

# WGS84 Global Ellipsoid Data for Drone Pilots: A Practical Geodetic Reference Tool for RTK/PPK Mapping in South Africa

Stephanus Minnie and Shaakir Deal (South Africa)

**Key words:** GNSS/GPS; Positioning; Reference systems; Remote sensing; WGS84; geodetic reference frame; ellipsoidal height; RTK/PPK; trig beacons; Town Survey Marks; drone mapping

## SUMMARY

Abstract (≈290 words; within FIG’s 250–500 requirement)

Accurate positioning underpins defensible drone-derived mapping. This contribution presents a practitioner-focused application, “WGS84 Global Ellipsoid Data for Drone Pilots” (author: Stephanus Minnie; published 31 October 2024), designed to streamline field access to authoritative coordinate information for control selection, base-station setup, and post-processing. The application aggregates Trigonometrical beacons and Town Survey Marks (TSM) and exposes their coordinates in decimal degrees and degrees–minutes–seconds, together with ellipsoidal heights, enabling alignment with WGS84 for direct use in D-RTK/RTK and PPK workflows. The tool functions as a lightweight geodetic aide: pilots can pre-plan missions, anchor image blocks to reliable control, and verify GNSS solutions against published marks.

The paper will articulate three elements that matter to FIG’s positioning and land administration community. First, geodetic soundness: how a WGS84-centred workflow reduces datum confusion during field operations, clarifies vertical references through ellipsoidal height usage, and supports rigorous transformations when required. Second, operational integration: a stepwise field procedure for selecting marks, configuring RTK base setups, logging metadata, and validating solutions during and after flights. In practice, this often means a simple sequence—select suitable marks, confirm visibility and monument condition, initialise RTK with a published point, and record check shots for quality assurance. Third, governance and caution: the application is an assistance tool; when absolute accuracy is required, coordinates and metadata should be verified directly with National Geo-spatial Information (NGI) sources, and local regulatory obligations for RPAS operations must be

---

WGS84 Global Ellipsoid Data for Drone Pilots: A Practical Geodetic Reference Tool for RTK/PPK Mapping in South Africa (14041)

Stephanus Minnie and Shaakir Deal (South Africa)

FIG Congress 2026

The Future We Want - The SDGs and Beyond

Cape Town, South Africa, 24–29 May 2026

observed.

The expected contribution is a replicable, low-friction reference pattern for drone programmes operating at municipal and national scales: a WGS84-anchored control workflow, a concise field checklist for RTK/PPK missions, and a data-handling note that distinguishes ellipsoidal heights from orthometric heights in downstream GIS. The approach improves positional reliability for cadastral-adjacent mapping, infrastructure inspection, environmental monitoring, and other public-sector use cases, while remaining simple enough for rapid adoption by field teams.

---

WGS84 Global Ellipsoid Data for Drone Pilots: A Practical Geodetic Reference Tool for RTK/PPK Mapping in South Africa (14041)  
Stephanus Minnie and Shaakir Deal (South Africa)

FIG Congress 2026  
The Future We Want - The SDGs and Beyond  
Cape Town, South Africa, 24–29 May 2026