

A High Quality CORS Network for WA

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Landgate is Western Australia's Land Information Authority and custodian of the State's Geodetic Network. The Geodetic Network underpins all spatial data in Western Australia and supports land development through property boundaries; infrastructure utilities - roads, water, power, local government; mining; environmental studies - wetlands, saltlands; hazard management - flood, seismic, sea level monitoring; and general mapping purposes. Landgate has participated in a successful consortia bid for funding through the Federal Government's National Collaborative Research Infrastructure Strategy (NCRIS) for a significant upgrade to Australia's Geodetic Infrastructure. The funding will provide for a National network of 90 Continuously Operating Reference Station (CORS) Global Navigation Satellite System (GNSS) installations. It is contingent on co-contribution funding from participating organisations including Landgate. Landgate will receive funding through NCRIS for 13 sites and will fund a further 13 sites and also provide funding and logistical support for the installation and ongoing maintenance and operational costs of the network. This new network will provide infrastructure that supports research into sea level monitoring related to climate change, atmospheric modelling for improved weather forecasting and crustal deformation/seismic monitoring, possible subsidence due to ground water extraction, and precise satellite orbits for improved GPS services and accuracy. It will also provide the base framework upon which real time services can be developed with applications in surveying and mapping as well as machine guidance/auto steering for engineering, mining and precision agriculture, vehicle navigation and tracking, location based services and speed limiting systems.

Western Australia currently has 6 high quality CORS sites these being Gnangara, New Norcia, Mingenew, Roebourne, Christmas and Cocos Keeling Islands. These sites merely transmit data to Canberra, which is then made available for post processed surveying and research applications. There is also a real time service provided by private industry, operating over the greater Perth Metropolitan area from Binningup to Two Rocks and east to the Darling Scarp.

The new National CORS network initially needs to meet science objectives, hence must be placed near key precision tide gauges - in WA these are located at Hillarys, Broome and Esperance. Note that Hillarys already has an associated CORS but its stability cannot be guaranteed to the same degree as that required for the National Network. Other scientific and design requirements for WA are an East - West Transect at about the Latitude of Perth, coverage of the South West Seismic Zone and the main transportation routes - at a spacing of around 200km. The current network design achieves the 200km spacing in the southwest region, however the sites will initially be more sparsely placed in the northern region of the State. The original proposal to NCRIS had planned 35 CORS sites in WA, however due to funding cuts, this was reduced to 26. Landgate will be looking for opportunities to partner with private industry to achieve the optimal 35 sites. The sites will use the latest technology, high quality GNSS equipment and include a digital metrological station. The antennas will be placed on a substantial concrete pillar linked to bedrock where possible. Gravity measuring facilities will also be established at selected sites.

The rollout schedule is for 5 sites to be established in 07/08 - these will be Broome, Esperance, Kalgoorlie, Albany and possibly Burakin. Then for the following 3 years, 7 sites will be built each year - specific sites for these out years have not as yet been determined.



Figure 1. Map showing WA's proposed CORS Network



Figure 2. Housed receiver and computer equipment



Figure 3. Antenna Pillar

The Landgate WA CORS network will not provide the full suite of end user solutions. Instead the network is designed to provide a high quality multi purpose base framework and Landgate will be looking to private industry to densify the network and develop value add real time services in strategic areas – such as the south west region of the State. Currently these services require a much closer density of around 70km – however as the technology (hardware and software) continues to develop it is expected that the distance from base stations will also be able to be extended beyond 70km. In addition, there are developments in the satellite system arena - GPS Modernisation, Russia's GLONASS revitalisation and proposed new Satellite Systems - Europe's Galileo and China's Compass system are all proposed over the next 5-7 years. These developments also have the potential to improve reliability and extend the distance from base stations for accurate positioning services.

For Landgate the network will provide a modern base framework for the geodetic network in support of surveying and mapping in Western Australia. The proposed involvement of value added resellers to offer services from the network and provide infill sites hopefully will provide Landgate with a revenue stream to fund future equipment upgrades as the technology develops and new satellite systems come on stream.



Figure 4. Map Showing South West Region – Red are existing High Quality Sites; Yellow are the commercial real time network; Blue are proposed new sites