

Committee of the Whole (2) Report

DATE: Tuesday, September 19, 2023

WARD(S): ALL

TITLE: USE OF DRONES BY MUNICIPALITIES

FROM:

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ACTION: FOR INFORMATION

Purpose

Remotely piloted aircrafts, commonly called 'drones', have become very common in today's world, both for recreational purposes, as well as in many industries, such as film, delivery, transportation, surveillance, mapping and conflict. In Canada as of 2019, 90,000 drones were registered according to Transport Canada. This report explores these, and other emerging drone uses, along with implications and opportunities for the City.

Report Highlights

- This report looks at drone usage, regulations and potential implications for the City, enabling the City to consider how its oversight of City programs, policies and by-law enforcement may be transformed in the future.

Recommendations

1. That City Council receive this report for information.

Background

In line with the Council-approved By-law Strategy, City of Vaughan (City) staff endeavor to ensure the City's programs, policies and regulations continue to be relevant, accurate and make best use of resources and technology for efficient service delivery. This report explores the use of drones, along with regulations and potential implications.

How drones are being used today

Recreational flying

Drones have become an easily available recreational tool for private citizens operated for fun. Note that in the City of Vaughan, drones are not allowed in City Parks as per the Parks By-law's prohibitions on aircrafts, unless by City permit or approval, such as for special events or films. Drones are also subject to federal laws, summarized below.

Special Events, Filming and Photography

Persons holding special events and making films in Vaughan are required to obtain a Special Events and/or Film Permit. Staff believe drones are being used, however greater information gathering would be needed to better understand more about use.

To develop City media, the City's Corporate and Strategic Communications department already uses drones to capture Vaughan from the unique perspectives that this aircraft can provide, with filming performed by both in-house staff and external drone operators. The City's Design and Construction staff also use drones to film building construction to create time-lapped videos, showing the progression and final building.

Delivery drones

Drones are already in use for delivery of small parcels with many companies and organizations, such as Transport Canada, Amazon, Drone Delivery Canada, FedEx Corp, UPS and the ZF Group. Drone delivery has been particularly well used in remote areas, which can be otherwise difficult to get to, as well as other short-distance deliveries of small parcels. Companies have taken different approaches to delivery, including drone landing requiring the parcel to be removed, as well as the parcel being parachuted down, with no landing required.

Drones transporting people

Drone transportation of people is now a reality, being developed by several companies around the world, such as Airbus, Joby Aviation, Lillium, Terrafugia, Tetra, Uber Elevate, Urban Aeronautics and Volocopter. Uber Elevate is now aiming to launch in several cities to the south, such as Los Angeles, Melbourne and Dallas, providing transportation from suburbs to cities, touching down on "skyports" atop of buildings.

Mapping and inventory

Drones equipped with cameras and sensors have now become a common, expedient tool in mapping, topological surveying, and inventory of nature, wildlife and man-made structures, with the Regional Municipality of York (York Region) and Transport Canada already using these for some of their projects.

Hazardous environments

Drones are also improving workplace safety, replacing workers who would otherwise enter and traverse potentially hazardous environments, such as confined spaces,

locations at high elevations, underground pipes, tanks, reservoirs, bridges and multi-storey buildings. Drones are being used both to carry out inspections, as well as modified to perform tasks, with welding being one example.

Use by police and fire services

Drones have become a commonly used tool for various police agencies, such as York Regional Police (YRP), which sometimes works in tandem with Vaughan Fire and Rescue Services (VFRS). YRP's Air Support Unit uses drones for a variety of purposes, such as:

- search and rescue operations and other emergency responses;
- monitoring events;
- searching for evidence;
- to apprehend criminals;
- to create three-dimensional models, such as of collisions and crimes scenes;
- performing high-risk vehicle stops and arrests; and
- monitoring of prolonged police deployments.

YRP use different types of drones, including some with enhanced thermal imaging capabilities that can see through smoke and fire, and provide effective night monitoring. Note that YRP drones are operated out of vehicles, in which images can be seen by both the drone pilot, as well as at their command centre. Nearby fire services, such as the Town of Georgina, are using drones as well to aid in rescues over both land and water.

Elsewhere, in places like the United Arab Emirates (U.A.E.) in Dubai, staff have seen news reports that drone 'motorbikes' are being tested for use by police for travel, perhaps a precursor of what will be available in the future.

Non-emergency surveillance by the public sector

In addition to drones being used for filming events, they are sometimes used in tandem for monitoring, such as for New York City's world-famous New Year's Eve Times Square countdown. Drone usage may be a very effective means to expand the capability of enforcement staff to monitor the many dozens of special events that take place in the City every year.

A versatile agricultural tool

Drones are proving to be versatile farmworkers, being used for planting seeds, spraying pesticides, monitoring frost and crop growth, and even picking and packaging. With respect to harvesting, some drones have the ability to select which produce to pick based on colour and size, with the added advantage of being able to easily to pick high-hanging fruit.

Light shows and entertainment

Drones have expanded the ability for the night sky to be used as the canvas for entertainment, becoming a popular alternative to fireworks. Different companies have provided drone shows in the Greater Toronto Area in recent years, such as in the Town of Markham and Toronto's Canadian National Exhibition.

Building construction and site development monitoring

Drone use has expanded into the realm of putting things together, leveraging the tireless precision of machines and ability to place things in hard-to-reach positions, as well as paint and assemble materials. Drones are also being used to monitor site alteration in Whitchurch-Stouffville.

Energy generation through wind power

Another emerging area is the use of drones to serve as mobile 'wind turbines', harnessing the energy of the wind to generate energy.

Military use during conflict

In today's news stories about global war and conflict, it is very common to hear about the use of drone weaponry, both by military and civilian groups involved. In review of the BBC audio documentary [Year of the Drone](#), some key takeaways were that:

- drones are a very common tool used in war; and
- where there is war, there is often a very visible presence of armed drones.

As such, if greater use of drones were to be considered in everyday life, it would be important to consider the impact this may have on perception of safety.

Trends and changes

Bigger drones are coming

The world is seeing greater use of larger drones, such as in the areas noted above, such as for larger parcel delivery, transport of people, and for use in warfare and security. In Canada, the Canadian federal government is considering changes to the *Aeronautics Act* to regulate the use of larger drones and their pilots.

Minimizing opportunities for disease transmission

During pandemics and times where social distancing is required, drones can be an effective tool to deliver goods while minimizing human contact and potential disease transmission.

Use of airspace

As explored below, the use of airspace above our heads is regulated, such as that drones are prohibited from being flown below 122 m (400 ft), within 30 m of other people (98 ft) or 1.9 km from heliports or 5.6 km from airports on controlled space.

As well, in places where drone flight is not allowed, drone pilots may receive an alert advising that they may not fly somewhere or see that their drone may be prevented taking off or flying entirely by an invisible “geofence” barrier. As the utility and volume of drones increase, Transport Canada predicts that the corresponding rules will evolve as well.

Architectural design and navigation

As drones become more prevalent, this may change how people think about entrances and exits, in which building entry and exit, and delivery and pick up may no longer be just on the ground. This may lead to more building to accommodate this, such as areas for landing, access and egress and deliveries on the tops and sides of buildings.

At present, people around the world are accustomed to using GPS systems to navigate on the two-dimensional plains of our roads. Perhaps in the future, your deliveries can skip the front door and hone in on a point on your condominium balcony or signal on your phone, changing your front door to one several storeys in the sky, or where you happen to be standing!

Vaughan’s Transportation Innovation Program

The Infrastructure and Corporate Asset Management Department received support from Council in June 2023 for creating the Transportation Innovation Program (TIP) in Vaughan, to foster innovative and/or emerging transportation technologies that align with the City’s Vaughan Transportation Plan, which will allow the testing of a variety of transportation technologies.

Acts, regulations and by-laws

While drone operation is largely governed by Canadian federal regulation through the Transport Canada agency, there are a number of regulations and by-laws that govern drones, summarized below.

Table 1 – Acts, regulations and by-laws

NO	ACTS, REGULATIONS AND BY-LAWS	RELEVANCE
1	Government of Canada Canadian Aviation Regulations (SOR/96-433)	This governs where drones can fly and whether pilot licensing and drone registration is required. Some key provisions are that: <ul style="list-style-type: none"> - The pilot must be able to see the drone at all times, unless granted a certificate from Transport Canada. - Unless given permission from Navigation Canada, drones may not be flown below 122 m (400 ft), within 30 m of other people (98 ft) or 1.9 km from heliports or 5.6 km from airports on controlled space.

NO	ACTS, REGULATIONS AND BY-LAWS	RELEVANCE
		<p>- Drones of between 250 grams and 25 kg require pilot licensing and drone registration, with drones over 25 kg requiring permission from Transport Canada.</p> <p>Note that Vaughan has controlled airspace in which drones are prohibited, shown here.</p>
2	Government of Canada Criminal Code of Canada and Trespass to Property Act	The Criminal Code prohibits various serious crimes that could be facilitated by use of drones, such as in the areas of air and maritime safety, breaking and entering, voyeurism, mischief and publication of images without consent. Consequences for these include imprisonment and serious fines. Similarly, the Trespass to Property Act enables trespassers to be fined up to \$10,000.
3	Government of Canada Canadian Charter of Rights and Freedoms	Section 8 of the Charter protects the public from unreasonable search and seizure. Based on the type of investigation and resulting actions, governments may require additional consent and permission prior to performing an investigation using drones. All activities by the government are required to be fair, reasonable, proportionate and justifiable.
4	Province of Ontario Highway Traffic Act	The Highway Traffic Act prohibits aircraft to be driven or drawn along a highway, except in emergencies.
5	Province of Ontario Municipal Freedom of Information and Privacy Act (MFIPPA)	The act establishes a right of people to access information about themselves held by institutions, as well as privacy protocols. This would apply to images and videos taken by drones, as well as investigation-related information, by-laws and policies under development, or information that could threaten health and safety. MFIPPA regulates what information can be disclosed by institutions, as well as the criteria for refusal and protocols for doing so. This is particularly relevant to the use of images and video in which people can be identified.
6	City of Vaughan Parks By-law	This prohibits flying aircraft in parks, such as drones.
7	City of Vaughan Retention By-law	This by-law outlines how information must be retained, such as information gathered by drones.

Drone regulations in other Canadian municipalities

In review of online information for Brampton, Edmonton, Mississauga, Oshawa, Ottawa, Pickering, Richmond Hill and Toronto, staff found the following:

- If someone would like to film using a drone within a municipality, they sometimes must submit their federal pilot certification with their film permit application, declaring they will adhere to the federal [Canadian Aviation Regulations](#) (SOR/96-433) when operating.

- Municipalities refer persons to Transport Canada for regulations and enforcement.
- Almost all municipalities prohibit the use of drones in parks, except if allowed by permit.

York Region uses drones mainly for filming, taking photos and mapping. York's drone operations include that:

- all drone pilots must have the Transport Canada Advance Operations certificate, have completed all applicable corporate safety training courses, and adhere to the Standard Operating Procedures for Remotely Piloted Aerial Systems;
- they must obtain consent for any flights over property not owned by York Region and they must notify residents in advance of such flights taking place; and
- their practice is to not capture people's faces when filming and/or taking photos.

Drones and Privacy

In research on drone use by government, a key consideration is how drone use can impact privacy, both in surveilling public spaces and public areas outside, as well private areas visible from outside, such as backyards or interiors of dwellings that are visible through windows. These considerations are relevant not only to drone usage, but also other technology that can record and transmit photos and videos, such as cellular phones, smart watches, satellite technology and public infrastructure, such as cameras and traffic tracking devices.

The Information and Privacy Commission (IPC) of Ontario's 2012 document, [*Drones and Privacy: Unmanned Aerial Vehicles*](#), suggests that if drones are being used by government institutions, a framework should first be developed considering:

- why they are being used, who can use them and in what situations they can be used;
- what kind of information will be collected, how long it will be stored;
- possible impacts on privacy and how to mitigate issues; and
- who is responsible for oversight of drone use and managing complaints.

Vaughan's Office of the City Clerk, Access and Privacy recommend that, in advance of any drone use:

- a privacy impact assessment should be conducted; and
- a protocol should be developed in line with IPC recommendations above, establishing when drone usage is appropriate, such as to mitigate major health and safety risks.

Drones and warfare

As mentioned above, Transport Canada largely regulates drones on a federal level, with additional regulations by many municipal governments, such as to ban drone use in parks if used without a permit. With that said, given the international nature of the City and our connections with other countries across continents, what is happening around the world may also be very relevant to the sentiment of our residents.

Many news stories which speak of drones speak of warfare, which involves drone usage in both surveillance and attack. In the BBC audio documentary [Year of the Drone](#), the narrators explain that where there is modern warfare, there is often a very visible presence of armed drones. As such, in consideration of greater use of drones within the City, pertinent questions include:

- How does Vaughan's community feel about the greater use of drones in their city, such as with respect to nuisance and safety?
- Would Vaughan's community feel safer with stationary surveillance rather than use of drones, such as cameras and monitoring devices mounted on streetlights, bridges, or otherwise temporarily placed in certain locations?
- Can drone surveillance taken by government be stolen or hacked in order to contribute to crime, and if so, how can this be mitigated?
- Can weaponry be easily added to drones, such as those used for recreational use?

This area would likely require stakeholder engagement if more drone usage was considered.

Drones enabling crime

Some risks of drone usage include that they can enable crimes, such as through spying or following people, smuggling prohibited materials into prisons or across borders, or arming drones with weapons or the ability to drop explosives or other weapons, disrupting safe airlift, use by terrorists and hacking of drones. While this report's intent is to consider use of drones by government, because hacking and crime are possibilities associated with drone use, this section is intended to identify the need for safeguards and other steps to be taken to prevent and respond to misuses.

Drones and cost

There are a number of different costs that would need be considered should drones decide to be purchased, discussed below.

Rentals and purchases

Based on past usage, the City's Corporate and Strategic Communications department estimates that drone rental to be between \$80 to \$300 per hour, with costs of purchasing from \$1000 to \$5000 for the types of drones suitable for their purposes.

YRP staff explained that the drones they use were purchased several years ago at between \$3,000 to \$30,000, in which the latter aircraft are equipped with additional features, such as thermal imaging.

If the City decides to purchase drones and have certified staff, the costs of training, maintenance, and operations would need to be considered. Conversely, Design and Construction staff have used contractors for their drone filming, so this is another alternative for the City to consider, so that these operational costs would not be necessary.

Insurance

Drones have different types of risks associated with their operations, with one of the worst being potential collision or causation of damages. In 2017, the City obtained input from the insurance industry on what types and amounts of insurance should be obtained, receiving the following suggestions:

- aviation liability insurance in the amount of \$5 million;
- commercial general liability insurance with injury and non-owned aviation liability in the amount of \$2 million;
- professional liability insurance for \$1 million;
- physical damage coverage for the drones for the value of the drones and equipment used;
- automobile liability for \$2 million, for vehicles involved in transport of drones; and
- cyber liability for the information transmitted for the drone.

Should greater drone usage be considered, the City would undertake a competitive process in line with the City's procurement policies, and to obtain up-to-date prices.

Previous Reports/Authority

Reports

- [Council-approved By-law Strategy](#)
(Item 3, Report No. 3 of the Priorities and Key Initiatives Committee, June 24, 2014)

Other resources

- BBC. (2014, October 6). *Year of the Drone*. Youtube. <https://www.bbc.co.uk/sounds/play/b04k9qj6>
- Dezeen. (2018, May 21). *Elevation documentary: how drones will change cities*. Youtube. <https://www.youtube.com/watch?v=Z0osJnSWxt8>
- Information and Privacy Commission of Ontario. (2012, August 12). *Drones and Privacy: Unmanned Aerial Vehicles*. <https://www.ipc.on.ca/resource/privacy-and-drones-unmanned-aerial-vehicles>

- Transport Canada. (2021). *Drone Strategy to 2025*.
<https://tc.canada.ca/sites/default/files/2021-03/TC223-Drone-Strategy-ENG-ACC.pdf>
- York Regional Police. (2023). Field Support Bureau.
<https://www.yrp.ca/en/about/Field-Support-Bureau.asp>

Analysis and Options

In addition to building communal knowledge, a key goal of this report is to begin to consider whether the greater use of drones would enhance service delivery and programs and would be of good value considering any costs and risks that would need to be mitigated. The following table looks at potential uses of drones from this perspective.

Table 1 – Considering new drone uses within the City of Vaughan

NO	POTENTIAL USE OF DRONES	PROS	CONS
1	Monitoring of public spaces, parks and other public spaces	This could provide Enforcement Services with a greater ability to monitor public spaces in the City, particularly problem areas, such as those known for parking, noise and nuisance issues, and/or special events.	The City would need to consider privacy implications, and whether signage or other notifications should be posted to let people know they are being filmed.
2	Private property evidence gathering and filming	Where outdoor aerial footage would be useful, drones could be useful in gathering photos and film.	In the course of investigations, City officers are required to identify themselves and provide written notice and orders. The City's upper tier municipality, York Region, also notifies private property owners prior to filming. Also, use of drones on private property without permission would need to be assessed on a case-by-case basis to ensure the City is compliant with federal and provincial laws, such as Canadian Aviation Regulations, Criminal Code of Canada, the Trespass to Property Act and Municipal Freedom of Information and Protection of Privacy Act.

Increasing the City's drone use

To increase the City's use of drones for City business, the City could contract a drone company for the various departments' needs, or develop additional in-house capacity, which would include purchasing drones and having staff obtain their drone licence through Transport Canada, a "RPAS Special Flight Operations Certificate". As per the considerations in the above table, staff would need to develop programs which incorporated safety, privacy, risk management, regulatory requirements and other factors.

Financial Impact

This report is for information purposes only and as such, there is no anticipated impact.

Operational Impact

This report is for information purposes only and as such, there is no anticipated impact.

Broader Regional Impacts/Considerations

This report illustrates that Vaughan's regulations with respect to drone usage are fairly similar to other major Ontario cities, useful in enabling the public to better understand and operate in accordance with relevant regulations in our province. We also see that drone usage in a variety of industries is increasing around the world, which may help the City to better consider policy, program and technology decisions.

Conclusion

The intent of this report is to contribute to building communal knowledge in line with City Council's priorities of City Building, and its objective of continuing to invest in making Vaughan a "Smart City", as well as the priority of Community Safety and Well-being, with the objective of enhancing community safety in collaboration with Regional/Provincial/Federal partners.

The report has been developed with input from City staff in the Office of the City Clerk's Risk Management and Access and Privacy, Legal Services, Office of the Chief Information Officer, Transportation and Fleet Management Services, and Vaughan Fire and Rescue Services, as well as the Regional Municipality of York and York Regional Police.

In addition to the work being led by the Infrastructure Planning and Corporate Asset Management department to develop the Transportation Innovation Program, BCLPS staff will continue to consider drone usage in enhancing our services and programs.

For more information, please contact: Susan Kelly, Director of By-Law and Compliance, Licensing and Permit Services, ext. 8952

Attachments

There are no attachments.

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