

PORT OF DURBAN

ISLAND VIEW SEAWALLS UPGRADE

TENDER NUMBER: TBC

VOLUME III: CONTRACT DOCUMENT

ANNEXURE E4

GENERIC SPECIFICATIONS

DRONE SURVEYS

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E4 DRONE SURVEYS

1. SURVEY EQUIPMENT

Unmanned aerial vehicle (drone) with airborne LiDAR. The drone shall be able to operate effectively in wind speeds up to 8 m/s.

The data logger system must have adequate electronic storage capabilities. The system shall store multiple inputs (Date, Time, X, Y, Z Position, Photographs) on an electronic medium, which can be transferred to a personal computer. The system shall be provided with the necessary approved software to plot the positions of the recordings and draw maps, contours, cross profiles, etc. The data shall be stored at 1-second intervals or less.

2. SURVEY CONTROL AND SETTING OUT OF THE WORKS

2.1 General

The coordinate system used during this contract shall be the Universal Transverse Mercator (UTM) Zone 36S. The levelling datum shall be the Port of Durban Chart Datum (CDP), which is 0.9 m below Mean Sea Level (MSL).

All survey work shall be carried out and certified by a qualified land surveyor (SAGC recognized surveying course or equivalent).

2.2 Bench marks

The local bench mark used shall be documented appropriately. If no existing local bench marks are available, a new bench mark shall be established and clearly marked on site. The bench mark shall be suitably located and adequately protected for future use during construction which may occur after a few years.

A schedule of the bench mark(s) used shall be included in a final drawing(s), with the following information:

- Bench mark designation;
- Spot level value; and
- Plan coordinates.

2.3 Technical requirements

CONDITIONS: The survey shall be undertaken at low tide. The LiDAR configuration shall be such that the ground levels, rather than tree canopy, other vegetation levels or pipe rack levels are detected.

ACCURACY: The X, Y, Z coordinates shall have a horizontal and vertical accuracy of 5 cm. Grid spacing of points shall be 0.2 m.

2.4 Deliverables and data presentation

The *Contractor* shall submit a survey quality control plan to the *Project Manager*. A survey report shall be submitted to the *Project Manager* on completion of all surveys. The report shall give a clear account of how the survey was carried out, the results achieved, the difficulties encountered and the shortcomings. Emphasis shall be placed on the analysis of achieved accuracies.

The *Contractor*, upon completion of the survey, shall produce the following:

1. High resolution digital geo-referenced orthophotos at 2.5 cm pixel size
2. Digital Elevation Model (DEM) extracted from the Digital Surface Model (DSM)
3. Survey report indicating the datum used, time of survey, conditions during survey, survey personal, equipment used and methodology.
4. Date, time and X, Y, Z data, stored in ASCII format: comma separated values (CSV), txt or tab delimited.
5. Photographs of any significant items: existing services, stormwater outlets, moorings, rat proofing, unknown structures etc.

3. **PERMITS**

The *Contractor* is advised that various processes are required to obtain a drone survey permit for the Port of Durban. The *Contractor* shall ensure that the relevant Authorities are identified (Including but not limited to the Port Engineer, TNPA Security, SSA, SAPS, Cutler) and consulted prior to an application being made. The *Contractor* shall allow for adequate time for these processes to be completed. Costs associated with obtaining the required permits shall be for the *Contractor*.