

Annex B. Draft Terms of Reference

DRAFT TERMS OF REFERENCE

Procurement of Drones for Use in Protected Area Management

1. BACKGROUND

The Department of Environment and Natural Resources (DENR) implements the Protected Areas Development and Management Program (PADM). The DENR adopts technological innovations to strengthen the management and protection of protected areas for the conservation of the biodiversity therein.

2. OBJECTIVES

The DENR intends to procure aerial drones to enhance its capability to map the landscape and ecosystems of protected areas for the purpose of monitoring biodiversity and tenure areas in aid of law enforcement, detecting change, spatial planning, and post-disaster response.

3. APPROVED BUDGET FOR THE CONTRACT (ABC)

The Approved Budget for the Contract to purchase _____ (number) of drone package is PhP _____ (amount) with the following inclusions:

Option 1: VTOL Fixed-Wing Hybrid RPA Package

Particulars/Unit Item	Quantity
VTOL Fixed-Wing Hybrid RPA Unit <ul style="list-style-type: none">with telemetry laptop (i5, 8GB RAM, GPU card, 1 TB HDD)with flight softwarewith 3 units batterywith wireless telemetry antennawith trackerwith custom case	
Camera (survey grade, 24MP*)	
Camera (multi-spectral*)	
Image processing laptop with software (perpetual license)	
Training	
Supervised flights	

Option 2: Medium Multi-rotor Drone

Particulars/Unit Item	Quantity
Medium Multi-rotor Drone <ul style="list-style-type: none">with telemetry laptop (i5, 8GB RAM, GPU card, 1 TB HDD)with flight softwarewith 3 units batterywith wireless telemetry antennawith trackerwith custom case	
Camera (survey grade, 24MP*)	
Camera (multi-spectral*)	

Option 2: Medium Multi-rotor Drone

Particulars/Unit Item	Quantity
Image processing laptop with software (perpetual license)	
Training	
Supervised flights	

Option 3: Small Multi-rotor Drone

Particulars/Unit Item	Quantity
Small Drone <ul style="list-style-type: none">▪ with flight software▪ with 3 units battery▪ with wireless telemetry antenna▪ with tracker▪ with custom case	
Camera (survey grade, 24MP*)	
Image processing laptop with software (perpetual license)	
Training	
Supervised flights	

The technical specifications of the above inclusions are detailed in Item 5 hereof.

4. MODE OF PROCUREMENT

The project shall be procured through Competitive Bidding, Article IV Section 10 of Republic Act No. 9184 and its implementing Rules and Regulations.

The Contractor:

- a. Must be a certified distributor of the unit or brand being offered;
- b. Shall have at least five (5) years of extensive experience in using and configuring the instrument with technical support personnel classified as specialists;
- c. Shall have at least five (5) years of experience in providing related training courses and with trainers who are certified to train by the manufacturer;
- d. Must provide a warranty statement granting technical support services for 12 months through phone, email, and onsite repairs, if necessary, which will commence upon commissioning of the units;
- e. Must have at least 5 certified RPA controllers for training and supervised flights.

5. TECHNICAL SPECIFICATIONS

The package shall include (all brand new units*):

Option 1: Vertical Take-off and Landing (VTOL) Fixed Wing Hybrid Remotely Operated Vehicle (RPA) with Mobile Ground Station and Flight Software	
Mission Capability	Mapping / Surveillance
Maximum Flight Time (Endurance)	Up to 2.5 hours, with at least 1.5 hours effective flying time per sortie (1 full battery charge)

Option 1: Vertical Take-off and Landing (VTOL) Fixed Wing Hybrid Remotely Operated Vehicle (RPA) with Mobile Ground Station and Flight Software	
Maximum Operating Altitude	4,000 masl
Maximum Take-off Weight	8.5 kgs
Cruise Speed	16-19 m/s
Data Link	Over 40 km
Effective Range	Up to 30 km radius
Payload capability	Can mount either/or: (a) survey grade camera, (b) multi-spectral camera and (c) LiDAR
Mobile Ground Station	<ul style="list-style-type: none"> ▪ With real time control and monitoring ▪ With rugged all-weather case
Flight Software	Flight software compatible with the VTOL RPA unit

** Brand new means that the unit had not been used for data acquisition. This does not include test flights and test image capture.*

Option 2: Medium Multi-rotor Drone with Mobile Ground Station and Flight Software	
Mission Capability	Mapping / Surveillance
Maximum Flight Time (Endurance)	Up to 55 minutes, with at least 30 minutes effective flying time per sortie (1 full battery charge)
Maximum Operating Altitude	4,000 masl
Maximum Take-off Weight	8 kgs
Cruise Speed	16-19 m/s
Data Link	Up to 15 km
Effective Range	Up to 8 km radius
Payload capability	Can mount either/or: (a) survey grade camera, (b) multi-spectral camera and (c) LiDAR
Mobile Ground Station	<ul style="list-style-type: none"> ▪ With real time control and monitoring ▪ With rugged all-weather case
Flight Software	Flight software compatible with the drone unit

** Brand new means that the unit had not been used for data acquisition. This does not include test flights and test image capture.*

Option 3: Small Multi-rotor Drone with Mobile Ground Station and Flight Software	
Mission Capability	Mapping / Surveillance
Maximum Flight Time (Endurance)	Up to 30 minutes, with at least 15 minutes effective flying time per sortie (1 full battery charge)
Maximum Operating Altitude	4,000 masl
Maximum Take-off Weight	900 g
Cruise Speed	16-19 m/s
Data Link	Up to 15 km
Effective Range	Up to 8 km radius
Payload capability	Can mount survey grade camera
Mobile Ground Station	<ul style="list-style-type: none"> ▪ With real time control and monitoring ▪ With rugged all-weather case
Flight Software	Flight software compatible with the drone unit

Option 3: Small Multi-rotor Drone with Mobile Ground Station and Flight Software

** Brand new means that the unit had not been used for data acquisition. This does not include test flights and test image capture.*

Payload Options (Please refer to Item 3)	
a. Survey-grade RGB camera	
Sensor	24 MP
Ground Sample Distance	2.4 cm/px at 120 m AGL
Minimal trigger time	1.0 second
Sensor type	CMOS
Sensor format	APS-C
Sensor size	23.5 x 15.6 mm
Payload weight RTF (ready to fly)	550 g
Shutter type	Focal plane
Storage	SD card (external slot)
b. Multi-spectral camera kit	
Capability	Multi-spectral imaging
Sensor resolution	1456 x 1088 (1.6MP per MS band) 2464 x 2056 (5.1MP panchromatic band)
Spectral bands	Blue (475 nm center, 32 nm bandwidth), Green (560 nm center, 27 nm bandwidth), Red (668 nm center, 14 nm bandwidth), Red Edge (717 nm center, 12 nm bandwidth), Near-IR (842 nm center, 57 nm bandwidth)
RGB Color Output	5.1 MP (global shutter, aligned with all bands)
Ground sample distance	7.7 cm per pixel (per MS band) at 120m (~400 ft) AGL 3.98 cm per pixel (panchromatic band) at 120m (~400 ft) AGL
Field of view	50° HFOV x 38° VFOV (MS) 44° HFOV x 38° VFOV (PAN)
Capture rate	Up to three captures per second raw DNG
Field of view	50° HFOV x 38° VFOV (MS), 44° HFOV x 38° VFOV (PAN)
Storage	128 GB CFexpress card
Interfaces	Three configurable GPIO: select from trigger input, PPS input, PPS output, and top of frame signals. Host virtual button. USB 2.0 port for WiFi. Serial. 10/100/1000 Ethernet. CF Express for storage
Kit contents	Sensor Lens cover Calibrated reflectance panel Light sensor with integrated GPS Cables Mounting screws Hard carrying case Card reader
c. Light Detection and Ranging (LiDAR) sensor	
Wavelength	905 nm
Maximum altitude	140 mAGL
Precision	1.8 – 2.5 cm

Payload Options (Please refer to Item 3)	
Accuracy	<3 cm
Scanner field of view	70°
Shots per second	240,000
Point density @100 m	50 -100 points/m²
Multi-echo technology	up to 3 echoes per shot
Payload weight RTF	950 g
Flight time	60 minutes
d. Thermal Camera	
Weight	Not more than 930 g
Thermal Imager	Uncooled VOx Microbolometer
Sensor Resolution (Photo)	1280×1024
Sensor Resolution (Video)	1280×1024@30fps
Spectral bands	8-14 µm
Temperature Measurement Range	High Gain: -20° to 150° C (-4° to 302° F), -20° to 450° C (-4° to 842° F) (With Infrared Density Filter) Low Gain: 0° to 600° C (32° to 1112° F), 0° to 1600° C (32° to 2912° F) (With Infrared Density Filter)
Storage	Internal, or memory card
e. Hyperspectral	
Scanner	SWIR 640
Wavelength Range	900 – 2500nm
Spatial Pixels	640
Camera Technology	MCT
Weight (sensor only)	Not more than 1.9 kg / 4.2 lbs

Image Processing Laptop	
Central Processing Unit	At least Intel i7
Graphics Processing Unit	Dual GPU, At least GeoForce RTX 3060
Size	15.6”
Random Access Memory	At least 16 GB
Storage (HDD/SSD)	1 TB
Accessories	Mouse and Laptop Bag

Image Processing Software	
Software capabilities	<ul style="list-style-type: none"> ▪ Photogrammetric triangulation ▪ Dense point cloud: editing and classification ▪ Digital elevation model: DSM/DTM generation and editing ▪ Georeferenced orthomosaic generation ▪ LiDAR data support ▪ Ground control points / scale bar support ▪ Measurements: distances, areas, volumes ▪ Stereoscopic measurements ▪ 3D model: generation and texturing ▪ Hierarchical tiled model generation ▪ 4D modeling for dynamic scenes ▪ Panorama stitching ▪ Multispectral imagery processing ▪ Automatic powerlines detection ▪ Satellite imagery processing

	<ul style="list-style-type: none">▪ Python and Java API▪ Network processing▪ Cloud processing
License	Perpetual

6. CERTIFICATION FROM MANUFACTURER AS AUTHORIZED DISTRIBUTOR

The Contractor must be a certified distributor of the brand being offered. A certification from the manufacturer must be presented as part of the bid documents.

7. DELIVERY

The delivery, installation, configuration, and testing of the drone units shall be within forty-five (45) calendar days from the receipt of the Notice to Proceed (NTP).

8. SCOPE OF WORK

The Contractor shall:

- a. Conduct a pre-implementation meeting with the DENR representatives to discuss the necessary preparations, ideal set-up, contractor's familiarization, and other implementation matters;
- b. Deliver, install, configure, and test the drone package prior to and during the training for RPA controllers;
- c. Assist in the registration of the drones with the Civil Aviation Authority of the Philippines (CAAP);
- d. Train assigned employees of the DENR and provide manuals and modules to the DENR;
- e. Assist in the CAAP registration of trained DENR personnel as RPA controllers and of the DENR as RPA operator;
- f. Provide/render the following after-sales support services during the warranty period:
 - (1) Provide 24/7 technical support for critical issues and within 72 hours for non-critical issues during the warranty period;
 - (2) Replace units or parts with manufacturing defects at no additional cost to the DENR;
 - (3) Repair damaged units or parts at no cost to DENR. However, parts to be replaced that are not covered in Item 8.f(2) hereof should be billed against DENR;
 - (4) Provide a service unit of at least the same brand, model, features and functionalities or its equivalent in case of equipment breakdown and the unit needs to be pulled out for servicing, at no additional cost to the DENR.
- g. Provide technology transfer in introduction to RPA capabilities, essential workflows, and processes in using the instrument from data acquisition, data processing, and post-processing in the process of installation, configuration, and

testing of the drones and accompanying image processing software and hardware;

- h. For VTOL RPA or medium multi-rotor drones, provide on-site supervised flights commencing at the date of commissioning of the drones for a period of 1 year or until THREE thousand (3,000) hectares per drone unit of data acquisition is reached;
- i. Assign a field supervisor during the supervised flights to supervise, monitor and validate the skills capability and level reached by the RPA Team; and
- j. Provide a documentation of the drones in both hard and soft copies including information in the deployment, and system resource employed in the project, as well as procedures, after the completion of the training program.

The DENR Regional Executive Director shall issue a Certificate of Acceptance once all the requirements are fully met by the Contractor.

9. WARRANTY

The Contractor:

- a. Warrants that it shall conform strictly to the terms and conditions of this TOR;
- b. Warrants, represents, and undertakes reliability of the services and that their manpower complements are hardworking, qualified/reliable and dedicated to do the service required to the satisfaction of the DENR. It shall employ well-behaved and honest employees with ID displayed conspicuously while working within the premises of the DENR. It shall not employ DENR employees to work in any category, whatsoever;
- c. In the performance of its services, shall secure, maintain at its own expense all registration, licenses, or permits required by National or Local laws and shall comply with the regulations and directives of Regulatory Authorities and Commissions;
- d. Contractor's personnel shall take all necessary precautions for the safety of all persons and properties at or near their area of work and shall comply with all the standard and established safety regulations, rules, and practices;
- e. Shall coordinate with the authorized and/or designated DENR personnel in the performance of their jobs;
- f. Shall be liable for loss, damage, or injury due directly or indirectly through the fault or negligence of its personnel. It shall assume full responsibility thereof and the DENR shall be specifically released from any and all liabilities arising therefrom;
- g. Shall neither assign, transfer, pledge, nor sub-contract any part or interest therein;
- h. Shall identify the certified technical support personnel that will be given authority to assess and operate the specified equipment. DENR shall be informed through a formal notice on the change or replacement of technical personnel five (5) days prior to the actual rendering of technical support services;

The warranty/subscription period shall commence on the day of commissioning of the RPA and shall be in force for a period of 365 days therefrom.

10. CONFIDENTIALITY OF DATA

- a. All project personnel of the Contractor shall be required to sign a Non-Disclosure Agreement (NDA) in accordance with the RA ____ Data Privacy Act;
- b. The Contractor agrees to hold the Proprietary Information in strict confidence. The Contractor furthermore agrees not to reproduce, translate, or disclose the Proprietary Information to third parties without prior written approval of the DENR.

11. MODE OF PAYMENT

- a. The Contractor shall be paid in two (2) tranches; the total contract price of which is subject to the required Final Withholding VAT (Services) of five percent (5%) and Expanded Withholding Tax of two percent (2%).

Upon delivery of drones fixed wing hybrid RPA units: 80%
Upon completion of supervised flights: 20%

- b. Payment shall be made within a reasonable time from the submission of the documentary requirements such as, but not limited to the following, based on existing accounting and auditing laws, rules and regulations:

- (1) Sales Invoice/Bills
- (2) Manual
- (3) Certificate of Acceptance issued by the RED
- (4) Non-Disclosure Agreement

- c. No advance payment shall be made as provided for in Section 88 of PD 1445.

12. COMPLIANCE WITH LAWS, RULES AND REGULATIONS GOVERNING THE PROCUREMENT

By submitting its bid, interested parties expressly signify acquiescence to compliance with the provisions of Republic Act No. 9184, its Implementing Rules and Regulations (IRR) and all issuances from the Government Procurement Policy Board, and all other agencies exercising regulatory authority over this transaction. Specific restrictions and/or guidelines as may be provided by the GPPB, or other government agencies and entities exercising supervisory or regulatory functions over DENR and/or the subject matter of this procurement shall be included and made an integral part of the contract. Contract provisions, especially, although not limited to those involving contract implementation and termination, running contrary to any restriction or issuance by GPPB, and/or other government agencies and entities exercising supervisory or regulatory functions over DENR and/or the subject matter of this procurement, as well as any established process/procedure of the DENR, shall be removed or modified accordingly. Submission of bid thus serves as agreement and consent of interested bidders to see to it that any and all additional requirements apart from what is stated in the relevant laws, rules and regulations governing this procurement, which other government agencies or entities may require, shall be complied with.

Any and all additional expenses which may be deemed necessary for the DENR to effectively and efficiently execute the contract or Purchase Order (P.O.) for this procurement shall be included in the determination of the lowest calculated bid.

The bid must contain any and all additional charges, which shall be imposed by the interested bidder. Any charge not included therein may not be imposed by the interested bidder during contract or Purchase Order (P.O.) drafting and execution.

Any provision which may hinder, or create a more onerous requirement detrimental to the performance of functions of the DENR in the ordinary course of business, may not be included in the contract or Purchase Order (P.O.) proper.

13. VIOLATION OF THE TERMS AND CONDITIONS

- a. The Contractor shall hold the DENR free from any and all claims, liabilities, losses and suits arising from the Contractor's services, or the acts, omissions, or conduct of all persons employed or allowed by the Contractor or participate or assist in the performance of its obligations under this TOR;
- b. The DENR shall have the right to declare this Agreement rescinded and terminated after due notice upon failure of the Contractor to comply with any terms and conditions of this Agreement without prejudice to such other rights of the DENR to proceed against the Contractor as may be warranted by the circumstances, including forfeiture of performance bond and/or the filing of appropriate administrative, civil, or criminal charges against the responsible persons;
- c. If the Contractor shall violate any of the terms and conditions of this TOR, or shall neglect to perform any of their work, duties, functions, responsibilities or obligations stipulated herein, or for any other causes shall not carry the tasks in acceptable manner, and by the reason thereof, the DENR suffers damages or losses, the Contractor shall be assessed a penalty in the form of liquidated damages in the amount of at least equal to 1/10 of 1% of the cost of the unperformed portion for everyday of delay. The Contractor shall be subject to Administrative sanctions pursuant to RA 9184 and its IRR.