



Sizing the future drone and advanced air mobility market in Australia

Projections of the growth of
commercial drones in Australian
skies over the next two decades

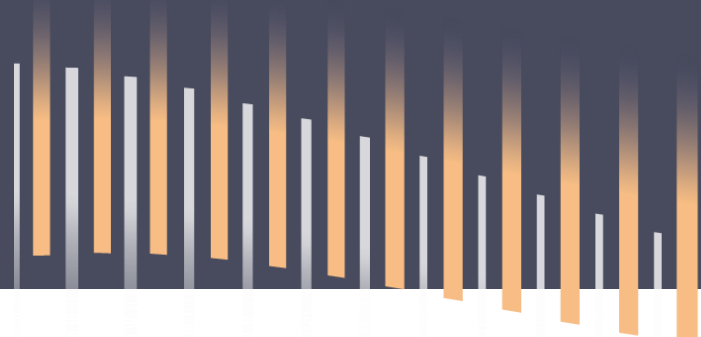
February 2024

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ADVISORY

Foreword



Foreword



After many years of speculation and discussion, the drone industry in Australia is finally becoming established in a serious way.

Over the last five years (in part stimulated by the challenges of the COVID-19 pandemic) we have seen a significant maturing of the industry. Use cases that once faced significant technological barriers (such as air taxis) are now being prototyped, tested and publicly demonstrated.

This market sizing report was developed by Scyne Advisory for Airservices Australia to help inform its plans for the future uncrewed aircraft system traffic management (UTM) system.

It provides a forecast of the size of the commercial drone market (in flights) in Australia from 2023 to 2043, based on current operations and the likely future adoption of drones by industry groups.

We predict that commercial drone flights will increase by an average of 20% per annum over the next 20 years - culminating in 60 million flights in 2043.

Growth will be focused in densely populated areas, which highlights that an operational UTM system will be critical to maintaining safe and equitable access to this soon to be contested airspace.

In completing this report, we used a bottom-up approach to identify and assess current drone use cases in Australia and globally. We also considered possible future uses of drones in established industries.

Our approach took an operational perspective, considering future drone operating models, potential market disruption enabled by drone operations, and global technological and business trends. We consulted across industries to ensure market constraints were considered during the market sizing.

Advancing industry maturity highlights that the key factors that will unlock or constrain growth are no longer technology-related; rather future growth will be enabled by policy and regulatory certainty and clarity on the ongoing operational environment.

Now is the time for government to work collaboratively with industry to develop, test and introduce the right regulatory frameworks and operational systems that will enable the safe and equitable growth of the market that is described in this report.

Acknowledgement

We would like to acknowledge the contribution of **Michael Burns**, PwC's Global Airports Leader and PwC's global Drone Centre of Excellence in the development of this report.

About Scyne Advisory

Scyne Advisory exists to support Australia's public service to create a stronger Australia. One purpose, one practice.

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01

**Executive
summary**



Executive summary

The commercial drone industry in Australia is at an inflection point. Over the next twenty years drone flights are projected to grow on average by 20% per annum, culminating in around 60 million flights each year by 2043.

This growth presents a once-in-a-generation opportunity to unlock a new, enduring and world-leading aviation market in Australia.

As drones become an increasingly common and important feature of our airspace, safely enabling this growth will require a whole-of-government vision and focus to maintain the right safety, equity and capacity settings in policy and regulations. Quickly agreeing and implementing the right regulatory frameworks and operational systems will be critical to safely managing this growth.

In the short-term, established players are continuing to invest, creating and entering new markets, while newer companies are poised to move from start up to scale up. Critically, most companies based in Australia are looking to invest and grow their drone fleets by two to five times over the next five years alone.

From policy and regulation to technology testing and research, it is clear that industry wants to work hand-in-hand with government as this market develops. Transparency and trust between all parties will accelerate the development of the industry, as regulatory and therefore investment certainty is increased through genuine collaboration.

Industry growth will be enabled by continued incremental technology advances like increased battery life and payloads that help overcome Australia's unique challenges of population dispersion and geographic scale.

Currently, drones are mostly used in the agricultural and mining industries, and for surveying properties. But the future growth of the drone industry in Australia will be driven primarily by the transport and logistics.

Autonomous air transport is continuing to move from science fiction towards reality, and deliveries of food, goods and medical products by drone will become commonplace in the future. Trials are already underway in some of these industries, and technologies are continuing to be developed and enhanced.

The forecasts in this report assume incremental (rather than revolutionary) advances in battery technology or propulsion systems, and assumes that there is a permissive regulatory environment.

These assumptions generate forecasts over the 20-year horizon that may be more conservative than other reports, but still demonstrate significant growth in drone numbers, operations and applications.

Future policy and regulatory settings will have a material impact on the development of the drone market. Therefore, maintaining close and ongoing collaboration between industry, government and the community will be critical to this industry's success moving forward.



02

**Overall projected
growth of the
drone market**



By 2043, total drone flights are projected to grow to 60 million flights each year

Australia’s drone market is expected to grow significantly over the next twenty years. This section of the report outlines high level market projections, highlighting the key industry groups driving growth and sets out our expectations of the market by 2043.

The number of drone flights* this year is estimated to be approximately 1.5 million. We predict that it will increase to approximately 60.4m by 2043. This increase is driven primarily by drones being used for goods deliveries - an industry that is projected to grow exponentially over the next 20 years.

***Flight: a trip consisting of one take-off and one landing; due to constraints such as battery life, multiple flights may be required to complete a task.**

Our modelling indicates there will be 60.4 million drone flights in Australia by 2043

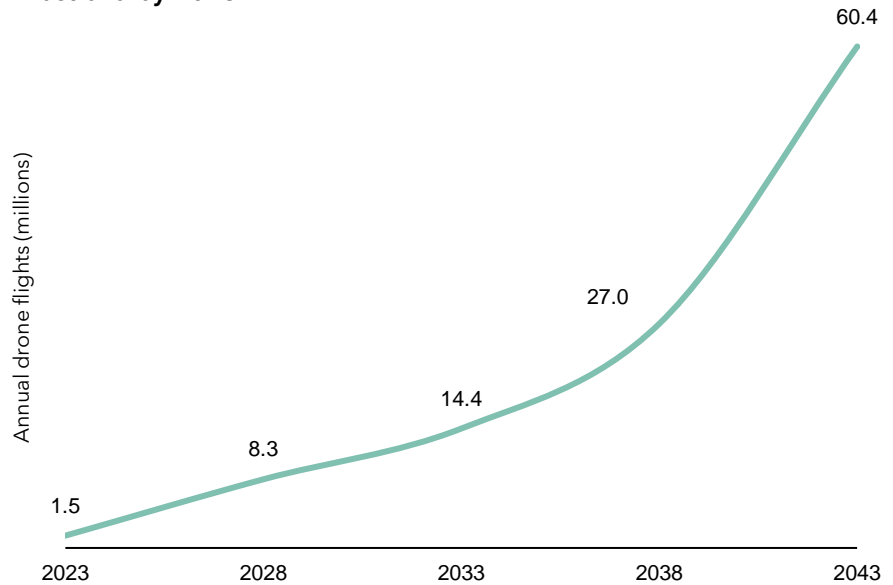













Chart 1. Total number of annual drone flights (millions), 2023-2043

By 2043....

 <p>The total number of drone flights will be around 60 million</p>	 <p>Approximately 100 thousand patients will be transported using drones</p>	 <p>Goods deliveries will reach 46 million, growing at a CAGR of 31%</p>	 <p>Almost 1 million passenger transportation flights per year</p>
 <p>The number of total flying hours will rise to over 15 million</p>	 <p>Over 3.5 million flights will monitor protected areas, coastline and wildlife</p>	 <p>Farmers will make almost 500,000 flights to monitor and support their crops</p>	 <p>Surf life saving clubs will be supported by almost 80,000 annual drone flights</p>
 <p>There will be over 500,000 medical deliveries</p>	 <p>Just over 1.5 million food deliveries will be made across Australia</p>	 <p>Around 310,000 drone flights will be used to support frontline policing</p>	 <p>The mining industry will operate almost half a million drone flights</p>

The growth in flights is driven primarily by the transport and logistics industry

Transport and logistics will account for 77% (~50 million) of all flights in 2043

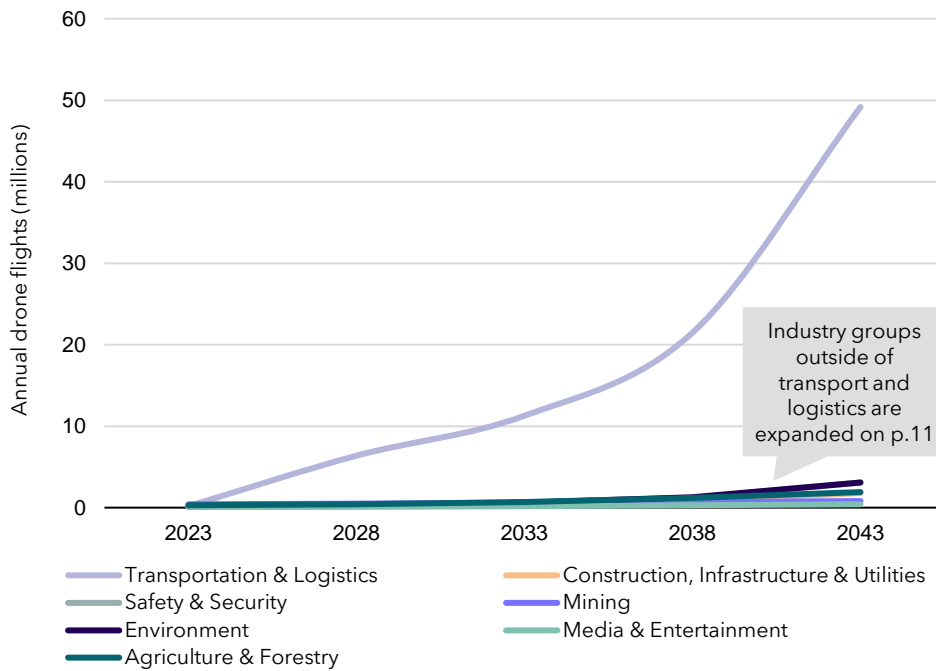
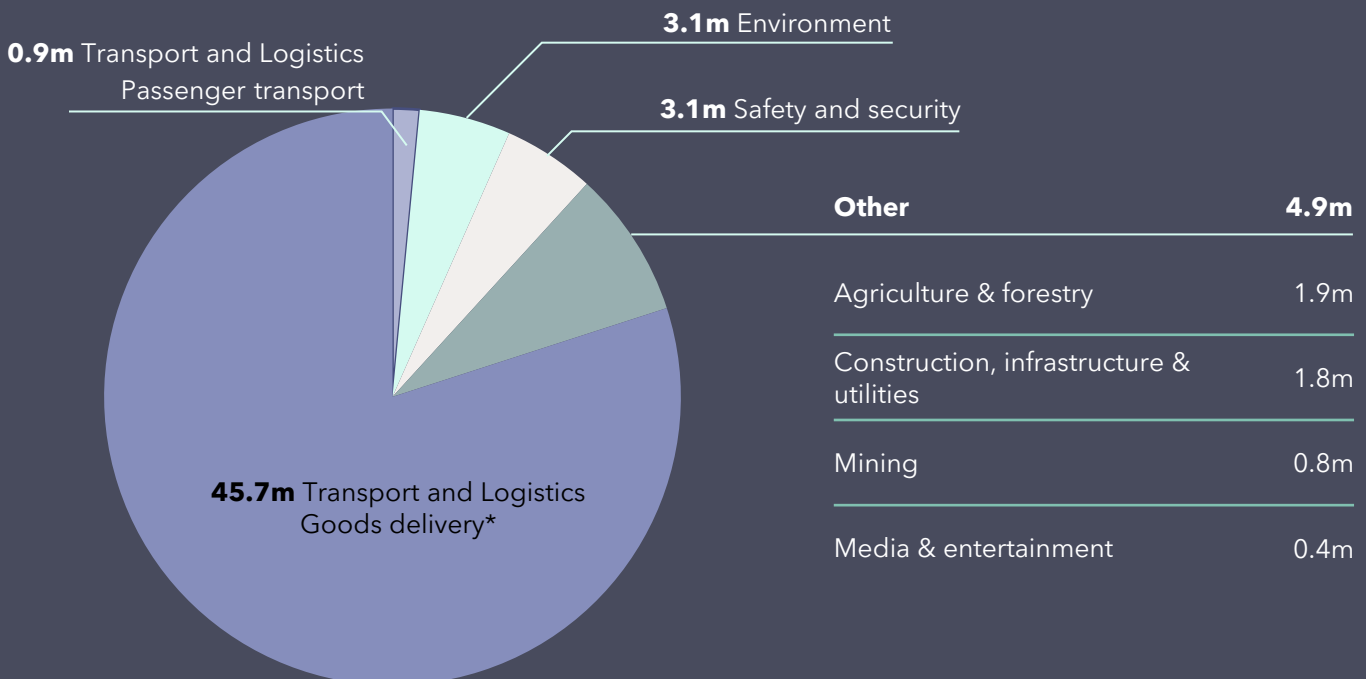


Chart 2. Annual drone flights (millions) per industry group, 2023-2043

The industries currently generating the most annual drone flights are agriculture and mining. However, it is expected that the transport and logistics industry will rapidly become the largest user of drone flights in the Australian market. This industry is dominated by goods delivery (e.g. takeaway food, groceries, parcels) and also includes passenger transportation later in the 20-year horizon. This growth assumes broad community acceptance and a regulatory environment that supports competitive market dynamics.

2043 drone flights by industry group and select sub sectors



*Goods delivery includes: takeaway food, groceries, last-mile parcels, business-to-business deliveries, prescription medication, blood delivery and pathology samples

Industries like safety and security, agriculture and environment will grow from an existing base

In addition to transport and logistics, there are several other industry groups that are already implementing drone technology and are expected to increase adoption steadily over a twenty-year horizon. By 2043, the three largest industry groups (excluding transport and logistics) are expected to be safety and security, environment, and agriculture.



The **safety and security** industry group is expected to accelerate its growth through wide adoption by private security companies, law enforcement and emergency response. Deployment of autonomous solutions will increase applications in monitoring, patrolling and detecting threats.



The **environment** industry group is expected to grow in response to increased environmental consciousness and demand for environmental mapping and monitoring by both private industry (e.g. mining) and by government entities such as national parks services.



The use of drones in the **agricultural** industry group is already well-established in Australia, particularly for the monitoring of crops and private infrastructure (e.g. fence lines). Moderate growth is expected in this industry as drone technology improves and uses other than monitoring, such as livestock handling and crop spraying, become more commonplace.

Excluding transport and logistics, environmental, safety and agriculture applications are the next biggest drivers of growth

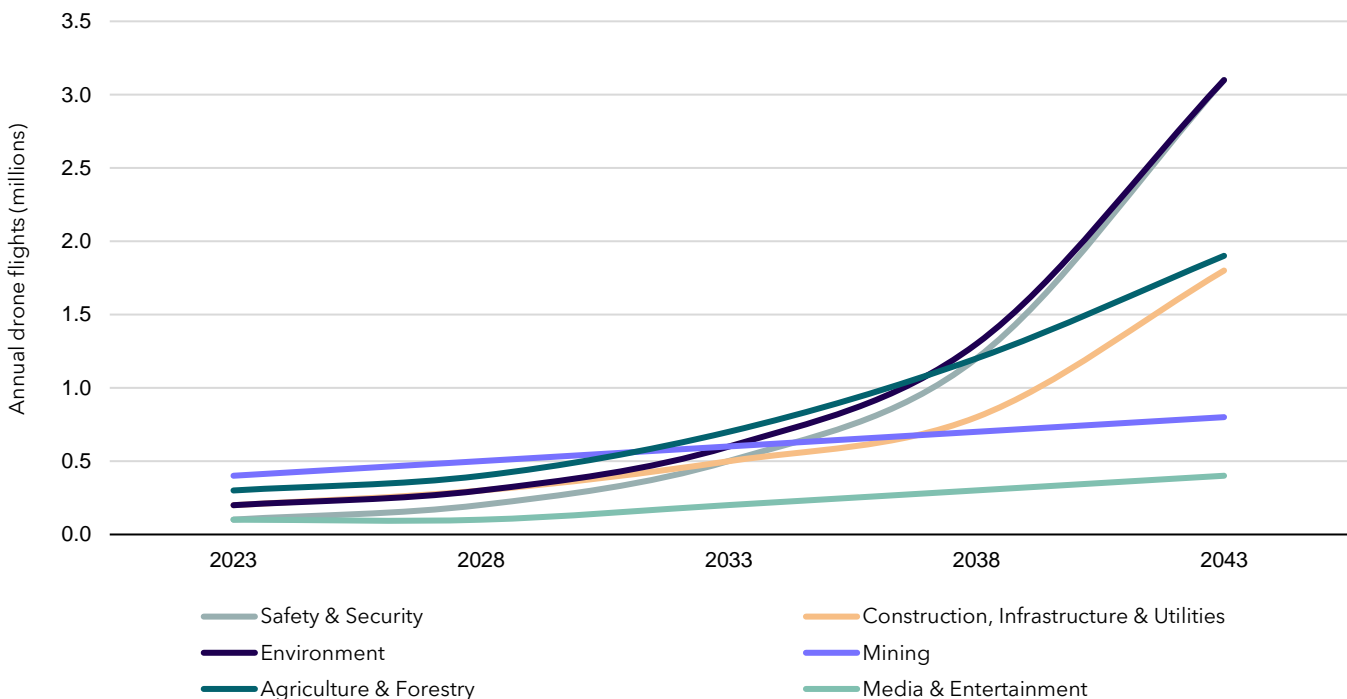


Chart 3. Annual drone flights (millions) per industry group (excluding transport & logistics), 2023-2043

03

**Market analysis:
transport
and logistics**



By 2043, more than 70% of total drone flights will be for goods delivery

The transport and logistics industry group is set to drive the majority of growth in Australia’s drone ecosystem over the next twenty years. This section of the report will detail the two sub-sectors in this industry group: goods deliveries and passenger transportation.

In the short term, drone deliveries are expected to grow gradually. While there have been a number of delivery trials in Australia and globally, this industry is awaiting enabling regulation and drone traffic management

technologies to be implemented in Australia. Once these enablers are put into place, the growth will start to accelerate, likely within the next five years.

Within the transport and logistics industry group, goods delivery accounts for almost all of the predicted increase in flight volumes

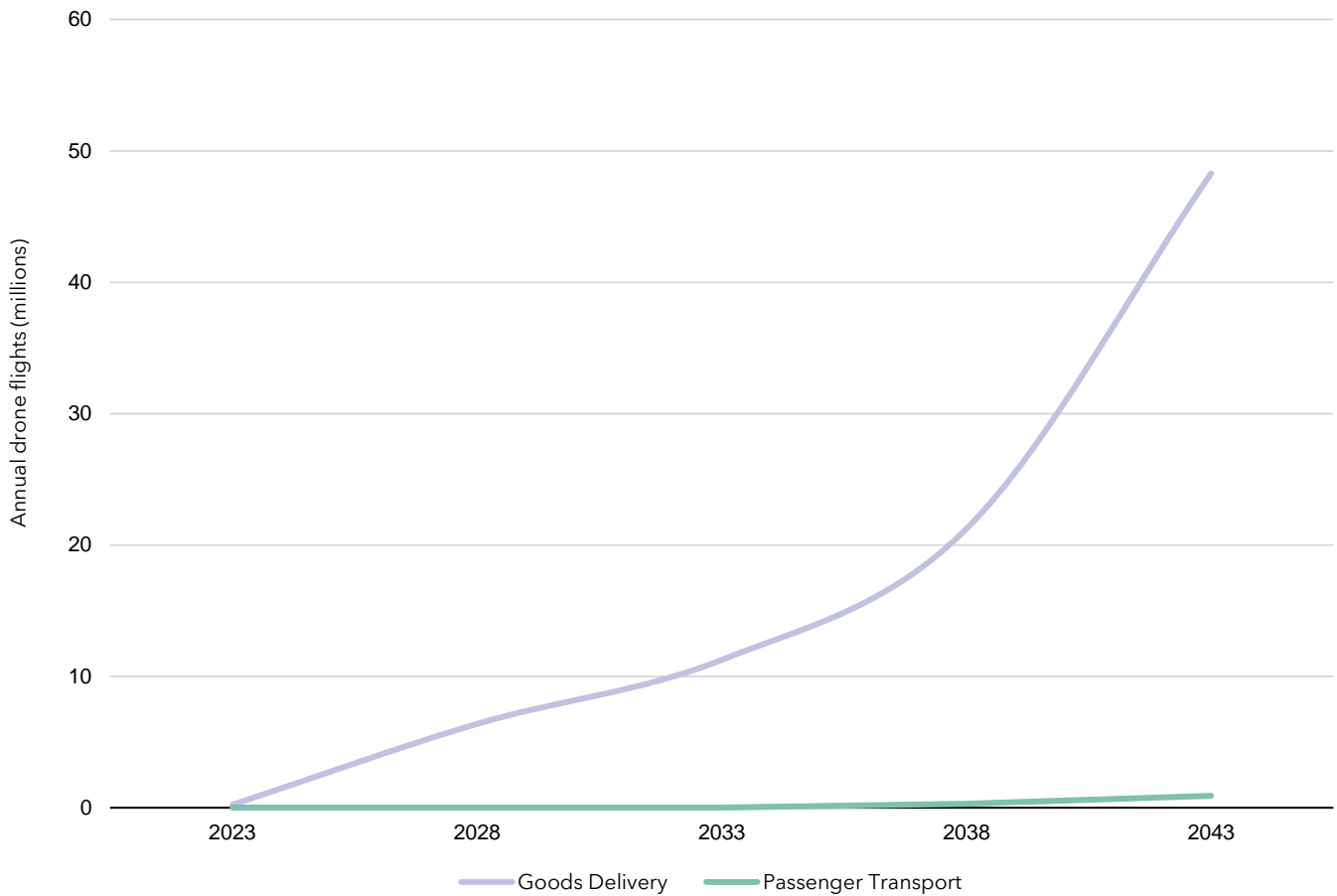


Chart 4. Annual drone flights (millions) within the transportation and logistics industry group, 2023-2043

The Australian drone transport and logistics industry is still nascent and most delivery flights have not expanded significantly beyond their initial rollout sites. The passenger transportation sub-sector has not yet reached the pilot phase. However, by 2043, it is expected that the goods delivery sub-sector will have grown rapidly and will be reaching maturity. It is expected that the passenger transportation sub-sector will lag behind most delivery segments, but has the potential for substantial growth in later time horizons as that market becomes more established.

Increasing payload capacity will help unlock key use cases like last-mile parcel delivery

Within the transport and logistics industry group, there are a variety of smaller use cases that service different needs throughout the Australian market. In the future, the largest of these will be last-mile parcel delivery which uses drones to deliver packages from local warehouses and distribution centres to specific addresses across the country. This comes on the back of significant growth within the Australian e-commerce industry, and the geographic characteristics of Australian suburbs where these deliveries take place. Drones are expected to complement traditional last-mile delivery models and optimise them from an economic and environmental perspective.

Last mile parcel deliveries and food deliveries are the use cases most likely to drive growth

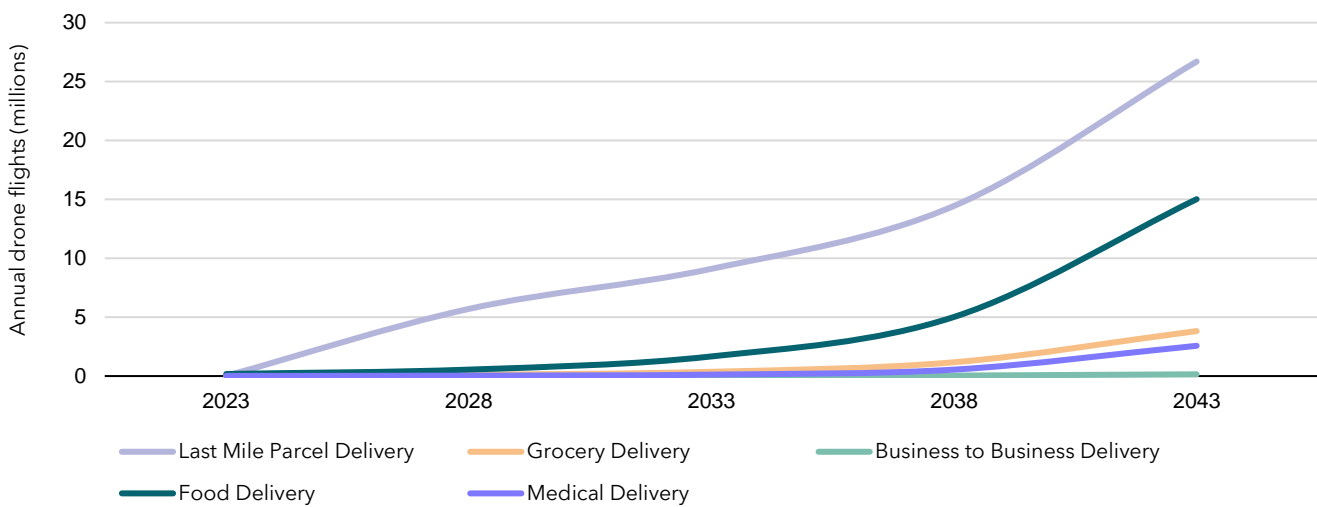


Chart 5. Annual drone flights (millions) within the goods delivery subsector, 2023-2043

Timeline

- 2023** Drone technology is still at an early stage of development with **deliveries limited to small packages** for groceries, supermarket goods, and specific medical deliveries such as test samples. Goods delivery has not expanded significantly beyond initial locations, nonetheless, over 120,000 trips are taking place per year¹.
- 2028** Drones are expected to be permitted to **deliver heavier packages (up to several kilograms), presenting significant growth opportunities** in business-to-consumer scenarios, especially for last-mile parcel and food deliveries.
- 2033** **Drone payload capacity increases, and regulatory approvals are in place** that enable larger and more sensitive deliveries to take place such as medical drone deliveries which can deliver blood, medicine, pathology samples and emergency supplies. This should offer significant time savings compared to road transportation, particularly in regional areas.
- 2038** By 2038, the **business-to-business delivery market is expected to be small but established** as drones with sufficient endurance and payload are available for urgent deliveries and as an alternative to relieve bottlenecks within the traditional supply chain. It's expected that deliveries of packages up to 10kg will be standard practice across the industry.
- 2043** **The delivery market will reach maturity** with a substantial share of food and last-mile packages being delivered by drones.

1. Wing, Wing and Mirvac team up to transform Australian urban retail spaces into drone delivery hubs, October 2022

Food delivery flights are expected to increase by ~25% p.a. and trials are already underway

Food Delivery Case Study

Accelerated by the COVID-19 pandemic, Australia has a well-established delivery market for takeaway food. Drone delivery of this takeaway food is now emerging in Australia. Currently, there is only one Civil Aviation Safety Authority (CASA) approved provider of this service. It is expected that over time food delivery will become a significant market for the drone industry, with a CAGR of 24.7%.

It is probable that drone deliveries will have a competitive advantage within a range of ~400m to 5km. Shorter trips will likely be taken on foot and at longer distances drones are less likely to be competitive against methods of road transportation. The route comparison between modes of delivery can be seen below.

In future, drone food deliveries will still compete with conventional modes of food delivery by road, where it makes more sense to continue doing so. Current trials will provide further insights into how and where drones can provide operational advantages specific to food deliveries in high density urban environments.

Growth in food delivery flights (mil), 2023-2043

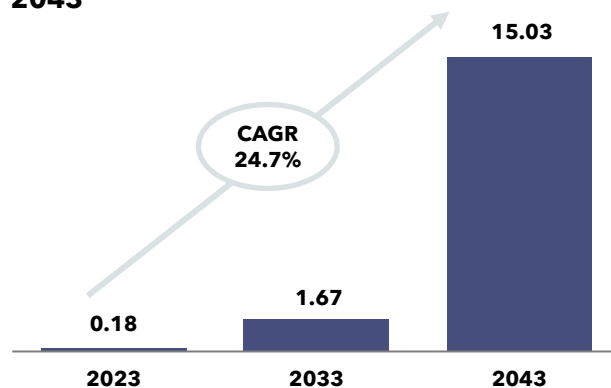
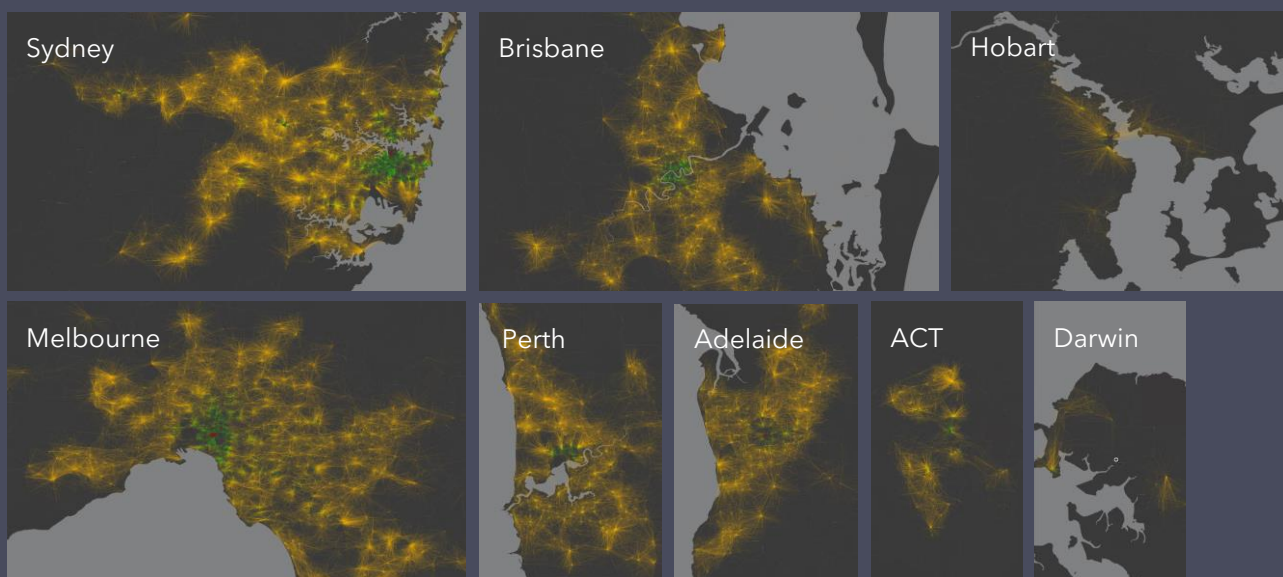


Chart 6. Annual drone flights (million) for food delivery use case, 2023-2043

Projected food delivery routes in major Australian cities



Key

— Cycle/Walk Route — Drone/Car Route

Figure 1. Maps visualising where mechanised modes (drones and vehicles) are likely to compete against cycling or walking for food delivery

The market for drone passenger transport in Australia is expected to emerge in the 2030s

In the 2030s, it is expected that passenger transportation and Advanced Air Mobility (AAM) will start to scale, catalysed by the 2032 Olympic Games in Brisbane. It is predicted that the market for air taxis will emerge from this major global event. In the years that follow, Australians should then see passenger drone transport expand to include regional air mobility and the expansion of enabling infrastructure such as vertiports. We anticipate four core types of transportation:

<p>Air Taxi</p> <p>Drones replace some of the trips currently conducted using traditional taxis, ride sharing services and limousines. Trips are typically concentrated in urban areas and are short in duration (<1 hour).</p>	<p>Regional Air Mobility</p> <p>Drones are used for regional trips such as those currently completed via regional trains, flights and buses. In later years this may involve new drone technology with increased capacity (>10 people).</p>	<p>Patient Transportation</p> <p>Drones offer the kind of transport that would currently be completed by ambulance, both in emergency situations and for inter-hospital transfers.</p>	<p>Search and Rescue Evacuation</p> <p>Drones are used in missions performed by frontline emergency services requiring evacuation, e.g. flood rescue.</p>
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Approximately 750,000 annual air taxi trips are forecast in 2043

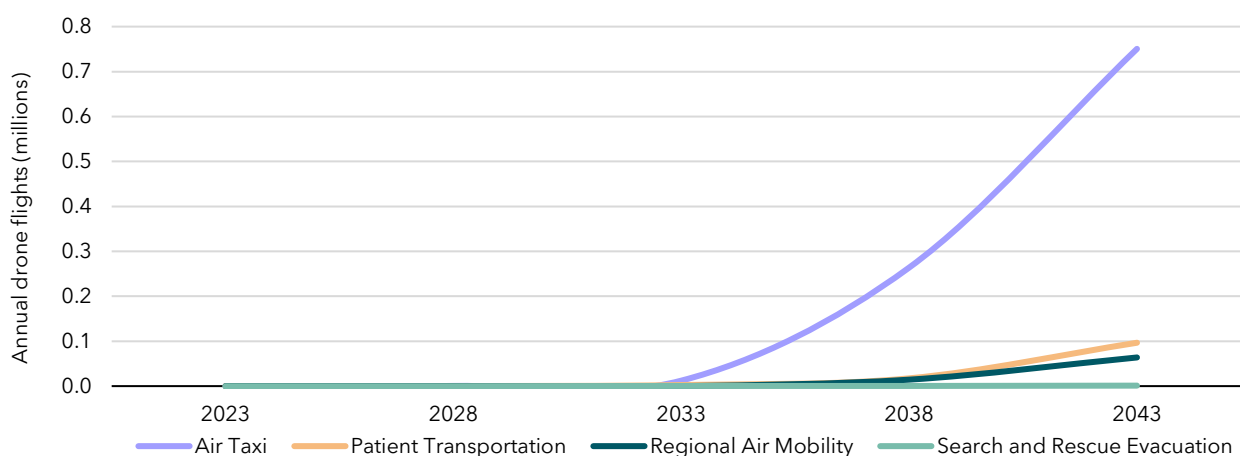


Chart 7. Annual drone flights (millions) for passenger transport subsector, 2023-2043

Timeline

- 2023** The market for uncrewed passenger transportation has not yet emerged in Australia. An Eve and Microflite partnership is expected to bring **Urban Air Mobility (UAM) to Melbourne for trials in 2026**¹.
- 2028** Uncrewed passenger transportation exists via a number of restricted pilot projects but it is not widely available to consumers. **Vertiport infrastructure has commenced construction in key cities** such as Melbourne and Brisbane.
- 2033** The **Brisbane 2032 Olympic and Paralympic Games** has accelerated the introduction of autonomous air taxis in Southeast Queensland. Industry players such as Wisk have established air taxi infrastructure in Southeast Queensland ahead of the Olympics².
- 2038** **Patient transportation and regional air mobility are expected to grow** after the air taxi industry becomes more established. This will expand the regional aviation network, **connecting rural areas to regional hubs**.
- 2043** The market for uncrewed passenger transport is well established, with **just under a million drone flights catering to passenger transport Australia-wide**, primarily as air taxis (~750,000) and for patient transport (~97,000).

1. Eve Air Mobility, *Eve and Microflite announce partnership to bring UAM services to Melbourne*, February 2022
 2. Wisk and Council of Mayors South East Queensland, *Memorandum of Understanding*, July 2022

04

**Market analysis:
other industry groups**



Other industries are expected to grow at more moderate rates than transport and logistics

This section of the report will step through each industry group. Some industry groups have existing use cases in the Australian market (e.g. in agriculture) but further enabling regulations, the ability to conduct larger-scale beyond visual line of sight (BVLOS) operations and improved unit economics are expected to accelerate adoption.

Drone flights by industry group (excluding transport and logistics)

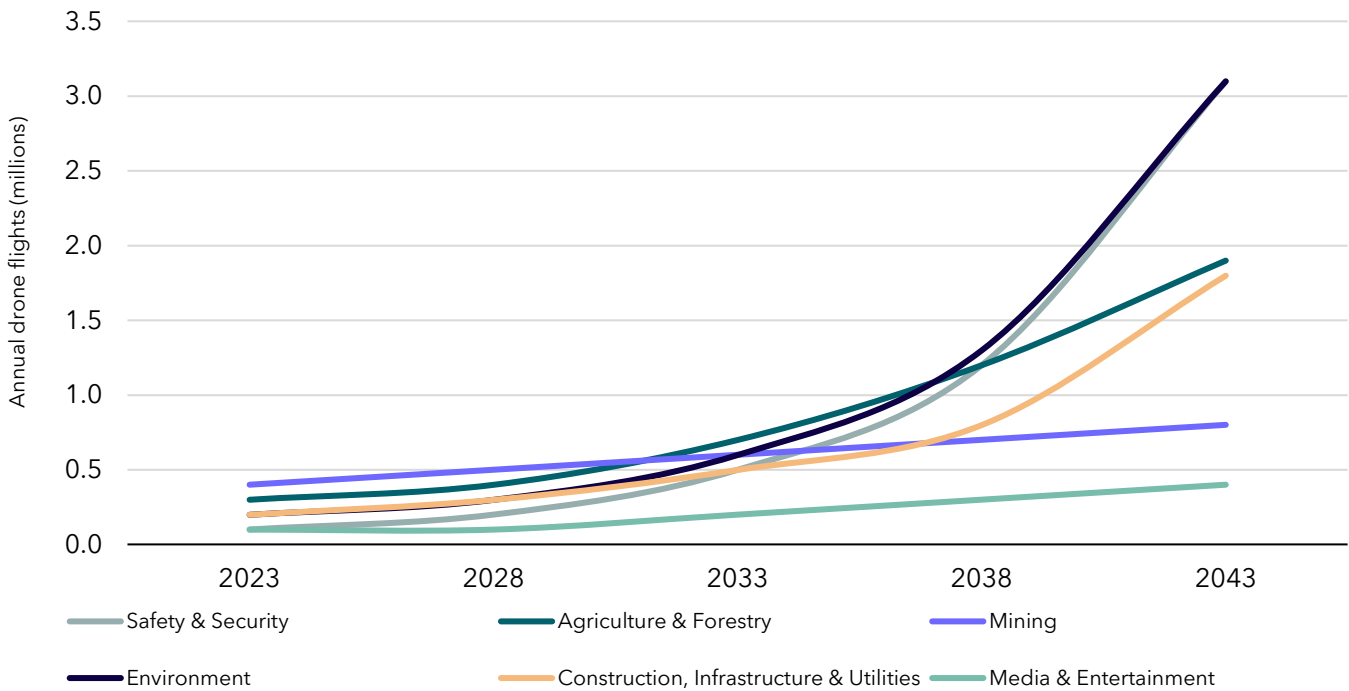


Chart 8. Annual drone flights (millions) per industry group (excluding transport & logistics), 2023-2043

By 2043....

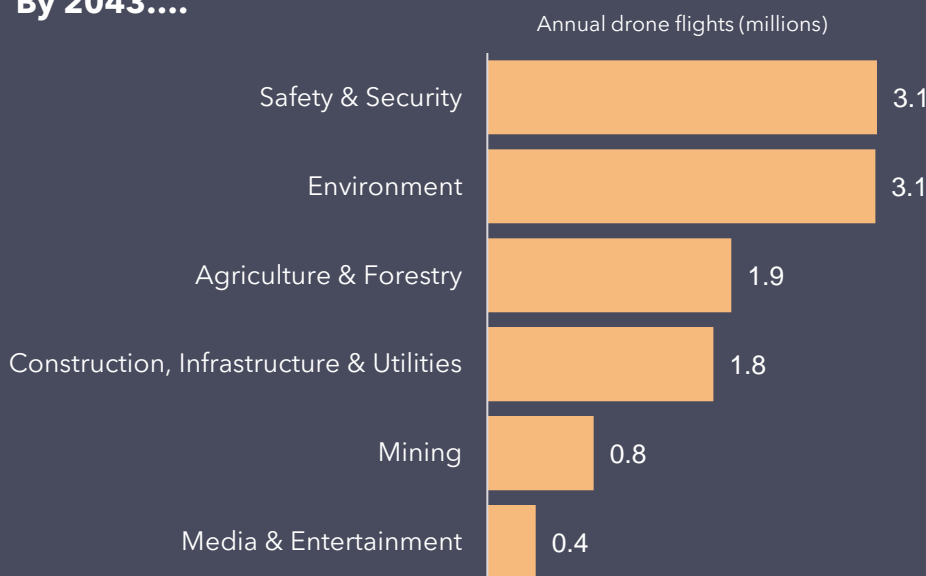


Chart 9. Annual drone flights (millions) per industry group in 2043

BVLOS explainer

BVLOS operations travel beyond an operator's sight and allow drones to embark on longer journeys with fewer human interventions, enabling larger-scale and autonomous applications. Improved ability to conduct BVLOS flights is a core enabler of market growth, as it unlocks use cases that were previously not commercially viable.

By 2043, safety and security will be the largest industry group outside of transport and logistics

By 2043, the safety and security industry group will be the largest driver of drone flights outside of transport and logistics, primarily driven by search and surveillance activities. It includes use cases from fire and emergency services, surf lifesaving, policing, border force and private security. In many of these use cases, drones will complement existing capabilities, offering service providers cost-effective search and surveillance capabilities.

Snapshot: Safety and Security

In 2023, drones are being trialled and adopted by several entities in the safety and security ecosystem. They have been used successfully by state police forces to support frontline policing operations by locating offenders and potential suspects¹, as well as supporting emergency services during the Black Summer fires in 2019-2020². It is expected that drone flights in safety and security will grow at a compound annual growth rate (CAGR) of 18.2% from just over 100 thousand to over 3 million over the next twenty years, as they become increasingly cost effective and capable.

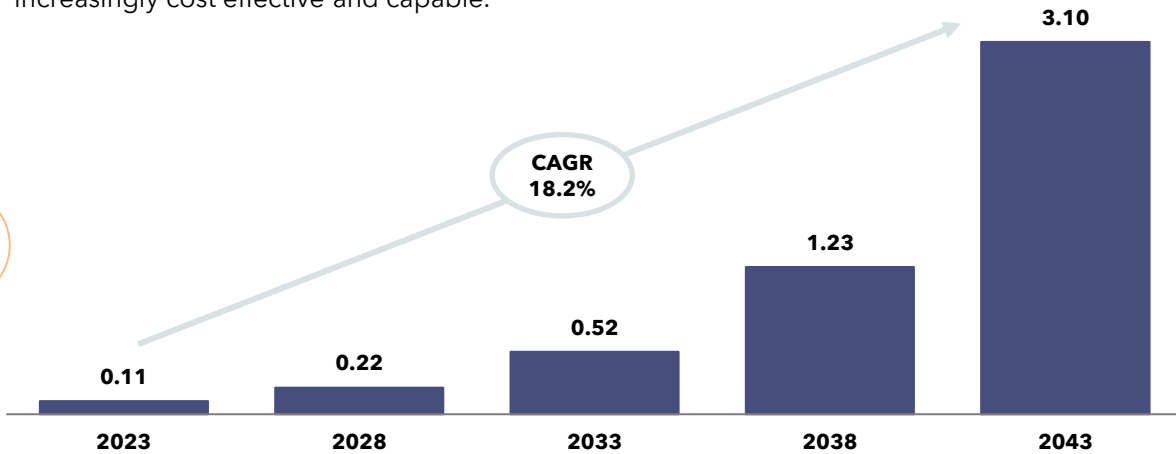


Chart 10. Annual drone flights (millions) for safety and security industry group, 2023-2043

It is expected that by 2043 drones will be closely integrated with existing systems, for example, every fire truck or every surf lifesaving club will be equipped with drone units to support their operations. Other use cases include disaster response in terms of situational awareness and post-disaster mapping, beach safety monitoring, shark management, event surveillance, private security surveillance activities and others.

Surf life saving case study

Australia has a well-established beach culture, with approximately 600 patrolled beaches, 190,000 members of Surf Lifesaving Clubs and 8,916 rescues in 2021 alone³. Given the size and scale of surf life saving operations drones can assist in patrolling and monitoring.

Drones have been in operation providing this assistance for more than five years. For example, the Ripper Group and its 'Little Ripper Lifesaver' drone participated in its first rescue event in 2018, supporting the rescue of two teenagers at Lennox Head. The 'Little Ripper' Drone has evolved over time, adding new capabilities that expand its operational envelope and demonstrate the utility of drones in safety and security applications⁴.



1. Nine News, *How drones are changing the face of policing in Australia*, April 2021

2. The Guardian, *Send in the drones: how to transform Australia's fight against bushfires and floods*, November 2022

3. Surf Life Saving Australia

4. Ripper Corp.

Use of drones for environmental purposes is expected to grow rapidly with a 15% CAGR

The environment and agriculture industry groups are also expected to experience growth in drone flights. The adoption of drones in the environmental industry group is in its nascent stages but is expected to grow rapidly in response to societal trends in environmental awareness. In the agricultural industry group, drones have more widespread adoption and moderate growth is expected due to technological improvements making new use cases feasible.



Snapshot: Environment

Environmental use cases for drones focus on the monitoring of protected areas and wildlife, monitoring of the environmental impacts of industry and reforestation and rehabilitation activities.

When it comes to environmental use cases, annual drone flights are expected to grow from over 188,000 in 2023 to over 3 million by 2043, at a CAGR of 15%.

This rapid growth is expected in response to increased environmental consciousness and demand for environmental mapping and monitoring by both private industry (e.g. mining) and government entities such as national parks services.

A 15% CAGR is expected in response to increased demand for environmental services

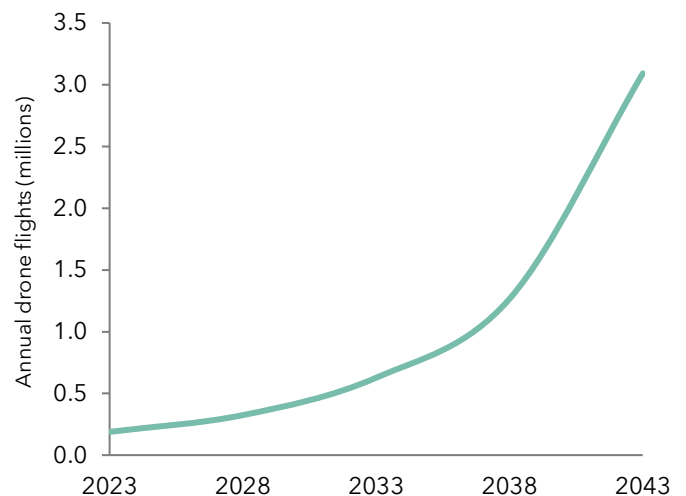


Chart 11. Annual drone flights (millions) for the environmental industry group, 2023-2043



Snapshot: Agriculture

Agriculture is one of the more mature industries with respect to drone adoption, as the technology brings improved accuracy, efficiency, and ease of use compared to traditional methods. Current use is particularly focused on the monitoring of crops, livestock, and private infrastructure (e.g. fences).

Within agriculture, drone flights are expected to grow from just under 275,000 to over 1.9 million over the next twenty years with a CAGR of 10.3%. A more moderate growth rate is expected for this industry as it is more established, this is also reflected through the relatively large number of flights in 2023, second only to mining.

Growth in this industry is expected to be driven by improvements in drone technology which enable uses other than monitoring, such as livestock handling, crop seeding, and spraying become more commonplace.

In this established industry, growth is expected as more complex use cases become feasible

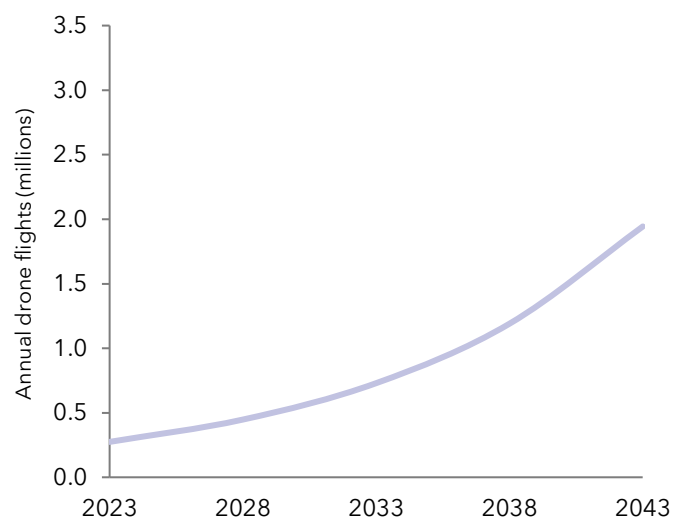


Chart 12. Annual drone flights (millions) for the agriculture industry group, 2023-2043

Expansion in construction, utilities & infrastructure will largely be driven by inspections

Growth in the construction, infrastructure and utilities industry group is driven largely by inspection activities, e.g. inspection of roads, bridges and wind turbines. It includes use cases from energy, water, waste, telecommunications and other built infrastructure. It also includes construction monitoring use cases from across these industries.

Approximately 1.8m flights are forecasted for 2043, driven largely by inspection activities

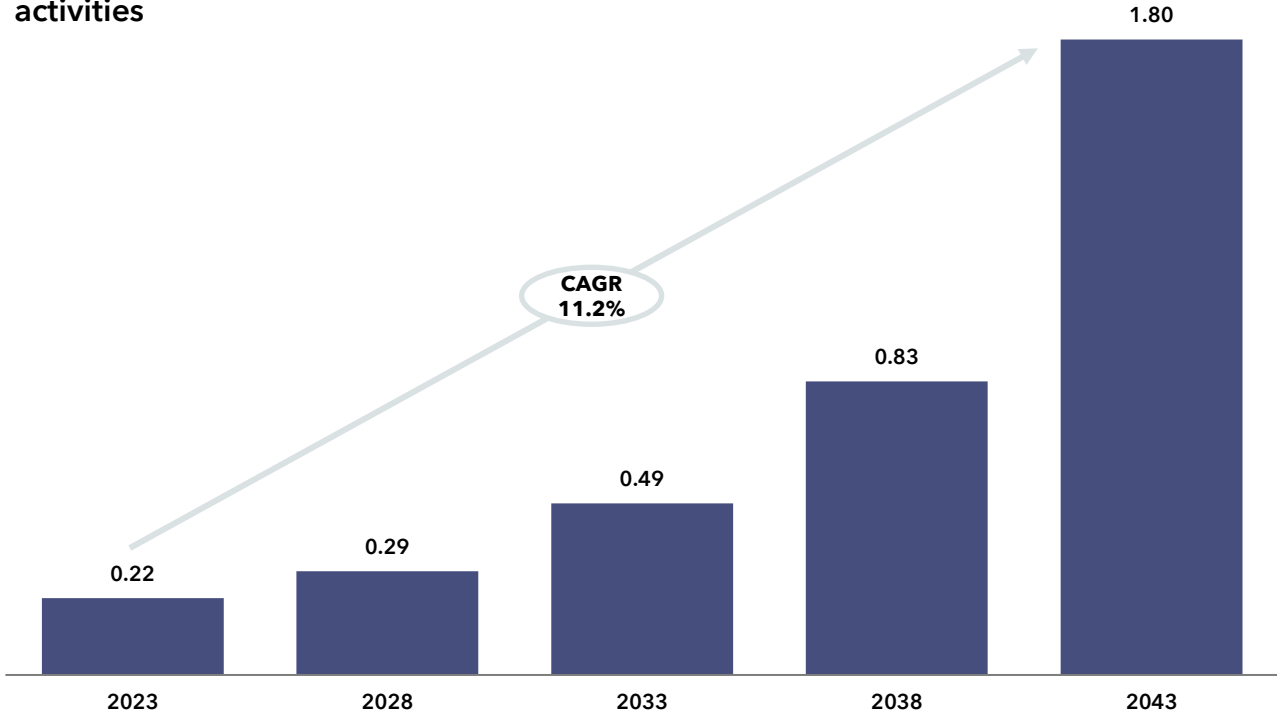


Chart 13. Annual drone flights (millions) for construction, infrastructure and utilities industry group, 2023-2043

Mapping, inspection, and monitoring of infrastructure assets is an established industry in Australia. Australian construction, infrastructure, and utilities companies have been investing in drones and drone pilots for a significant period of time. For example, Telstra was employing drones to inspect their mobile towers as early as 2016¹.

Australia is also already home to a number of drone companies that specialise in drone infrastructure inspection, offering this service for a variety of infrastructure types (e.g. water utilities). It is expected that the number of third-party service providers will increase over time.

As these business models develop, we anticipate an increase in efficiency, reducing the number of flights and drones required to complete inspections. However, it is also expected that as the costs of inspection are reduced, there will be an increased demand for more frequent inspections, (e.g. inspecting once per month rather than once per year), enabling decisions that improve safety outcomes such as pre-emptive maintenance. Therefore, flights overall are still expected to increase.



1. Telstra, *Response to Senate Inquiry on safe use of drones*, December 2016

Industries like media & entertainment and mining have well established drone use cases

Both the mining and the media and entertainment industry groups already employ drones for a variety of uses. Mining in particular has been an early adopter of drone technology. Media and entertainment presents a novel use case in the form of drone shows; a number of which have already occurred in Australia during large events.



Snapshot: Mining

Australian mining companies have been early adopters of drone technology, using drones for surveying and mapping, monitoring and inspection, and for site safety and surveillance.

Annual drone flights are expected to grow from just under 415,000 in 2023 to over 847,000 by 2043, a CAGR of 3.6%.

The relatively moderate growth rate is expected due to this being a more established drone industry with high rates of current-day adoption. This is reflected through mining having the largest number of flights of any industry in 2023.

Use of drones in mining is well established, reflected in the ~0.4m flights in 2023

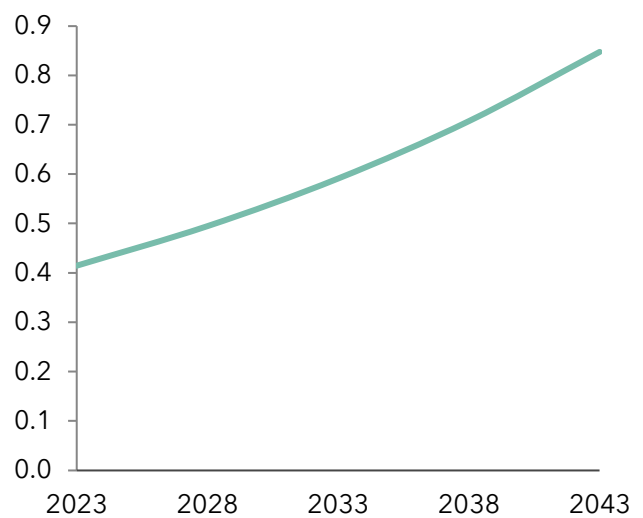


Chart 14. Annual drone flights (millions) for mining, 2023-2043



Snapshot: Media & Entertainment

The media and entertainment industry group consists of use cases such as aerial videography and broadcasting, as well as drone entertainment via drone shows.

Annual drone flights are expected to grow from just under 80,000 in 2023 to over 384,000 by 2043, at a CAGR of 8.2%. Drones are already being used in the media and entertainment industry in Australia, but it is expected that technological improvements such as increased capacity and battery life will facilitate industry growth.

It is important to note that, in this analysis, one drone show is only considered to be one 'flight', despite it potentially having 500+ drones complete take-offs and landings throughout. This decision was made to avoid distorting the distribution of flights between industry groups.

A moderate rate of growth is expected in media and entertainment due to technological improvements

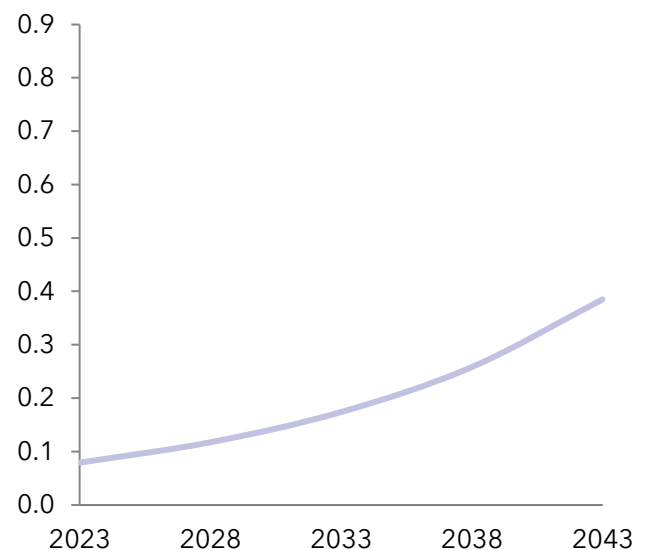


Chart 15. Annual drone flights (millions) for the media and entertainment industry group, 2023-2043

05

**Ready for growth:
the drone**

ecosystem in Australia

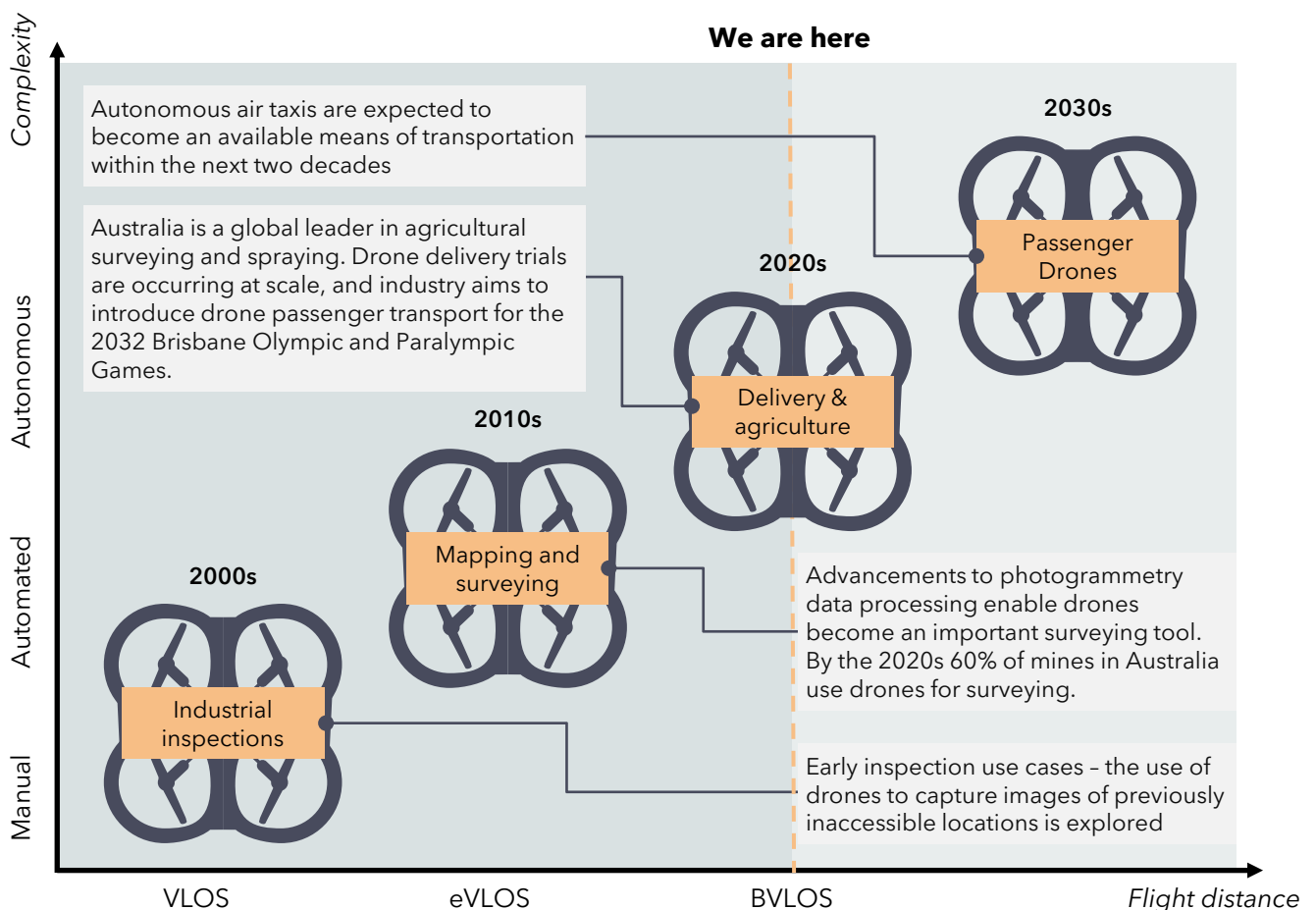


The drone industry in Australia is at an inflection point...

Today, technology and the rate of innovation are the primary drivers of drone industry growth. Superior sensors, better navigation systems, improved battery performance, more effective propulsion systems, and enhanced automation capabilities all act as technological tailwinds that spur growth in the ecosystem – it is now cheaper, faster and safer to conduct operations via drones.

The Australian drone industry has developed significantly in the last two decades. Today, drones are widely used in the agricultural and mining industries, with a significant number of mines adopting drones for surveying and mapping. In addition, trials of food and goods delivered by drones are already underway¹, with in excess of 120,000 trips per year taking place in trial areas². Further, Wisk and the Council of Mayors South East Queensland have signed a Memorandum of Understanding to bring electric air taxis to Queensland for the 2032 Olympic and Paralympic Games³.

The drone industry in Australia is at an inflection point: demand for drone applications is increasing, and key technology and regulatory changes (e.g. beyond visual line of sight (BVLOS) operations, autonomous drones and management systems) are poised to accelerate the pace of industry growth over the next decade.



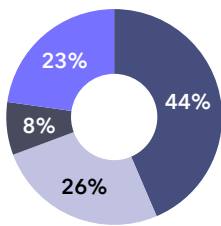
1. Australian Financial Review, *Australia emerges as major drone delivery market*, April 2023
 2. Wing, *Wing and Mirvac team up to transform Australian urban retail spaces into drone delivery hubs*, October 2022
 3. Wisk and Council of Mayors South East Queensland, *Memorandum of Understanding*, July 2022

... our market scan indicates it is poised for significant growth

In order to better understand the Australian drone industry and calibrate growth projections, PwC (prior to the establishment of Scyne Advisory) conducted a survey of 80 market participants on behalf of Airservices Australia. Our findings suggest that the Australian drone industry is well-positioned for future growth, having established a solid base of small businesses, the majority of which have ambitions for rapid growth and maturation in both the near and long term.

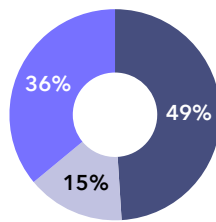
The Australian drone industry is mostly made up of small but well established businesses, creating a solid base for scaling operations to meet future demand.

Full time employees



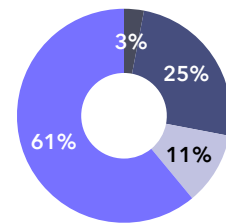
■ 1-10 ■ 11-50 ■ 51-100 ■ 100+

Area of operations



■ Australia only
 ■ Asia Pacific, including Australia
 ■ Global, including Australia

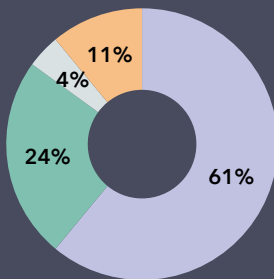
Years in the market



■ <1 year ■ 1-3 years ■ 4-5 years ■ >5 years

This industry has ambitions to rapidly grow and mature in the next five years, with 70% of respondents expecting to expand their drone fleets considerably over the next two decades.

Anticipated years for business to reach maturity



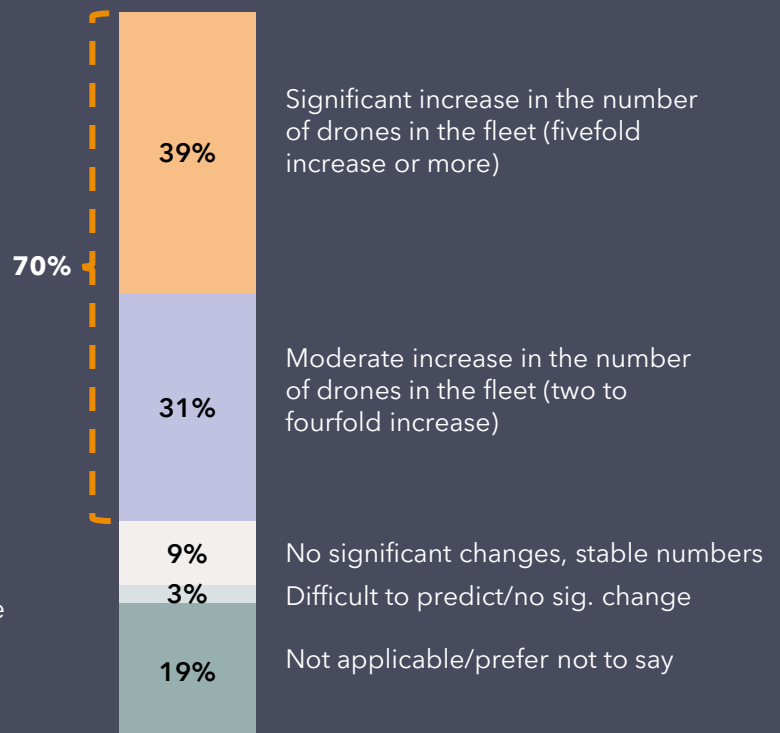
■ 1-5 years ■ 6-10 years ■ 11-15 years ■ No response

Main organisational priority over the next five years

41%

of respondents said their **main organisational priority** over the next five years was **expanding their offered services and products**

Anticipated change in organisational fleet over the next 20 years



... but industry and government must collaborate to overcome key challenges and unlock this growth

Our market analysis reveals that there is significant potential for the growth of the drone market in Australia. However, there are challenges that need to be overcome in order to enable sustained growth over the next two decades.

Uncrewed Aircraft System (UAS) regulations

Industry participants in our research indicated that compliance with **regulation was the most significant challenge** for organisations in the drone industry. Moving forward, government needs to collaborate with industry to develop regulation that supports industry growth, especially as BVLOS operations and autonomous systems are priorities of the Australian market. Regulations will need to be carefully calibrated to ensure that industry growth is supported while balancing safety and equity concerns within the airspace.

Community acceptance

As drones become a common sight in our skies, community acceptance will play a large role in the **pace and scale of the market's growth**. As more and more drones fly in populated areas, drone safety, privacy, and noise concerns will become top of mind for citizens. The public needs to see the tangible value of the technology and be convinced that the regulatory and safety mechanisms put in place are sufficient for them to trust the advancement of drones in day-to-day life. Getting this right will require a **strategic and concerted effort from both government and industry**.



Development of UTM

To safely achieve scale within the market, critical infrastructure such as a UTM system will be required. UTM will enable an environment where drones (in large numbers) can operate in shared airspace, avoiding collisions, and maximising efficiency while still protecting the safety and privacy of airspace users and the community. Our research revealed that most respondents believe **the majority of UTM services should be delivered in a hybrid model, involving both government and industry**. This is aligned with Airservices Australia's current commitment to delivering a Flight Information Management System, which will form the backbone of a federated service delivery model for UTM.

Our research found that **one of the largest current challenges respondents faced when doing business, was meeting appropriate risk mitigations for BVLOS flights**. It is particularly difficult to mitigate risks in the current environment as there is no UTM system, which would offer more certainty around tracking, deconfliction and risk assessment. In fact, **85% of respondents who operate drones indicated they would be more likely to operate BVLOS flights if risk mitigations were available through a UTM**.

These challenges cannot be addressed by industry alone, but will require close and ongoing collaboration between industry, government and the community. The Australian drone industry is at a critical point, there is enormous potential for investment and growth over the next twenty years. It is essential that government act now, working in partnership with industry and the community to develop, test and introduce both regulatory frameworks and services, such as UTM, that will enable safe and equitable market growth

06

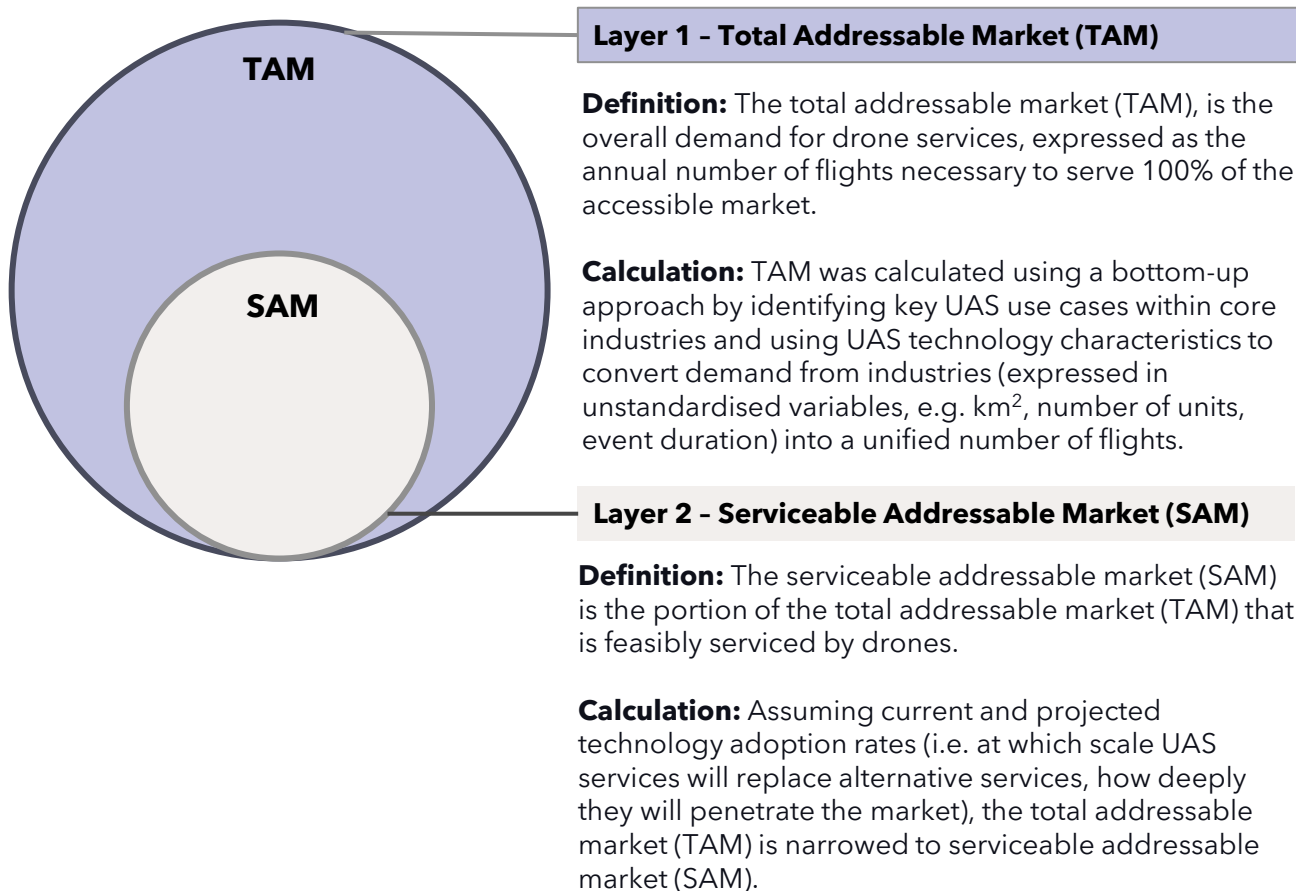
Appendices



Our market sizing methodology involved the systematic narrowing of the potential market size to the actual market size

To present an accurate market sizing, it is crucial to integrate carefully selected methodology with extensive and well-rounded research, and industry and operational expertise.

The methodology for market sizing involves the systematic narrowing down of the potential market size to the actual market size. Starting with an estimation of the total potential demand for UAS services, segments of the market (at a use case level) that cannot be effectively targeted or served are excluded. This process results in a refined and accurate representation of the real market size.



Sources of knowledge

The report is based on comprehensive industry and operational expertise, market research, and considers a wide range of current and future market factors. The main sources of this analysis are: market size quantitative modeling, global industry benchmarks, industry announcements, external expert interviews, internal expert knowledge, broad desktop research and industry reports.

To conduct our bottom-up analysis, use cases were developed for each industry group

As this market analysis was conducted using a bottom-up approach, a number of use cases were selected and organised into industries and subsectors. The process of selection was based on extensive market research, statistical analysis and expert knowledge.

Industry Groups	Sub-sectors	Example Use Cases (non-exhaustive)
Transportation & Logistics	<ul style="list-style-type: none"> • Passenger transportation • Goods delivery 	<ul style="list-style-type: none"> • Air taxi, regional air mobility, patient transportation and search and rescue evacuation • Medical goods: Blood delivery, medicines delivery, pathology samples delivery and emergency supplies • Non-medical goods: Food delivery, grocery delivery, last-mile delivery, first-mile and mid-mile delivery
Safety & Security	<ul style="list-style-type: none"> • Fire and emergency services • Policing • Border Force • Private security • Surf live saving 	<ul style="list-style-type: none"> • Surveillance support during fire incidents and fire control, situational awareness and post-disaster mapping, maritime incidents support • Surveillance support during large events, patrolling support • Routine border surveillance • Private security patrolling • Beach monitoring and shark management, lifebuoy delivery
Environment	<ul style="list-style-type: none"> • National parks • Reforestation • Private sector environmental protection 	<ul style="list-style-type: none"> • Protected areas mapping & monitoring and wildlife monitoring • Pre-planting mapping, tree seeding and tree spraying • Monitoring of industrial impact on environment, soil rehabilitation and revegetation
Agriculture	<ul style="list-style-type: none"> • Crop production • Forestry • Livestock 	<ul style="list-style-type: none"> • Crop and soil monitoring, drone seeding and drone spraying • Forest plantation monitoring • Livestock monitoring and handling
Construction, Infrastructure & Utilities	<ul style="list-style-type: none"> • Construction monitoring • Built infrastructure • Oil & gas • Power generation, storage & distribution • Water utilities • Waste management • Telecommunications 	<ul style="list-style-type: none"> • Surveillance of infrastructure object under construction • Built infrastructure objects inspection (e.g. bridges, roads) • Surveillance/mapping of exploration area before drilling and pipeline monitoring • Inspection of power generation, storage and distribution objects (e.g. powerlines) • Inspection of water desalination and storage facilities, pipelines • Landfill mapping • Inspection of telecommunications towers
Media & Entertainment	<ul style="list-style-type: none"> • Media • Entertainment 	<ul style="list-style-type: none"> • Drone footage for TV production and advertising • Drone shows
Mining	<ul style="list-style-type: none"> • Mining 	<ul style="list-style-type: none"> • Excavation mapping • Inspection of mining assets

Current markets were used to calculate the total addressable market (TAM)

Use cases within each industry and sub-sector used existing or analogous current markets as the basis for demand calculations.

Industry Groups	Sub-sectors	Example Current Markets Relevant for UAS Demand
Transportation & Logistics	<ul style="list-style-type: none"> • Passenger transportation • Goods delivery 	<ul style="list-style-type: none"> • Conventional taxis & ride sharing, regional flights, train & bus, ambulance & hospital transfers, police/emergency services search & rescue evacuations • Medical goods: Blood banks, prescription medications, pathology laboratories, post disaster supplies distribution • Non-medical goods: Food delivery, grocery delivery, e-commerce deliveries
Safety & Security	<ul style="list-style-type: none"> • Fire and emergency services • Policing • Border Force • Private security • Surf live saving 	<ul style="list-style-type: none"> • Fire incidents in cities and towns, bushfires, natural disasters, e.g. floods, earthquakes • Police patrolling, large public event safety, search and rescue operations • Area of exclusive economic zone • Current contracted operations for private security • Surf life saving patrols, shark monitoring activities
Environment	<ul style="list-style-type: none"> • National parks • Reforestation • Private sector environmental protection 	<ul style="list-style-type: none"> • Conservation areas (e.g. national parks, marine parks) • Reforestation activities • Area affected by industrial activities
Agriculture	<ul style="list-style-type: none"> • Crop production • Forestry • Livestock 	<ul style="list-style-type: none"> • Crop farming area • Forest plantation areas • Active grazing areas, livestock numbers
Construction, Infrastructure & Utilities	<ul style="list-style-type: none"> • Construction monitoring • Built infrastructure • Oil & gas • Power generation, storage & distribution • Water utilities • Waste management • Telecommunications 	<ul style="list-style-type: none"> • Construction project sites • Infrastructure area (e.g. roads, bridges) • Electricity substations, powerlines, solar farms, wind farms • Area of water storage assets (e.g. dams), water desalination plants, pipelines • Landfill sites • Telecommunications towers • (All) inspection/monitoring companies
Media & Entertainment	<ul style="list-style-type: none"> • Media • Entertainment 	<ul style="list-style-type: none"> • Videography, film making, events broadcast • Public events, drone shows
Mining	<ul style="list-style-type: none"> • Mining 	<ul style="list-style-type: none"> • Surface mining area, exploration area, mining assets

Current markets were used to calculate the total addressable market (TAM)

To convert the total addressable market (TAM) into the serviceable addressable market (SAM), use cases were assessed in terms of current industry adoption, potential future adoption rates, expected technology developments, possible barriers and enablers, and other case-specific industry research.

Australian Industry Insights and Trends

Industry Groups	Current Insights	Future Trends (10+ years)
Transportation & Logistics	<ul style="list-style-type: none"> • Ca. 200-300k drone deliveries in Australia today • Two current key market players 	<ul style="list-style-type: none"> • In 10+ years, air taxis are expected to emerge commercially • As infrastructure and relevant aircraft are developed the services will scale
Safety & Security	<ul style="list-style-type: none"> • Law enforcement and emergency services are utilizing drones as regular tools • Trials and R&D currently occurring in Australia for beach and shark management 	<ul style="list-style-type: none"> • Deployment of autonomous solutions would increase the level of adoption in cases such as monitoring, patrolling and detection of threats
Environment	<ul style="list-style-type: none"> • Drones are currently being used by government entities to monitor and map protected areas and species • Adoption is largely limited to trials and R&D 	<ul style="list-style-type: none"> • Regulatory requirements for ESG as well as operational optimisation can cause up to 10x growth of drone technology adoption
Agriculture	<ul style="list-style-type: none"> • Australian agricultural companies have been relatively early adopters of drone technology; surveys of Australian farmers indicate that up to 1/3 expect to use drone technology in the next five years¹ 	<ul style="list-style-type: none"> • Adoption will increase for more complex use cases such as livestock handling as technology improves, particularly with increasing levels of autonomy
Construction, Infrastructure & Utilities	<ul style="list-style-type: none"> • Drones are being adopted in infrastructure inspections and monitoring, a mixture of third party providers and companies conducting their own inspections • The operations are performed in manual or semi-automated mode 	<ul style="list-style-type: none"> • Increasing levels of autonomous solutions and efficiency benefits can drive adoption rates up to 90-100% in 20 years for inspection and monitoring use cases
Mining	<ul style="list-style-type: none"> • There is a high level of drone adoption in mining, according to a 2022 GlobalData survey 75% of mines in Australasia have fully invested or made a considerable investment in drone technology² 	<ul style="list-style-type: none"> • While adoption is still expected to increase, this increase is expected to be moderate considering high initial rates of adoption
Media & Entertainment	<ul style="list-style-type: none"> • Main markets are TV production and cinematography • The level of entry is fairly low for operators to use drones in video production • Drone shows exist but the market is continuing to develop 	<ul style="list-style-type: none"> • Sports broadcasting and drone shows are key expected trends to grow • Up to 90% of key events and video production would include drone footage in 20 years

1. Future Trends in UAV Applications in the Australian Market, 2023, <https://www.mdpi.com/2226-4310/10/6/555>

2. Validating the benefits of increased drone uptake for Australia: Geographic, demographic and social insights, 2023, <https://www.drones.gov.au/sites/default/files/documents/validating-the-benefits-of-increased-drone-uptake-for-australia-final-report.pdf>

Drone technology assumptions were also used to inform SAM calculations

To convert the TAM into the SAM, use cases were assessed in terms of current industry adoption, potential future adoption rates, expected technology developments, possible barriers and enablers, and other case-specific industry research.




UAS	UAS type	Typical use case
Automated drone system	Multi-rotor autonomous	Automated inspection
Cargo drone (VTOL)	VTOL	Cargo transport
Fixed-wing	Fixed-wing	Mapping
Fixed-wing advanced	Fixed-wing	Mapping
Fixed-wing advanced linear	Fixed-wing	Mapping
Fixed-wing linear	Fixed-wing	Mapping
Heavy-lift cargo drone	VTOL	Cargo transport
Multi-rotor advanced	Multi-rotor	Mapping
Multi-rotor firefighting	Multi-rotor	Firefighting
Multi-rotor linear	Multi-rotor	Mapping
Multi-rotor linear specialized	Multi-rotor	Mapping
Multi-rotor SAR (for livestock)	Multi-rotor	SAR
Multi-rotor specialized	Multi-rotor	Mapping
Passenger drone	Passenger	Passenger transport
Seeding drone	Multi-rotor	Agriculture
Spraying drone	Multi-rotor	Agriculture
Tethered	Tethered	Private and public security
VTOL mapping drone	VTOL	Mapping
Light show drone	Light show	Light show
Autonomous surveillance system	Multi-rotor autonomous	Autonomous surveillance
Reconnaissance UAS	Fixed-wing	Reconnaissance

Cross-Industry Technology Trends

Passenger Drones Capacity	Payload Increases	Battery Life	Increasing autonomy
Air taxis would continue to serve limited groups (2-4 people), but regional air mobility aircraft are expected to carry up to 20-40 people in 20 years	Payloads for food delivery drones expected to increase, currently, average payload is 2-3 kg, reaching 10 kg in 2043 which fully serves the demand	Battery life will improve 2% per year over the next 20 years, increasing potential flight duration and distance	The level of autonomy for repetitive tasks (e.g. inspections) is expected to grow. "Drone in a box" solutions will affect the applicability rates from current 20-30% up to 90-100%

Three categories of assumptions informed the analysis behind market sizing calculations

The assumptions used to create and enhance the model consist of regulatory, market growth and use case assumptions, all used simultaneously in order to narrow down the margin of error and enhance the model's accuracy.

	Description	Key Output
 Use case assumptions	Assumptions about each application including drone types used, areas covered, and utilisation of drones	<i>(Mathematical)</i>
 Market growth assumptions	Assumptions on market growth and limitations are calculations based on benchmarks, global trends and growth metrics	Detailed Market Sizing
 Regulatory assumptions	Regulatory assumptions are the underpinning enablers or limitations in the external environment that are assumed to be in place in the target state. These assumptions are considerations for the report but do not directly affect the calculations.	<i>(Non-mathematical)</i>

Regulatory assumptions underpin the approach to modelling but do not directly impact numbers within the model

The first level - regulatory assumptions - is strictly theoretical and prevents the model from including any actions that could be considered unrealistic and/or illegal either in the present or the future or influence the market environment in any way

Regulatory assumptions

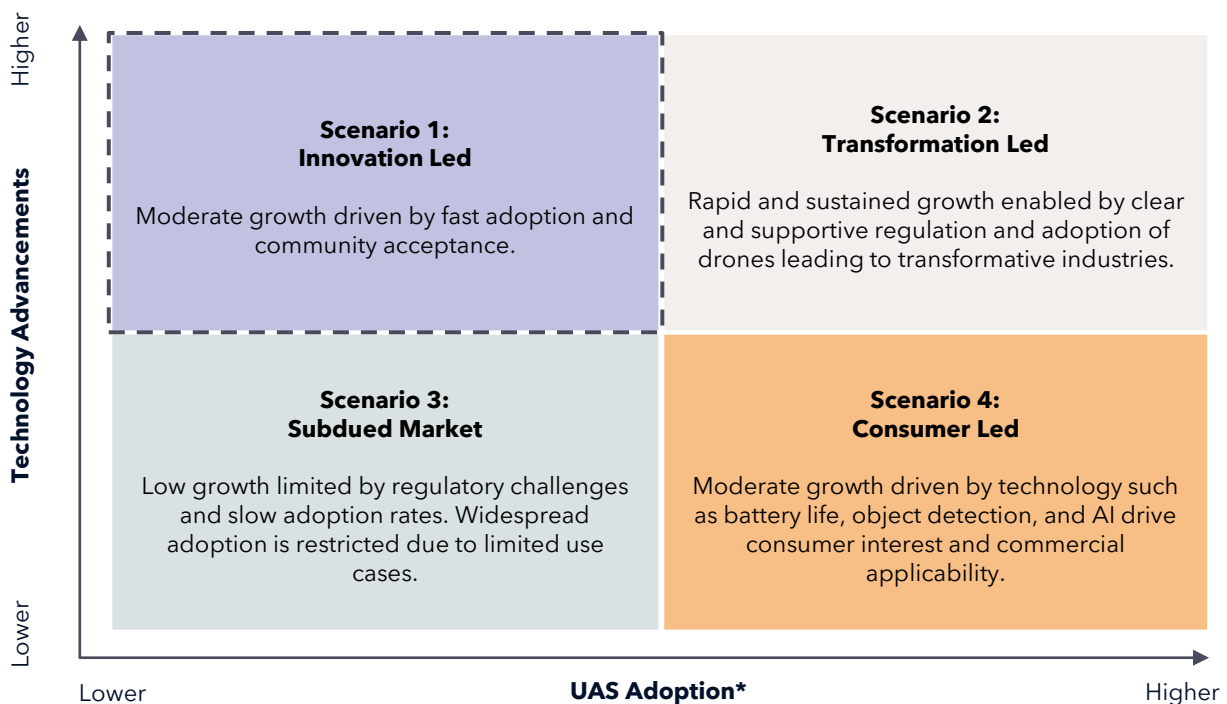
Assumption	Assumption Description
Regulation	It is assumed that regulatory frameworks will not limit the technology adoption, enabling for an organic growth of drone industries during the assessed 20 years period
Service Delivery	Both government and industry deliver services delivered in the UTM ecosystem
Pricing	Pricing for services has been accepted and does not negatively impact industry growth
Constraint Management	There are no additional constraints (e.g. that limit UAS operations) placed on airspace over and above those that exist through the current constraint management processes
Registration	A method to register commercial and recreational UAS is in operation and does not negatively impact market growth
Remote ID	The method for Remote ID has been agreed and implemented, creating the required level of electronic conspicuity
Communication ¹	Communications networks (including navigation, surveillance and information exchange) can provide the reliability, maintainability and availability required to enable UTM operations
Ecosystem ¹	There is an active USS market with a range of service offerings that enables market participation and growth

1. Enabling assumptions

Another core assumption was which growth scenario best described the Aus. drone industry

The three challenges mentioned in section 5 (regulation, UTM, and community acceptance), as well as technology are the key factors that influence growth, as enablers or barriers. For example, technological breakthroughs can accelerate the pace of change in the drone industry, whereas a slowdown in development can have the opposite effect. Based on this, we have developed four broad growth scenarios, the most realistic of which anticipates a steady pace of change in technological development and adoption (including regulation, UTM, community).

Potential Growth Scenarios for Australia’s Drone Industry



*UAS adoption includes regulatory clarity, community acceptance, and accompanying UAS infrastructure

Given the level of uncertainty beyond a five-year horizon and the current pace of change in the Australian industry, this model assumed an Innovation Led scenario of steady state growth over twenty years. This realistic scenario is based on what we know about ongoing investments and trials from industry, drone technology innovation globally, and anticipated adoption barriers. Enabling infrastructure such as development of the FIMS, USSs, and vertiports is also expected to drive a steady rate of UAS adoption.

Key Scenario 1 Assumptions

Technology	UTM	Regulation	Community acceptance
Technology will improve at a steady rate that does not limit the adoption of drones, but also there are no breakthroughs that rapidly accelerate market growth. Battery efficiency will improve 2% per year	The establishment of a UTM system will be a critical growth enabler, allowing the ecosystem to scale in a steady and safe manner	Regulation continues to evolve alongside the market and is implemented in a manner that does not limit market growth	Community acceptance for drones will grow over time at a rate that does not limit the expansion of the drone ecosystem

Our analysis also assumes that drone adoption will occur at different rates across industry groups

Within the innovation led scenario, it is anticipated that the commercial uptake of drones will occur within Australian industries at different rates due to industry-specific needs and challenges. It is projected it will take over a decade for half the industries in the market to fully adopt and utilise UAS technology within their operations.

The largest influences on this timeline are technological innovation and how business models adapt to adopt drones as costs reduce and the ease of implementation increases.

Early adopters are expected to be industries requiring inspections, surveying, and mapping due to lower barriers to entry. For example, within the mining industry it is relatively simple to replace manual inspections with lower-cost, higher-frequency drone operations. Often, these industries also in areas that pose low risk to the general public, as they are sparsely populated, further increasing the ease of implementation. Conversely, industries such as goods delivery must operate in areas of high population density, increasing the barriers to entry.

Adoption horizon of selected industries and use cases



Disclaimer

We prepared this report solely for Airservices Australia in accordance with and for the purpose set out in our agreed statement of work with Airservices Australia dated 26/05/2023. In doing so, we acted exclusively for Airservices Australia and considered no one else's interests.

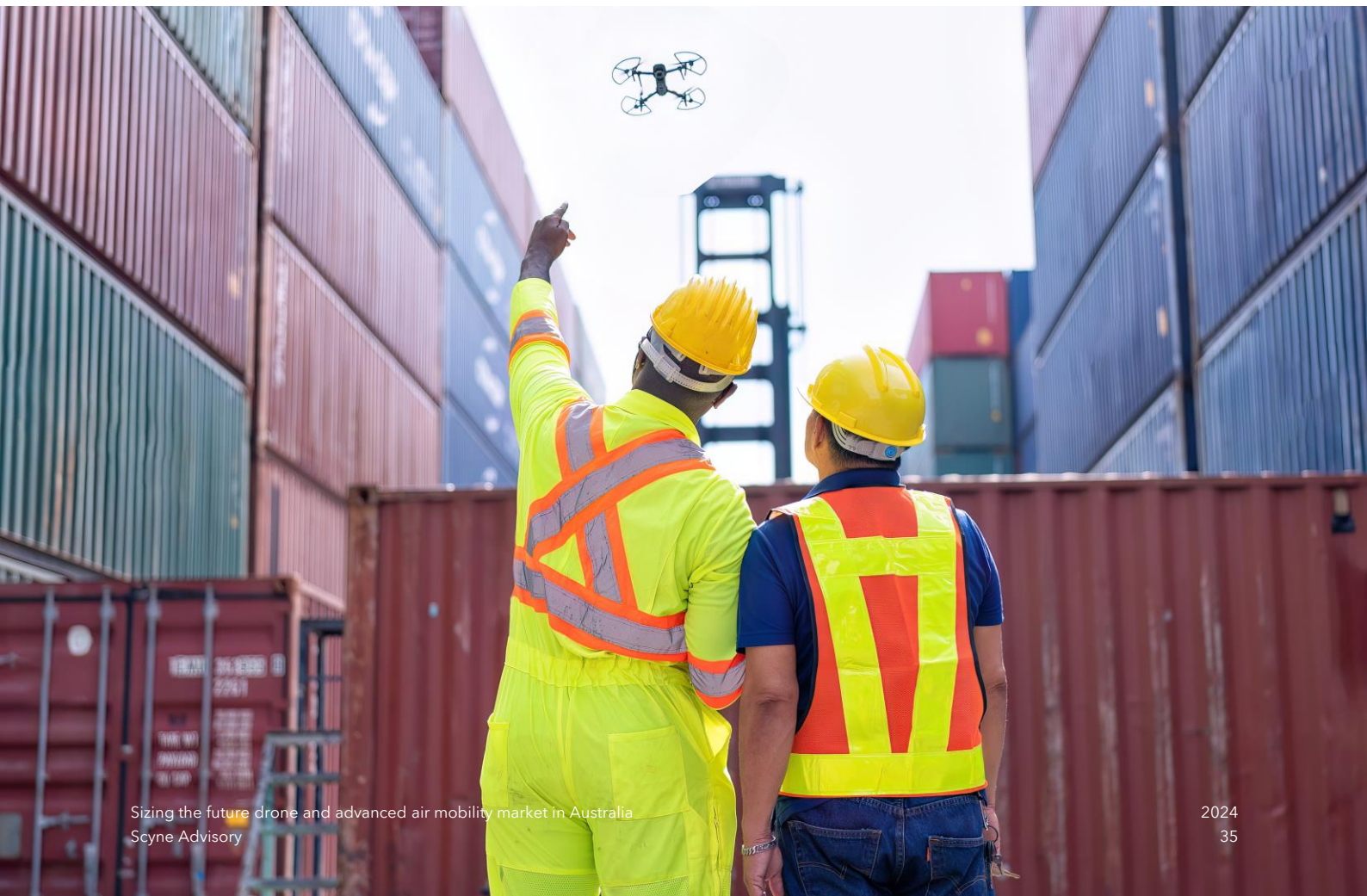
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