



CITY MANAGER'S OFFICE

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CITY COUNCIL STAFF REPORT

March 15, 2022

Subject

Overview of the Innovation and Technology Drone Program business case, drone selection process, thermal use case, and privacy concerns. RESPONSE TO COUNCIL INQUIRIES

Recommended Action

No City Council action required, although the Council may “accept,” “acknowledge,” or “receive” the report.

Background

On December 21, 2021, City Council meeting, Councilmember Moore raised some concerns regarding the purchase of a drone by the Innovation and Technology Department. This staff report and presentation outlining the business case for purchasing the drone, drone selection process, thermal use case, and privacy concerns was developed to respond to these concerns.

Drone Business Case

The drone was purchased as part of the Innovation and Technology's effort to create a drone program to achieve the following:

- **Disaster assessment.** After a disaster, the need to capture high resolution imagery fast provides the city a valuable tool to ascertain damage, prioritize response and communicate damage visually with EOC and disaster service workers.
- **Image capture for before/after analysis.** This is useful for Public Works, Community Development, and Parks & Recreation projects demonstrating work progress and end results. Images can be uploaded to the City's website and provide the Communications Department with video and photo acquisition for City branding and marketing
- **Capture 3D imagery of a specific building or business areas in Cupertino.** Coupled with Drone processing software, 3D renderings of potential development sites to gain a deeper understanding of the impact of new development or future growth.

- **Tree Health Assessment Pilot** – The ISA (International Society of Arboriculture) recognizes two levels of tree risk assessment where the drone can be useful – Level 1 flyovers and Level 3 aerial inspections.
- **Roof Inspection Test Pilot** – Municipalities are starting to use drones for building roof inspections. The drones fly over buildings and take photos of them after re-roofing work has been completed to ensure the structure's safety. Inspectors then view the images taken from the drone on a computer. Municipalities are finding this method of roof inspection process to be safer and more efficient than previous methods. !

The goal is to have IT staff become skilled in automating drone flights, capturing imagery, and processing the imagery for use in the cases mentioned above. These skills will ensure pilots can fly proficiently when a disaster strikes.

Drone Selection

With growing concerns over natural disasters including wildfires, earthquakes, and floods; as well as human disasters including energy shutdowns, the City of Cupertino investigated the use of drones as a tool to aid in our emergency response.

Using drones would allow the city to safely gather situational awareness without sending staff or volunteers into high-risk areas. Drones also allow the City to gather awareness from vantage points unreachable from the ground.

For a drone to assist in disaster response, the City wanted a drone that was lightweight, portable, and capable of autonomous flight and obstacle avoidance. These properties were determined to be key factors for efficient and safe deployments in an emergency and in the business cases stated above. The City evaluated multiple drones including the DJI Mavic Enterprise Advanced, DJI Matrice 300 RTK, Autel Evo II Dual R Drone, Altavian Galaxy R8700, Parrot Anafi Thermal, and the Skydio X2E. After meeting and researching numerous vendors and cities it was determined that the Skydio X2E was the drone that fit the business needs of the City best and was purchased with City Manager approval.

Drone Thermal Use **Disaster Response**

Drones with thermal cameras can be used during nighttime conditions when temperatures are low enough to make infrared radiation detectable by the drone's sensor. Thermal imaging drones can see through smoke, making them incredibly useful when looking for people who may have been trapped or lost in a fire situation, including wildfires and other disasters. They can also help identify hazardous materials leaks at chemical plants or gas stations by getting a clear picture of the scene. Thermal cameras cannot see through walls.

Infrastructure Inspections

Thermal cameras can identify faults in structures including roofs and bridges. Thermal cameras are also suitable for assessing the extent of erosion on roads and bridges.

Tree Inspections

Thermal cameras can be used as a tool to identify early detections of damages in trees. Thermal cameras allow for the differentiation of functional tissue from dysfunctional tissue allowing for further inspection of the vitality and health status of trees.

Drone Privacy

The City's drones will not be used to spy on its residents. Pilots will be respectful of private space and will not deploy a drone or focus cameras where a person would have reasonable expectations of privacy such as a backyard or inside a private building. Use of thermal camera will have to be approved before a mission and will have a clear and obvious use-case.

Recommended Action

No City Council action required, although the Council may "accept," "acknowledge," or "receive" the report.

Sustainability Impact

Besides quickly being able to assess the damage to our city after an emergency strikes with focused high-resolution imagery, we also plan to pilot the drone for tree health assessments. In recent years using a drone to manage tree health is not uncommon. As part of the drone program project, we plan to test pilot the use of drones to determine the health of trees from a different vantage point. In addition, the thermal camera will allow us to inspect City Facilities for any heat leaks through air loss. These inspections can help identify areas of improvement in energy conservation efforts within City infrastructure.

Fiscal Impact

No additional fiscal impact. This item was already approved in the 2021 fiscal budget.

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