

## 2. Car Parking



# Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Parking Demand Study Addendum

*Teneo Consulting, 2019*

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# 1 Introduction

## 1.1 Purpose and scope of this report

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### Introduction

This report has been prepared in support of the planning application submitted by Bristol Airport Limited (BAL) (LPA Ref. 18/P/5118/OUT) to North Somerset Council (NSC) for the development of Bristol Airport to accommodate 12mppa (million passengers per annum). It forms an addendum to the Parking Demand Study<sup>1</sup> already submitted as part of that application, providing further evidence and justification for the year-round use of the existing seasonal extension to the Silver Zone car park (Phase 1) (hereafter referred to as 'Cogloop 1') and for the proposed extension of that car park on land to the south (Phase 2) (hereafter referred to as 'Cogloop 2'). The parking demand modelling included within this report is based on the same methodology and analysis presented in the original Parking Demand Study and the reader should refer to that report for a detailed explanation of that methodology.

Currently, BAL has planning permission with a condition to use Cogloop 1 in the Summer period (1 May to 31 October) (LPA Ref. 16/P/1486/F), although permission for the temporary use of the car park in the Winter 2018/19 period was granted by NSC in October 2018 (LPA Ref. 18/P/4007/FUL). The application for development of the airport to 12 mppa includes a proposal to permanently remove the seasonal condition and a further proposal for an extension to the Silver Zone car park on agricultural land to the south without any restriction on seasonal use (Cogloop 2).

This addendum to the Parking Demand Study provides further evidence of the need for the permanent year-round use of the existing Cogloop 1 (C1) car park. It also provides evidence for the proposed year-round use of Cogloop 2 (C2) which is scheduled to be open in Summer 2020). This report considers two factors in relation to assessing the requirement for the year-round use of C1 and C2

- The forecast future Winter demand for airport parking; and

Figure 1 – Report structure

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<sup>1</sup>Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Parking Demand Study

- The future capacity available at the airport.

While there are considerably more airport passengers (and therefore cars parked) in the Summer months compared to the Winter, the demand forecasts in this report consider the impact of Winter demand peaks, the underlying growth in demand, the potential provision for off-site parking demand and a shift in the seasonality of demand in assessing the need for further Winter capacity. The Winter supply analysis, meanwhile, considers the planned long-term changes to car park capacity, the adequate provision of low-cost parking, the requirement for operational buffers to effectively manage car parking and the planned short-term construction-based parking closures (which results in the loss of spaces). We have considered the impact of the year-round use of C1 and C2 in reducing the quantum of unofficial (and often unauthorised) parking in close vicinity to the airport, and in removing the operational constraint of opening/closing of the car parks every Winter/Summer.

Within this report *Winter* is defined as the months that C1 has previously been closed for: January, February, March, April, November and December, while *Summer* refers to the remaining months of the calendar year (May through to and including October). We use central case assumptions for public transport from our demand modelling as set out in the original Parking Demand Study<sup>2</sup>. Unless otherwise stated, demand for parking is made up of both *Park&Fly* and *Park&Drop*.

## 2 Winter parking demand

2	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	3.5	4.0
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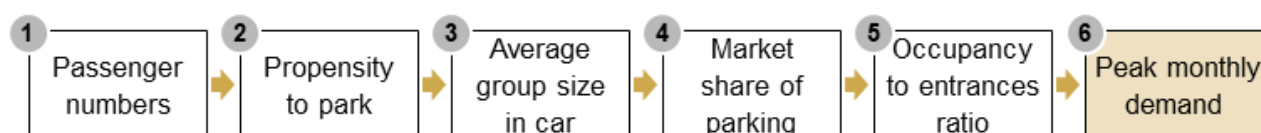
### 2.1 Peak Winter demand

#### Demand

#### 2.1.1 The approach to forecasting future Winter demand

This report's forecast for future Winter parking demand builds upon the five key drivers of demand analysed in the original Parking Demand Study: passenger numbers, propensity to park of passengers, average number of passengers travelling per car, Bristol Airport's market share of parking, and the occupancy to entrances ratio of Bristol Airport's car parks (occupancy/demand ratio). Further detail on how these demand growth drivers are modelled can be found in the original Parking Demand Study; a summary of the process is provided below in Figure 2 .

Figure 2 – Process for analysing peak monthly demand

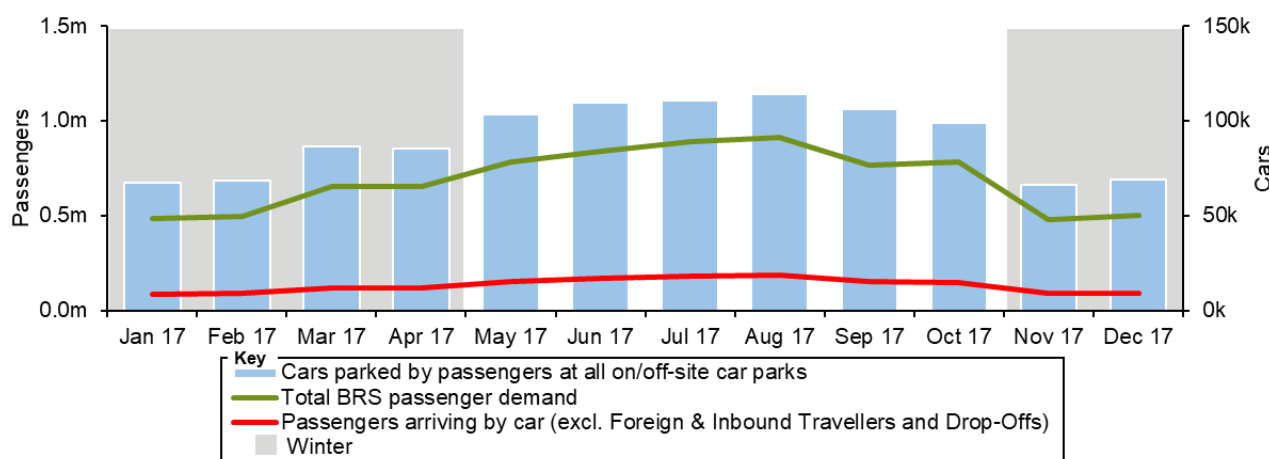


<sup>2</sup> Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Parking Demand Study

For the purposes of this report, we have focussed on the Winter months and forecast the expected level of demand across these periods for every year until 2026. It should be noted that the difference between Summer and Winter car parking demand is almost exclusively driven by differences in total passenger numbers rather than variations in propensity to park, group size or market share.

In 2017, Bristol Airport's throughput was a total of 8.2 million passengers. However, passenger numbers are not spread evenly across the year, with significantly more passengers travelling in the Summer, compared to the Winter. The seasonality of passenger numbers also applies to both passengers who park and the number of cars parked, with both considerably higher in the Summer months compared to Winter. As shown in Figure 3 below, the total number of cars parked across 2017 varied in line with total passenger numbers at the airport. The difference in the number of cars parked in Summer compared to Winter is driven almost exclusively by differences in passenger numbers as opposed to variations in propensity to park or group size, which remain relatively consistent throughout the year. This report addresses the need for capacity to meet Winter demand.

Figure 3 – Demand seasonality of Bristol Airport, 2017

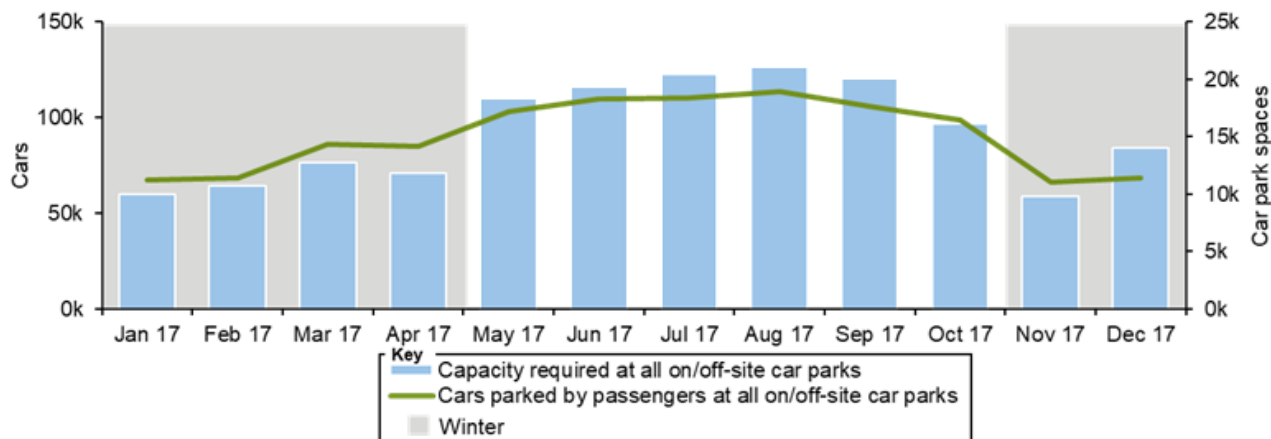


### 2.1.2 The impact of Winter demand peaks on the requirement for Winter capacity

While there is a lower demand for car parking throughout the Winter, the number of spaces required is driven by several peaks in demand during the Winter months, seen in December and March, as highlighted in Figure 4 below. These peaks reflect school holidays. During 2017, total Winter demand (including off-sites) peaked during the months of December (68k cars and 14k spaces) and March

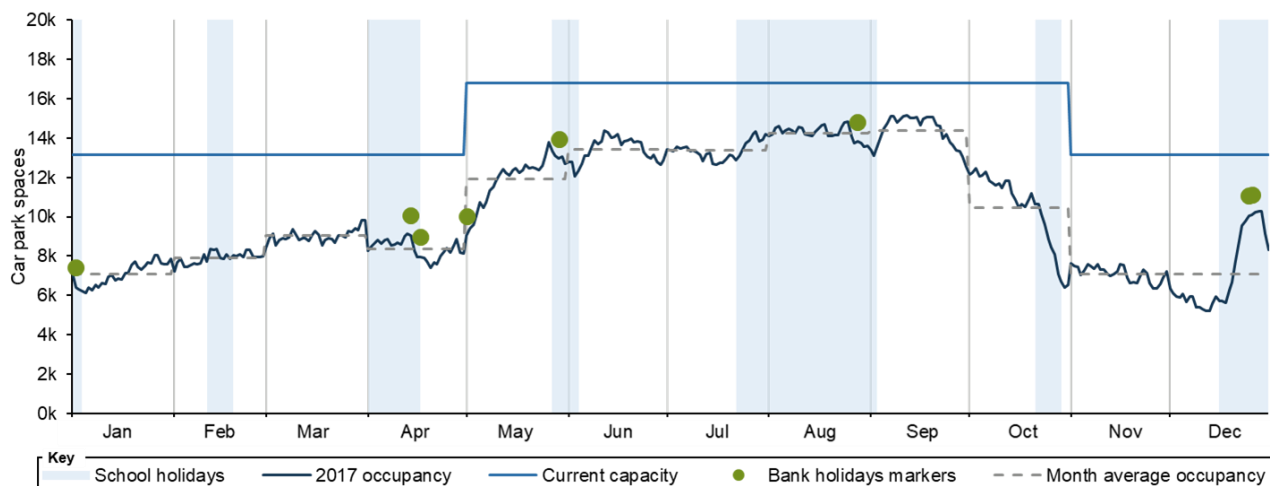
(86k cars and 13k spaces). Meeting demand in these months is crucial to providing sufficient capacity throughout the Winter.

Figure 4 – Comparison of cars parked, and spaces required, 2017 (all sites including competitors)



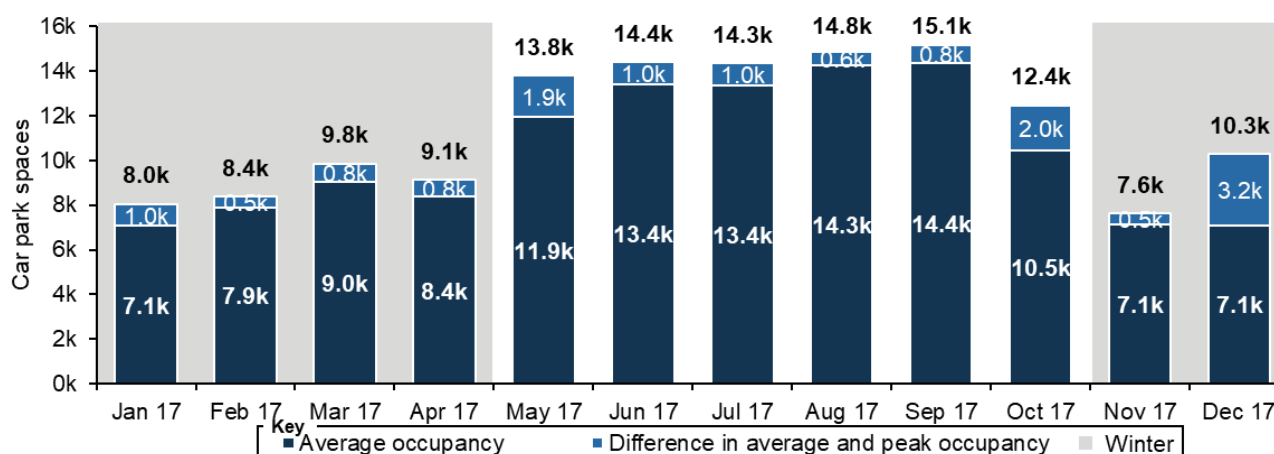
It should be noted that in December in particular, the comparatively high number of spaces required is not driven exclusively by the volume of cars, but rather the short period of time in which they require to be parked. This is expressed as the occupancy / demand ratio and is explained in full detail within the original Parking Demand Study. December sees a large volume of cars parking in a compressed period around the Christmas holidays which leads to a high space requirement; this trend is also experienced during other school holidays and Bank holidays, as shown in Figure 5 below.

Figure 5 – Daily occupancy of Bristol Airport's car parks, 2017



The operation of the airport relies on car park capacity meeting peaks in demand, not just average demand. Figure 6 shows the difference between monthly average occupancy and peak occupancy. In 2017, December was the month with the greatest variation between average and peak occupancy, at **3.2k** spaces.

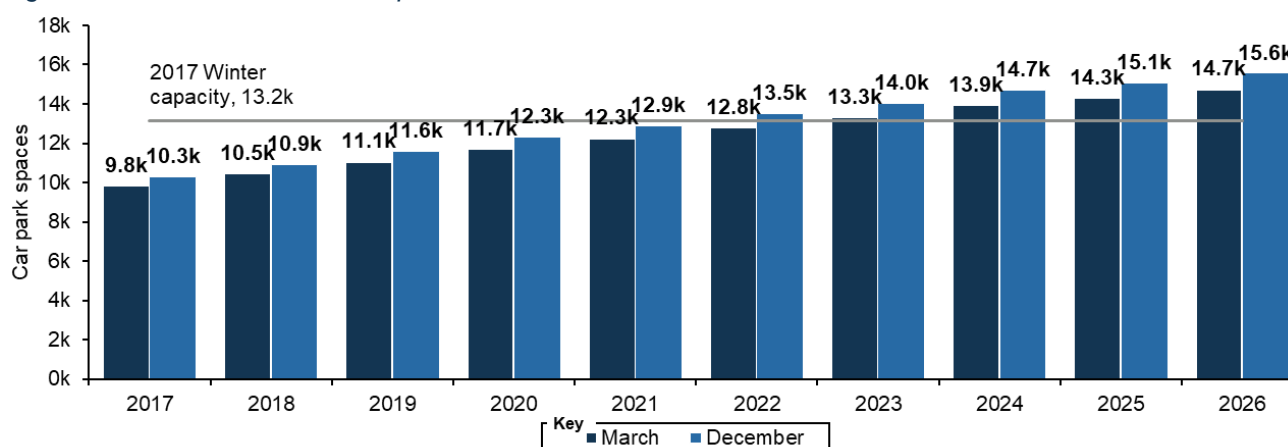
Figure 6 – Forecast in-month occupancy peaks above average monthly demand, 2017



### 2.1.3 The impact of underlying growth on future demand forecasts

As set out in the original Parking Demand Study, demand for car parking at Bristol Airport will increase with underlying growth in passenger numbers. We forecast that this growth in passenger numbers and several other factors will lead to an increase in the demand for parking spaces in the Winter months, and specifically the Winter peaks of December and March, as shown in Figure 7 below. The growth in demand between Winter 2017's peak and Winter 2019's peak is **1.3k** spaces.

Figure 7 – Forecast demand for spaces in March / December 2017 to 2026

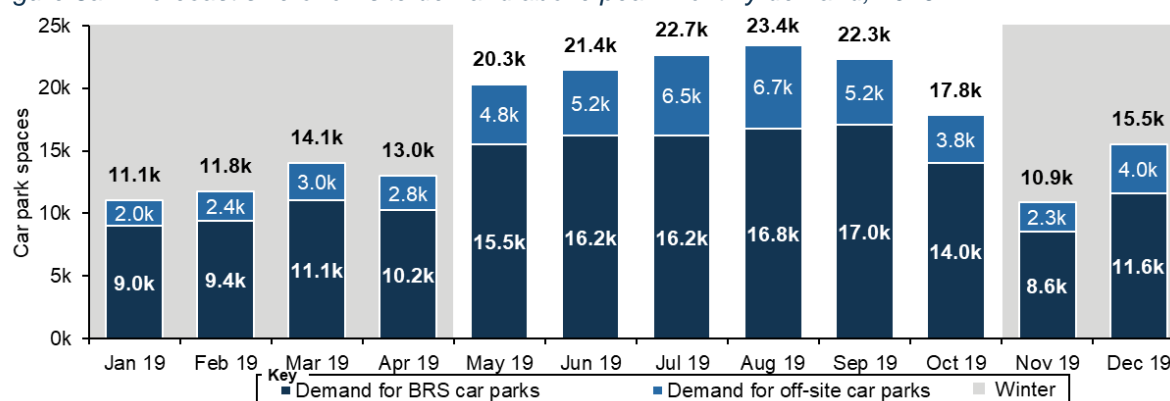


## 2.2 Reducing demand for off-site parking

The original Parking Demand Study reports spaces required for Bristol Airport on-site parking only, i.e. it excludes volumes assumed to be lost to off-site locations based on an assessment of competition carried out as part of our research (Figure 8a). However, given the collective desire of NSC and a large number of stakeholders (including local residents, businesses and environmental groups) to reduce the volume of cars parked in unofficial and often unauthorised off-site locations, we have calculated the number of spaces which would be required to adequately service all airport demand in Winter months, including those currently forecast to use off-site locations.

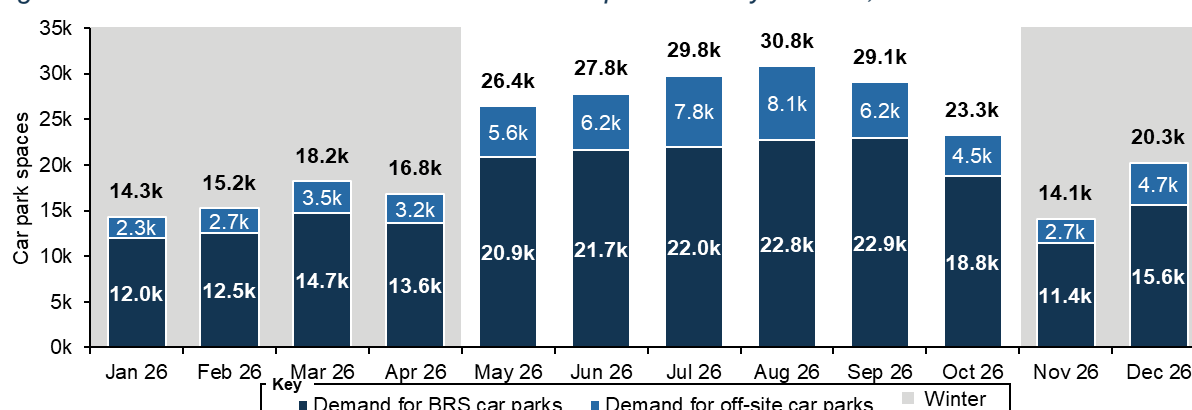
We calculate peak Winter 2019 demand for off-site parking to be **4.0k** spaces in December 2019. Forecast demand would therefore need to increase by **4.0k** spaces in this year to provide an official alternative to the demand for unofficial off-site parking.

Figure 8a – Forecast size of off-site demand above peak monthly demand, 2019



We note that by peak Winter 2026, we estimate total off-site parking demand to have grown to **4.7k** spaces in stable competitive market conditions (Figure 8b) (a previous version of the addendum erroneously stated parking demand to grow to 5.1k by 2026). Without increased provision of on-site parking off-site parking demand is forecast to maintain its growth in line with on-site parking's rate of growth. However, with the proposed increase in on-site parking supply off-site's proportion of total parking demand would be expected to decline.

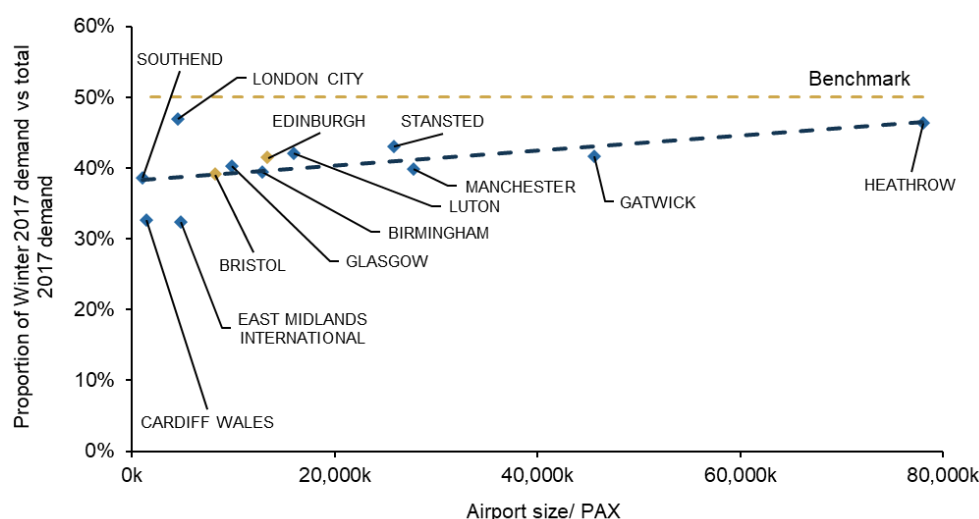
Figure 8b – Forecast size of off-site demand above peak monthly demand, 2026



## 2.3 Shift in demand seasonality

As an airport develops, the proportion of demand that occurs in the off-peak (Winter) season gradually increases as the airport offers a greater variety of routes and peak landing slots becomes less available. A positive correlation exists between airport size, measured in passengers per annum, and the proportion of those passenger travelling in Winter, as shown in Figure 9.

Figure 9 - Comparison between airport size and the proportion of passengers travelling in Winter, 2017



As Bristol Airport expands in size, there is a scenario where demand seasonality may shift towards having an increased proportion of passengers flying in Winter; this shift would lead to increased on-site and off-site parking demand.

Bristol Airport is expected to increase its passenger numbers to 12mppa by 2026. We have modelled the scenario in which Bristol Airport's demand seasonality shifts to that of Edinburgh Airport, an airport that is similarly sized (13mppa) to Bristol Airport's target size. Edinburgh Airport had 41.4% of its 2017 annual demand in the Winter, 2.4 percentage points higher than that of Bristol Airport. Such a shift in demand seasonality would lead Bristol Airport to have an increase in Winter passenger numbers, and hence an increase in demand for on-site and off-site parking in Winter by **0.9k** spaces. An increase in Winter demand of 0.9k spaces should be covered by an increase in Winter parking capacity to ensure the smooth running of the airport.

## 2.4 Cumulative demand calculation

The cumulative effect of the four demand changes (peak winter demand, demand growth, off-site parking demand and shift in demand seasonality) described above results in a maximum requirement for **16.5k** parking spaces by the peak of Winter 2019, as seen in Figure 10, growing to **20.5k** parking spaces by 2026. Assuming no further Winter capacity changes (dealt with in the section below), Bristol Airport would approach Winter capacity in 2019 without allowing any additional capacity for cars currently parked at off-site providers or the shift of seasonal demand. Therefore, without any Winter

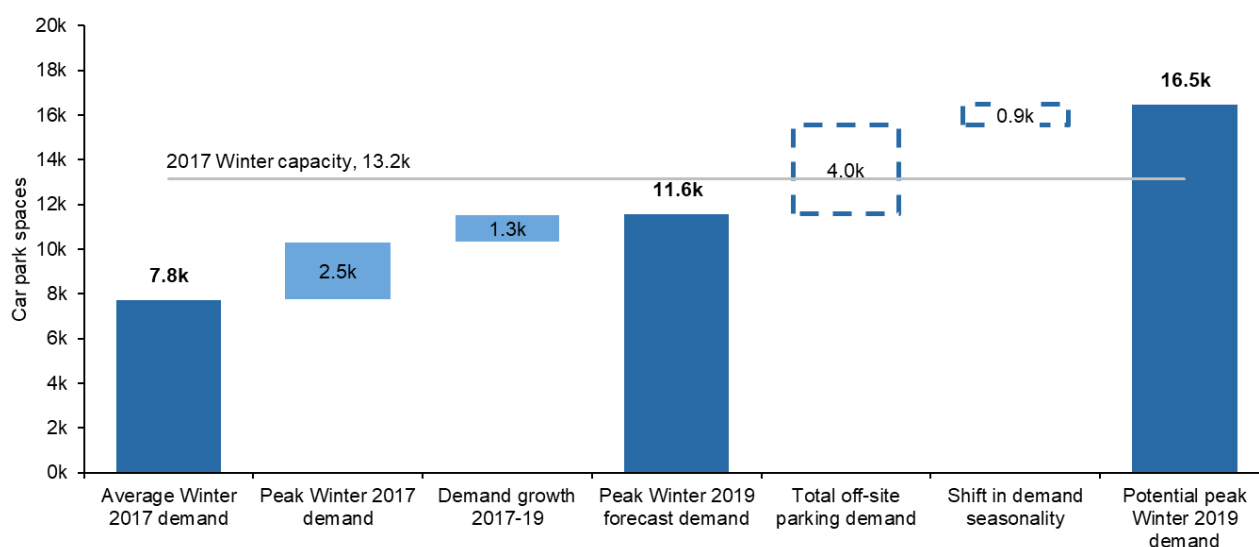
parking at C1, (and not taking into account change in supply) there is a forecasted 3.3k parking shortage for Winter 2019. Assuming the need to park at least some cars currently forecast to use off-sites, we consider that the airport does not currently have enough Winter capacity to meet Winter 2019 demand.

Figure 10 below shows the forecasted peak Winter demand in 2019 (11.6k) taking into account the following two factors:

- The operation of the car parks at the airport require peak demand to be met, not only average demand, increasing demand by 2.5k; and
- Underlying growth in passenger numbers resulting in an increase in the demand for parking spaces in the Winter months by 1.3k.

Further to this, the shift in demand seasonality and reducing the demand for off-site unofficial parking may result in a potential peak winter demand of 16.5k in 2019 as shown in Figure 10 below.

*Figure 10 - Forecast changes to demand for parking spaces*



### 3 Winter parking supply

#### 3.1 Long-term parking capacity changes

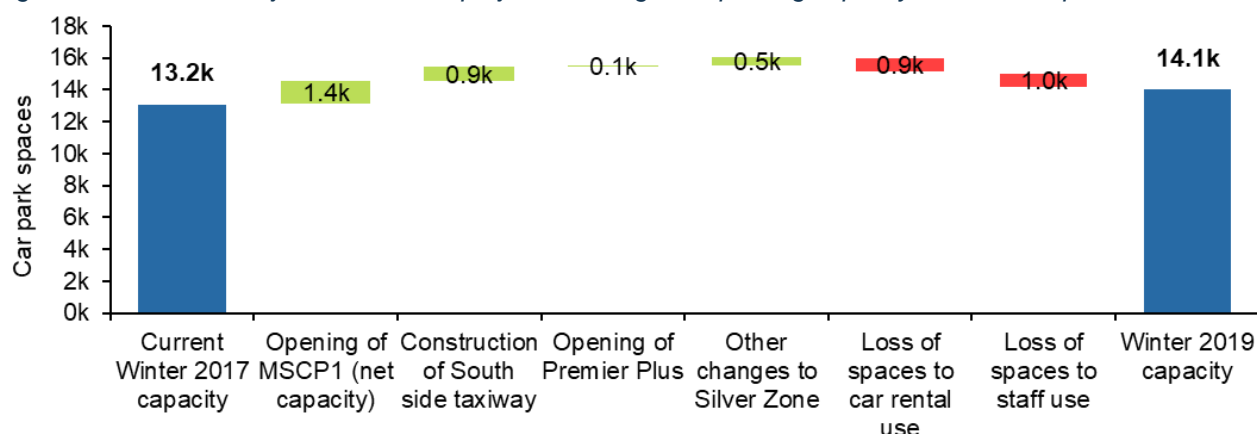
3	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	3.5	4.0
Supply										

There are multiple construction projects which will affect future parking capacity at the airport over the coming years and therefore need to be considered. This is illustrated in Figure 11. While this section considers the long-term effect of infrastructure changes to capacity, section 3.4 considers the short-term effect of construction-based closures to parking capacity. The two most significant projects set to change the net number of spaces available for passengers in the long-term are:

- The construction of MSCP1 on Long Stay and Premier-parking land reducing Long Stay capacity by **0.5k**, while increasing overall capacity by **1.9k** MSCP1 spaces; and
- The relocation of staff to Silver Zone in 2018 has led to a reduction of 1.0k capacity.

The net effect of all planned construction projects is to increase capacity by **0.9k** spaces by the end of 2019. These additions will relieve some of the demand pressure in future years and the additional capacity is included within the calculations shown in the summary report.

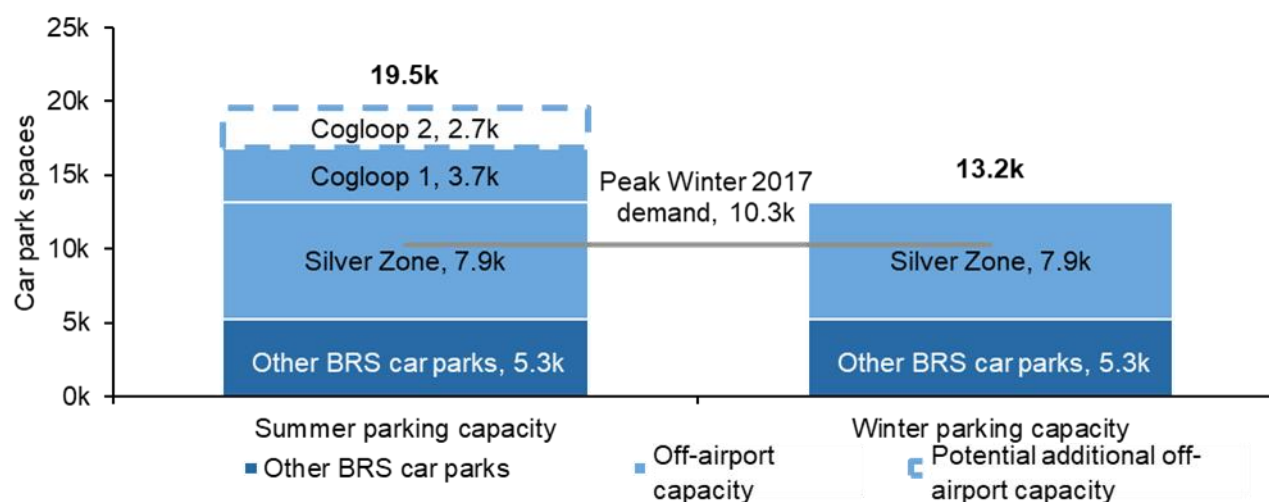
Figure 11 - Effect of major construction projects on long-term parking capacity at Bristol Airport, 2017-19



## 3.2 Mix of parking provision

Without the introduction of C1 and C2 use during the Winter period, there is significantly less lower cost capacity during the Winter compared to the summer. The alternative for those seeking low cost parking would be to use the off-site car parks, many of which are unofficial. Providing increased low-cost capacity in the Winter would help to offer users of unofficial off-site car parks with a financially viable authorised alternative.

Figure 12 – Bristol Airport's capacity split by off-airport (low-cost)/other and Summer/Winter parking, 2017

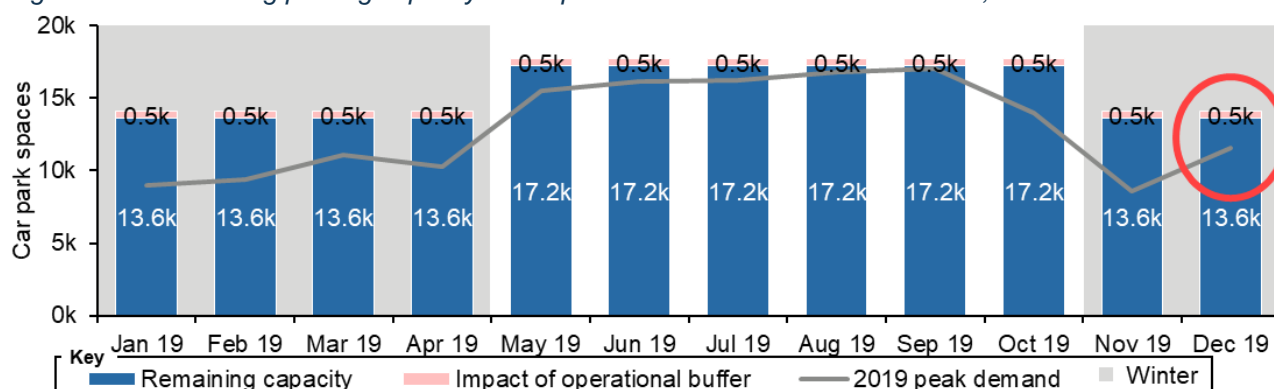


### 3.3 Operational buffers

Another consideration for the level of car parking capacity which can be provided by the airport is the proportion of spaces which can be used at any one time to operate the car park efficiently. There are operational buffers in place which ensure car parks can run effectively but also reduce their maximum serviceable capacity.

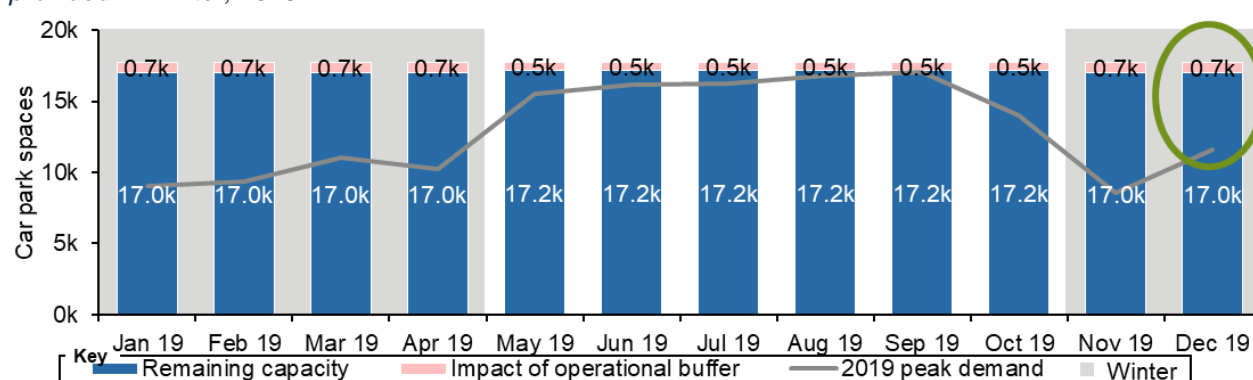
Bristol Airport operate a 5% 'block parking' buffer on its Silver Zone capacity throughout the year. This buffer is often extended during Winter months to ensure smooth operation of parking facilities and accounting for adverse weather conditions and potential flight delays. These operational buffers reduce Bristol Airport's Winter 2019 capacity by **0.5k** spaces and a further **0.2k** spaces if C1 is made operational. As highlighted in Figure 13 below, operational buffers have a significant impact on Winter capacity, bringing it to within 2.0k spaces of being filled by 2019.

Figure 13 – Remaining parking capacity after operational buffers are accounted for, 2019



With the extension of C1 to Winter months, spare capacity is kept considerably higher, Figure 14.

Figure 14 – Remaining parking capacity after operational buffers are accounted for and C1 capacity is provided in Winter, 2019



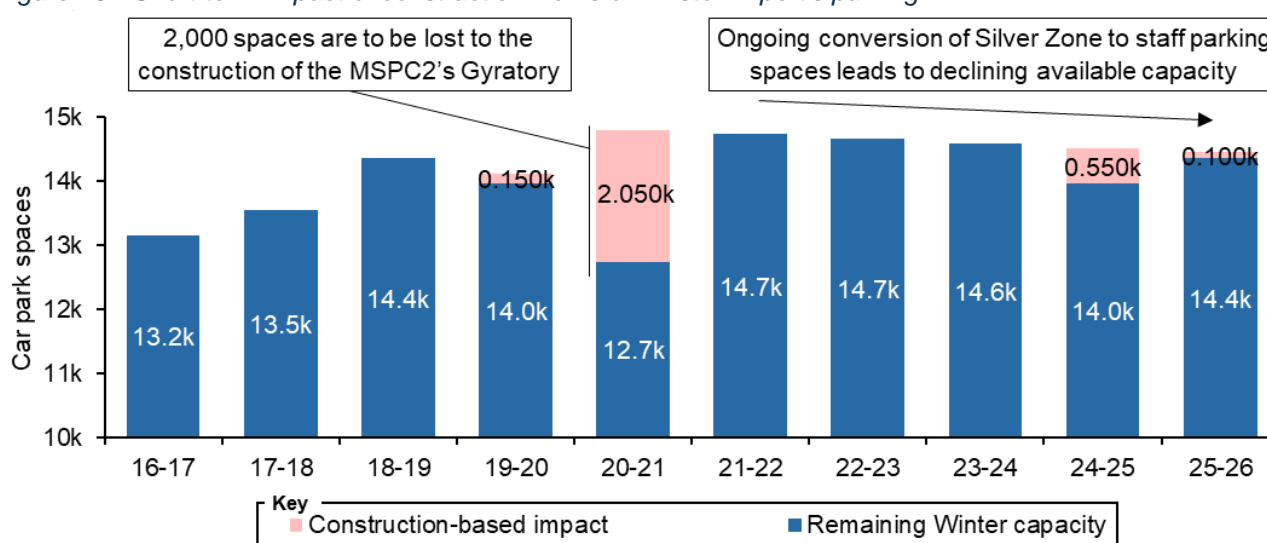
### 3.4 Short-term construction-based parking closures

The forecast spare capacity levels will be affected by short-term construction-based closures for set periods up until at least 2026. To facilitate the construction of additional infrastructure, there are short-term instances of parking closures that will temporarily affect the available parking capacity. While these only affect set periods of time, they are likely to bring the year in which the airport begins to run out of spare capacity forward to 2020, when the most significant works are due to occur.

There are six short-term construction-based parking closures currently planned to occur before the end of 2026. The most significant of such short-term constructions is the building of the MSCP2's gyratory which will impact 2.0k spaces between October 2020 and May 2021 (see Figure 15). The closure of these (incl. 50 other spaces) **2.1k** spaces is forecast to temporarily reduce Bristol Airport's car parking capacity by 15%, further reducing spare capacity in Winter 2020 (October – December) and Winter 2021 (January – April).

The year-round opening of C1 would ensure that the short-term closures (specifically in the Winter of 2020/21) do not reduce airport capacity to the point where it cannot meet demand.

Figure 15 - Short-term impact of construction works on Bristol Airport's parking



### 3.5 Cumulative supply calculation

While the increases in capacity through the development of MSCP1 (by 2019) will provide sufficient capacity to meet forecast Winter demand, this would allow for only minimal capacity to support the migration of demand which is currently forecast to park in unofficial off-sites.

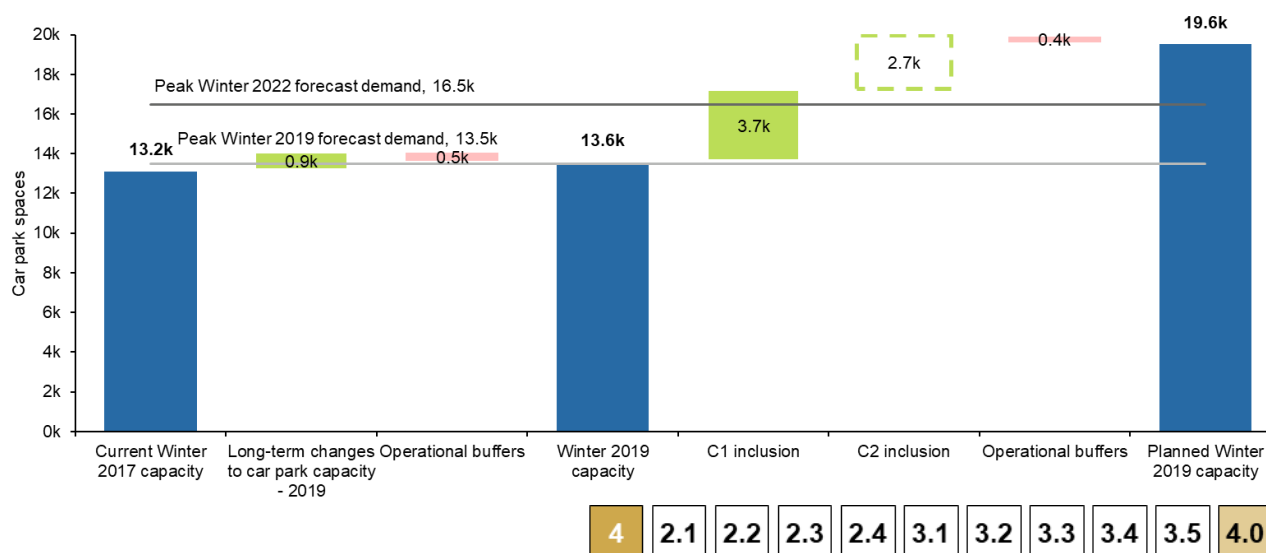
Further to this, the reduction in total capacity by over 2k spaces during the Winter of 2020/21 for construction reasons will reduce capacity below forecast demand and could lead to further passengers opting to use unofficial off-sites.

The provision of additional Winter capacity from the Winter of 2019 will aid in:

- Supporting the migration of passengers currently parking at unofficial off-sites to official airport parking from the Winter of 2019;
- Ensuring that the construction activities planned for Winter 2020/21 do not reduce capacity below forecast demand for the Winter of 2020 and 2021; and
- Ensuring that the medium- to long-term demand for airport parking is met.

It should be noted that in order to meet the estimated total amount of demand met by off-site provision and retain a suitable buffer for ongoing construction activities, it will be necessary to ensure that both Cogloop1 and Cogloop2 are open all year round from 2020.

Figure 16 - Forecast changes to Bristol Airport's car parking capacity



## 4 Conclusion

Without the Winter operation of C1, Bristol Airport's peak Winter 2019 forecast demand (**11.6k** spaces) would be close to the supply of **14.1k<sup>3</sup>** spaces; however, this does not account for key factors, including:

- The additional capacity currently forecast to park at off-site locations;
- The potential for a shift in demand seasonality;
- The reduction in low-cost capacity in Winter months driving passengers to unofficial off-site locations; and
- The temporary loss of capacity associated with construction works.

<sup>3</sup> Operational buffer not taken into account

Furthermore, in order to fully meet **all the expected demand** which is currently catered for by offsite capacity, it will be necessary to make both C1 and C2 all year round from 2020 onwards, once C2 has been constructed.

As set out in the original Parking Demand Study, demand for Bristol Airport parking will increase with underlying growth in passenger numbers. We forecast that this growth in passenger numbers and several other factors will lead to a c. **51%** increase in the number of spaces required to service peak Winter demand at the airport by 2026. The full explanation of the various factors which affect the growth of propensity to park, cars parked, and spaces required is found in the original report.

# Parking Strategy Off-site Parking Options

## Bristol Airport: Off-site Parking Options

Site Name	Travel Distance to departures (miles)	Travel time (Avg)	Travel Time (peak)	Other issues
Severn Beach (Western Approach Distribution Park	17.6	35-40 mins	40- 1h 15 mins	Possible Congestion: A403, M5, Portbury Lane & Bridgwater Rd/A38
Avonmouth North West	13.3	26-30 mins	30-55 mins	Possible Congestion: M5, Portbury Lane & Bridgwater Rd/A38
Avonmouth North East	13.7	22-28 mins	30-55 mins	Possible Congestion: M5, Portbury Lane & Bridgwater Rd/A38
Liberty Freight yard	5.8	10-14mins	14-26 mins	Possible Congestion: Bridgwater Rd/A38

## 1) Severn Beach (Western Approach Distribution Park)



## 2) Avonmouth North West



## 6) Avonmouth North East



10) Liberty Freight yard

