skeydrone
Enabling safe drone operations

DRONE DETECTION REPORT



REGION: Extended Brussels Capital Region
PERIOD: May 2024

Table of Contents

1. KEY FACTS & FIGURES 3
2. INTRODUCTION 4
3. FLIGHT FREQUENCY AND DRONE TYPES 6
4. FLIGHT TIME AND DURATION 8
5. FLIGHT HEIGHT AND DRONE-PILOT DISTANCE 10
6. COMPLIANCE 11
7. HOTSPOTS 12
8. CONCLUSION 15

1. KEY FACTS & FIGURES



An average of **12 flights per day** were detected, with daily counts ranging from **5 to 24.**



The highest recorded drone flight reached **1640 feet above ground level**.



The furthest **distance** observed between the drone and its pilot was **997 meters**.



Only **10%** of the detected drone flights had obtained the mandatory geozone flight **authorisation**.



74% of all authorised drone flights were at least partially **conforming** according to their submitted flight plans.

2. INTRODUCTION

This report offers a high-level analysis of the drone flights detected within the broader Brussels Capital Region during the month of May 2024.

Detections were made based on SkeyDrone's Drone Detection system, i.e. a growing network of distributed sensors, placed at strategically interesting locations and capable of detecting drones by capturing the radio frequency (RF) signals they emit; both C2 link signals (communication between ground control station & drone) and Direct Remote Identification (DRI) signals.

SkeyDrone's current drone detection network in the Brussels Region covers[1] about **400 km²**.

For obvious reasons of safety and security, this report contains neither data nor results from the airport of Brussels-National and its surroundings.



Figure 1: SkeyDrone's drone detection network in the Brussels Region covers about 400 km².

[1] The vertical detection performance of our network depends on the distance between the drone and the closest individual detection sensor. SkeyDrone has a detailed coverage map (for each detection region) indicating per 2D coverage cell (dimensions 1km x 1km) the minimum and maximum detection height above ground level.

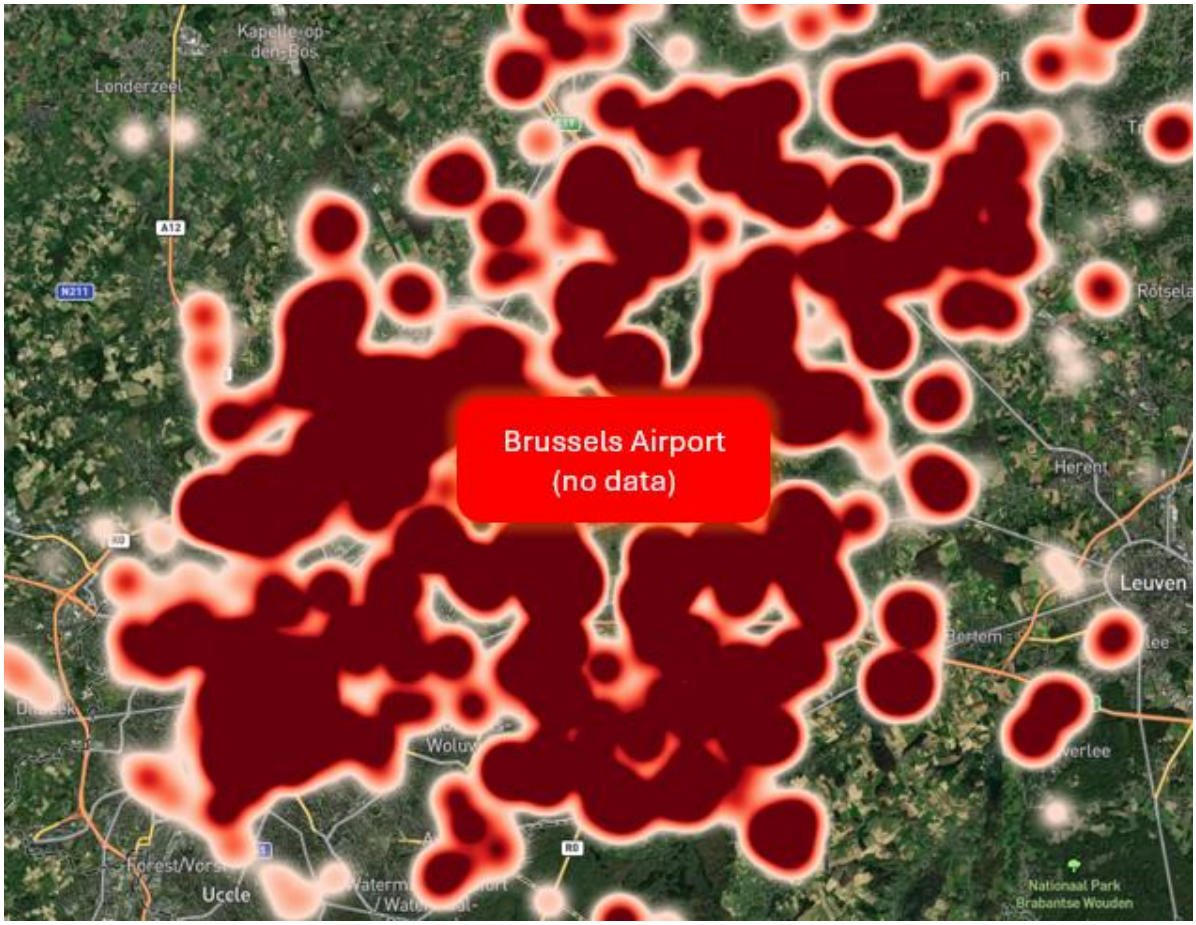


Figure 2: This report contains neither data nor results from the airport of Brussels-National and its surroundings.

By providing insights into the types of drones, as well as the frequency, time, duration, height, drone-pilot distance and compliance of drone flights with regulations, as well as highlighting some hotspots, this report serves as a valuable resource for understanding the emerging landscape of drone operations within the broader Brussels region, including both the opportunities and threats they induce for many public and private stakeholders.

3. FLIGHT FREQUENCY AND DRONE TYPES

368 drone flights were detected between 1 May 2024 and 31 May 2024, ranging from 5 to 24 flights per day, resulting in an average of 12 flights per day. In Figure 3, the hours of sunshine per day (data from the KMI) are added to the right Y-axis, indicating a correlation between drone flights and sunshine.

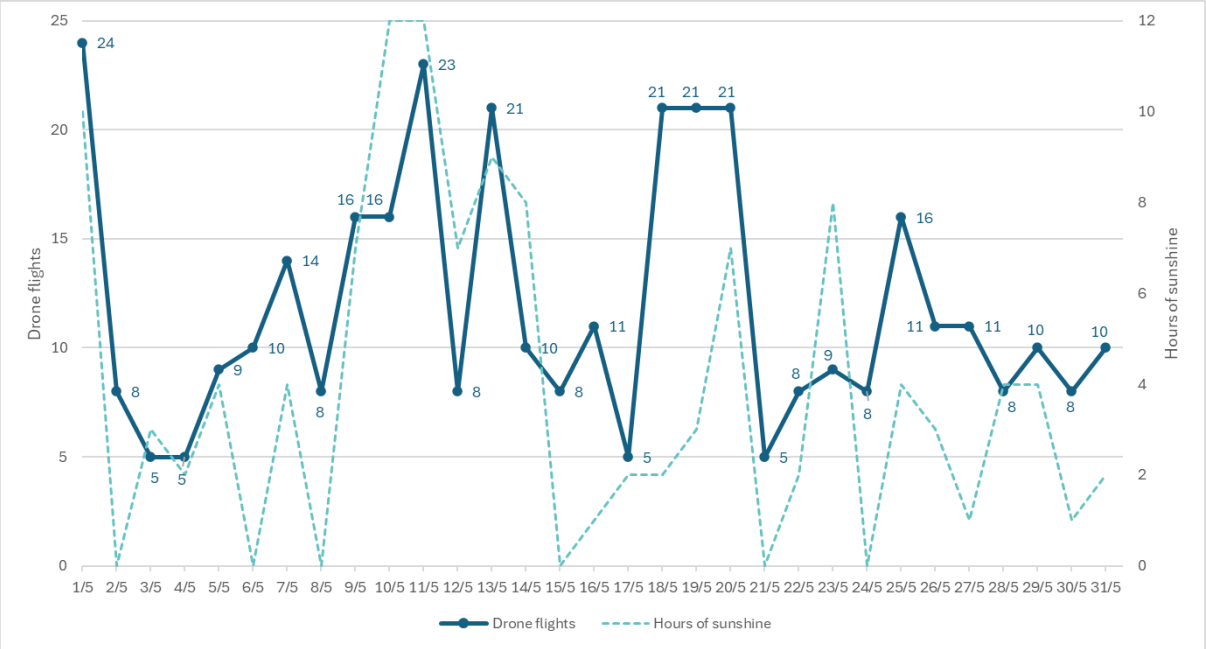


Figure 3: Drone flights per day (left Y axis), correlated with hours of sunshine (right Y axis)

The 368 observed drone flights involved 207 unique drones. Among these drones, the vast majority (150) completed only one single flight. One drone stood out, conducting 18 flights throughout this period.

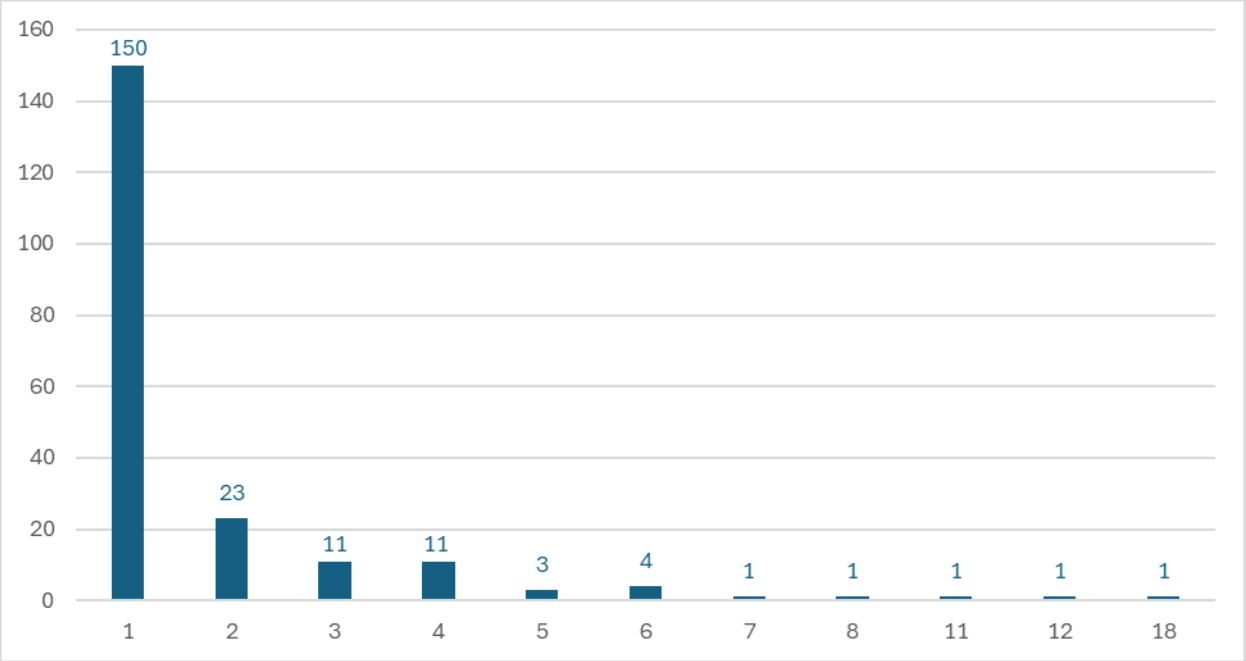


Figure 4: Number of flights executed per drone

58% of the detected drone flights were conducted using a DJI Mini, a drone weighing less than 250 grams. These lightweight drones are considered low risk and are allowed to fly over people. An additional 35% of the flights involved drones weighing between 250 and 900 grams, which are not permitted to fly over people, except unintentionally. Only 4% of the flights were performed with drones weighing more than 900 grams, typically reserved for professional use. Furthermore, 3% of the flights, totaling 12, were performed with non-DJI drones.

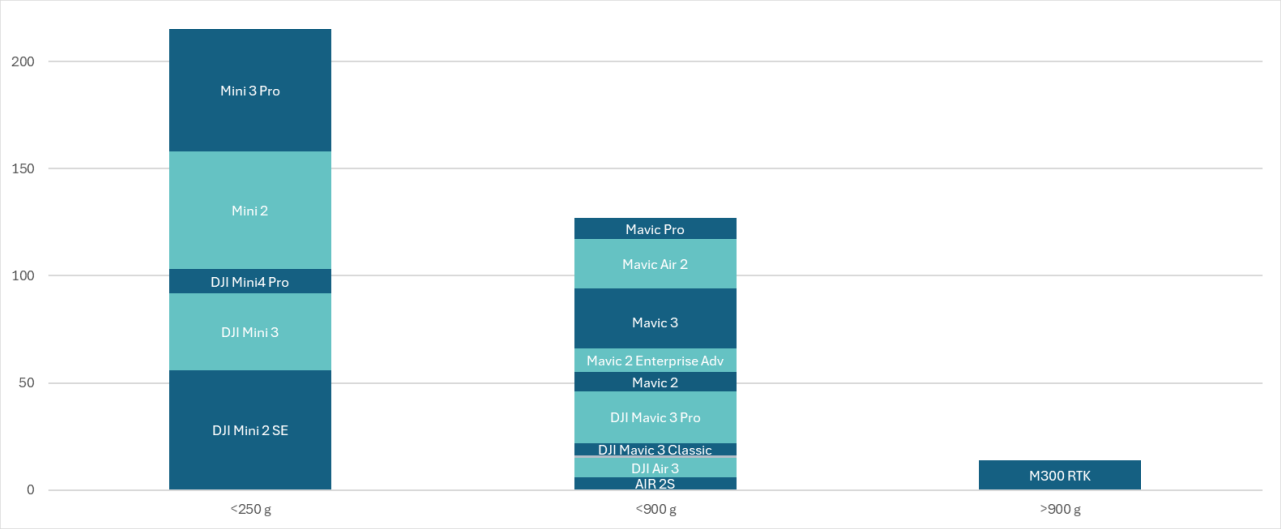


Figure 5 : Drone flights per weight category and model

4. FLIGHT TIME AND DURATION

Most drone flights occurred on Saturdays (65), while the fewest took place on Tuesdays (37). Notably, May had several bank holidays, but none fell on a Tuesday.

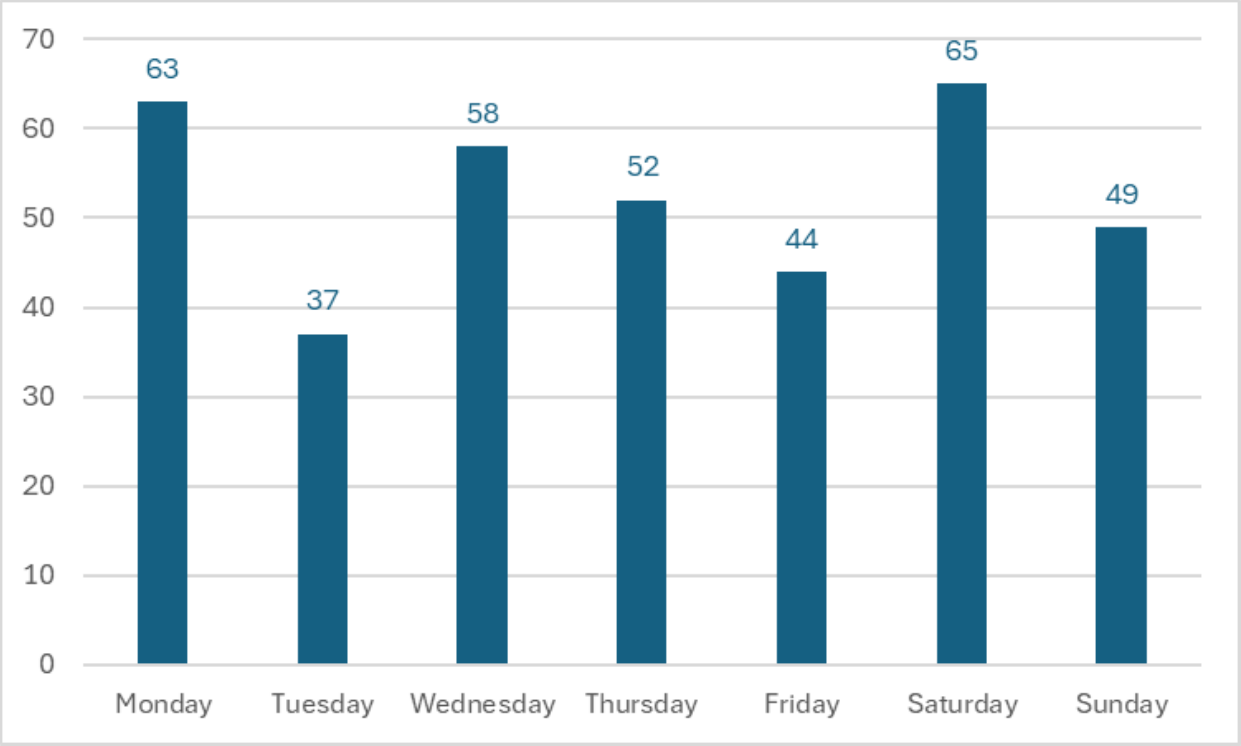


Figure 6: Detected drone flights per weekday

Flights peaked during daylight hours, especially towards 4 p.m. local time, while some flights were also performed in the dark, between 10 p.m. and 2 a.m..

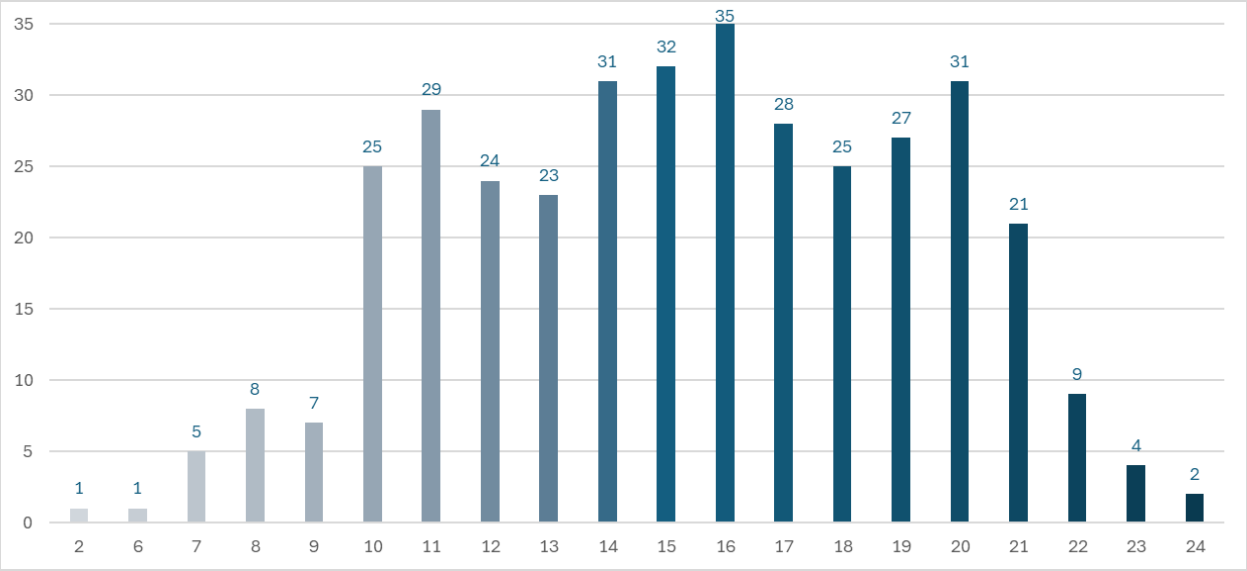


Figure 7: Detected drone flights per hour of day

The average flight duration was 6 minutes and 14 seconds. The majority of detected drone flights took less than 5 minutes. The longest drone flight lasted 1 hour, 1 minute and 26 seconds.

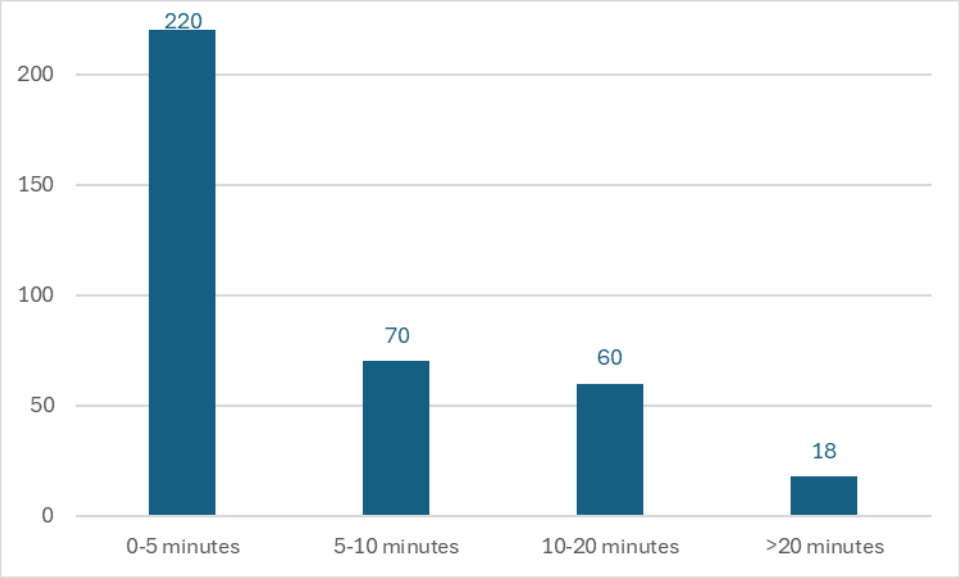


Figure 8: Drone flights by duration category

5. FLIGHT HEIGHT AND DRONE-PILOT DISTANCE

The average drone flight took place at 245 feet above ground level (AGL), with a distance of 154 meter between the drone and its pilot. The maximum height at which a drone was detected was at 1640 feet (500 meters) above ground level. The maximum observed distance between the drone and its pilot was 997 meters.

Open Category (or 'low risk') operations are limited both in height (max. 120 m or about 400 ft AGL) and in distance (only visual line-of-sight (VLOS) flight, typically occurring up to a range of 500 m from the remote pilot).

49 drone flights surpassed these height or distance limitations and, as a consequence, should have taken place in the Specific Category of operations, requiring - in most cases - an operational authorization from the Belgian Civil Aviation Authority.

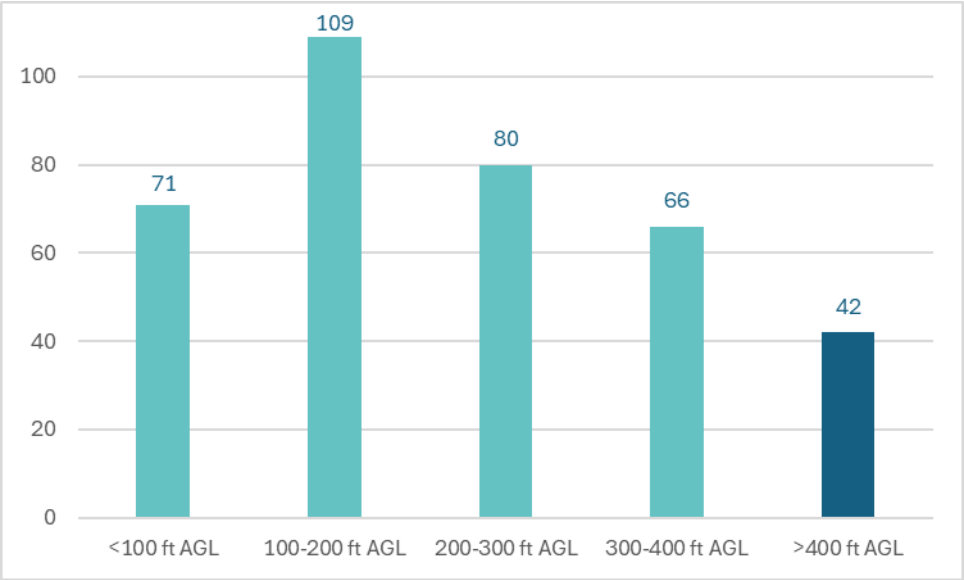


Figure 9: Drone flights per maximum height category (feet above ground level)

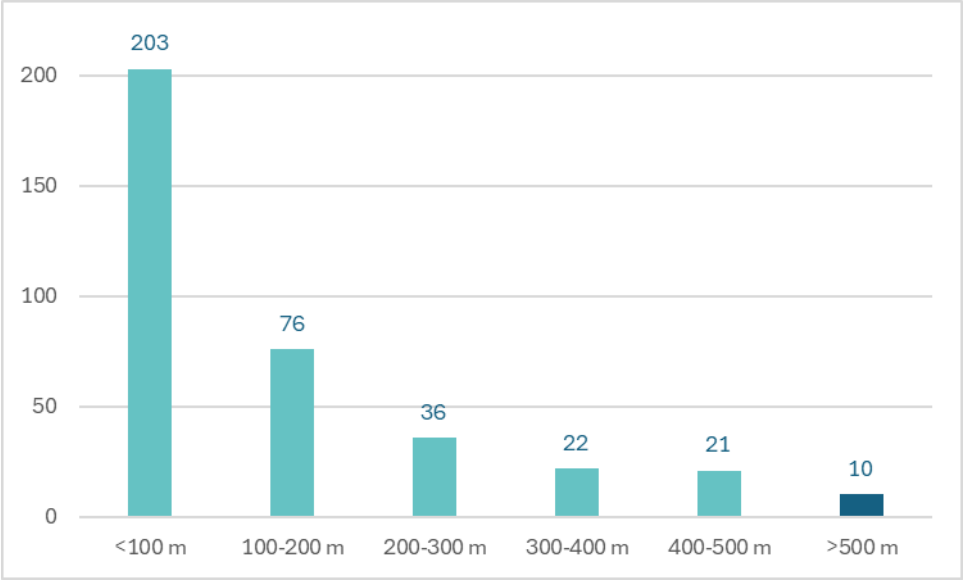


Figure 10: Drone flights per distance range between drone and pilot

6. COMPLIANCE

As the analysed region coincides with a UAS geozone managed by skeyes, drone operators are supposed to obtain a flight authorisation prior to executing their flight.

SkeyDrone's Drone Detection system integrates with skeyes' geo-zone management tool (i.e. the Drone Service Application (DSA)), allowing the automatic tagging of detected flights as either 'authorised' or 'unauthorised'.

During the analysis period, only 10% of the detected flights could be correlated with an issued flight authorisation! In turn, 43% of all authorised drone flights were fully conforming and 31% partially conforming, according to the flight authorisation granted by skeyes.

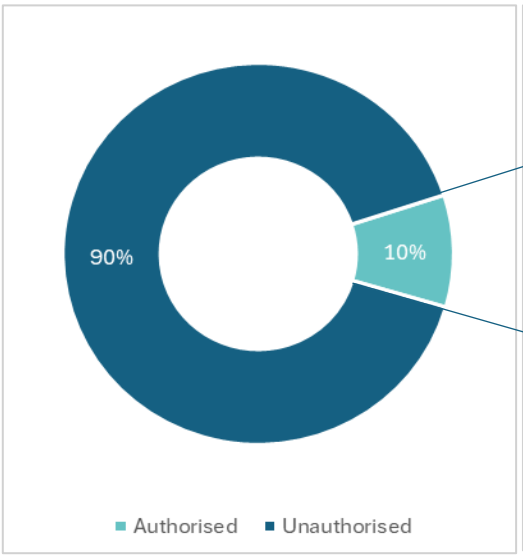


Figure 11: Authorised versus unauthorised drone flights

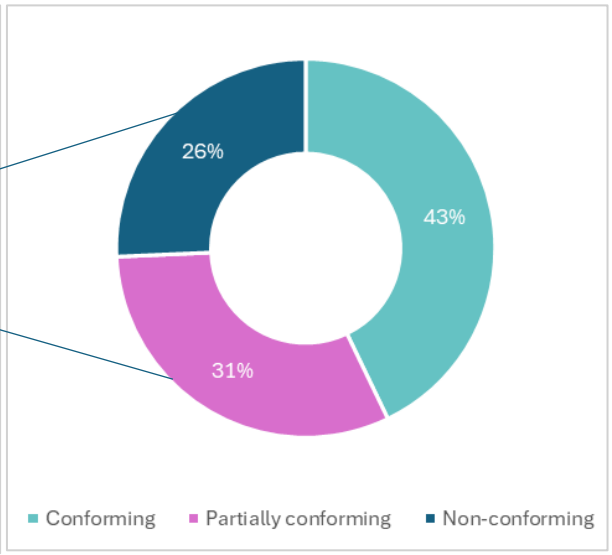


Figure 12: Conforming versus non-conforming drone flights

7. HOTSPOTS

In this chapter we highlight a few locations within the Brussels region where high concentrations of unauthorised drones were detected.

Railways

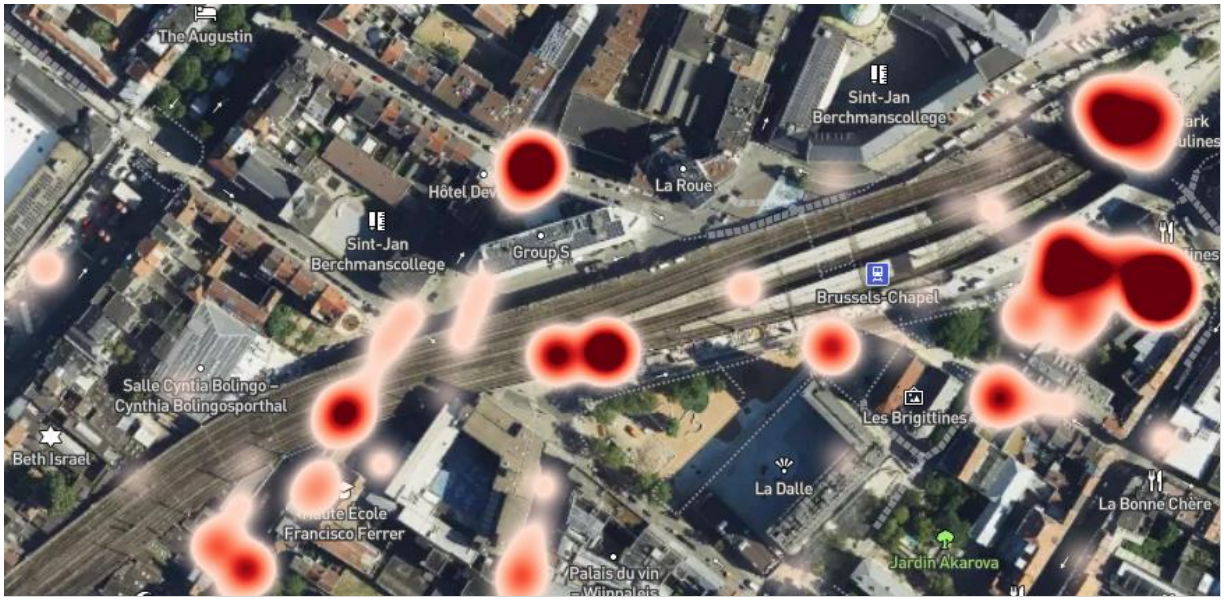


Figure 13: Heatmap of unauthorised drones above rail tracks at Brussels Chapel station

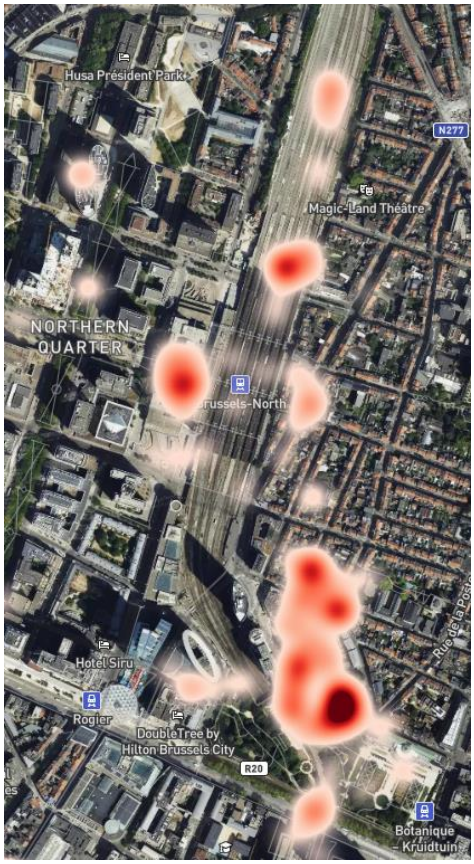


Figure 14: Heatmap of unauthorised drones above rail tracks at Brussels North station

According to Infrabel, flying a drone near or over railway infrastructure presents several significant dangers.

Within a distance of 5 meters from the tracks, wake turbulence can destabilise the drone and/or its pilot.

Flying above the overhead power lines (carrying between 3000 and 25000 volts) can cause electromagnetic interference with the radio transmissions and electronic systems of drones.

A head-on collision with a moving train at 160 km/h can injure or even disable the train operator. All these dangers can lead to accidents and incidents that, in addition to causing serious human and material damage, will also disrupt train traffic, resulting in economic losses in terms of punctuality.

Royal Estates

To fly over Royal estates in Brussels, drone operators need an additional authorisation as a dedicated geozone has been installed over the Royal Palace of Brussels and the Castle of Laeken.

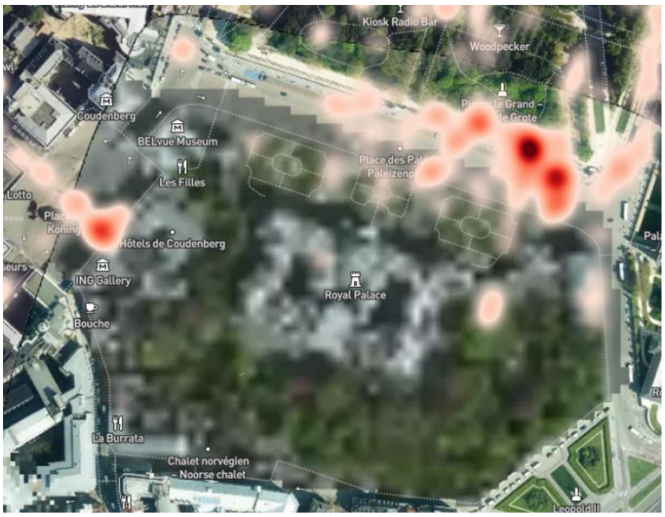


Figure 15: Heatmap of unauthorised drones above the Royal Palace of Brussels

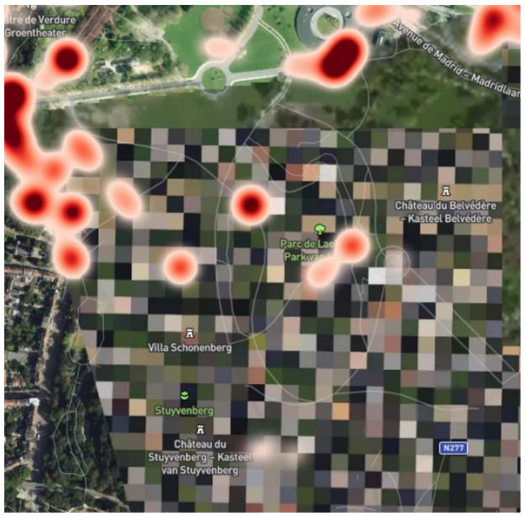


Figure 16: Heatmap of unauthorised drones above the Castle of Laeken

Tourist Hotspots

According to the European Union Aviation Safety Agency, drones in the Open Category (low risk) are not allowed to fly over assemblies of people. Assemblies of people are not defined by a specific number of people, but are related to the possibility for an individual to move around in order to avoid the consequences of a drone which is out of control. They include parks on sunny days, commercial streets during shop opening hours and therefore the below tourist hotspots.



Figure 17: Heatmap of unauthorised drones above the Grand Place of Brussels

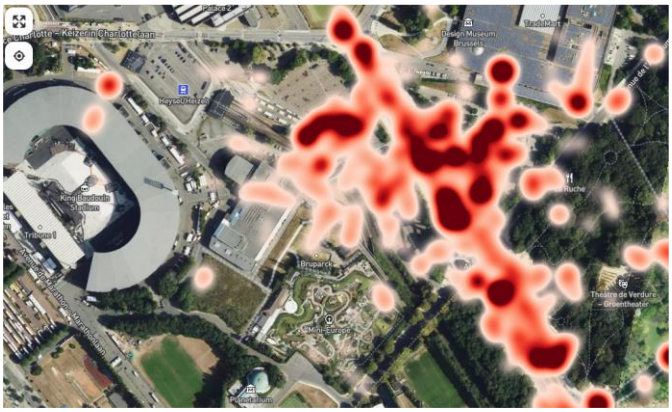


Figure 18: Heatmap of unauthorised drones above the Atomium



Figure 17: Heatmap of unauthorised drones above the Royal Park of Brussels



Figure 18: Heatmap of unauthorised drones above the panoramic view point next to the Congress Column

8. CONCLUSION

This report provides undeniable evidence of the growing presence of drones in the Brussels region. Our findings underscore the need for continued investments in advanced detection systems, collaboration with public authorities, and public awareness campaigns on drone legislation.

Interested to learn more about SkeyDrone's Drone Detection solution? Find more information here.

For further inquiries about this report, or to request a customized report for a specific period or region, contact communication@skeydrone.aero.