**Section II: Schedule of Requirements**

**eSourcing reference:** **ITB/2021/25213**

1. **Technical specifications for Goods and Comparative Data Table**

The ITB is for the procurement of drones: bidders at their own discretion may bid for any lot or all the lots.

Lot 1 - Large capacity spraying Drone

Lot 2 - Surveying drone VTOL

Lot 3 - Image Processing Computer

|  | **UNOPS minimum technical requirements** | **Is the bid compliant?** Bidder to complete | **Details of goods offered.** Bidder to complete |
| --- | --- | --- | --- |
|  |  |  | Insert details of goods offered, including specifications and brand/model offered if applicable |
| **Lot 1** | **Large Capacity Spraying Drone (14 ea)** |  |  |
| **1** | **Aircraft body** |  |  |
| **1.1** | **Material** |  |  |
|  | Body type; Multi-copter/helicopter modular design | ☐ Yes ☐ No |  |
|  | Propeller: foldable carbon fibre should supply additional propeller (minimum one full set ) | ☐ Yes ☐ No |  |
|  | Structural material: Aluminium alloy and /Carbon Fiber | ☐ Yes ☐ No |  |
|  | UAV: Min IP54 environmental Protection or equivalent | ☐ Yes ☐ No |  |
|  | Electronics: Min IP66 environmental Protection or equivalent | ☐ Yes ☐ No |  |
| **2** | **Flight** |  |  |
|  | Drone type: heavy lift multicopter/helicopter | ☐ Yes ☐ No |  |
|  | Flight Duration: Minimum 60 min at full payload | ☐ Yes ☐ No |  |
|  | Flight range: Minimum 60km | ☐ Yes ☐ No |  |
|  | Max flying speed: 15m/s or better | ☐ Yes ☐ No |  |
|  | Operating speed: 12m/s or better | ☐ Yes ☐ No |  |
|  | wind resistance: level 6 or better | ☐ Yes ☐ No |  |
|  | Max flying altitude: 3000m ASL or better | ☐ Yes ☐ No |  |
|  | Integrated failsafe feature | ☐ Yes ☐ No |  |
| **3** | **Power Source** |  |  |
|  | Source: gasoline/electrical | ☐ Yes ☐ No |  |
|  | Engine type: Electric fuel injection/Hybrid | ☐ Yes ☐ No |  |
|  | Integrated power management system (PMS) | ☐ Yes ☐ No |  |
|  | Communicate battery and Fuel status via data-link system | ☐ Yes ☐ No |  |
|  | Battery type: Li-Po with battery management system | ☐ Yes ☐ No |  |
|  | Fuel capacity: based on endurance | ☐ Yes ☐ No |  |
|  | battery capacity: redundant battery that last for minimum 2 hrs for electronic systems | ☐ Yes ☐ No |  |
|  | Electronics: Min IP66 environmental Protection or equivalent | ☐ Yes ☐ No |  |
|  | Redundant power system with Batteries: 2 batteries | ☐ Yes ☐ No |  |
|  | Smart and fast battery charger | ☐ Yes ☐ No |  |
|  | Easily swappable battery: within 3 minute | ☐ Yes ☐ No |  |
| **4** | **Flight Control** |  |  |
| **4.1** | **Flight Controller** |  |  |
|  | Full autonomous system including : | ☐ Yes ☐ No |  |
|  | 1 Geofencing | ☐ Yes ☐ No |  |
|  | 2 breakpoint return | ☐ Yes ☐ No |  |
|  | 3 intelligent return to home | ☐ Yes ☐ No |  |
|  | Payload and gimbal control | ☐ Yes ☐ No |  |
|  | Ground station pairing: within 2 minute | ☐ Yes ☐ No |  |
|  | Firmware and software update manager | ☐ Yes ☐ No |  |
|  | Secure boot loader | ☐ Yes ☐ No |  |
|  | Intelligent based pesticide spraying controller (selective Spraying) | ☐ Yes ☐ No |  |
| **4.2** | **Redundant Inertial measurement unit (IMU)** | ☐ Yes ☐ No |  |
|  | Onboard Gyro/accelerometer | ☐ Yes ☐ No |  |
|  | Onboard Magnetometer | ☐ Yes ☐ No |  |
|  | Onboard Barometer | ☐ Yes ☐ No |  |
|  | Compass | ☐ Yes ☐ No |  |
|  | GNSS (multiple satellites) | ☐ Yes ☐ No |  |
|  | Collision avoidance |  |  |
|  | Autopilot: Yes | ☐ Yes ☐ No |  |
|  | On flight mission planning: Yes | ☐ Yes ☐ No |  |
|  | Plug and play controller: Yes | ☐ Yes ☐ No |  |
|  | Flight mode: Manual/Autonomous | ☐ Yes ☐ No |  |
|  | Hover precision: less than 30cm | ☐ Yes ☐ No |  |
| **5** | **Data link system** |  |  |
| **5.1** | **Link range:** |  |  |
|  | RC distance: minimum 2km | ☐ Yes ☐ No |  |
|  | Telemetry data at least 60 km range | ☐ Yes ☐ No |  |
| **5.2** | **Security:** |  |  |
|  | Spread spectrum technique (FHSS/DSSS) | ☐ Yes ☐ No |  |
|  | Encryption: AES | ☐ Yes ☐ No |  |
|  | Redundant data link system | ☐ Yes ☐ No |  |
| **6** | **Payload** |  |  |
|  | **Plastic tankers** (minimum 80kg capacity) | ☐ Yes ☐ No |  |
|  | **Integrated real-time FPV camera** | ☐ Yes ☐ No |  |
|  | **Remote controlled high power LED signal light** | ☐ Yes ☐ No |  |
|  | **Long range remote controlled LED headlight** | ☐ Yes ☐ No |  |
|  | **Spray pump :** |  |  |
|  | Volume application rate : 1-3 Litre/hectare | ☐ Yes ☐ No |  |
|  | Pump valve : at least one valve for two spray nozzles | ☐ Yes ☐ No |  |
|  | electromagnetic flow meter for each valve | ☐ Yes ☐ No |  |
|  | **Spray nozzle :** |  |  |
|  | Nozzle type: Nozzle for Ultra Low Volume and oil based EC formulation (Atomizer type) | ☐ Yes ☐ No |  |
|  | Integrated Nozzle control system | ☐ Yes ☐ No |  |
|  | Minimum 6 pcs nozzles | ☐ Yes ☐ No |  |
|  | Droplet size: uniform 50-100 microns or better | ☐ Yes ☐ No |  |
|  | multiple interchangeable nozzle types(Shall apply for both ULV and EC formulation) | ☐ Yes ☐ No |  |
|  | Spraying width : more than 10 meters | ☐ Yes ☐ No |  |
| **7** | **Ground control** |  |  |
|  | **Number of channel:** |  |  |
|  | Minimum 12 VDC channel | ☐ Yes ☐ No |  |
|  | Compatible with Android and IOS | ☐ Yes ☐ No |  |
|  | **Features:** |  |  |
|  | Number of parallel drone control: 5 drones | ☐ Yes ☐ No |  |
|  | Minimum 2 km range real time video transmission | ☐ Yes ☐ No |  |
|  | Use spread spectrum (FHSS and DSSS) | ☐ Yes ☐ No |  |
|  | Integrated RTK | ☐ Yes ☐ No |  |
| **8** | **Power rating:** |  |  |
|  | Reverse polarity protection | ☐ Yes ☐ No |  |
|  | Over voltage protection | ☐ Yes ☐ No |  |
|  | Includes Rigid enclosure design | ☐ Yes ☐ No |  |
| **9** | **Software and related factors** |  |  |
|  | Agricultural processing software in CD with key  Function Included:  Smart spray function  Mapping and surveying  Real-time transmission | ☐ Yes ☐ No |  |
|  | Software Support: Min. 1 year, including | ☐ Yes ☐ No |  |
|  | 1 Re Configuration and customization | ☐ Yes ☐ No |  |
|  | 2 Software update | ☐ Yes ☐ No |  |
|  | 3 Troubleshooting | ☐ Yes ☐ No |  |
| **10** | **Trainings including** |  |  |
|  | 1 Operational training | ☐ Yes ☐ No |  |
|  | 2 Maintenance training | ☐ Yes ☐ No |  |
|  | 3 Software training | ☐ Yes ☐ No |  |
| **11** | **Spare parts** |  |  |
|  | Multirotor Motor, Propeller and ESC (minimum one full set ) (14 set) | ☐ Yes ☐ No |  |
|  | Battery for electrical system if drone is Gasoline (28 ea) | ☐ Yes ☐ No |  |
|  | Engine Type : 1 full set of engine for each drone (14 set) | ☐ Yes ☐ No |  |
|  | Ground control spare battery(14 ea) | ☐ Yes ☐ No |  |
|  | ULV sprayer set (14 ea) | ☐ Yes ☐ No |  |
| **12** | **Warranty:** minimum 1 year | ☐ Yes ☐ No |  |
| **13** | The equipment manufacturer/supplier have a local agent/dealer | ☐ Yes ☐ No |  |
|  | If No, can you commit/agree to arrange a local agent/dealer within 2-3 weeks after award | ☐ Yes ☐ No |  |
| **Lot 2** | **Surveying drone VTOL (9 ea)** |  |  |
| **1** | **Aircraft body** |  |  |
| **1.1** | **Material** |  |  |
|  | Body type; VTOL hybrid wing | ☐ Yes ☐ No |  |
|  | Structural material: carbon fiber | ☐ Yes ☐ No |  |
|  | Wing type: Foldable/separable wings for portability | ☐ Yes ☐ No |  |
|  | UAV: Min IP54 environmental Protection or equivalent | ☐ Yes ☐ No |  |
|  | Electronics: Min IP66 environmental Protection or equivalent | ☐ Yes ☐ No |  |
| **2** | **Flight** |  |  |
|  | Minimum duration: 80 min with payload | ☐ Yes ☐ No |  |
|  | Minimum range: 80 km | ☐ Yes ☐ No |  |
|  | Flight speed minimum: 30km/h with payload | ☐ Yes ☐ No |  |
|  | Maximum flying Altitude: 3500 ASL | ☐ Yes ☐ No |  |
|  | Wind resistance: level 6 | ☐ Yes ☐ No |  |
| **3** | **Power Source** |  |  |
|  | Source: Gasoline/Electric/ Hybrid | ☐ Yes ☐ No |  |
|  | Fuel and battery capacity; based on endurance | ☐ Yes ☐ No |  |
|  | Redundant power system | ☐ Yes ☐ No |  |
|  | Easily swappable battery: within 3 minute | ☐ Yes ☐ No |  |
|  | Engine type- Electric fuel injection/Li-PO with smart and fast battery charger/Hybrid with smart and fast battery charger | ☐ Yes ☐ No |  |
| **4** | **Flight Control** |  |  |
| **4.1** | **Flight Controller** |  |  |
|  | Software: Open source/ non-proprietary Firmware and flight management system | ☐ Yes ☐ No |  |
|  | Data encoding capability | ☐ Yes ☐ No |  |
|  | Full autonomous system including | ☐ Yes ☐ No |  |
|  | 1 Geofencing | ☐ Yes ☐ No |  |
|  | 2 breakpoint return | ☐ Yes ☐ No |  |
|  | 3 intelligent return to home | ☐ Yes ☐ No |  |
|  | Payload and gimbal control | ☐ Yes ☐ No |  |
|  | Support multiple types of payload | ☐ Yes ☐ No |  |
|  | Ground station pairing: within 2 minute | ☐ Yes ☐ No |  |
|  | Firmware and software update manager | ☐ Yes ☐ No |  |
|  | Secure boot loader | ☐ Yes ☐ No |  |
|  | Integrated power management system | ☐ Yes ☐ No |  |
| **4.2** | **Redundant inertial measurement unit (IMU):** | ☐ Yes ☐ No |  |
|  | Gyro/accelerometer | ☐ Yes ☐ No |  |
|  | Onboard Magnetometer | ☐ Yes ☐ No |  |
|  | Onboard Barometer | ☐ Yes ☐ No |  |
|  | Compass | ☐ Yes ☐ No |  |
|  | GNSS (multiple satellites) | ☐ Yes ☐ No |  |
|  | Autopilot: Yes | ☐ Yes ☐ No |  |
|  | On flight mission planning: Yes | ☐ Yes ☐ No |  |
|  | Plug and play controller: Yes | ☐ Yes ☐ No |  |
|  | Automatic Fail-safe operation: Yes | ☐ Yes ☐ No |  |
|  | Flight mode: Manual/Autonomous | ☐ Yes ☐ No |  |
| **5** | **Data link system** |  |  |
| **5.1** | **Data link** |  |  |
|  | RC distance minimum 2 km | ☐ Yes ☐ No |  |
|  | Secure data link at 50 km range or above | ☐ Yes ☐ No |  |
| **5.2** | **Security**: |  |  |
|  | Speed Spectrum technique (FHSS/DSSS | ☐ Yes ☐ No |  |
|  | advanced Encryption system for data link | ☐ Yes ☐ No |  |
| **6** | **Ground system** |  |  |
| **6.1** | **Portable Ground Control station** |  |  |
|  | Quad core or better mobile process | ☐ Yes ☐ No |  |
|  | Storage 128GB better + Memory card | ☐ Yes ☐ No |  |
|  | 6GB RAM or better | ☐ Yes ☐ No |  |
|  | Integrated joystick control | ☐ Yes ☐ No |  |
|  | multi touch display | ☐ Yes ☐ No |  |
|  | Radio compatible with external antenna configuration | ☐ Yes ☐ No |  |
|  | 8 channel transmitter or better | ☐ Yes ☐ No |  |
|  | Redundant power supply batteries | ☐ Yes ☐ No |  |
|  | 10 inch integrated display or better | ☐ Yes ☐ No |  |
|  | Rugged case | ☐ Yes ☐ No |  |
|  | IP65 Dust and Water-resistant Design or equivalent | ☐ Yes ☐ No |  |
|  | **Operating system**: Microsoft windows or Android | ☐ Yes ☐ No |  |
|  | **Tactical Radio Integration**: minimum 2 km supporting 4k surveillance video | ☐ Yes ☐ No |  |
|  | **Communication**: Ethernet (RJ45),WIFI,Bluetooth, 3G/4G/LTE and GPS | ☐ Yes ☐ No |  |
|  | **Interface**: USB and USB-C | ☐ Yes ☐ No |  |
| **7** | **Software and related factors** |  |  |
|  | Agricultural processing software in CD with key | ☐ Yes ☐ No |  |
|  | **Function include:** |  |  |
|  | Real-time telemetry data transmission | ☐ Yes ☐ No |  |
|  | Mapping and surveying | ☐ Yes ☐ No |  |
|  | 3D mapping | ☐ Yes ☐ No |  |
|  | Navigator and Geotagging | ☐ Yes ☐ No |  |
|  | Mosaicking redundancy | ☐ Yes ☐ No |  |
|  | Geo tagging | ☐ Yes ☐ No |  |
|  | Atmospheric correction | ☐ Yes ☐ No |  |
|  | Geometric correction | ☐ Yes ☐ No |  |
|  | Image co registration | ☐ Yes ☐ No |  |
|  | Masking | ☐ Yes ☐ No |  |
|  | Extraction of image derived statistics | ☐ Yes ☐ No |  |
|  | Support file type –.KML/.KMZ/.GEOTIFF/.MBTiles/.WMTS | ☐ Yes ☐ No |  |
|  | Software Support: min 1 year | ☐ Yes ☐ No |  |
|  | Including |  |  |
|  | 1 Re Configuration and customization | ☐ Yes ☐ No |  |
|  | 2 Software update | ☐ Yes ☐ No |  |
|  | 3 Troubleshooting | ☐ Yes ☐ No |  |
| **8** | **Trainings** |  |  |
|  | 1 Operational training | ☐ Yes ☐ No |  |
|  | 2 Maintenance training | ☐ Yes ☐ No |  |
|  | 3 Software training | ☐ Yes ☐ No |  |
| **9** | **Payload** |  |  |
|  | The drone shall fit with all the three payloads mentioned under this section  Below is the configuration of the Payloads :   * 1 drone shall come with all the payloads as listed here under this section); * 1 drone with Payload 1(RGB camera ; * 4 drones with payload 2(Multispectral Camera) and * 3 drones with payload 3(LIDAR Imaging camera) | ☐ Yes ☐ No |  |
|  | Integrated Gimbal | ☐ Yes ☐ No |  |
|  | Support multiple standard camera payload (RGB. Multispectral Camera, LIDAR) | ☐ Yes ☐ No |  |
|  | Interface: USB connection | ☐ Yes ☐ No |  |
|  | Storage:128GB | ☐ Yes ☐ No |  |
|  | **Payload 1: min 42MP high resolution RGB camera** (One unit for each drone) | ☐ Yes ☐ No |  |
|  | 35 mm lens, full-frame sensor, 42 MP | ☐ Yes ☐ No |  |
|  | **Payload 2: Multispectral Camera**(One unit for each drone) | ☐ Yes ☐ No |  |
|  | 8 mm lens, 5 individual custom multispectral sensors | ☐ Yes ☐ No |  |
|  | Number of camera: 5 | ☐ Yes ☐ No |  |
|  | (Red/Green/Blue/NIF/RGB) | ☐ Yes ☐ No |  |
|  | Optimal compatible Thermal imaging device | ☐ Yes ☐ No |  |
|  | **Payload 3: LIDAR Imaging camera** (One unit for each drone) | ☐ Yes ☐ No |  |
|  | Optimized and sunlight protected | ☐ Yes ☐ No |  |
|  | Minimum 200 m range with compact form factor | ☐ Yes ☐ No |  |
|  | An accuracy of 1-3cm or better. | ☐ Yes ☐ No |  |
|  | Measurement rate Points per sec minimum 350K or better | ☐ Yes ☐ No |  |
|  | Horizontal (360°) and vertical (40°) FoV or better | ☐ Yes ☐ No |  |
|  | Vertical and Horizontal accuracy right down to 0.2° or better | ☐ Yes ☐ No |  |
|  | Advanced features for minimizing false positives | ☐ Yes ☐ No |  |
|  | Internal SSD storage = yes | ☐ Yes ☐ No |  |
|  | Data output interface = Ethernet and others | ☐ Yes ☐ No |  |
|  | Environmental protection = IP64 or better | ☐ Yes ☐ No |  |
|  | Temperature Range = -100 to + 400 or better | ☐ Yes ☐ No |  |
| **10** | **Spare parts** |  |  |
|  | Multirotor Motor, Propeller and ESC (minimum one full set (9 ea) | ☐ Yes ☐ No |  |
|  | Battery for electrical system if drone is Gasoline (18 ea) | ☐ Yes ☐ No |  |
|  | Engine Type : 1 full set of engine for each drone (9 set) | ☐ Yes ☐ No |  |
|  | Ground control spare battery (9 ea) | ☐ Yes ☐ No |  |
| **11** | **Warranty:** minimum 1 year | ☐ Yes ☐ No |  |
| **12** | The equipment manufacturer/supplier have a local agent/dealer | ☐ Yes ☐ No |  |
|  | If No, can you commit/agree to arrange a local agent/dealer within 2-3 weeks after award | ☐ Yes ☐ No |  |
| **LOT 3** | **Image processing computer (23 ea)** |  |  |
|  | **CPU**: 6-core, 8-thread, 1.8GHz or better with turbo boost and hyperthreading. | ☐ Yes ☐ No |  |
|  | **GPU**: Midrange or higher discrete GPU with 8GB GDDR6, 1800MHz or higher. PCIe 4.0+ interface. | ☐ Yes ☐ No |  |
|  | **RAM**: 16GB, DDR4, 2400MHz or better. | ☐ Yes ☐ No |  |
|  | **Display**: FHD, 120Hz 400 nits or higher. HDR, Anti-Glare 14" minimum. | ☐ Yes ☐ No |  |
|  | **Storage**: minimum 512GB SSD NVme | ☐ Yes ☐ No |  |
|  | **Battery**: minimum 6hrs | ☐ Yes ☐ No |  |
|  | **Connectivity**: multiport USB 3.0, Bluetooth 5.0 BLE, WiFi Dual band 802.11AX or better. | ☐ Yes ☐ No |  |
|  | **Warranty:** minimum 1 year | ☐ Yes ☐ No |  |

1. **Delivery requirements and Comparative Data Table:**

| **UNOPS Requirements** | | **Is the bid compliant?** Bidder to complete | **Details**  Bidder to complete |
| --- | --- | --- | --- |
| **Delivery time** | Bidder shall deliver the goods **90** days after Contract signature. | ☐ Yes ☐ No | Insert details |
| **Delivery place and Incoterms rules** | DAP Addis Ababa, Ethiopia including custom clearance handling at destination , as per Incoterms 2020  UNOPS reserve the right to award contracts on FCA Terms. | ☐ Yes ☐ No | Insert details |
| **Consignee details** | Federal Democratic Republic of Ethiopia, Ministry of Agriculture, Addis Ababa, Ethiopia | ☐ Yes ☐ No | Insert details |
| **UNOPS Right to vary requirements** | At the time the Contract is awarded, UNOPS reserves the right to vary the quantity of the goods and associated services specified above, provided this does not exceed +/- 20%, without any change in the unit prices or other terms and conditions of the ITB. | ☐ Yes ☐ No | Insert details |

**Additional required information that bidders are expected to provide together with their bid submission.**

* Manufacturer name and year of manufacture of the chosen equipment
* Country of origin of the chosen equipment
* Detailed product data sheet/ catalogue of the chosen equipment

1. **Inspections and tests**

The following inspections and tests shall be performed:

* Inspection and test by the manufacturer/agent

The vendor must have the goods inspected in the manufacturer’s works by a competent authority and submit a test certificate and also a guarantee/warranty certificate that the goods conform to written specifications.

UNOPS or its representative shall inspect and/or test any or all items of the goods to confirm their conformity to the contract, prior to dispatch from the manufacturer’s premises. Such inspection and clearance will not prejudice the right of the consignee to inspect and test the goods on receipt at destination.

If the goods fail to meet the laid down specifications, the supplier shall take immediate steps to remedy the deficiency or replace the defective goods to the satisfaction of the purchaser.