

**Antwerp airport**

**RUNWAY  
PERFORMANCE  
REPORT  
2019**

# EXECUTIVE SUMMARY



2019 has been another record breaking year for Belgian airports, with regards to passenger numbers. As cited on the airport's website: "In 2019, Antwerp Flanders International Airport registered 306,330 passengers, representing an increase of 2.7% compared to 2018."

Comparing with skeyes traffic figures which show a decrease in IFR movements (mostly commercial traffic), one can conclude that the higher occupancy rate of aircraft is indeed an important factor contributing to passenger increase. The airport has therefore managed to optimize its service to passengers, without a negative impact on the environment.

Some disruptions in air navigation services in the en-route centre of skeyes occurred in 2019. All closures occurred during the night and therefore had no impact on Antwerp airport air traffic. However, skeyes has been working on business continuity procedures for Antwerp to minimize the dependency on the en-route centre. The airspace closures due to industrial actions however did impact Antwerp, with the 13<sup>th</sup> March figuring in the ten (10) days with the least traffic recorded in 2019.

Traffic levels throughout the year have followed similar patterns over the past four years: traffic is understandably busier in the summer period, with an increase of VFR flights during the good weather months. Looking at the distribution of movements throughout the day, this has also been constant in the past four years.

The same cannot be said for the runway in use, as this is strongly dependent on the wind patterns. As such, whereas 2018 was a year with frequent north-easterly winds observed on all Belgian airports, 2019 seems to have gone back to the more regularly observed south-westerly (with a very visible exception in the month of April).

Air Traffic Management (ATM) Performance is driven by four Key Performance Areas (KPAs): safety, capacity, environment and cost-efficiency. This report focuses on skeyes' operations at Antwerp airport (ICAO code EBAW). Its aim is to provide our main stakeholders with traffic figures for 2019 and relevant data on the performance of our operations at EBAW, namely on three of the four KPA's: safety, capacity and environment.

## Safety

Two types of occurrences are analysed in this report, both giving a view on airport safety performance: missed approaches and runway incursions. Regarding missed approaches, Antwerp has seen an increase in the number of missed approaches since 2017, both in absolute numbers and in rate. The main causes over the past years are similar, with weather factor playing an important role.

There were fewer runway incursions (RI) in 2019, and the rate per 100,000 movements has dropped. However, this positive trend is marred by an increase of runway incursions with ATM contribution. Following each of the RI, investigations conducted by skeyes led to a series of measures to improve safety, from awareness campaigns to specific topics addressed in refresher courses. All RI and recommendations were discussed in the Local Runway Safety Team so as to raise awareness among all users of the airport.

## Capacity and Punctuality

Capacity and delay go hand in hand when it comes to runway performance. As in previous years, the throughput capacity of the airport is analysed, comparing actual traffic with the declared IFR capacity. Even during the busiest month of the year, the declared capacity of each runway is not exceeded, i.e there is still IFR capacity available.

New to this edition of the RWY performance report are the details of the delays from the airport's point of view. From skeyes' point of view, there was one (1) Air Traffic Flow Management (ATFM) regulation placed at Antwerp airport in the past five years (in August 2018, due to works at the airport), creating 123 minutes of delay. From a passenger

or airport perspective however, delays are observed much more frequently than this, as every departure or arrival can be affected by ATFM regulations placed in other parts of the Belgian airspace, or, in greater proportion, by other countries that the flight has to cross. In 2019, flights departing from EBAW experienced a total of 15,676 minutes of ATFM delay of which 33.2% was attributable to skeyes. The ATFM delay for arriving flights was of 16,763 minutes. 35.6 % of that delay was due to ATFM measures placed by skeyes and 64.4 % was due to ATFM measures set by other ANSPs.

## Environment

The preferential runway system at Antwerp, which indicates that an aircraft exceeding 5,700 kg should prefer runway 11 for take-off, was less in use in 2019. However, this can be explained by a return of south-westerly winds, implying that RWY 29 was more often in use.

Also relevant for local noise measures, night movements decreased significantly in 2019, with a drop of 72% compared to 2018. There was one (1) movement registered after 00:30.

# SAMENVATTING



2019 was opnieuw een recordjaar voor de Belgische luchthavens wat betreft het aantal passagiers. Zoals vermeld op de website van de luchthaven: “De Internationale Luchthaven van Antwerpen verwelkomde 306.330 passagiers in 2019 - een stijging van 2,7% tegenover 2018.”

In vergelijking met de verkeerscijfers van skeyes, die wijzen op een daling van het aantal IFR-bewegingen (het grootste deel van het commerciële vliegverkeer), kan worden geconcludeerd dat de hogere bezettingsgraad inderdaad een belangrijke factor is die bijdraagt aan het groeiend aantal passagiers. De luchthaven is er dus in geslaagd zijn dienstverlening aan de passagiers te optimaliseren, zonder dat dit negatieve gevolgen heeft voor het milieu.

De luchtvaarnavigatiedienstverlening werd in 2019 enkele malen verstoord in het en-routeluchtverkeersleidingscentrum van skeyes. Dat alles gebeurde 's nachts en had dus geen impact op het Antwerpse luchtverkeer. skeyes heeft echter gewerkt aan procedures om de continuïteit van de dienstverlening te garanderen voor Antwerpen om zo min mogelijk afhankelijk te zijn van het en-route-centrum. De herhaalde sluiting van het luchtruim als gevolg van werkonderbrekingen heeft echter wel een impact gehad op Antwerpen, waarbij 13 maart in de top tien stond van dagen met het minste verkeer in 2019.

Het hele jaar door volgden de verkeersniveaus een gelijkaardig patroon als in de afgelopen vier jaar: het verkeer is begrijpelijkerwijs drukker in de zomer, met een toename van VFR-vluchten tijdens de maanden met mooi weer. Als we kijken naar de spreiding van de bewegingen over de dag, dan is dit ook constant geweest in de afgelopen vier jaar.

Dat geldt niet voor het baangebruik, omdat dat sterk afhankelijk is van de windpatronen. Terwijl 2018 een jaar was met frequente noordoostenwinden die op alle Belgische luchthavens werden waargenomen, lijkt 2019 terug te grijpen naar de regelmatigere waargenomen zuidwestenwinden (met een zeer zichtbare uitzondering in april).

Air Traffic Management-prestaties (ATM) worden gedreven door vier kernprestatiegebieden (Key Performance Areas of KPA's): veiligheid, capaciteit, milieu en kostenefficiëntie. Dit verslag richt zich op de operaties van skeyes op de luchthaven van Antwerpen (ICAO-code: EBAW). Het doel is om onze belangrijkste stakeholders de verkeerscijfers voor 2019 en relevante gegevens over de prestaties van onze activiteiten op EBAW te verschaffen, namelijk inzake drie van de vier KPA's: veiligheid, capaciteit en milieu.

## Veiligheid

In dit verslag worden twee soorten voorvallen geanalyseerd, die beide een beeld geven van de veiligheidsprestaties op de luchthaven: afgebroken naderingen en runway incursions. Het aantal afgebroken naderingen in Antwerpen is sinds 2017 toegenomen, zowel in absolute aantallen als in percentage. De belangrijkste oorzaken in de afgelopen jaren zijn vergelijkbaar, en weersverschijnselen spelen daarin een belangrijke rol.

Er waren minder runway incursions (RI) in 2019 en het percentage per 100.000 bewegingen is gedaald. Deze positieve trend wordt echter ontsierd door een toename van het aantal runway incursions waarbij ATM een rol speelde. Elke runway incursion werd onderzocht door skeyes en gaf aanleiding tot een reeks maatregelen om de veiligheid te verhogen, van bewustmakingcampagnes tot het aan bod komen in opfriscursussen. Om alle gebruikers van de luchthaven bewust te maken van de runway incursions en de aanbevelingen, worden deze ter sprake gebracht in het Local Runway Safety Team.

## Capaciteit en stiptheid

Capaciteit en vertraging gaan hand in hand als het gaat om baanprestaties. Net zoals de voorbije jaren wordt de doorvoercapaciteit van de luchthaven geanalyseerd, waarbij het werkelijke verkeer wordt vergeleken met de opgegeven IFR-capaciteit. Zelfs in de drukste maand van het jaar wordt de opgegeven capaciteit van elke baan niet overschreden, i.e. er is nog capaciteit beschikbaar voor IFR.

Nieuw in deze editie van het RWY Performance-verslag zijn de details van de vertragingen vanuit het oogpunt van de luchthaven. Vanuit het

standpunt van skeyes werd in de voorbije vijf jaar slechts één ATFM-regulering (Air Traffic Flow Management) op de luchthaven van Antwerpen ingevoerd, namelijk in augustus 2018, wegens werken op de luchthaven, waardoor er 123 minuten vertraging ontstond. Vanuit een passagiers- of luchthavenperspectief worden er echter veel vaker vertragingen vastgesteld, aangezien elk vertrek of elke aankomst kan worden beïnvloed door ATFM-reguleringen die in andere delen van het Belgische luchtruim ingevoerd worden of, in grotere mate, door andere landen die het vliegtuig moet overvliegen. In 2019 hadden vluchten bij vertrek op EBAW in totaal 15.676 minuten ATFM-vertraging, waarvan 33,2% te wijten was aan skeyes. De ATFM-vertraging voor de aankomende vluchten bedroeg 16.763 minuten. 35,6% van die vertraging was te wijten aan ATFM-maatregelen van skeyes, 64,4% aan ATFM-maatregelen van andere luchtvaarnavigatiedienstverleners.

## Milieu

Het systeem voor preferentieel baangebruik (Preferential Runway System, PRS) in Antwerpen, dat aangeeft dat opstijgende vliegtuigen die meer dan 5.700 kg wegen de voorkeur zouden moeten geven aan baan 11, werd in 2019 minder nageleefd. Dit kan echter worden verklaard door een terugkeer van de zuidwestenwinden, wat impliceert dat baan 29 vaker in gebruik was.

Ook relevant in het licht van lokale geluidsmaatregelen is het feit dat het aantal bewegingen 's nachts aanzienlijk is gedaald in 2019, met maar liefst 72% ten opzichte van 2018. Er werd slechts één beweging na 00:30 uur geregistreerd.

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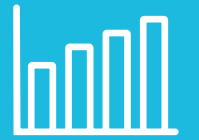


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# ACRONYMS



<b>ACFT</b> :	Aircraft	<b>EU</b> :	European Union
<b>AIP</b> :	Aeronautical Information Publication	<b>FABEC</b> :	Functional Airspace Block Europe Central
<b>AMS</b> :	Airport Movement System	<b>FOD</b> :	Foreign Object Debris
<b>ANSP</b> :	Air Navigation Service Provider	<b>ICAO</b> :	International Civil Aviation Organization
<b>ARR</b> :	Arrival	<b>IFR</b> :	Instrument Flight Rules
<b>ATC</b> :	Air Traffic Control	<b>ILS</b> :	Instrument Landing System
<b>ATCO</b> :	Air Traffic Control Officer	<b>KPA</b> :	Key Performance Area
<b>ATFM</b> :	Air Traffic Flow Management	<b>KPI</b> :	Key Performance Indicator
<b>ATM</b> :	Air Traffic Management	<b>LVO</b> :	Low Visibility Operations
<b>ATS</b> :	Air Traffic Service	<b>M/A</b> :	Missed Approach
<b>BCAA</b> :	Belgian Civil Aviation Authority	<b>MCT</b> :	Maximum Throughput Capacity
<b>CDO</b> :	Continuous Descent Operation	<b>MVT</b> :	Mixed Volume Traffic
<b>CRSTMP</b> :	C-Capacity, R-Routing, S-Staffing, T- Equipment, M- Airspace Management, P- Special Event	<b>NM</b> :	Network Manager
<b>CTOT</b> :	Calculated Take-Off Time	<b>NM</b> :	Nautical Mile
<b>CTR</b> :	Control Zone of an Airport	<b>NOTAM</b> :	Notice to Airmen
<b>DEP</b> :	Departure	<b>PRS</b> :	Preferential Runway System
<b>DGS&amp;O</b> :	Directorate General Systems and Operations	<b>PRU</b> :	Performance Review Unit
<b>EBAW</b> :	Antwerp airport ICAO Code	<b>RAT</b> :	Risk Analysis Tool
<b>EBBR</b> :	Brussels airport ICAO Code	<b>RI</b> :	Runway Incursions
<b>EBCI</b> :	Charleroi airport ICAO Code	<b>ROTA</b> :	Runway Occupancy Time for Arrival
<b>EBKT</b> :	Kortrijk airport ICAO Code	<b>RWY</b> :	Runway
<b>EBLG</b> :	Liège airport ICAO Code	<b>SRO</b> :	Simultaneous Runway Occupancy
<b>EBOS</b> :	Ostend airport ICAO Code	<b>VFR</b> :	Visual Flight Rules



# 1. TRAFFIC

In this chapter, the traffic at Antwerp airport is presented, as recorded by the Airport Movement System (AMS) developed by skeyes. The AMS records the movements at an aerodrome and within its Control Zone (CTR), which are defined as an aircraft either crossing the CTR, landing or taking off at the aerodrome.

The figures presented throughout the report consider a movement as a take-off or landing of all traffic (VFR and IFR, helicopters and airplanes, commercial or general aviation). As this report considers runway performance, movements such as crossings of CTRs are not considered. As such<sup>1</sup>:

- one take-off = one movement
- one landing = one movement
- one touch-and-go = two movements.

<sup>1</sup>As per BCAA's aerodrome movement definition



## Decreasing traffic

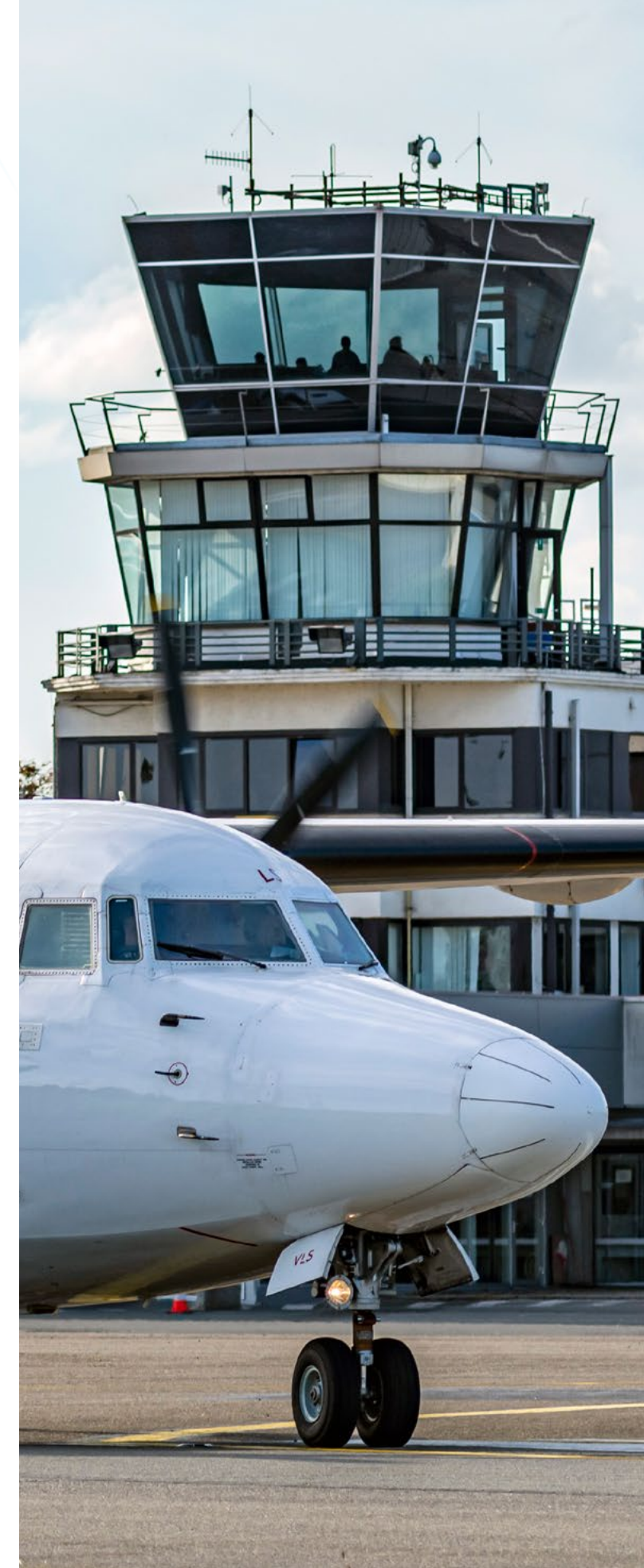
The number of aircraft movements for the past four years are as followed:

- 2016: 41,132 (17,129 IFR; 24,003 VFR)
- 2017: 37,359 (15,305 IFR; 22,054 VFR)
- 2018: 38,618 (15,932 IFR; 22,686 VFR)
- 2019: 35,794 (14,134 IFR; 21,660 VFR).

After a slight increase in 2018, the traffic numbers in Antwerp decreased again in 2019. IFR flights were reduced by almost 2,000 movements, while VFR dropped by 1,000. The highest traffic in 2019 was observed in August, with 3,639 movements. See Figure 1-1 and Table 1-1 for the details per month.



Figure 1-1: Total monthly movements per year



## Busy days

The 10 busiest days of 2019 for Antwerp Airport are depicted in Figure 1-2 below.

Table 1-1: Total monthly movements per year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
IFR	2016	1,156	1,406	1,807	1,718	1,706	1,725	1,413	1,312	1,452	1,319	1,052	1,063	17,129
	2017	1,047	1,025	1,381	1,263	1,558	1,438	1,375	1,373	1,334	1,409	1,135	967	15,305
	2018	1,103	1,251	1,494	1,524	1,526	1,672	1,544	1,534	1,157	1,153	912	1,062	15,932
	2019	946	905	1,000	1,204	1,258	1,336	1,401	1,198	1,250	1,379	1,140	1,121	14,138
VFR	2016	1,692	2,062	1,685	2,191	2,702	1,945	2,260	2,205	2,229	1,943	1,617	1,472	24,003
	2017	1,138	1,298	2,368	2,113	2,133	2,187	2,320	2,685	1,923	1,790	1,189	910	22,054
	2018	1,294	1,956	1,571	2,492	2,950	2,728	2,096	2,050	1,743	1,517	1,184	1,105	22,686
	2019	1,074	1,750	1,493	1,900	1,933	2,177	2,065	2,441	2,202	1,997	1,479	1,145	21,656
Total	2016	2,848	3,468	3,492	3,909	4,408	3,670	3,673	3,517	3,681	3,262	2,669	2,535	41,132
	2017	2,185	2,323	3,749	3,376	3,691	3,625	3,695	4,058	3,257	3,199	2,324	1,877	37,359
	2018	2,397	3,207	3,065	4,016	4,476	4,400	3,640	3,584	2,900	2,670	2,096	2,167	38,618
	2019	2,020	2,655	2,493	3,104	3,191	3,513	3,466	3,639	3,452	3,376	2,619	2,266	35,794

Another way of describing traffic is to look at the number of arrivals and departures at an airport. Table 1-2 below shows the details for each year.

As the overall traffic decreased in Antwerp airport in 2019, so did the arrival and departure rates.

Table 1-2: Monthly arrival and departure movements per year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
ARR	2016	1,432	1,731	1,750	1,947	2,203	1,833	1,836	1,760	1,842	1,632	1,332	1,263	20,561
	2017	1,097	1,159	1,867	1,685	1,845	1,805	1,846	2,034	1,625	1,600	1,161	939	18,663
	2018	1,199	1,600	1,531	2,004	2,241	2,194	1,823	1,784	1,439	1,329	1,026	1,067	19,237
	2019	1,010	1,329	1,235	1,552	1,594	1,761	1,736	1,815	1,724	1,685	1,314	1,134	17,889
DEP	2016	1,416	1,737	1,742	1,962	2,205	1,837	1,837	1,757	1,839	1,630	1,337	1,272	20,571
	2017	1,088	1,164	1,882	1,691	1,846	1,820	1,849	2,024	1,632	1,599	1,163	938	18,696
	2018	1,198	1,607	1,534	2,012	2,235	2,206	1,817	1,800	1,461	1,341	1,070	1,100	19,381
	2019	1,010	1,326	1,258	1,552	1,597	1,752	1,730	1,824	1,728	1,691	1,305	1,132	17,905

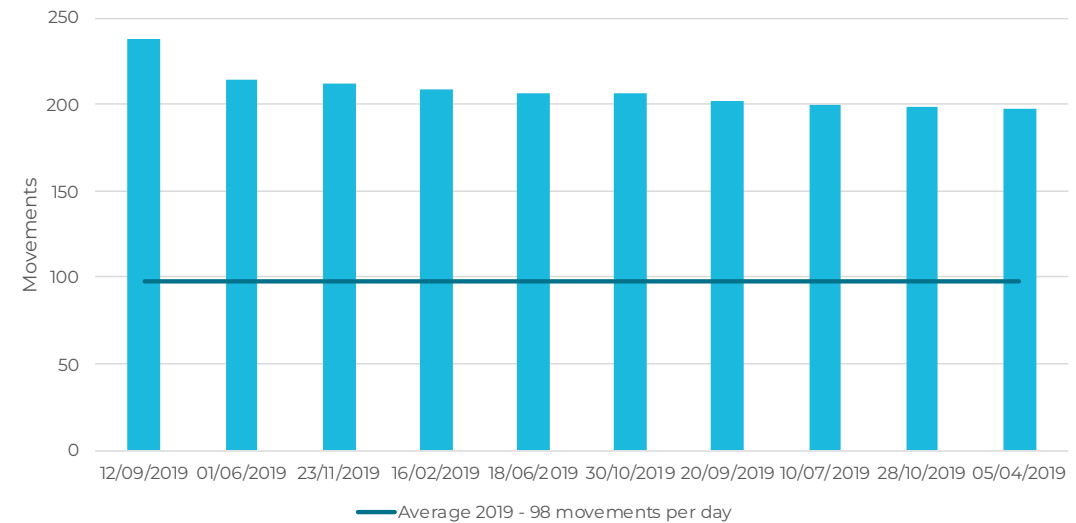


Figure 1-2: Ten days with highest amount of traffic in 2019

The most active days in 2019 were spread out during the year. The 12<sup>th</sup> of September saw the highest amount of traffic with 238 movements, while the average movements in Antwerp airport

in 2019 was 98 per day. Figure 1-3 emphasizes the fact that the traffic dropped compared to the previous years. Top ten days with highest traffic of the past four years do not include any of 2019.

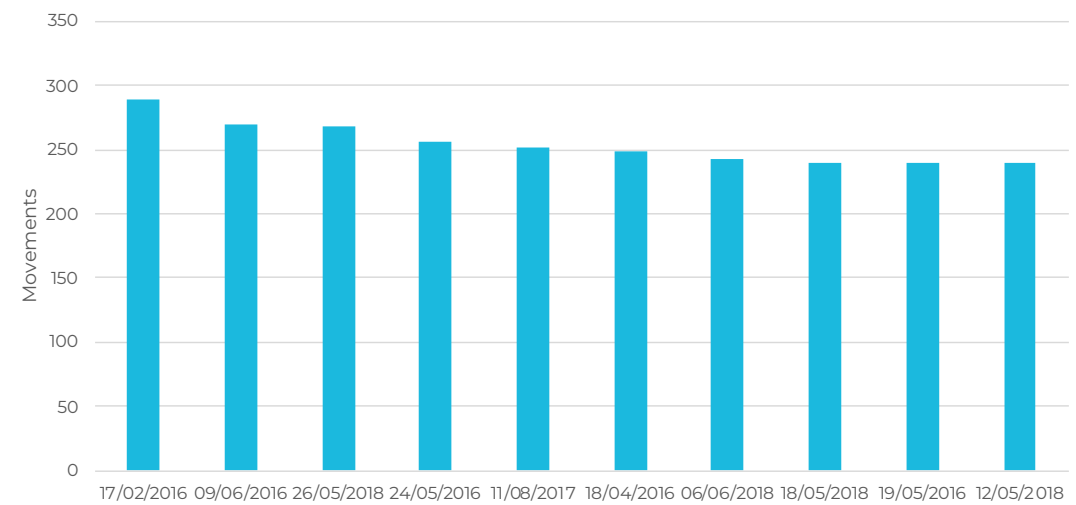


Figure 1-3: Ten days with highest amount of traffic since 2016

## Quiet days

Figure 1-4 below shows the ten days with the least traffic recorded in 2019.

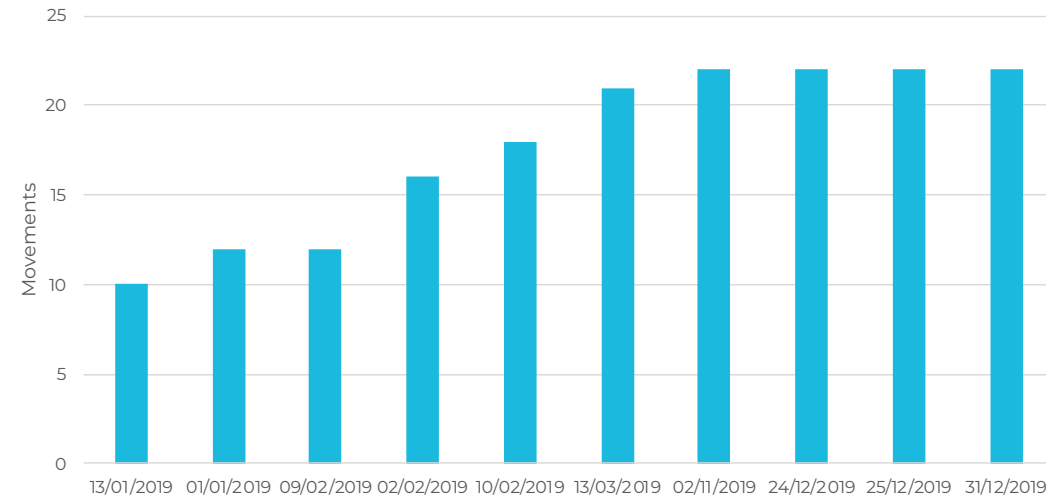
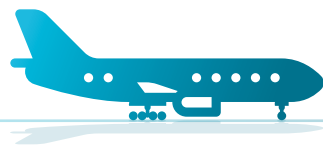


Figure 1-4: Ten days with lowest amount of traffic in 2019

It is no surprise that all of these calm days occurred during winter, as there is mostly VFR traffic in Antwerp airport, dependent on good weather conditions. This trend can be further seen in Figure 1-6.

Note also that the 13<sup>th</sup> March was a day of industrial action at skeyes, with a closure of the en-route airspace impacting local traffic at Antwerp.



## Traffic patterns

Figure 1-5 shows the average IFR and VFR traffic throughout the hours of the day over the period 2016 to 2019. A small peak in IFR traffic can be seen at 07:00 local time, just after the opening time

of the airport, followed by a rather constant rate of 3.5 movements between 10:00 and 17:00. VFR traffic is more significant, its peak hours being 11:00 and 15:00.

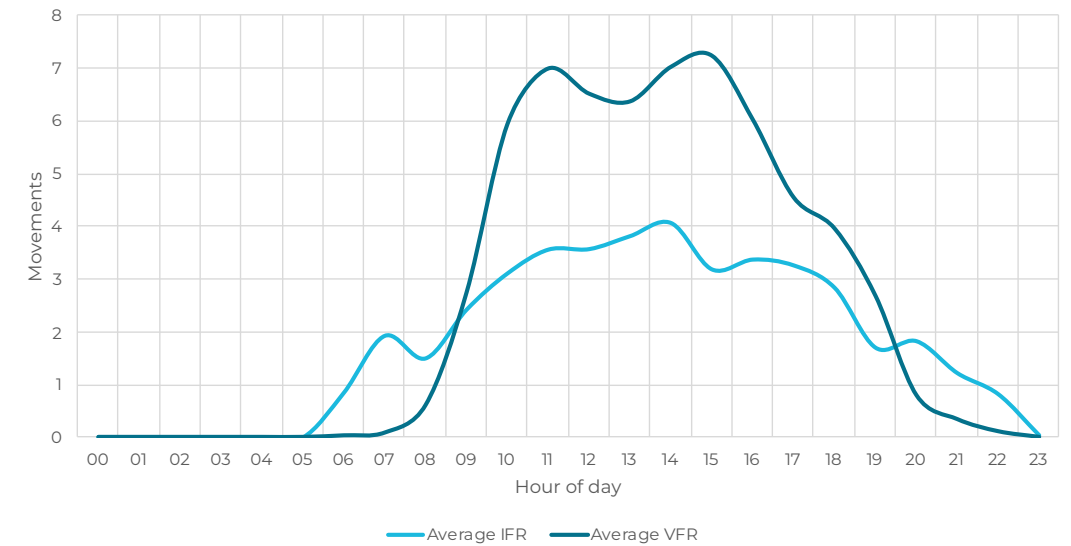


Figure 1-5: Average hourly IFR and VFR movements for the period 2016-2019 (local time)

Figure 1-6 confirms that traffic is higher during summer months (April until October included) than in winter.

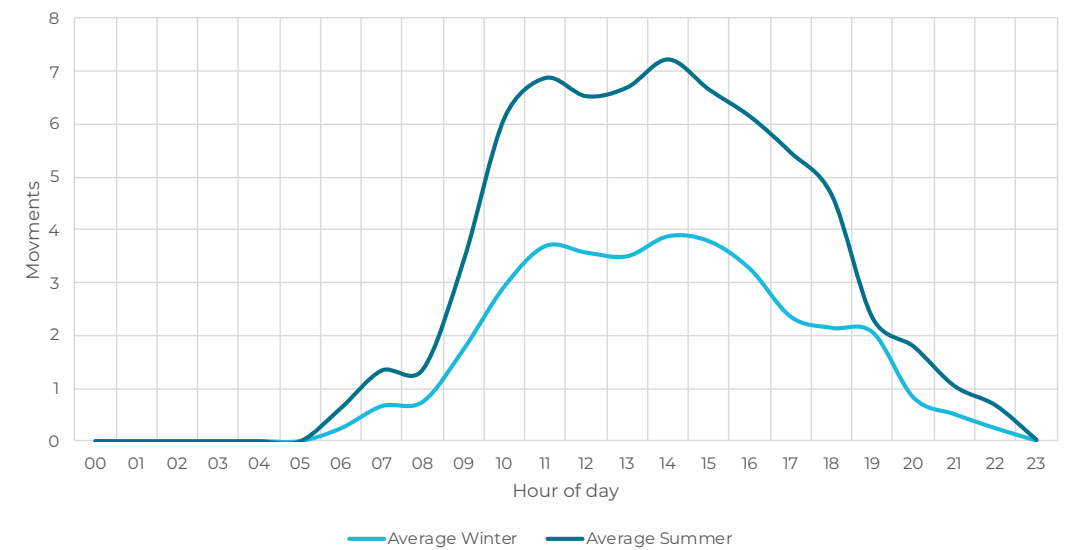


Figure 1-6: Average hourly movements in winter and summer for the period 2016-2019 (local time)

## Runway use

The use of one runway configuration over another depends on several factors that have to be taken into account, which are detailed in Chapter 4. Figure 1-7 shows the runway use in Antwerp since

2016. The trend in 2019 follows those of 2016 and 2017. In 2018, more easterly winds than usual were recorded, which explains the greater use of runway 11 that year.

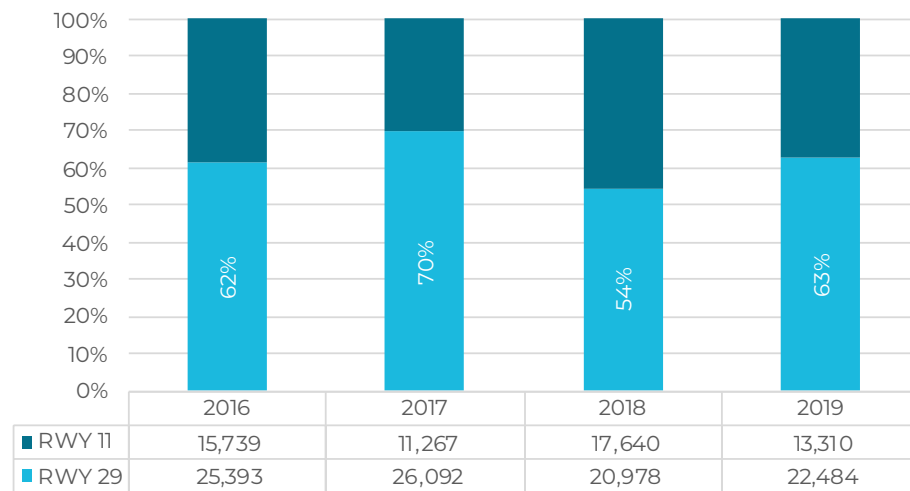


Figure 1-7: Runway use per year

Figure 1-8 below shows the runway use per month of 2019. Runway 29 is overall the most used runway, except in April 2019, where strong north-easterly winds were recorded, in Antwerp as in all other

Belgian airports. This explains the increased usage of runway 11. More details about winds can be found in Figure 4-3 and Figure 4-4 of the Environment chapter.

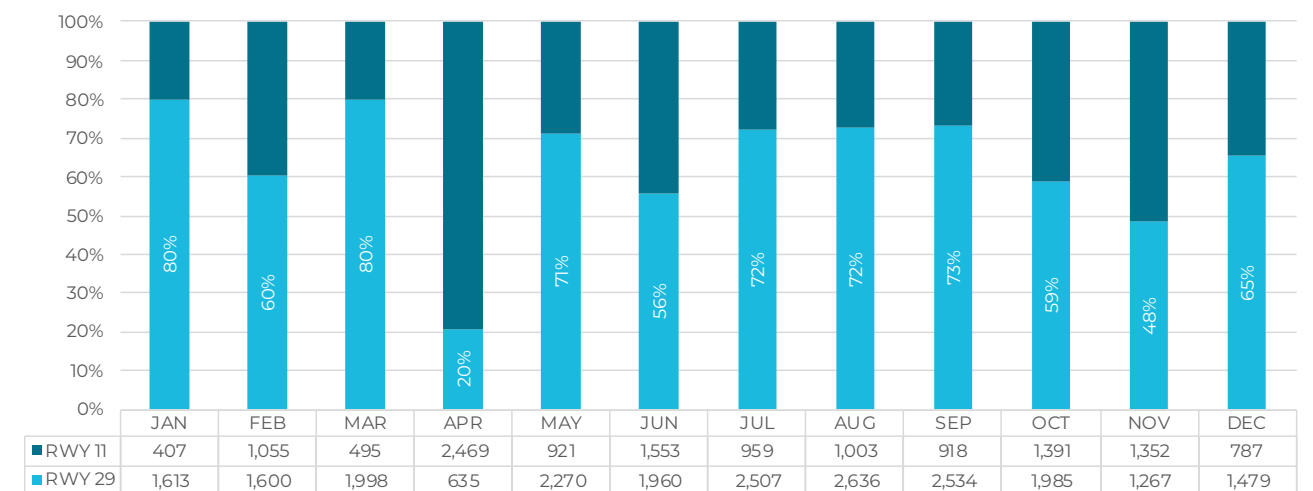


Figure 1-8: Runway use per month in 2019



## 2. SAFETY

*This section highlights two topics: runway incursions and missed approaches. The runway incursions is a lagging runway safety indicator and is mandatory to be reported. Missed approaches are not mandatory to be reported, and are reported on a voluntary basis. As such the quality and accuracy of the available information is commensurate with the level of reporting.*

*Missed approaches do not represent safety incidents. They are an operational solution allowing to maintain safety margins when the approach cannot be continued for a safe landing. At the same time, particularly during peak hours at busy airports, they also increase the traffic complexity and the residual safety risk. One could argue that missed approaches are a hybrid leading indicator, and that by analysing the reasons leading to this type of procedure, we can examine if there are any systemic deficiencies in a technical equipment, in a procedure or in manner in which Air Traffic Control Officers (ATCOs) and/or pilots apply these procedures.*

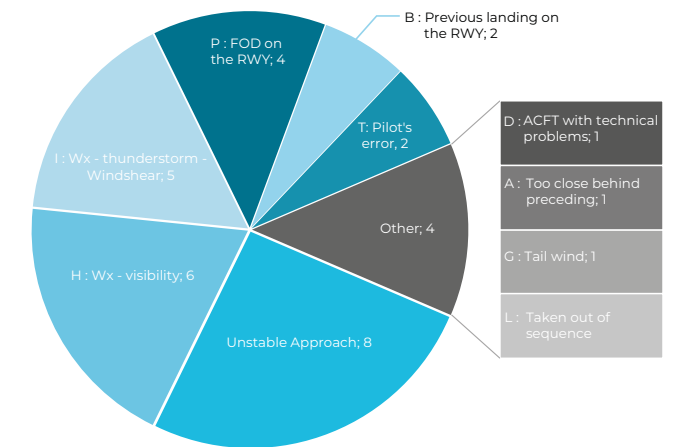


## Missed Approaches

Missed approaches are performed according to published procedures, under the instructions of the air traffic controller or they are initiated by the pilot when the approach cannot be continued for a safe landing. Besides the discomfort for passengers and crew, the missed approaches increase the air traffic management complexity. The number of missed approaches, and particularly their cause, can therefore indicate which measures are to be taken to improve the safety of air navigation service provision. All missed approaches are recorded by cause of event, and the reporting is done by the ATCOs.

Missed approaches are monitored on a weekly basis. This report gives a yearly overview and a comparison over four years for each runway. In 2019 there were 31 missed approaches, Figure 2-1 shows the number of missed approaches per cause. It is clear that weather conditions and unstable approaches are the main reasons accounting for 61.3% of the missed approaches at Antwerp airport.

Figure 2-1: Missed approaches 2019 per cause



Antwerp has seen an increase in the number of missed approaches since 2017. The number of arrivals has decreased in 2019, and the absolute number of missed approaches has increased. Both factors determined an increase in the rate of missed approaches per 1,000 arrivals, see Figure 2-2.

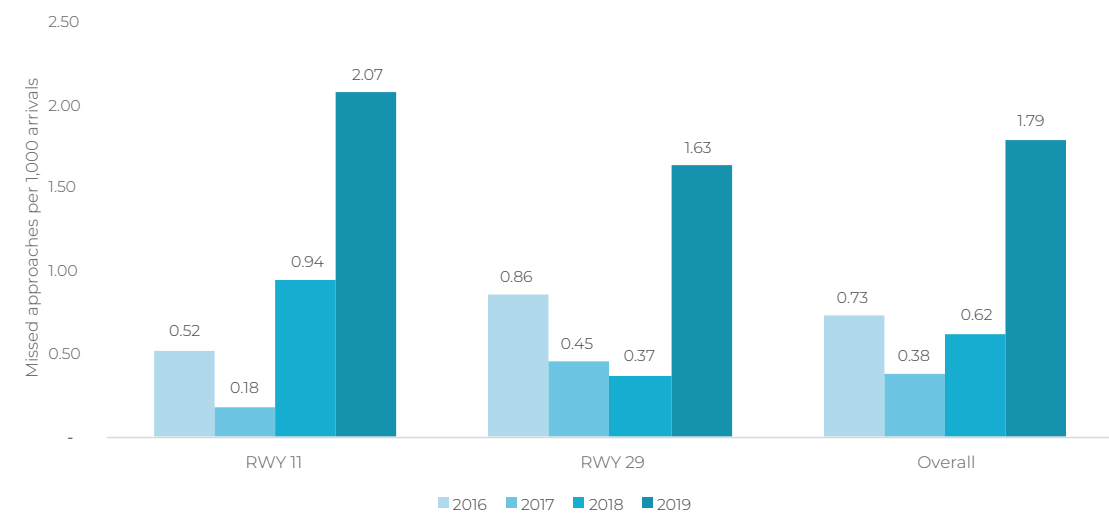


Figure 2-2: Rate of missed approaches per 1,000 arrivals, per year

## Runway 11

For runway 11 a total of 13 missed approaches were reported in 2019 which is an increase compared to 2018. Table 2-1 shows the top five causes of missed approaches in 2019. The table also shows the number of missed approaches with these reasons in the period from 2016 until 2018 and the percentage of the total missed approaches attributable to these causes. The main causes in 2019 remain similar to the ones in 2018.

Top five causes in 2019	2016	2017	2018	2019
<b>Total missed approaches</b>	<b>4</b>	<b>1</b>	<b>8</b>	<b>13</b>
<b>H : Wx - visibility</b>	1	1	2	5
<b>B : Previous landing on the RWY</b>			1	2
<b>Unstable Approach</b>	1		4	2
<b>P : FOD on the RWY</b>	1		1	1
<b>T : Pilot's error</b>				1
<b>part top 5 causes of 2019</b>	<b>75.0%</b>	<b>100%</b>	<b>100%</b>	<b>84.6%</b>

The main reason for missed approaches is 'H: Wx – visibility' accounting for 38.5% of the missed approaches. It should be noted that runway 11 does not have an ILS which increases the difficulty to land in low visibility.

Table 2-1:  
Causes of missed approaches on runway 11, per year, top five causes in 2019

## Runway 29

In 2019, 18 missed approaches were reported. Compared to 2018 this is a large increase. Based on the reported causes the missed approaches are attributable to unstable approaches (33.3%), weather conditions (33.3%) and foreign object debris (FOD) on the runway (16.7%). Table 2-1 shows the top five causes of missed approaches in 2019. The table also shows the number of missed approaches with

these reasons in the years 2016 until 2018 and the percentage of the total missed approaches attributable to these causes.

Contrary to runway 11, for runway 29 the cause 'H: Wx - Visibility' is not a top five cause of missed approaches. Runway 29 is equipped with a CAT I ILS, meaning it is more suitable for landings in low visibility.

Top five causes in 2019	2016	2017	2018	2019
<b>Total missed approaches</b>	<b>11</b>	<b>6</b>	<b>4</b>	<b>18</b>
<b>Unstable Approach</b>	3		2	6
<b>I : Wx - thunderstorm - Windshear</b>	3	4		5
<b>P : FOD on the RWY</b>				3
<b>D : ACFT with technical problems</b>	1			1
<b>T : Pilot's error</b>				1
<b>part top 5 causes of 2019</b>	<b>63.6%</b>	<b>66.7%</b>	<b>50%</b>	<b>88.9%</b>

Table 2-2:  
Causes of missed approaches on runway 29, per year, top five causes in 2019

## Runway incursions

According to ICAO Doc 4444 – PANS-ATM, a Runway Incursion is defined as “Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft”.

It should be noted that this ‘incorrect presence’ may be a consequence of a failure of a pilot or vehicle driver to comply with a valid ATC clearance or their compliance with an inappropriate ATC clearance.

Runway incursions are mandatory to be reported as per EU 2015/1018. Moreover, in accordance with EU 2019/317, all RIs need to be reported using the severity classification based on the Risk Analysis Tool (RAT).

According to this scheme, RIs are classified based on their severity in the following categories:

- A – Serious Incident, a collision was narrowly avoided.
- B – Major Incident, separation decreases and there is a significant potential for collision, which may result in a time critical corrective or evasive response.
- C – Significant Incident, an incident characterized by ample time and/or distance to avoid a collision.
- D – Not Determined, an incident that meets the definition of runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and take-off of aircraft but with no immediate safety consequences.
- E – No Safety Effect
- N – No ATM contribution (i.e. no system, procedure or person involved in the provision of ATC services initiated or contributed to the incident).



This indicator includes:

- The overall number of runway incursions;
- The overall number of runway incursions where skyes had an ATM Ground contribution, classified according to the incident's severity from A to E as described above;
- The overall number of movements in the corresponding period. The number of movements for this KPI is provided by the AMS under the BCAA's aerodrome movement definition.

## Increase in runway incursions with ATM contribution

A monthly overview of the runway incursions in 2019 can be seen in Figure 2-3. In total there were eight (8) runway incursions, out of which three (3) had an ATM contribution. Five (5) runway incursions without ATM contribution were three (3) occurrences where an aircraft passed the holding point without permission, one (1) event was a pedestrian crossing without clearance and there

was one take-off without clearance. As a result of an investigation on the RIs in 2018 where four (4) of the runway incursions occurred at Holding Point F, Antwerp airport followed the recommendation of repainting Holding Point F. The result is a decrease to two runway incursions, see Table 2-3, at Holding Point F in 2019.

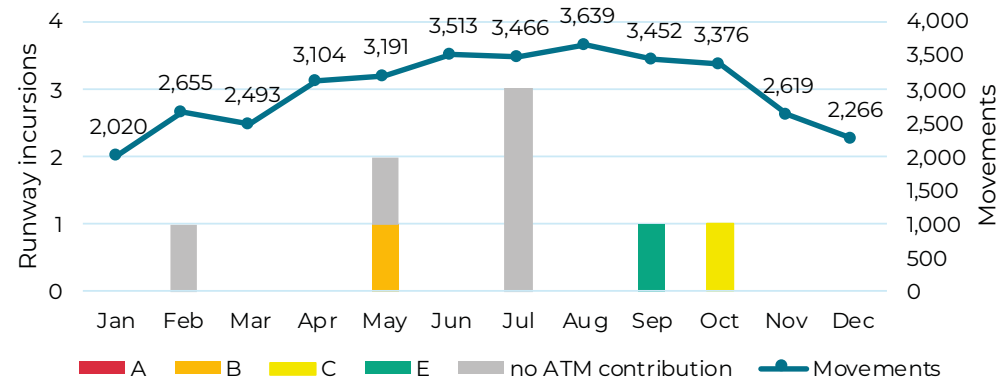


Figure 2-3: Runway incursions 2019, per month, per category

There was one runway incursion categorized as B meaning there was a significant potential for collision. This was caused by a clearance to land while another aircraft was on the runway. At one (1) NM this was noticed and the aircraft was given a go-around.

The runway incursion of category C is an early landing clearance while another aircraft was lined up on the runway. As the clearance was given very early there was ample time to revise the landing clearance, let the traffic depart and reissue the landing clearance.

Table 2-3: Runway incursions 2019 per occurrence

Date	Initiator	Category of severity	RWY of Occurrence	Location of Occurrence
15/02/2019	Aircraft	N	11	Holding point F
22/05/2019	Aircraft	B	29	RWY29
22/05/2019	Aircraft	N	29	Holding point F
01/07/2019	Aircraft	N	29	RWY29
29/07/2019	Pedestrian	N	29	Taxiway E
31/07/2019	Aircraft	N	29	Holding point B2
05/09/2019	Aircraft	E	29	Taxiway G
10/10/2019	Aircraft	C	29	RWY29

Figure 2-4 gives a yearly overview of the runway incursions from 2016 until 2019. A decrease is seen in runway incursions compared to 2018. However,

the runway incursions with ATM contribution increased from one (1) to three (3).

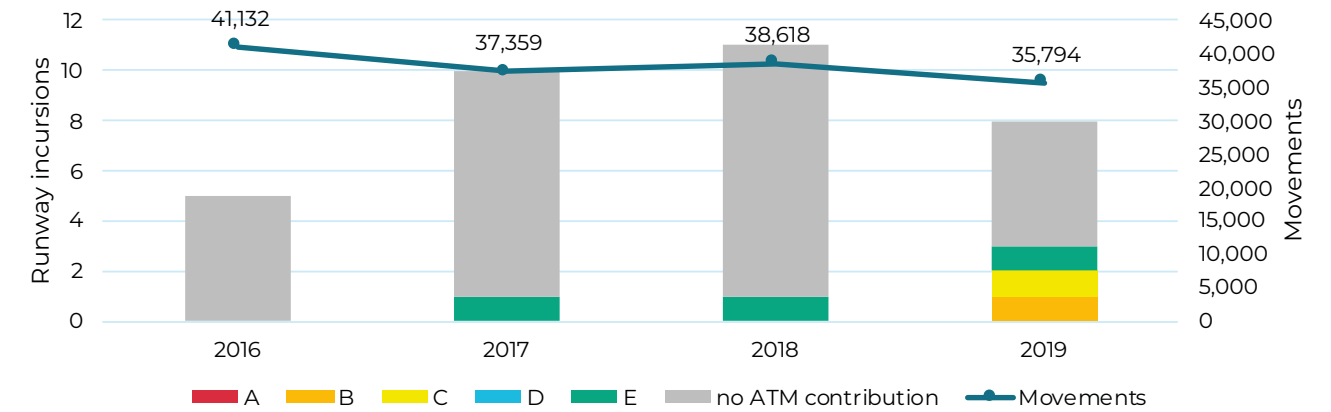


Figure 2-4: Runway incursions 2016-2019, per year, per category

A better way to compare this KPI with other airports is through the rate of runway incursions. Figure 2-5 shows the rate per 100,000 movements for Antwerp airport for the years 2016 until 2019. The same trend is seen as in the graph showing the absolute figures (Figure 2-4) regarding total rates. In 2019 the rate of

RI with ATM contribution achieved, together with Ostend, the greatest levels in the country. The rate of RI with no ATM contribution was however more than double than for the airports of Ostend, Charleroi and Liège that are also not equipped with a ground radar.

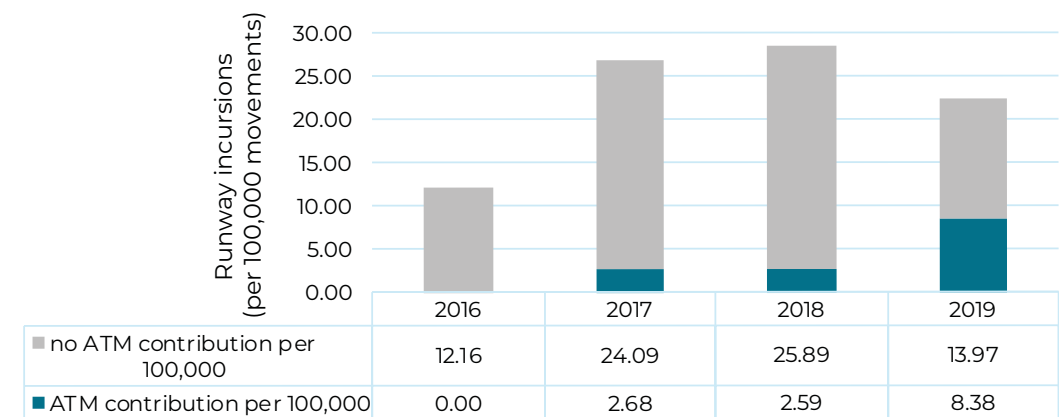


Figure 2-5: Rate of runway incursions per 100,000 movements 2016-2019, per year



## Safety recommendations implemented

After each RI, an investigation is conducted at skeyes and the event is discussed in the Local RWY Safety Team (LRST) meetings organised by the airport. All stakeholders are present in those meetings (flying schools, flight companies, handling agents, airport, skeyes,...). Discussing the RIs and the recommendations resulting from the investigations during these meetings creates an overall awareness to all stakeholders.

Regarding the RIs with ATM contribution, measures have been taken by skeyes to improve safety.

After the RI of severity B which occurred in May 2019, a personal debriefing of the reporter was made. The occurrence was presented during the yearly safety refresher course (Autumn 2019) to disseminate lessons learned to all the EBAW ATCOs and create awareness. As part of an awareness campaign, a movie was sent to all ATCOs and posters placed in each unit. An awareness leaflet was made and distributed by the safety and training departments. Further dissemination will take place during the safety refresher courses of 2020.

In September, an incident of severity E took place. The occurrence was presented during the yearly safety refresher course (Autumn 2019) to disseminate lessons learned to all EBAW ATCOs. As phraseology was a contributory factor, taxi instructions using TWY G were revised.

Regarding the RI of severity C in October, recommendations include the presentation of the occurrence in the yearly safety refresher course of 2020. This RI was linked to a complex situation that was created because of a loss of the public electrical system. Therefore, a specific module on how to react in case of a power failure will be added to the ATCO refresher course, explaining also the different layers of redundancy in the power supply and the guaranteed autonomy.



## 3. CAPACITY & PUNCTUALITY

*This chapter is divided into two sections. In the first part, the airport capacity is addressed. The declared capacities for runways 11 and 29 are given and analysed, taking as reference the number of movements during peak hours in the busiest month.*

*In the second section, the punctuality (arrival delay) at EBAW is studied. The delay is also analysed from the airport's point of view, i.e. considering the impact caused by regulations not only at EBAW, but also in the Belgian en-route airspace and by other air navigation service providers.*



## Airport Capacity

A performance indicator for airports is the throughput capacity and its utilisation. The throughput capacity of an airport is influenced by several factors, e.g. airport layout, weather, fleet mix, ATC procedures, etc.

To better understand the following section, some definitions are given first:

### Capacity

Aerodrome capacity is the estimated number of total operations that a given aerodrome configuration can handle in a given period of time and under a given set of assumptions, which are fleet mix, separation minima rules, weather conditions and technological aids.

### Maximum Throughput (or Saturation) Capacity

Maximum Throughput Capacity (MCT) is the fundamental measure of the runway system's capacity. MCT defines the average number of movements (arrivals and/or departures) that can be performed on the runway system in one hour. Following assumptions are made:

- There is a continuous supply of arrivals and/or departures
- Air Traffic Control rule - no Simultaneous Runway Occupancy (SRO)
- Air Traffic Control rule - safe Wake Vortex Separation Distances between two flights
- Static fleet mix (i.e. types of aircraft do not change)
- Approach and departure procedures do not change.

As a consequence, MCT is a theoretic measure of runway capacity and is represented as an average capacity for the runway system.

### Declared Capacity

Declared capacity is the capacity per hour used to determine the number of slots available for schedule coordination purposes.

For the declared capacity of 2019, the figures of 2018 were taken, as the assumptions and conditions did not change.

For Antwerp airport, the declared capacities for each runway threshold have been calculated as being 90% of the theoretical MCT. For the calculations of the MCT, on top of the above-mentioned assumptions, the following was considered:

- The fleet mix of the busiest month in 2018 is taken as reference (IFR traffic only).
- A nominal radar separation of 3NM is taken into account.
- A loss factor of 15% is considered for inter arrival times.
- The average runway occupancy time for arrival (ROTA) is based on assumptions.
- The average approach speed is 112 knots (based on measurements).
- The average headwind differs per runway.
- The inter departure time is a function of the time to reach an altitude after being cleared for T/O.

Table 3-1 shows the declared capacities depending on the runway configurations in Antwerp airport. Only IFR traffic has been considered in the

calculations, the declared capacity will therefore be referred to “declared IFR capacity”.

Table 3-1: Declared IFR capacity

Runway configuration	Runway		Declared Capacity		
	DEP	ARR	DEP	ARR	MVT
<b>RW29</b>	29	29	27	17	41
<b>RW11</b>	11	11	27	17	41

Details for the month of August the busiest month of the year, are presented below. In fact, Figure 3-1 shows the number of arrivals and departures, along with the runway configuration and the resulting declared IFR capacity for the peak hour of each day of the month.

A peak hour is determined on a 15 minutes floating basis.

The overview of the year can be found monthly in Annex 1.

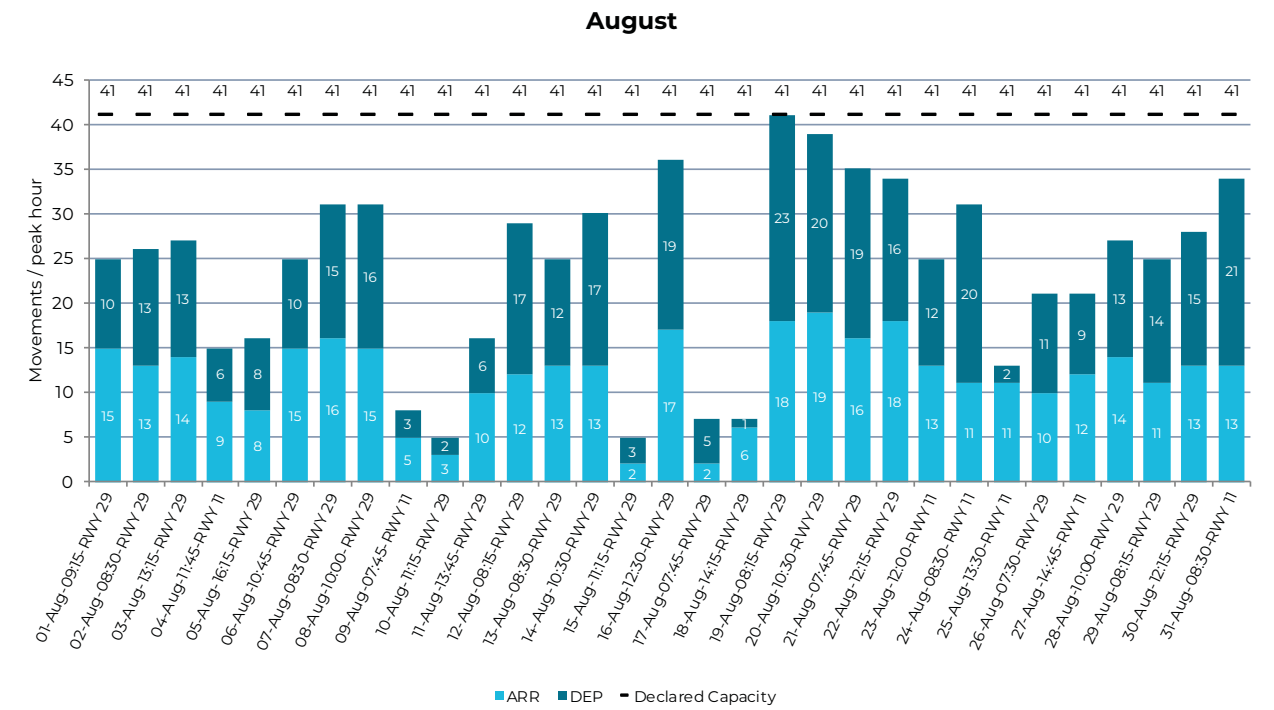


Figure 3-1: Arrivals, departures and declared capacities during peak hours in August 2019

The declared capacity was reached on one day only, the 19<sup>th</sup> of August.

The highest traffic per peak hour happened on the 23<sup>rd</sup> of October, with 45 movements. On two more days, the 16<sup>th</sup> and 23<sup>rd</sup> of November, the declared IFR capacity was exceeded by two movements. However, at the peak hour of those days, almost

only VFR flights were recorded, which impacts on the capacity of the airport; with VFR flights only, the capacity could be higher. It can be concluded that the declared IFR capacity was, in fact, not exceeded.

On average in 2019, the traffic at peak hours was 21.4 movements below the declared IFR capacity.

## Punctuality

Punctuality can be seen as a service quality indicator from a passenger perspective. This section observes one of the factors that influences the punctuality: ATFM (Air Traffic Flow Management) delay. ATFM delay is defined as the time difference between estimated take-off time (ETOT) and calculated take-off time (CTOT) of the NM (Network Manager, EUROCONTROL) and is due to ATFM measures that are classified according to the respective causes listed below:

- A - Accident
- C – ATC Capacity
- D - De-icing
- E - Equipment (non-ATC)
- G – Aerodrome Capacity
- I - Industrial Action (ATC)
- M - Airspace Management
- N - Industrial Action (non-ATC)
- O - Other
- P - Special Event
- R – ATC Routeing
- S – ATC Staffing
- T - Equipment (ATC)
- V – Environmental Issues
- W - Weather
- NA - Not Specified.

According to the FABEC Performance Plan the causes with ANSP contribution are (in the order listed in the Performance Plan):

- C – ATC Capacity
- R – ATC Routeing
- S – ATC Staffing
- T - Equipment (ATC)
- M - Airspace Management
- P - Special Event.

Hence, in the remainder of the report all causes with ANSP contribution are referred to as “CRSTMP”, while “Other Categories” aggregates all categories but CRSTMP and W (weather).

The discussion in this subchapter starts with the key performance indicator arrival delay, the delay of a flight due to a regulation placed by the airport of arrival. In addition, this section gives an overview of the influence of ATFM measures on departing traffic followed by an overview of the influence of ATFM measures on arriving traffic.

### Airport arrival ATFM delay per flight

As of January 1st 2015 skeyes is subject to an annual target with regard to ATFM arrival delay. The target is defined as average arrival delay per flight, as defined in the FABEC Performance Plan, §3.1. (C). (ii), which is in accordance with the European Performance Regulation (EU) No 390/2013, Annex 1, Part 2, §3.1 (b).

Targets are set on a national level and on an airport level. On an airport level, only Brussels airport and Liège airport have targets for the arrival ATFM delay. However, as part of a continuous monitoring of the ANSP’s performance, skeyes registers the arrival ATFM delays for Antwerp airport, as an internal performance indicator. The national target is the aggregation of the airport targets and is 0.10 minutes/flight for the period from 2016 until 2019.

The arrival delay for each flight is calculated by the NM and has been provided by the Performance Re-

view Unit (PRU / EUROCONTROL). In 2019 there was no regulation put in place at the airport for arriving traffic. There was in the last four years only one airport regulation which caused delay at Antwerp airport. This regulation was due to works on runway 11/29 (NOTAM A2339/18) and caused 123 minutes. The regulation was in place on August 20<sup>th</sup> 2018 between 18:00 and 20:30 local time, under the reason G-Aerodrome Capacity.

### All ATFM delay affecting departures

Flights departing an airport can be delayed by ATFM measures in any of the sectors they cross on their route. In 2019, 890 departing flights from Antwerp airport were delayed resulting in a total of 15,676 minutes of delay for the departing traffic. 33.2% (5,201 minutes) of the minutes is attributable to skeyes while 66.8% (10,475 minutes) is attributable to other ANSPs. Figure 3-2 shows the ATFM delay attributable to skeyes and other ANSPs.

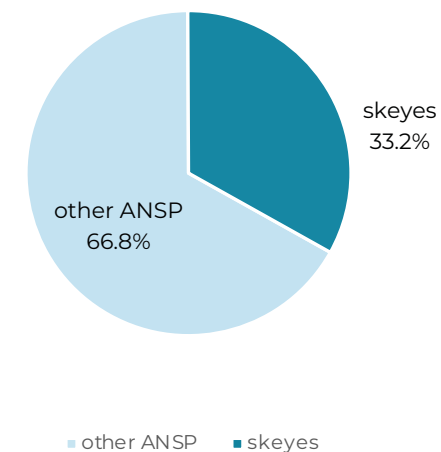


Figure 3-2: ATFM delay for departing flights attributable to skeyes and other ANSPs

To give a view of the severity of the impact, the delayed flights can be categorised based on the length of the delay (Figure 3-3).

There are four categories:

- Between one and 15 minutes
- Between 16 and 30 minutes
- Between 31 and 60 minutes
- More than 60 minutes.

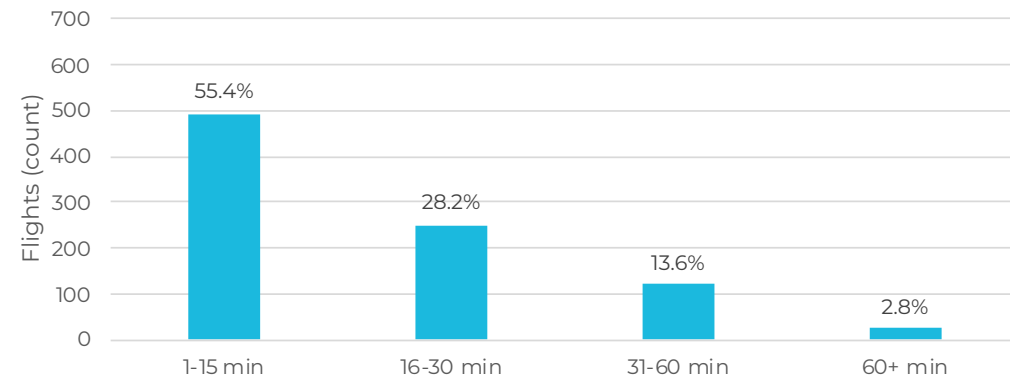


Figure 3-3: Delayed departing flights per category

Based on the graph in Figure 3-3, the conclusion is that the majority of the delayed flights have a delay of maximum 15 minutes. 83.6% of the delayed flights

did not have a delay that exceeded 30 minutes and less than 3.0% of the delayed flights had a delay that exceeded one hour.

### All ATFM delay affecting arrivals

Flights arriving at an airport can be delayed by ATFM measures in ATC sectors on the flight plan (en-route delays) and arrival delays which are caused by the airport of arrival. This section observes the delay of arriving traffic at Antwerp airport.

In 2019, 400 flights with destination Antwerp airport were delayed and experienced a total of 16,763 minutes of delay. 35.6% (5,969 minutes) of that delay was due to ATFM measures by skeyes and 64.4% (10,794 minutes) was due to ATFM measures by other ANSPs. This is illustrated in Figure 3-4.

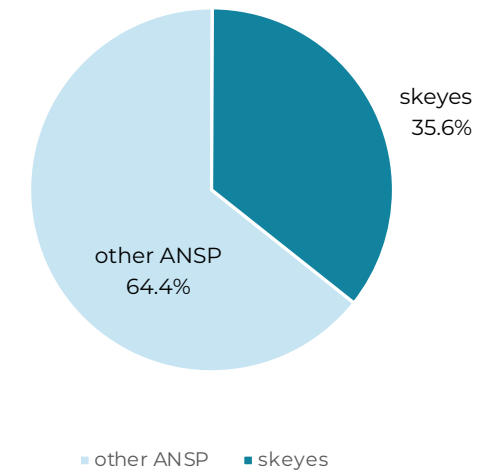


Figure 3-4: AFTM delay for arriving traffic attributable to skeyes and other ANSPs

Delayed flights can be categorised based on the length of the delay, see Figure 3-5. There are four categories:

- Between 1 and 15 minutes
- Between 16 and 30 minutes
- Between 31 and 60 minutes
- More than 60 minutes.

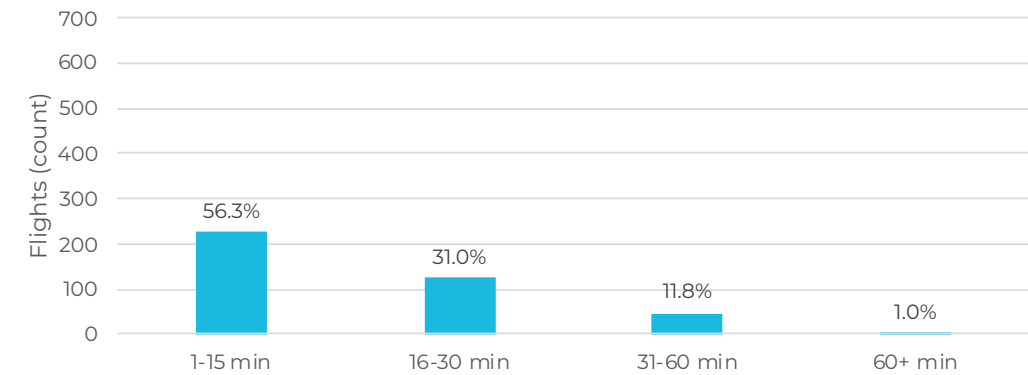


Figure 3-5: Delayed arriving flights per category

The graph in Figure 3-5 shows that the majority of the delayed arrivals had a delay of maximum 15 minutes. 87.3% did not have a delay that exceeded 30 minutes and 1.0% had a delay of more than one hour.

## 4. ENVIRONMENT

*Because of its geographical location in a densely populated area, it is important to consider noise distribution around the airport. There is as such a preferential runway system in place at EBAW which is monitored in this chapter. Night movements are also looked at in this chapter.*

*An overview of predominant winds is also provided, as wind is a leading factor in the choice of runway use.*

## Preferential Runway System

As mentioned in the Aeronautical Information Publication (AIP) (AD 2.20, Ch. 4.1), a preferential runway system (PRS) is in place in Antwerp. With weather and traffic permitting, aircraft exceeding a 5,700 kg weight shall use RWY 11 in preference to RWY 29 when departing.

Figure 4-1 shows the number of departures for the two runways, 11 and 29, with the distinction VFR/IFR. This distinction is made as VFR traffic are usually light aircraft weighing less than 5,700 kg. The number of IFR departures decreased by 27% on runway 11 and increased slightly (2%) on runway 29.

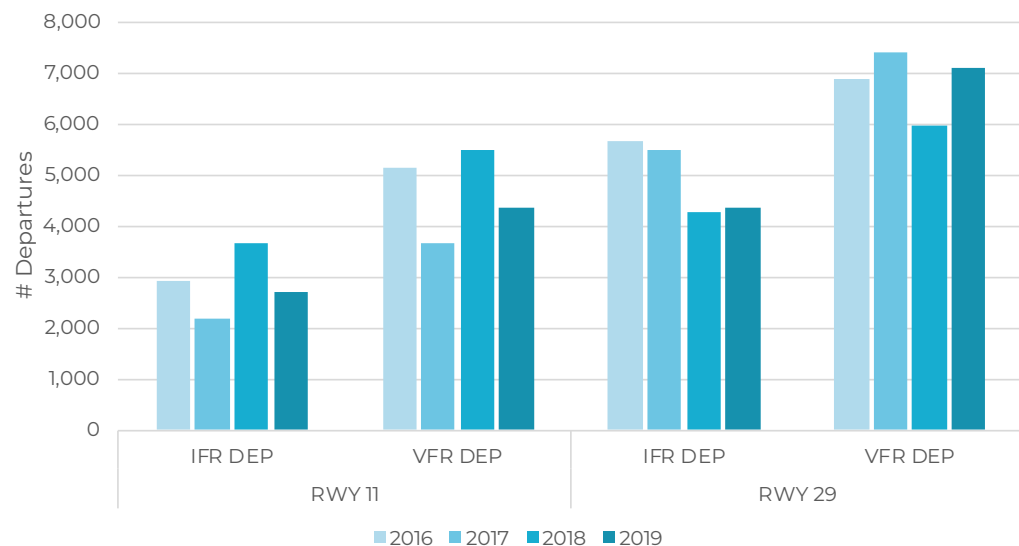


Figure 4-1: Number of departures from EBAW per flight rules and RWY threshold

## Fewer night movements in 2019

The normal operational hours of Antwerp airport are from 06:30 to 23:00 Local Time (AIP, AD 2.3). However, it can happen that a flight is delayed and the airport remains open until this flight takes-off or lands.

The figures of 2019 show a considerable decrease in the amount of night movements compared to previous year, with very similar numbers to 2017. In total, eight (8) movements were registered, seven (7) of which between 23:00 and 00:30, and one (1) movement was registered between 01:00 to 01:30.

In order to observe how the amount of night movements evolved over the previous years, Figure 4-2 shows the number of movements outside normal operational hours.

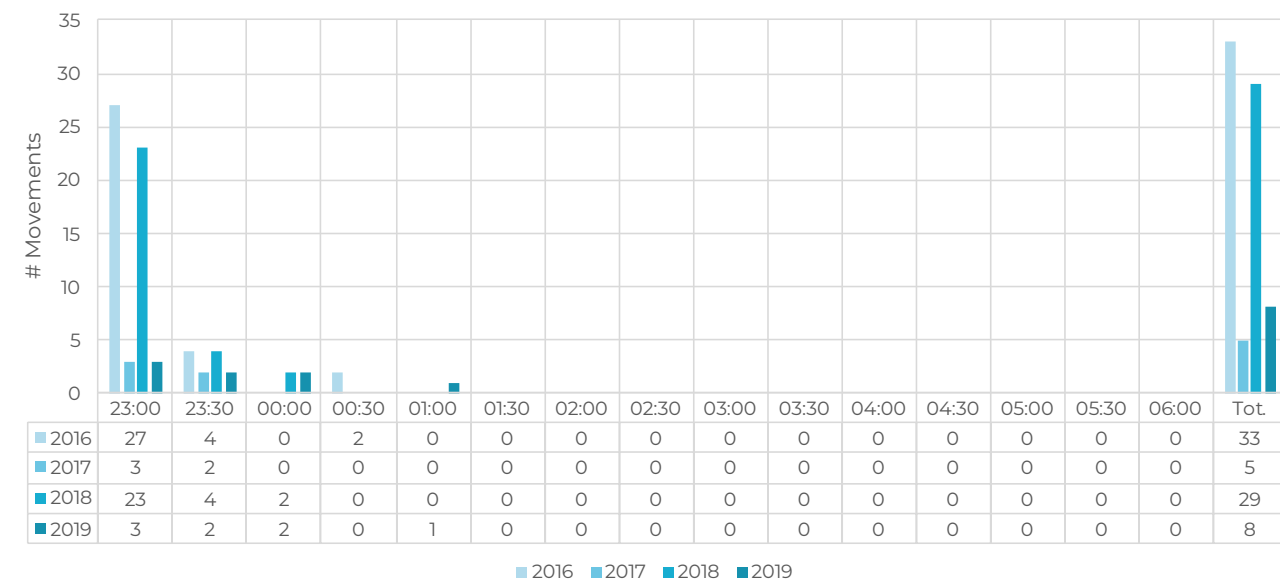


Figure 4-2: Number of movements between 23:00 and 06:30 (hour indicates start time of 30 minutes period)



## A return to south westerly winds in 2019

The clear predominance of south westerly winds returned in 2019, as registered in 2016 and 2017. This shows a contrast with 2018 where there was

no clear main direction of the wind. It explains the increase in the usage of RWY 29 this year compared to 2018.

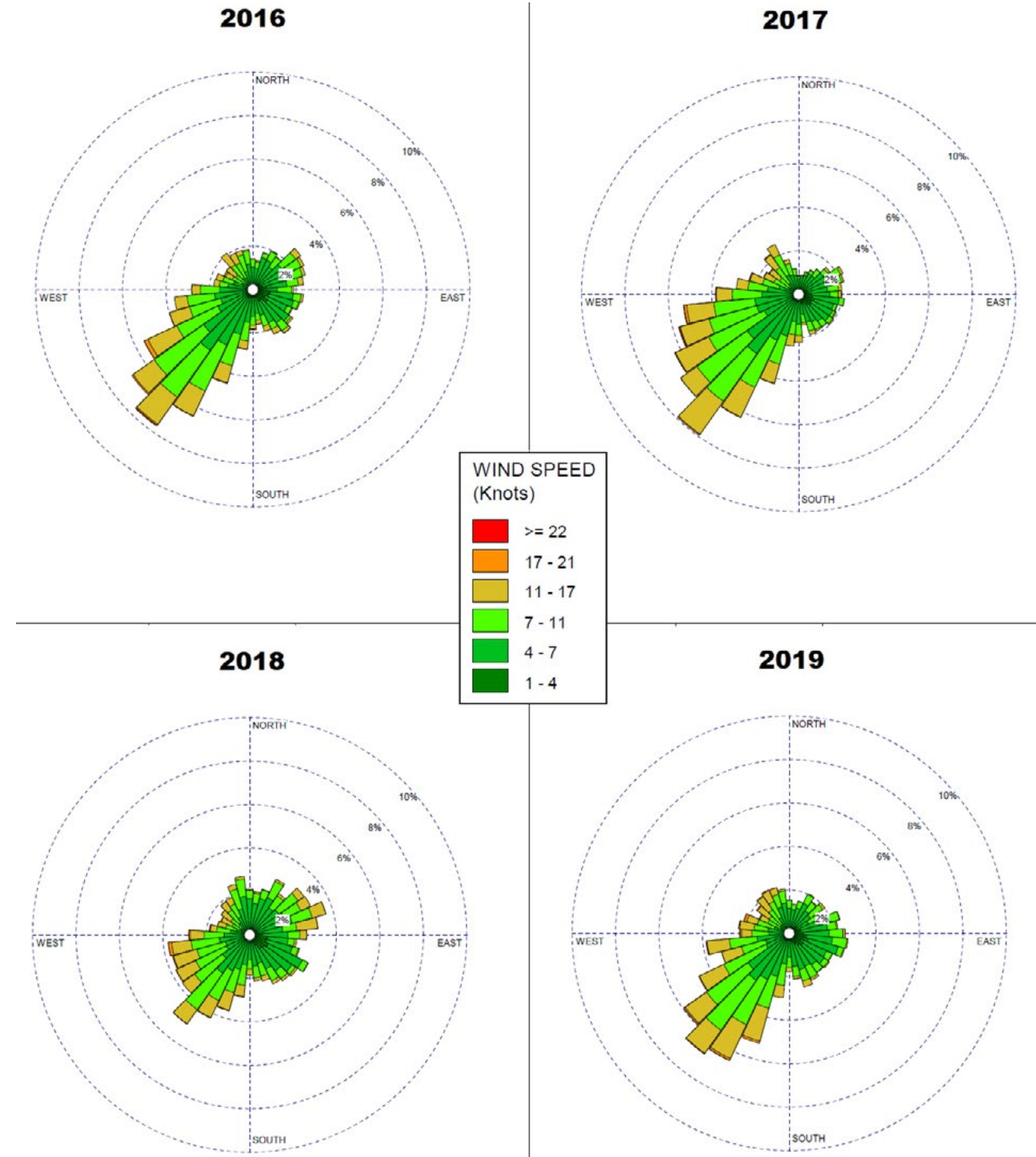


Figure 4-3: Wind roses EBAW 2016-2019

As shown in the first chapter, the runway usage in Antwerp changed in April, when RWY 11 was the most used. This was due to the change in the wind

direction, which came exceptionally from east/north east during that month.

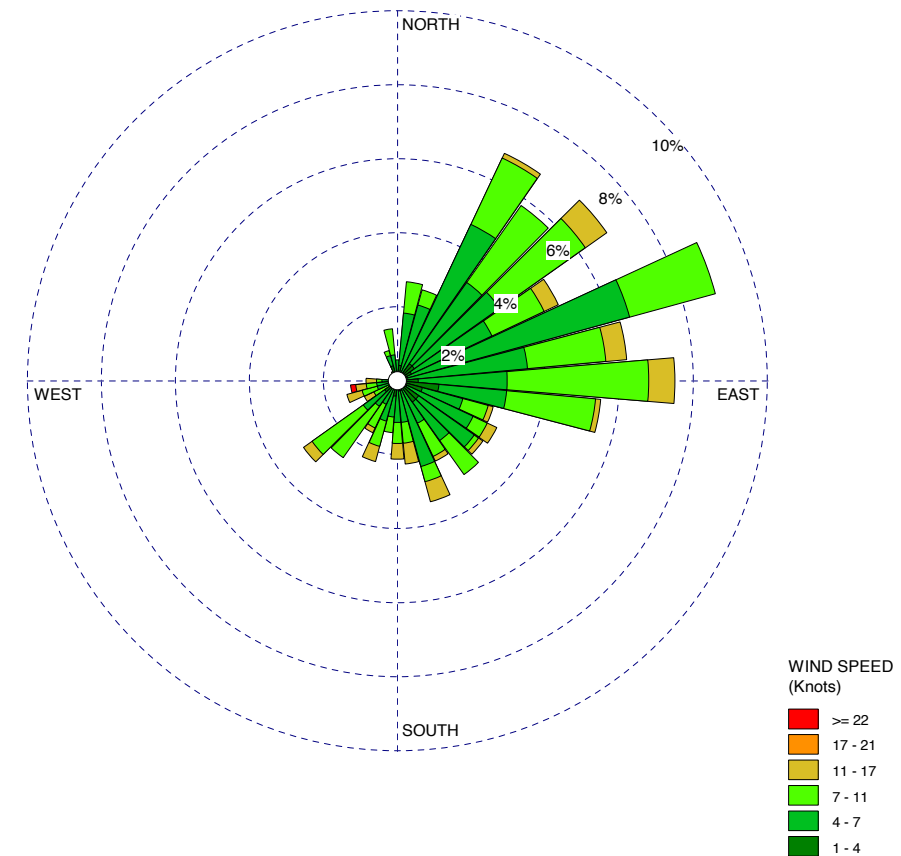
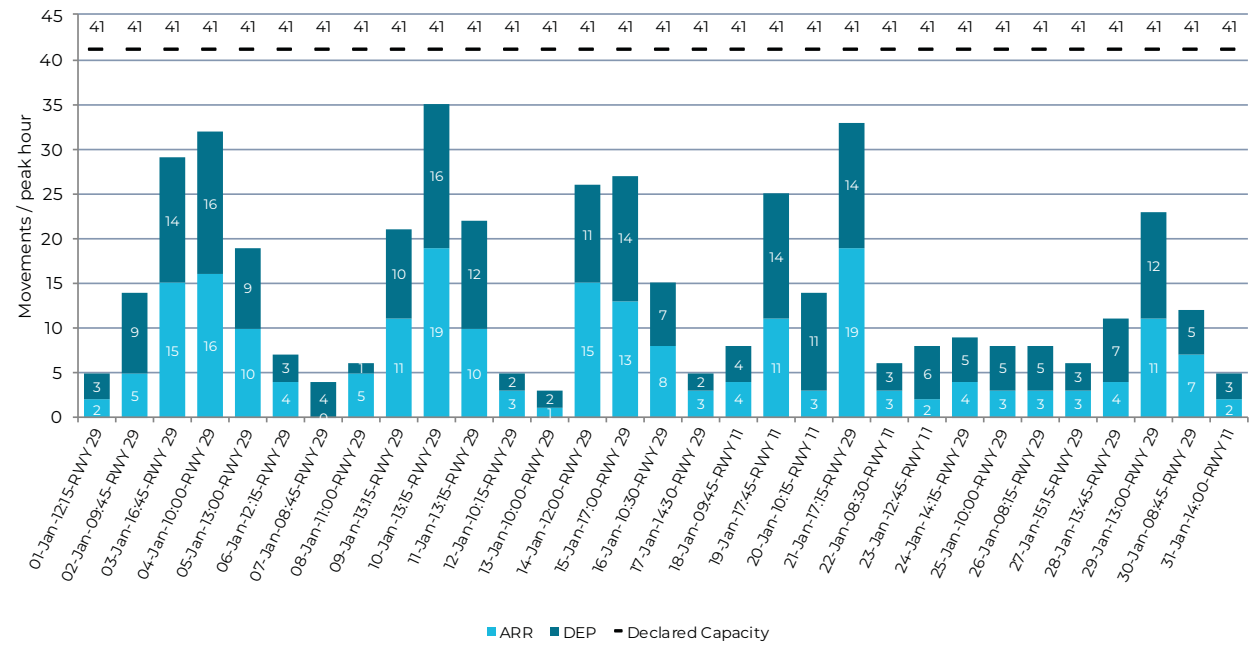


Figure 4-4: Wind rose EBAW April 2019

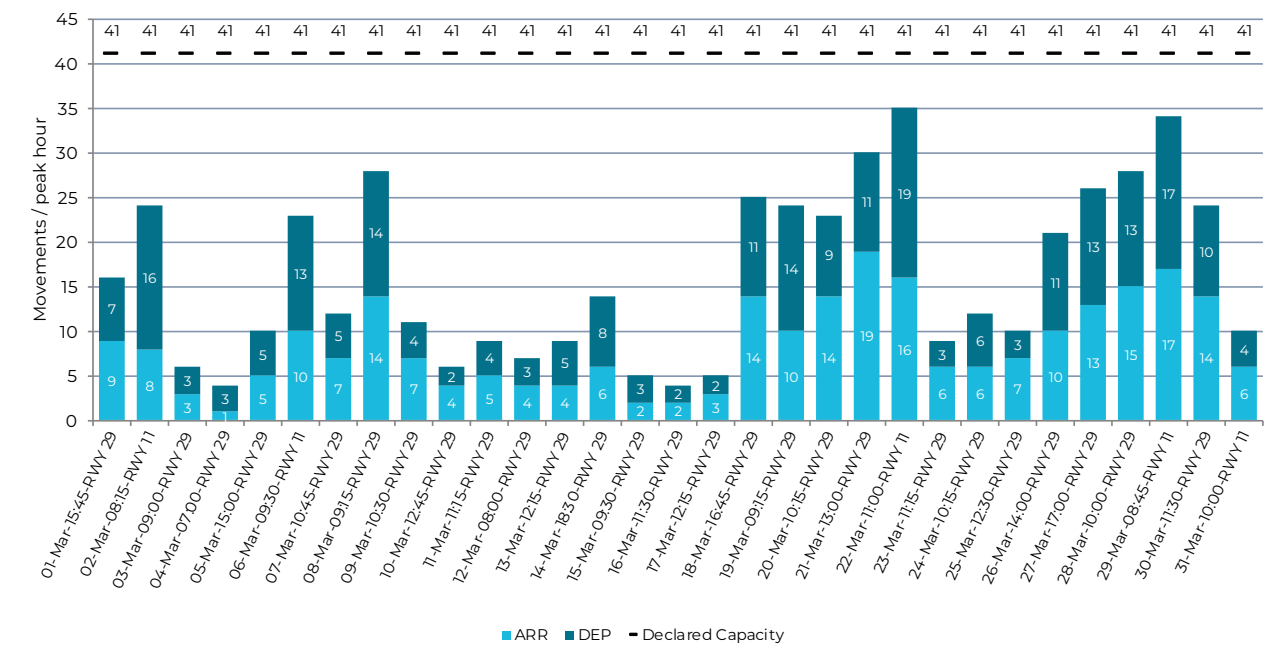
**ANNEX**

# Annex 1: Monthly overview of arrivals and departures at peak hours

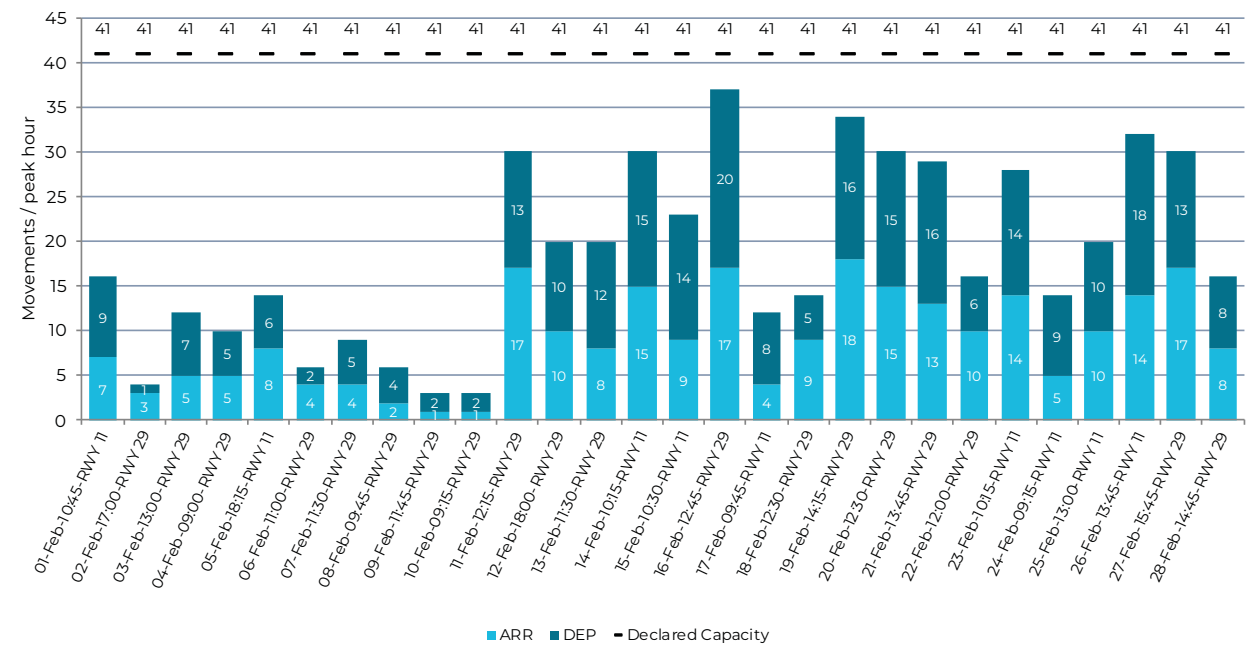
January



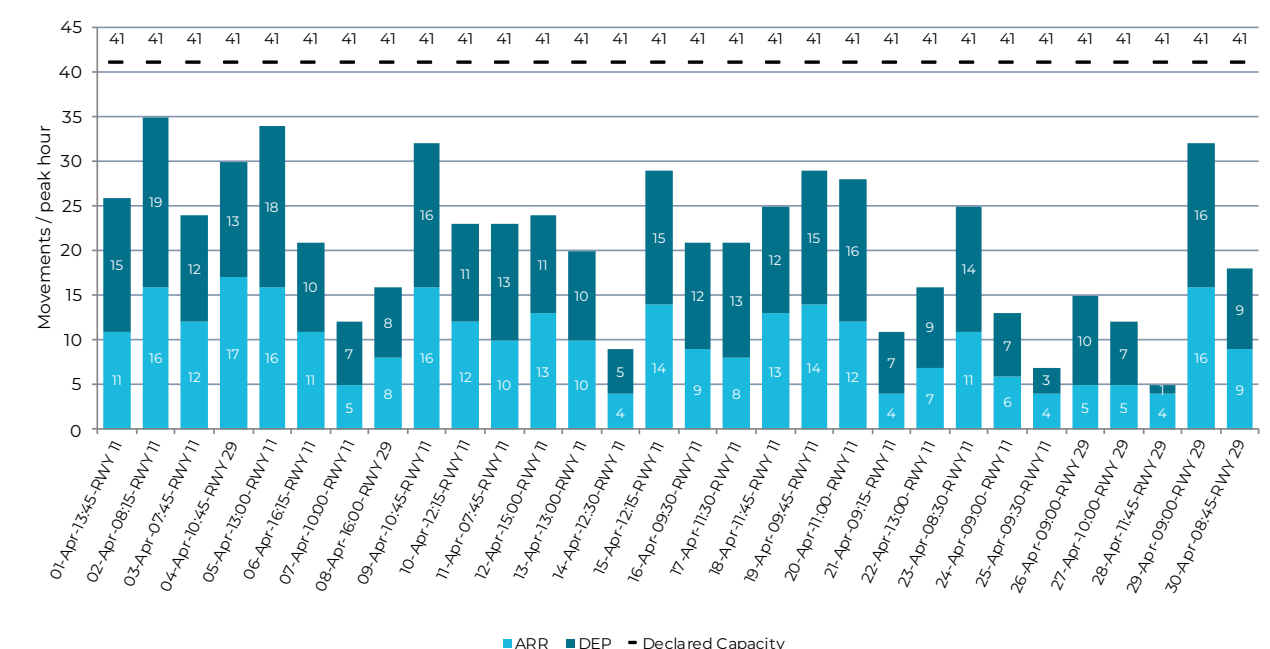
March



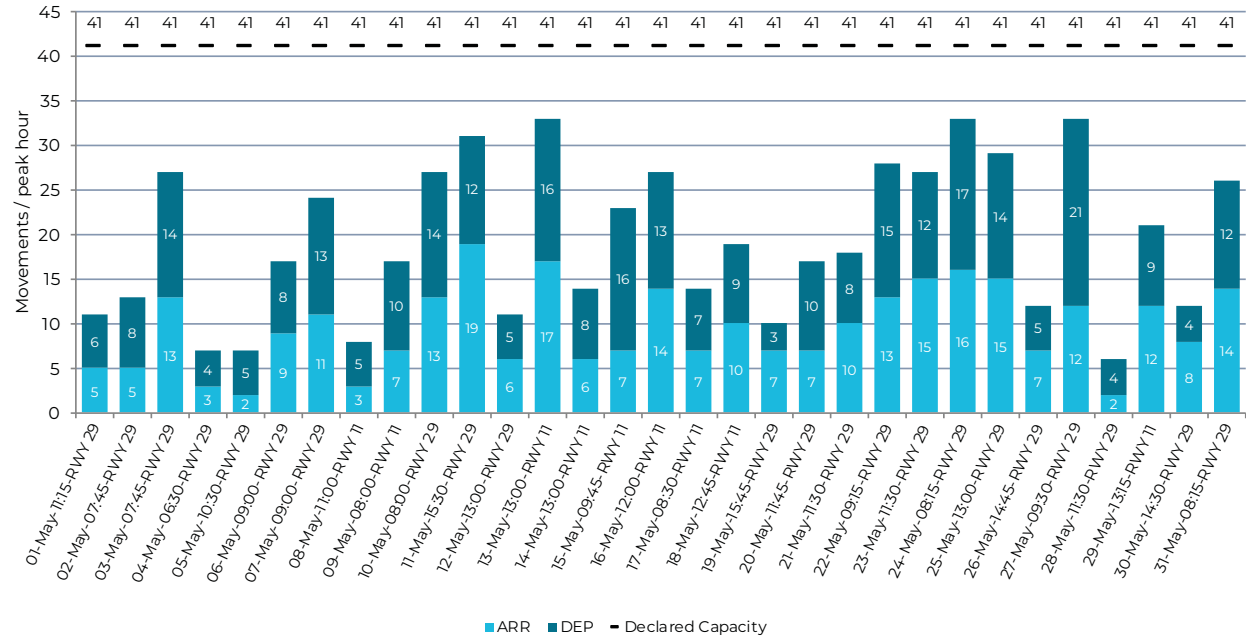
February



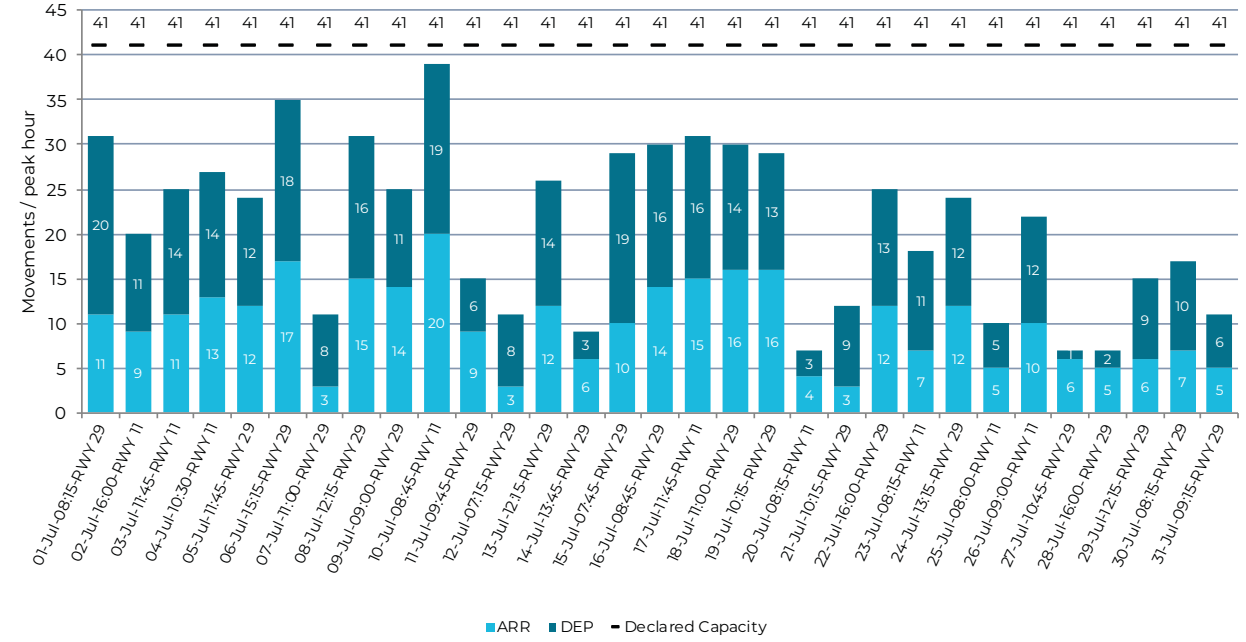
April



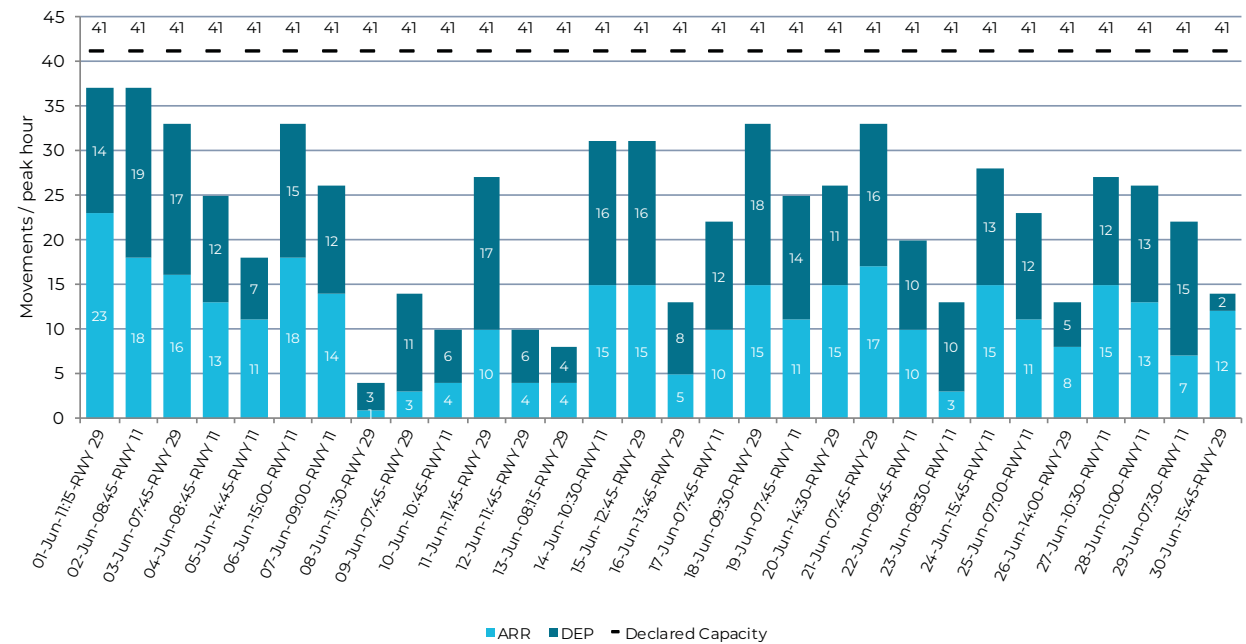
### May



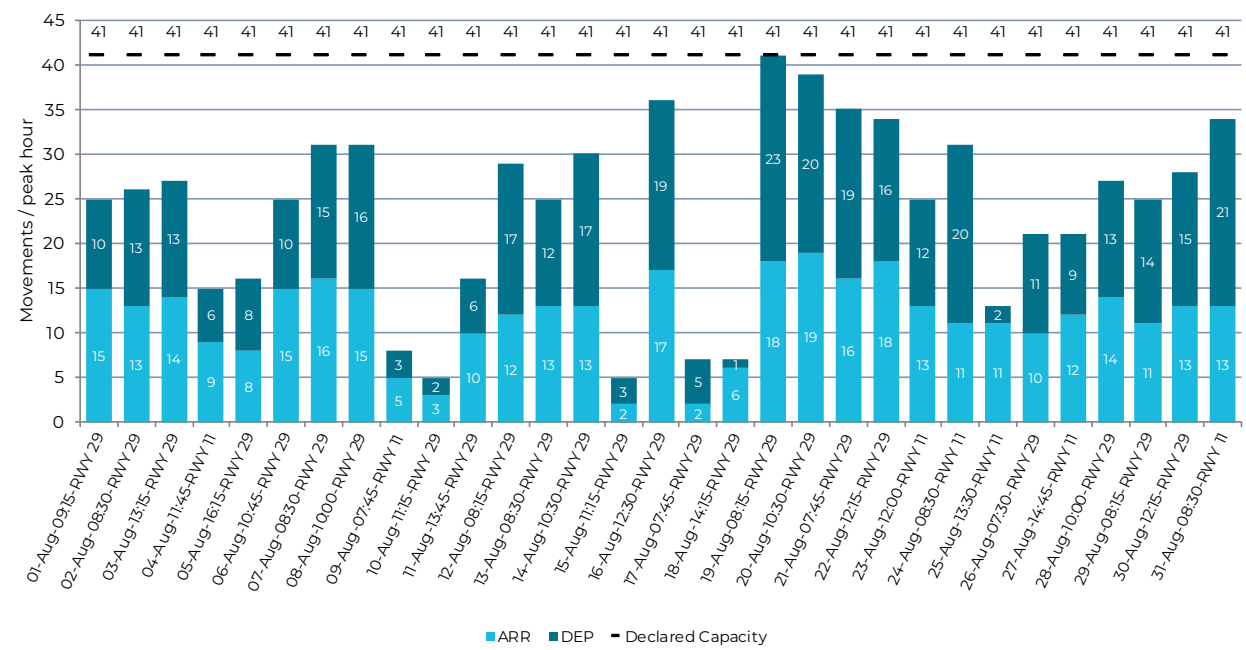
### July



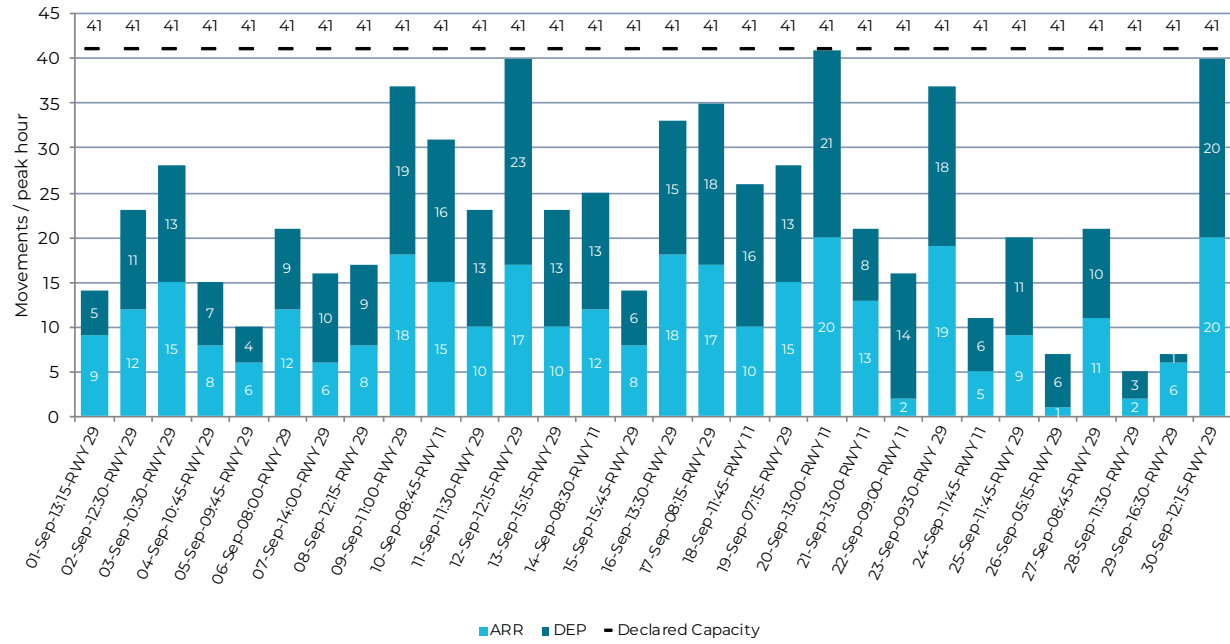
### June



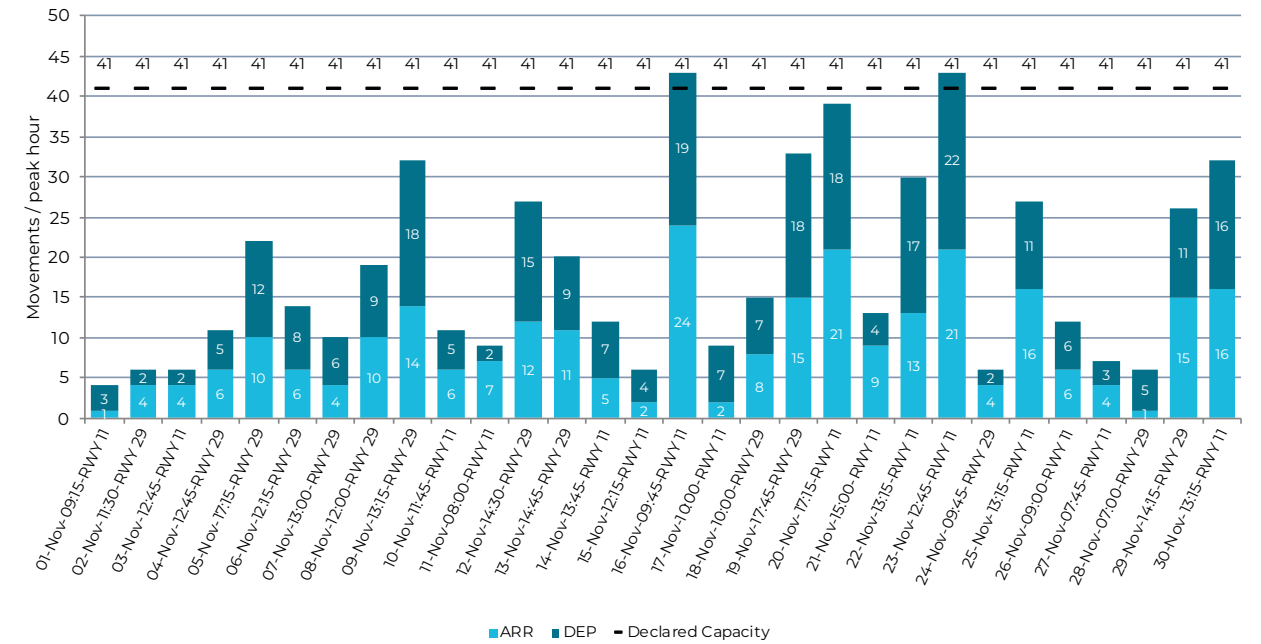
### August



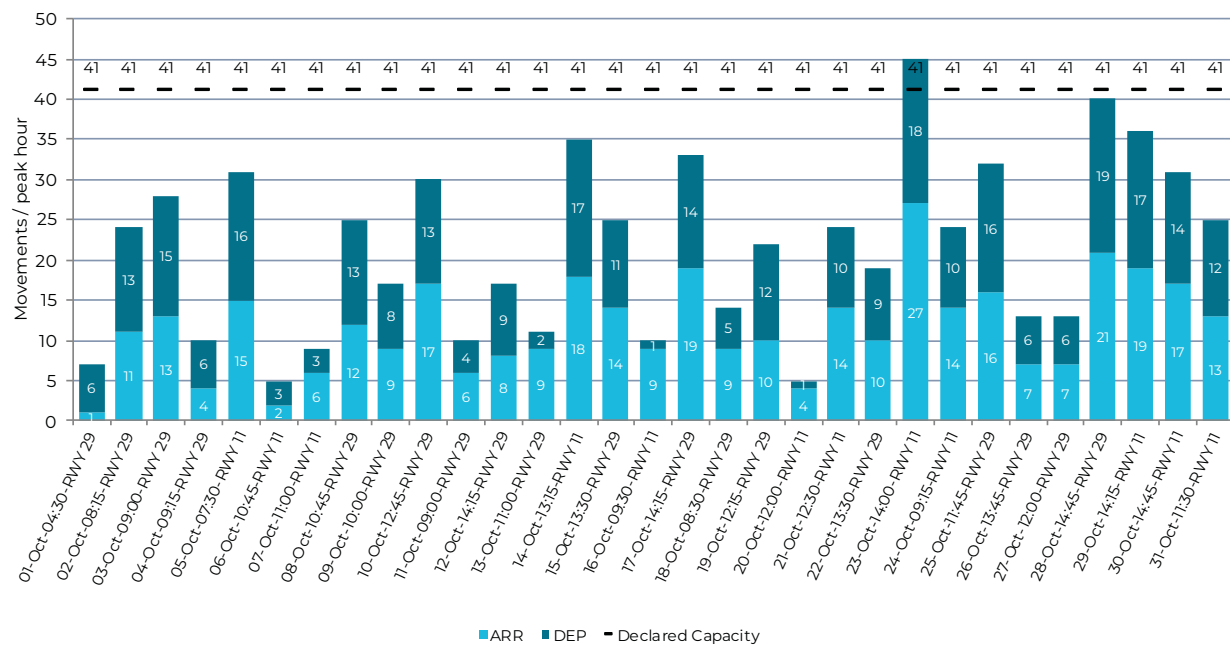
### September



### November



### October



### December

