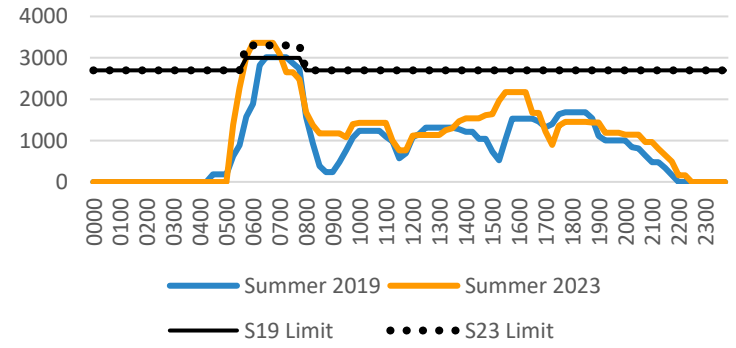
Domestic Arrivals – 60 min – Summer 2023 v 2019



International Arrivals – 60 min – Summer 2023 v 2019



Total Departures – 60 min – Summer 2023 v 2019



Source: ACL data (accessed 09/12/2022)

5 Other capacity analysis

Review of other capacities

Car parking and surface access

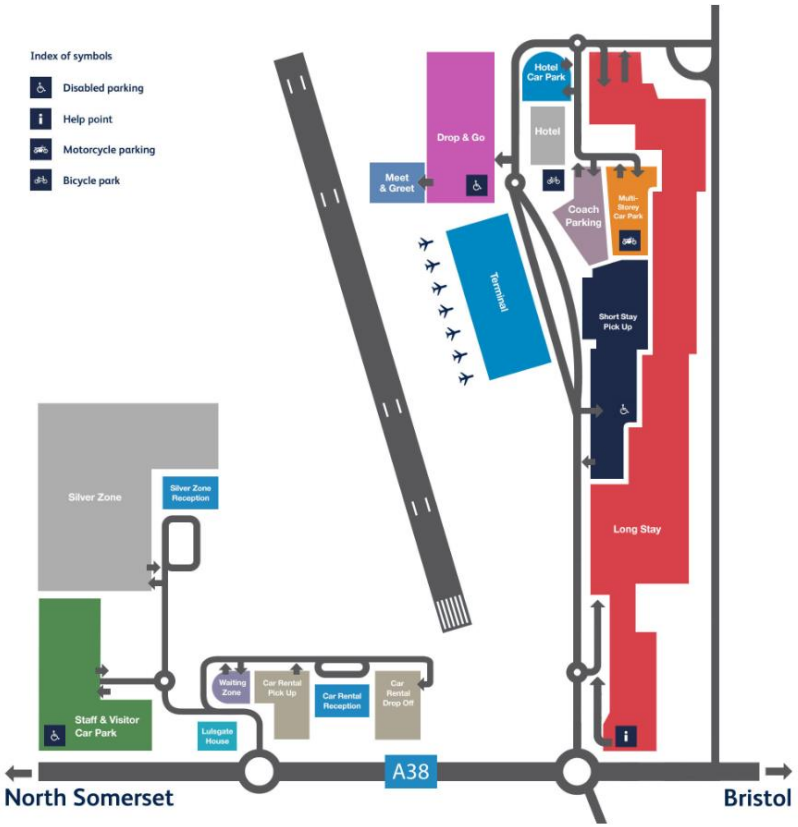
Car Parking

- 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

6 Appendix 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