

# TECHNICAL REQUIREMENTS FOR PROCUREMENT OF A PROFESSIONAL MAPPING DRONE

## 1. Procurement Scope

| Item             | Minimum Requirement                                                                                                                                          |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAV platform     | Professional multirotor mapping UAV, transportable/foldable, suitable for repeated field survey operations.                                                  |
| Complete package | Aircraft, professional controller, RTK/GNSS capability, minimum 3 flight batteries, charging hub/charger, spare propellers, rugged case and required cables. |
| Mapping workflow | Automated grid, corridor and terrain-following missions; adjustable front/side overlap; nadir and oblique capture.                                           |
| Data openness    | JPEG/DNG, flight logs, GNSS/RTK information and image metadata exportable; normal photogrammetric processing shall not depend on proprietary-only data.      |

## 2. Aircraft & Flight Performance

| Parameter             | Minimum / Required Performance                                                                                                                 |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Take-off weight       | below 2.0 kg including standard battery and normal mapping payload; actual operating weight shall be stated.                                   |
| Flight endurance      | greater than or equal to 40 minutes under manufacturer specified test conditions without payload; practical mapping endurance shall be stated. |
| Wind resistance       | greater than or equal to 10 m/s.                                                                                                               |
| Operating altitude    | Capable of operation at least up to 5,000 m AMSL.                                                                                              |
| Operating temperature | At least -10°C to +40°C.                                                                                                                       |
| Speed                 | Maximum horizontal speed not less than 15 m/s.                                                                                                 |
| Obstacle avoidance    | Omnidirectional or multi-directional obstacle sensing with automatic braking/avoidance.                                                        |
| Navigation            | Multi-GNSS including at least GPS, Galileo and BeiDou; additional constellations acceptable.                                                   |
| Failsafe              | Configurable return-to-home, low-battery and lost-link failsafe functions, additional features acceptable.                                     |

## 3. RGB Mapping Camera – Core Requirement

The RGB camera is the principal procurement criterion. Any manufacturer/model may be proposed provided it meets or exceeds these requirements.

| Parameter  | Minimum / Required Performance                                                          |
|------------|-----------------------------------------------------------------------------------------|
| Sensor     | CMOS sensor greater than or equal to 1-inch optical format; larger sensor accepted.     |
| Resolution | Greater than or equal to 18 MP for the primary mapping camera.                          |
| Shutter    | Mechanical or global shutter required; rolling-shutter-only cameras are not acceptable. |
| Lens       | Wide-angle mapping lens 20–35 mm full-frame equivalent.                                 |

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| Aperture           | Fixed or adjustable aperture; adjustable preferred.                                                          |
| RAW                | DNG/RAW capture supported for the primary mapping camera.                                                    |
| Photo interval     | Timed/continuous capture at less than or equal to 1 second or faster at principal mapping resolution.        |
| Metadata           | Timestamp, camera parameters and synchronized image-position information available.                          |
| Gimbal             | 3-axis stabilized gimbal with controllable pitch for nadir and oblique imaging.                              |
| Mapping capability | Capable of approximately 2–3 cm GSD at suitable low-altitude mapping missions, subject to flight conditions. |

#### 4. RTK / PPK / Positioning

| Parameter          | Minimum / Required Performance                                                                        |
|--------------------|-------------------------------------------------------------------------------------------------------|
| RTK                | Integrated or securely attachable RTK GNSS capability; RTK available during flight.                   |
| Correction sources | Network RTK/NTRIP through internet and compatibility with an external GNSS base/correction source.    |
| RTK accuracy       | $\leq 2$ -5 cm horizontal and $\leq 3$ -5 cm vertical when RTK FIX is achieved, or better.            |
| Correction link    | Controller and/or aircraft supports mobile internet connectivity for NTRIP.                           |
| GNSS               | At least GPS + Galileo + BeiDou; multi-frequency GNSS preferred.                                      |
| RTK status         | Controller clearly displays FIX/FLOAT/no-correction status, satellite information and correction age. |
| Raw data           | Exportable positioning/flight logs for independent QC and, where supported, PPK processing.           |
| Survey control     | GCP/check-point workflows supported even when RTK is used.                                            |

#### 5. Terrain Following / AGL Control

| Parameter                   | Minimum / Required Performance                                                                                                |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Automatic terrain following | Highly desirable and preferably available for autonomous mapping missions.                                                    |
| AGL control                 | Ability to maintain a user-defined above-ground flight height over changing/undulating terrain.                               |
| Terrain source              | Onboard terrain-awareness and/or imported DEM/DSM support acceptable; bidder shall state method.                              |
| Mission types               | Support for terrain-following grid and corridor/linear mapping missions where applicable.                                     |
| Slope/relief handling       | Suitable for sloping and mountainous terrain; bidder shall state maximum supported slope/elevation variation and limitations. |
| Mission safety              | Automatic altitude adjustment shall not compromise                                                                            |

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|  | planned flight path, obstacle avoidance or camera orientation. |
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## 6. Additional Mission Payloads & Field Utility

| Feature                 | Requirement / Performance                                                                                                                                                                       |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Laser Rangefinder (LRF) | Integrated or factory-supported LRF; range $\geq 1,000$ m under suitable conditions; bidder shall state accuracy and operating limitations. Geotagged/coordinate-linked measurements preferred. |
| Spotlight               | Integrated or quick-mount LED spotlight; effective illumination $\geq 100$ m preferred; adjustable/stabilized orientation and continuous/strobe modes desirable.                                |
| Speaker                 | Integrated or quick-mount speaker; approximately $\geq 10$ W preferred; clear live and/or prerecorded voice broadcast; effective range around $\geq 200$ m preferred.                           |
| Expansion capability    | Quick-release payload/accessory interface preferred, without compromising normal mapping operations.                                                                                            |

## 7. Communication, Controller & Storage

| Parameter              | Minimum / Required Performance                                                                                                      |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Transmission           | Digital command/video link rated at least 10 km unobstructed; actual operating range subject to Nepal regulations.                  |
| Controller             | Screen at least 7 inches; 1,000 nits or higher for outdoor use.                                                                     |
| Mission control        | Live map, RTK status, camera control, mission planning, terrain-following controls, RTH/failsafe and flight logging.                |
| Storage                | Minimum 128 GB internal/aircraft/controller storage or equivalent plus removable high-speed storage.                                |
| Connectivity           | USB-C/equivalent high-speed data; Wi-Fi/Bluetooth or equivalent; cellular data support for NTRIP required.                          |
| Software compatibility | Usable with common photogrammetry/GIS software including Agisoft Metashape, Pix4D, RealityCapture, ArcGIS and equivalent platforms. |

## 8. Batteries, Accessories, Safety & Service

| Item        | Minimum / Required Provision                                                 |
|-------------|------------------------------------------------------------------------------|
| Batteries   | Minimum 3 intelligent flight batteries with health/cycle information.        |
| Charging    | Multi-battery charging solution with suitable electrical/thermal protection. |
| Spare parts | At least two spare propeller sets and essential tools.                       |
| Transport   | Protective hard/rugged carrying case.                                        |
| Training    | Supplier shall provide practical training covering                           |

|          |                                                                                                           |
|----------|-----------------------------------------------------------------------------------------------------------|
|          | flight safety, mission planning, RTK/NTRIP, terrain-following, data download and troubleshooting.         |
| Warranty | Minimum 1-year warranty for aircraft/controller/accessories;                                              |
| Support  | Local/authorized technical support in Nepal or defined regional support; spare-parts availability stated. |

***Note: The quoted price shall include all necessary accessories, photogrammetry software, warranty, delivery, training (by the certified trainer).***