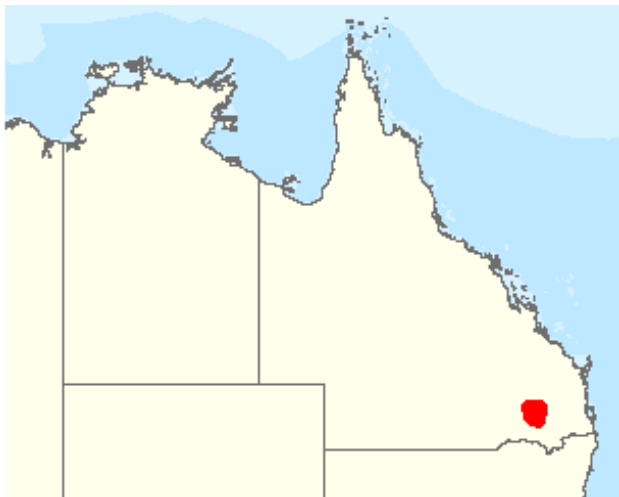


Significant Species Management Plan 5

Philotheca sporadica (Kogan Wax Flower)



Philotheca sporadica (Photos: Martin Bennett)



Philotheca sporadica Distribution Map (DoE, 2015)

EPBC Act Conservation Status

Vulnerable

NC Act Conservation Status

Near Threatened

Known Distribution

Philotheca sporadica is endemic to southern Queensland occurring in the Brigalow Belt South IBRA bioregion. Based on HERBRECS data, searched on 1st July, 2014, there are 41 records, collected between August 1940 and May 2011, in an area ranging from just west of an approximate line between Chinchilla and Tara, south-east to a line approximately between Kumbarilla to Dunmore State Forests. There is one HERBRECS record that is considered to be erroneous as the lat/long positions it north-east of Oakey, while the description of its location is in the Braemar State Forest.

Surveys by ecologists approved by the Australian Government Department of Environment (DoE; formerly known as DSEWPac) between 2010 and 2014 have identified an additional 3,186 records including new populations south of the Moonie Highway, north of the Braemar State Forest and west of the Chinchilla–Tara Rd (Figure 1). These locations are usually the epicenter of patches of *P. sporadica* as it appears to be a communal species, rarely if ever occurring as a single isolated plant.— **Figure 1**

illustrates the known geographic distribution of *P. sporadica* based on HERBRECS and supplemented by QGC's own field records.

The DoE (2008) Approved Conservation Advice for *P. sporadica* identifies that the total population size is estimated to be in excess of 64,000 individuals based on the previously known 11 populations. This information was based on Queensland herbarium records at the time. Since that time, an additional 30 populations have been identified, mostly from private land. Population estimates have more than doubled and are now conservatively estimated at >159,000. Both extent of occurrence and area of occupancy have increased substantially as additional survey effort locates new populations. While most of these occur on private land, it must be recognised that *P. sporadica* is found in a wider range of Regional Ecosystems (11.3.25, 11.5.1, 11.7.4, 11.7.5, 11.7.6, 11.7.7) than previously thought.

The increase in the known number of populations and geographic distribution since 2008 is likely explained by the increased survey effort undertaken within the region due to Coal Seam Gas (CSG) exploration activities.

Occurrence within Anya Block

QGC Field surveys have confirmed the presence of *P. sporadica* within QGCs existing Surat Basin gas fields. The closest HERBRECS and QGC records of *P. sporadica* occur just east of the Anya Project area in the QCLNG block David. Field surveys undertaken by RPS (2014) found that suitable habitat for the species occurs throughout most of Anya, with high value habitat associated with RE 11.7.4 more limited to the northern and western portions of the area. However, QGC research has found that the species is limited to REs 11.3.25, 11.5.1, 11.7.4, 11.7.5, 11.7.6 and 11.7.7 (QGC 2015). While suitable habitat for the species occurs within Anya, field validation surveys undertaken to date have not been able to confirm the presence of the species as no individuals have been found (RPS 2014).

Potential *P. sporadica* habitat using RE associations within the Anya project area is shown in **Figure 2**.

Description and Relevant Characteristics

P. sporadica is an open to compact, many branched, aromatic shrub measuring to 1.5 m tall. Its bark is black, furrowed and almost minnirichi-like with green, fleshy, warty new shoots. This species has small, spoon-shaped (club-like), warty, fleshy and concolorous leaves that measure to 5 mm long and 1 mm wide with entire margins. *P. sporadica* produces waxy, white, showy, five-petalled flowers arranged in axillary clusters towards the ends of branches. Its fruit has many lobes with rounded to braked tips (Halford 1995).

There is limited information available in relation to the germination and viability of *P. sporadica* seeds. Other members of the *Philotheca* genus are difficult to germinate but do respond positively to smoke water treatment (Halford 1995) and seed coat scouring (Halford 1995). Some related species have been propagated from cuttings.

In a report commissioned by QGC, titled "*Philotheca sporadica*: Population Genetics and Propagation" (USC 2014), it was concluded that the species is difficult to propagate from seeds or cuttings. The report found that propagation via cuttings was occasionally successful, although the initial timing of the propagation project in Winter may have exacerbated the low success rate with cuttings as Spring and Summer may have proved more successful for new plant material growth (USC 2012). Tissue-culture was highly successful and a QGC propagation trial and project was subsequently developed utilising tissue-culture techniques to satisfy QCLNG Project NCA Protected Plant permit requirements.

Biology and Reproductive Ecology

Halford (1995p) estimates that individual shrubs can live for 20 years however longevity of individual plants beyond 20 years has not been studied.

Flowering of *P. sporadica* has been recorded from August to October, and mature fruits have been observed in late November. Flower petals are white and open during the day and nectar is produced from glands at the base of the ovary (Halford, 1995).

Halford (1995) observed that only a small proportion of flowers set viable seed, but acknowledge that unusually dry seasonal conditions at the time could be the cause.

P. sporadica occurs in a relatively geographically restricted area around the locality of Kogan in south Queensland. It is expected that threatened species in relatively small, isolated populations like

P.sporadica may lose genetic diversity through drift and increased inbreeding (Ellstrand & Elam 1993; Leimu et al. 2006). Etterson (2004) found that the amount of genetic variation within a species is often seen as a surrogate measure of its potential to survive in changing environmental conditions.

In the study conducted by the USC, the sampled *P.sporadica* collected within the project area was found to possess high residual levels of genetic diversity within the sampled populations and further, these populations were found to be genetically similar. These results indicate a high gene flow among populations therefore distinct and viable gene connectivity between populations (USC 2012).

However, the *P. sporadica* offset project undertaken by QGC ultimately found that translocation of the species has a low success rate.

Preferred Habitat and Microhabitat

Philothea sporadica occurs in the Brigalow Belt South, Queensland Bioregion, in association with landzone 7 – Cainozoic duricrusts. It is found on residual hills which are remnants of laterised Cretaceous sandstones. Soils are shallow uniform sandy loams to clay loams or shallow texture contrast soils with loamy surfaces and medium clay subsoils; ironstone gravel is usually present. The soils on which this species grows are of extremely low fertility and poor physical condition. Vegetation is mainly low open forest of *Acacia burrowii*, *Eucalyptus exserta*, often surrounded by *Eucalyptus crebra*, *Eucalyptus fibrosa* subsp. *nubila* and *Callitris glaucophylla* (Halford 1995).

The DEHP Essential Habitat database (V3.1 2011) identifies two regional ecosystems known to be associated with *P.sporadica*, RE 11.7.4 including 11.7.4c and 11.7.7. However, it is also commonly found in 11.7.5 and known to occur in other Regional Ecosystems, often adjacent to the DEHP listed essential regional ecosystems including 11.3.25, 11.5.1 and 11.7.6.

Empirical evidence indicates that *P. sporadica* favours the edge of RE 11.7.5, often grading into 11.7.4 and 11.7.7. It is commonly found in association with *E. exserta*. Where *P. sporadica* is present, the scalded plateau of RE 11.7.5 is often bare or dominated by mature thickets of shrubs such as *Thryptomene* sp.. *Philothea sporadica* will occur in a dense belt around these thickets with some *P. sporadica* occurring amongst the thickets. While these *P. sporadica* can be either older specimens or young recruits, the general appearance is that the thryptomene thickets (being taller) are gradually excluding the *P. sporadica* from the top of the scald. Consequently, dense stands of *P. sporadica* occur along the edge of the RE 11.7.5 outcrop and grade out into the surrounding RE's (11.3.25 11.5.1, 11.7.4, 11.7.6, 11.7.7) until the surrounding ground cover becomes too dense. Extensions of the outer edges of the *P. sporadica* populations appear to follow the drainage lines from the scalds into the surrounding RE's.

Of these REs 11.5.1, 11.7.4 and 11.7.7 occur within the Anya area (RPS 2014).

General Threats

The current threat to this species is loss of habitat. There is no quantitative data to indicate that the number of *P.sporadica* populations is in decline (DoE 2011). In fact, since 2008 an additional 30 individual populations have been identified (HERBRECS 2014) increasing its relatively restricted geographic extent to a much broader distribution. This increase in the known number of individual populations since 2008 is likely explained by the increase of survey effort undertaken within the region due to Coal Seam Gas (CSG) exploration activities rather than population expansion.

The lack of secure land tenure is also identified as a threat to the long term viability of this species. Populations on roadsides are also at risk from general road maintenance and inappropriate use of sites.

The main potential threats to *P.sporadica* are grazing, forestry practices, invasive weeds, and inappropriate fire regimes (DoE).

Potential Project Threats

Potential threats related to the project phases may include:

Development Threats

- Clearing of individuals for infrastructure;
- Indirect impacts from the inadvertent introduction of weeds that may compete with seedlings;
- Soil degradation from clearing, use of heavy vehicles and machinery and increased access by stock;
- Changes to surface hydrological regimes resulting from earthworks for well pad establishment leading to sedimentation; and
- Increased damage and grazing pressures from increased access by stock.

Operational Threats

- Sedimentation, increased salinity and pollution of surface water flows; and
- Habitat erosion from alterations, associated with infrastructure, to surface hydrological regimes.

Decommissioning Threats

- Altered fire regimes;
- Sedimentation, increased salinity and pollution;
- Increased likelihood of weed invasion from disturbed areas.

Management Strategies

Overall management for this species will focus on the identification and avoidance of populations when locating Project infrastructure. Where populations cannot be avoided, the management strategy will then focus on measures to assist in habitat recovery.

Planning and placement of infrastructure

During the planning phase proposed infrastructure locations will be placed following QGCs Constraints Planning and Field Development Protocol (The Protocol). The primary aim of the protocol is to avoid placing infrastructure within areas of significant environmental value, including MNES, by ranking constraints as Low, Moderate, High, Very High or No Go according to infrastructure type. In accordance with the Protocol, MNES, including *P. sporadica* are designated as either 'very high' or 'no go' constraints in the mapping depending on infrastructure type (e.g. static or linear). Buffers are applied to these areas, 200m for linear infrastructure and 300m for static infrastructure. These buffers are assigned the same constraint ranking as the MNES.

P. sporadica individuals will be ranked as 'No Go'. They are considered likely to be within discrete locations that can be avoided by minor changes to proposed infrastructure locations.

Where the constraint is 'No Go', QGC will not conduct activities in the area containing MNES unless:

- ground truthing and field ecological surveys demonstrate that siting infrastructure in that location will cause minimal adverse impact on MNES or ESAs, including habitat for listed species and/or MNES/habitat is recoverable;
- it would be within disturbance limits; and
- other constraints preclude any alternative location; or
- QGC obtains the relevant permits and/or approvals for the activity to commence e.g. EA Amendments or Clearing Permits.

Where the constraint is 'very high' QGC will seek alternative locations for proposed infrastructure in that location. Very high is generally assigned to environmental constraints when planning for linear infrastructure as it is not always possible to avoid these constraints.

Alternative locations may be recommended by QGC's environment advisers based on desktop analysis of environmental constraints, or the DoE approved ecologist conducting pre-clearance surveys in the field. The approval process for determining the final location of infrastructure is described in Section 3.0 of the Protocol. This requires all proposed infrastructure locations to be approved by various discipline managers within QGC.

Pegging Party Surveys

All proposed infrastructure locations are surveyed by a multi-functional group to determine the best location for each piece of infrastructure that takes into account all validated constraints (referred to as a pegging party). An ecological survey by a DoE approved ecologist forms part of the pegging party. During these surveys ecologists will search for *P. sporadica* within proposed disturbance areas and areas immediately adjacent. If the species is found the pegging party will aim to relocate proposed infrastructure to avoid individuals. If any individuals are unavoidable a quantification survey will be undertaken.

Quantification surveys

If the ecological survey determines that *P. sporadica* is within proposed disturbance areas, quantification surveys will be undertaken by DoE approved ecologists to confirm the disturbance to the species. These surveys will be undertaken prior to final internal approval of proposed infrastructure locations. Where

any high risk flora trigger areas are present under state mapping all quantification surveys will be undertaken as per the DEHP requirements.

Realignment of infrastructure

Where the species has been confirmed within proposed alignments infrastructure locations will be reconsidered. Where possible infrastructure will be pegged in areas where the species can be avoided or the total disturbance reduced as far as possible. Plants are likely to be in discrete locations that can be avoided by minor infrastructure moves. Plants will not be cleared unless the requirements of the protocol can be met or the location is agreed to by QPWS.

Clearing Permit

Where *P. Sporadica* is unavoidable a clearing permit application will be submitted to DEHP for clearing of the species. All clearing must be in line with the conditions of this permit including disturbance limits.

Should the species be identified, and impacts confirmed, the mitigation strategies outlined in the following section will be implemented.

Mitigation Measures

If *P. sporadica* is present within the proposed clearance area, the following measures will be implemented:

Clearing

- Pre-clearance walk through to be undertaken by a QGC FEO or Contractor environment representative
- Where possible, clearing areas should be reduced to avoid individuals on the edges of alignments;
- A clearing permit from DEHP will be required for all unavoidable plants;
- Demarking of adjacent populations with temporary fencing or flagging to avoid accidental damage;

Soil

- Prior to works commencing, a soil assessment will be undertaken to determine appropriate soil management requirements;
- The depth of topsoil strip will be assessed and confirmed on site with a QGC FEO to ensure protection of topsoil for rehabilitation purposes;
- Where practicable soil stockpiles will be kept in a way that ensures optimal preservation of the seed bank and soil will be spread back over the site as soon as practical as part of progressive or final rehabilitation; and
- Prior to works a site-specific drainage, erosion and sediment control plan will be developed by the contractor. The plan must include all appropriate mitigation measures and be approved by a QGC Field Environment Officer and Queensland Parks and Wildlife Service (QPWS).

Population and Habitat Loss

- Infrastructure will be located to maximise the use of areas of pre-existing disturbance;
- Infrastructure will avoid protected plant species wherever possible;
- The total disturbance proposed for the Anya project will not exceed 5% of the total Anya Project Area and disturbances will be spread throughout the area due to well spacing requirements. This means each site disturbance will be small compared to the surrounding vegetated area; and
- Rehabilitation will be undertaken as soon as possible after construction.

Weeds

- Weeds will be identified and recorded by an ecologist during pegging parties;
- For each site the contractor will develop a weed strategy and submit to a QGC FEO for approval; and
- Throughout all site activities crews will implement the QGC Weed and Pest Management Plan and Procedure for Weed Hygiene for Vehicle and Machinery. These documents specify requirements for weed hygiene, including ensuring all vehicles and machinery are certified weed free before commencing work on site and regular weed wash-down to minimise introduction and spread of weeds.

Fire

- QGC has no fire regime, fire management in the area may be undertaken by the Land manager, in this case Queensland Parks and Wildlife Service (QPWS) as per their usual management strategies;
- Staff and contractors will be made aware of fire risk levels and will use increased caution during high fire risk period;

- All combustible liquids onsite must be stored appropriately and in line with the relevant Australian standard where available. Storage of combustible liquids will be minimised during times of high fire risk;
- On site fire management practices shall be in accordance with Contractor HSSE requirements, relevant construction permits and method statements and appropriate dedicated firefighting equipment will be available at high risk construction sites to manage any fires that may start up and to avoid wildfires breaking out;
- Cleared work areas around QGC infrastructure and activities will act as fire breaks that prevent or reduce the potential of any fire started from QGC works spreading to local vegetation; and
- Cleared vegetation will be removed from or limited in fire break areas with preference for storing these materials toward the edges of cleared areas. For example, fire breaks of 15m will be maintained around well heads and vegetation placement for storage or progressive rehab will not occur within these areas (progressive rehabilitation will occur in other parts of the 1ha well pad area).

Reporting

- All sightings and impacts to the species will be recorded, and will also be reported to the relevant administering authority where required; and.
- Any identified locations of *P.sporadica* will be used to update this SMP.

Rehabilitation and Recovery

If *P. sporadica* is identified and clearing is determined to be unavoidable:

- Any adjacent populations will not be disturbed;
- Any clearing will be authorised by the relevant statutory authority in accordance with approval conditions;
- Rehabilitation will be progressively undertaken during construction following backfilling and completion of infrastructure establishment;
- Post construction rehabilitation to include reinstatement of soil and distribution of mulched vegetation. Natural regeneration will then be allowed to occur;
- As per QPWS requirements, rehabilitation will initially include seeding with a cover crop of annual millet grass to stabilise the area and prevent erosion while natural regeneration takes place and fertiliser application as per their specified rates.

Residual Impacts

Once the above mitigation and rehabilitation measures have been undertaken there is considered to be no or low residual impact to the species. QGC studies have determined that propagation and translocation is not effective and that natural regeneration is the most effective method for restoring this species. Stockpiling will ensure maximum preservation of the seed bank and progressive and final rehabilitation will encourage the natural regeneration of the area by stabilising and fertilising the soil. Therefore, within a few months of progressive or final rehabilitation all important habitat characteristics will have been reinstated to allow the species to begin to regenerate.

Performance Measures

Performance measures for this species includes:

- Any clearing of *P. sporadica* will be authorised by the relevant statutory authority in accordance with approval conditions;
- Pegging parties, quantification surveys (where required) and pre-clearing walkthroughs are to be undertaken to confirm the presence / absence of *P. sporadica*;
- Should impacts to the species occur, any adjacent populations will not be disturbed and an offset will be provided for the impacted plants, if applicable; and
- All progressive rehabilitation will occur within three months of construction.

Monitoring

Monitoring required for this species includes:

- Monitoring is not currently required as the species has not been confirmed as present within the

project area;

- DoE will be notified if the species is located;
- An appropriate monitoring program, incorporating the monitoring of any offset site, if applicable, will be established in conjunction with the relevant authority once any impact to *P. sporadica* is identified; and
- Monitoring of rehabilitation areas, including areas containing *P. sporadica*, will be undertaken to assess the success of rehabilitation.

References

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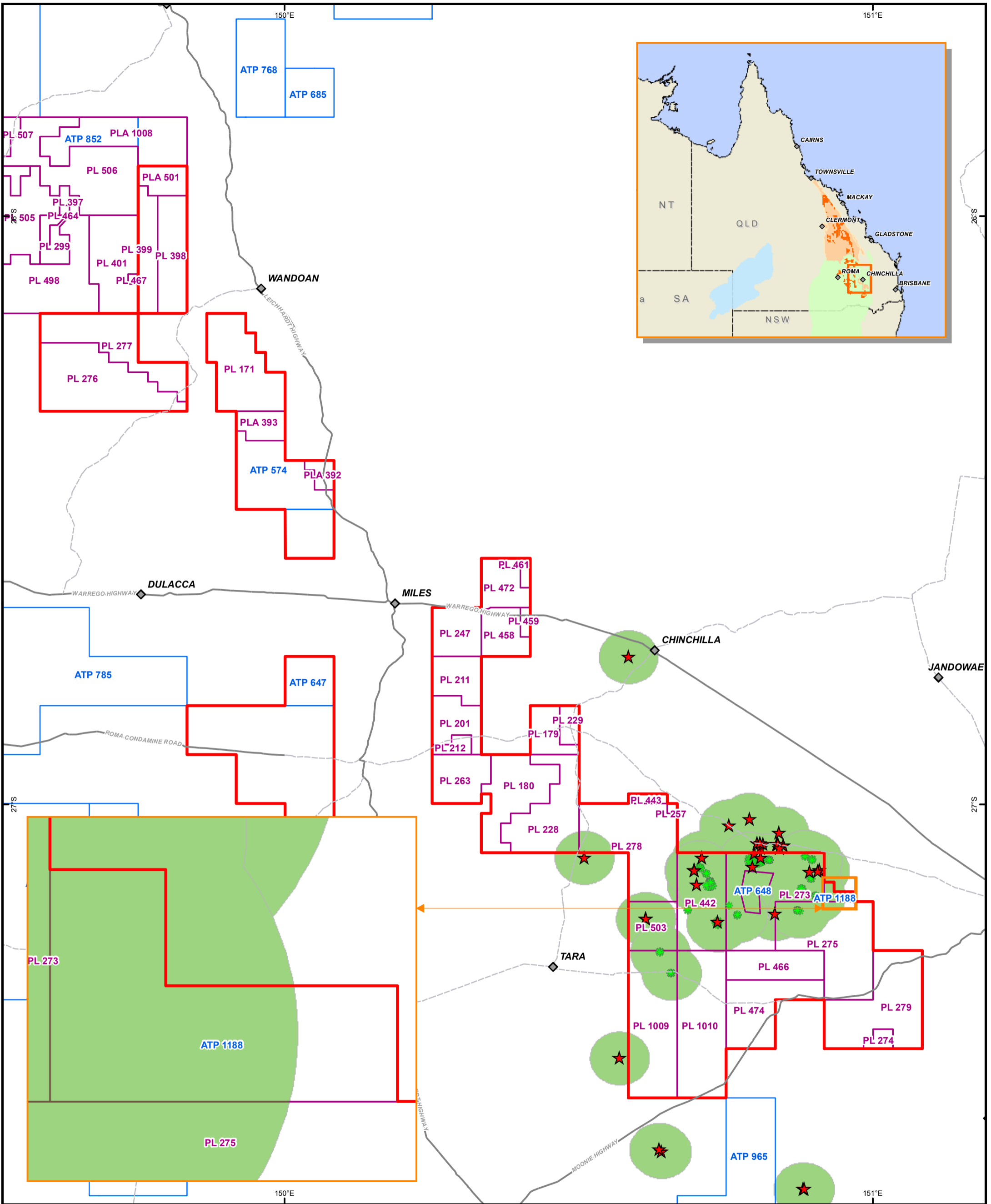
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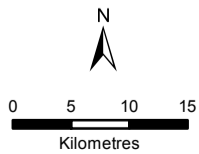
HERBRECS 2014, *Census of the Queensland Flora*, viewed November 2014, <https://data.qld.gov.au/dataset/census-of-the-queensland-flora-2014>.

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Figure 1 Kogan Wax Flower Distribution



Kogan Waxflower distribution



Map Projection: GDA 94

SCALE: 1:650,000 (A3)

DATA SOURCE:

Tenements - DME, Infrastructure - QGC
Towns - GA, Roads - DERM

- ◆ Town/City
- ★ *Philotheca sporadica* Records (HERBRECS)
- ✱ *Philotheca sporadica* Survey Records (QGC)
- Principal Road
- - - Secondary Road
- *Philotheca sporadica* Potential habitat
- QCLNG Project Area










DATE: 15/07/2015 **CREATED BY:** Rollmanc

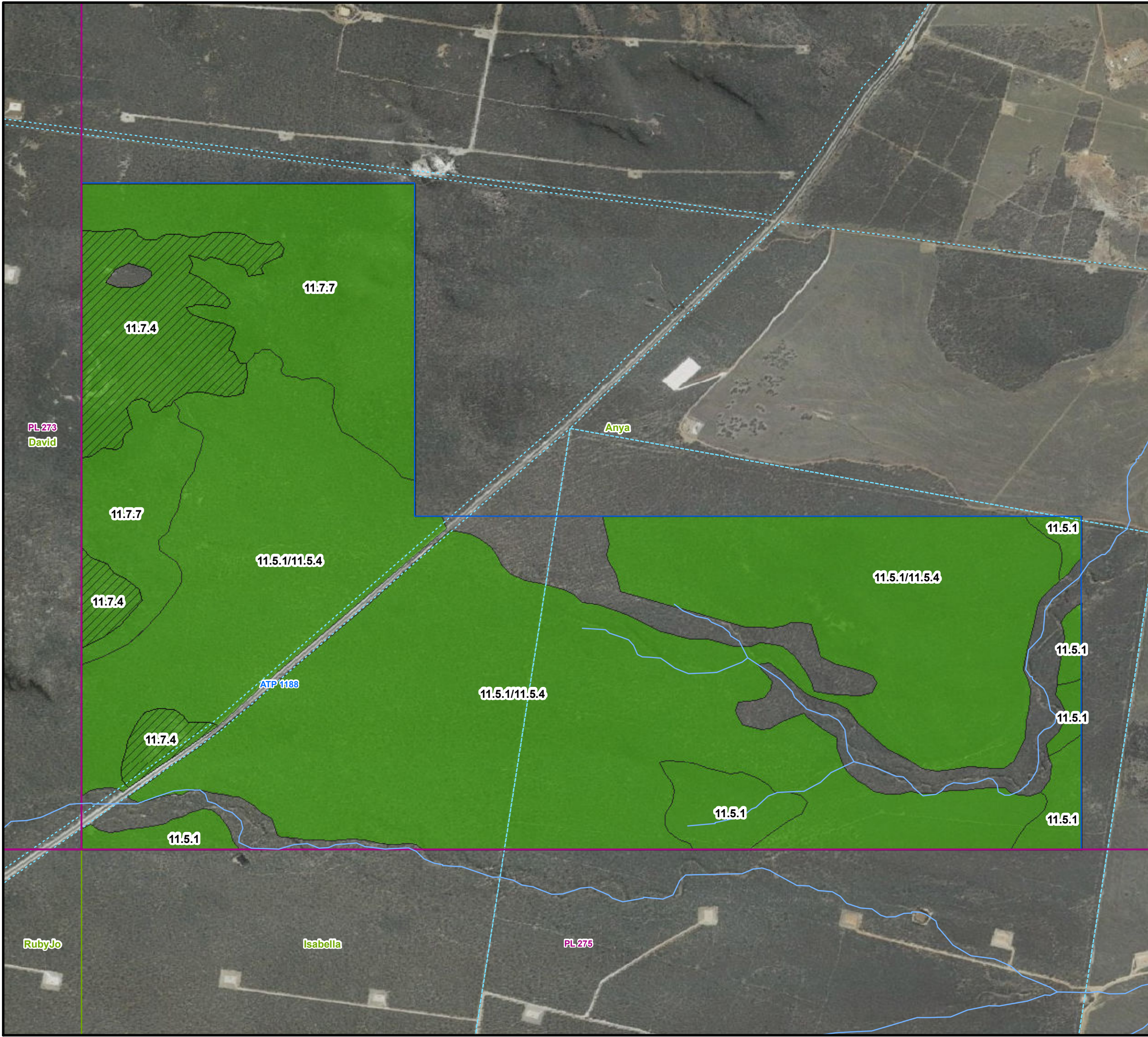
MAP NO: M_41278_01

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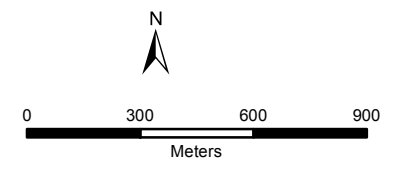
Figure 2 Kogan Wax Flower Potential Habitat

Kogan Waxflower Habitat

-  Watercourse
 -  Surveyed Property Boundary
 -  QGC PL
 -  QGC Field
 -  QGC ATP
- Kogan Waxflower Habitat**
-  Suitable Habitat
 -  High Quality Habitat



DATE: 21/07/2015 CREATED BY: Rollmanc
 MAP NO: M_41245_01



Map Projection: GDA 94 SCALE: 1:20,000(A3)

DATA SOURCE: DCDB, Railways - DERM | Roads, Towns - GA Infrastructure - QGC

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