# Enhancing Geodetic Reference Systems in Kiribati: Installation and Impact of a Secondary CORS Site

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**SUMMARY**

The isolation of the Republic of Kiribati inherits geodetic inequalities that limit the nation's abilities to maintain accurate spatial data, adopt modern surveying practices and ensure the integrity of the land administration and cadastre systems. In late 2025, a team of university surveying staff and students from the University of Southern Queensland (UniSQ) travelled to Tarawa to assist the Land Management Division (LMD) in addressing these challenges through targeted technical support and capacity building. The primary objective involved investigating and correcting a long-standing 9m horizontal error in the national datum to improve the reliability of infrastructure mapping/planning and coastal analysis efforts. Completing this, multiple field survey training sessions were delivered to strengthen local surveying capabilities, advance professional skills, and support institutional development. This is in direct alignment with SDG 4 (Quality Education), 10 (Reduced Inequalities), and 16 (Peace, Justice and Strong Institutions).

Alongside the team's collective work, an independent honours research project was undertaken to establish and evaluate the effectiveness of a new Continuously Operating Reference Station (CORS) donated by Positioning Insights. Although separate from the datum correction task, this project demonstrated the broader geodetic and governance benefits of permanent GNSS infrastructure. The purpose of the research is to show how the implementation of a second CORS will enhance redundancy, improve network geometry, and provide more stable, higher quality, real-time Global Navigation Satellite System (GNSS) solutions to support surveying, mapping, engineering and infrastructure developments across Tarawa. This directly aligns with FIG Commission 5’s mission to improve positioning and measurement, particularly in small island development states (SIDS). Introducing a second CORS helps bridge the gap between the limited accuracy and single-point vulnerability of the existing CORS, and the standards expected of modern positioning systems. Kiribati’s sole CORS station (KIRI) was found to be relied upon heavily

during the three-month collaboration between UniSQ representatives and LMD staff, reinforcing the need for a resilient multi-station system.

The method of installing the CORS required close collaboration by the UniSQ team with the LMD survey team, local businesses and international partners, demonstrating a practical alignment with SDG 17 (Partnerships for the Goals). The sourcing of materials, fabrication, and the mounting of the bracket using heavy equipment relied upon partnerships with small local enterprises, which provided the mutual benefit of supporting the technical demands of the project while contributing financially and professionally to the local industry in alignment with SDG 11 (Sustainable Cities and Communities).

The implications of this work extend beyond immediate national benefit. The CORS will contribute to the Asia-Pacific Reference Frame (APREF), providing short-term advantages such as improved regional data sharing and more reliable station coordinates. Over time, the combined stations will strengthen contributions to the International Terrestrial Reference Frame (ITRF), expand geodetic infrastructure in a severely under-observed region, support the development of a denser velocity field model, and aid efforts to refine the regional reference frame. These long-term outcomes demonstrate how the installation process and methodological link directly to wider regional and global geodetic initiatives.

Together, these initiatives highlight the importance of modern geospatial technologies, knowledge exchange, and capacity building in overcoming geodetic inequalities and supporting sustainable development and climate responses in Kiribati and across the broader central Pacific region. This report will investigate these activities in detail and assess their contribution to a more robust and equitable geospatial future for Kiribati.