TECHNICAL SPECIFICATION

The equipment offered must meet the minimum technical specifications or better

LOT 1: Meteorological Stations

TECHNICAL SPECIFICATIONS
Supply of Three Meteorological Stations

1. General Requirements

The Contracting Authority currently operates ten meteorological stations manufactured by METER Group, equipped with ZL6 Basic data loggers. Data are manually retrieved from the stations via Bluetooth and subsequently incorporated into a shared research database.

To ensure the continuity of long-term meteorological measurements and data comparability, the new stations must support data collection at comparable measurement intervals and in consistent measurement units, as well as manual data retrieval without an internet connection. Data must be available in a clearly structured, machine-readable format suitable for integration into the existing research database.

Components from different manufacturers are also permitted, provided that the Tenderer ensures and demonstrates, through appropriate technical documentation, their mutual compatibility, compliance with the required measurement specifications, and proper operation of the complete measurement system.

The Tenderer must specify the manufacturer and model of each component in the tender and provide the relevant technical documentation.

The tender must include three complete and identical meteorological station sets.

Each meteorological station must include:

- Data logger;
- Air temperature, relative humidity, and atmospheric pressure sensor;
- Rain gauge;
- Ultrasonic wind speed and direction sensor;
- Autonomous power supply system;
- Appropriate connection cables and components required for connecting the sensors.

2. Data Logger

The data logger must meet the following technical requirements:

- **Sensor connectivity and expandability:** Ability to connect at least six independent sensor assemblies. The Contracting Authority plans to expand the meteorological stations in the future by adding sensors for solar and UV radiation, soil water content, soil temperature, and soil electrical conductivity. The data logger must support the connection and recording of data from these additional sensor types without replacing the existing data logger or requiring the purchase of an additional one. Additional sensors must be connectable using the available inputs or a functionally equivalent solution. The Tenderer must demonstrate the expandability of the system through appropriate technical documentation.
- Support for appropriate digital, analogue, and/or pulse signals, depending on the sensors offered.
- Data logging interval: 60 minutes.
- Measurement sampling at least once per minute, with calculation of hourly averages or totals, as appropriate for each measured variable.

- Internal memory sufficient to store at least six months of measurements from all connected sensors at an hourly logging interval.
- Retention of previously stored data in the event of a power interruption.
- Ability to transfer stored data directly to a computer via USB and export them to a machine-readable file without requiring an internet connection.
- Direct wireless connection to a mobile device (Android or iOS) via Bluetooth or a functionally equivalent local wireless technology. The connection must enable:
  - Viewing current measurements from connected sensors;
  - Viewing the status and settings of the data logger;
  - Configuring the data logger and synchronising its clock;
  - Manually downloading stored measurement data to a mobile application.
- Field operation without requiring mobile network coverage or a continuous internet connection.
- **Autonomous power supply:** Power must be provided by batteries or another autonomous power supply system. The power supply must ensure at least six months of uninterrupted operation of the complete supplied meteorological station configuration, including all connected sensors, without connection to an external electrical power supply or battery replacement.
- Weather-resistant and UV-resistant enclosure with a protection rating of at least IP55 or equivalent.
- Suitability for long-term outdoor operation.

3. Rain Gauge

The rain gauge must meet the following technical requirements:

- Automatic measurement and recording of precipitation amounts.
- Measurement resolution of 0.2 mm per measurement increment or finer.
- Ability to calculate hourly and daily precipitation totals.
- Design suitable for permanent outdoor installation, using materials resistant to moisture and UV radiation.
- Ability to level the sensor during installation.
- Documented measurement resolution and procedures for verifying measurement accuracy.
- Compatibility with the supplied data logger.
- Type: tipping-bucket rain gauge (double-spoon mechanism).

4. Air Temperature, Relative Humidity, and Atmospheric Pressure Sensor

Air Temperature

- Measurement range: at least –40 to +80 °C.
- Resolution: 0.1 °C or better.
- Accuracy of the temperature sensing element: ±0.2 °C or better under the conditions for which the manufacturer specifies this accuracy.

Relative Humidity

- Measurement range: 0–100% RH.
- Resolution: 0.1% RH or better.
- Accuracy: no worse than ±2 percentage points RH within the 20–80% RH range at temperatures from 0 to 40 °C.
- Documented sensor response characteristics and long-term measurement stability.

Atmospheric Pressure

- Measurement range: at least 1–120 kPa.
- Resolution: 0.01 kPa or better.

- Accuracy: ±0.05 kPa or better at 25 °C.

Vapour Pressure

- Vapour pressure must be obtainable from the measured meteorological variables.
- Measurement or calculated value range: at least 0–47 kPa.
- Resolution: 0.01 kPa or better.

Additional Requirements

- The air temperature and relative humidity sensor must be equipped with an appropriate radiation shield to minimise the influence of direct solar radiation on measurements.
- The sensor must be suitable for long-term outdoor research measurements.
- The Tenderer must provide documentation on measurement accuracy and factory calibration procedures or other methods used to verify measurement performance.

5. Ultrasonic Wind Speed and Direction Sensor

The ultrasonic anemometer must meet the following technical requirements:

- **Wind speed:** Measurement range of at least 0–30 m/s, resolution of 0.01 m/s or better, and accuracy of ±0.3 m/s or ±3% of the measured value, whichever is greater, or better.
- **Wind direction:** Measurement range of 0–359°, resolution of 1° or better, and accuracy of ±5° or better.
- **Wind gusts:** Ability to record maximum wind gusts, with a documented measurement and time-averaging methodology.
- **Tilt measurement:** Ability to measure the tilt of the anemometer along two mutually perpendicular axes (X and Y), with the possibility of recording and exporting tilt data together with wind measurements.
- Tilt measurements are intended to monitor the horizontal alignment of the anemometer during long-term field measurements and to ensure the quality and reliability of wind measurements. An integrated tilt sensor or a functionally equivalent integrated solution is acceptable.
- The anemometer must be suitable for long-term outdoor operation, compatible with the supplied data logger, and supported by documentation specifying its measurement characteristics and procedures for verifying measurement accuracy.