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Runway Performance Report **2023**

# ANTWERP AIRPORT

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Runway performance report

# Antwerp Airport

# EXECUTIVE SUMMARY

The global aviation industry is experiencing a swift resurgence and throughout Europe traffic levels of 2019 are being reached. Remarkably, Antwerp Airport had already surpassed 2019 traffic since 2021. Despite this positive trajectory, the year 2023 witnessed a substantial decline in traffic, primarily attributed to a notable decrease in Visual Flight Rules (VFR) activity compared to the preceding year.

This report gives an overview of skeyes' operations at Antwerp Airport (ICAO code: EBAW) for 2023 covering traffic analyses and providing relevant data on the performance of Air Traffic Management (ATM). ATM performance is driven by four Key Performance Areas (KPAs): safety, capacity, environment and cost-efficiency. This report aims to provide information on three of the four KPAs: safety, capacity and environment.


## Traffic

The traffic levels in Antwerp Airport in 2023, exceeded those of 2019 and 2020, but fall below 2021 and 2022. skeyes controlled 36,153 movements at Antwerp Airport in 2023. It experienced a significant -11% dip from 2022 but a 1% rise from 2019. Simultaneously, Instrument Flight Rule (IFR) traffic showed a nuanced -2% shift from 2022 and a more pronounced 5% decrease from 2019. VFR traffic dominates Antwerp Airport in 2023, accounting for approximately 63% of total traffic in 2023. However, a discernible -15% downturn in VFR activity, compared to the previous year, is noteworthy. This decline is primarily ascribed to adverse weather conditions, notably in the months of March and July.

In terms of runway use, runway 29 saw a 55% usage rate, with the highest usage rate in the month of July.

## Safety

Two types of events are analysed in this report, both giving a view on airport safety performance: missed approaches and runway incursions. The rate of missed approaches has held steady at 2.1 missed approaches per 1,000 arrivals compared to 2022. The primary cause for missed approaches is unstable approach, which accounts for 55% of occurrences in 2023. This may stem from the prevalence of training flights at Antwerp, potentially involving less experienced pilots. Notably, unstable approaches have increased from 15 to 21 compared to 2022.
There were eight runway incursions of which two had an ATM contribution. Most of the runway incursions happened with pilots taking off without clearance, or misunderstanding the air traffic controller's instructions. One runway incursion was classified as a Major Incident (B). This runway incursion happened when one aircraft was cleared to land while another was already lined up for take-off. The one landing did a go-around after getting a visual on the lined-up one. This occurred at the same time as a fire resulting in a lot of smoke in the Control Zone (CTR). Another runway incursion was classified as a Significant Incident (C). This occurrence happened when one aircraft was cleared for landing while an inspection car had not vacated the runway yet. The inspection car immediately vacated the runway via a taxiway and the aircraft landed safely.

## Capacity and Punctuality

Capacity and delay go hand in hand when it comes to runway performance. The throughput capacity of the airport is analysed, comparing actual traffic with the declared IFR capacity. Even though the theoretical IFR capacity was reached or exceeded on 12 occasions, the movements at these peak moments were almost all VFR movements, meaning that the aerodrome was not at its IFR capacity limit.

While there are no targets set by the Functional Airspace Block Europe Central (FABEC) performance plan on Antwerp Airport, as part of a continuous monitoring of the ANSP's performance, skeyes registers the arrival Air Traffic Flow Management (ATFM) delays for Antwerp Airport, as an internal performance indicator. There has been no arrival delay recorded since 2018.

For information purposes, the report also provides an indication of how traffic bound to or taking off from Antwerp Airport, with a flight plan submitted to the Network Manager, was affected by ATFM delay, and indicates which share of this delay was caused by regulations placed by skeyes. In 2023, flights departing from Antwerp Airport experienced a total of 16,007 minutes of ATFM delay, of which 7.4% was attributable to skeyes. Arriving flights encountered a total ATFM delay of 14,868 minutes, with 5.5% resulting from ATFM measures placed by skeyes.

## Environment

The Preferential Runway System (PRS) in Antwerp indicates that aircraft exceeding 5,700kg should use runway 11 for take-off if conditions permit – crosswind not exceeding 15 knots, or tailwind, including gusts, not exceeding 5

# SAMENVATTING

De wereldwijde luchtvaartindustrie beleeft een snelle heropleving en in heel Europa worden de verkeersniveaus van 2019 bereikt. Opmerkelijk is dat de luchthaven van Antwerpen het verkeersvolume van 2019 al sinds 2021 had overtroffen. Ondanks dit positieve traject stond het jaar 2023 in het teken van een substantiële daling van het vliegverkeer, die voornamelijk toe te schrijven was aan een opmerkelijke implosie van de VFR-activiteit (Visual Flight Rules, zichtvliegvoorschriften) ten opzichte van het voorgaande jaar.

Dit verslag biedt een overzicht van de activiteiten van skeyes op de luchthaven van Antwerpen (ICAO-code: EBAW) voor 2023, met verkeersanalyses en relevante data over de prestaties inzake luchtverkeersbeheer (Air Traffic Management, ATM). Die prestaties worden bepaald door vier prestatiekerngebieden (KPAs, Key Performance Areas): veiligheid, capaciteit, milieu en kostenefficiëntie. Dit verslag beoogt informatie te verstrekken over drie van de vier prestatiekerngebieden: veiligheid, capaciteit en milieu.


## Verkeer

De verkeersniveaus op de luchthaven van Antwerpen lagen in 2023 hoger dan die van 2019 en 2020, maar doken onder die van 2021 en 2022. skeyes controleerde 36.153 bewegingen op de luchthaven van Antwerpen in 2023, waarbij een significante krimp met -11% ten opzichte van 2022 werd opgetekend; in vergelijking met 2019 bedroeg de stijging echter 1%. Tegelijkertijd vertoonde het IFR-verkeer (Instrument Flight Rules, instrumentvliegvoorschriften) een ietwat genuanceerd beeld van -2% ten opzichte van 2022 en een meer uitgesproken daling met -5% ten opzichte van 2019. Het VFR-verkeer domineerde de luchthaven van Antwerpen in 2023, goed voor ongeveer 63% van het totale verkeer in 2023. Een duidelijk te onderscheiden neergang van de VFR-activiteit met -15 %, vergeleken met het voorgaande jaar, was echter opmerkelijk. Hij was voornamelijk toe te schrijven aan ongunstige weersomstandigheden, met name in de maanden maart en juli.

Wat het baangebruik betreft, werd baan 29 voor 55% gebruikt, een percentage dat het hoogst opliep in de maand juli.

## Veiligheid

In dit verslag worden twee types van voorvallen geanalyseerd, met name de afgebroken naderingen en runway incursions, die beide een beeld geven van de prestaties inzake veiligheid op de luchthaven. Het aantal afgebroken naderingen is stabiel gebleven op 2,1 per 1.000 aankomsten, vergeleken met 2022. De belangrijkste oorzaak voor afgebroken naderingen zijn de onstabiele naderingen, goed voor 55% van de voorvallen in 2023. Dat kan het gevolg zijn van het overwicht aan trainingsvluchten in Antwerpen, waarbij mogelijk minder ervaren piloten betrokken zijn. Dergelijke instabiele naderingen stegen met name van 15 naar 21 in vergelijking met 2022.
Er deden zich acht runway incursions voor, waarvan slechts twee met een ATM-bijdrage. De meeste runway incursions gebeurden doordat piloten zonder klaring opstegen of de instructies van de luchtverkeersleider verkeerd begrepen. Eén runway incursion werd geklasseerd als een belangrijk incident (B). Het deed zich voor toen één vliegtuig een landingsklaring kreeg terwijl een ander al opgelijnd stond om op te stijgen. Het landende vliegtuig maakte een doorstart (go-around) nadat diens piloot het opgelijnde vliegtuig gespot had. Tegelijkertijd ontstond er een brand die voor veel rookontwikkeling zorgde in de Control Zone (CTR). Een andere runway incursion werd geklasseerd als significant incident (C). Dat voorval deed zich voor toen een vliegtuig een landingsklaring kreeg terwijl een inspectievoertuig de landingsbaan nog niet vrijgemaakt had. Het inspectievoertuig maakte de landingsbaan onmiddellijk vrij via een taxibaan en het vliegtuig landde veilig.

## Capaciteit en stiptheid

Capaciteit en vertraging gaan hand in hand als het gaat om de prestaties op start- en landingsbanen. De doorvoercapaciteit van de luchthaven wordt geanalyseerd door het werkelijke verkeer te vergelijken met de opgegeven IFR-capaciteit. Ook al was de theoretische IFR-capaciteit 12 keer bereikt of overschreden, waren de bewegingen op die piekmomenten bijna allemaal VFR-bewegingen, wat betekent dat het vliegveld niet aan de limiet van zijn IFR-capaciteit zat.

Hoewel er in het FABEC-prestatieplan (Functional Airspace Block Europe Central) geen doelstellingen zijn vastgelegd voor de luchthaven van Antwerpen, registreert skeyes, in het kader van een permanente monitoring van zijn prestaties als luchtvaartnavigatiedienstverlener, de Air Traffic Flow Management-vertraging (ATFM) bij aankomst voor de luchthaven van Antwerpen, als een interne prestatie-indicator. Sinds 2018 werd er geen vertraging bij aankomst opgetekend.

Ter informatie voorziet het verslag tevens in een indicatie van de gevolgen van ATFM-vertraging voor het inkomend of uitgaand verkeer op de luchthaven van Antwerpen, met een vliegplan dat aan de Network Manager wordt voorgelegd, en wordt aangegeven welk deel van deze vertraging werd veroorzaakt door reguleringen van skeyes. In 2023 liepen vertrekkende vluchten vanaf de luchthaven van Antwerpen in totaal 16.007 minuten ATFM-vertraging op, waarvan 7,4% te wijten was aan skeyes. In het geval van de aankomende vluchten bedroeg de ATFM-vertraging 14.868 minuten; 5,5% van die vertraging was te wijten aan ATFM-maatregelen van skeyes.

## Milieu

Het systeem van preferentieel baangebruik (Preferential Runway System, PRS) in Antwerpen schrijft voor dat vliegtuigen zwaarder dan 5.700 kg baan 11 zouden moeten gebruiken om op te stijgen, als de omstandigheden dat toelaten: zijwind van niet meer dan 15 knopen, of staartwind, inclusief windvlagen, van ten hoogste 5 knopen. De mate waarin het PRS nageleefd werd, daalde van 50,3% in 2022 tot 45,6% in 2023. Ondanks die daling ligt het huidige cijfer hoger dan de overeenkomstige percentages die in 2019, 2020 en 2021 werden waargenomen.

Nachtbewegingen, voor zover ze relevant zijn voor lokale maatregelen tegen geluidshinder , worden ook in dit hoofdstuk genoemd. Een opmerkelijke stijging in de bewegingen, van 7 naar 17, voltrok zich tussen 23.00 en 00.00 uur (lokale tijd) in 2023 en overtrof de statistieken van de voorgaande jaren. Het aantal nachtbewegingen bereikte zijn piek met niveaus die sinds 2019 niet meer werden gezien.

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# GLOSSARY

**AAE:** — Aerodrome Elevation
**AIP:** — Aeronautical Information Publication
**AMC:** — Acceptable Means of Compliance
**AMS:** — Airport Movement System
**ANSP:** — Air Navigation Service Provider
**ATC:** — Air Traffic Control
**ATCO:** — Air Traffic Control Officer
**ATFM:** — Air Traffic Flow Management
**ATM:** — Air Traffic Management
**BCAA:** — Belgian Civil Aviation Authority
**BURDI** — Belgium-Netherlands U-space Reference Design Implementation
**CAA:** — Civil Aviation Authority
**CISP:** — Common Information Service Provider
**COVID-19:** — Corona Virus Disease (2019)
**CRSTMP:** — C-Capacity, R-Routeing, S-Staffing, T-Equipment, M-Airspace Management, P-Special Event
**CTOT:** — Calculated Take-Off Time
**CTR:** — Control Zone
**DSA:** — Drone Service Application
**EASA:** — European Union Aviation Safety Agency
**EBAW:** — Antwerp International Airport ICAO Code
**EBBR** — Brussels Airport ICAO Code
**EBCI:** — Brussels South Charleroi ICAO Code
**EBKT:** — Kortrijk-Wevelgem International Airport ICAO Code
**EBLG:** — Liege Airport ICAO Code
**EBOS:** — Ostend–Bruges International Airport ICAO Code
**ETOT:** — Estimated Take-Off Time
**FABEC:** — Functional Airspace Block Europe Central
**GeoZone:** — Geographical Zone
**ICAO:** — International Civil Aviation Organization
**IFR:** — Instrument Flight Rules
**KPA:** — Key Performance Area
**LRST:** — Local Runway Safety Team
**LVP:** — Low Visibility Procedure
**MTOW:** — Maximum Take-Off Weight
**NM:** — Nautical Mile
**PRS:** — Preferential Runway System
**RAT:** — Risk Analysis Tool
**ROTA:** — Runway Occupancy Time for Arrival
**RPAS:** — Remotely Piloted Aircraft Systems
**RWY:** — Runway
**SRO:** — Simultaneous Runway Occupancy
**UAS:** — Unmanned Aircraft System
**USSP:** — U-Space Service Provider
**VFR:** — Visual Flight Rules
**VLL:** — Very Low Level

# TRAFFIC

In this chapter, traffic at Antwerp Airport (International Civil Aviation Organization (ICAO) code: EBAW) is presented as recorded by the Airport Movement System (AMS). The AMS is an in-house developed tower air traffic control (ATC) system and records the movements at an aerodrome and within its Control Zone (CTR). The movements 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 (flights under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR), helicopters and airplanes, commercial, military or general aviation). As this report considers runway performance, movements such as crossings of CTRs are not considered. As per Belgian Civil Aviation Authority's (BCAA) aerodrome movement definition:

- **one take-off = one departure movement**
- **one landing = one arrival movement**
- **one touch-and-go = two movements: one departure & one arrival**

# Traffic Overview

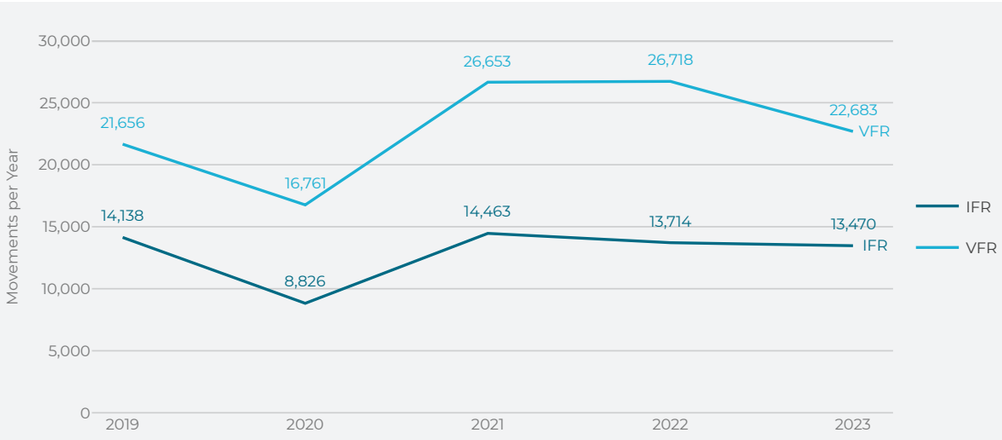
## YEARLY FIGURES

The number of aircraft movements for the last five years are as follows:

| | | |
|---|---|---|
| 2019: | **35,794** | (14,138 IFR; 21,656 VFR) |
| 2020: | **25,587** | (8,826 IFR; 16,761 VFR) |
| 2021: | **41,116** | (14,463 IFR; 26,653 VFR) |
| 2022: | **40,432** | (13,714 IFR; 26,718 VFR) |
| 2023: | **36,153** | (13,470 IFR; 22,683 VFR) |

After two years with high traffic, traffic levels decreased in 2023 and are similar to 2019. ***Figure 1.1*** shows the traffic evolution for IFR and VFR movements.

***Figure 1.1:*** *Traffic Evolution at Antwerp Airport from 2019 to 2023*




1. KMI : https://www.meteo.be/nl/klimaat/klimaat-van-belgie/klimatologisch-overzicht/2023 (URL retrieved 30/01/2024)



## MONTHLY FIGURES

While IFR movements remained steady between 2022 and 2023, VFR movements show a noticeable decrease of 15 %. This VFR traffic drop seems to be mainly caused by worse weather conditions compared to 2022, especially in March and July, two of the busiest months for VFR traffic in 2022.

March 2023 had only 83 sun-hours while March 2022 had 227 sun-hours. July 2023 had 185 sun-hours when July 2022 had 276 sun-hours0F . The evolution per month can be seen in ***Figure 1.2***.

***Figure 1.2:*** *Monthly Movements from 2019 to 2023 at Antwerp Airport*

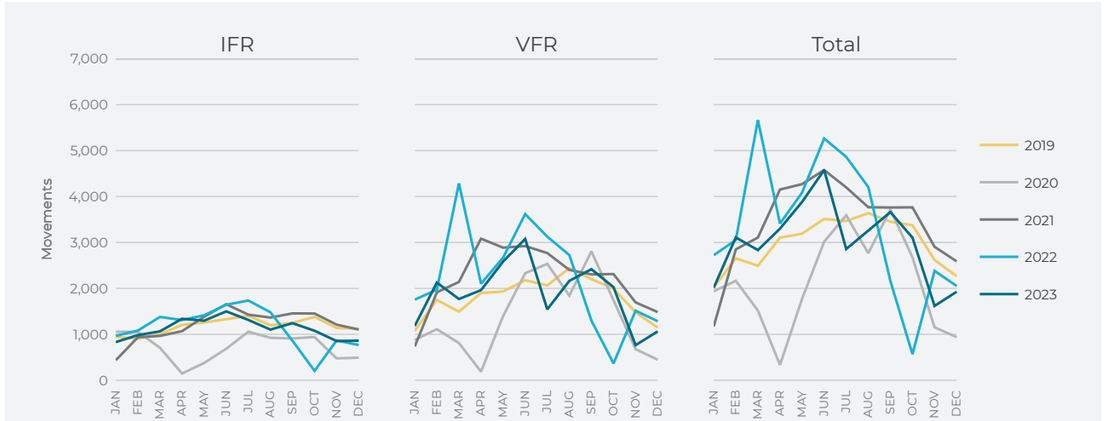



***Table 1.1*** give the number of movements per flight rule and ***Table 1.2*** gives the total arrivals and departures per month. From ***Table 1.1***, it can be seen that the airport faced a lower amount of movements all year long in comparison with 2022 except in February, September and October. Antwerp had a runway closure in 2022 from the 19th of September to the 25th of October for renovation works, which explains the very positive values for September and October.

According to ***Table 1.2***, Antwerp sees its movements amount dropping by 11% in comparison with 2022, mainly due to VFR impact already discussed above.



***Table 1.1:*** *VFR, IFR and Total Traffic per Month from 2019 to 2023*

| | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IFR | **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** |
| | **2020** | 1,057 | 1,053 | 707 | 147 | 376 | 686 | 1,056 | 924 | 911 | 941 | 476 | 492 | **8,826** |
| | **2021** | 436 | 936 | 966 | 1,069 | 1,383 | 1,655 | 1,429 | 1,365 | 1,456 | 1,453 | 1,211 | 1,104 | **14,463** |
| | **2022** | 967 | 1,082 | 1,379 | 1,310 | 1,416 | 1,644 | 1,736 | 1,481 | 861 | 204 | 867 | 767 | **13,714** |
| | **2023** | 831 | 983 | 1,065 | 1,339 | 1,297 | 1,500 | 1,314 | 1,103 | 1,243 | 1,078 | 854 | 863 | **13,470** |
| | 2023 vs 2019 | -12% | +9% | +6% | +11% | +3% | +12% | -6% | -8% | -1% | -22% | -25% | -23% | -5% |
| | 2023 vs 2022 | -14% | -9% | -23% | +2% | -8% | -9% | -24% | -26% | +44% | +428% | -1% | +13% | -2% |
| VFR | **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** |
| | **2020** | 880 | 1,111 | 811 | 188 | 1,397 | 2,330 | 2,536 | 1,843 | 2,807 | 1,734 | 677 | 447 | **16,761** |
| | **2021** | 737 | 1,914 | 2,141 | 3,083 | 2,887 | 2,922 | 2,770 | 2,402 | 2,305 | 2,312 | 1,695 | 1,485 | **26,653** |
| | **2022** | 1,756 | 1,971 | 4,285 | 2,102 | 2,669 | 3,619 | 3,127 | 2,725 | 1,299 | 365 | 1,515 | 1,285 | **26,718** |
| | **2023** | 1,183 | 2,127 | 1,769 | 1,962 | 2,585 | 3,077 | 1,543 | 2,164 | 2,418 | 2,027 | 764 | 1,064 | **22,683** |
| | 2023 vs 2019 | +10% | +22% | +18% | +3% | +34% | +41% | -25% | -11% | +10% | +2% | -48% | -7% | +5% |
| | 2023 vs 2022 | -33% | +8% | -59% | -7% | -3% | -15% | -51% | -21% | +86% | +455% | -50% | -17% | -15% |
| Total | **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** |
| | **2020** | 1,937 | 2,164 | 1,518 | 335 | 1,773 | 3,016 | 3,592 | 2,767 | 3,718 | 2,675 | 1,153 | 939 | **25,587** |
| | **2021** | 1,173 | 2,850 | 3,107 | 4,152 | 4,270 | 4,577 | 4,199 | 3,767 | 3,761 | 3,765 | 2,906 | 2,589 | **41,116** |
| | **2022** | 2,723 | 3,053 | 5,664 | 3,412 | 4,085 | 5,263 | 4,863 | 4,206 | 2,160 | 569 | 2,382 | 2,052 | **40,432** |
| | **2023** | 2,014 | 3,110 | 2,834 | 3,301 | 3,882 | 4,577 | 2,857 | 3,267 | 3,661 | 3,105 | 1,618 | 1,927 | **36,153** |
| | 2023 vs 2019 | -0% | +17% | +14% | +6% | +22% | +30% | -18% | -10% | +6% | -8% | -38% | -15% | +1% |
| | 2023 vs 2022 | -26% | +2% | -50% | -3% | -5% | -13% | -41% | -22% | +69% | +446% | -32% | -6% | -11% |

***Table 1.2:*** *Departures and Arrivals Figures per Month from 2019 to 2023*

| | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arrivals | **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** |
| | **2020** | 971 | 1,079 | 756 | 167 | 886 | 1,510 | 1,790 | 1,385 | 1,860 | 1,334 | 579 | 466 | **12,783** |
| | **2021** | 593 | 1,421 | 1,553 | 2,073 | 2,138 | 2,286 | 2,099 | 1,879 | 1,885 | 1,874 | 1,458 | 1,295 | **20,554** |
| | **2022** | 1,356 | 1,527 | 2,830 | 1,706 | 2,040 | 2,635 | 2,429 | 2,091 | 1,052 | 304 | 1,203 | 1,019 | **20,192** |
| | **2023** | 1,012 | 1,552 | 1,414 | 1,654 | 1,930 | 2,286 | 1,428 | 1,634 | 1,825 | 1,555 | 808 | 959 | **18,057** |
| | 2023 vs 2019 | +0% | +17% | +14% | +7% | +21% | +30% | -18% | -10% | +6% | -8% | -39% | -15% | +1% |
| | 2023 vs 2022 | -25% | +2% | -50% | -3% | -5% | -13% | -41% | -22% | +73% | +412% | -33% | -6% | -11% |
| Departures | **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** |
| | **2020** | 966 | 1,085 | 762 | 168 | 887 | 1,506 | 1,802 | 1,382 | 1,858 | 1,341 | 574 | 473 | **12,804** |
| | **2021** | 580 | 1,429 | 1,554 | 2,079 | 2,132 | 2,291 | 2,100 | 1,888 | 1,876 | 1,891 | 1,448 | 1,294 | **20,562** |
| | **2022** | 1,367 | 1,526 | 2,834 | 1,706 | 2,045 | 2,628 | 2,434 | 2,115 | 1,108 | 265 | 1,179 | 1,033 | **20,240** |
| | **2023** | 1,002 | 1,558 | 1,420 | 1,647 | 1,952 | 2,291 | 1,429 | 1,633 | 1,836 | 1,550 | 810 | 968 | **18,096** |
| | 2023 vs 2019 | -1% | +17% | +13% | +6% | +22% | +31% | -17% | -10% | +6% | -8% | -38% | -14% | +1% |
| | 2023 vs 2022 | -27% | +2% | -50% | -3% | -5% | -13% | -41% | -23% | +66% | +485% | -31% | -6% | -11% |

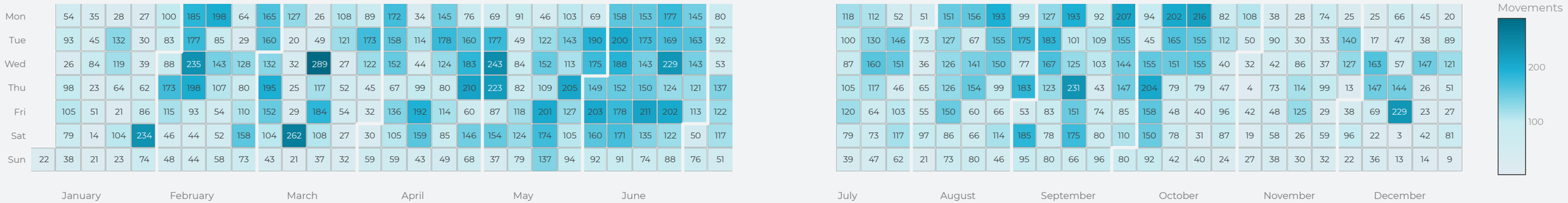



***Figure 1.3:*** *Calendar view of movements per day in 2023*

The calendar in ***Figure 1.3*** shows the daily movements. The busiest days occurred in March and might be related to the early good weather days of the season. The busiest period remains, as in 2022, June. A noticeable decrease in summer can be related to weather conditions not suitable for training flights. There was an average of 99 movements per day in 2023, while it was 110 flights in 2022.

## Traffic Patterns

This section describes the traffic pattern throughout the day in Antwerp Airport. The IFR and VFR hourly traffic patterns can be seen in ***Figure 1.4*** and ***Figure 1.5***, respectively. The graph shows the average number of movements in an hour per half hour steps. The traffic pattern of IFR traffic in Antwerp Airport is similar to the previous years.

VFR traffic is clustered in the daylight hours. Compared to the years 2022 and 2021 traffic is lower. This decrease, as mentioned before, may be related to the worse weather condition of 2023. This brought back the VFR pattern to a pattern similar to the average pattern seen in 2019.

***Figure 1.6*** shows the traffic pattern over the day for each of the seasons. As expected, summer allows more movements to occur thanks to the early rising sun, especially for VFR. Fall also seems to be an enjoyed season for late flights. In 2022, the runway closure in September and October did offset the Fall pattern, but in 2023, Fall recovered its traffic as usual.

The daily distribution per weekday, as seen in ***Figure 1.7***, demonstrates that Sunday tends to be the least busy day, likely because there are no training flights allowed, as published in the Aeronautical Information Publication (AIP) (AD 2.20, Ch. 5.7). Wednesdays tend to be the busiest day in the week.

**Figure 1.4:** *Average Hourly Movement for IFR flights*

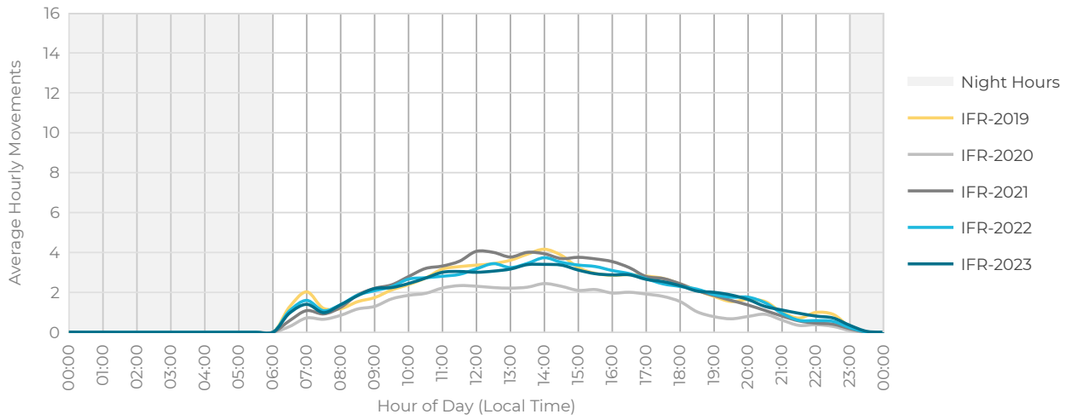



**Figure 1.5:** *Average Hourly Movements for VFR flights*

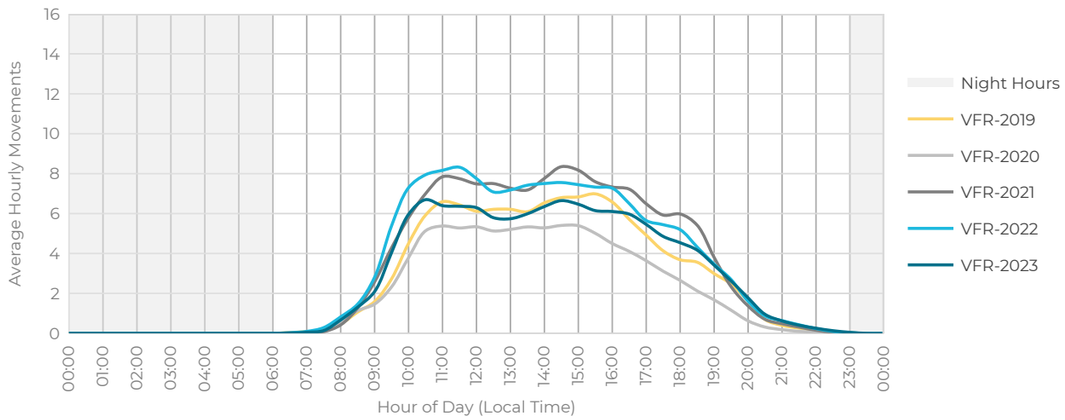



**Figure 1.6:** *Average Hourly Movements by Season for 2023*

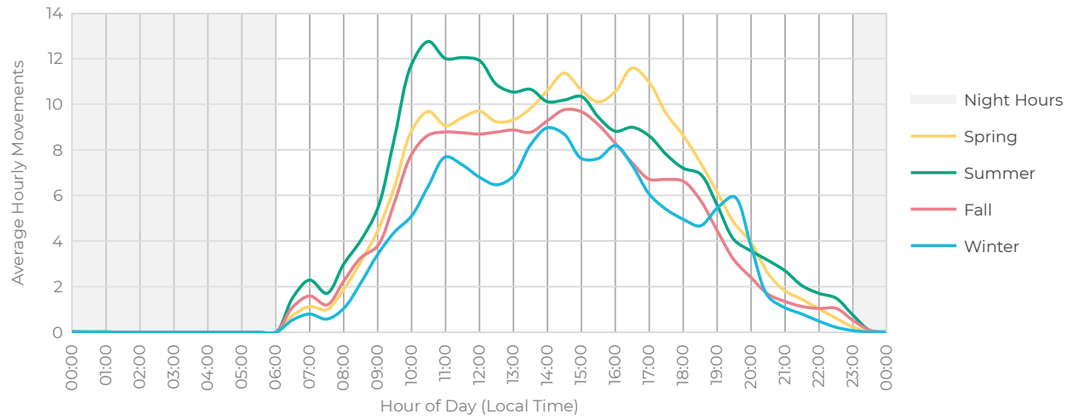
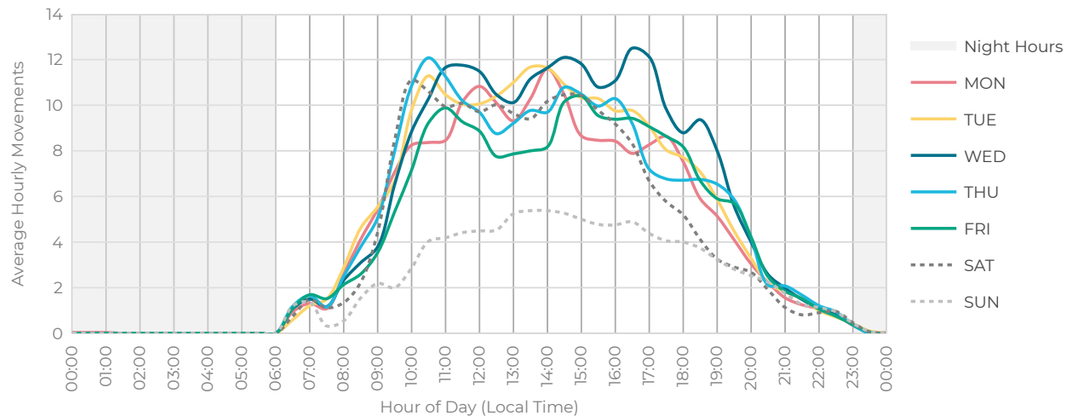



**Figure 1.7:** *Average Hourly Movements in 2023 per Weekday*



## Drone Activities

The emerging activities of unmanned aircraft systems (UAS) and the variety of their operations is one of the challenges driving the future of Air Navigation Service Providers (ANSP). To enable a reliable and efficient UAS integration, a framework is designed at EU level: U-space. U-space is a set of specific services and procedures designed to ensure safe and efficient access to airspace for a large number of drones. Implementing U-space airspaces requires states to define and designate U-space airspaces with mandatory service provision. For the provision of these mandatory services, the deployment of U-space will entail the integration of two new service providers into the system: the common information service provider (CISP) and the U-space service provider (USSP). The CISP will be in charge of making available the common information required to enable the operation and provision of U-space services in U-space airspaces wherever it has been designated.[2]

skeyes is playing a central role in the development of the U-space as manager of UAS geographical zones in Belgium and by actively participating in the BURDI Project. The BURDI project, which stands for Belgium-Netherlands U-space Reference Design Implementation, is dedicated to implementing a U-space airspace concept to ensure a reliable and efficient UAS integration.[2] Additionally, since 2023, skeyes has been working on obtaining the certification to become the CISP in Belgium.

The controlled airspace above and around an airport is a UAS geographical zone, also called "GeoZone". UAS geographical zones are zones that are only accessible to drones complying with technical and operational criteria called access conditions, and that can have restrictions with regard to the use of drones. skeyes is the GeoZone manager for controlled airspace above and around the airports of Antwerp, Brussels, Charleroi, Liege, Ostend and the Radio Mandatory Zone of Kortrijk.[4,5]

skeydrone, created in 2020 as subsidiary of skeyes, envisages to play a central role in the implementation of U-space as USSP by offering a wide variety of services that enable safe and efficient drone operations in all types of airspace. This is how in 2022, skeydrone, in collaboration with the local development company, facilitated the implementation of the first marine GeoZone at an offshore test platform in the North Sea. Following that success, a project, implicating skeydrone, the port of Ostend and other European partners, was launched. Its aim is to develop offshore logistics solutions to support the transition from fossil fuels to renewable energy sources in the North Sea. In this context, skeydrone's contributions include implementing U-space drone corridors between land and offshore renewable energy platforms and managing offshore drone traffic as a USSP.[6]

One of the other services proposed by skeydrone is a web application: the Drone Service Application (DSA) to facilitate planning, coordination and information flow between drone operators and Air Traffic Control, especially in controlled airspace. The figures in this report related to UAS are provided by the DSA tool.



Drone activities are authorised to operate in a certain category. These categories are defined by the risk the drone activity forms for manned aviation in very low level (VLL) zones. For Antwerp airport, these are defined as:

**high risk** — runway and surroundings

**moderate risk** — departure/approach track, visual circuits and rest of the control zone above 400 ft above aerodrome elevation (AAE), excluding the high-risk zone.

**low risk** — on the edge of the control zone below 400 ft AAE, outside the moderate and high-risk zone

***Table 1.3*** shows the number of drone operations per VLL zone from 2021 to 2023. Drone operations are an area in aviation that is growing and this is also true near Antwerp Airport. In 2023, there were 17% more drone operations authorized compared to 2022.

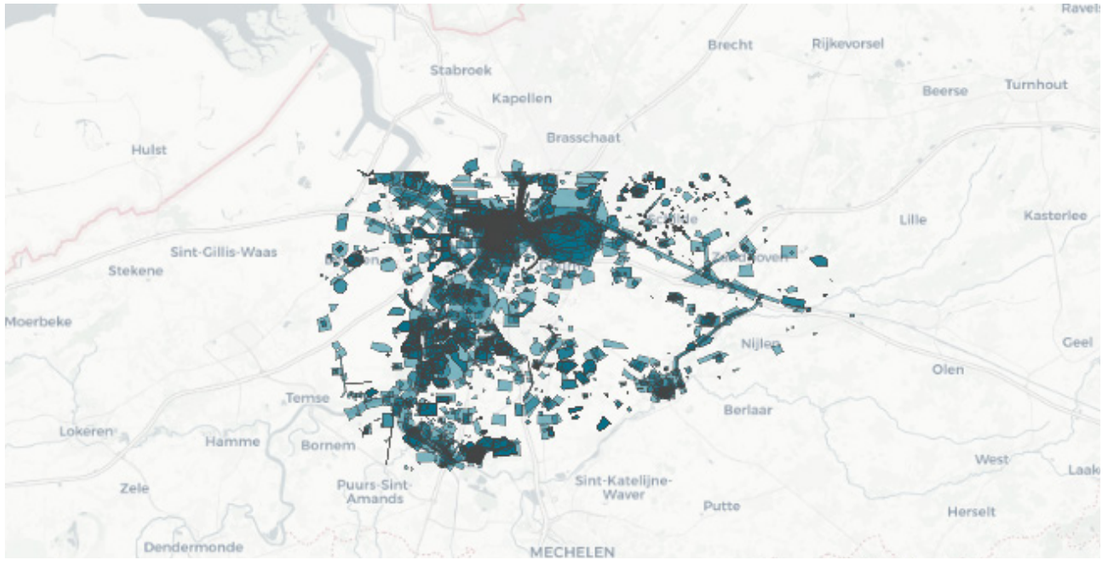
***Table 1.3:*** *Authorized drone activities per VLL zone risk level*

| | Low | Moderate | High | Total |
|---|---|---|---|---|
| **2021** | 3,047 | 328 | 9 | **3,384** |
| **2022** | 3,293 | 245 | 7 | **3,545** |
| **2023** | 3,804 | 335 | 25 | **4,164** |
| 2023 *vs* 2021 | +25% | +2% | +178% | +23% |
| 2023 *vs* 2022 | +16% | +37% | +257% | +17% |

2. https://www.ecac-ceac.org/activities/unmanned-aircraft-systems/uas-bulletin/22-uas-bulletin/504-uas-bulletin-2-what-is-u-space (URL retrieved on 16/02/2023)
3. https://www.sesarju.eu/projects/BURDI (URL retrieved 16/04/2024)
4. UAS geographical zone statuses can be seen at https://map.droneguide.be (URL retrieved 21/04/2024)
5. skeyes, "skeyes drone service application, https://www.skeyes.be/en/services/drone-home-page/you-and-your-drone/drone-service-application/ (URL retrieved on 21/02/2024).
6. https://www.unmannedairspace.info/uncategorized/west-flanders-drone-ecosystem-expands-with-skydrone-support/ (URL retrieved on 10/02/2024)

***Figure 1.8*** displays a map with the airspace polygons of drone activities, which were authorized in the DSA. A higher concentration of activities is seen around Antwerp harbour. The top 5 activities registered in DSA are videography, aerial photography, recreational, photogrammetry and inspection.

***Figure 1.8:*** *Distribution of Drone Activities throughout 2023 near Antwerp Airport*






As per European Union Aviation Safety Agency (EASA) definition6F , activities can furthermore be categorized into a different risk classification scheme that considers the complexity of the operation. The following three classes exist:

**OPEN** — Presents low risk to third parties. An authorisation from the Civil Aviation Authority (CAA) is not required.

**SPECIFIC** — More complex operations or aspects of the operation fall outside the boundaries of the Open Category. Authorisation is required from the CAA.

**FORMER CLASS 1** — Very complex operations, presenting an equivalent risk to that of manned aviation.

***Table 1.4*** provides an overview of the complexity of operations at Antwerp airport. Open activities increased more than Specific ones in 2023 compared to 2022.

***Table 1.4***: *Drone Activities in Antwerp per EASA Risk Category in 2023*

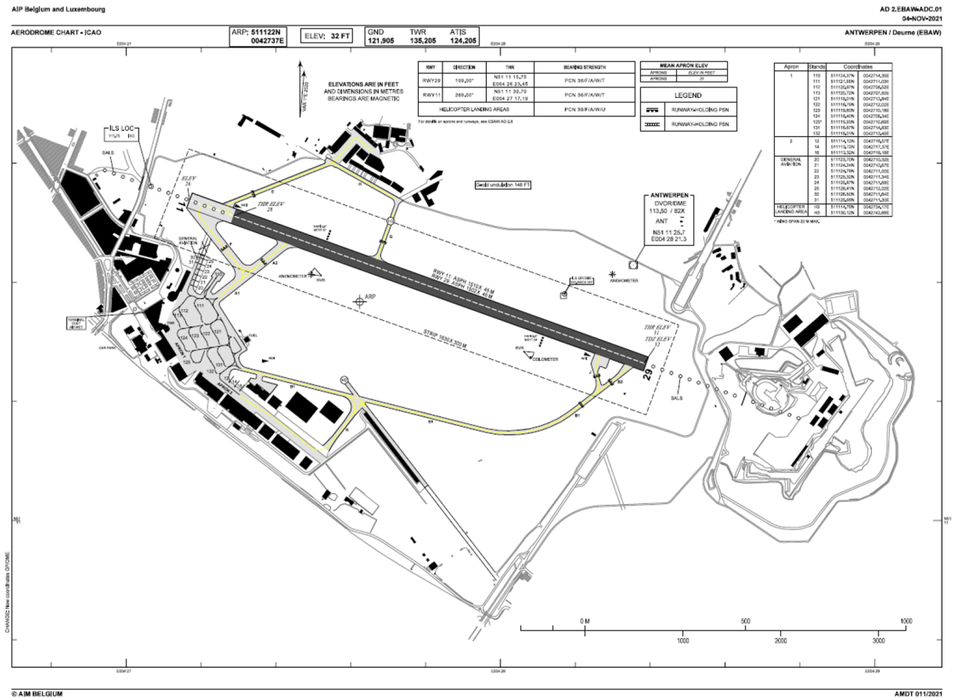
| | Open | Specific | Former Class 1 | Total |
|---|---|---|---|---|
| **2021** | 2,482 | 777 | 125 | **3,384** |
| **2022** | 2,407 | 1,138 | 0 | **3,545** |
| **2023** | 2,965 | 1,199 | 0 | **4,164** |
| 2023 *vs* 2021 | +19% | +54% | -100% | +23% |
| 2023 *vs* 2022 | +23% | +5% | - | +17% |

7. EASA, “Drones - regulatory framework background”. https://www.easa.europa.eu/domains/civil-drones/drones-regulatory-framework-background (URL retrieved on 02/02/2024)

## Runway Use

The layout of Antwerp Airport with its two reciprocal runways (RWY) is depicted in the ICAO chart of ***Figure 1.9***.

***Figure 1.9:*** *ICAO Chart of Antwerp Airport*




The use of one runway configuration over another depends on several factors that must be considered (e.g. wind direction or proximity of densely populated areas). ***Figure 1.10*** shows the runway use in absolute numbers of movements at Antwerp Airport for the period from 2019 to 2023. Runway 29 was used for 55% of the movements in 2023.



***Figure 1.10:*** *Runway Use at Antwerp Airport from 2019 to 2023*

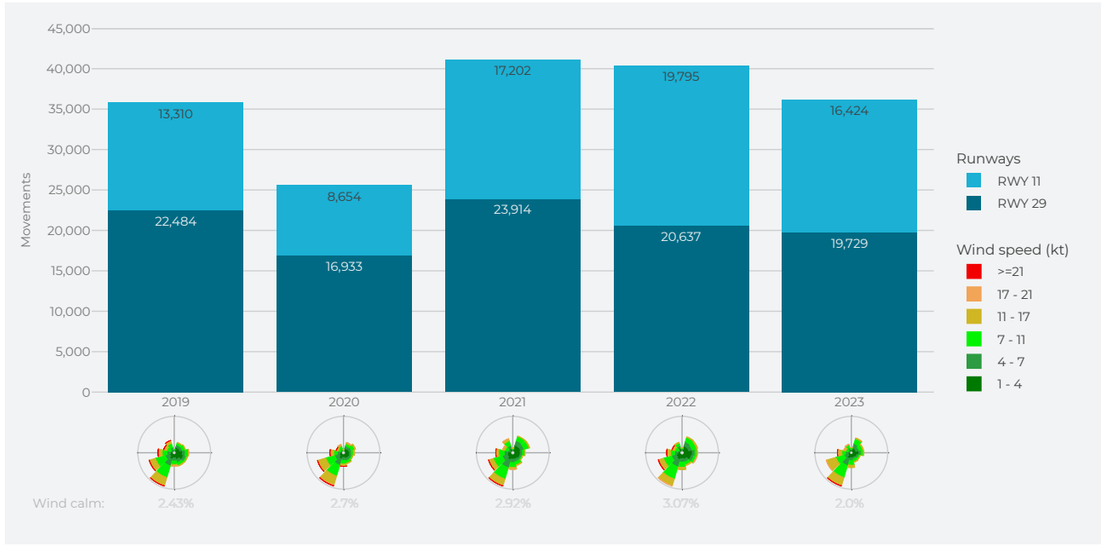
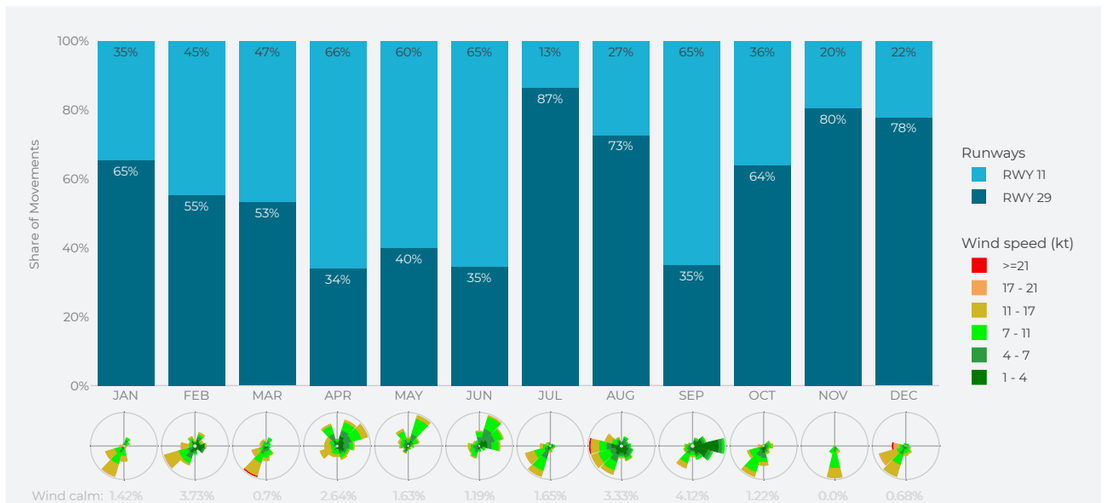



***Figure 1.11*** below shows the runway use per month in 2023 with the wind roses beneath. Bigger images of the wind roses can be found in ***Chapter 4***. As mentioned above, wind direction is a big factor for the choice of the runway configuration. July, November and December had prevalent south and south-westerly winds with almost no north-easterly winds resulting in a high usage of runway 29. The first trimester and October had a bigger north-easterly component, this is reflected in the runway usage. Easterly and north-easterly winds prevailed in April, May, June and September resulting in a higher usage of runway 11 than runway 29.

***Figure 1.11:*** *Runway Usage per Month in 2023 and Wind-Roses for Antwerp Airport*



*Missed Approaches*

*Runway Incursions*

*Other Noteworthy Incidents*

*Improvements And Recommendations*

# SAFETY

This chapter is divided into four topics: missed approaches, runway incursions, other noteworthy incidents and improvements and recommendations.

The missed approaches covered in the following chapter are based on internal logging. As such the quality and accuracy of the available information is commensurate with the level of reporting. These logs of missed approaches are not considered as safety occurrences. 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. It could be argued that missed approaches are a hybrid leading indicator, and that by analysing the reasons leading to this type of procedure, it is possible to 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.

The runway incursions are a lagging runway safety indicator. The runway incursions and occurrences discussed in other noteworthy incidents are safety occurrences. These are subject to a risk classification using the Risk Analysis Tool (RAT) methodology to assess the contribution that skeyes had in the chain of events (in accordance with EU Reg 376/2014 and EU Reg 2019/317). The following chapter indicates the severity classification that was derived from the calculated RAT risk for the safety occurrences. The following definitions apply for the severity classification (in accordance with EASA AMC). The following definitions apply for the severity classification (as per EASA Acceptable Means of Compliance (AMC)). This classification scheme is applicable for the operational occurrences

**Table 2.1:** *Severity classification*

| Severity Classification | Description |
|---|---|
| **A – Serious incident** | An incident involving circumstances indicating that an accident nearly occurred. |
| **B – Major incident** | An incident associated with the operation of an aircraft, in which the safety of the aircraft may have been compromised, having led to a near collision between aircraft, with ground or obstacles (i.e. safety margins were not respected; in this case, not as a result of an ATC instruction). |
| **C – Significant incident** | An incident involving circumstances indicating that an accident, or a serious or major incident could have occurred if the risk had not been managed within the safety margins, or if another aircraft had been in the vicinity. |
| **D – Not determined** | Insufficient information was available to determine the severity, or inconclusive or conflicting evidence precluded such determination (RAT RF < 70 %). |
| **E – No safety effect** | An incident which has no safety effect. |
| **N – No ATM ground contribution** | No system, procedure or person involved in the provision of ATC services initiated or contributed to the incident. |

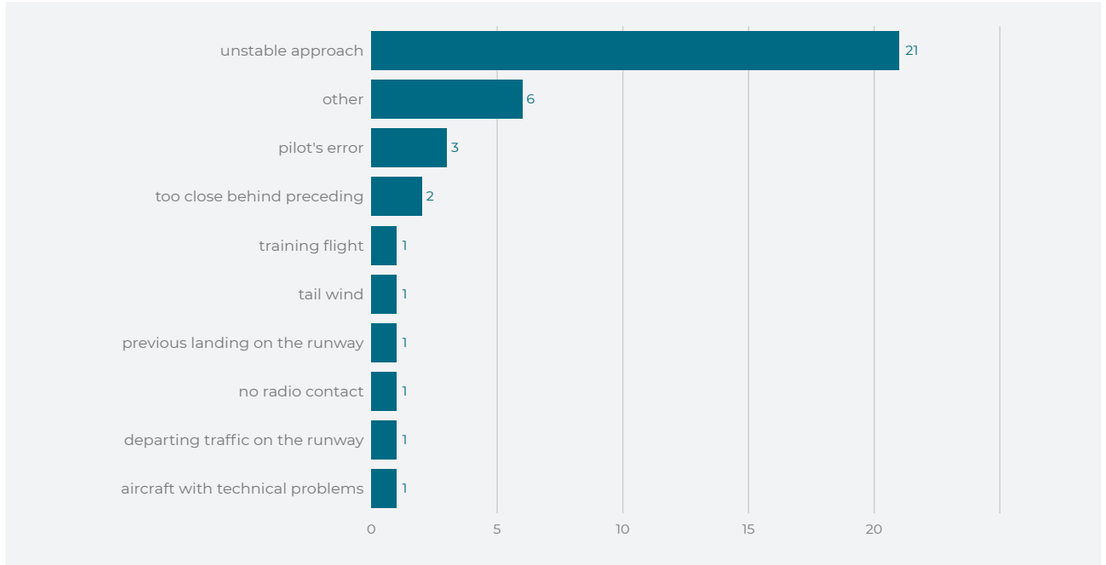
## Missed Approaches

A missed approach is flown when, for any reason, it is judged that an approach cannot be continued to a safe landing. A missed approach procedure is a published procedure and is performed under the instructions of the air traffic control officer or after initiation 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 the cause can give an indication of which measures are to be taken to improve the safety of air navigation service provision. The missed approaches are recorded by cause of event, and the internal reporting is done by the ATCOs.



In 2023, there were 38 missed approaches, ***Figure 2.1*** shows the number of missed approaches per cause. Unstable approaches were the cause for over a half (55%) of all missed approaches at Antwerp Airport in 2023. Many training flights happen at Antwerp Airport and inexperienced pilots could be a reason for the many unstable approaches.

**Figure 2.1**: *Missed approaches per cause in 2023*



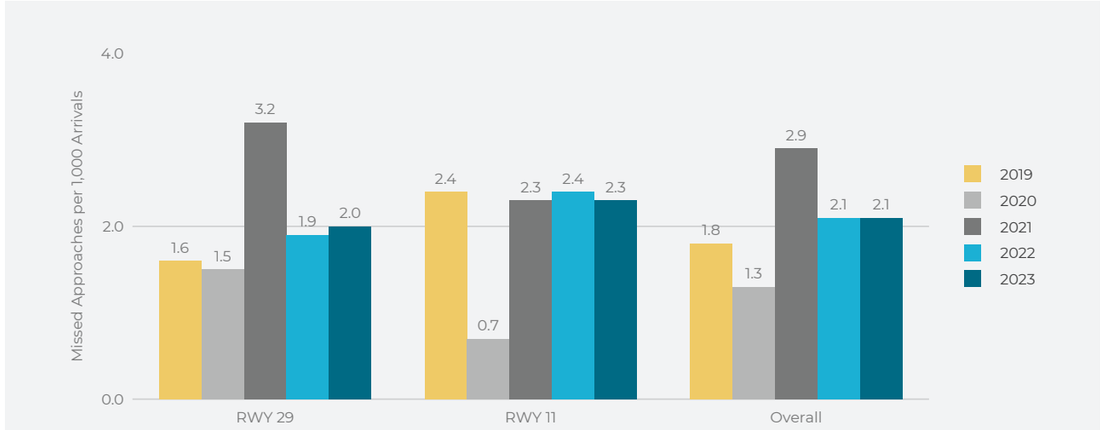

There were 6 missed approaches with reason Other, these are detailed in ***Table 2.2.***

**Table 2.2:** *Descriptions of the Missed Approaches with Reason O: Other*

| Description | Runway |
|---|---|
| Gear not down, aircraft did a go around and joined left circuit for a full stop landing | 11 |
| Aircraft initially touched on RWY 11 behind the blocks, and proceeded for a missed approach. Pilot proceeded for a 2nd attempt and landed safely | 11 |
| Aircraft was on 5NM final RWY 11 and decided to divert to EBBR due to runway condition getting worse from 555 to 444 | 11 |
| Aircraft was short final at 22:00 UTC. Pilot was advised that the airport had closed for non-scheduled flights, and was asked for his intentions. Pilot decided to proceed for missed approach and divert to EBLG | 29 |
| Aircraft made a go around because of a late touchdown due to the gusty wind conditions. Aircraft asked vectors and landed safely on the second attempt | 29 |
| On short final, pilot reported not in the correct configuration for landing. Landed safely after visual circuit | 29 |

The number of missed approaches has gone down by 12% in 2023 compared to 2022. This might be related to the lower amount of VFR training flights. Rather than comparing absolute numbers, looking into the rate of missed approaches per 1,000 arrivals is more convenient for comparison purposes. Compared to 2022, the rate of missed approaches stayed steady at 2.1 per 1000 arrivals (see ***Figure 2.2***). The rate of missed approaches for runway 11 is comparable to the previous years' values. For runway 29 the rate of missed approaches remained at the level of previous values, signalling that 2021 was an outlier in the amount of missed approaches on this runway.

***Figure 2.2:*** *Rate of Missed Approaches per 1,000 Arrivals*




In total, there were 18 missed approaches reported on runway 11 and 20 missed approaches on runway 29. The details per reason and per year can be found in the **ANNEX**.

## Runway Incursions

As mentioned above, this section highlights one of the categories of safety occurrences: the 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". According to AMC 3 of EU Reg 2019/317, the 'incorrect presence' is defined as the "unsafe, unauthorised, or undesirable presence, or movement of an aircraft, vehicle, or pedestrian, irrespective of the main contributor (e.g. ATC, pilot, driver, technical system)".

A monthly overview of the runway incursions in 2023 can be retrieved from ***Figure 2.3***. In total there were eight runway incursions of which two had an air traffic management (ATM) contribution.

The most severe runway incursion was a major incident (B). One aircraft was cleared to land while another was already lined up for take-off. The one landing did a go around after getting visual on the lined up one. This occurred at the same time as a fire resulting in a lot of smoke in the CTR.

The second most severe runway incursion had significant effect (C). One aircraft was cleared for landing while an inspection car had not vacated the runway yet. The inspection car immediately vacated the runway via a taxiway and the aircraft land safely.

***Figure 2.3:*** *Runway Incursions by Month at Antwerp Airport in 2023*

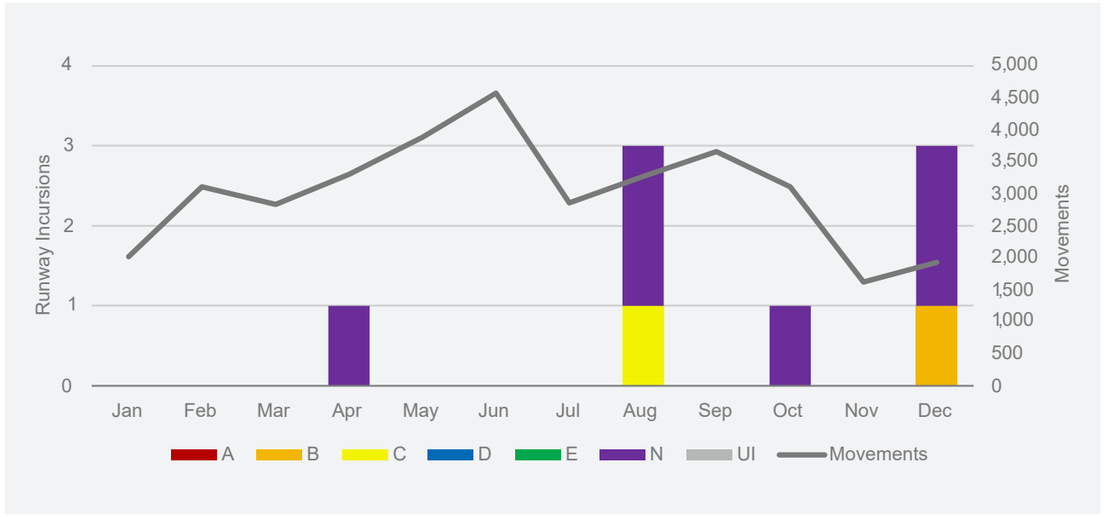
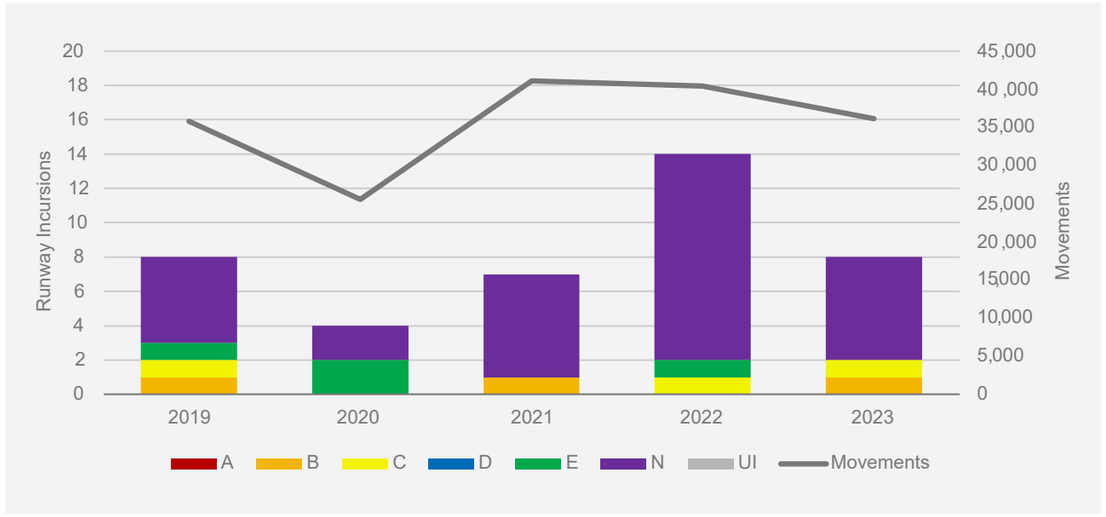



***Figure 2.4*** shows a yearly evolution of the number of runway incursions from 2019 to 2023 along with the evolution of the movements at Antwerp Airport. Many of the runway incursions were due to deviations from ATC instructions.

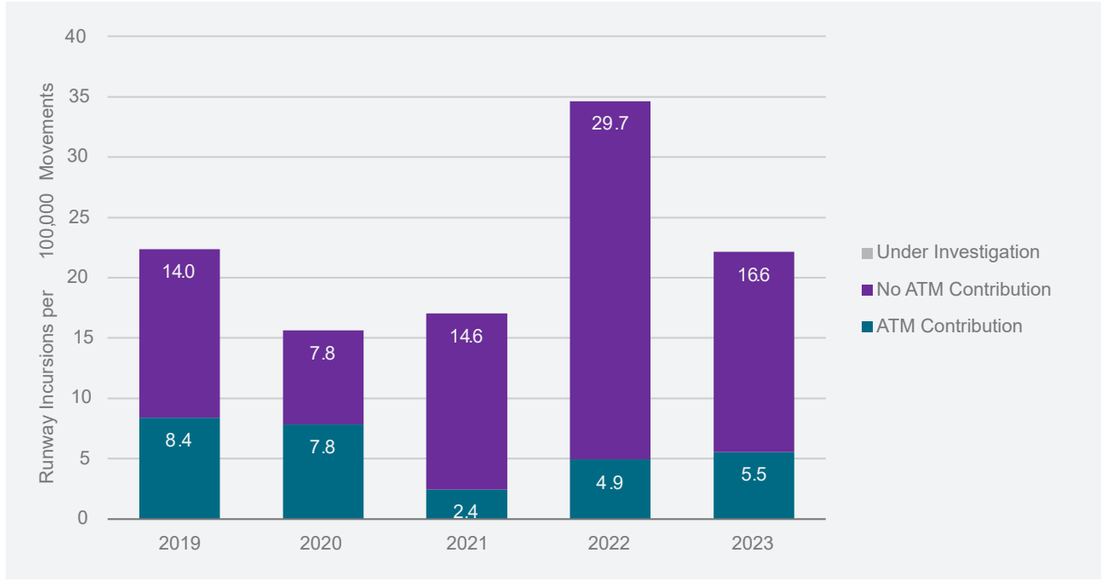


***Figure 2.4:*** *Runway Incursions per Severity Category at Antwerp Airport by Year*




For comparison purposes it is more convenient to use the rate of runway incursions. ***Figure 2.5*** shows the rate of runway incursions per 100,000 movements at Antwerp Airport for the period from 2019 to 2023. There has been a decrease in the rate of runway incursions. On top of this decrease, the rate of runway incursions with ATM contribution is still lower than in 2019 and 2020.

***Figure 2.5:*** *Rate of Runway Incursions per 100,000 Movements from 2019 to 2023*



## Other Noteworthy Incidents

All safety occurrences are closely monitored and registered by skeyes. Of these, reports from pilots being inconvenienced by laser beams, or users spotting unauthorized Remotely Piloted Aircraft Systems (RPAS), widely known as drones, are also closely monitored. ***Table 2.3*** shows the evolution of these safety occurrences per year. Laser beam incidents have led to more cooperation measures with the local police, informing them promptly when one is reported.

***Table 2.3:*** *Descriptions of the Missed Approaches with Reason O: Other*

| Year | Laser beam | RPAS |
|---|---|---|
| **2019** | 1 | 6 |
| **2020** | 1 | 2 |
| **2021** | 1 | 4 |
| **2022** | 8 | 4 |
| **2023** | 5 | 4 |

## Improvements And Recommendations

Following every runway incursion, an investigation is conducted at skeyes. The Local Runway Safety Team (LRST) - SAFCA, then hold meetings organised by the airport to discuss the events thoroughly. All stakeholders are present in those meetings (flying schools, aircraft operators, handling agents, airport, skeyes, ...). Discussing the runway incursions and the recommendations resulting from the investigations during these meetings creates an overall safety awareness to all stakeholders.

In 2023, Antwerp Airport shows a decrease of runway incursions which might be result of safety awareness of last year on phraseology to use, to avoid confusion between new route clearance and take-off clearance while lined-up. In regard to the severity B occurrence, the discussions are ongoing at skeyes to look for ways to prevent an incorrect landing clearance with an occupied runway.

As a recommendation following the runway incursions, the Low Visibility Procedure (LVP) are being reassessed.

In addition, in 2023, skeyes implemented a common transition layer in all Belgian airspace to ensure 1,000 ft separation between traffic below and above this layer (the transition layer separates traffic which vertical position is defined based on local altitude and traffic which vertical altitude is defined base on Average Sea Level). This is in line with ICAO DOC 7030 EUR and Commission Implementing Regulation (EU) 2020/469 of 14 February 2020.

*Airport Capacity*

*Punctuality*

# CAPACITY & PUNCTUALITY

This chapter addresses the airport capacity and punctuality. In a first section, the declared capacities for different runway configurations are given along with a view on the effective utilisation of this capacity.

In the second section, the punctuality at Antwerp Airport is studied. The arrival delay, delay due to regulations placed by Antwerp Airport on the arrivals, is analysed and the Air Traffic Flow Management (ATFM) delay from the airport's point of view is given, i.e. the impact on traffic to or from Antwerp Airport caused by regulations not only at Antwerp Airport, but also in the Belgian en-route airspace and by other ANSPs.

## Airport Capacity

The capacity of an aerodrome, i.e. how many operations can be handled in a certain amount of time, is influenced by several factors including the airport layout, the fleet mix of the arriving and departing traffic, ATC procedures, weather conditions, and technological aids.

For optimal conditions, a theoretical measure of the capacity is calculated per runway configuration of the airport: This **Theoretical Capacity Throughput**, which determines the average number of movements (arrivals and/or departures) that can be performed on the runway system within one hour, is calculated considering certain assumptions of optimal conditions:

- *There is a continuous supply of arrivals and/or departures.*
- *Simultaneous Runway Occupancy (SRO) is prohibited (air traffic control rule).*
- *The Safe Wake Vortex Separation distance between two flights has to respected at all times (air traffic control rule).*
- *The fleet mix is static (i.e., types of aircraft do not change).*
- *Approach and departure procedures do not change.*
- *Conditions of flying and service provision are optimal (weather, staffing, etc.).*

For the calculation of the Theoretical Capacity Throughput, on top of the above-mentioned assumptions, the following parameters have been considered:

- *The fleet mix of the busiest month in 2018 is taken as reference.*
- *A nominal radar separation of 3NM.*
- *A loss factor of 15% is considered for inter arrival times, which accounts for the fact that controllers rather want to err on the right side when separating aircraft.*
- *The average Runway Occupancy Time for Arrivals (ROTA) is based on assumptions.*
- *The average approach speed is 136 knots (based on measurements).*
- *The average headwind differs per runway and is subtracted from the average approach speed.*
- *The inter-departure-time is a function of the between take-off-clearance delivery and the aircraft reaching a given altitude.*

Since the safe wake vortex separation distance between two flights, which is one of the inputs of the theoretical model, is only declared for IFR flights, the Theoretical Capacity Throughput also just indicates to the maximum number of IFR movements that an aerodrome can handle per hour with a specific runway configuration under optimal conditions.

In practice, such optimal conditions are rarely reached. Therefore, the declared capacity is set at 90% of the optimum. As it only represents the capacity of IFR flights it is also referred to as "Declared IFR Capacity". ***Table 3.1*** shows the declared capacity per runway configuration at Antwerp Airport. Note that this is only a theoretical calculation and currently not used for schedule coordination purposes.



***Table 3.1:*** *Declared IFR capacity*

| Runway Configuration | | Maximum | Declared | % of Hours |
|---|---|---|---|---|
| Departures | Arrivals | Movements/hour | Capacity | above Capacity |
| 11 | 11 | 51 | 41 | 0.09% |
| 29 | 29 | 43 | 41 | 0.00% |

To get a view on the actual usage of the aerodrome's capacity, the Effectively Used Capacity is an important performance indicator for the airport and the air navigation service provider handling the arrivals and departures. For each runway configuration, it compares the theoretical value of the declared capacity to the distribution of the actual number of movements performed within each hour of the year.

***Figure 3.1*** and Figure 3.2 provide an easy way to visually inspect if the declared capacity has ever been exceeded. In these plots, each dot represents a rolling hour throughout the year of 2023 (with a roll step of one minute), during which the runway configuration was active for at least an hour within the default opening times of the aerodrome and during which there was at least one movement. The position of the dot indicates the number of arrivals (y-axis) and the number of departures (x-axis). The opacity of the dot indicates if there were many or few hours with this number of arrivals and departures, with more translucency indicating less hours. The histograms on the sides show the distributions of arrivals and departures. The declared capacity is shown by a diagonal red line: At any point on this line, the x-axis value (departures) and y-axis value (arrivals) will add up to the threshold number (total movements). Any dot above this line indicates an hour exceeding the declared capacity. Note that this capacity is usually only declared for IFR movements, yet this plot considers both IFR and VFR movements. This is because only considering IFR flights would give a distorted view on the number of hourly movements – especially for airports with high VFR shares. Helicopter movements are not included, as they do not land on the runways of the configurations, but missed approaches are. The notation for the runway configurations in this report always mentions the departure runways first and the arrival runways, separated by a hyphen, afterward.

**Figure 3.1:** *Distribution of the Hourly Movements for runway 11 in 2023*

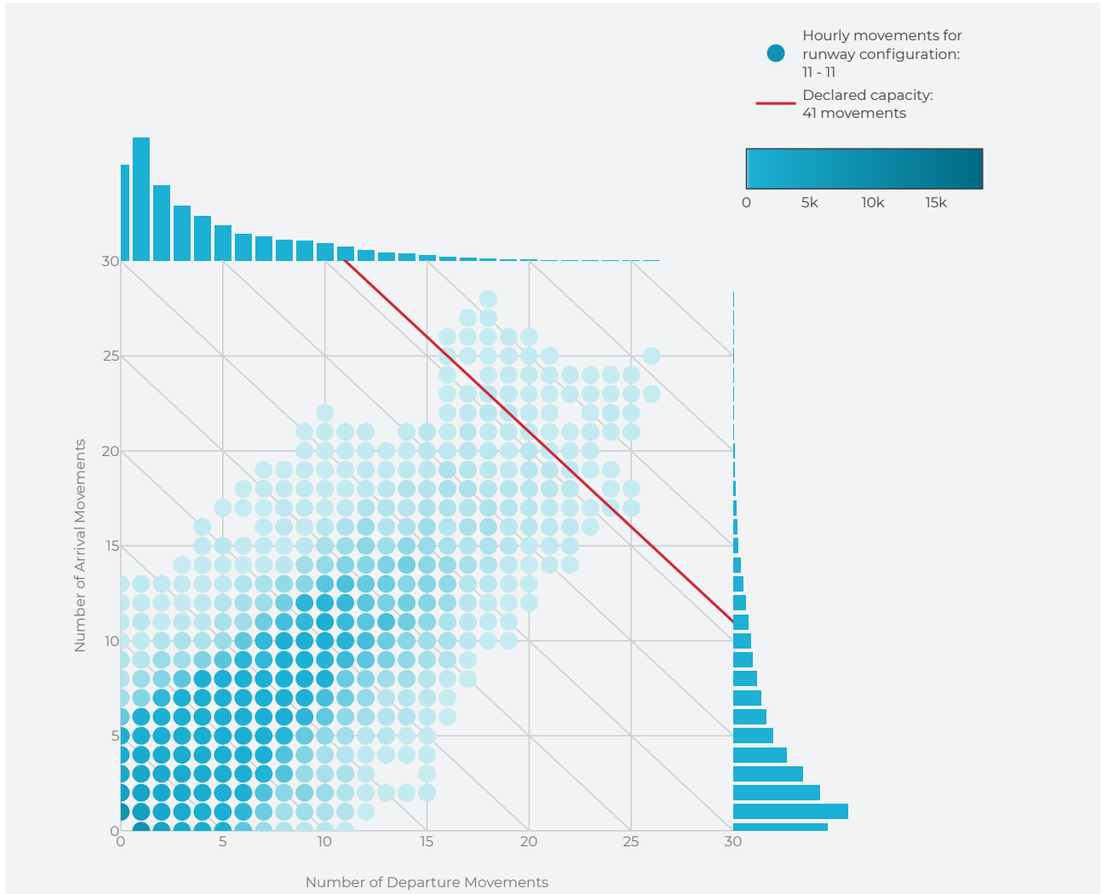
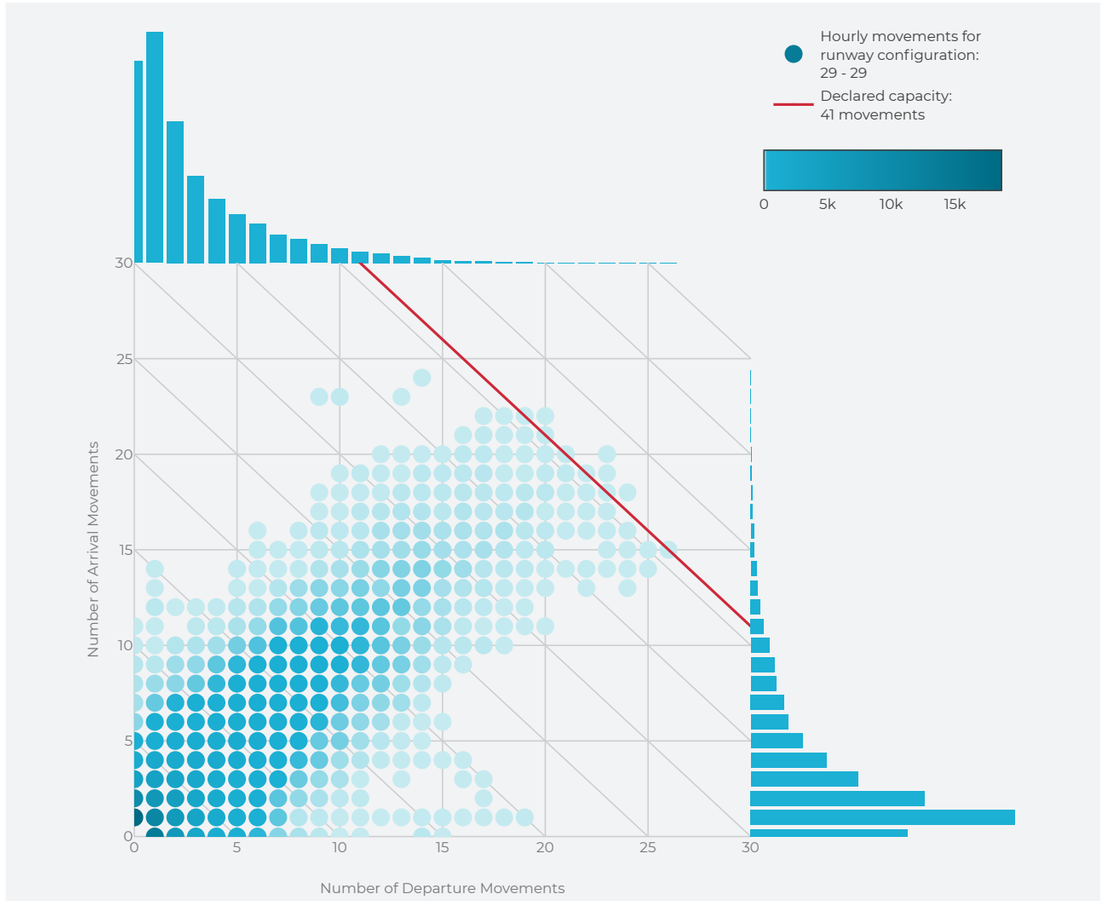



**Figure 3.2:** *Distribution of the Hourly Movements for runway 29 in 2023.*




Several factors may lead to exceeding the declared capacity. One plausible cause could be a high share of VFR traffic, since the separation minima do not apply strictly to these flights, and therefore more movements can be performed within an hour. Alternatively, the surpassing of declared capacity might stem from an exceptional deviation from safety margins, or a heightened incidence of missed approaches (each counting as two movements in little time), among other possibilities.

***Table 3.2*** gives figures on the days where the traffic exceeded the capacity. As the calculation is based on a rolling calculation per minute, the capacity is exceeded for a period. The table gives a summary in terms of extra movements (during the time that the traffic exceeded capacity the minimum number and maximum number of extra movements is given), share of IFR traffic and share of departures.

In 2023, 12 days saw capacity exceedances, nine with runway configuration 11-11 and three with runway configuration 29-29. The number of days where the capacity was surpassed for runway 11 decreased from 22 to 9 days compared to 2022. This reduction can be attributed to a substantial decrease in VFR movements, particularly notable in the months of March and July.

**Table 3.2:** *Days with Hours Exceeding the Capacity at Antwerp Airport in 2023 per Runway Configuration*

| Runway Configuration | | Date | Extra Movements | | % IFR | | % Departures | |
|---|---|---|---|---|---|---|---|---|
| Departures | Arrivals | 2023 | min | max | min | max | min | max |
| 11 | 11 | Jan. 28 | 1 | 5 | 7% | 14% | 38% | 45% |
| | | Feb. 6 | 1 | 2 | 5% | 7% | 45% | 48% |
| | | Mar. 15 | 1 | 1 | 10% | 10% | 52% | 52% |
| | | May. 3 | 1 | 8 | 9% | 16% | 47% | 54% |
| | | May. 4 | 1 | 1 | 12% | 21% | 52% | 52% |
| | | May. 20 | 1 | 1 | 0% | 0% | 50% | 50% |
| | | Jun. 2 | 1 | 10 | 7% | 19% | 46% | 53% |
| | | Jun. 7 | 1 | 5 | 5% | 7% | 43% | 45% |
| | | Oct. 16 | 1 | 2 | 5% | 7% | 55% | 60% |
| 29 | 29 | Apr. 29 | 1 | 1 | 5% | 5% | 48% | 48% |
| | | May. 21 | 1 | 2 | 0% | 0% | 53% | 55% |
| | | Jun. 21 | 1 | 1 | 7% | 7% | 57% | 57% |

## 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: Air Traffic Flow Management (ATFM) 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)*
*P - Special Event*
*R – ATC Routeing*
*S – ATC Staffing*
*T - Equipment (ATC)*
*V – Environmental Issues*
*W - Weather*
*NA - Not Specified*
*Other*

The ATFM measures with Air Navigation Service Provider (ANSP) contribution are listed according to the Functional Airspace Block Europe Central (FABEC) 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).

This section of the report 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

skeyes is subject to an annual target with regard to ATFM arrival delay, which is the delay of a flight caused by restrictions on landing capacity (regulations) at the destination airport. The average minutes of ATFM arrival delay per flight is a performance indicator in accordance with the European Performance Regulation (EU) no 317/2019, Annex 1 , section 1, §3.1(b).

This indicator is the average time, expressed in minutes, of ATFM arrival delay per inbound IFR flight and is calculated for the whole calendar year. The indicator includes all IFR flights landing at the destination airport and covers all ATFM delay causes excluding exceptional events.

Targets for this indicator are set on a national level and on an airport level. The national target is the aggregation of the airport targets. The target in Belgium was 0.10 min/flight for the years 2016 until 2019, and only Brussels Airport and Liege Airport were considered as contributing airports. For reference period 3 (RP3), 2020-2024, only Brussels Airport was considered as contributing airport. Initially the national target was planned to be 1.82 minutes per flight for all causes and 0.17 minutes per flight for CRSTMP causes. However, due to the unexpected impact of COVID-19 on the air traffic, the European Commission requested a revision of Union-wide performance targets for RP3. The current proposal only includes arrival delay targets for Belgium as of 2022 (1.08 minutes per flight all causes and 0.12 minutes per flight for CRSTMP causes) and the only contributing airport remains Brussels Airport.

The arrival delay over the past five years is shown in ***Table 3.3***. It can be seen that there was no ATFM arrival delay impacting Antwerp Airport in the last five years. The last arrival delay caused by Antwerp Airport was in 2018.

***Table 3.3:*** *ATFM Arrival Delay at Antwerp Airport per Year and Cause*

| | Minutes of ATFM Arrival Delay | | | | IFR Arrivals |
|---|---|---|---|---|---|
| Year | CRSTMP | Weather | Other categories | Total | (with flight plan) |
| **2019** | 0 | 0 | 0 | **0** | 6,563 |
| **2020** | 0 | 0 | 0 | **0** | 4,048 |
| **2021** | 0 | 0 | 0 | **0** | 6,667 |
| **2022** | 0 | 0 | 0 | **0** | 6,507 |
| **2023** | 0 | 0 | 0 | **0** | 6,029 |

**ATFM impact on departing and arriving traffic**

Besides being delayed by Antwerp tower, flights to or from Antwerp Airport can also be delayed by ATFM measures in any ATC sector along their flight route; i.e. en-route or at the other departure or arrival airport. Note that regulations can be put in place at all ATC sectors of the flight plan: en-route sectors, departing airport and destination airport. The impact of all these regulations give the total ATFM delay of traffic at Antwerp Airport.

In 2023, 816 departing flights from Antwerp Airport were delayed, resulting in a total of 16,007 minutes of delay for the departing traffic. This is an increase of 19% compared to 2022 in terms of total departure delay, but still a 1% below pre-COVID levels in 2019. 8% (1,177 minutes) of departing traffic delay is attributable to skeyes' en-route sectors while 92% is attributable to other ANSPs. For arriving flights, a similar story holds. A total of 14,868 minutes of delay impacted 798 flights. Regulations in skeyes' sectors were the cause for 6% of the total delay.

***Figure 3.3:*** *ATFM Delay on Departures Attributable to skeyes and other ANSPs*

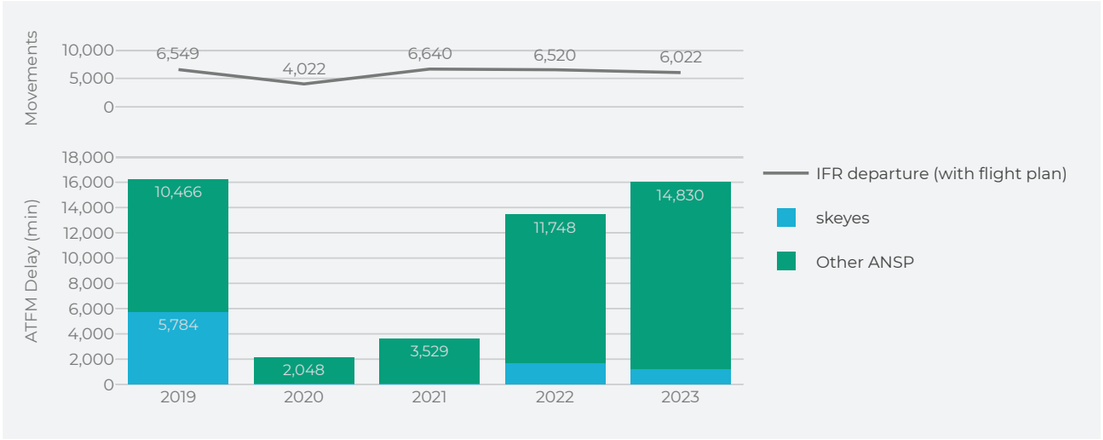
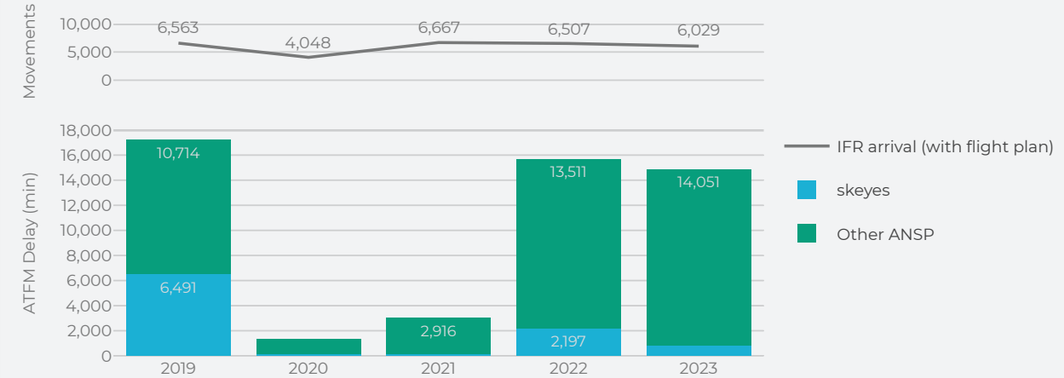



***Figure 3.4***: *ATFM Delay on Arrivals Attributable to skeyes and other ANSPs*




To give a view of the severity of the impact, the delayed flights can be categorised based on the magnitude of the delay. There are four categories:

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

The graphs in ***Figure 3.5*** and Figure 3.6 show that 57% of the delayed arrivals were delayed for a maximum of 15 minutes, and 95% of the delayed flights had a delay of less than one hour. For delayed departures this is 53% with a maximum of 15 minutes of delay and 96% with a delay of less than one hour.

***Figure 3.5:*** *Distribution of Delayed Arrivals per Delay Interval*

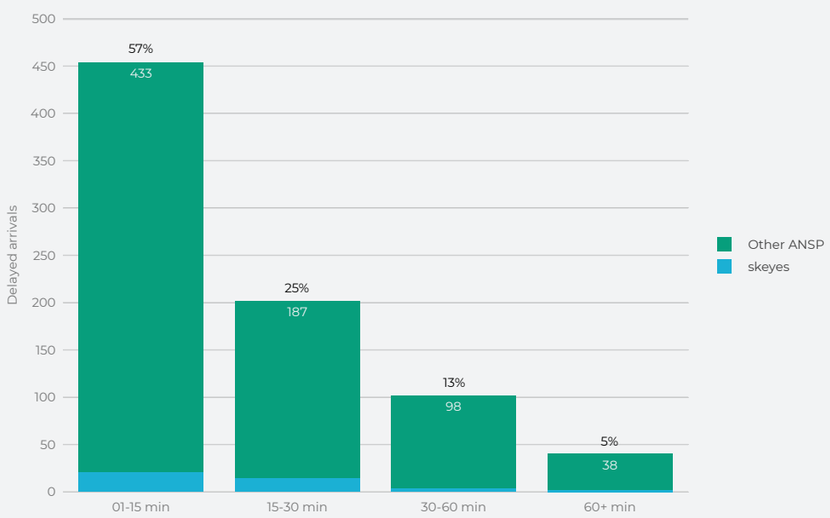
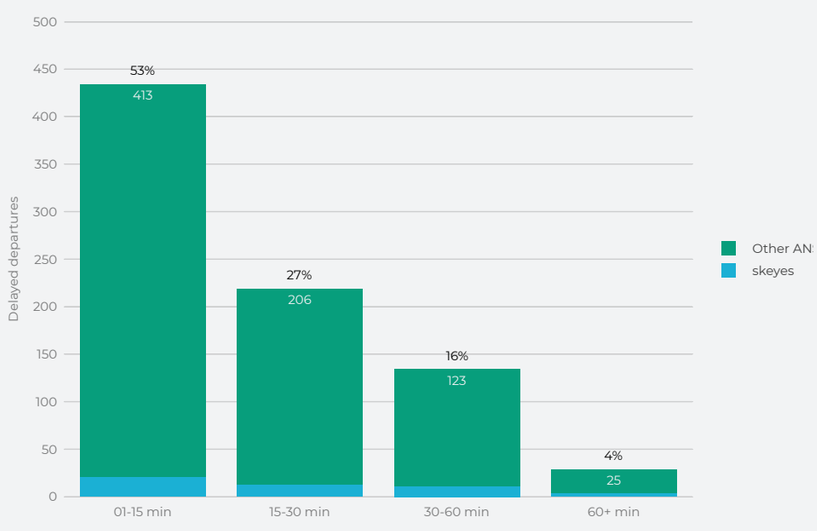



***Figure 3.6:*** *Distribution of Delayed Departures per Delay Interval*






*Preferential Runway System (PRS)*

*Night Movements*

*Wind Pattern*

# ENVIRONMENT

The main environmental effects of aviation are noise and sustainability. As Antwerp Airport is located near populated areas, it is important to consider noise and its reduction, as far as possible, in the vicinity of the airport. One of the ways to do so is to put in place a preferential runway system, a decision taken by the BCAA, which prioritises a runway use above the other, given that some conditions, mainly weather-driven, are met.

This chapter addresses, in the first part, the compliance with the preferential runway system in Antwerp Airport, movements outside of normal operating hours, and, lastly, will give an overview of wind speed and direction, as wind is a major factor in the choice of runway use.

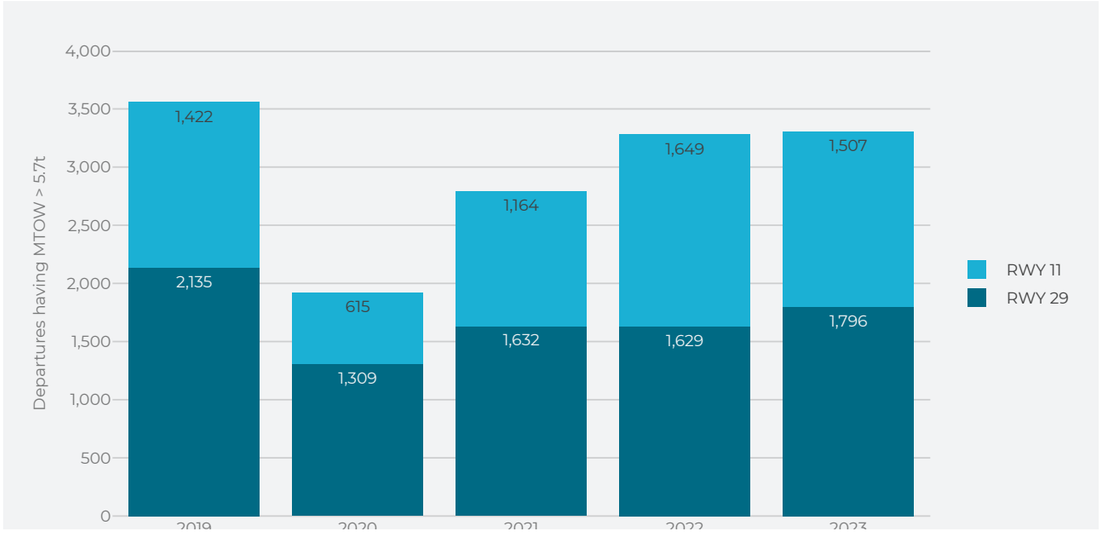
skeyes demonstrates its commitment to sustainability by participating in the GreenATM program initiated by CANSO, an environmental accreditation program to provide ANSPs with an independent, industry-endorsed, accreditation of their environmental efforts. skeyes obtained as one of the first ANSPs the GreenATM level 3 accreditation in 2023.

## Preferential Runway System

As mentioned in the AIP (AD 2.20, Ch. 4.1), the following Preferential Runway System (PRS) is in place at Antwerp Airport: with weather and traffic permitting, aircraft with weight exceeding 5,700kg shall use runway 11 in preference to runway 29 when departing.

***Figure 4.1*** shows the number of departures for the two runways, runway 11 and runway 29, of aircraft whose Maximum Take-Off Weight (MTOW) exceeds 5.7 tonnes. A positive trend can be seen throughout the years, the PRS being followed for 40% of the movements in 2019 to 50% in 2022, and 46% in 2023.

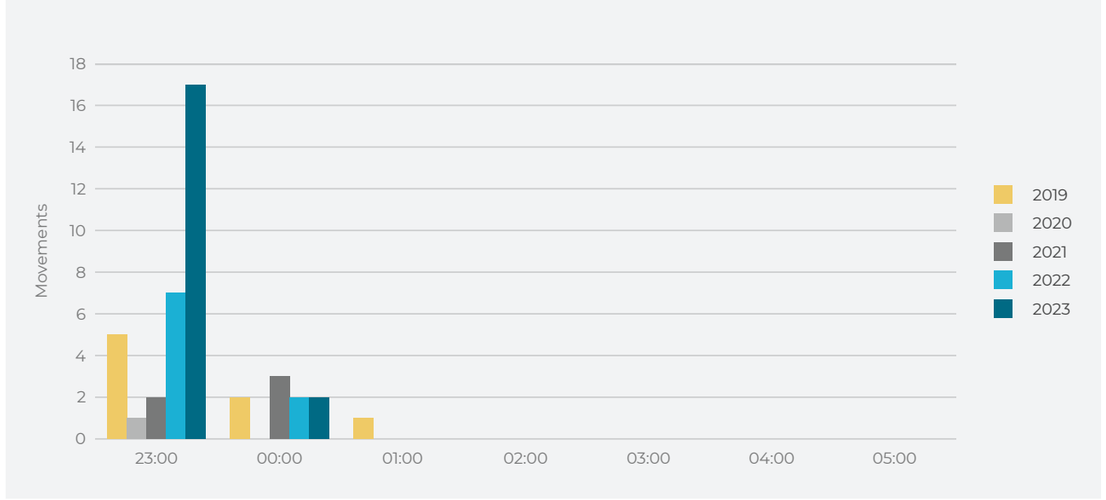
**Figure 4.1:** *PRS compliance in 2023 for Ostend-Bruges Airport*

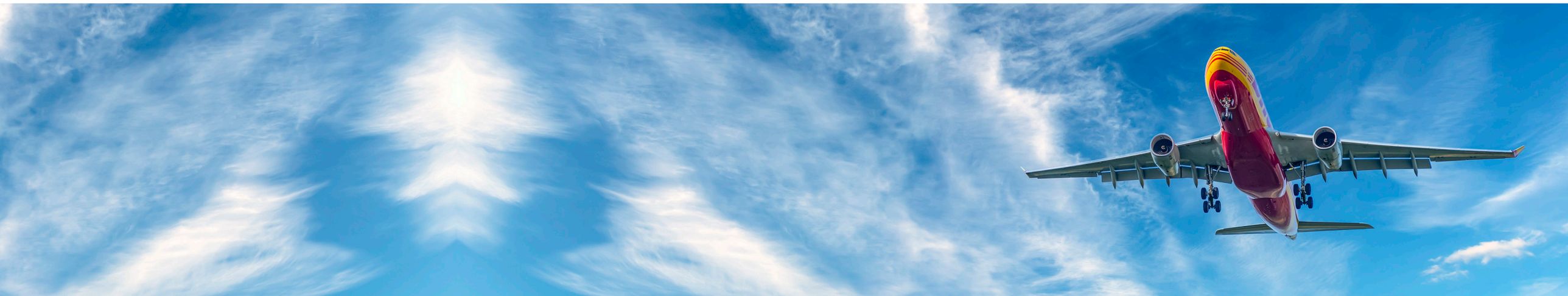



## Night movements

The usual 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. To observe how the number of night movements evolved over the previous years, Figure 4 2 shows the number of movements outside usual operational hours. The figures of 2023 show that 19 night movements were registered, 17 of which were between 23:00 and 00:00.

**Figure 4.2:** *Yearly Nighttime (23:00 - 6:00 LT) Traffic*



## Wind Pattern

Meteorological conditions affect operations and are a frequent cause for deviating from the PRS. ***Figure 4.3*** shows the wind roses for 2019 to 2023. The main wind direction is from the south-west, with a secondary direction coming from the north-east. This almost bi-modal nature of the wind can also be seen in ***Figure 4.4***. One can see a direct link between wind direction and the runway usage in ***Figure 1.11***, with April, May, June and September clearly favouring runway 11 whereas the other months were more in favour of runway 29

***Figure 4.3:*** *Wind Roses for Antwerp Airport, 2019-2023*

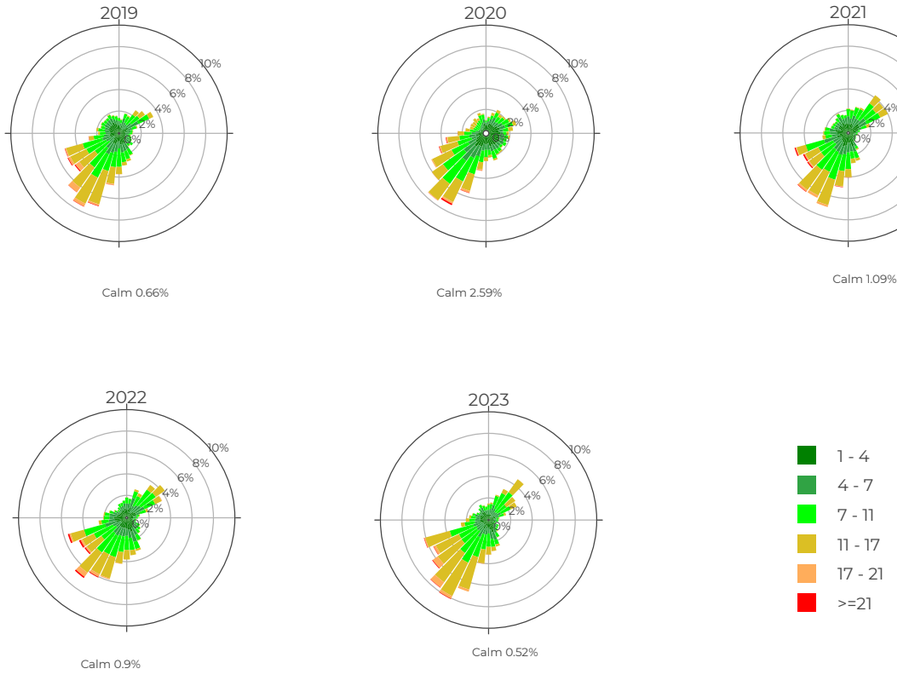
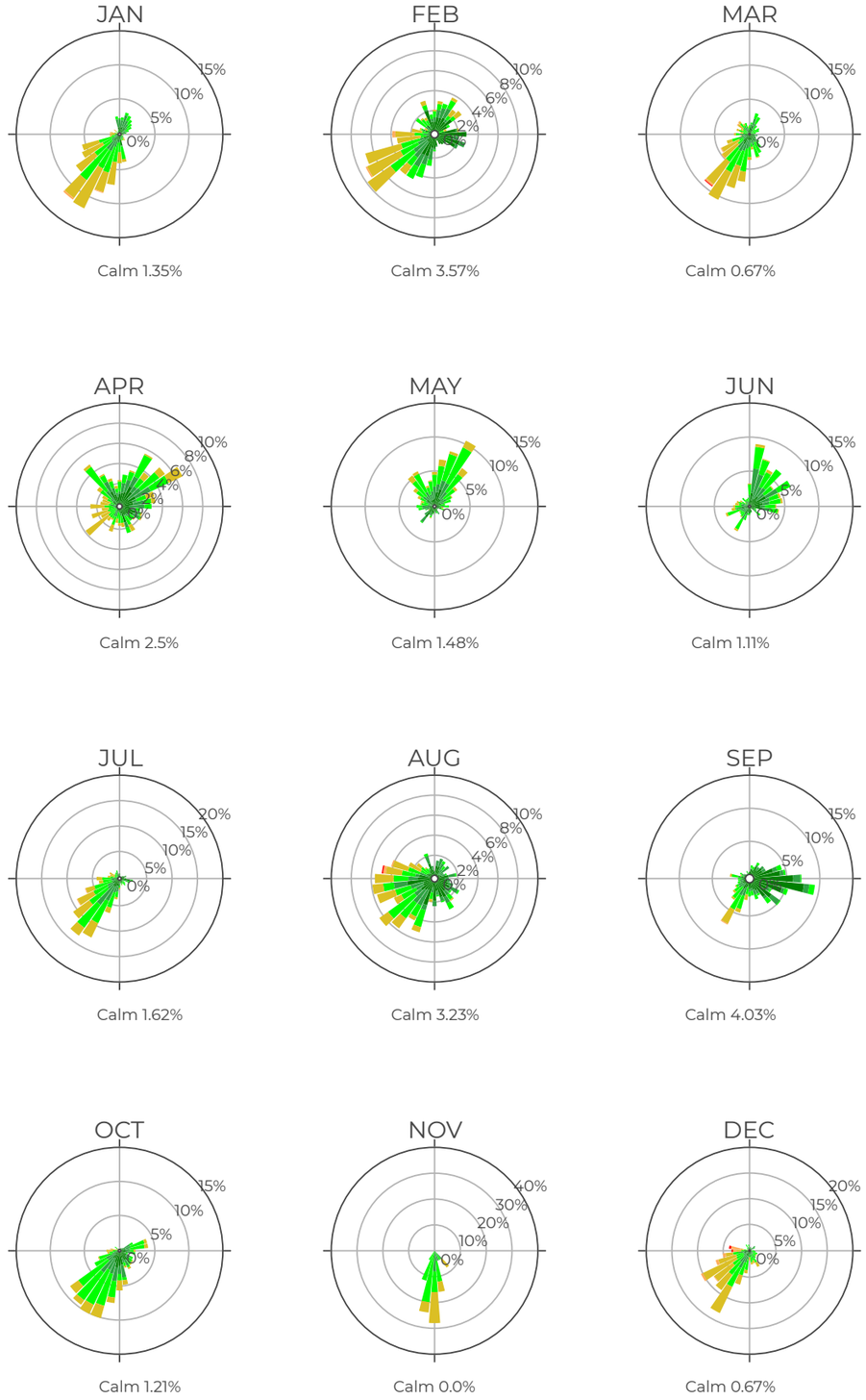





***Figure 4.4:*** *Wind Roses for Antwerp Airport per Month of 2023*



# ANNEX Fact sheet



## Yearly Evolution

- *11% traffic decrease mainly due to VFR movements drop*

| Movements | 2019 | 2020 | 2021 | 2022 | 2023 | 2023 vs 2022 | 2023 vs 2019 |
|---|---|---|---|---|---|---|---|
| IFR | 14,138 | 8,826 | 14,463 | 13,714 | 13,470 | -2% | -5% |
| VFR | 21,656 | 16,761 | 26,653 | 26,718 | 22,683 | -15% | +5% |
| Total | 35,794 | 25,587 | 41,116 | 40,432 | 36,153 | -11% | +1% |

## Quarterly comparison

| Movements | 2019 | 2020 | 2021 | 2022 | 2023 | 2023 vs 2022 | 2023 vs 2019 |
|---|---|---|---|---|---|---|---|
| Q1 | 7,168 | 5,619 | 7,130 | 11,440 | 7,958 | -30% | +11% |
| Q2 | 9,808 | 5,124 | 12,999 | 12,760 | 11,760 | -8% | +20% |
| Q3 | 10,557 | 10,077 | 11,727 | 11,229 | 9,785 | -13% | -7% |
| Q3 | 8,261 | 4,767 | 9,260 | 5,003 | 6,650 | +33% | -20% |



## Missed Approaches

38 missed approaches in 2023 (-12% vs. 2022, +15% vs. 2019)

TOP 3 causes in 2023:

1. Unstable approach (21)
2. O: Other (6)
3. Pilot's error (3)

## Safety Occurrences

- 8 runway incursions, 2 with ATM contribution





## Capacity

- Capacity exceeded on 3 days for 29-29 and on 9 days for 11-11 only due to majority VFR traffic. IFR capacity was never exceeded.

| Runway configuration | Declared IFR Capacity | Maximum Movements/Hour in 2023 |
|---|---|---|
| 11-11 | 41 movements/hour | 51 movements/hour |
| 29-29 | 41 movements/hour | 43 movements/hour |

## Punctuality

**Arrival delay:**

- Arrival Delay: 0 min/flight
- CRSTMP delay: 0 min/flight

**ATFM impact:**

- Departures 16,007 minutes ATFM delay (1,177 due to skeyes' regulations)
- Arrivals: 14,868 minutes ATFM delay (817 due to skeyes' regulations)

## PRS

- Departures 16,007 minutes ATFM delay (1,177 due to skeyes' regulations)
- Arrivals: 14,868 minutes ATFM delay (817 due to skeyes' regulations)

## Extensions of operational times

- 46% of movements with a MTOW of 5.7 tonnes or more used the PRS 50% in 2021, and 40% in 2019

## Night Movements

- 19 night movements were recorded (11 more than in 2019)

# ANNEX Missed Approaches

***Table A.1:*** *Causes for missed approaches per runway per year.*

| | Reasons | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|
| RWY 11 | FOD (foreign object debris) on the runway | 1 | - | - | - | - |
| | aircraft with technical problems | - | 1 | 2 | 1 | - |
| | authorized vehicle still on runway | - | - | - | - | - |
| | departing traffic on the runway | - | - | - | - | - |
| | no radio contact | - | - | - | - | 1 |
| | other | - | - | 1 | 5 | 3 |
| | pilot's error | 1 | - | - | 1 | 1 |
| | previous landing on the runway | 2 | 1 | 3 | 4 | 1 |
| | runway condition | - | - | - | 1 | - |
| | runway incursion | - | - | - | 1 | - |
| | tail wind | 1 | - | - | - | - |
| | taken out of sequence | 1 | - | 1 | - | - |
| | too close behind preceding | - | - | - | 3 | 1 |
| | training flight | - | - | - | 1 | 1 |
| | unstable approach | 4 | - | 11 | 5 | 10 |
| | weather - thunderstorm - windshear | - | - | 1 | - | - |
| | weather - visibility | 5 | 1 | - | 1 | - |
| RWY 29 | FOD (foreign object debris) on the runway | 3 | 3 | 4 | - | - |
| | aircraft with technical problems | 1 | - | 2 | - | 1 |
| | authorized vehicle still on runway | - | - | 1 | - | - |
| | departing traffic on the runway | - | 1 | 1 | - | 1 |
| | no radio contact | - | - | - | - | - |
| | other | - | - | 3 | 1 | 3 |
| | pilot's error | 1 | - | 2 | 2 | 2 |
| | previous landing on the runway | - | - | 1 | 1 | - |
| | runway condition | - | - | - | - | - |
| | runway incursion | - | - | - | - | - |
| | tail wind | - | - | - | - | 1 |
| | taken out of sequence | - | - | - | - | - |
| | too close behind preceding | 1 | - | - | 2 | 1 |
| | training flight | - | - | - | 1 | - |
| | unstable approach | 6 | 5 | 16 | 10 | 11 |
| | weather - thunderstorm - windshear | 5 | 2 | 5 | 1 | - |
| | weather - visibility | 1 | 2 | 5 | 2 | - |

skeyes nice to guide you

# Runway Performance Report **2023**

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