

DRONE AND URBAN AIR MOBILITY STRATEGY FOR DUBLIN CITY COUNCIL 2024 - 2029



Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

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Abbreviations

Abbreviation	Full Term
AAM	Advanced Air Mobility
BVLOS	Beyond Visual Line of Sight
DCD	Dublin Civil Defence
EASA	European Union Aviation Safety Agency
eVTOL	Electric Vertical Take-Off and Landing Aircraft
IAA	Irish Aviation Authority
IAM	Innovative Air Mobility, the safe, secure and sustainable air mobility of passengers/cargo enabled by new-generation technologies integrated into a multimodal transportation system; includes Urban Air Mobility (UAM) and Non-Urban Air Mobility (NAM). Transport is performed by Vertical Take-Off and Landing (VTOL) Capable Aircraft (VCA) ¹
IAS	Innovative Aerial Services, the set of operations and/or services that are of benefit to the citizens and to the aviation market, and that are enabled by new airborne technologies; include both the transportation of passengers/cargo and aerial operations (e.g. surveillance, inspections, mapping) ¹
LIDAR	Light Detection and Ranging technology that uses the light from a laser to collect measurements. These are used to create 3D models and maps of objects and environments
NAM	Non-Urban Air Mobility, a subset of IAM operations where all segments of the flight are outside congested (urban) areas ¹
SORA	Specific Operations Risk Assessment
S&M	Survey and Mapping
UAM	Urban Air Mobility, a subset of IAM operations, where at least one segment of the flight is within a congested (urban) area ¹
UAS	Unmanned Aircraft System
UAV	Unmanned Aerial Vehicle
UIC2	Urban-Air-Mobility Initiative Cities Community
U-space	A set of new services relying on a high level of digitalisation and automation of functions and specific procedures designed to support safe, efficient and secure access to airspace for large numbers of air vehicles
USSP	U-Space Service Provider
UTM	Unmanned Aircraft System Traffic Management
VCA	Vertical Take-Off and Landing (VTOL) Capable Aircraft, a power-driven, heavier-than-air aircraft, other than aeroplane or rotorcraft, capable of performing vertical take-off and landing by means of lift and thrust units used to provide lift during take-off and landing. It could be electric and/or other non-fossil fuel powered, remotely piloted or with a pilot on board ¹
VLOS	Visual Line Of Sight

¹See <https://www.easa.europa.eu/en/document-library/opinions/opinion-no-032023>

Drone and Urban Air Mobility Strategy for Dublin City Council 2024 - 2029

Introduction

Around the world, cities have started to deploy drones in a variety of missions. The technology has evolved at a breath-taking pace over the past decade with significant growth in the number of drones using our airspace. Public sector and local government aerial operations² are at an early stage of their journey, with the next decade expected to bring about dramatic changes. Drones have been deployed in a variety of missions – saving lives, reducing costs, delivering better services and generating efficiencies.

The development of Drone³ and Urban Air Mobility Strategy for Dublin City Council (DCC) has been led through our Smart City programme, which supports the council in future-proofing the city in how new and emerging technologies could be applied. Drones are emerging as a new technology that will play a significant role in how we deliver services, and move people and goods in the future, across our cities and towns.

This strategy has been formulated under the direction of an internal High-Level Drone Steering Group (comprising three departments: Corporate Services & Transformation, Dublin Fire Brigade, and Environment & Transport), chaired by the Assistant Chief Executive of the Corporate Services and Transformation Department. The development of the strategy was supported by international experts, Julie Garland (Avtrain) and Philip Butterworth-Hayes (PMI Media).

The strategy was also developed in close co-operation with the Irish Aviation Authority, which is recognised as one of the leading regulators globally in its support of the emerging drone sector.

“The Irish Aviation Authority is very supportive of public sector bodies developing drone strategies. We are delighted to support this initiative by Dublin City Council to develop their drone strategy where they will drive the innovation and development in the drone sector”.

Jim Gavin, Chief Operations Officer in the Irish Aviation Authority

²Refers to the use of new aerial technologies and services provided to customers for other purposes than the transport of people and freight. These small drones equipped with advanced sensors and AI technologies can be deployed in diverse sectors such as construction, railways, ports, agriculture, energy, public safety, security, filming, insurance, real estate, transport of small payload, etc. (source: A Drone strategy 2.0 for Europe to foster sustainable and smart mobility)

³Drone – common name for Unmanned Aircraft System (UAS), which means an Unmanned Aerial Vehicle (UAV) and the equipment to control it remotely

The insights and recommendations have been developed in consultation with staff across Dublin City Council through workshop and surveys and with the support of a cross-departmental internal drone working group. There was also significant engagement with the external drone industry through a survey and showcase event, which brought together leading drone services providers, innovators and researchers across Ireland to ensure their views were reflected in this strategy.

Why does Dublin City Council need a strategy?

A key objective of this drone strategy is to optimise and expand drone services within the organisation, building on existing capabilities and resources. To achieve this DCC will need to transition its current use of drones from an ad hoc approach to a corporate centralised approach for drone operations while also ensuring compliance with evolving European Union regulations developed by European Union Aviation Safety Agency (EASA).

Dublin City Council has made significant progress in recent years implementing the use of drones across services including emergency response, dangerous buildings, site inspections, and environmental monitoring for example. There is a real opportunity to build on this success and scale operations internally. Five key benefits of using drones were identified through internal workshops and surveys with DCC staff to inform this strategy:

- + Improved capabilities for first responders to save lives and protect their personnel
- + Improved access to hard-to-reach/complex areas for surveys and monitoring
- + Improved health and safety
- + Improved efficiency
- + Improved environmental protection capabilities

An initial evaluation on the benefits of drones have demonstrated significant cost and efficiency savings compared to traditional approaches for example in monitoring dangerous buildings (see case study of Iveagh Market, p. 21).

There is also an important role for DCC to play in supporting the external drone ecosystem and building capabilities to deliver innovative third-party drone services to the benefit of citizens and communities.

Flying a single drone within the pilot's visual line of sight (VLOS) is a regular occurrence in most parts of the world. Scaling up operations over cities and towns to encompass many drones flying many different autonomous missions in a shared airspace above people and beyond visual line of sight (BVLOS) will require an extraordinary acceleration of technology, research, standards development and regulatory approvals. There is also the emergence of Innovative Air Mobility (IAM) (both Urban and Non-Urban) services with Vertical Take-Off and Landing (VTOL) Capable Aircraft (VCA) carrying passengers/cargo, which are likely to transform the aviation and city transport sector over the coming years (see p. 27-29).

There is a significant amount of research and development globally supporting initial pilots and demonstrators of these Innovative Air Services (IAS). The City Council will have a critical role to play in the management of low-altitude air space and all the associated activities around Urban

Air Mobility (UAM), to help future-proof the city ensuring that drones are deployed in safe and responsible manner. This will require a new level of collaboration across central government, local government, academia, drone industry, and the Irish Aviation Authority. Agreeing the new rules and governance for how we best utilise this low-altitude air space will be essential.

Already Dublin is one of the most advanced cities in the world in the area of drone deliveries - thanks in part to an Irish company Manna Drone Delivery which has been prototyping drone delivery services in a number of suburban areas of Dublin and is now scaling these services globally.



Credit: Manna Drone Delivery

Ireland is at the forefront of drone innovation thanks to the foresight of the Irish Aviation Authority (IAA) and progressive European Regulation led by the European Union Aviation Safety Agency (EASA). The next decade will be transformative as new regulations and technology advances evolve allowing for beyond visual line of sight (BVLOS) operations and larger passenger carrying Vertical Take-Off and Landing (VTOL) Capable Aircraft (VCA).

However, for these services to be scale, public trust and buy-in will be the key. Citizens have various concerns for example safety, security, privacy, noise, nuisance, environmental impact, so engaging and involving the public in early stages of both drone and IAM initiatives will help foster understanding, awareness, and longer-term acceptance of the technology.



While many European cities are developing strategies and roadmaps to advance drone operations and launch VCAs, none are organised in quite the same way as Dublin. These are the key differentiators of the DCC approach:

Dublin City Council's drone strategy is based on the following priorities:

- + enhancing already operationally and commercially mature drone services.
- + bringing together all key industry drone ecosystem stakeholders from the aviation safety regulator, industry, operators, researchers – led by Dublin City Council
- + to optimise the delivery of local authority-based drone services.

In comparison most EU-based urban drone programmes are:

- + led by EU research organisations or national government departments
- + are focused on trials and tests and developing an eco-system in which third-party operators can develop their services
- + for some EU cities there is more emphasis on electric air taxis and advanced air mobility (AAM) rather than optimising their own drone services.

However, there are some notable exceptions where local authorities have developed their own drone initiatives with direct relevance to Dublin City Council's plans. Cities such as Helsinki, Stockholm, Madrid, Amsterdam, Hamburg City and the North Sea ports of Rotterdam, Hamburg and Antwerp are leading drone development services above urban areas with the use cases around ports currently the most advanced.

Strategy:

Vision, Mission, Core Values and Principles

The following vision statement has been developed to inform our drones strategic development over the next 5 years running from 2024-2029:

Dublin City Council to be an European leader in the delivery of drone-based public-sector services and to enable a wider ecosystem in which drone innovation can flourish to the benefit of all citizens in a safe, inclusive, affordable, and environmentally responsible way.

The mission of the strategy is to deliver the following benefits:

- + Improve DCC services, enabling the scaled-up use of drones for tasks such as planning enforcement, emergency response, environmental monitoring and protection, asset management, and illegal dumping
- + Increase public trust and the responsible use of drones promoting broader community benefits of drones; prioritising safety, privacy and ethics
- + Ensuring that all drones services adhere to the highest safety standards and ethical principles in their operations
- + Support innovation in new drone services that supports economic growth opportunity and wider city sustainability goals



Dublin City Council's Drone and Urban Air Mobility Strategy will be built upon the following **core values**:



HEALTH & SAFETY

The safety of how drone services are delivered



INNOVATION

Explore the potential of new drone innovations to enhance service delivery



SUSTAINABILITY

Promote environmental responsibility and address climate change challenges



TRANSPARENCY

Be open and transparent in all aspects of the drone operations

The Strategy will be guided by the following **principles**:



Data privacy

Protecting the privacy of citizens and ensuring responsible data collection and usage



Public engagement

Engaging with stakeholders in a meaningful way to understand their concerns and priorities



Regulatory compliance

Adhering to all applicable local, national, and EU regulations and maintaining a strong relationship with the IAA

A dedicated, centralised Drone Unit

the core of the strategy

In order to manage the complexity of issues relating to drone operations both internally and externally Dublin City Council will need to centralise its drone expertise, where strategic (policy and governance) and day-to-day operational capabilities are combined within a single unit. There is currently no centralised co-ordination or unit to support drone activities across the organisation. This has led to an ad-hoc and somewhat siloed approach to delivering drone services.

A core element of the strategy is to create a dedicated Drone Unit.

The Drone Unit's expertise should scale in line with the demands of increased use of drone services across the organisation and the evolution of the technical and regulatory landscape, with the aim of the Unit to be a leading centre of excellence for local authority drone services.

The current DCC drone operations structure has four sections registered with the IAA, including Dublin Fire Brigade, Survey & Mapping, National Building Control Office and Dublin Civil Defence. The Chief Executive of DCC is the overall accountable manager (Figure 1). If additional sections in DCC need to establish drone operations, they would also need to register as additional sub-entities and complete appropriate training and registration with the IAA which is complex and time consuming.

This new dedicated drone unit will be formed within the DCC's Survey and Mapping division (Figure 2), which along with Dublin Fire Brigade already accounts for the majority of DCC's current drone activities. The current team of pilots have the highest level of expertise within the organisation in relation to drone operations. With a new corporate focus and the addition of a number of new dedicated roles to manage and deliver drone services it will enable the unit to support other sections seeking to apply drones within their services.



Figure 1. Current DCC drone operations structure



Figure 2. New DCC drone operations structure

It is proposed that the DCC Drone Unit should include the following competencies:



Operations

- + **Shared Services:** The Drone Unit will provide drone services for other DCC sections as demand grows and will have relationships with other registered DCC drone operators (DFB, NBCO and DCD).
- + **Centralised Management of Drone Equipment:** The Drone Unit will be responsible for researching and then purchasing relevant drone hardware including base flight units and relevant accessories (e.g. LIDAR/Camera/sensors).
- + **Regulatory Knowledge:** Drone Unit staff will keep up to date with all State and EU regulations with regard to safe flying, drone & pilot registration, submission of mandatory documentation to the IAA as well as providing advice to other DCC Departments/ Sections.
- + **Training and Skills:** Staff within the unit will be required to maintain training standards and ensure minimum flying hours are logged (as per EU regulation).
- + **Procurement:** The Drone Unit will be responsible for procuring and maintaining Framework Agreements for pilot training and consultancy work around registration and conducting operations with the IAA. Where external surveying drone services are required, the Unit will develop a framework so various departments can easily access the services.
- + **Centre of Excellence:** The corporate Drone Unit would be at the centre of all drone operations for DCC carrying out flight missions, offering advice and technical assistance to all Departments/Sections within DCC.
- + **Expertise:** The section will be staffed by colleagues who are fully trained and qualified as remote pilots in accordance with the relevant State and EU regulations.



Governance & Policy

- + **Governance:** The Drone Unit will be responsible for the implementation of all State and EU Regulations. The Unit will operate under the High-Level Drone Steering Group (comprising members of the DCC Senior Management Team) and will be responsible for the development of operational terms and conditions for all DCC drones services.
- + **Policy Support:** Keeping up to date on international best practice and industry development to inform city policy.



Innovation

- + **Ecosystem Co-ordination and Collaboration:** The Drone Unit in partnership with the Smart Cities Unit will co-ordinate relationships within DCC and external bodies such as universities, IAA, consultants and other drone services providers to share best practices and identify new opportunities for collaboration.

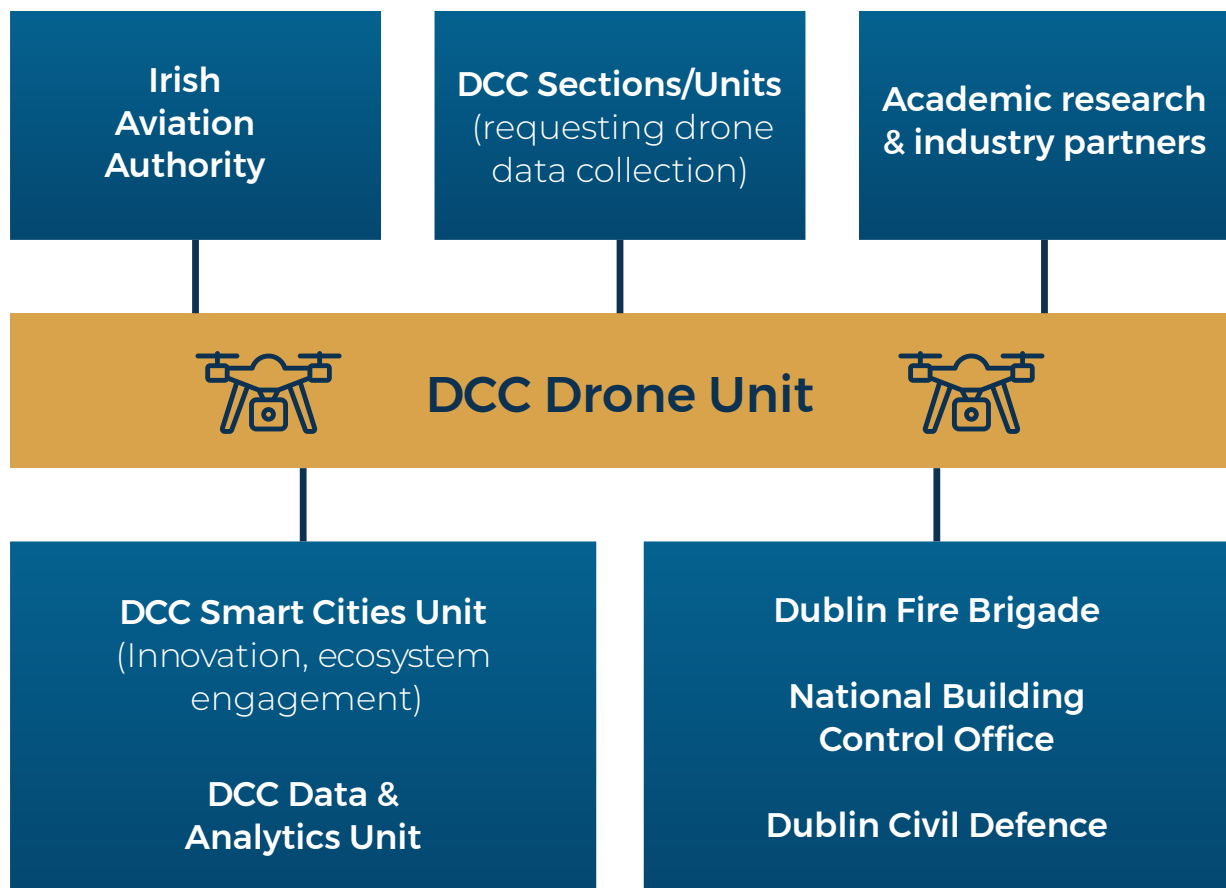


Figure 3. DCC Drone Unit strategic relationships

DCC Drone Strategy

Five-Year Action Plan

The Drone Unit should be able to determine which current DCC operations could be enhanced by applying drones, taking into account factors such as direct cost, environmental impact, staff-hours, resources required and safety benefits, There will also be significant opportunities for service redesign, improvement and transformation that will be facilitated by the introduction or expansion of drone technology.

The City Council will have two pivotal roles to play in this context as a provider of drone services and as an eco-system manager, to allow third-party suppliers to extend their operations in the city. This Strategy will be executed via the following action plan, and it will be guided by the internal High-Level Drone Steering Group:

Short term (12 months)

Establish a Drone Unit

- + Develop a workforce plan to determine exact staffing and resource requirements to establish a dedicated Drone Unit.
- + Further develop the Drone Unit business case: Sign off on the establishment of the unit and governance model.
- + Skills and technical assessment: Establish a baseline for understanding skills and technology which will need to be developed in house and where niche external suppliers will be required (complex mapping projects, niche surveys and to test new innovative use cases).

Internal Organisation

- + Develop and clarify roles and responsibilities with other DCC sections/units requiring drone services and other DCC standalone drone operators (Dublin Fire Brigade, National Building Control Office, Dublin Civil Defence), the council's Data and Analytics Unit and Smart Cities Unit, the IAA, and external research organisations.
- + Create a central register of all drone operations across the organisation.
- + Continue to expand cost-benefit analysis for costs of traditional approaches versus the cost of drones carrying out the same role, and establish metrics to determine improvement in service quality, efficiency and delivery/turnaround time that result from adoption and expansion of drone use.
- + Develop policy and operational guidance material for all DCC drone services.
- + Initial website development as central information and communications outlet with the public.
- + Help define requirements around centralised data storing/sharing system, and develop a policy around safe data storing/sharing.
- + Support communications campaigns, external stakeholder engagement and citizen surveys.

Innovation and Research

- + Engage with academic research partners and the IAA through innovation partnerships to conduct experimental trials on scaling up drone operations in urban environment, including addressing issues such as privacy, environmental impact and safety concerns. To start addressing the future integration of drones in urban settings, DCC, in collaboration with the IAA and Maynooth University will initiate a 2-year Drone Innovation Project starting in Q2 2024. This initiative is co-funded by Lero, the Science Foundation Ireland Research Centre for Software, with the aim to develop an overarching drone framework and policy recommendations. This will support the scale up of drone operations in urban environments, encompassing inputs for Policymaking, Innovation and Operations, involving all the relevant stakeholders across public and private sectors.
- + Identify and apply for new funding opportunities to support the work and objectives of the unit.

Collaboration and Regulatory Compliance:

- + Work with the IAA to determine how flight authorisations for more complex DCC drone operations can be streamlined.
- + Work within the Local Government sector and central government to agree common approaches to address how low-level airspace is managed (ie. landing and take-off zones, define specific areas where drone activities are permitted or restricted, and infrastructure required to support). There will be a need to develop planning guidelines to support drone infrastructure in new buildings and developments.
- + Collaborate with other Public Services agencies to share best practice and support each other on adoption levels.
- + Collaborate with other European Union cities networks such as Urban-Air-Mobility Initiative Cities Community (UIC2) to share best practice and learnings (see p. 29-30).
- + Educate the Public about drone applications and promote responsible drone use, inform about the benefits, safety guidelines, and legal requirements associated with drones through awareness campaigns, workshops, or community events.

Medium term (1-3 years)

- + Plan for and establish a regulatory and technical framework for a drone eco-system in Dublin, building on the trials identified with research partners in year one, where third party operators can develop their business in line with identified community needs.
- + Develop a foundational U-space with the IAA to manage drone traffic in Dublin (see p. 27-29). Set out the technology, institutional and business case for such a system, identifying key roles for all stakeholders.
- + Plan for integrating Urban Air Mobility (UAM) services within the DCC's strategic transport planning function.
- + Expand Drone Unit capabilities to manage more complex DCC drone operations – including BVLOS and night flights.

Long term (3 years - 5 years and beyond)

- + Collaborate with partners including IAA to support trials of an UAM network of drones and VCAs in the DCC area.
- + To review commercial viability and roadmap for UAM services in Dublin
- + Agree responsibilities with the IAA and AirNav Ireland⁴ around deployment of a city wide UTM system which could have the potential to manage multiple, autonomous drone and VCA services.
- + Instigating experimental trials of U-space and complex drone operations, including autonomous and swarm operations for detailed collection of data.



⁴AirNav Ireland is a commercial semi-state company with primary function to provide air traffic management and related services within airspace controlled by Ireland.

Background to the Drone and Urban Air Mobility Strategy

Introduction

The background to the Drone Strategy and Urban Air Mobility for DCC was laid in 2021-2022 with the “Accelerating the Potential of Drones for Local Government”⁵ project. This involved the publication of the “International best and emerging practice report”⁶, which identified how drones could provide better services for local government and helped to understand what role local government could play in shaping the future of drones. This project won a prestigious World Smart City award in 2022 in the category of Emerging Technology and Governance.

A key objective of a drone strategy for Dublin City Council (DCC) is to optimise and expand drone services within the organisation, building on existing capabilities and resources. There is also an important role for DCC to play in supporting the external drone ecosystem and building capabilities to deliver innovative third-party drone services to the benefit of citizens and communities.

This strategy was developed with the expertise and guidance of Julie Garland and Philip Butterworth-Hayes.



Julie Garland, the founder of Avtrain, provides training, regulatory compliant operations manuals and risk assessments, consultancy services for complex operations along with operational safety support to drone operators, government agencies and organisations to incorporate drones into daily operations. Her background as a former Airline Training Captain, Aircraft Maintenance Engineer, Barrister at Law and Fellow of the Chartered Institute of Arbitrators is unparalleled and prior to undertaking her position as CEO of Avtrain she was the Director Compliance for Norwegian Air International. She is the founding Chair of the Unmanned Aircraft Association of Ireland, the Vice Chair of the Joint Authorities for Rulemaking on Unmanned Systems Industry Stakeholders Body (JARUS ISB) Steering Committee and the President of JEDA – the Joint European Drone Associations

⁵<https://smardublin.ie/accelerating-the-potential-of-drones-for-local-government-2/>

⁶<https://smardublin.ie/wp-content/uploads/2022/05/Drone-Report-V15-Digital-Version.pdf>

Philip Butterworth-Hayes, a principal consultant of PMI Media Limited, an international defence and aerospace consultancy, based in the UK, specialising in policy, market development and regulatory affairs within the uncrewed aviation sector. Philip edits www.unmannedairspace.info, www.urbanairmobilitynews.com and www.globalairmobilitymarket.com. The company's expertise and the work of Philip Butterworth-Hayes - previously a Director of Strategy and Communications at the Civil Air Navigation Services Organisation and for 20 years the European correspondent of Aerospace America, the Journal of the American Institute of Aeronautics and Astronautics - in this area goes back many years. It is wide-ranging and operates at a high level in both industry and government domains, including the development of the UKRI-funded www.aam4gov.com set of educational materials to connect the drone and advanced air mobility industries with UK local authority service delivery.



The Drone Strategy for DCC was informed through the following outputs developed over the past 12 months which included:

- + Evaluation of Dublin City Council drone use now and in the future. A workshop was delivered in March 2023 for DCC staff (30 attendees) who are using drones & data from drones to give their views on the current and future direction of DCC drone operations. This also involved a comprehensive survey across DCC departments on how they envisaged drone operations evolving (40+ replies).
- + Desk based research identified how other major European city councils and public bodies were developing drone strategies to help inform DCC's approach.
- + Evaluation of the Capabilities within Ireland's drone industrial base to support DCC drone requirements. A Drones Showcase Event (and follow up survey) was delivered in April 2023 with 100+ representatives across industry and DCC staff to better communicate and understand drone capabilities across Dublin and Ireland, including future plans and business models to see whether and how they might relate to DCC's strategic drone services requirements.



Current and planned use of drone services by Dublin City Council

As part of the strategy development process, extensive consultations were conducted with DCC staff, involving participants from 27 sections. This included a workshop and a survey aimed at gauging views on the current and future direction of DCC drone operations.

Dublin City Council's use of drones may be relatively modest currently, but it has already delivered substantial benefits across multiple departments, particularly in the execution of 'dull, dirty or dangerous'⁷ operations, for example dangerous buildings surveys or flood defence structures.

Operations performed by DCC staff are between one and fifteen flights per month per section (in total this represents approximately 300 flights per annum across the organisation).

Section	Number of remote pilots	Number of drones
Survey and Mapping	4; 5 in training	8
Dublin Civil Defence	2; 3 in training	2
Dublin Fire Brigade	4; 3 in training	6
Dangerous Building Control Office	1	1

The majority of drone operations are delivered by the Survey and Mapping section, which also provides drone survey services for other sections. In cases where there is no capacity in-house (mainly for bigger and more complex surveying and mapping projects, traffic monitoring or illegal dumping) external drone services providers, support DCC operations. The number of operations and services had been growing across the organisation up to 2022.

Introduction of new, stricter, complex and evolving regulations (Reg. (EU) 2019/947 and Reg. (EU) 2019/945) have contributed to slowing that growth. However, once these regulations are fully applied, they will have radical impact on the industry opening the opportunity for autonomous and BVLOS operations, likely accelerating the industry further and faster than ever before. There are already the number of BVLOS operations in place in Ireland.

⁷The 'Dull, Dirty or Dangerous' tagline is used by Avtrain to promote the benefits of drones services

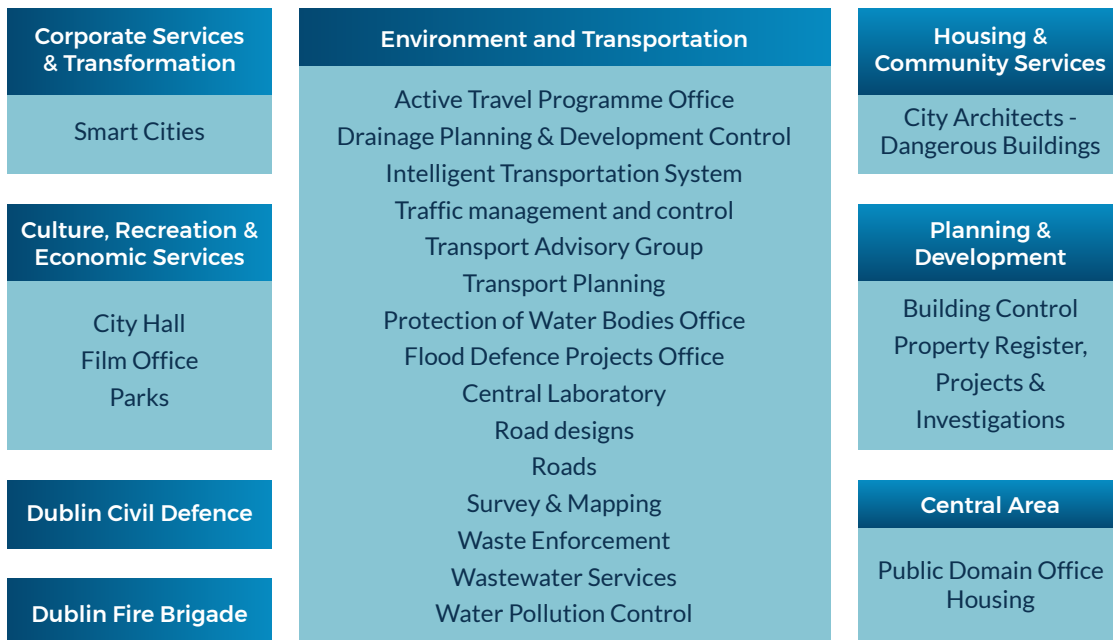


Figure 4. Dublin City Council's departments and sections engaged in the survey and workshops to develop the strategy

Overall fleet sizes range between one and eight drones per department. Apart from the emergency response teams in Dublin Fire Brigade (DFB) and Civil Defence (DCD), all drone flights are planned in advance. Almost all departments plan to increase drone use and undertake new opportunities with new types of drones and more sensor types.

In order to achieve this the organisation needs to invest in capacity and equipment in a much more strategic manner. While currently most DCC drone operations are pre-planned (except for emergency service operators) there was a clear wish to increase capabilities for on demand operations.

The majority of DCC staff, who took part in the workshop and surveys, expressed the need to increase the use of drones in the future, with preference to expand in-house capacity as a priority. However, it is envisaged that there will be a requirement to access external services in the future, mainly for complex mapping projects, niche surveys and to test new innovative use cases before implementation into DCC internal drones' portfolio and within existing council services.



Figure 5. DCC staff workshop, March 2023

Summary of benefits of Drones to DCC

There are five main areas where the City Council benefits from drone use (based on staff survey and workshop):



Improved capabilities for first responders to save lives and protect their personnel

- + “A great tool for Dublin Fire Brigade”, allowing for the gathering of large volumes of data, monitoring areas which wouldn’t otherwise be possible.
- + In search and rescue operations drones can reduce response times, increase safety, and transform how missions are managed, increasing services and improving efficiency. Fire brigade staff can view buildings and sites in emergency situations which might be unsafe or otherwise generally inaccessible.
- + Drones can help reduce the risk to staff working at height and firefighting.



Improved access to hard-to-reach/complex areas for surveys and monitoring

- + Drones give DCC staff access to areas that would otherwise be too expensive or unsafe to access – using aerial photo surveys from drones rather than helicopters/fixed wing aircraft for river catchment surveys, roof surveys etc.
- + Working with landscape architects in landscape surveys, drones give more accurate and up to date information.
- + Drones provide a clear and accurate picture of the roads and streets in the city and facilitates the design and implementation of Active Travel routes. Drones have already changed procedures in road design; they allow for traffic records over specific periods of time; improves safety for the surveyor.
- + Drones allow for large green field sites to be surveyed regularly and safely and for safe surveys of vacant or derelict sites and buildings.
- + Drones are used to produce 3D/2D models and plans for surveying purposes.
- + Drones are also used for planning enforcement and DCC buildings maintenance.



Improved health and safety

- + Drones enable the safe pre-inspections of roofs and above ground level structures to inform risk assessments.
- + Drones allow survey staff to gather information from sites that are too dangerous to physically enter on foot.



Increased efficiency

- + Drones allow for the quick access to a large amount of data and visual information, speeding up large-scale surveys.
- + Drones reduce the need to install CCTV for certain applications.
- + Drones also give staff the ability to feed high definition images into numerous departments for mapping and visualisations.



Improved environmental protection capabilities

- + Drones assist in mapping flood extents and detailing flood defence defects.
- + Drones are particularly useful in invasive species monitoring, siltation levels and topographical surveys.
- + Drones are useful tools to combat illegal dumping.
- + Drones support work with the North Bull Island team as part of coast watch and Bull Island surveying in relation to climate change.
- + Drones assist in tree surveying - improved capabilities working with tree officers.
- + Drones add knowledge on the extent of pollution/discharges, bird populations etc.

There was a very clear message that drone operations will have a positive impact on the delivery of council services now and into the future.

An example below of the benefits of an internal drone application shows how the increased usage of drones within Dangerous Building Section could have dramatic cost, efficiency, and health and safety implications.



Benefits of using drones vs traditional survey based on example of Iveagh Markets rooftop survey

A full video rooftop survey via **drone** was carried out at short notice responding to a structural issue related to the Iveagh Markets building. This involved the following tasks:

- + The pre-planning work and associated IAA documentation /approvals (1 hour)
- + A drone survey carried by in house drone pilot from the Survey & Mapping team (30 min. flying /30 min travel)
- + Post processing of data and end product was delivered to the internal client (Dangerous Building section) via sharefile (1 hour)

The total cost of the operation was 300€ (excluding the cost of the drone*).

The same survey done by external drone company would cost around 1,000€.

* The Drone Used was a DJI Mini3 (Cost 1,200€)

Traditional rooftop assessment:

- + Preparation of a full project plan, which includes preparation of Risk Assessment and Traffic Management Plan and additional DCC personnel attendance to monitor the closure of the road during the survey (2 people) is estimated at 600€
- + Hiring of a cherry picker machine for a full day (20m height range and reach of 15m) with mounted camera. The total cost of the machine and the driver's time would be approx. 800 €.

This traditional way of survey might be completed within approximately 5-10 days from the request, as it requires a significant pre-planning activities and paper work approved.

Taking all of the above into consideration the approximate cost of this survey would have been approx. 1,400€.

This initial evaluation demonstrates a significant cost and time saving when using drones - up to a 4.5 times reduction in costs while the operation can be delivered in days or hours as opposed to days or weeks in the traditional manner.

Based on feedback from the workshops and surveys with DCC staff the following areas need to be addressed as part of an organisational wide drone strategy:

- + Building awareness across wider DCC departments on the potential opportunities presented by drone technologies. Develop more business case evaluations on the benefits of drones vs traditional service delivery.
- + Need to standardise drone equipment and training and to manage this corporately.
- + Establish a centralised resource where drones services can be booked in advance by the various departments.
- + Develop a clear policy around safe and centralised storage of the large volumes of data collected and procure a centralised data storage solution.
- + Ensure all drone operators are adequately trained; ensure all relevant sections who intend flying missions on a regular basis register with the IAA.
- + Develop guidance on the use of external service providers ensuring there is full compliance with regulations and protocols. There is a clear preference to keep drone operations in-house, especially in first responder roles.
- + Create and manage a central register of all drone operations across the organisation. Ensuring that all documentation, risk assessments, and flight logs are accurately recorded drone flights internal and external.



Input from the drone industry and alignment with DCC current and future requirements

For DCC to deliver on its ambition to scale up its usage of drones there needs to be a strong external commercial drone sector to support aspects such as training, certification, and service delivery as required. Also, as the drone sector grows in areas such as drone deliveries and other commercial operations, the city council will need to work collaboratively with the drone industry to shape a future where drones and Urban Air Mobility can be delivered in a safe, secure and sustainable manner as set out in our drone strategy principles.

At the core of the drone industry in Ireland is the role of the Irish Aviation Authority (IAA), which has established itself as a proactive regulator. Flying and operating drones in Ireland is subject to State and European Union Regulations, including Reg. (EU) 2019/947 and S.I. 24 of 2023. The IAA regulates to the highest professional standards to ensure a safe, secure and consumer-focused aviation environment. Through regulation, they support world-class performance and innovation in Irish and global aviation. The IAA also provides guidance for operating and flying drones in order to ensure public safety. The IAA has also shown a leadership role in establishing a dedicated UAS Division to promote and regulate the industry, to maximise competitive and socio-economic benefits, while ensuring the highest level of safety, security and protection for citizens.

“The IAA is particularly good at developing new regulations and particularly diligent at policing them. In the short term, this means that for industry it can take time to work out how to correctly implement the new rules, but in the longer term, this will allow the industry to expand and flourish, especially in the European Union (EU). This follows the IAA’s track record in manned aviation, which has attracted so much investment in Ireland.”

Drone Industry Questionnaire Respondent



A number of engagements including a survey and industry showcase event were delivered with industry to better understand the capabilities of the sector as well as gathering feedback on what role they envisioned for the city council to support the growth of their sector.

DUBLIN CITY COUNCIL
A DRONES STRATEGY
INDUSTRY SHOWCASE

Industry Showcase Day
 A meeting point for the DCC and Ireland's drone operators

A Drones Showcase Event was held on 27th of April 2023 at the Guinness Enterprise Centre, Dublin. Around 100 industry representatives, DCC staff and guests from public sector bodies attended. The event included drones exhibition and presentations from broad array of drone companies and also the opportunity for networking.

Logos of participating drone service providers: MANNA, APEX SURVEYS, spright, ANARKY LABS, SKYFAB AERIAL IMAGING, Drone Works Ireland, Skyflow, Unmanned Aircraft Association of Ireland, GARDÁ COAST GUARD, THE SHANNON AIRPORT GROUP, FUTURE MOBILITY CAMPUS IRELAND, Avtrain, CIS camera inspection services, ENGINEERS WITH DRONES, EIREDRONE SERVICES, and Murphy GEOSPATIAL.

Through a survey and Drone Industry Showcase Event with local and national drone services providers a broad array of services were identified which are delivered to DCC or other local authorities, including mapping (orthophotography, 3D models), inspections, confined space surveys, videography, traffic monitoring, environmental monitoring, illegal dumping, thermal surveys, vegetation mapping using multispectral camera, to name a few. It was clear that if DCC require these types of external services, the sector will be more than capable of providing these.

The table below takes the feedback from the industry engagement workshops and survey and the input from DCC sections to assess the likely demand across DCC for drone related services for the next three years. It covers a variety of services from training, consultancy, equipment and software as well as delivery of specific application areas. The initial work of the new Drone Unit will focus on identifying the current and future needs of the organisation and to establish appropriate frameworks that can deliver on those needs.

Training	Consultancy/ Advisory	Equipment and software	External services (if there is no capacity in DCC)
<ol style="list-style-type: none"> 1) Training for new staff for open and specific category 2) Re-certification of pilots as required. 3) Flight training 	<ol style="list-style-type: none"> 1) Consultancy for developing Emergency Response Plan for drones operations on corporate level 2) Provision for drawdown days to assist with documentation, innovation, SORA etc. 3) Advice on operating in urban area with minimal pre-planning 4) Specialists in the use of thermal imaging, surveying of elevations of buildings and in internal surveying of buildings 	<ol style="list-style-type: none"> 1) Future purchases will be in 2 categories – standard and specialized survey drone (not from mainstream vendors) 2) Possible standard drones and equipment: M30T, DJI Dock, DJI Mini 3 Pro, DJI Mavic 3 Pro, 4k Camera, Smart Controller, Drone Safety Accessories (Parachute/Radio Cut Off etc), extra batteries, storage case, “drone operator” Hi-vis vests, maintenance 3) Video viewing/ editing software, software to review 3sm files, software to view thermal image 	<ol style="list-style-type: none"> 1) Brownfield and greenfield land banks & existing buildings survey 2) Bonfire Material Detection (5 days/year) 3) Roof Surveys 4) Thermal surveys 5) Building elevation surveys 6) Internal building surveys 7) Invasive species analysis / surveying (30 days/3years) 8) River and coastal Surveying & Mapping –type of survey (30 days/3 years) 9) Inspections of Quay Walls and other Flood Defence structures (30 days/3 years) 10) Coastal and River Pollution monitoring (30 days/3 years) 11) Site and rooftop inspections 12) Manhole position surveys 13) Sustainable Urban Drainage Systems (SuDS) Surveys

The industry feedback on the future role of DCC provided valuable input into formulation of the strategy and is very much aligned with the current discussions on the role of local government and regulators on how drones and UAM will be managed in the future. Some of the areas highlighted include the following:

Regulation and Policy: DCC will need to play a crucial role in developing and implementing regulations and policies related to drone operations within Dublin. This will also involve the establishment of guidelines alongside other state and government agencies for safe and responsible drone use, address privacy concerns, and define specific areas where drone activities are permitted or restricted across Dublin.

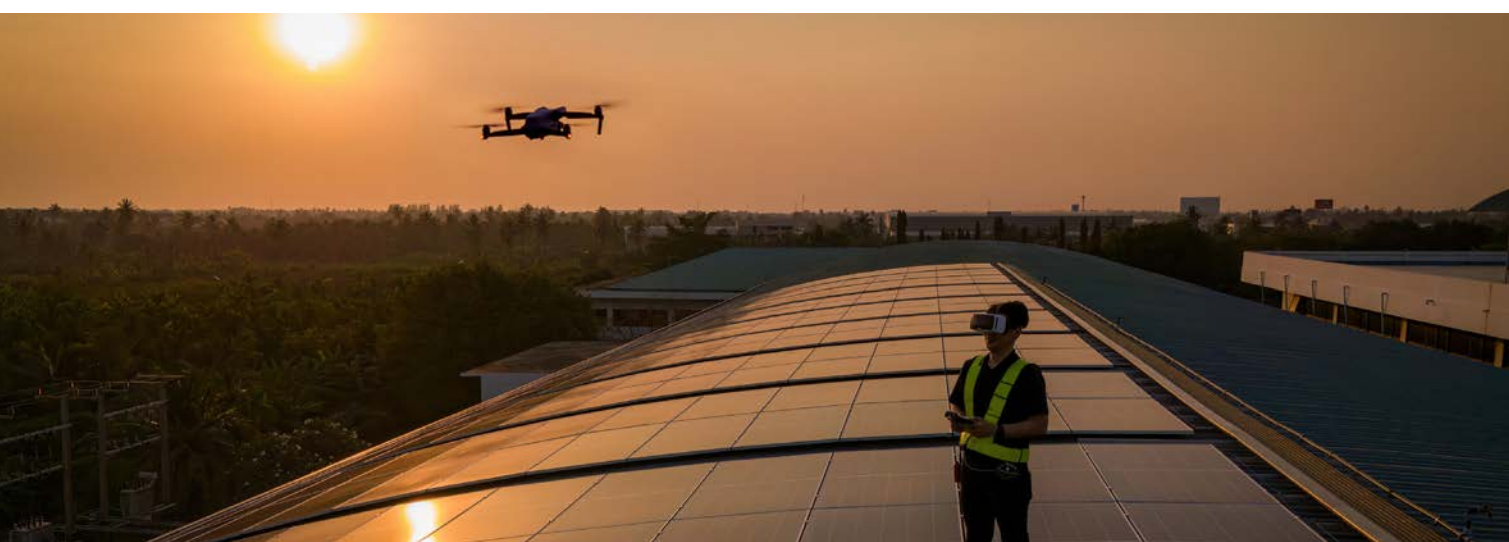
Collaboration with Public Services: DCC will need to collaborate with other public service departments, such as emergency services, transport, and environmental agencies to share best practice and support each other on adoption levels.

Permitting and Licensing: DCC could in future handle the permitting and licensing process for drone operators within their jurisdiction.

Infrastructure Development: DCC could collaborate with drone service providers and stakeholders to develop infrastructure to support drone applications or develop planning guidelines to support drone infrastructure in new buildings and developments. This may include establishing dedicated landing pads/safe areas, designated areas for drone operations in public spaces.

Public Engagement and Education: DCC should play an important role in educating the public about drone applications and promoting responsible drone use. This can help foster public acceptance and understanding of drone technology.

Collaboration with Industry and Innovation: DCC should build out collaboration with the wider drone industry, research institutions, and innovation centres to foster the development and implementation of new drone technologies and applications. This collaboration can help attract investment, support research and development initiatives, and promote the growth of the drone industry in Dublin.



The role of local authorities in advancing Urban Air Mobility (UAM) operations

The City Council will need to play an important role in supporting external drone services as they scale up and new legislation gets enacted at an EU and national level. For example, this has started with the support for beyond visual line of sight (BVLOS) operations since 2019 (Reg. (EU) 2019/947) and it is now moving towards larger scale passenger and freight services (UAM)⁸. The first electric vertical take-off and landing (eVTOL) services are planned for 2024 in some countries and the wider commercialisation of the eVTOL industry planned for 2025-2028. In this regards the timeframe for local authorities to extend their competencies in this area is relatively short.

The UTM, or U-space, traffic management system for drones will require a range of inputs from industry, academia, regulators and the drone industry to understand roles, responsibilities and a way forward. DCC, IAA, industry and academia need to work together to agree the future principles for how drones will operate in urban areas particularly as technical advances will enable complex drone operations and UTM service development.

Appropriate governance models, both internal and external, will be critical in how we shape this path for safe, trusted and sustainable drone services into the future to understand how they can best manage low-level airspace in urban areas and cities.

In particular, there needs to be widespread engagement to define the rules for flying and how areas of concerns in relation to safety, security, environmental impacts and privacy can be addressed.

Vertical take-off and landing (VTOL) capable aircraft (VCA) are new types of aerial vehicles which can enable greener and quieter flights for Urban Air Mobility. They require dedicated landing and take-off areas called vertiports, with the infrastructure needed for safe commercial air transport of passengers and goods that travel by these VCAs. Vertiports need to be easily accessible and connected to existing terrestrial transport system (streets, railway stations, buses, etc.).

⁸Opinion 03/2023 introducing the regulatory framework for enabling IAM for manned VCA was recently approved by the European Commission, however it is a framework and not a detailed regulation to support the industry and the transition from Specific Category to Certified Category of operations.

The U-space Regulation (Reg. (EU) 2021/664), became applicable in January 2023 and establishes a framework for a digital system with the objective of ensuring the safety, security, and environmental sustainability of UAS operations. U-space⁹ is UAS traffic management system, a set of services (minimum four services are required: network identification, traffic information, flight authorisation and geo-awareness) provided in a digital and automated manner, inside a volume of airspace. This will enable fair and efficient sharing and use of the airspace, dense drone operations, complex and long distance UAS operations (BVLOS), operations in urban environment, safe separation between manned aircraft and drones, safe flights and operations of drones in the airspace. U-space will not be deployed everywhere, with priority given to areas with expected large volume of operations.

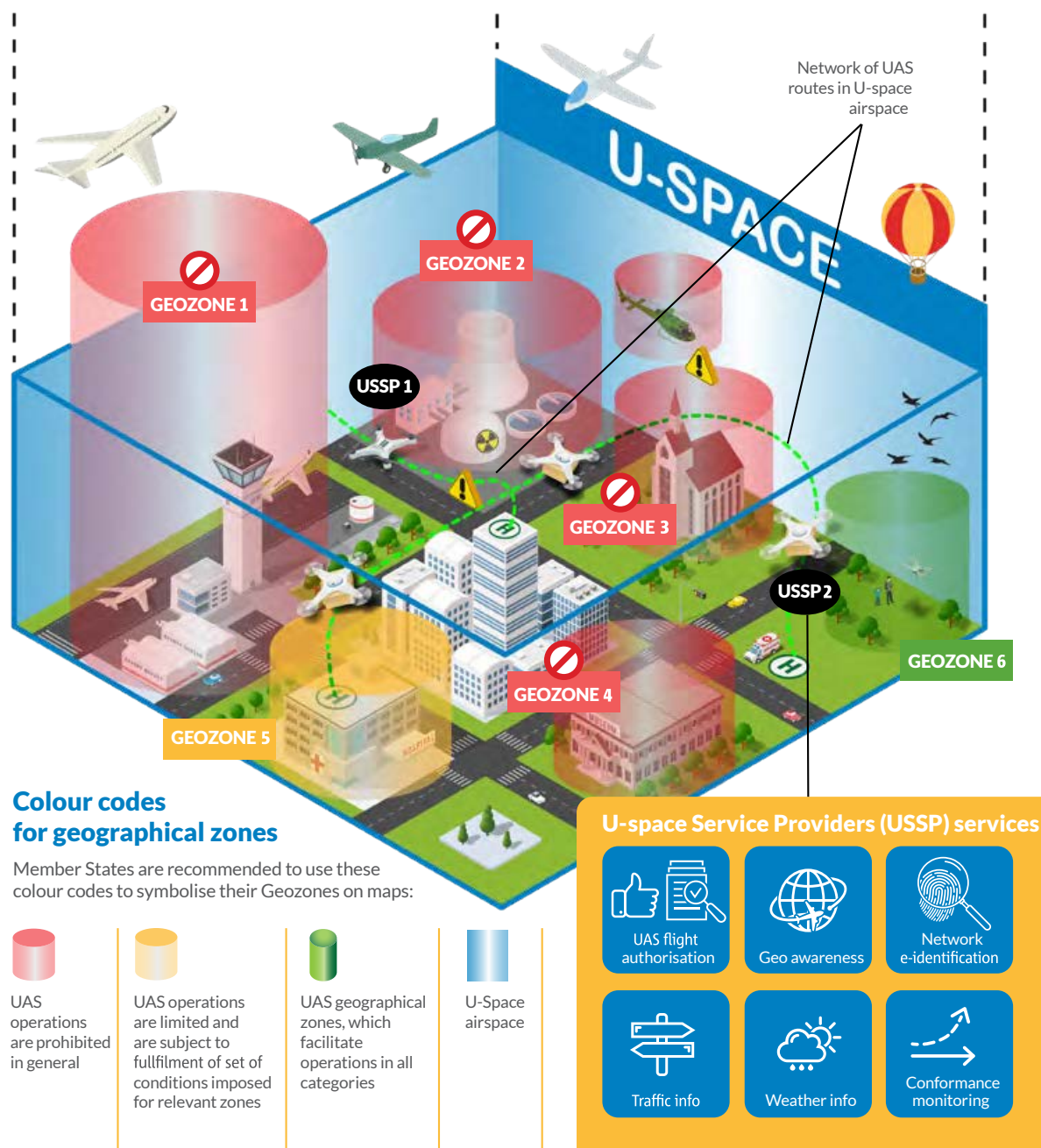


Figure 7. U-Space concept

Source: www.easa.europa.eu/en/document-library/general-publications/understanding-how-new-u-space-will-enable-safe-integration

⁹Based on <https://www.easa.europa.eu/en/newsroom-and-events/events/u-space-workshop-concept-implementation> and <https://www.easa.europa.eu/en/document-library/general-publications/understanding-how-new-u-space-will-enable-safe-integration>

As part of the strategy preparation there also was a review of drone operations across EU cities what the key obstacles were to advancing Urban Air Mobility in Europe, specifically, the areas in which non-aviation stakeholders, such as local authorities and land owners, will have legal responsibilities for infrastructure development distinct from those of the airspace regulator.

The box below shows some of the key issues that will need to be addressed by stakeholders – what is clear is that none of the key stakeholder groups are yet fully prepared for autonomous BVLOS drone operations above people, the key starting point for full profitable commercialisation of the industry. This work will need to be progressed in the short, medium and long term to realise the full potential for UAM.

- + *National transport ministries - Still unsure of where UAM fits in their strategic planning.*
- + *European Aviation Safety Agency - High level rules agreed, but these are open to interpretation.*
- + *EASA and in the future National aviation safety regulators – Have yet to certify any U-space Service Providers (USSPs)*
- + *Standards authorities – Some key standards missing, including air-ground cellular communications, detect and avoid, automated risk assessments for drone flights above people.*
- + *Local Authorities – Unclear to their roles and responsibilities. Most are unaware of the potential benefits and challenges that drones and eVTOLs will bring.*
- + *Operators of urban air mobility services – Technically ready, but need the standards and rules to operate.*
- + *UTM/U-space service providers – Technically ready, but need the standards and rules to operate.*
- + *The public – Unprepared for what is coming. It is still not clear whether they want the services on offer or how they view drones flying overhead.*

Source: Philip Butterworth - Hayes (2024)

In particular, the role of local authorities is not yet fully understood. The European Commission has for some time recognised this as a major obstacle to progress and in 2017 set up the Cities and Regions of the UAM Initiative Cities Community (UIC2)¹⁰ to involve local authorities throughout the EU in demonstrating drone operations and developing governance bodies to oversee city drone services and the development of city-based drone eco-systems.

¹⁰<https://civitas.eu/urban-air-mobility>

Based on the work of UIC2 and the more recent “The study on the future of Helsinki’s urban air mobility” areas where local authorities might have a direct role in UAM operations will include:

- + Deciding the sites of drone take-off and landing areas and eVTOL vertiports, especially on council-owned property.
- + Liaising with law enforcement agencies to develop a policy to deal with rogue drone operations, including the use of drones by criminal organisations.
- + Defining no-go zones for environmental, wildlife and other ground-protection issues.
- + Integrating eVTOL route networks and vertiports within ground transport infrastructure planning.
- + Monitoring drone activities using radar and RF detectors to understand compliance and scale of activities.
- + Agreeing the placement of sensors on buildings for drone/eVTOL operational communications.
- + Liaising with the local community to provide a single contact point where community concerns can be raised, logged and addressed.
- + Integrating UAM planning with a local authority’s decarbonisation strategy.
- + Identifying safe spaces where recreational drone operators can fly their drones.



Figure 6. Vertiport concept in Melbourne. Credit: Skyportz Image

Conclusion

The development of a comprehensive Drone and Urban Air Mobility Strategy for Dublin City Council represents a significant milestone in our ongoing commitment to innovation and service excellence. Building upon the groundwork laid in 2021-2022 by the “Accelerating the Potential of Drones for Local Government” project and the invaluable insights gleaned from international best practices, our strategic framework sets the stage for the optimized utilization and expansion of drone services within our organization.

Through extensive research, consultations, workshops, and surveys, we have gained a comprehensive understanding of both current operations and future opportunities for drone integration across various departments of DCC. The feedback from our staff underscores a strong desire to enhance in-house capabilities while also leveraging external services for specialized projects and innovative use cases. Moreover, the enthusiastic response from the drone industry reaffirms the readiness of external stakeholders to collaborate in realizing our vision.

One of the key outcomes of this process is the establishment of a dedicated Drone Unit within the Survey and Mapping division. This unit will serve as the focal point for strategic planning, operational coordination, and ongoing innovation in drone technology. By centralizing expertise and resources, the Drone Unit aims to streamline operations, ensure compliance with regulations, and drive forward the adoption of emerging technologies in drone operations.

As we look ahead, the role of DCC in shaping the future of drone services extends beyond our organizational boundaries. We recognize the importance of collaboration with industry partners, regulatory authorities, and academic institutions to address evolving challenges and seize emerging opportunities in the rapidly evolving drone landscape.

In embracing this strategic framework, Dublin City Council reaffirms its commitment to leveraging technology for the benefit of its citizens, enhancing service delivery, promoting safety, and fostering sustainable urban development. By harnessing the transformative potential of drones, we aim to build a smarter, more resilient city.



Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

