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Antwerp Airport

RUNWAY PERFORMANCE REPORT 2022

skeyes / Tervuursesteenweg 303 / B-1820 Steenokkerzeel
T +32 2 206 21 11 / F +32 2 206 22 88

member of FABEC

www.skeyes.be

EXECUTIVE SUMMARY

The world-wide aviation sector is on a rapid recovery and throughout Europe traffic levels of 2019 are being reached. Antwerp Airport had already surpassed 2019 traffic in 2021, and 2022 is no different. Despite being closed for runway renovations for 37 days in September and October, traffic levels surpassed 2019 numbers.

This report gives an overview of skeyes' operations at Antwerp Airport (ICAO code: EBAW) for 2022 covering traffic analyses and providing relevant data on the performance of Air Traffic Management (ATM). ATM performance is driven by four Key Performance Area's (KPAs): safety, capacity, environment and cost-efficiency. This report aims to provide information on three of the four KPAs: safety, capacity and environment.

Traffic

After 2020, which was a year with a historical drop in air traffic, traffic recovered at Antwerp Airport. Compared with pre COVID-19 traffic figures in 2019, the total number of movements increased by 13% and there was a 23% increase in flights using Visual Flight Rules (VFR). However, flying by Instrument Flight Rules (IFR) decreased by 3% compared to 2019 numbers. Despite being closed for renovation works for 10% of the year, traffic only decreased by 2% compared to 2021.

In terms of runway use, runway 11 was used 49% of the time with March being the month with the highest use

Safety

Two types of events are analysed in this report, both giving a view on airport safety performance: missed approaches and runway incursions. Regarding missed approaches, compared with 2021 the rate has decreased from 2.9 to 2.1 missed approaches per 1,000 arrivals, bringing it almost back to 2019 levels. Unstable approach is the top reason for missed approaches, as many training flights occur at Antwerp, it could that the cause is because of inexperienced pilots.

There were 14 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 seen as a significant safety event. This runway incursion happened during low-visibility at the airport. Recommendations have been made to reassess the low-visibility operations plan. Another recommendation has been made to only mention the word 'cleared' in relation to take-off or landing clearance, to avoid confusion. Lastly, a safety recommendation resulted in a review and update to the mowing areas and procedures.

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 24 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 2022, flights departing from Antwerp Airport experienced a total of 13,427 minutes of ATFM delay, of which 12.5% was attributable to skeyes. The ATFM delay for arriving flights was of 15,708 minutes. 14% of that delay was due to ATFM measures placed by skeyes and 86% was due to ATFM measures set by other ANSP's.

Environment

The Preferential Runway System at Antwerp, indicating that aircraft exceeding 5,700kg should use runway 11 for take-off, which again, was the runway more often in use. The ratio of runway 11 used by aircraft with a Maximum Take-Off Weight (MTOW) of greater or equal to six tonnes increased from 42% in 2021 to 51% in 2022. This is the highest use since 2019.

Night movements, as they are relevant for local noise measures, are also mentioned in this chapter. There was an increase from five to nine movements, recorded during the timeframe from 23:00 to 06:30 Local Time.

SAMENVATTING

De luchtvaartsector herstelt zich snel wereldwijd en in heel Europa worden de verkeersniveaus van 2019 bereikt. In 2021 had de Luchthaven Antwerpen al het verkeersniveau van 2019 overtroffen en anno 2022 was dat niet anders. Hoewel de luchthaven in september en oktober 37 dagen lang gesloten was voor renovatiewerken aan de startbaan, overtrof het verkeer de cijfers van 2019.

Dit verslag geeft een overzicht van de activiteiten van skeyes op de Luchthaven Antwerpen (ICAO-code: EBAW) voor 2022, met verkeersanalyses en relevante gegevens over de prestaties inzake luchtverkeersbeheer (Air Traffic Management, ATM). De prestaties inzake luchtverkeersbeheer worden bepaald door vier kernprestatiegebieden (KPA's, Key Performance Areas): veiligheid, capaciteit, milieu en kostenefficiëntie. Dit verslag beoogt informatie te verstrekken over drie van de vier KPA's: veiligheid, capaciteit en milieu.

Verkeer

Na 2020, dat een jaar was met een historische krimp in het luchtverkeer, herstelde het verkeer zich op de Luchthaven Antwerpen. In vergelijking met de verkeerscijfers van 2019 (het precoronatijdperk), steeg het totale aantal bewegingen met 13%; vluchten waarbij gebruikgemaakt wordt van *Visual Flight Rules* (VFR) namen met 23% toe. Het aantal vluchten volgens *Instrument Flight Rules* (IFR) daalde echter met 3% ten opzichte van de cijfers van 2019. Ondanks de sluiting voor renovatiewerken gedurende 10% van het jaar daalde het verkeer slechts met 2% ten opzichte van 2021.

Wat het baangebruik betreft, werd baan 11 49% van de tijd gebruikt en was maart de maand met de hoogste gebruiksfrequentie (82% van de tijd).

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. In vergelijking met 2021 is het aantal afgebroken naderingen per 1.000 aankomsten gedaald van 2,9 tot 2,1, waardoor het niveau van 2019 bijna opnieuw gehaald wordt. De hoofdoorzaak van afgebroken naderingen was een onstabiele nadering. Er vinden veel trainingsvluchten plaats op Luchthaven Antwerpen en dit kan een rol spelen bij het aantal onstabiele naderingen.

Er deden zich 14 *runway incursions* voor, waarvan twee met ATM-bijdrage. De meeste *runway incursions* gebeurden doordat piloten zonder klaring opstegen of de instructies van de luchtverkeersleider verkeerd begrepen. Eén *runway incursion* werd gezien als een significant veiligheidsevenement. Dit gebeurde tijdens lage zichtbaarheid operaties. Er zijn aanbevelingen gedaan om de procedures tijdens lage zichtbaarheid te herzien. Een andere aanbeveling werd gedaan om het woord *cleared* (geklaard) alleen te vermelden in verband met een klaring voor het opstijgen of landen, om verwarring te vermijden. Een andere veiligheidsaanbeveling mondde uit in een herziening en update van de maaigebieden en -procedures.

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 werd de theoretische IFR-capaciteit 24 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 Antwerpen, registreert skeyes, in het kader van een permanente monitoring van zijn prestaties als luchtvaartnavigatiedienstverlener, de ATFM-vertraging (ATFM, *Air Traffic Flow Management*) bij aankomst voor de Luchthaven 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 Antwerpen, en wordt aangegeven welk deel van deze vertraging werd veroorzaakt door reguleringen van skeyes. In 2022 liepen vertrekkende vluchten vanaf de Luchthaven Antwerpen in totaal 13.427 minuten ATFM-vertraging op, waarvan 12,5% te wijten was aan skeyes. De ATFM-vertraging voor aankomende vluchten bedroeg 15.708 minuten. 14% van die vertraging was te wijten aan ATFM-maatregelen van skeyes, 86% aan die van andere ANSP's.

Milieu

Het systeem van preferentieel baangebruik (*Preferential Runway System*) in Antwerpen schrijft voor dat vliegtuigen zwaarder dan 5.700 kg baan 11 zouden moeten gebruiken om op te stijgen. Die baan was opnieuw vaker in gebruik.

Het aantal vertrekken vanaf baan 11 die wordt gebruikt door toestellen met een maximaal startgewicht (*Maximum Take-Off Weight*, MTOW) van 6 ton of meer klom van 42% in 2021 naar 51% in 2022. Dat is de hoogste gebruiksratio sinds 2019.

Nachtbewegingen die relevant zijn in het licht van lokale maatregelen tegen geluidshinder, worden ook in dit hoofdstuk vermeld. Hun aantal steeg van vijf naar negen bewegingen, in het tijdsbestek van 23.00 uur tot 6.30 uur (lokale tijd).

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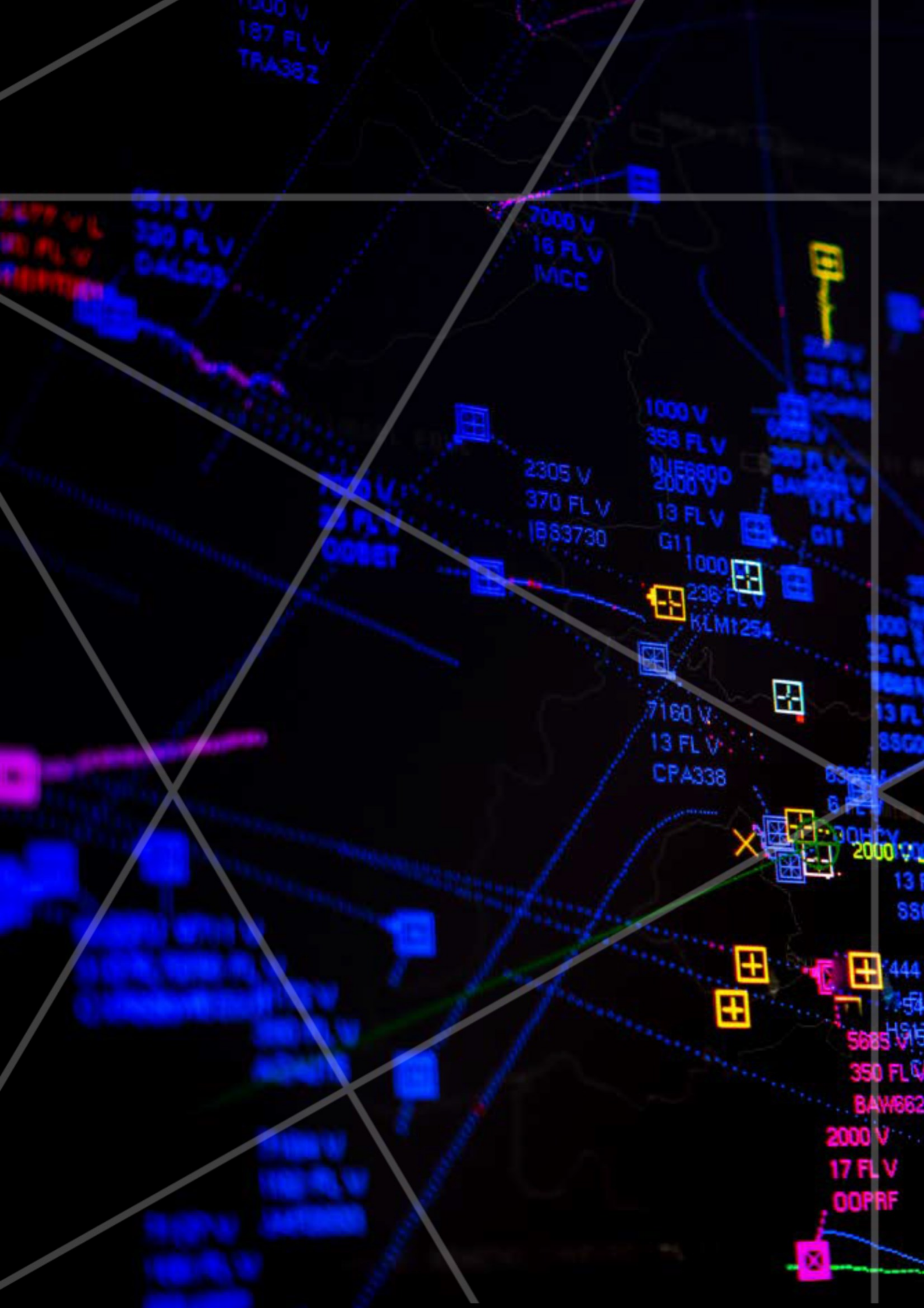
GLOSSARY

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
CAA:	Civil Aviation Authority
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:	Liège Airport ICAO Code
EBOS:	Ostend–Bruges International Airport ICAO Code
ETOT:	Estimated Take-Off Time
ICAO:	International Civil Aviation Organization
IFR:	Instrument Flight Rules
LRST:	Local Runway Safety Team
MCT:	Maximum Throughput Capacity
MTOW:	Maximum Take-Off Weight
NM:	Network Manager
PRS:	Preferential Runway System
RAT:	Risk Analysis Tool
RI:	Runway Incursion
RMZ:	Radio Mandatory Zone
RPAS:	Remotely Piloted Aircraft Systems
RWY:	Runway
SRO:	Simultaneous Runway Occupancy
UAS:	Unmanned Aircraft System
VFR:	Visual Flight Rules
VLL:	Very Low Level


187 FL V
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7000 V
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IMCC
1000 V
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370 FL V
IB63730
2000 V
13 FL V
G11
1000
236 FL V
KLM1254
7160 V
13 FL V
CPA338
2000 V
5685 V
350 FL V
BAW662
2000 V
17 FL V
OOPRF

1. 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 Instrumental 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 BCAA's (Belgian Civil Aviation Authority) aerodrome movement definition:

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

Traffic Overview

The number of aircraft movements for the last four 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).

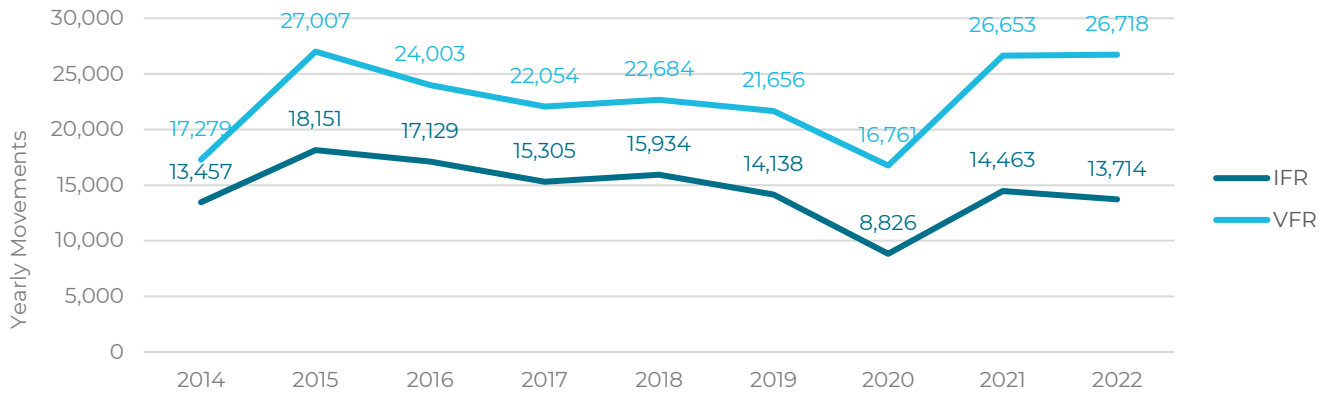


Figure 1-1: Traffic Evolution at Antwerp Airport from 2014 to 2022

Even though traffic is 13% higher than 2019, a decrease of 2% compared to 2021 has been observed. VFR traffic is up 23% since 2019, but IFR shows a decrease of 3% since before COVID. A major cause for the decrease in 2022 is the closure of the runway from 19 September to 25 October for renovation works. The impact of the closure of the runway can be seen in Figure 1-2, which shows the amount of movements per month. Both September and October show a sharp decrease in traffic compared to previous years.

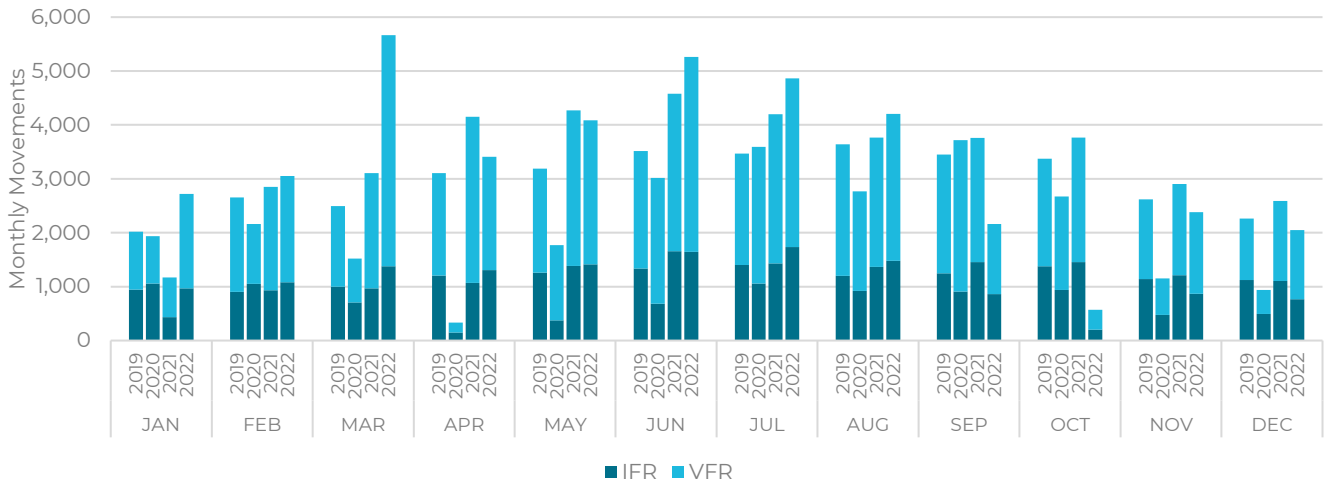


Figure 1-2: Total Monthly Movements from 2019 to 2022 at Antwerp Airport

From Table 1-1, it can be seen that the year started busy, with almost every month up to September showing an increase compared to both 2019 and 2021. The last 4 months of the year show a decrease, mainly caused by the closure of the airport due to renovation works in September and October. The low number of movements in November and December is due to shorter period of daylight and worse weather condition. March 2022 was the busiest month of the last four years, with 5,664 movements. This coincides with the end of some additional COVID restrictions. March also was dry and extremely sunny, having over 227 sun-hours, nearly twice as much as the average for the month[1]. Table 1-2 shows the arrivals and departures from Antwerp Airport. The same trends from Table 1-1 can be seen here.

[1] KMI: https://www.meteo.be/nl/klimaat/klimaat-van-belgie/klimatologisch-overzicht/2022/maart (visited 23/02/2023)

There was an average of 110 movements per day in 2022, in 2021 there were an average of 113 flights per day. The airport was closed for 37 days due to construction works on the runway. On the days the airport was open, there were an average of 123 flights per day, an increase of 9% compared to last year.

Table 1-1: VFR, IFR and Total Traffic per Month from 2019 to 2022

		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**
	2022 vs 2019	+2%	+20%	+38%	+9%	+13%	+23%	+24%	+24%	-31%	-85%	-24%	-32%	**-3%**
	2022 vs 2021	+122%	+16%	+43%	+23%	+2%	-1%	+21%	+8%	-41%	-86%	-28%	-31%	**-5%**
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**
	2022 vs 2019	+64%	+13%	+187%	+11%	+38%	+66%	+51%	+12%	-41%	-82%	+2%	+12%	**+23%**
	2022 vs 2021	+138%	+3%	+100%	-32%	-8%	+24%	+13%	+13%	-44%	-84%	-11%	-13%	**+0%**
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**
	2022 vs 2019	+35%	+15%	+127%	+10%	+28%	+50%	+40%	+16%	-37%	-83%	-9%	-9%	**+13%**
	2022 vs 2021	+132%	+7%	+82%	-18%	-4%	+15%	+16%	+12%	-43%	-85%	-18%	-21%	**-2%**

Table 1-2: Departures and Arrivals Figures per Month from 2019 to 2022

		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**
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**

The calendar in Figure 1-4 shows the daily movements. On the busiest days of the year, most of the movements were from training aircraft. For example, on March 8th, the busiest day of the year, two aircraft were responsible 168 out of 346 movements.

Traffic Patterns

IFR and VFR hourly traffic patterns can be seen in Figure 1-3 and Figure 1-5, respectively. VFR traffic is clustered in the daylight hours, as is expected. Unlike the other airports, COVID did not modify the IFR traffic pattern, except for absolute numbers, at Antwerp Airport. Figure 1-6 shows the seasonal variation in traffic. Once again, there is a drop in the early morning and evening hours for the winter, which is due to the shorter period of daylight. The airport was closed for 37 days between September and October (over one third of the fall season), which is why the traffic in fall was so much lower.

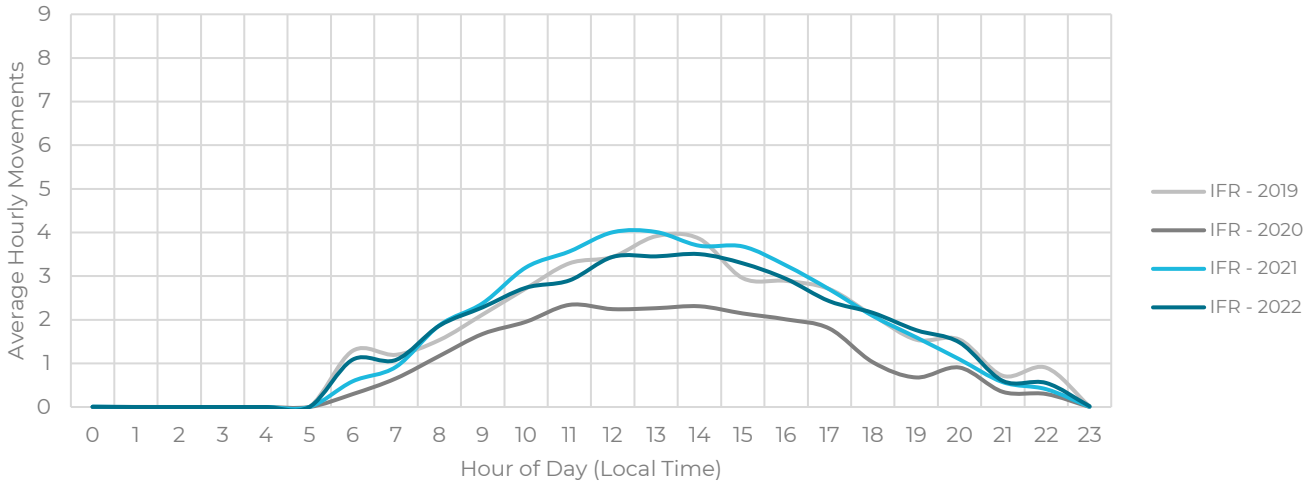


Figure 1-3: Average Hourly Movement for IFR flights

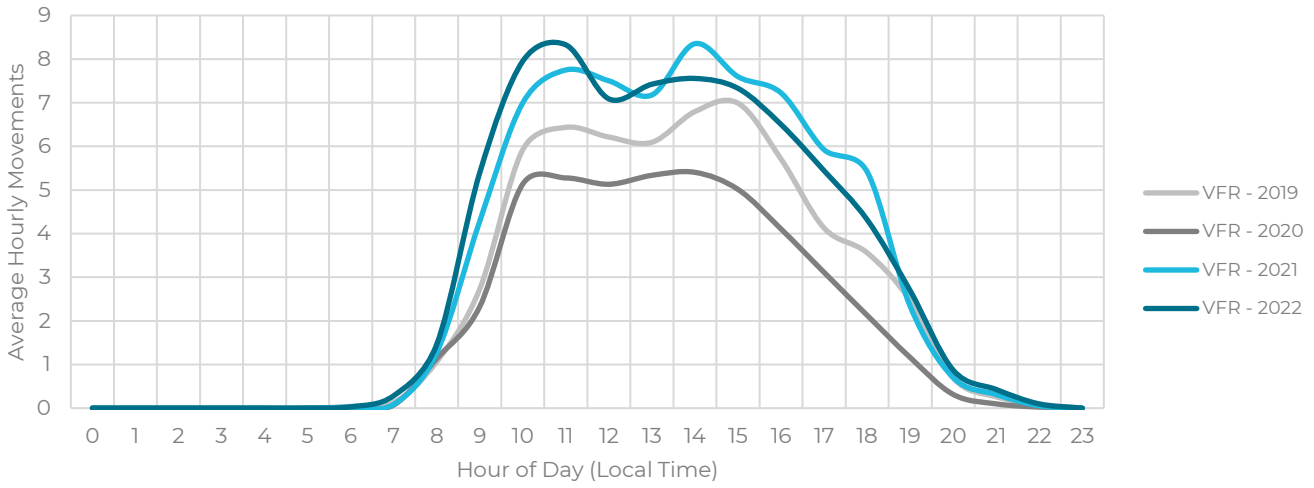


Figure 1-5: Average Hourly Movements for VFR flights

95	56	198	256	28	214	92	27	275	276	164	182	148	37	143	121	90	107	158	105	109	216	63	169	195	154	154	187		
57	216	124	58	87	156	79	91	264	346	209	127	134	86	154	141	156	149	142	188	84	169	186	253	253	253	183	249		
110	39	72	67	81	153	41	212	246	279	276	157	135	52	123	133	91	168	105	133	164	138	44	260	212	237	207	202		
192	7	151	40	97	68	82	69	222	255	178	168	116	31	156	193	171	153	150	116	87	176	175	273	197	191	105	245		
91	15	111	109	51	207	22	109	246	157	198	158	36	191	116	85	157	118	184	110	135	197	150	293	117	172	205	211		
41	39	71	137	53	147	206	49	237	195	157	210	218	127	132	92	143	145	104	227	184	145	206	161	236	202	187	135	154	
32	63	20	55	120	14	65	23	99	82	50	63	48	69	99	84	58	67	78	78	91	61	33	100	64	75	65	97	92	
Jan					Feb				Mar				Apr				May					Jun						Jul	

Figure 1-4: Calendar with Daily Movements for 2022

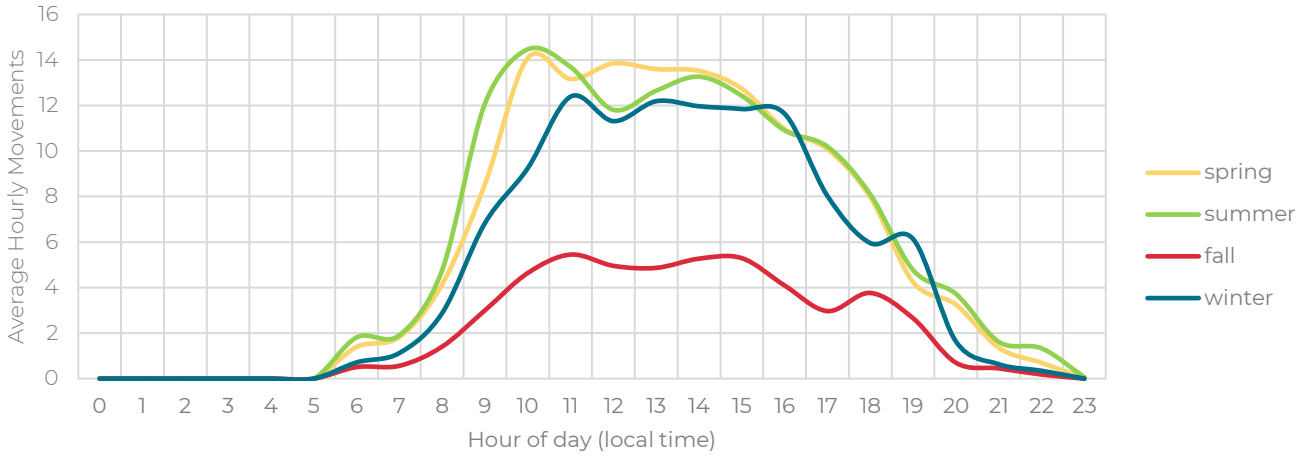


Figure 1-6: Average Hourly Movements by Season for 2022

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).

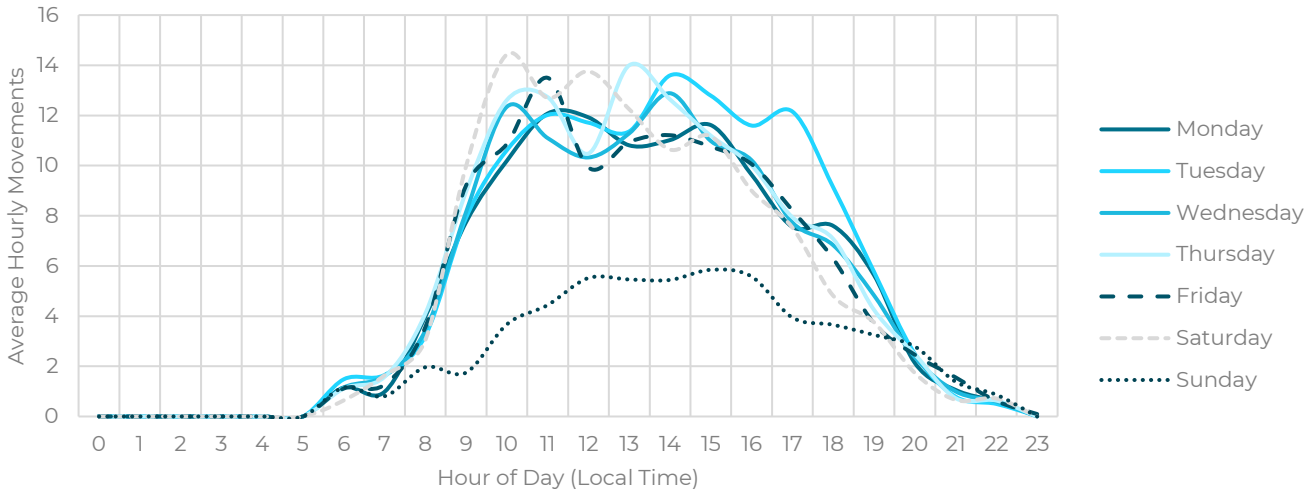
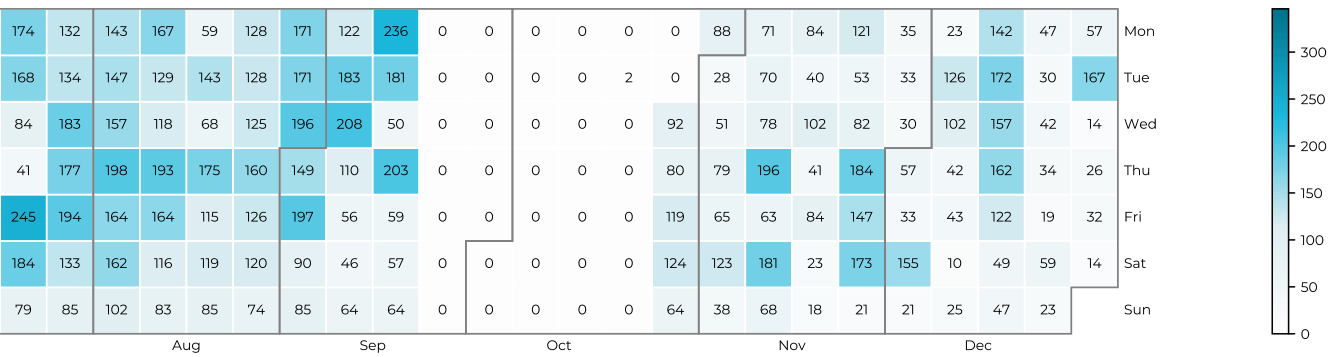


Figure 1-7: Average Hourly Movements in 2022 per Weekday



Drone Activities

The challenges and opportunities associated with the expected widespread growth of unmanned aerial vehicles will be one of the factors driving the future of Air Navigation Service Providers (ANSP). Early 2020, the company SkeyDrone was created as subsidiary of skeyes. SkeyDrone envisages to play a central role in the implementation of U-space, a set of specific services and procedures designed to ensure safe and efficient access to airspace for a large number of drones, in Belgium. SkeyDrone offers a wide variety of services that enable safe and efficient drone operations in all types of airspace. Those services are provided to authorities – such as managers of Unmanned Aircraft System (UAS) geographical zones – and operators of critical infrastructure – such as ports, nuclear plants, prisons and industrial complexes. It provides soft- and hardware based solutions that allow to manage safety & security related risks associated with drone flights in and around their areas of responsibility. SkeyDrone also supports drone operators – both large and small enterprises, as well as government agencies – in order to offer solutions that allow to plan and execute flights in the safest and most efficient manners[2].

The UAS geographical zones, also called "GeoZones" are only accessible to drones complying with technical and operational criteria, as well as restrictions with regard to the use of these drones. Therefore, to facilitate planning, coordination and information flow between drone operators and Air Traffic Control, SkeyDrone has implemented a web application: the Drone Service Application (DSA). The two main objectives of DSA is to simplify the planning process for drone operators, and to visualize the planned drone operations for skeyes, which is the GeoZone manager for controlled airspace above and around the airports of Antwerp, Brussels, Charleroi, Kortrijk, Liège and Ostend[3,4]. This source is used to show the drone activity in the following figures of this section.

Figure 1-8 displays the location of drone activities and the level of risk involved in the operations per airport. These categories are defined by the risk the drone activity forms for manned aviation in very low level (VLL) zones. For all airports where a control zone exists, 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

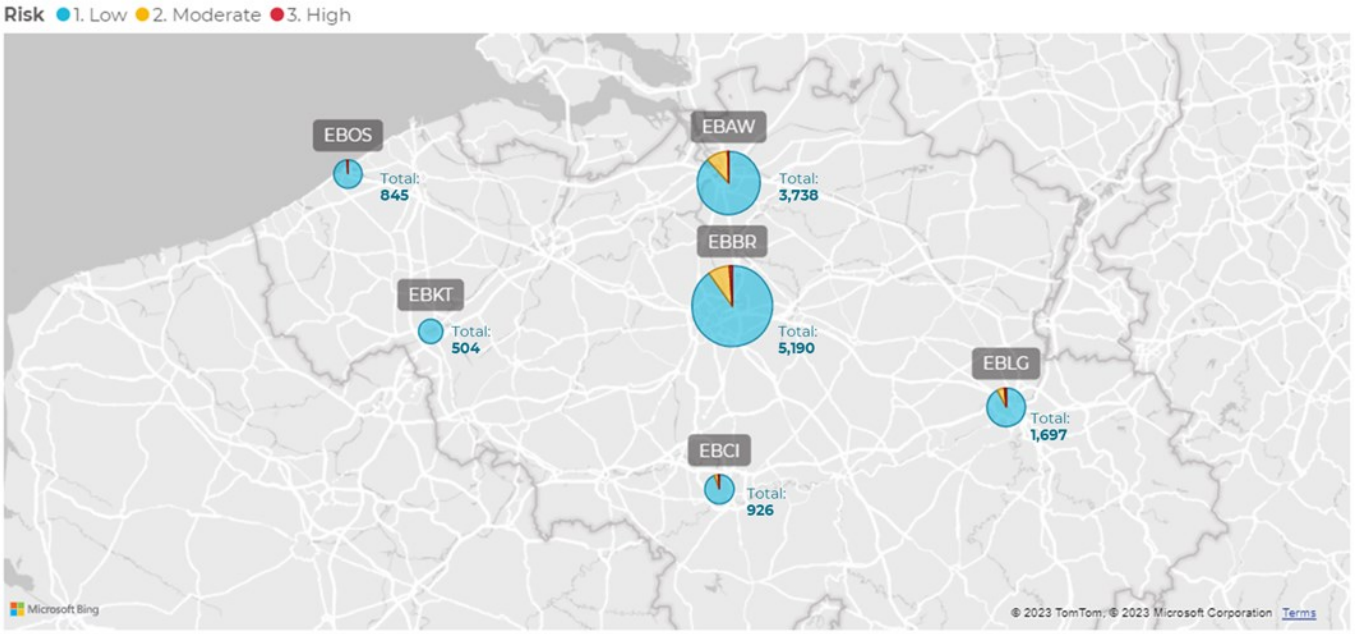


Figure 1-8: Drone Activities in Belgium in 2022

[2] Skeydrone, "Enabling safe drone operations", 2022. https://skeydrone.aero/ (URL retrieved on 14/02/2023)

[3] UAS geographical zone statuses can be seen at https://map.droneguide.be (URL retrieved on 14/02/2023)

[4] skeyes, "skeyes drone service application,". https://www.skeyes.be/en/services/drone-home-page/you-and-your-drone/drone-service-application/ (URL retrieved on 14/02/2023)

Table 1-3: Drone Activities in Belgium per EASA Risk Category in 2022

	2022				2021	2022 vs 2021
	OPEN	SPECIFIC	FORMER CLASS 1[5]	Total	Total	
EBBR	3,481	1,709		**5,190**	**4,530**	+15%
EBCI	581	345		**926**	**731**	+27%
EBLG	1,161	536		**1,697**	**852**	+99%
EBOS	652	182	11	**845**	**1,451**	-42%
EBAW	2,557	1,181		**3,738**	**4,157**	-10%
EBKT	333	163	8	**504**	**610**	-17%
Total	8,765	4,116	19	12,900	12,331	+5%

As per European Union Aviation Safety Agency (EASA) definition[6], 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 1-3 provides an overview of the complexity of operations at EBAW and the other five airports, where skeyes provides services. In addition, Figure 1-9 provides a detailed view of the activities around EBAW in 2022, displaying the initial coordinates of all UAS. Figure 1-10 shows the distribution of activities at EBAW over the year.

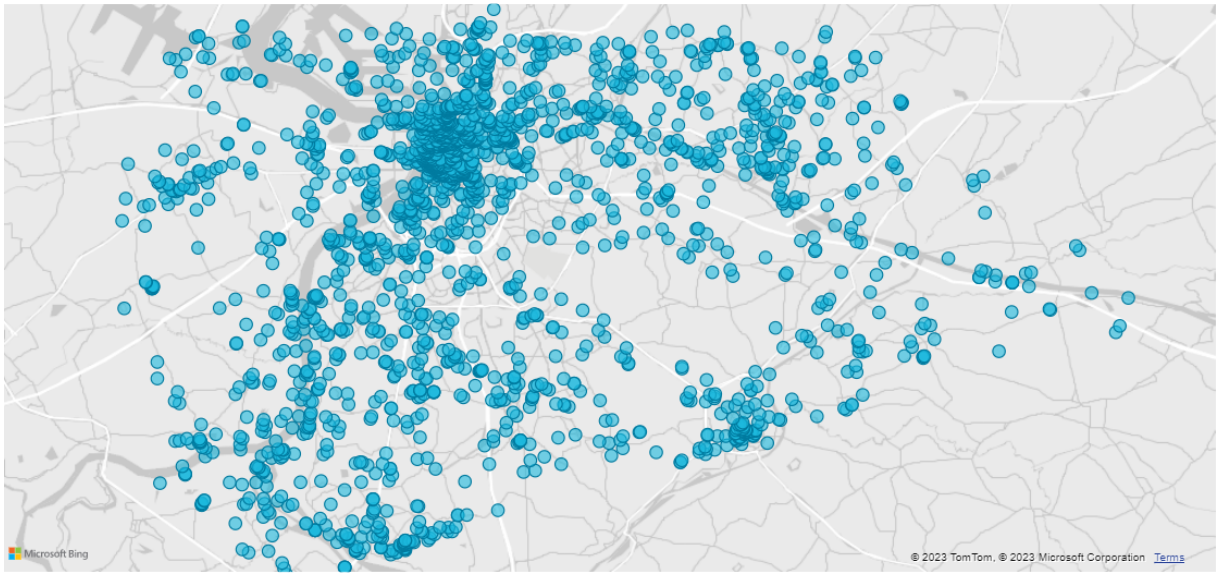


Figure 1-9: Initial Coordinates of Drone Activities near Antwerp Airport in 2022

Because Antwerp Airport was closed for more than one month, a lot of drone activity near the airport was not registered.

[5] Since 31/12/2020, the EU Drone Regulation has been in force in Belgium and old licenses for FORMER CLASS 1 operations expired a year after, i.e. at the end of 2021. Thus, no operations in the FORMER CLASS 1 category should have taken place in 2022 – yet some records can be found in the logs of the DSA. For further information, contact skeydrone.

[6] EASA, "Drones - regulatory framework background". https://www.easa.europa.eu/domains/civil-drones/drones-regulatory-framework-background (URL retrieved on 14/02/2023)

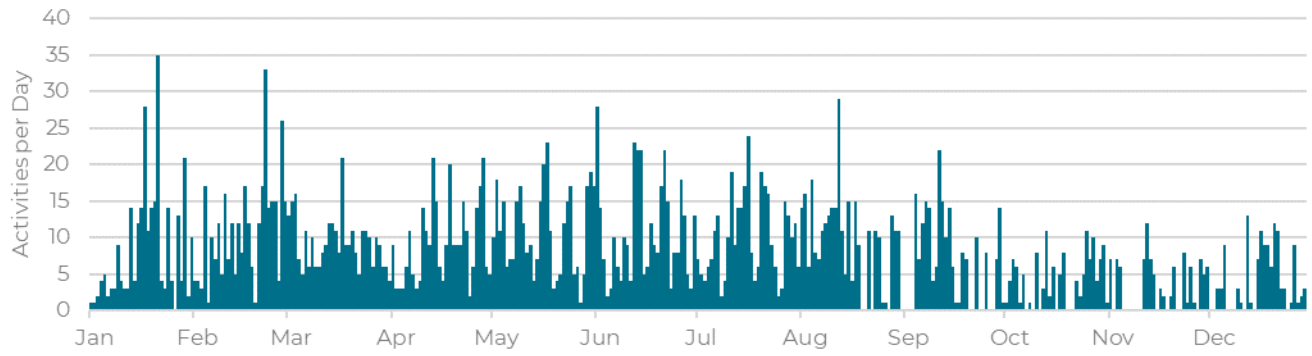


Figure 1-10: Distribution of Drone Activities throughout 2022 near Antwerp Airport

Runway Use

The layout of Antwerp Airport with its two reciprocal runways (RWY) is depicted in the International Civil Aviation Organization (ICAO) chart of Figure 1-11.

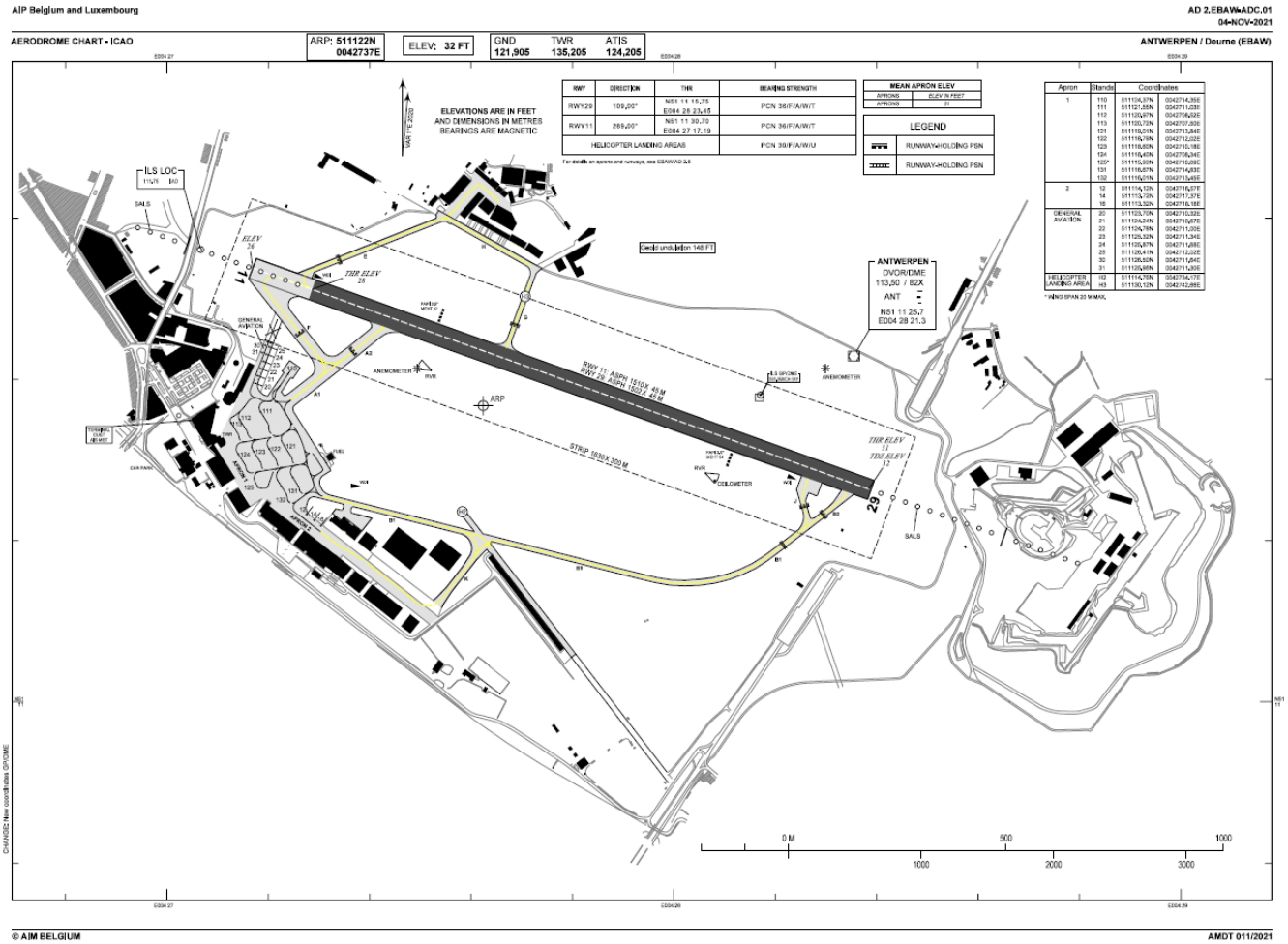
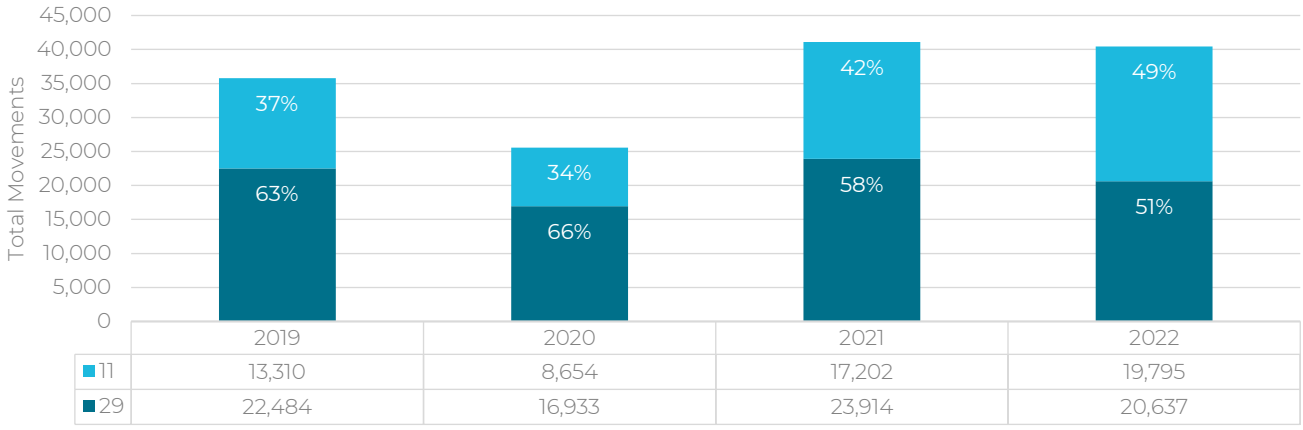


Figure 1-11: ICAO Chart of Antwerp Airport

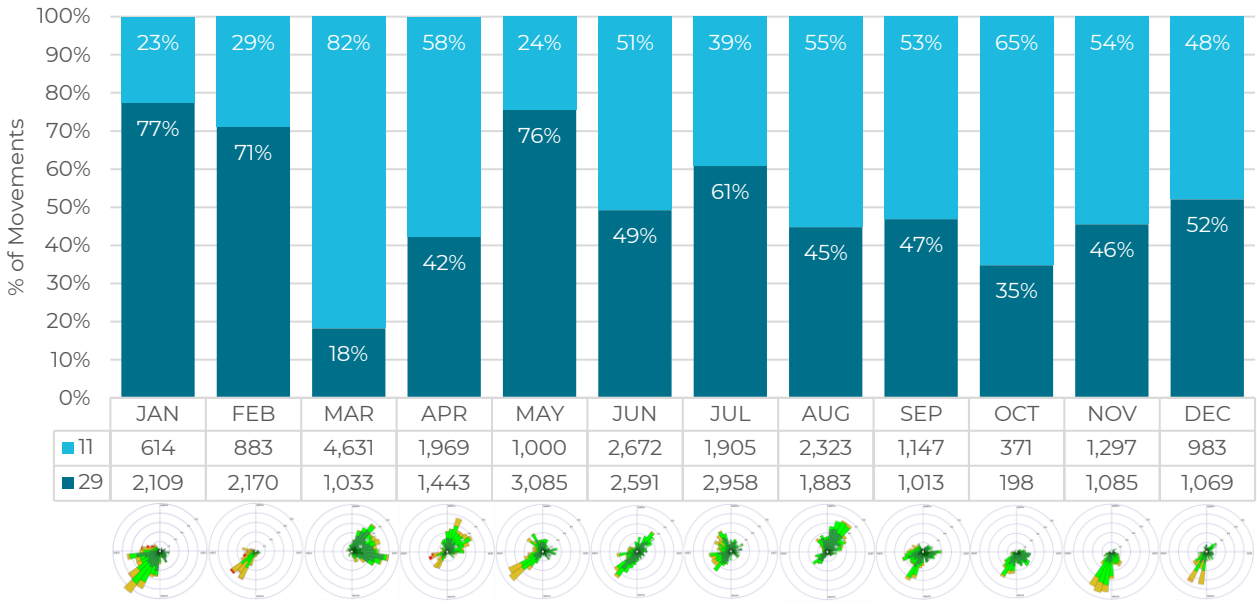
The use of one runway configuration over another depends on several factors that must be considered (e.g. wind direction or proximity of densely populated areas. Figure 1-12 shows the runway use in percentage and absolute numbers of movements at Antwerp Airport for the period from 2019 to 2022. There is a significant drop is usage of runway 29, this may be due to better adherence to the Preferential Runway System (more in Chapter 4).



	2019	2020	2021	2022
11	13,310	8,654	17,202	19,795
29	22,484	16,933	23,914	20,637

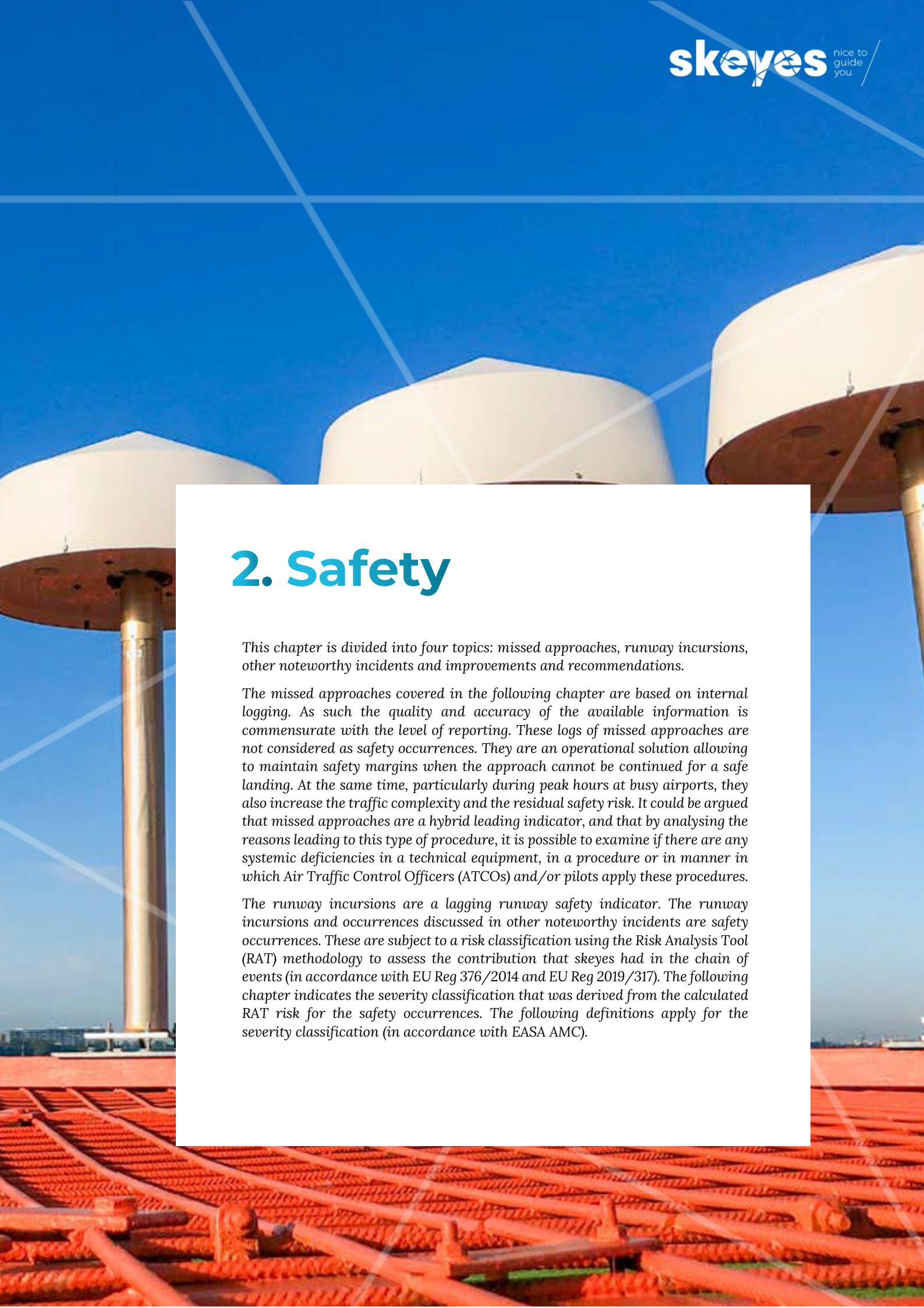
Figure 1-12: Movements per Runway from 2019 to 2022

Figure 1-13 below shows the runway use per month in 2022. In contrast to 2021, both runways are used almost equally as much throughout the year. As mentioned above, wind direction is a big factor for the choice of the runway configuration. Easterly and north-easterly winds in March, April and August resulted in higher usage of runway 11. Bigger images of the wind roses can be found in Chapter 4.



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
11	614	883	4,631	1,969	1,000	2,672	1,905	2,323	1,147	371	1,297	983
29	2,109	2,170	1,033	1,443	3,085	2,591	2,958	1,883	1,013	198	1,085	1,069

Figure 1-13: Runway Usage per Month in 2022 and Wind-Roses for Antwerp Airport

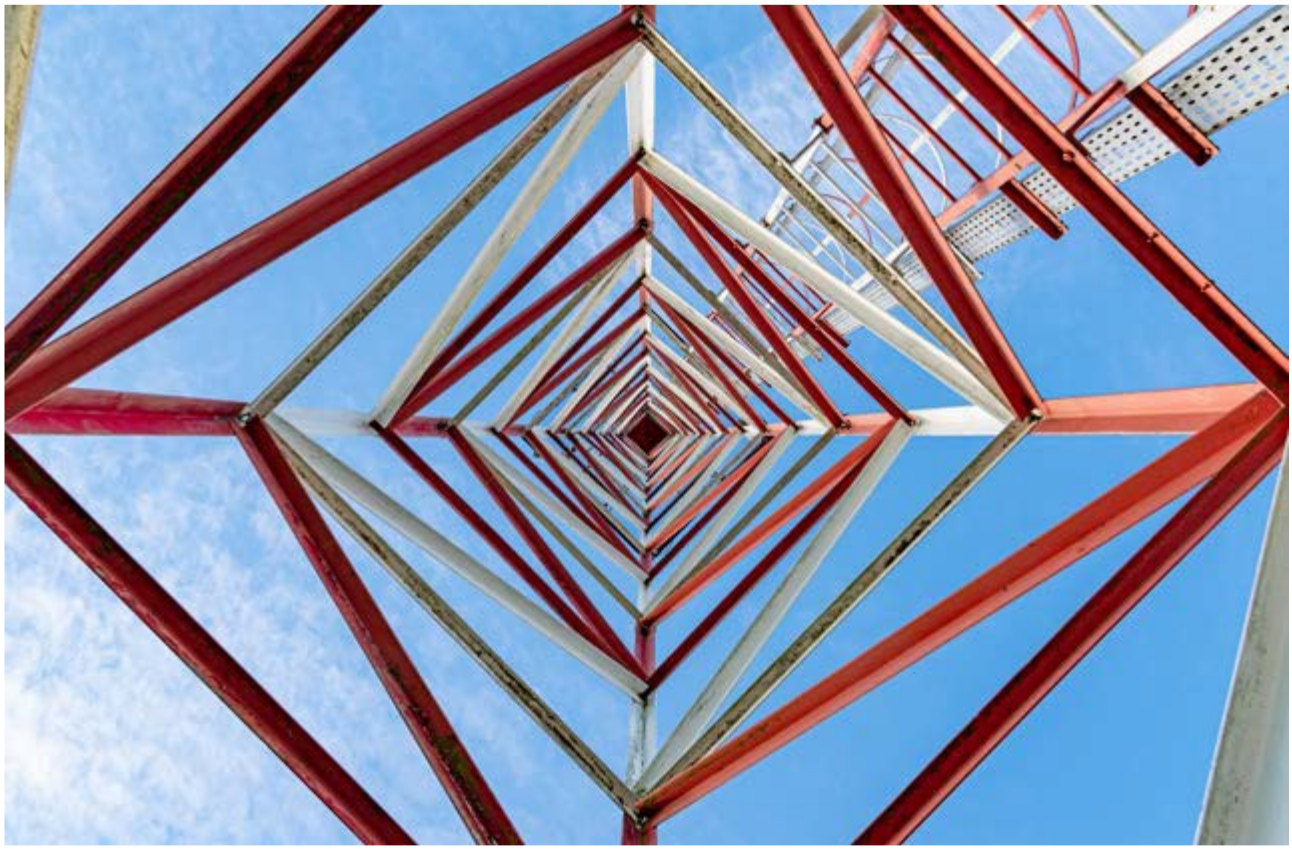


2. Safety

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 air traffic control (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 2022, there were 43 missed approaches, Figure 2-1 shows the number of missed approaches per cause. Unstable approaches were the cause for over one third (35%) of all missed approaches at Antwerp Airport in 2022. Many training flights happen at Antwerp Airport and inexperienced pilots could be a reason for the many unstable approaches.

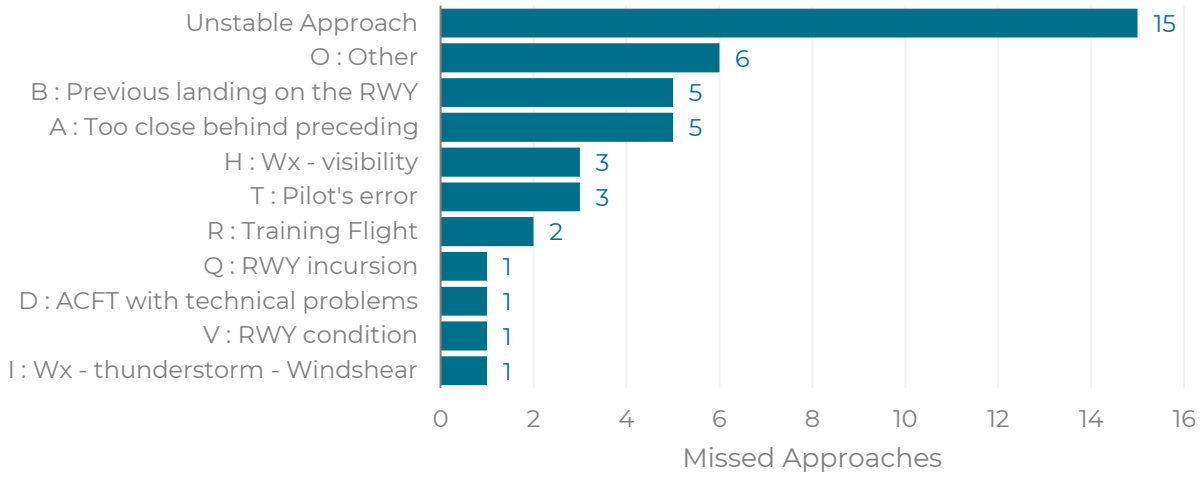


Figure 2-1: Missed Approaches in 2022 per Cause

There were six missed approaches with reason O: Other, these are detailed in Table 2-2.

Table 2-2: Descriptions of the Missed Approaches with Reason O: Other

Description	Runway
Pilot was number 2 to land, when he was cleared to continue, the pilot initiated a go around because he had reached the minima. He landed safely after the second approach.	11
Controller cancelled the approach clearance at 21:58:40 because the aircraft would not be able to land before 22:00:00 (time at which the airport closes).	11
Traffic on a visual approach was still at 2000 ft on 1 nm final. Pilot didn't have the field in sight.	11
Turbulence	11
While flaring pilot experienced some lift and couldn't make the landing. Aircraft lands safely after a visual approach	11
Initial request was made to land on Runway 29. Between initial request, winds changed and the pilot reported to be unable to land with the latest winds. After a go-around, the aircraft landed safely on Runway 11 with a visual approach.	29

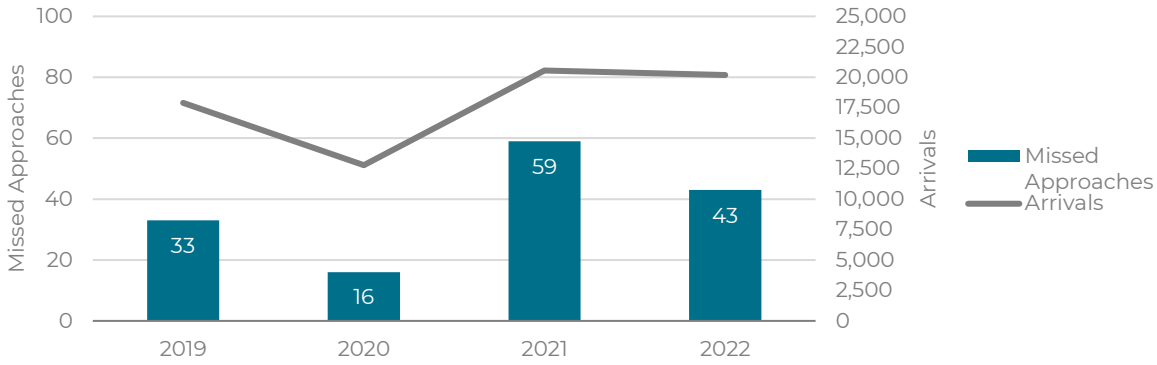


Figure 2-2: Missed Approaches per Year since 2019

Despite similar levels of traffic to 2021, the number of missed approaches has gone down by 27%, as shown in

Figure 2-2. Rather than comparing absolute numbers, looking into the rate of missed approaches per 1,000 arrivals is more convenient for comparison purposes. Compared to 2021, the rate of missed approaches has decreased from 2.9 to 2.1 per 1000 arrivals (see Figure 2-3). *The rate of missed approaches for Runway 11 is comparable to the values from 2019. For Runway 29 the rate of missed approaches has returned back to previous values, signalling that 2021 was an outlier in the amount of missed approaches on this runway.*

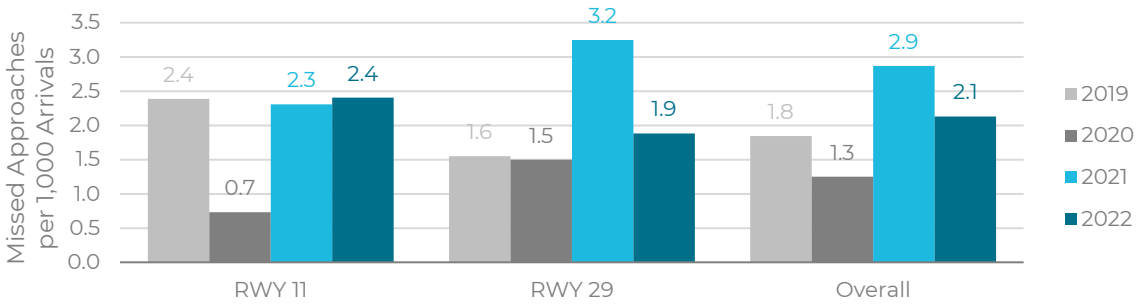


Figure 2-3: Rate of Missed Approaches per 1,000 Arrivals

Runway 11

There were 23 missed approaches reported on Runway 11 in 2022. The top five causes for missed approaches on Runway 11 in 2022 are provided in Table 2-3.

Table 2-3: Occurrence of Missed Approaches of Top 5 Causes in 2022 per Runway and Year

Top 5 causes in 2022 RWY 11	2019	2020	2021	2022
Total Missed Approaches	15	3	19	23
Unstable Approach	4		11	5
O : Other			1	5
B : Previous landing on the RWY	2	1	3	4
A : Too close behind preceding				3
Q : RWY incursion				1
Part top 5 causes of 2022	40%	33%	79%	78%

Top 5 causes in 2022 RWY 29	2019	2020	2021	2022
Total Missed Approaches	18	13	40	20
Unstable Approach	6	5	16	10
T : Pilot's error	1		2	2
A : Too close behind preceding	1			2
H : Wx - visibility	1	2	5	2
B : Previous landing on the RWY			1	1
Part top 5 causes of 2022	50%	54%	60%	85%

Runway 29

There were 20 missed approaches reported on Runway 29 in 2022. This is half of last year's value. From the top five causes for missed approaches on Runway 29 in 2022, which can be seen in Table 2-3, there were much fewer missed approaches due to unstable approach and visibility. In 2021 there were 16 missed approaches due to unstable approaches, and in 2022 there were 10. However, in 2019 and 2020 there were only 6 and 5 missed approaches due to unstable approach, respectively.

Runway Incursions (RI)

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 (RI) 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 2022 can be retrieved from Figure 2-4. In total there were fourteen runway incursions of which two had an air traffic management (ATM) contribution.

The most severe runway incursion was a significant incident (C). This occurred when visibility was deteriorating and the airport was installing Low Visibility Operations (LVO). One aircraft had reportedly vacated the runway but was in fact still within the protected area because cones were placed on the taxiway as part of the LVO procedures, meanwhile clearance was given to two other aircraft to take-off and land. skeyes had a contribution to the RI as the aircraft later reported to still be stuck on the cones and had in fact not vacated the protected area, and clearance was still given to one more aircraft after this report.

The second RI was without safety effect (E). This RI happened because mowing vehicles were close to the runway when an aircraft was about to land, the ATCO made the correct decision to issue a go around and the situation was resolved safely.

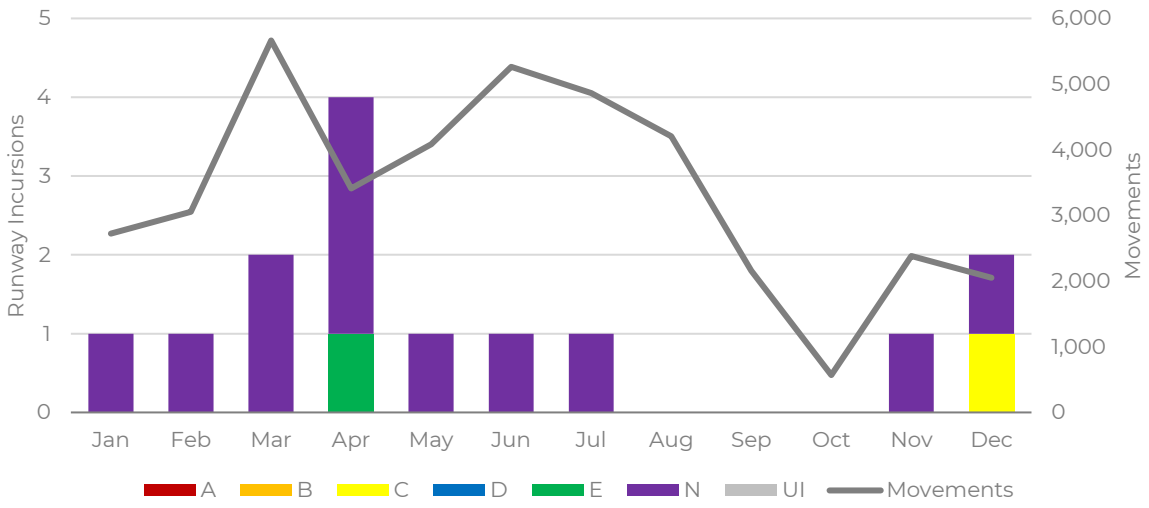


Figure 2-4: Runway Incursions by Month at Antwerp Airport in 2022

Figure 2-5 shows a yearly evolution of the number of runway incursions from 2019 to 2022 together with the evolution of the movements at Antwerp Airport. Many of the runway incursions were due to deviations from ATC instructions.

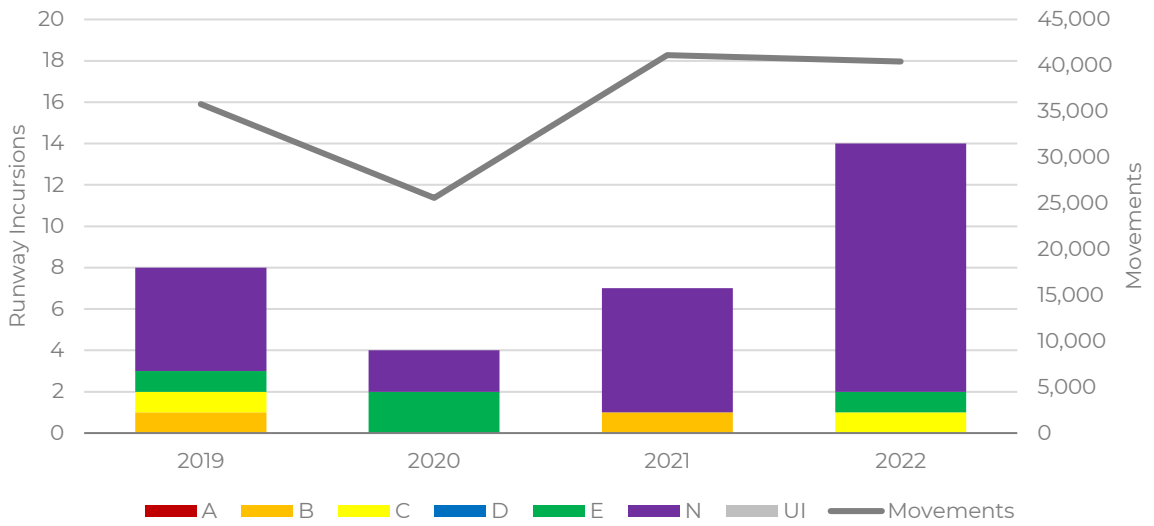


Figure 2-5: Runway Incursions per Severity Category at Antwerp Airport by Year

For the comparison purposes it is more convenient to use the rate of runway incursions. Figure 2-6 shows the rate of RI per 100,000 movements at Antwerp Airport for the period from 2019 to 2022. There has been an increase in the rate of runway incursions, however the rate of runway incursions with ATM contribution is still lower than in 2019 and 2020.

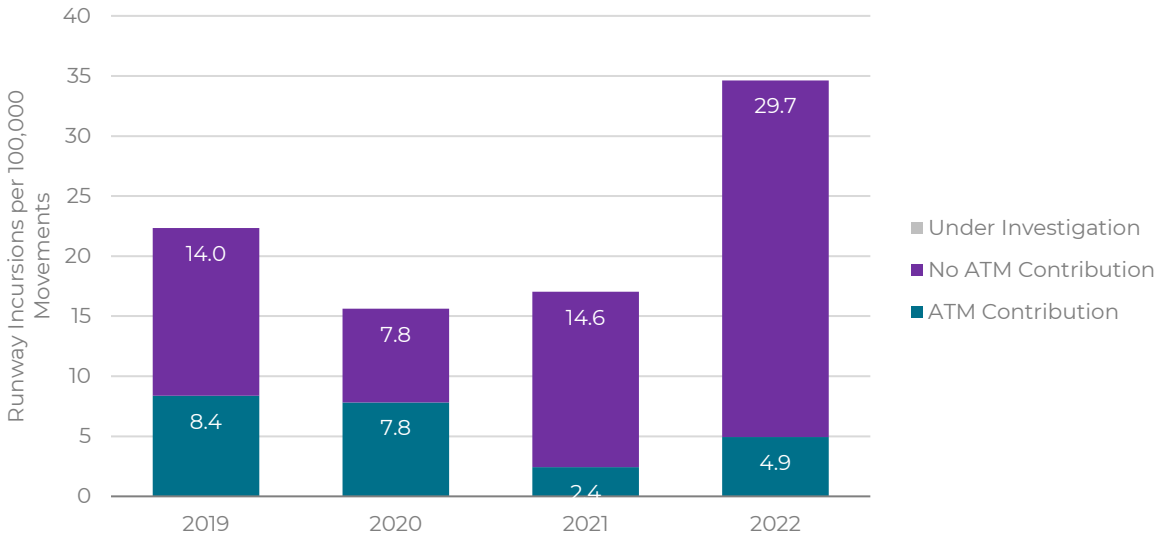


Figure 2-6: Rate of Runway Incursions per 100,000 Movements from 2019 to 2022

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 2-4 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 2-4: Number of laser beam and RPAS occurrences at Antwerp Airport

Year	Laser beam	RPAS
2019	1	6
2020	1	2
2021	1	4
2022	5	4

skeyes also tracks bird strikes and other wildlife reports. Not only does a collision with wildlife pose a danger to damage an aircraft, it also is another factor by which the environment is impacted by aviation. Figure 2-7 gives insight in the number of wildlife reports over the last four years.

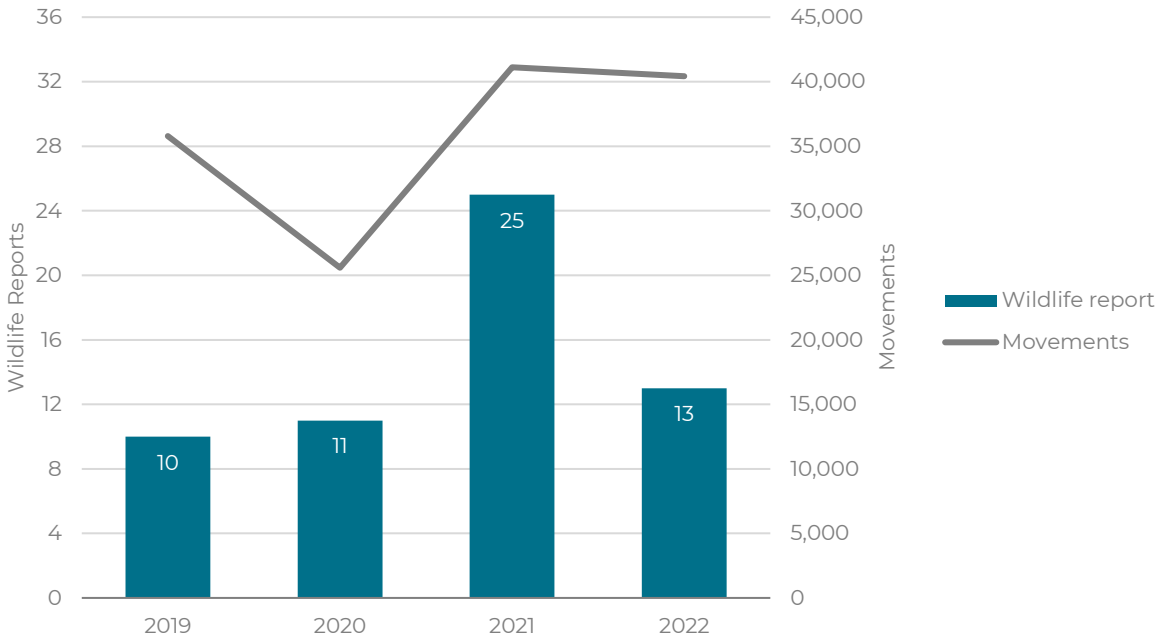


Figure 2-7: Wildlife reports at Antwerp Airport over the years

Improvements And Recommendations

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

From the incident during the installation of LVO procedures, it became clear that there were differences between the LVO plan and airport manual on where cones will be placed to block off taxiways, this resulted in confusion whether the aircraft had vacated the protected area. A recommendation has been made to reassess the LVO plan. Air Traffic Controllers should have a correct map in the tower which shows where cones are placed. Furthermore, it will be assessed whether the cones can be placed further along the taxiway such that aircraft could clear the protected area.

Two recommendations were made to reduce the RIs without ATM contribution. Many of the runway incursions were due to ATC instructions not being followed or being misunderstood. The first recommendation was to avoid using the word 'cleared' except for when an aircraft is cleared to land or take-off. For example, the following sentence structure has been changed: ''After departure climb to FL 060." instead of: "Recleared, after departure climb to FL060." The Airport has installed some stopbars at Holding Point F as part of the second recommendation. This recommendation also advises to light the stopbars at Holding Point F during normal operations, instead of only during Low Visibility Procedures. 21% of the RI of 2022 happened at Holding Point F.

After the incident with the mowing vehicles, the mowing procedures at Antwerp Airport have been reviewed. The mowing areas have been redesigned and new letter codes are in use. These procedures will be published in the Antwerp Ops Manual with clear written procedures.


LIERS


CTC 687

3. 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 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 Air Navigation Service Providers (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.

Assumptions:

- 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 and weight categories) is well represented by the fleet mix of the reference period for the calculations.
- 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 5NM.
- 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 112 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.

The declared capacity has been set as 90% of the Theoretical Capacity Throughput for each runway system. Here, it is noteworthy that the declared capacity only represents the capacity of IFR flights, because safe Wake Vortex Separation Distances between two flights have been assumed during the calculation. Therefore, it is also referred to as "Declared IFR Capacity". Table 3-1 displays this declared capacity per runway configuration at Antwerp Airport.

Table 3-1: Declared IFR capacity

Runway Configuration	Runways		Declared Capacity [movements/hour]		
	DEP	ARR	Only Departures	Only Arrivals	Mixed Fleet
RWY 29	29	29	27	17	**41**
RWY 11	11	11	27	17	**41**

Besides the calculated theoretically possible capacity, the Effectively Used Capacity is an important performance indicator for the airport and for the air navigation service provider handling the arrivals and departures. Figure 3-1 shows the distribution of hourly movements per runway configuration for rolling hours with a step of one minute during the times the runway configuration was at least one hour in use in 2022. For this plot, helicopter movements are not considered, but both VFR and IFR flights[7]. The declared capacity is indicated as a horizontal line. The peak of

[7] Only showing IFR flights would give a distorted view on the number of hourly movements – especially for airports with high VFR shares. For interpretation, however, it is to be considered that the declared capacity is only declared for IFR movements.

the distribution shows the most likely number of movements that there will be during the next hour when picking a random minute of the year during which the runway configuration is in use and will stay in use for this next hour.

To summarize, the Theoretical Throughput Capacity per runway configuration is the theoretical number of operations that an aerodrome can handle within an hour under optimal conditions. In practice, such optimal conditions cannot be reached. The declared capacity is thus set at 90% of the optimum and the flight schedule is coordinated based on this declared capacity. As a performance indicator, we regard how many operations have actually been performed within each hour of the year and check if the declared capacity has ever been exceeded.

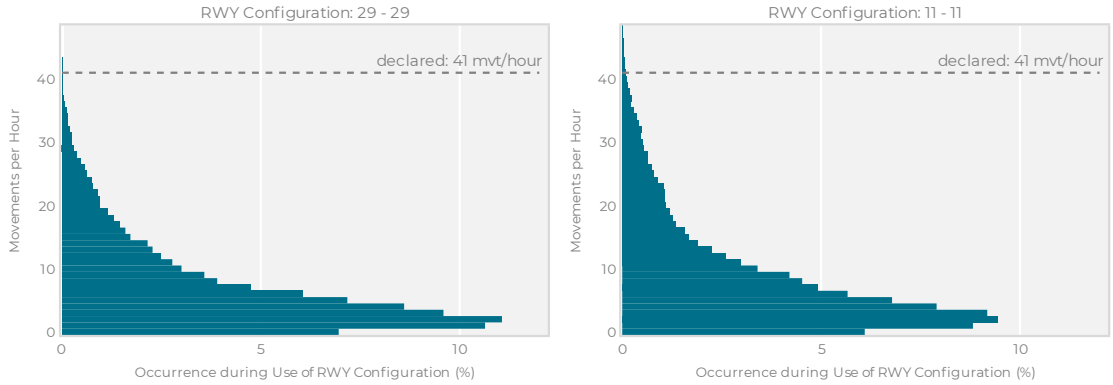


Figure 3-1: Effectively Used Capacity in 2022

Each day of the year where capacity has been exceeded at least once, is listed in Table 3-2. The capacity has been exceeded 24 times in 2022: 22 in configuration 11-11, and 2 times in configuration 29-29. For all of the hours during which the declared capacity has been exceeded, the traffic was composed of a high share of VFR movements, for which the IFR separation rules do not apply, such that a higher throughput could be reached.

Table 3-2: Days with Hours Exceeding the Capacity at Antwerp Airport in 2022 per Runway Configuration

Runway Configuration	Date (local time)	Extra Movements maximum number (*)	VFR Share minimum hourly percentage (*)	Departures Share	
				minimum hourly percentage (*)	maximum hourly percentage (*)
11 - 11	24/01/2022	3	93%	53%	60%
11 - 11	12/02/2022	6	88%	51%	57%
11 - 11	26/02/2022	7	90%	57%	64%
11 - 11	01/03/2022	2	88%	49%	50%
11 - 11	02/03/2022	1	93%	52%	52%
11 - 11	07/03/2022	2	76%	50%	55%
11 - 11	08/03/2022	6	64%	43%	50%
11 - 11	09/03/2022	5	90%	43%	56%
11 - 11	11/03/2022	2	93%	50%	55%
11 - 11	15/03/2022	6	87%	47%	52%
11 - 11	16/03/2022	3	98%	50%	52%
11 - 11	18/03/2022	7	79%	48%	58%
11 - 11	19/03/2022	1	95%	52%	52%
11 - 11	21/03/2022	1	88%	52%	52%
11 - 11	26/03/2022	5	88%	45%	52%
11 - 11	20/05/2022	1	93%	50%	50%
11 - 11	14/06/2022	5	77%	48%	53%
11 - 11	14/07/2022	6	93%	47%	56%
11 - 11	19/07/2022	4	91%	52%	56%
11 - 11	22/07/2022	2	86%	43%	48%
11 - 11	31/08/2022	5	93%	48%	55%
11 - 11	12/09/2022	4	91%	44%	49%
29 - 29	14/05/2022	1	95%	40%	40%
29 - 29	13/07/2022	2	72%	45%	51%

(*) of all exceeding hours of the day

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 (Air Navigation Service Providers) 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).

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 ATFM Arrival Delay

skeyes is subject to an annual target with regard to ATFM arrival delay. ATFM arrival delay is the delay of a flight attributable to terminal and airport air navigation services and 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 Liège 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/flight for all causes and 0.17 minutes/flight for CRSTMP causes (9.34% of target delay for all 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/flight all causes and 0.12 minutes per flight, 11.11%, for CRSTMP causes; and the only contributing airport remains Brussels Airport).

Table 3-3: ATFM Arrival Delay at Antwerp Airport per Year and Cause

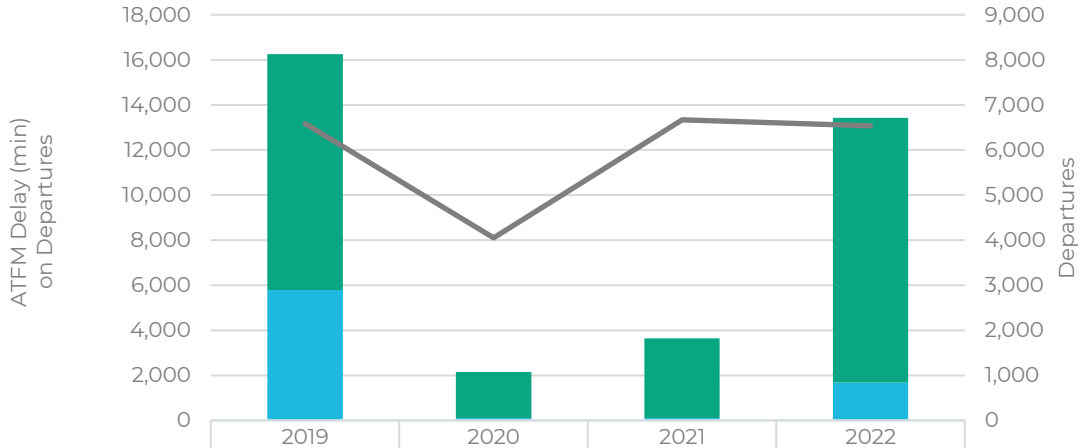
	Minutes of ATFM Arrival Delay				# Arrivals
	CRSTMP	Weather	Other categories	**Total**	
2019	0	0	0	**0**	6,587
2020	0	0	0	**0**	4,068
2021	0	0	0	**0**	6,685
2022	0	0	0	**0**	6,522

The arrival delay over the past four years is shown in Table 3-3. It can be seen that there was no ATFM arrival delay caused by Antwerp Airport in the last three years. The last arrival delay caused by Antwerp Airport was in 2018.

ATFM impact on departing and arriving traffic

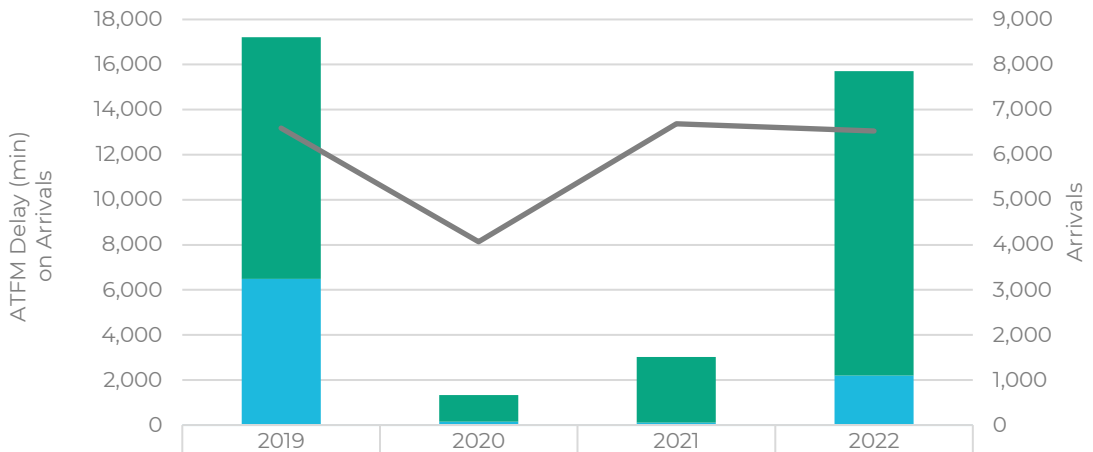
Besides being delayed by Antwerp tower flights to or from Antwerp Airport can also be delayed by ATFM measures in any ATC sector along their flight route; i.e. en-route or at the other departure or arrival airport. Note that regulations can be put in place at all ATC sectors of the flight plan: en-route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

In 2022, 766 departing flights from Antwerp Airport were delayed, resulting in a total of 13,427 minutes of delay for the departing traffic. This is an increase of 169% compared to 2021 in terms of total departure delay, but still a 17% decrease compared to pre-COVID levels in 2019. 12.5% (1,679 minutes) of departing traffic delay is attributable to skeyes' en-route sectors while 87.5% is attributable to other ANSP's. For arriving flights, a similar story holds true. A total of 15,708 minutes of delay impacted 865 flights. Regulations in skeyes' sectors was the cause for 14% of the total delay.



	2019	2020	2021	2022
Other ANSP	10,466	2,048	3,529	11,748
skeyes	5,784	104	108	1,679
IFR departures (with flight plan)	6,586	4,051	6,669	6,538

Figure 3-2: ATFM Delay on Departures Attributable to skeyes and other ANSPs



	2019	2020	2021	2022
Other ANSP	10,714	1,173	2,916	13,511
skeyes	6,491	159	110	2,197
IFR arrivals (with flight plan)	6,587	4,068	6,685	6,522

Figure 3-3: 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 less than 15 minutes
- More than 15 and less than 30 minutes
- More than 30 and less than 60 minutes
- More than 60 minutes.

The graphs in Figure 3-4 and Figure 3-5 show that 58% of the delayed departures were delayed for a maximum of 15 minutes, and 98% of the delayed flights had a delay of less than one hour. For delayed arrivals this is 52% with a maximum of 15 minutes of delay and 98% with a delay of less than one hour.

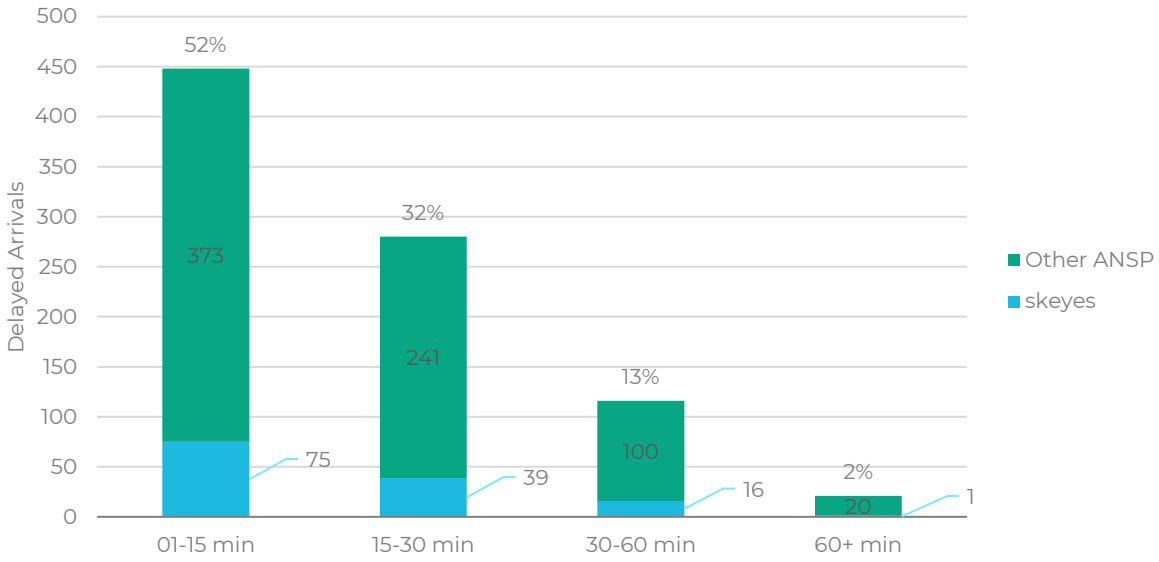


Figure 3-4: Distribution of Delayed Arrivals per Delay Interval

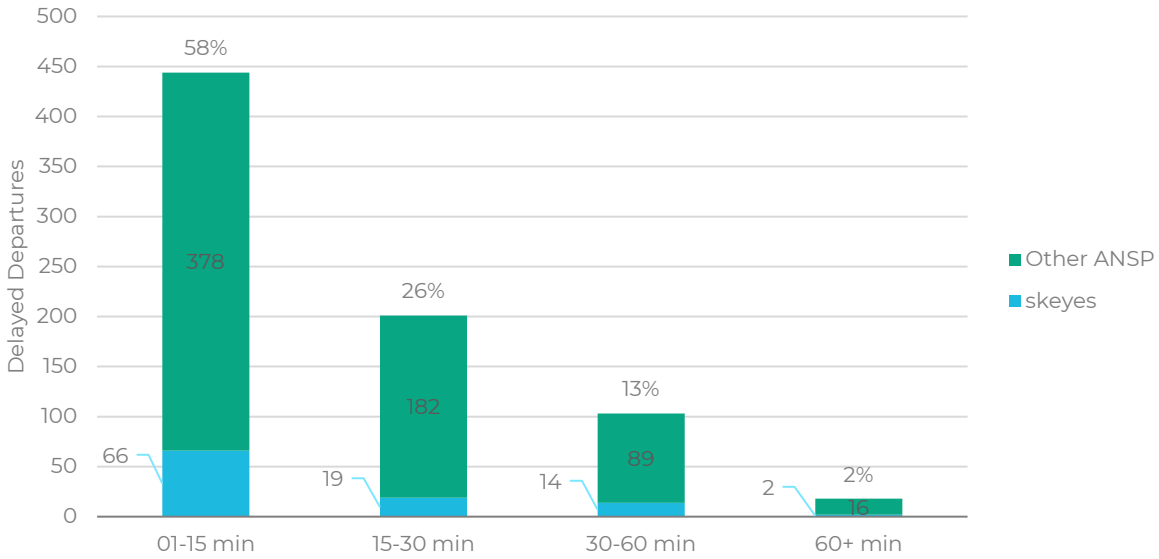


Figure 3-5: Distribution of Delayed Departures per Delay Interval

4. Environment

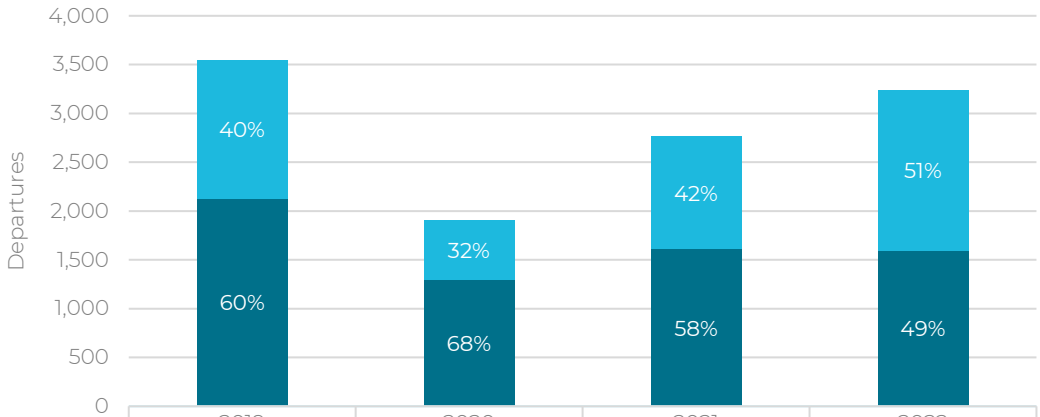
As most airports, Antwerp Airport is located near populated areas. It is therefore foremost important to consider noise and its reduction, as far as possible, in the vicinity of the airport. One of the ways to do so is to put in place a preferential runway system, a decision taken by the BCAA, which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

This chapter will address, in the first part, the compliance to 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.

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 RWY 11 in preference to RWY 29 when departing.

Figure 4-1 shows the number of departures for the two runways, 11 and 29, of aircraft whose Maximum Take-Off Weight (MTOW) is greater or equal than six tonnes . A positive trend can be seen throughout the last years, from 40% PRS usage in 2019, to 51% in 2022. As shown in Chapter 1, runway 11 was used 49% of all movements, up from 42% in 2021.

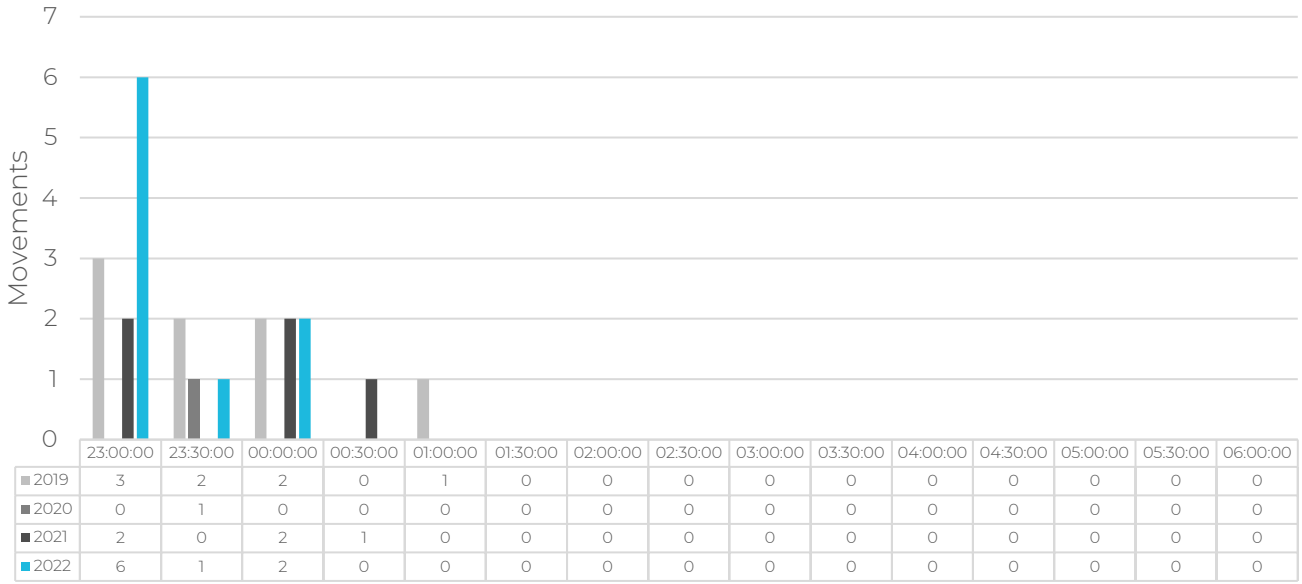


	2019	2020	2021	2022
RWY 11	1420	608	1156	1639
RWY 29	2129	1298	1607	1600

Figure 4-1: Runway Usage for Departures with a Maximum Take-off Weight larger than 6 Tons.

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 2022 show that nine night movements were registered, 6 of which were between 23:00 and 23:29.



	23:00:00	23:30:00	00:00:00	00:30:00	01:00:00	01:30:00	02:00:00	02:30:00	03:00:00	03:30:00	04:00:00	04:30:00	05:00:00	05:30:00	06:00:00
2019	3	2	2	0	1	0	0	0	0	0	0	0	0	0	0
2020	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	2	0	2	1	0	0	0	0	0	0	0	0	0	0	0
2022	6	1	2	0	0	0	0	0	0	0	0	0	0	0	0

Figure 4-2: Movements Outside of Normal Operational Hours

Wind Patterns

Meteorological conditions affect operations and are a frequent cause for the non-use of PRS.

Figure 4-3 shows the wind roses for 2019 to 2022. 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 1-13, with January and February clearly favouring runway 29, and March, April and August runway 11.

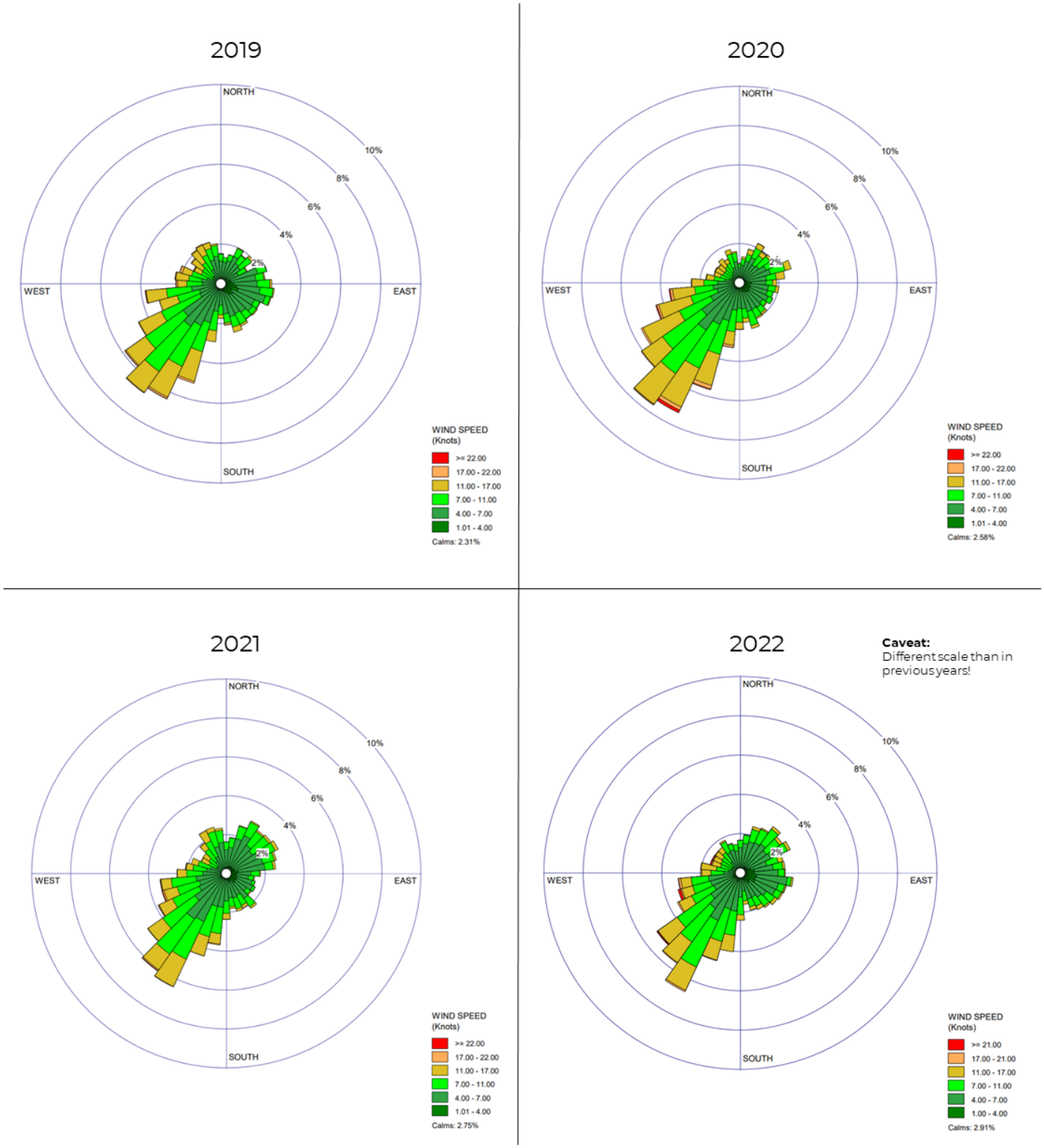


Figure 4-3: Wind Roses for Antwerp Airport, 2019-2022

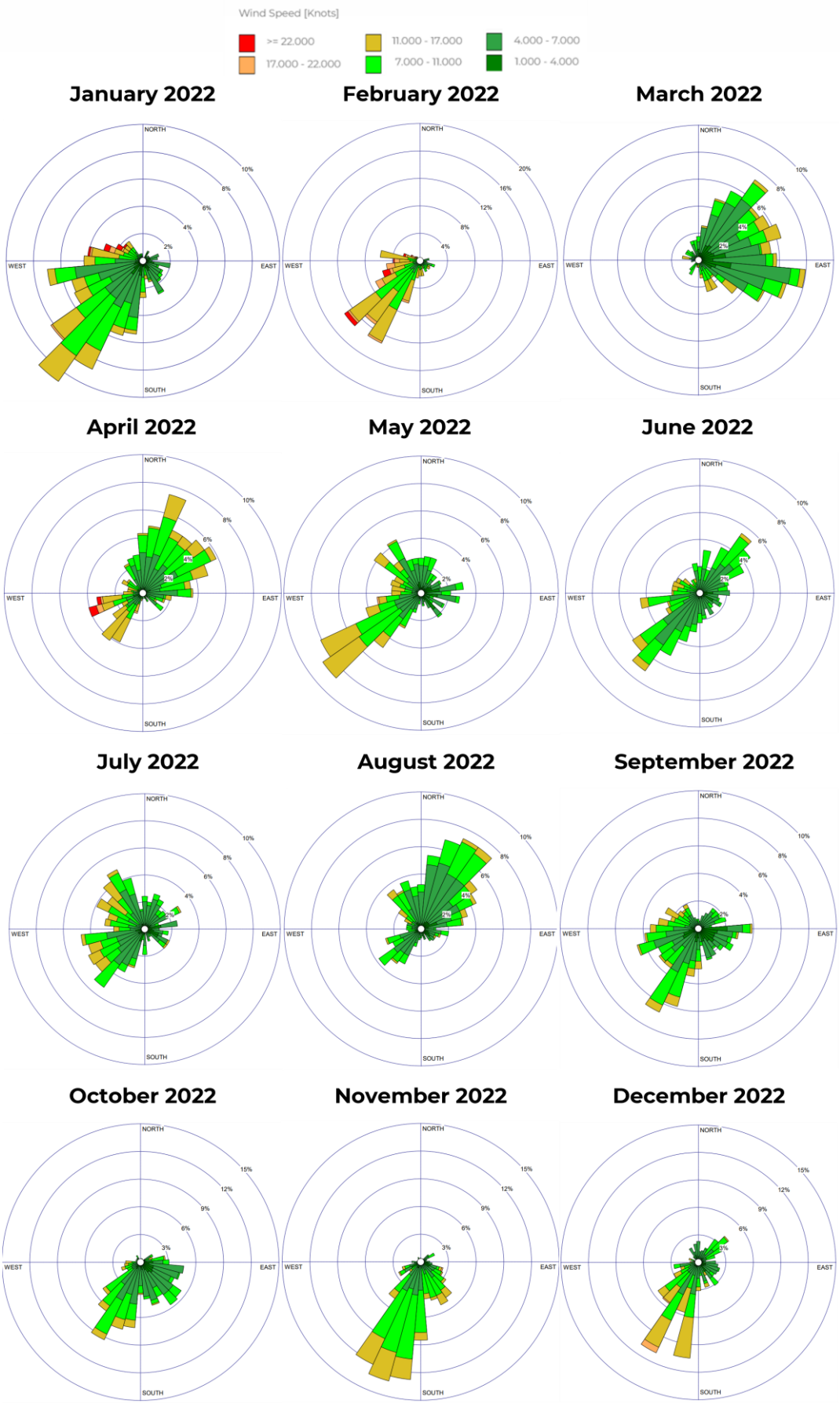


Figure 4-4: Wind Roses for Antwerp Airport per Month of 2022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ANNEX


6353
A009
OVAP32
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M150

ANNEX: Fact sheet 2022

Traffic

Yearly evolution

- Despite RWY being closed for 37 days, the movements are only 2% lower than last year

Movements	2019	2020	2021	2022	2022 *vs* 2021	2022 *vs* 2019
Total	35,794	25,587	41,116	40,432	-2%	+13%
IFR	14,138	8,826	14,463	13,714	-5%	-3%
VFR	21,656	16,761	26,653	26,718	+0%	+23%

Quarterly comparison

- Q4 is impacted by the closure of the airport for 37 days between September and October

Movements	2019	2020	2021	2022	2022 vs 2021	2022 vs 2019
Q1	7,168	5,619	7,130	11,440	+60%	+60%
Q2	9,808	5,124	12,999	12,760	-2%	+30%
Q3	10,557	10,077	11,727	11,229	-4%	+6%
Q4	8,261	4,767	9,260	5,003	-46%	-39%

Safety

Missed Approaches

- 43 missed approaches in 2022 (-27% vs. 2021, +30% vs. 2019)
- TOP 3 causes in 2022:
  1. Unstable approach (15)
  2. O: Other (6)
  3. Previous landing still on RWY (5) & Too close behind preceding aircraft (5)

Safety Occurrences

- Fourteen runway incursions, 2 with ATM contribution

Capacity & Punctuality

Capacity

Runway Configuration	Declared IFR Capacity	Maximum Movements/Hour in 2022
11 - 11	41 movements/hour	48 movements/hour
29 - 29	41 movements/hour	43 movements/hour

Capacity exceeded on 2 days for 29-29 and on 22 days for 11-11 only due to majority VFR traffic. IFR capacity was never exceeded.

Punctuality:

Arrival delay:

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

ATFM impact:

- Departures 13,427 minutes ATFM delay (1,679 due to skeyes' regulations)
- Arrivals: 15,708 minutes ATFM delay (2,197 due to skeyes' regulations)

Environment

Runway use:

- RWY29 – 51%
- RW11 – 49%

PRS

- 51% of movements with a MTOW of 6 tons or more used the PRS
  Up from 42% in 2021, and 40% in 2019

Night Movements

- 9 night movements were recorded (1 more than in 2019)

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skeyes / Tervuursesteenweg 303 / B-1820 Steenokkerzeel
T +32 2 206 21 11 / F +32 2 206 22 88

member of FABEC

www.skeyes.be