

To: Chief Administrative Officer **Date:** June 17, 2024
From: Chris Gruenwald, Director of Forestry
Subject: **Unmanned Aerial Vehicle (UAV) Purchase – Forestry, Fire Department**

Recommendation(s)

1. That Council approve a capital expenditure of \$75,261 towards the purchase of a 2024 DJI Matrice 350 RTK UAV (Drone), and associated sensors, from the Forestry Capital Reserve; and
2. That the Financial Plan be updated accordingly.

Executive Summary

Forestry and Fire Department staff are seeking Council approval to purchase a 2024 Matrice 350 RTK UAV, along with a Thermal Camera and LiDAR sensor, to be used for key applications for both departments as well as miscellaneous use in other departments.

Purpose

This report is intended to seek Council approval by providing background information and rationale as to why a purchase of a commercial grade UAV is needed for both forestry and fire department operations.

Background

Wildfire has occurred in the Municipal Forest over the last two years (2022, 2023), and the long-term trends point in the direction of increasing wildfire risk due to climate change. BC Wildfire Service (BCWS) has been looking at the use of Unmanned Aerial Vehicles (UAV's), or drones, to help in wildfire applications. In addition to safely mapping the perimeter of a wildfire, a UAV can also identify and map fire hotspots underground when equipped with a thermal camera. This allows fire crews to quickly target hotspots during fire mop up activities that can not be seen with the naked eye, significantly reducing the risk of wildfire spread.

A good example of this happened in the Municipal Forest in 2023 – during mop up activities of the Hunter wildfire, fire crews had to use the presence of smoke to identify hotspots and then had to spend time locating the hotspots on the ground, in steep rocky conditions. This method is inefficient, challenging, and carries an element of risk, as wildfire can spread quickly from the ground to full blown wildfire. The ability to see hotspots before they can be detected with the naked eye offers the ability to address these risks in a timely and efficient manner, protects key values in the Municipal Forest, as well as the safety of rural neighbourhoods in the Community.

Discussion and Analysis

Candrone has provided a quote for a DJI Matrice 350 RTK unit, along with a Thermal camera and a LiDAR sensor for a total of \$75,261 (PST included). The quote also includes additional equipment required, advanced training for 6 individuals, and relevant software applications. It

also comes with the SP Plus protection plan, which offers unlimited free replacement of the UAV and sensors for a year (no deductible), in case of a crash or other damage to the equipment. This quote includes a 5% Preferred customer discount from DJI, which translates to a savings of \$3,517.

The Matrice 350RTK was chosen, as it's a robust commercial series drone, that can be equipped with a number of different sensors covering a variety of applications for both forestry and fire fighting. The quote included a LiDAR sensor, which involves shooting lasers onto the ground to create accurate 3-dimensional models of the landscape (trees, ground and buildings). The forestry department is working with the UBC Faculty of Forestry on a number of survey level applications for the Municipal Forest that are expected to be more efficient than traditional surveying; these applications include:

- Silviculture Surveys: Stocking, Spacing, Free to Grow
- Timber Assessment – Species composition, volume/value
- Stream Identification/Classification
- Thinning surveys

In addition, there are a number of applications that the fire department will utilize both the thermal camera and LiDAR sensor for its operations, including:

- Assessing Fire Intensity (Thermal Camera)
- Detailed 360 Assessments for Structure Fires, MVIs
- Building Inspections
- Search and Rescue Operations

Note that some of these applications could also be used for other Departments – urban tree canopy assessment for Planning or Parks, Recreation and Culture for example.

In terms of investment, the following estimate of saving 2 hectares of Municipal Forest using this technology provides a good example in terms of the value:

- **2 hectares @ 700m³/ha = 1,400m³ timber X \$40/m³ net profit (conservative) = \$56,000**

Financial Implications

The anticipated balance in the Forestry Capital Reserve at the end of 2024 is projected to be \$188,190. There is currently no additional equipment scheduled to be purchased over the next two years, as we have recently purchased two new excavators in 2023, which will not be up for replacement until 2033 at the earliest. Annual insurance costs are estimated to be \$2,000/year for liability insurance, and annual maintenance costs, as provided by DJI are anticipated to be \$1,200/year.



I have reviewed the financial implications
Doug Stewart, Director of Finance

Communication

If approved, staff will work with the Purchasing Department to finalize the purchase of the Matrice 350RTK.

Summary and Conclusion

Staff is recommending that Council approve a capital expenditure from the Forestry Capital Reserve for the purchase of a 2024 DJI Matrice 350RTK, with a thermal camera and LiDAR sensor. There are a number of different applications to be undertaken by both the forestry and fire department using this technology, and the efficiencies gained are projected to save the City money and provides an application that will assist in keeping rural neighbourhoods safe from the risk of wildfire.

Report Prepared by: Chris Gruenwald, Director of Forestry

Reviewed by: Ian Glasgow, Assistant Fire Chief

Approved for Inclusion: Mike Younie, Chief Administrative Officer

Attachment(s)

Attachment A: Candrone Quote – DJI Matrice 350RTK

Attachment B: Press Article – UAV and Wildfire applications