### 5.4.6.2 *Nyctophilus corbeni* (South-eastern Long-eared Bat)

<table>
<thead>
<tr>
<th>Significant Species Management Plan 68</th>
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<tbody>
<tr>
<td><em>Nyctophilus corbeni</em> (South-eastern Long-eared Bat)</td>
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<table>
<thead>
<tr>
<th>EPBC Act Conservation Status</th>
<th>Vulnerable</th>
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</thead>
<tbody>
<tr>
<td>NC Act Conservation Status</td>
<td>Vulnerable</td>
</tr>
</tbody>
</table>

The South-eastern Long-eared Bat was formerly considered to be a distinct form of the Greater Long-eared Bat *Nyctophilus timoriensis* complex (Parnaby 1988; Duncan *et al.* 1999). This former taxonomy is reflected in the common and scientific names under which the species is listed in State and Commonwealth nature conservation legislation, and in the scientific literature. However, the species was very recently formally described as a separate species and is now called, *Nyctophilus corbeni* (Parnaby 2009). *N. corbeni* is classified as Vulnerable under the EPBC Act under the former taxonomy as *Nyctophilus timoriensis* south-eastern form – Greater Long-eared Bat.

The South-eastern Long-eared Bat is found from eastern South Australia, through the slopes and plains of New South Wales and into central southern Qld. Throughout its distribution it appears to be uncommon with...
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*Nyctophilus corbeni* (South-eastern Long-eared Bat)

Scattered populations (Turrill & Ellis 2006). Records also indicate populations in River Red Gum (*Eucalyptus camaldulensis*) forests along the Murray River (Law & Anderson 1999). In Queensland, the South-eastern Long-eared Bat is mainly recorded in the Brigalow Belt South Bioregion, extending eastwards to the Bunya Mountains National Park. It has been recorded as far north as the Expedition Range and Dawson River areas. Its westerly range extends into the Mulgalands Bioregion and west of Bollon. There are limited records in Victoria, with patchy distributions in the Northern Plains and Mallee regions (Lumsden 1994; Koehler 2006).

A desktop assessment of remnant vegetation (based on mapped regional ecosystems) associated with the South-eastern Long-eared Bat’s preferred habitat types has been undertaken. This has provided potential habitat mapping for this species within the RoW (Figures 52 - 59).

<table>
<thead>
<tr>
<th>Actual/Potential Distribution within Project area</th>
<th>GCH</th>
<th>EP</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP 0 to end</td>
<td>✔</td>
<td>✔</td>
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</tbody>
</table>

**Biology and Reproduction**

The South-eastern Long-eared Bat is an insectivorous bat. Food can be taken in flight, by gleaning vegetation or ground foraging (Lumsden and Bennett 2000; Van Dyck and Strahan 2008). In flight, it commonly feeds on beetles, bugs, and moths (Lumsden and Bennett 2000); however, it has also been recorded feeding on grasshoppers and crickets.

Foraging activities are concentrated around patches of trees in the landscape. Individuals appear to have defined foraging areas which they return to; they do not defend foraging areas and many individual from different species may share the same area.

There is little information currently available on this species' reproductive biology. Pregnant and lactating females have been trapped in November in central-western New
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| **Preferred Habitat and Microhabitat** | South Wales and Queensland suggesting a similar breeding cycle to other sympatric long-eared bat species (Schulz and Lumsden 2010). The South-eastern Long-eared Bat occurs in a range of inland woodland vegetation types, including box, ironbark and cypress pine woodlands (DSEWPC 2011). The species also occurs in Buloke woodland, Brigalow woodland, Belah woodland, Smooth-barked Apple, *Angophora leiocarpa*, woodland; River Red Gum, *Eucalyptus camaldulensis*, forests lining watercourses and lakes (DSEWPC 2011). Throughout inland Queensland, the species habitat is dominated by various eucalypt and bloodwood species, and various types of tree mallee with it being most abundant in vegetation with a distinct canopy and a dense cluttered shrub layer (Dominelli 2000; Ellis et al. 1999; Koehler 2006; Lumsden 1994; McFarland et al. 1999; Parnaby 1995; Turbill and Ellis 2006). There are a small number of records from closed forest adjacent to dry sclerophyll woodlands; in Araucarian notophyll vine forest in the Bunya Mountains and in semi evergreen vine thickets on the banks of the Dawson River and in the Brigalow Belt Bioregion (Pennay 2002; Venz et al. 2002). |
| **Threats** | Due to the lack of data available, assessment of threats is difficult. Broad-scale vegetation clearing is likely to be a key threat in many areas. This leads to habitat destruction and fragmentation. Prior to European settlement, mallee and woodland habitats were extensive across inland eastern Australia. Agriculture is the main cause of habitat fragmentation; this is a threat as trapping surveys show the species displays a preference for larger habitats. Increased fire frequencies destroy understorey vegetation and this may be a key microhabitat feature for this species. The South-eastern Long-eared Bat is believed to forage on low ground and shrubs (DSEWPC 2011). High density grazing around such regions destroys shrubs and limits the regeneration of the habitat. Overgrazing by feral species such as the rabbit may also pose a threat to this bat. The availability of suitable roosting habitats is essential for the presence of bat populations. The South-eastern Long-eared Bat is known to roost in deadwood or hollow trunks / branches from 25mm – 30mm in size and frequently under bark. Standard forestry practices remove such items from the environment and are hence considered a potential threat. |
### Significant Species Management Plan 68

**Nyctophilus corbeni** (South-eastern Long-eared Bat)

Impacts to this species are projected to be quite low, since no broad scale clearing of remnant vegetation will occur in any areas. The species is also highly mobile across habitats, which should ensure that populations are not fragmented. In fact, narrow, linear clearances such as the ones created by pipeline routes in this Project are known to be used by bats for commuting and foraging.

The only other impact may be due to the loss of large riverine, hollow-bearing trees; however, such trees will be identified and they will be avoided wherever possible.

<table>
<thead>
<tr>
<th>Potential Impacts from the QCLNG Pipeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction of the QCLNG GCH and EP will involve the disturbance of remnant vegetation within the know distribution area of the Long-eared Bat. Potential impacts to the Long-eared Bat and its habitat include (but are not limited too):</td>
</tr>
<tr>
<td>- Alteration, removal or destruction of foraging habitat as a result of clearing processes (i.e. removal of canopy vegetation and associated food resources);</td>
</tr>
<tr>
<td>- Increased artificial lighting during natural periods (this however, potentially provides a foraging resource);</td>
</tr>
<tr>
<td>- Destruction of roosting habitat and maternity roosts such as hollows, fissures and decorticating bark;</td>
</tr>
<tr>
<td>- Dispersion of weed and pest species through the RoW reducing foraging resources; and</td>
</tr>
<tr>
<td>- Fire as a result of construction activities and associated machinery.</td>
</tr>
</tbody>
</table>

This species has not been recorded within the project area. No offset is proposed for general habitat for this species, however if roosting caves/trees are identified these will be captured on a Fauna Survey Form and managed in accordance with the Breeding Place SMP. If this species is identified QGC will undertake discussions with DSEWPC regarding possible offset requirements.

Construction mitigation measures will be sufficient to manage potential impacts on this species.

<table>
<thead>
<tr>
<th>Potential Impact Areas and Pre-Clearance Quantification</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Long-eared Bat is found in variety of vegetation communities throughout its known habitat range. Throughout its Queensland range it inhabits a number of remnant regional ecosystems.</td>
</tr>
<tr>
<td>To provide an overarching quantification of the potential habitat area for this species, all remnant vegetation persisting within the RoW that has been identified as habitat for this species has been mapped as such (Figures 52 - 59).</td>
</tr>
<tr>
<td>The RE’s identified as likely to contain suitable microhabitats for the Large-eared Pied Bat include: 11.12.1, 11.3.2, 11.3.14, 11.3.18, 11.3.25, 11.3.26, 11.4.3, 11.5.1, 11.5.1a,</td>
</tr>
</tbody>
</table>
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* Nyctophilus corbeni (South-eastern Long-eared Bat) *

11.5.20, 11.5.21, 11.5.4, 11.5.4a, 11.7.2, 11.7.4, 11.7.4c, 11.7.5, 11.7.6, 11.7.7, 11.9.5.

- Total Alignment (40 m wide) – 501.45 ha

This has been further refined to demonstrate the areas of habitat that occurs within each sub-section of construction (GCH and EP).

- GCH – 315.26 ha
- EP – 186.19 ha

It should be noted that these totals are likely to overstate the actual habitat suitable for this species and the measures outlined in Section 5.1 relating to calculation of actual disturbance areas for offsetting purposes may be applied.

If targeted habitat surveys are conducted as outlined in Section 5.1, the following microhabitats are to be present for the potential habitat to be considered as confirmed actual habitat for the species:

- Hollow bearing limbs (generally small <10cm);
- Decorticating bark and tree fissures; and
- Remnant vegetation with a dense understorey.

Should this species be identified, during spotter catcher activities or at any other time prior to or during clearing, the management strategies outlined in Section 5.1.2 of this SSMP will be applied.

**Management Strategies**

As the South-eastern Long-eared Bat or roost sites have not been identified in the field through preclearance surveys undertaken by suitably qualified ecologists, the primary management strategy is to focus on the identification, avoidance and protection of individuals, populations, habitat and roosting sites.

Various mitigation measures outlining how this will occur are detailed in the following section.

Should the species be identified the management strategies outlined in Section 5.1.2 of this SSMP will be applied.

Should a South-eastern Long-eared Bat breeding place (i.e. roost in trees) be identified and it is determined that disturbance or tampering to the breeding site is unavoidable the management strategy will be to follow the procedures outlined in the Breeding Place SMP detailed in Appendix 2.

Offset sites will potentially be established for unavoidable impacts to South-eastern Long-eared Bat roosting habitat in accordance with the quantification of actual habitat outlined in Section 5.
Significant Species Management Plan 68
*Nyctophilus corbeni* (South-eastern Long-eared Bat)

<table>
<thead>
<tr>
<th>Mitigation Measures</th>
<th>Mitigation measures to minimise Project impacts on South-eastern Long-eared Bat are:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>- Prior to clearing activities the area should be traversed by qualified spotter catchers searching for suitable roosting habitat, including hollow bearing limbs. Should this species or roosting habitat be identified the management strategies outlines in Section 5.1.2 of this SSMP will be applied;</td>
</tr>
<tr>
<td></td>
<td>- Prior to clearing of the RoW or associated sites, limits of clearing areas will be clearly marked out and any occurrences of this species which may be located on the periphery of the RoW or in other locations where clearing can be avoided or minimised will be identified as “no go” zones. Such areas will be clearly marked out with appropriate flagging material and/or barricade webbing as determined by the site Environment Representative;</td>
</tr>
<tr>
<td></td>
<td>- If roosting sites for the South-eastern Long-eared Bat are identified within the clearance area or within close proximity to it, these sites shall be clearly marked out as a ‘no go’ zone with appropriate flagging material and/or barricade webbing as determined by the site Environment Representative. An appropriate buffer zone as determined by the licensed fauna spotter catcher shall also be applied and marked out around the roost site. These areas shall be recorded by GPS and mapped in the Environmental Constraints Mapping.</td>
</tr>
<tr>
<td></td>
<td>- Clearing activities shall carry on around the outside of any defined buffer zone until appropriate actions to manage the roost site have been determined in conjunction with the licensed fauna spotter catcher. A monitoring programme to determine potential construction impacts to the roost shall be implemented during the construction period as per the monitoring section of this SSMP;</td>
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<tr>
<td></td>
<td>- As part of routine pre-start meetings, work crews will be briefed on any known and potential environmental constraints occurring in that work location, including South-eastern Long-eared Bat and any other likely significant flora and fauna species and populations they may encounter;</td>
</tr>
<tr>
<td></td>
<td>- Wherever practicable signage should be erected to increase the general awareness amongst work crews of the species and particularly any roosts in the area and their habitat;</td>
</tr>
<tr>
<td></td>
<td>- All possible measures shall be taken to avoid disturbing any roost site including the reduction of the clearance area or relocation of any associated site infrastructure. If any previously unidentified high value roost areas such as caves are discovered during a pre clear and grade walk, construction activities shall cease at this location and alternative construction techniques that will not compromise the stability of</td>
</tr>
</tbody>
</table>
Significant Species Management Plan 68  
*Nyctophilus corbeni* (South-eastern Long-eared Bat)

- sandstone ridges containing the caves/roosts shall be investigated;

- If it is determined that an active roost cannot be avoided actions will be put in place as identified in the Species Management Program for breeding places *(Appendix 2)*. This will include ensuring a licensed and experienced fauna spotter catcher who is in possession of appropriate permits for fauna relocation is onsite during all clearing activities and that any injured bats are transported to an appropriate veterinarian or wildlife carer immediately;

- In areas where South-eastern Long-eared Bats are identified and breeding sites are removed as part of clearing activities, habitat creation activities shall be undertaken, including the installation of artificial roost sites in appropriate locations outside the clearing area as determined by the licensed fauna spotter catcher;

- Where possible, when erecting any project related fencing the use of barb wire, particularly on the top strand, is to be avoided to avoid birds and other fauna getting caught;

- Direct temporary lighting away from light-sensitive areas such as roost areas. Light shades and low lighting must be applied to construction and operational areas where these are located adjacent to remnant vegetation and other environmentally sensitive areas;

- Maintain contact details for qualified veterinarian staff that can assess, treat or euthanize (as necessary) any large native vertebrates.

- Clearing is to be be carried out in a sequential manner and in a way that directs escaping wildlife away from clearing and into adjacent native vegetation or natural areas of their own volition. Sequential clearing coupled with the slow nature of the clearing activities will take into account any variation in landscape features such as rocky escarpments, riparian habitats and steep sloping areas and provide fauna with sufficient time to exit the disturbance area;

- All clearing activities will be carried out in a manner that will not result in the isolation of habitat, habitat features or any noted fauna persisting within the RoW. Sequential clearing activities will provide safe escape routes for fauna and allow sufficient time for fauna spotter catchers to identify any potential fauna habitat, habitat features or fauna for relocation prior to clearing and identify this for consideration by the clearing team. Decisions will then be made jointly between the spotter catchers and construction contractor as to the most appropriate clearing method based on each situation and the surrounding landscape/geological features;

- Vehicle activities will be restricted to roads, access tracks and hardened surfaces.
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*Nyctophilus corbeni* (South-eastern Long-eared Bat)

<table>
<thead>
<tr>
<th>Rehabilitation and Recovery</th>
<th>Rehabilitation and recovery measures to apply to cleared areas of confirmed habitat for this species are outlined below.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Rehabilitation Plans specific to South-eastern Long-eared Bat are to be prepared by the Construction Contractor, prior to commencement of rehabilitation in all confirmed areas containing this species. These plans will be based on the standard template for rehabilitation along the RoW but will include specific measures relevant to returning the species to its pre-clearance condition such as:</td>
</tr>
<tr>
<td></td>
<td>- habitat retention and replacement</td>
</tr>
<tr>
<td></td>
<td>- reseeding with endemic grass species to the area of impact</td>
</tr>
<tr>
<td></td>
<td>- details of the location of the areas disturbed including regional ecosystems, species composition and habitat values present prior to clearing;</td>
</tr>
<tr>
<td></td>
<td>- specific performance criteria and rehabilitation timeframes.</td>
</tr>
<tr>
<td></td>
<td>- These plans shall have input from an ecologist as appropriate, shall be approved by</td>
</tr>
</tbody>
</table>

wherever possible to reduce the possibility of wildfire, spread of weeds and any potential impact on significant or other species;

- Dust suppression measures will be implemented to minimise dust deposition on foliage;

- Fire management measures shall take into account the need to protect remnant vegetation from frequent and hot fires. On site fire management practices shall be in accordance with Contractor HSSE requirements, relevant construction permits and method statements and appropriate dedicated fire fighting equipment will be available at high risk construction sites to manage any fires that may start up and to avoid wildfires breaking out;

- Implementation of the Pipeline Weed Management Action Plan will be undertaken to minimise the impact of weeds on survival and reproduction of this species;

- Should non-compliance with the mitigation measures or management strategies outlined in this SSMP occur on site an investigation shall be undertaken by all responsible parties to be followed by corrective action procedures if required. Work in the area will cease at the time of the non-compliance if the incident is deemed significant by the site Environment Representative.

- Following the completion of clearing, the actual area of disturbance to this species will be recorded in a register of clearance areas as per the method outlined in Section 5.1. to enable calculation of disturbance areas and reconciliation against the QCLNG Offset Program.
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QGC prior to use and be aligned with any rehabilitation requirements specified in the applicable DERM Pipeline Environmental Authority (EA).

- Analogue sites will be established prior to rehabilitation commencing to assist with setting of performance criteria. Suitable sites are to represent the land use(s), topographic and soil characteristics and vegetation community(ies) of each area to be rehabilitated.

- Aside from any specific measures outlined in the Rehabilitation Plans specific to the species, revegetation should occur naturally and in line with pre-disturbance vegetation communities and surrounding vegetation. Restoration activities will comply with the Pipeline EA and Construction Environment Management Plan (CEMP).

**General Rehabilitation Measures to be implemented:**

- Aside from any specific measures outlined in the Rehabilitation Plans specific to South-eastern Long-eared Bat, Revegetation should occur naturally and in line with pre-disturbance vegetation communities and surrounding vegetation. Restoration activities will comply with the Pipeline EA and Construction Environment Management Plan (CEMP).

- In areas where natural regeneration has not occurred and/or plant growth is not advancing after twelve months, an investigation will be undertaken to determine issues (such as topsoil inversion) and rectification carried out. This may include direct seeding with native species of local provenance.

- Any re-seeding plan implemented will be based on soil type and existing local ground layer vegetation characteristics along the route. The type of species to be used, density of plantings etc. will be determined as part of the development of the specific rehabilitation plans.

- Topsoil to be appropriately separated and stockpiled and reinstated within one month of completion of all construction activities in that area. Stockpiles are to be stabilised to prevent erosion.

- Re-profiling natural contours and drainage lines to their original profile to the greatest extent practicable taking into account landscape features and variation and ensuring the risk of erosion is minimised.

- Re-spread and compact subsoil over the trench, with crown development, and use subsoil for the construction of contour banks on steep slopes and above banks at water crossings. Wheel ruts are to be graded where necessary.
### Significant Species Management Plan 68

**Nyctophilus corbeni** (South-eastern Long-eared Bat)

<table>
<thead>
<tr>
<th>Performance Measures</th>
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<tbody>
<tr>
<td>Any clearing of South-eastern Long-eared Bat roosting habitat to be authorised by the relevant statutory authority in accordance with approval conditions.</td>
</tr>
<tr>
<td>There shall be a net conservation gain of South-eastern Long-eared Bat roosting habitat that is cleared through delivery of the QCLNG Offset Program.</td>
</tr>
<tr>
<td>All significantly disturbed land is rehabilitated so that the species composition is representative of the pre-disturbed distribution, including South-eastern Long-eared Bat.</td>
</tr>
<tr>
<td>No new weed species will be introduced.</td>
</tr>
<tr>
<td>Rehabilitation area to be stabilised with no evidence of significant erosion.</td>
</tr>
<tr>
<td>The following rehabilitation performance criteria will be used as a guide when preparing rehabilitation and recovery plans specific to South-eastern Long-eared Bat habitat:</td>
</tr>
<tr>
<td>- the rehabilitated site shows distinct and progressive re-establishment of the various strata which characterises the pre-disturbed vegetation communities or</td>
</tr>
</tbody>
</table>

- Ground disturbance outside of the trench is to be minimised to encourage suckering
- Compaction relief to be carried out where appropriate along the contours (parallel) to minimise rilling.
- Ongoing implementation of the Pipeline Weed Management Action Plan will be undertaken to minimise the impact of weeds on survival and reproduction of this species.
- Rehabilitation area to be stabilised with no evidence of significant erosion. No burning of felled vegetation or deliberate lighting of fires. Felled vegetation should be redistributed over the RoW to provide fauna habitat and to assist in revegetation and erosion control. This will further encourage regrowth within these communities, as well as minimise weed infestations.
- When re-spreading on slopes, tree trunks should be along the line of the contour. The root ball for large trees should be left lying to the outer edge of the RoW.
- Felled vegetation should be re-spread in “filter strips” **NOT** distributed across the entire RoW so that access is prevented during operations and any erosion or subsidence will be apparent during subsequent monitoring inspections.
- If in the unlikely event imported topsoil (of an appropriate quality and weed free) is required for construction-corridor repairs, this will only be used with landholder approval.
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*Nyctophilus corbeni* (South-eastern Long-eared Bat)

- selected analogue site;
- all dominant species within each strata are re-established at densities and frequencies equivalent to that of the pre-disturbed site;
- habitat structures, including (but not limited to) litter cover, fallen woody material, hollow logs, etc. should be re-established to reflect the pre-disturbed values;
- Within two years from completion of pipeline construction the rehabilitation will result in self-sustaining vegetation cover with species diversity and cover similar to that of surrounding undisturbed areas and the pre-clearing vegetation.

**Monitoring**

- Any unavoidable clearing of South-eastern Long-eared Bat roosting habitat will be recorded and reconciled against offset activities annually in accordance with the Project approval conditions.

- All unavoidable clearing will be compensated by the establishment of offsets in accordance with the offset conditions stipulated in the DSEWPC and CG approval conditions and the QCLNG Offset Program.

- If a South-eastern Long-eared Bat roost is identified and located within or in close proximity to the clearance area, a monitoring programme to capture any potential disturbance impacts arising from construction activities will be developed in accordance with the Survey Guidelines for Australia’s threatened Bats.

- The monitoring programme shall continue for the duration during which any construction related activities are being carried out which may have a potential impact on the roost site.

- The Queensland Herbarium’s *Methodology for the Establishment and Survey of Reference Sites for BioCondition* (Eyre et al. 2006) will be used to select analogue sites and methodology for the survey of vegetation.

- Parameters to be measured in the analogue site for comparison against rehabilitated sites to determine rehabilitation success include as a minimum:
  i. flora species richness and diversity;
  ii. a description of the structural strata present;
  iii. dominant species within each strata;
  iv. associated stem count densities;
  v. percentage foliage cover.
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*Nyctophilus corbeni* (South-eastern Long-eared Bat)

- Regular weekly inspections following reinstatement works will be undertaken for the species rehabilitation area to evaluate weeds, stability and rehabilitation success until the site is considered stable. Inspections will then be relaxed to monthly inspections to assess for ongoing success.

- After the initial twelve months, monitoring of the species rehabilitation area will be undertaken quarterly for the next twelve months at which time the vegetation should be self-sustaining and not require significant weed control or maintenance input.

- Monitoring will then occur annually until the rehabilitation has met the performance objectives as detailed in the specific rehabilitation plans. Guiding principles are outlined above.

- Monitoring will also include an assessment of the effectiveness of weed-control measures.

- The process of monitoring and rehabilitation will conclude only once the site becomes stable and rehabilitation achieves the performance objectives.

- An annual third party audit to determine compliance with the EA conditions (including rehabilitation) will be undertaken, and recommendations and corrective actions implemented.

**References**


Lumsden, L. and Bennett A. (2000). Bats in rural landscapes: a significant but largely unknown faunal component. T. Barlow and R. Thorburn, eds. *Bushcare Grassy Landscapes*
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*Nyctophilus corbeni* (South-eastern Long-eared Bat)


Nyxophilus corbeni (South-eastern Long-eared Bat) Potential Habitat Areas
Map 1 of 8

Legend
- Town
- Potential Habitat for South-eastern Long-eared Bat (Unidel Survey Records, 2010)
- Potential Habitat for South-eastern Long-eared Bat (DERM, RE Mapping 2009)
- Least Concern Regional Ecosystems

Proposed Pipeline Alignment
- Export Pipeline & KP's
- Collection Header & KP's

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DOCUMENT NO: QCLNG-BXOD-ENV-MAP-000067-13-01
DATA SOURCE: QGC PTY LTD - Queensland Curtis LNG Project
LOCATION DIAGRAM

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DATA SOURCE: QGC PTY LTD - Queensland Curtis LNG Project
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DATA SOURCE: QGC PTY LTD - Queensland Curtis LNG Project
LOCATION DIAGRAM
Nyctophilus corbeni (South-eastern Long-eared Bat) Potential Habitat Areas
Map 5 of 8

LEGEND

Potential Habitat for South-eastern Long-eared Bat (Unidel Survey Records, 2010)
Potential Habitat for South-eastern Long-eared Bat (DERM, RE Mapping 2009)
Least-Concern Regional Ecosystems

PROPERTY BOUNDARY

NIGHTLY ROAD
Majot Watercourse

Nyctophilus corbeni (South-eastern Long-eared Bat) Potential Habitat Areas

PROPOSED PIPELINE ALIGNMENT

Export Pipeline & KP's
Collection Header & KP's

QGC PTY LTD - Queensland Curtis LNG Project

DOCUMENT NO: QCLNG-BXOD-ENV-MAP-000067-13-05

DATA SOURCE: Regional Ecosystems Version 6.0b © State of Queensland (Environmental Protection Agency) 2009
Topographic Vector Series 3 © Commonwealth of Australia
Bing Maps ©MapData Sciences Australia 2010

Date Author Approved
04/08/2011 ES RC Issued for Review A
30/08/2011 ES BE Issued for Use 0
19/10/2011 ES BE Issued for Use 3

10/08/2011 ES BE Issued for Use 0
30/08/2011 ES BE Issued for Use 0
19/10/2011 ES BE Issued for Use 3

QGC PTY LTD - Queensland Curtis LNG Project

DOCUMENT NO: QCLNG-BXOD-ENV-MAP-000067-13-05

DATA SOURCE: Regional Ecosystems Version 6.0b © State of Queensland (Environmental Protection Agency) 2009
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04/08/2011 ES RC Issued for Review A
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10/08/2011 ES BE Issued for Use 0
30/08/2011 ES BE Issued for Use 0
19/10/2011 ES BE Issued for Use 3

1:150,000 (A) GDA 1994 MGA Zone 56
### 5.4.6.3 *Pteropus polypephalus* (Grey-headed flying fox)

<table>
<thead>
<tr>
<th>Significant Species Management Plan 70</th>
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<td><strong>Pteropus polypephalus (Grey-headed flying fox)</strong></td>
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<table>
<thead>
<tr>
<th>EPBC Act Conservation Status</th>
<th>Vulnerable</th>
<th></th>
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<tbody>
<tr>
<td>NC Act Conservation Status</td>
<td>Least Concern</td>
<td></td>
</tr>
</tbody>
</table>

**Known Distribution**

The Grey-headed Flying-fox is Australia’s only endemic flying-fox in a coastal belt form south-eastern Queensland to Melbourne, Victoria. Regular or frequently used camps have been located between Rockhampton in Queensland south to around Mallacoota in East Gippsland, Victoria. Less consistent records extend the south range of the species to Warrnambool, Victoria. They are generally

Grey-headed Flying Fox (Source: Bruce Thomson)
Significant Species Management Plan 70

*Pteropus polypehalus* (Grey-headed flying fox)

recorded between the western slopes of the Great Dividing Range. Recent surveys have located camps of this species as far north as the Mackay region, with several records further south between Gladstone and Bundaberg, Queensland. Despite one regular camp in Melbourne, the southern range of the species appears to have considerably retracted (Tidemann 1998).

**Actual/Potential Distribution within Project area**

<table>
<thead>
<tr>
<th>GCH</th>
<th>EP</th>
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KP 0-143

KP 0 to end

**Biology and Reproduction**

The Grey-headed Flying-Fox is one of the largest bats in the world ranging in weight from 600g to 1000g and having a length between 230cm and 289 cm in head and body. Its appearance can be distinguished by:

- The collar is orange/brown fully encircling its neck
- The leg fur extends to the ankle
- The head is covered by light grey fur
- The belly fur is grey, often with flecks of white and ginger

The Grey-headed Flying-Fox has a diverse native diet, which it supplements with introduced plants (Eby 1995, 1998; Hall and Richards 2000, and Parry-Jones and Augee 1991). Nectar and pollen from the flowers of Eucalypts (genera Eucalyptus, Corymbia and Angophora), Melaleucas and Banksias are the primary food for the species (Duncan et al., 1999). Most eucalypts have regular seasonal flowering schedules but do not flower every year and there are a few areas within the range of the Grey-headed Flying-Fox where nectar is available continuously (House 1997; Law et al. 2000, and Wilson and Bennett 1999). The species has no adaptations for withstanding food shortages and migrates in response to changes in the amount and location of flowering (Eby 1991; Eby and Lunney 2002; Spencer et al. 1991). The species is responsible for the seed dispersal of many rainforest trees, such as native figs and palms (Tidemann 1998).

The species commutes daily to foraging areas, usually within 15 km of the day roost site (Tidemann 1998). Grey-headed Flying-Foxes are capable of nightly flights of up to 50 km from their roost to feeding areas that shift as food resources change (Eby unpubl.).
cited in Eby, 1991). In suitable winds Grey-headed Flying-Foxes can cruise at speeds in excess of 35km per hour for extended periods (Tidemann 1998). At most times of the year there is a complete exodus from the colony site at dusk. The exception to this rule occurs in spring and early summer when juveniles are left in the nursery colony sites at night. During this time small groups of adult Grey-headed Flying-Foxes leave the site more than an hour after the majority of bats fly out. In nursery colonies Grey-headed Flying-Foxes fly in and out of the site throughout the night (Parry-Jones and Augee 1992).

Sexual maturity is generally not reached by females until three years of age (Martin 2000). However, research in Martin’s breeding colony observed pregnancy occurring in some females whilst in their second year (McIwhee & Martin 2002).

Mating occurs in early autumn, after which time the larger camps begin to break up, reforming in late spring/early summer, as food resources become more abundant (Hall & Richards 2000). Males and females segregate in October at the time females usually give birth. Lactation also usually begins in October and continues for three to four months or sometimes longer (Nelson 1965b). Following six months of gestation, females bear a single young each year. Twins are rare (Martin 2000). During birthing, the female hangs by the feet and young are born headfirst and are positioned so that wings are folded around the head (Nelson 1965b; Martin et al. 1987).

For a period of four to five weeks after giving birth, the mother carries her single young with her to feeding sites. Young are carried on the ventral surface of their foraging mothers for four to five weeks after birth (Tidemann 1998). Young are sometimes abandoned by their mothers, particularly when food is short in early summer (Tidemann 1998). Once the young are completely furred, they are left in maternal camps and continue to be nursed until they are independent after around 12 weeks (Hall & Richards 2000). During this nursery phase, males rejoin the females and attempt to court females with pair bonds being formed (Hall & Richards 2000).

In the wild, most adult female Grey-headed Flying-foxes conceive each year (Nelson 1965b; Towers & Martin 1985, 1995). However, females are prone to abort (Dukelow et al. 1990) in response to environmental stress and mass abortions and premature births are known to occur in the wild (Hall et al. 1991).

A natural mortality rate in the wild is believed to be between 15-20 years (McIwhee and Martin 2002)

Heat-related deaths in Australian flying-foxes have been documented repeatedly over the years. In 2004, a heatwave in north-east NSW reaching 45 °C resulted in the death of an estimated 5000-7000 individuals. The study, conducted in the Bellingen Island
**Significant Species Management Plan 70**  
*Pteropus poliocephalus (Grey-headed flying fox)*

- (NSW) roost, reported a significant impact on young bats less than 4 months old, as well as a decline in the percentage of adult females (Eby et al. 2004).

**Preferred Habitat and Microhabitat**  
The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. It also feeds in introduced tree species in urban areas and in commercial fruit crops. The primary food source is blossom from Eucalyptus and related genera but in some areas it also utilises a wide range of rainforest fruits (Eby 1998). None of the vegetation communities used by the Grey-headed Flying-fox produce continuous foraging resources throughout the year, and the species has adopted complex migration traits in response to ephemeral and patchy food resources (Duncan et al. 1999; Eby 1996, 1998; Nelson 1965a; Parry-Jones & Augee 1992; Spencer et al. 1991).

The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches, commonly of emergent trees. Roost sites are typically located near water, such as lakes, rivers or the coast (van der Ree et al. 2005). Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation (Nelson 1965a; Ratcliffe 1931), but colonies also use highly modified vegetation in urban and suburban areas (Birt et al. 1998; Tidemann & Vardon 1997; van der Ree et al. 2005). The species can maintain fidelity to roost sites for extended periods (Lunney & Moon 1997), although new sites have been colonised in recent times (Tidemann & Vardon 1997).

**Threats**  
No critical habitat has been listed for the Grey-headed Flying-Fox under the EPBC Act, and it is not known to associate with nor is dependent on any other listed threatened species (DSEWPC 2011).

General threats to the Grey-headed Flying-Fox include:
- Loss of foraging and roosting habitat throughout its distribution;
- Direct killing animals on orchards;
- Harassment and destruction of roosts;
- Competition with the Black Flying-Fox (*P. alecto*) (and perhaps the Little Red Flying-Fox (*P. scapulatus*)) may be a threat to the Grey-Headed Flying-fox;
- Fragmentation of habitat; and
- Accumulation of lead and other pollutants in the environment.
### Significant Species Management Plan 70

**Pteropus poliocephalus (Grey-headed flying fox)**

| Potential Impacts from the QCLNG Pipeline | Construction of the QCLNG GCH and EP will involve the disturbance of remnant vegetation within the foraging area of the Grey-headed Flying-Fox. Potential impacts to the Grey-headed Flying-Fox include:
|                                           | • Potential clearing of foraging habitat;
|                                           | • Disturbance to foraging by light pollution;
|                                           | • Disturbance to foraging by noise pollution;
|                                           | • Getting caught and injured on barbed wire fences; and
|                                           | • Dust coating blossom (food resource).
|                                           |
| No offset is proposed for general habitat for this species due to its highly mobile nature and broad habitat types, however if roosting sites are identified these will be captured on the ECMs and managed in accordance with the Breeding Place SMP. If this species is identified QGC will undertake discussions with DSEWPC regarding possible offset requirements.
|                                           |
| Construction mitigation measures will be sufficient to manage potential impacts on this species. |

| Potential Impact Areas and Pre-Clearance Quantification | The Grey Headed Flying Fox is known to inhabit a wide variety of remnant vegetation types throughout its known range. To provide a quantification of the potential habitat area for this species, all remnant vegetation persisting within the RoW that supports Eucalypt and Corymbia woodland, as well as other vegetation types meeting microhabitat requirements, has been identified as potential habitat.
|                                                          | The RE’s identified as potentially incorporating microhabitats for the Grey Headed Flying Fox include 11.3.4, 11.3.26, 11.11.3, 11.11.15, 12.3.3, 12.3.7, 12.3.11, 12.11.6 and 12.11.14 (Figure 60).
|                                                          | • Total Alignment (40 m wide) – 96.91 ha
|                                                          |
|                                                          | This has been further refined to demonstrate the areas of habitat that occurs within each sub-section of construction (GCH and EP).
|                                                          | • GCH – 3.40 ha
|                                                          | • EP – 93.51 ha
|                                                          |
|                                                          | It should be noted that these totals are likely to overstate the actual habitat suitable for this species and the measures outlined in Section 5.1 relating to calculation of actual disturbance areas for offsetting purposes may be applied.
|                                                          |
|                                                          | If targeted habitat surveys are conducted as outlined in Section 5.1, the following
**Significant Species Management Plan 70**

*Pteropus polypehalus* (Grey-headed flying fox)

Microhabitats are to be present for the potential habitat to be considered as confirmed actual habitat for the species:

- presence of a roosting site (camp);
- availability of blossoms for feeding; and
- proximity to water (for navigation purposes).

Should this species be identified, during spotter catcher activities or at any other time prior to or during clearing, the management strategies outlined in Section 5.1.2 of this SSMP will be applied.

### Management Strategies

The management practices used to minimise the impact on Grey-headed Flying-Foxes are presented in the following section. Monitoring, documentation and reporting and performance criteria are also presented in this section.

Should the species be identified the management strategies outlined in Section 5.1.2 of this SSMP will be applied.

Should a Grey-headed Flying-Foxes breeding place (i.e. roost in trees) be identified and it is determined that disturbance or tampering to the breeding site is unavoidable the management strategy will be to follow the procedures outlined in the Breeding Place SMP detailed in Appendix 2.

Offset sites will potentially be established for unavoidable impacts to confirmed habitat for Grey Headed Flying-fox roosting sites in accordance with the quantification of actual habitat outlined in Section 5.

### Mitigation Measures

Mitigation measures to minimise Project impacts on Grey-headed Flying Fox are:

- Prior to clearing activities the area should be traversed by qualified spotter catchers searching for active roost areas or camps. Should this species or active roosting habitat be identified the management strategies outlines in Section 5.1.2 of this SSMP will be applied;

- The EPBC Survey Guidelines for Australia’s Threatened Bats (2010) recommend the following survey methods be used for surveys:
  - Review of databases and available literature
  - Daytime field surveys of suitable habitats for camp/roost sites
  - Surveys of vegetation communities and food plants, and
  - Night time surveys.

- Prior to clearing of the RoW or associated sites, limits of clearing areas will be
### Significant Species Management Plan 70

**Pteropus polypehalus (Grey-headed flying fox)**

<table>
<thead>
<tr>
<th>Clearly marked out and any occurrences of this species which may be located on the periphery of the RoW or in other locations where clearing can be avoided or minimised will be identified as “no go” zones. Such areas will be clearly marked out with appropriate flagging material and/or barricade webbing as determined by the site Environment Representative;</th>
</tr>
</thead>
<tbody>
<tr>
<td>- If an active roosting sites for the Grey-headed Flying Fox is identified within the clearance area or within close proximity to it, these sites shall be clearly marked out as a ‘no go’ zone with appropriate flagging material and/or barricade webbing as determined by the site Environment Representative.</td>
</tr>
<tr>
<td>- A 100m buffer will be identified around any roost of the Grey-headed Flying Fox. Any works required within the 100m buffer will require assessment and advice from a qualified ecologist.</td>
</tr>
<tr>
<td>- The buffer shall be applied and marked out around the roost site. These areas shall be recorded by GPS and mapped in the Environmental Constraints Mapping.</td>
</tr>
<tr>
<td>- Clearing activities shall carry on around the outside of any defined buffer zone until appropriate actions to manage the roost site have been determined in conjunction with the licensed fauna spotter catcher. A monitoring programme to determine potential construction impacts to the roost shall be implemented during the construction period as per the monitoring section of this SSMP;</td>
</tr>
<tr>
<td>- As part of routine pre-start meetings, work crews will be briefed on any known and potential environmental constraints occurring in that work location, including Grey-headed Flying Fox and any other likely significant flora and fauna species and populations they may encounter;</td>
</tr>
<tr>
<td>- Wherever practicable signage should be erected to increase the general awareness amongst work crews of the species and particularly any roosts in the area and their habitat;</td>
</tr>
<tr>
<td>- All possible measures shall be taken to avoid disturbing any roost site including the reduction of the clearance area or relocation of any associated site infrastructure. If any previously unidentified high value roost areas such as caves are discovered during a pre clear and grade walk, construction activities shall cease at this location and alternative construction techniques that will not compromise the stability of sandstone ridges containing the caves/roosts shall be investigated;</td>
</tr>
<tr>
<td>- If it is determined that an active roost cannot be avoided actions will be put in place as identified in the Species Management Program for breeding places ([Appendix 2]). This will include ensuring a licensed and experienced fauna spotter catcher who is</td>
</tr>
</tbody>
</table>

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### Significant Species Management Plan 70

**Pteropus policephalus (Grey-headed flying fox)**

- In possession of appropriate permits for fauna relocation is onsite during all clearing activities and that any injured bats are transported to an appropriate veterinarian or wildlife carer immediately;

- In areas where Grey-headed Flying Fox are identified and breeding sites are removed as part of clearing activities, habitat creation activities shall be undertaken, including the installation of artificial roost sites in appropriate locations outside the clearing area as determined by the licensed fauna spotter catcher;

- Clearing is to be be carried out in a sequential manner and in a way that directs escaping wildlife away from clearing and into adjacent native vegetation or natural areas of their own volition. Sequential clearing coupled with the slow nature of the clearing activities will take into account any variation in landscape features such as rocky escarpments, riparian habitats and steep sloping areas and provide fauna with sufficient time to exit the disturbance area;

- All clearing activities will be carried out in a manner that will not result in the isolation of habitat, habitat features or any noted fauna persisting within the RoW. Sequential clearing activities will provide safe escape routes for fauna and allow sufficient time for fauna spotter catchers to identify any potential fauna habitat, habitat features or fauna for relocation prior to clearing and identify this for consideration by the clearing team. Decisions will then be made jointly between the spotter catchers and construction contractor as to the most appropriate clearing method based on each situation and the surrounding landscape/geological features;

- Where possible, when erecting any project related fencing the use of barb wire, particularly on the top strand, is to be avoided to avoid birds and other fauna getting caught;

- Vertebrate pests will be managed in accordance with the Pest Management Plan for the Project.

- Should roosting colonies be identified, adjacent to infrastructure requiring light, light shield will be fitted to prevent light spillage into colonies. Light spillage has potential to impact nursery sites leading to the death of juvenile bats.

- Excessively hot or frequent fires are likely to have a negative impact on remnant vegetation and possibly reduce flowering of Eucalypts and Melaleuca which are a primary food resource. The Site Specific Fire Management Plan must be implemented to ensure that the Project activities do not contribute in any way, to increased fire frequencies or severity. Fire management measures shall take into
### Significant Species Management Plan 70

**Pteropus poliocephalus (Grey-headed flying fox)**

- Account the need to protect remnant vegetation from frequent and hot fires. On site fire management practices shall be in accordance with Contractor HSSE requirements, relevant construction permits and method statements and appropriate dedicated fire fighting equipment will be available at high risk construction sites to manage any fires that may start up and to avoid wildfires breaking out;

- Infrastructure, particularly electrical, should be designed and constructed in accordance with APLIC Suggested Practices for Raptor Protection on Power-Lines: The State of the Art in 2005 in order to minimise the risk of collision to flying wildlife (i.e. adequate clearance between energised and/or grounded parts).

- Dust suppression will be managed in accordance with the Operation Environmental Management Plan for the Project, reducing potential for blossom smothering.

- Maintain contact details for qualified veterinarian staff that can assess, treat or euthanize (as necessary) any large native vertebrates.

- Vehicle activities will be restricted to roads, access tracks and hardened surfaces wherever possible to reduce the possibility of wildfire, spread of weeds and any potential impact on significant or other species;

- Implementation of the Pipeline Weed Management Action Plan will be undertaken to minimise the impact of weeds on survival and reproduction of this species;

- Should non-compliance with the mitigation measures or management strategies outlined in this SSMP occur on site an investigation shall be undertaken by all responsible parties to be followed by corrective action procedures if required. Work in the area will cease at the time of the non-compliance if the incident is deemed significant by the site Environment Representative.

<table>
<thead>
<tr>
<th>Rehabilitation and Recovery</th>
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<tbody>
<tr>
<td>Rehabilitation and recovery measures to apply to cleared areas of confirmed habitat for this species are outlined below.</td>
</tr>
<tr>
<td>- Rehabilitation Plans specific to Grey-headed Flying Fox are to be prepared by the Construction Contractor, prior to commencement of rehabilitation in all confirmed areas containing this species. These plans will be based on the standard template for rehabilitation along the RoW but will include specific measures relevant to returning the species to its pre-clearance condition such as:</td>
</tr>
<tr>
<td>- habitat retention and replacement</td>
</tr>
<tr>
<td>- reseeding with endemic grass species to the area of impact</td>
</tr>
<tr>
<td>- details of the location of the areas disturbed including regional ecosystems,</td>
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</table>
### Significant Species Management Plan 70

*Pteropus polypephalus (Grey-headed flying fox)*

- species composition and habitat values present prior to clearing;
  - specific performance criteria and rehabilitation timeframes.

- These plans shall have input from an ecologist as appropriate, shall be approved by QGC prior to use and be aligned with any rehabilitation requirements specified in the applicable DERM Pipeline Environmental Authority (EA).

- Any revegetation works in the vicinity of Grey-headed Flying Fox sightings will seek to re-instate tree and shrub species known to provide foraging resources for the species. For example, blossom prolific Eucalypt and Melaleuca species are known to be seasonally significant for the species.

- Analogue sites will be established prior to rehabilitation commencing to assist with setting of performance criteria. Suitable sites are to represent the land use(s), topographic and soil characteristics and vegetation community(ies) of each area to be rehabilitated.

- Aside from any specific measures outlined in the Rehabilitation Plans specific to the species, revegetation should occur naturally and in line with pre-disturbance vegetation communities and surrounding vegetation. Restoration activities will comply with the Pipeline EA and Construction Environment Management Plan (CEMP).

**General Rehabilitation Measures to be implemented:**

- Aside from any specific measures outlined in the Rehabilitation Plans specific to Grey-headed Flying Fox, Revegetation should occur naturally and in line with pre-disturbance vegetation communities and surrounding vegetation. Restoration activities will comply with the Pipeline EA and Construction Environment Management Plan (CEMP).

- In areas where natural regeneration has not occurred and/or plant growth is not advancing after twelve months, an investigation will be undertaken to determine issues (such as topsoil inversion) and rectification carried out. This may include direct seeding with native species of local provenance.

- Any re-seeding plan implemented will be based on soil type and existing local ground layer vegetation characteristics along the route. The type of species to be used, density of plantings etc. will be determined as part of the development of the specific rehabilitation plans.

- Topsoil to be appropriately separated and stockpiled and reinstated within one month of completion of all construction activities in that area. Stockpiles are to be
### Significant Species Management Plan 70

**Pteropus poliocephalus (Grey-headed flying fox)**

<table>
<thead>
<tr>
<th>Stabilised to prevent erosion.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Re-profiling natural contours and drainage lines to their original profile to the greatest extent practicable taking into account landscape features and variation and ensuring the risk of erosion is minimised.</td>
</tr>
<tr>
<td>- Re-spread and compact subsoil over the trench, with crown development, and use subsoil for the construction of contour banks on steep slopes and above banks at water crossings. Wheel ruts are to be graded where necessary</td>
</tr>
<tr>
<td>- Ground disturbance outside of the trench is to be minimised to encourage suckering</td>
</tr>
<tr>
<td>- Compaction relief to be carried out where appropriate along the contours (parallel) to minimise rilling.</td>
</tr>
<tr>
<td>- Ongoing implementation of the Pipeline Weed Management Action Plan will be undertaken to minimise the impact of weeds on survival and reproduction of this species.</td>
</tr>
<tr>
<td>- Rehabilitation area to be stabilised with no evidence of significant erosion. No burning of felled vegetation or deliberate lighting of fires. Felled vegetation should be redistributed over the RoW to provide fauna habitat and to assist in revegetation and erosion control. This will further encourage regrowth within these communities, as well as minimise weed infestations.</td>
</tr>
<tr>
<td>- When re-spread on slopes, tree trunks should be along the line of the contour. The root ball for large trees should be left lying to the outer edge of the RoW.</td>
</tr>
<tr>
<td>- Felled vegetation should be re-spread in “filter strips” NOT distributed across the entire RoW so that access is prevented during operations and any erosion or subsidence will be apparent during subsequent monitoring inspections.</td>
</tr>
<tr>
<td>- If in the unlikely event imported topsoil (of an appropriate quality and weed free) is required for construction-corridor repairs, this will only be used with landholder approval.</td>
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<table>
<thead>
<tr>
<th><strong>Performance Measures</strong></th>
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<tr>
<td>The performance criteria to measure success include:</td>
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<tr>
<td>- Any clearing of Grey-headed Flying Fox roosting habitat to be authorised by the relevant statutory authority in accordance with approval conditions.</td>
</tr>
<tr>
<td>- There shall be a net conservation gain of Grey-headed Flying Fox roosting habitat that is cleared through delivery of the QCLNG Offset Program.</td>
</tr>
<tr>
<td>- All significantly disturbed land is rehabilitated so that the species composition is</td>
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Significant Species Management Plan 70  
*Pteropus policephalus (Grey-headed flying fox)*

<table>
<thead>
<tr>
<th>Monitoring</th>
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<tbody>
<tr>
<td>The monitoring requirements for the Grey-headed Flying Fox include:</td>
</tr>
<tr>
<td>- In the case that a Grey-headed Flying Fox camp is recorded in proximity to operational areas, a monitoring program will be established to ascertain population numbers and breeding status over time using the survey techniques specified above. The monitoring program will seek to determine the overall size and composition of the camp,</td>
</tr>
<tr>
<td>- As required within CEMP, a minimum equal density and abundance of Eucalypt and Melaleuca species within rehabilitation areas, as that which occurs in analogue sites from the Project area.</td>
</tr>
<tr>
<td>- All sightings by qualified ecologists, particularly roosting activity will be reported to Environmental Officers for incorporation into constraints layer in the QGC GIS, and</td>
</tr>
<tr>
<td>- Should repeated sightings of foraging be reported for a particular area, records will be kept regarding the suite of tree or shrub species being exploited, such that rehabilitation/revegetation works can focus on restoring its preferred habitat.</td>
</tr>
<tr>
<td>- Any unavoidable clearing of Grey-headed Flying Fox habitat will be recorded and reconciled against offset activities annually in accordance with the Project approval conditions.</td>
</tr>
</tbody>
</table>

representative of the pre-disturbed distribution, including Grey-headed Flying Fox.  
- No new weed species will be introduced.  
- Rehabilitation area to be stabilised with no evidence of significant erosion.  
- The following rehabilitation performance criteria will be used as a guide when preparing rehabilitation and recovery plans specific to Grey-headed Flying Fox habitat:  
  - the rehabilitated site shows distinct and progressive re-establishment of the various strata which characterises the pre-disturbed vegetation communities or selected analogue site;  
  - all dominant species within each strata are re-established at densities and frequencies equivalent to that of the pre-disturbed site;  
  - habitat structures, including (but not limited to) litter cover, fallen woody material, hollow logs, etc. should be re-established to reflect the pre-disturbed values;  
  - Within two years from completion of pipeline construction the rehabilitation will result in self-sustaining vegetation cover with species diversity and cover similar to that of surrounding undisturbed areas and the pre-clearing vegetation.
### Significant Species Management Plan 70

**Pteropus poliocephalus (Grey-headed flying fox)**

- All unavoidable clearing of roosting habitat will be compensated by the establishment of offsets in accordance with the offset conditions stipulated in the DSEWPC and CG approval conditions and the QCLNG Offset Program.

- If a Grey-headed Flying Fox roost is identified and located within or in close proximity to the clearance area, a monitoring programme to capture any potential disturbance impacts arising from construction activities will be developed in accordance with the Survey Guidelines for Australia’s threatened Bats.

- The monitoring programme shall continue for the duration during which any construction related activities are being carried out which may have a potential impact on the roost site.

- The Queensland Herbarium’s Methodology for the *Establishment and Survey of Reference Sites for BioCondition* (Eyre et al. 2006) will be used to select analogue sites and methodology for the survey of vegetation.

  - Parameters to be measured in the analogue site for comparison against rehabilitated sites to determine rehabilitation success include as a minimum:
    - flora species richness and diversity;
    - a description of the structural strata present;
    - dominant species within each strata;
    - associated stem count densities;
    - percentage foliage cover.

  - Regular weekly inspections following reinstatement works will be undertaken for the species rehabilitation area to evaluate weeds, stability and rehabilitation success until the site is considered stable. Inspections will then be relaxed to monthly inspections to assess for ongoing success.

  - After the initial twelve months, monitoring of the species rehabilitation area will be undertaken quarterly for the next twelve months at which time the vegetation should be self-sustaining and not require significant weed control or maintenance input.

  - Monitoring will then occur annually until the rehabilitation has met the performance objectives as detailed in the specific rehabilitation plans. Guiding principles are outlined above.

  - Monitoring will also include an assessment of the effectiveness of weed-control measures.
### Significant Species Management Plan 70

**Pteropus poliocephalus (Grey-headed flying fox)**

- The process of monitoring and rehabilitation will conclude only once the site becomes stable and rehabilitation achieves the performance objectives.
- An annual third party audit to determine compliance with the EA conditions (including rehabilitation) will be undertaken, and recommendations and corrective actions implemented.

### References


### Significant Species Management Plan 70

**Pteropus policephalus (Grey-headed flying fox)**

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Reference</th>
</tr>
</thead>
</table>
Potential Distribution of the Grey Headed Flying Fox within the Subject Area

Potential Habitat for Grey-Headed Flying Fox (DERM, RE Mapping 2009)

Legend
- Proposed Gas Collection Header & KPs
- Proposed Export Pipeline & KPs
- Potential Habitat for Grey-Headed Flying Fox (DERM, RE Mapping 2009)

DATA SOURCE:
- Bing © MapData Australia 2010
- Regional Ecosystems Version 6.0b © State of Queensland (Environmental Protection Agency) 2009

GPO Box 3107 - Brisbane QLD 4000
p (07) 3024 9000  f (07) 3024 8999
www.qgc.com.au  qgc@qgc.com.au

Path: T:\Clients - Projects\QGC\QGC020-QCLNG\GIS\Data\Work Request\QGWRS_2500_2999\QGWRS_2991\Mxd\Grey Headed Flying Fox.mxd
APPENDIX 1 – RELEVANT APPROVAL CONDITIONS
DSEWPC Pipeline Conditions
<table>
<thead>
<tr>
<th>Condition no</th>
<th>Requirement</th>
<th>Answer</th>
</tr>
</thead>
</table>
| **Condition 5** | Before the clearance of native vegetation in the pipeline RoW, the proponent must:  
   a. Undertake pre-clearance surveys for the presence of listed threatened species and migratory species, their habitat and listed ecological communities.  
   b. Alternatively, where recent surveys have already been undertaken and those surveys meet the Department’s requirements for surveys for the relevant MNES, the proponent may elect to develop management plans based on those surveys in accordance with the requirements of **Condition 8**. | Pre clearance surveys have been conducted for the Pipeline to identify any listed species and ecological communities. |
| **Condition 8** | If a listed threatened species or migratory species or their habitat, or a listed ecological community is encountered during the surveys undertaken as required by **Condition 5** and is not specified in the Table 1 or 2 at **Condition 11**, the proponent must submit a separate management plan for each species or ecological community to manage the unexpected impacts of clearing. In relation to each listed species or ecological community each plan must address:  
   a. a map of the location of species, species’ habitat, or ecological community in proximity to the RoW;  
   b. measures that will be employed to avoid impact on the species, species’ habitat, or ecological community;  
   c. a quantification of the unavoidable impact (in hectares and / or individual specimens);  
   d. where impacts are unavoidable and a disturbance limit is not specified of the listed species or ecological community under **Condition 11**, propose offsets to compensate for the impact on the population of the species’ habitat, or the ecological community;  
   e. current legal status (under the EPBC Act); and | Refers to individual SSMPs of this document.  
Summary or Generic SSMPs have been developed for fauna species considered unlikely to be impacted by the Project. However, should such species be identified within potential impact area, a full SSMP would be developed. The other actions identified within the Summary and Generic SSMPs would also be implemented. |
For listed species, each plan must also include:

a. known species' populations and their relationships within the region
b. biology and reproduction
c. preferred habitat and microhabitat including associations with geology, soils, landscape features and associations with other native fauna and/or flora or ecological communities
d. anticipated threats to MNES from pipeline construction, operation and decommissioning
e. management practices and methods to minimise impacts, such as:
   - site rehabilitation timeframes, standards and methods
   - use of sequential clearing to direct fauna away from impact zones
   - re-establishment of native vegetation in linear infrastructure corridors
   - handling practices for flora specimens
   - translocation and/or propagation practices and monitoring for translocation/propagation success
   - monitoring methods including for rehabilitation success and recovery.

f. reference to relevant conservation advice, recovery plans, or other policies, practices, standards or guidelines relevant to MNES published or approved from time to time by the Department.

**Condition 9**
Each plan required under **Condition 8** must be submitted for the approval of the Minister. Commencement in the location covered by the management plan must not occur without approval. Each approved plan must be implemented.
**Condition 10**

If, during construction, a listed threatened species or migratory species or their habitat, or a listed ecological community is encountered and is not specified in the table at **Condition 11 or 12**, the proponent must submit a separate management plan for each species or ecological community in accordance with **Condition 8** within 20 business days of encountering that MNES. Work must not continue at the construction site where the MNES is encountered until the relevant management plan has been approved.

**Species Management Plans within this Document**

**Condition 12**

The proponent must prepare a management plan for each species in the table below. Each plan must be prepared in accordance with the requirements of **Condition 8**.

<table>
<thead>
<tr>
<th>Listed species</th>
<th>EPBC Act Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Cadellia pentastylys</em> (Ooline)</td>
<td>Vulnerable</td>
</tr>
<tr>
<td><em>Paradelma orientalis</em> (Brigalow Scaly foot)</td>
<td>Vulnerable</td>
</tr>
<tr>
<td><em>Furina dunmali</em> (Dunmall’s Snake)</td>
<td>Vulnerable</td>
</tr>
<tr>
<td><em>Egernia rugosa</em> (Yakka Skink)</td>
<td>Vulnerable</td>
</tr>
<tr>
<td><em>Geophaps scripta scripta</em> (Squatter pigeon – southern)</td>
<td>Vulnerable</td>
</tr>
<tr>
<td><em>Nyctophilus timoriensis</em> (Eastern Long-eared Bat)</td>
<td>Vulnerable</td>
</tr>
<tr>
<td><em>Chalinolobus dwyeri</em> (Large-eared Pied Bat)</td>
<td>Vulnerable</td>
</tr>
<tr>
<td><em>Xeromys myoides</em> (Water Mouse)</td>
<td>Vulnerable</td>
</tr>
</tbody>
</table>

Species Management Plans within this document. The exception being the Xeromys myoides (Water Mouse) which is captured as part of the LNG Curtis Island Significant Species Management Plans.
<table>
<thead>
<tr>
<th><strong>Condition 13</strong></th>
<th>Each management plan must be submitted for the approval of the Minister. Commencement in the location covered by the management plan must not occur without approval. Each approved plan must be implemented.</th>
</tr>
</thead>
</table>
Coordinator General Appendix 1 Whole of Project

<table>
<thead>
<tr>
<th>Condition No.</th>
<th>Requirement</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition 9</td>
<td>4. A species management plan for affected EVR listed species (both terrestrial and marine) must be prepared for the total project including, development, operation and decommissioning phases. The plan must satisfy the requirements under section 322 of the Nature Conservation (Wildlife Management) Regulation 2006 relating to tampering with animal breeding places. The plan shall be developed to:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) address the impacts to the species;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) provide for the survival of the species in the wild; and,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) achieve a net conservation benefit for the species.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Species Management Plan should be developed in consultation with DERM</td>
<td></td>
</tr>
</tbody>
</table>

DERM Environmental Authority Conditions

<table>
<thead>
<tr>
<th>Condition No.</th>
<th>Requirement</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHEDULE E – LAND AND WATERWAY MANAGEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimising disturbance to land and soil management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition E1</td>
<td>a. limit the pipeline right of way width to a maximum of 40 metres except as otherwise authorised by</td>
<td></td>
</tr>
</tbody>
</table>

Species Management Plans and Species Management Program within this document.
<table>
<thead>
<tr>
<th>Condition No.</th>
<th>Requirement</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimising disturbance to areas of ecological value</td>
<td></td>
</tr>
<tr>
<td>E16</td>
<td>Prior to conducting petroleum activities that involve significant disturbance to vegetation, an assessment must be undertaken of the condition, type and ecological value of any vegetation in such areas where the activity is proposed to take place.</td>
<td></td>
</tr>
<tr>
<td>E17</td>
<td>The assessment required by Condition (E16) must be undertaken by suitably qualified person and include the carrying out of field validation surveys, observations and mapping of any category A, B or C Environmentally Sensitive Areas (ESA’s) and the presence of species classed as endangered, vulnerable, rare or near threatened under the Nature Conservation Act 1992.</td>
<td></td>
</tr>
<tr>
<td>E18</td>
<td>The holder of this environmental authority, when carrying out petroleum activities must:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) avoid, minimise or mitigate (in order or preference) any impacts on areas of vegetation or other areas of ecological value;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) minimise the risk of injury, harm, or entrapment to wildlife and stock; and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e) prior to carrying out field based activities, make all relevant staff, contractors or agents carrying out those activities, aware of the location of any category A, B or C ESA’s and the requirements of this environmental authority.</td>
<td></td>
</tr>
<tr>
<td>E19</td>
<td>Any vegetation clearing authorised under this authority must be stockpiled in a manner that facilitates respreading or salvaging and does not impede vehicle, stock or wildlife movements.</td>
<td></td>
</tr>
<tr>
<td>E20</td>
<td>Remnant vegetation must not be cleared for the purposes of camps, borrow pits, vehicle access tracks or additional work areas associated with the construction of the pipeline.</td>
<td></td>
</tr>
<tr>
<td>Condition No.</td>
<td>Requirement</td>
<td>Answer</td>
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<tr>
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<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Condition E21</td>
<td>The holder of this authority must ensure that clearing activities are not undertaken in Semi-evergreen Vine Thicket areas.</td>
<td></td>
</tr>
<tr>
<td>Condition E22</td>
<td>The holder of this environmental authority must comply with any environmental offset agreement made in accordance with the conditions of this environmental authority.</td>
<td></td>
</tr>
<tr>
<td>Environmentally Sensitive Areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition E23</td>
<td>A maximum area of 393.88 hectares of vegetation may be cleared within the PPL 153 boundary for the pipeline right of way and turnaround bays, comprising:</td>
<td>Species Management Plans within this Document</td>
</tr>
<tr>
<td></td>
<td>a) Endangered Regional Ecosystem 11.4.3 – 1.28 hectares</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Of Concern Regional Ecosystem 11.3.2, 11.3.3 and 11.3.4 – 2.2 hectares</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Not of Concern Regional Ecosystem – 390.4 hectares.</td>
<td></td>
</tr>
<tr>
<td>Minimising Disturbance to River and Creek Crossings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition E27</td>
<td>All crossings must be in accordance with the construction methods described in the Gas Collection Header Watercourse Crossing Assessment – Addendum to Appendix 1 of the EM Plan.</td>
<td></td>
</tr>
<tr>
<td>Condition E29</td>
<td>The construction of the pipeline must not be in or within 100 metres of any natural wetland, lake or spring.</td>
<td></td>
</tr>
<tr>
<td>Condition E30</td>
<td>The design and construction of the pipeline, including all creek crossings and waterway barriers must:</td>
<td>Species Management Plans within this Document</td>
</tr>
<tr>
<td></td>
<td>a) minimise impacts on riparian, aquatic and water dependent flora and fauna;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) protect flora and fauna during construction and operation, including reduction or disruption to habitat, particularly any potential disruption of endangered species habitat; and</td>
<td>Species Management Plans within this Document</td>
</tr>
<tr>
<td></td>
<td>c) rehabilitate disturbed riparian areas including use of locally sourced species and intensive planting.</td>
<td>Species Management Plans within this Document</td>
</tr>
<tr>
<td>Condition No.</td>
<td>Requirement</td>
<td>Answer</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Condition E33</td>
<td>The holder of this environmental authority must not excavate or place fill in a way that interferes with the flow of water in a watercourse including works that divert the course of flow of the water or works that impound the water.</td>
<td></td>
</tr>
<tr>
<td><strong>Rehabilitation Requirements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition E37</td>
<td>Progressive rehabilitation of disturbed areas must commence as soon as practicable following the completion of any construction or operational works associate with the authorised petroleum activities on the relevant petroleum activity.</td>
<td></td>
</tr>
<tr>
<td>Condition E38</td>
<td>The holder of this authority must ensure that the pipeline right of way is reinstated to a maximum width of 12 metres once construction of the pipeline is completed.</td>
<td></td>
</tr>
<tr>
<td>Condition E39</td>
<td>For areas of native vegetation, revegetation must use seed sourced from local provenance native species, where available.</td>
<td></td>
</tr>
<tr>
<td>Condition E42</td>
<td>All land significantly disturbed by petroleum activities must be rehabilitated to:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) a stable landform with a self-sustaining vegetation cover with same species and density of cover to that of the surrounding undisturbed areas, except over the area that must be maintained free of large flora species for pipeline integrity and access, and in cases where approval is sought in accordance with Condition (E37);</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) ensure that all land is reinstated to the pre-disturbed land use and suitably class;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) ensure that the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance by petroleum activities.</td>
<td></td>
</tr>
<tr>
<td><strong>Pest and Weed Management</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Condition E46

The holder of this authority must develop and implement a pest and weed control program that includes but is not limited to the following:

- a) identification of areas requiring pest and weed control;
- b) control measures to prevent the spread of pest and weed species;
- c) measures to eliminate infestations of noxious pest and weed species that may occur.

### SCHEDULE F – FAUNA MANAGEMENT

#### Condition F1

The holder of this authority must develop and implement a species management plan for all fauna, including all endangered, vulnerable or rare (EVR) listed species likely to be impacted by the pipeline activities. The plan must:

- a) address the impacts to the species; and
- b) provide for the survival of the species in the wild.

#### Condition F2

The holder of this authority must develop and implement fauna management procedures in such a manner that petroleum activities are undertaken to prevent and/or minimise environmental harm. The fauna management procedures must include but not be limited to:

- a) training and awareness of staff and contractors;
- b) conduct of a preconstruction ecological survey to identify the presence of any endangered, vulnerable or rare fauna species and identify and mark hollow-bearing trees;
- c) minimising the clearing of mature and hollow-bearing trees;
- d) minimising the length of time the trench is open through the staging of activities;
- e) temporary exclusion fencing where practicable to restrict fauna access to the trench;

Species Management Plans within this Document
<table>
<thead>
<tr>
<th>Condition No.</th>
<th>Requirement</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>f)</td>
<td>the use of “night caps” over open pipe string ends to prevent the ingress of wildlife;</td>
<td></td>
</tr>
<tr>
<td>g)</td>
<td>pipes being strung with gaps to allow for fauna movement across the line of the pipe;</td>
<td></td>
</tr>
<tr>
<td>h)</td>
<td>a suitably qualified person for fauna handling must be present during clear and grade activities to relocate fauna or recover any injured fauna and must check the entire trench for captured fauna at least daily, preferably in the morning;</td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>ensure any vertebrates injured by clearing activities under this permit are referred to an appropriate wildlife cared group or veterinarian (to be predetermined prior to clearing) and DERM must be notified within 24 hours of any injuries of deaths;</td>
<td></td>
</tr>
<tr>
<td>j)</td>
<td>installation of shelter material to provide wet weather protection and reduction of heat stress, such as by placing sawdust filled Hessian bags in pairs every 250 metres.</td>
<td></td>
</tr>
</tbody>
</table>

Condition F2  
A copy of the fauna management procedures must be made available to the administering authority on request.

SCHEDULE I – MONITORING PROGRAMS

Condition I4  
An annual monitoring report must be prepared each year and submitted to the administering authority when requested. This report shall include but not limited to:

   e) an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs.
APPENDIX 2 - SPECIES MANAGEMENT PROGRAM: TAMPERING WITH THE BREEDING PLACE OF A PROTECTED ANIMAL SPECIES
Species Management Program
Tampering with the Breeding Place of a Protected Animal Species

QCLNG Gas Collection Header and Export Pipeline

QCLNG-BG00-ENV-RPT-000004
Rev 0
Produced for: QGC
## Release authorisation

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Originator</td>
<td>Sandrine Martinez</td>
</tr>
<tr>
<td>Reviewed</td>
<td>Berlinda Ezzy</td>
</tr>
<tr>
<td>Approved</td>
<td>Steve Fox</td>
</tr>
<tr>
<td>Client</td>
<td>QGC</td>
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</table>

## Revision record

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<th>Status</th>
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<th>Reviewed</th>
<th>Approved</th>
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<td>Issued to Client</td>
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<td>BE</td>
<td>SF</td>
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<td>14-02-2011</td>
<td>Client Review</td>
<td>SM</td>
<td>BE</td>
<td>SF</td>
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2 Scope................................................................................................................................... 4
3 Species Management Principles ...................................................................................... 5
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1 Introduction

Under section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006* (WM Reg) it is an offense to remove or tamper with an animal breeding place that is being used by a protected animal to incubate or rear the animal’s offspring, without reasonable excuse.

Pursuant to section 332(2), an animal breeding place is a place being used by a protected animal to incubate or rear the animal’s offspring if:

a) The animal is preparing, or has prepared, the place for incubating or rearing the animal’s offspring; or

b) The animal is breeding, or is about to breed, and is physically occupying the place; or

c) The animal and the animal’s offspring are physically occupying the place, even if the occupation is only periodical; or

d) The animal has used the place to incubate or rear the animal’s offspring and is of a species generally known to return to the space place to incubate or rear offspring in each breeding season for the animal.

Section 332(5) defines “tamper with an animal breeding place” to mean “damage, destroy, mark, move or dig up the breeding place”.

In October 2010 the Department of Environment and Resource Management (DERM) approved a Species Management Program (SMP) for the QCLNG Project. The SMP only applied to least concern animal species and expires on 30 June 2013. The SMP authorises activities that may require tampering with least concern animal breeding places provided it occurs in accordance with the specified conditions.

Specific exclusions from this document included animals that are ‘extinct in the wild’, ‘endangered’, ‘vulnerable’, ‘near threatened’, ‘special least concern’ and colonial breeders under the *Nature Conservation Act 1992* (NC Act).

2 Scope

This Species Management Program (SMP) has been developed to meet development approval conditions for the QCLNG Project required by the Coordinator General in Appendix 1: Condition 9. The intent is to ensure protected wildlife and their respective breeding places are appropriately managed during activities associated with construction and operation of the QCLNG pipeline.

This SMP encompasses those species listed as endangered, vulnerable, near-threatened, threatened or special least concern under the EPBC Act and the NC Act and their breeding places that may be encountered within the Gas Header Collection (GCH) Pipeline and the Export Pipeline, (Petroleum Pipeline Licences 153 and 154 respectively). Possible species present along the pipeline alignments have been determined as a result of fauna surveys undertaken, habitat suitability assessments, desktop searches, etc. Further information on the management and conservation of these species are detailed in the ‘QCLNG Pipeline Significant Species Management Plans’.
3 Species Management Principles

The following 3 principles will be adopted in order of priority when dealing with any animal breeding places, including least concern.

1. Pre-clearance Surveys

- On-ground ecological assessments (pre-clear and grad walkthroughs) will be undertaken prior to any clearing of native vegetation by a qualified and experienced spotter-catcher. The assessment will include observations to identify the presence of protected animal species, presence of their habitat and breeding places.

2. Avoid

- Avoid tampering through changing the placement of infrastructure and/or area of clearing; and
- Avoid tampering through operational timing where practicable (to allow young to vacate the breeding place).

3. Remove or Relocate

- Remove and relocate an inactive breeding place (i.e. without eggs or young) to a suitable area of adjacent habitat as close as possible to the impact area; and
- Remove and relocate an active breeding place with eggs or young to a nearby habitat deemed appropriate by a qualified spotter-catcher or relocate to a wildlife carer/facility.

3.1 Conditions of SMP

The following species management practices and actions outlined in Table 1 below will be adhered to if a breeding place of any threatened or ‘special least concern’ protected animal is encountered during the life of the Project. Particular emphasis is prior to and during construction as this is when most impacts to breeding places are likely to occur.

Table 1. Management Actions for Tampering with a Protected Species Breeding Place

<table>
<thead>
<tr>
<th>Species Group</th>
<th>Breeding Place Status</th>
<th>Action</th>
</tr>
</thead>
</table>
| EVNT Species (see Table 2) | Prior to clearing | • Undertake pre-clear and grade walkthrough within 24 hours before clearing to identify all hollow bearing trees and logs, active nest locations and peeling bark should be checked for the presence of any EVNT fauna. If roosting micro-bats are found, DERM will be contacted and a buffer zone must be erected as defined by a spotter-catcher and work must not continue in this zone. All hollow bearing trees, hollow logs and trees with active nests will be clearly marked.
• Where possible avoid the breeding place through minimising the clearing width or changing the location of infrastructure. Allow a buffer zone distance equal to the height of the hollow bearing tree or surrounding trees (which ever is tallest) plus 30% from the breeding place or a greater buffer zone as deemed appropriate by the spotter-catcher to minimise any detrimental impacts.
• If an active nest is identified, clearing activity must not occur within the buffer zone around the nest. If nest is identified as EVNT species the buffer will remain in place to allow the breeding cycle to occur (i.e. young have fully... |
<table>
<thead>
<tr>
<th>Species Group</th>
<th>Breeding Place Status</th>
<th>Action</th>
</tr>
</thead>
</table>
|                       |                          | fledged or left the breeding place).  
|                       |                          | • Clearly mark out buffers to ensure contractors and personnel do not clear vegetation in these areas.                                  |
|                       |                          | • Placement of nest boxes within the surrounding vegetation will occur to offset the loss of tree hollows within the clearing corridor. Nest boxes will be installed prior to or during clearing activities. These boxes will be of an appropriate size to cater for affected fauna and made out of long lasting materials (e.g. marine ply or hardwood). The nest box will remain in place for its useable life. |
|                       |                          | • Where tree hollows are identified as a potential breeding place for EVNT species investigate relocating the tree hollow to nearby, undisturbed habitat to cater for loss of hollow-bearing trees (this will be guided by a number of factors including the number of species found nesting in hollow trees within the clearance area). |
| ENVT Species (see Table 2) | During and/or after clearing | • Clearing must be undertaken in a sequential manner to ensure wildlife is directed towards adjacent habitat and not across roads or into other areas of threat (e.g. trench).  
<p>|                       |                          | • A licensed spotter-catcher will assess the possibility of removing and relocating a vacant nest to another suitable adjacent habitat. Consult DERM if required. |
|                       |                          | • If an active nest is irrecoverable and removal of eggs / young is required, the surviving eggs / young will be transported to a licensed wildlife carer or relocate to an appropriate place nearby as identified by the spotter-catcher. Notify DERM immediately. |
|                       |                          | • Where possible all impacted nesting hollows will be relocated into adjacent, undisturbed habitat.                                      |
|                       |                          | • Where possible all hollow (ground) logs will be removed and relocated into adjacent, undisturbed habitat.                             |
|                       |                          | • A licensed spotter-catcher will complete daily inspections of trenches, culverts and other structures prior to works within an area to determine whether there are any trapped or injured EVNT species present and taking action as appropriate (i.e. remove and relocate or take to a veterinarian/wildlife carer if required). |
|                       |                          | • Provide shade if EVNT species will remain in trenches for extended periods (over 3 hours) of time prior to being rescued.            |
|                       |                          | • If trenches are left open for extended periods of time (or overnight), provide exit ramps out of trenches to allow trapped fauna to leave of their own accord. |
|                       |                          | • Surviving adults will be released into nearby undisturbed habitat. Consult with DERM if required.                                   |
|                       |                          | • Injured animals will be taken immediately to the nearest wildlife facility or vet. A minimum of two veterinarians and/or wildlife carers will have been contacted in the local area to ensure that they will be available during the project and that transport of any injured animals to such a facility can be undertaken as quickly as possible. |
|                       |                          | • In the event a fauna injury occurs during the project’s |</p>
<table>
<thead>
<tr>
<th>Species Group</th>
<th>Breeding Place Status</th>
<th>Action</th>
</tr>
</thead>
</table>
| Special Least Concern Species *(see Table 3)* | Prior to clearing | • Undertake pre-clear and grade walkthrough to identify the presence of the special least concern species and their breeding place. Notify DERM if an active breeding place is located.  
• Where possible avoid the breeding place through minimising the clearing width or changing the location of infrastructure. Allow a buffer zone distance equal to the height of the hollow bearing tree or surrounding trees (which ever is tallest) plus 30% to the breeding place, or a greater buffer zone deemed appropriate by the spotter-catcher to minimise any detrimental impacts.  
Koala  
• If a koala is observed, the tree in which it is situated and any other trees where branches overlap that tree must not be cleared whilst the koala is present;  
• Allow a buffer zone distance equal to the height of the tree or surrounding trees (which ever is tallest) plus 30% to minimise any detrimental impacts or a greater buffer zone deemed appropriate by the spotter-catcher.  
• Clearing of these trees cannot commence and the buffer must be kept in place until the koala has vacated the tree of its own accord.  
• Clearly mark out this area to ensure contractors and personnel do not clear the trees until vacation by the koala is confirmed.  
Platypus  
• If a platypus den is identified leave a buffer of at least 30 m around the den. Do not excavate or disturb the ground within this area. |
| Special Least Concern Species *(see Table 3)* | During and/or after clearing | • Clearing must be undertaken in a sequential manner to ensure wildlife are directed towards adjacent habitat and not across roads or into other areas of threat (e.g. trench).  
• A licensed spotter-catcher will complete daily inspections of trenches, culverts and other structures prior to works within an area to determine whether there are any trapped or injured special least concern species present and taking action as appropriate (i.e. remove and relocate or take to a veterinarian/wildlife carer if required).  
• Provide regular shade if special least concern species will remain in trenches for extended periods (over three hours) of time prior to being rescued.  
• If trenches are left open for extended periods of time (or overnight), provide exit ramps out of trenches to allow trapped fauna to leave of their own accord.  
• Injured animals will be taken immediately to the nearest wildlife facility or vet. A minimum of two veterinarians |
Species Group | Breeding Place Status | Action
--- | --- | ---
 |  | and/or wildlife carers will have been contacted in the local area to ensure that they will be available during the project and that transport of any injured animals to such a facility can be undertaken as quickly as possible.
• In the event a fauna injury occurs during the project’s clearing or construction a financial agreement will be made with the chosen veterinarian/wildlife carer. DERM will be notified within 24 hrs of any injuries or deaths.
• If a least concern species active nest is irrecoverable and removal of eggs / young is required, the surviving eggs / young will be transported to a licensed wildlife carer. Notify DERM immediately.

Koala
• A koala spotter must be present during clearing in any koala habitat;
• If a koala is spotted and the vegetation around the koala is marked, ensure clearing in adjacent areas does not damage or interfere with these trees whilst the koala is present; and
• Allow the koala to safely move out of the area.

Platypus
• If the den cannot be avoided and it contains eggs / young remove them and transport to a licensed wildlife carer. Notify DERM immediately.

Colonial Breeding Species
• Notify DERM immediately if active breeding places are located within the clearing zone.

This SMP does not deal with disturbance of flying fox camps. DERM will be contacted directly for any activity that may disturb such places prior to any activities occurring.

### 3.2 Qualifications

Any tampering of animal breeding places will be carried out by a suitably qualified, experienced and licensed person (spotter-catcher).

### 3.3 Education

QGC will ensure that the actions identified in this SMP are understood and implemented in a compliant and consistent manner across the Project. This will be achieved through:

• Incorporating the SMP into relevant contractual documents and specifications for the project;
• Engaging suitably qualified ecologists and spotter-catchers to assist in implementing the SMP; and
• Educating field staff about protected wildlife that may be encountered, their role, what should be done and penalties for non-compliance.
3.4 Reporting & Monitoring

1. QGC will maintain a register of tampering with animal breeding places that may occur under this SMP. This register will be updated with each wildlife incident and e-mailed to DERM within 24 hours. The register will include as a minimum the following details:
   a) Date and time
   b) Location (GPS Point, Lot and Plan)
   c) QGC activity that was occurring (e.g. clearing native vegetation to construct pipeline)
   d) Authorised person that undertook the tampering
   e) Species tampered with
   f) Number of animals impacted
   g) Details of tampering (e.g. relocation of vacant nest)
   h) Wildlife Carer Details (where relevant)
   i) Why avoidance was not possible
   j) Comments/outcome

2. Where an animal breeding place has been removed and relocated to an adjacent area of habitat, monitoring will be undertaken by a suitably qualified ecologist to determine the outcomes and success of this measure. Monitoring will occur within one month from the relocation and then based on the particular species, during the time of year when eggs/young are likely to be present. Results of monitoring will be maintained by QGC and can be provided to DERM upon request.

3. Monitoring of nest boxes will be undertaken for the life of this SMP. A report will be submitted to DERM every year for the 3 year period detailing the results of this monitoring i.e. the success or otherwise of nesting boxes.

3.5 Term of Approval

This SMP will be valid for 3 years from date of approval.

3.6 Approved Parties

QGC and any of its employees, contractors or agents are authorised to operate in accordance with this SMP.

4 Offsets

QGC commit to avoiding the clearing of native vegetation and disturbance to protected wildlife habitat and breeding places to the greatest extent possible through design and operational activities for the life of the QCLNG Project. However it is recognised that there will be unavoidable environmental impacts. To compensate for these unavoidable environmental impacts QGC will be securing vegetation and biodiversity offsets to be outlined in an Offset Package for the QCLNG Project.

Offsets will include a range of regional ecosystems including coastal ecosystems, brigalow vegetation and koala habitat. These areas will include existing animal breeding places and allow for restoration of animal breeding places. Offset areas will include strategic sites near riparian and other wildlife corridors and areas adjoining protected areas. Offset sites will secure regional ecosystems included in the essential habitat database for species such as Powerful Owl, Glossy Black-cockatoo, Yakka Skink, Brigalow Scaly-foot and Koalas. Offset sites will also include habitat trees.
The offset sites will be secured on title and actively managed to enhance their habitat values and ecological condition. Restoration of degraded areas will also be undertaken as part of the offset package. All of these activities will contribute to the conservation of protected wildlife, their habitats and overall population viability.
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status^</th>
<th>Breeding Place Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Death Adder</td>
<td>Acanthophis antarcticus</td>
<td>NT^2</td>
<td>Favours large amount of fallen woody debris and leaf litter.</td>
</tr>
<tr>
<td>Magpie Goose</td>
<td>Anseranus semipalmata</td>
<td>Ma</td>
<td>Nests usually close to wetlands during wet season. Nest consists of a simple unlined cup placed either in a floating platform of trampled reeds or built in tree-tops (Pringle 1985).</td>
</tr>
<tr>
<td>Regent Honeyeater</td>
<td>Anthochaera phrygia</td>
<td>E^1 Mi</td>
<td>Breeds from May to March, mostly September to November. Cup-shaped nests are often situated in an upright tree fork 3-30 m above the ground and are built using small pieces of plant material (e.g. strips of eucalypt bark) and spider webs (e.g. Geering 1997; Geering and French 1998).</td>
</tr>
<tr>
<td>Great Egret</td>
<td>Ardea alba</td>
<td>Mi, Ma</td>
<td>Nesting colonies are usually near or over water, where they construct large stick nests in low trees or sometimes in reed beds (Pringle 1985).</td>
</tr>
<tr>
<td>Cattle Egret</td>
<td>Ardea ibis</td>
<td>Mi, Ma</td>
<td>Nesting colonies are usually near or over water, where they construct large stick nests in low trees or sometimes in reed beds (Pringle 1985).</td>
</tr>
<tr>
<td>Woma</td>
<td>Aspidites ramsayi</td>
<td>NT^2</td>
<td>Shelters in hollow logs, animal burrows or thick herbage.</td>
</tr>
<tr>
<td>Glossy Black-cockatoo</td>
<td>Calyptorhynchus lathamii</td>
<td>V^2</td>
<td>Nest in large hollow-bearing eucalypts (often in dead trees; Forshaw and Cooper 1989). Eggs are laid between March and August (Forshaw 2003).</td>
</tr>
<tr>
<td>Large-eared Pied Bat</td>
<td>Chalinolobus dwyeri</td>
<td>V^1</td>
<td>Breeds mostly in cave and man-made structures.</td>
</tr>
<tr>
<td>Little Pied Bat</td>
<td>Chalinolobus picatus</td>
<td>NT^2</td>
<td>Roosts in trees, caves and abandoned mines and building (Churchill 2008).</td>
</tr>
<tr>
<td>Red-browed Treecreeper</td>
<td>Climacteris erythrops</td>
<td>NT^2</td>
<td>Nests in tree-hollows.</td>
</tr>
<tr>
<td>Northern Quoll</td>
<td>Dasyurus hallucatus</td>
<td>E^1, NT^2</td>
<td>Dens are found in hollow logs, rock crevices and caves, and in tree hollows (Hill and Ward 2010). Young are born in the mid dry season (June) (Oakwood 2000).</td>
</tr>
<tr>
<td>Collared Delma</td>
<td>Delma torquata</td>
<td>V^1 and 2</td>
<td>Weathered loose rocks, flattish bedrock outcroppings, logs or mats of leaf litter, or in cracks and crevices among tussock grasses. Lays two eggs around December with hatching in February or March</td>
</tr>
<tr>
<td>Ornamental Snake</td>
<td>Denisonia maculata</td>
<td>V^1 and 2</td>
<td>No breeding information available. Shelters in earth cracks, litter, and fallen timber (Cogger 1992; Ehmann 1992; Cogger et al. 1993).</td>
</tr>
<tr>
<td>Yakka Skink</td>
<td>Egernia rugosa</td>
<td>V^1 and 2</td>
<td>Breeding season and clutch size not known. Digs burrow systems among low...</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Status</td>
<td>Breeding Place Information</td>
</tr>
<tr>
<td>--------------------------</td>
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</tr>
<tr>
<td>Red Goshawk</td>
<td>Erythrotriorchis radiatus</td>
<td>V1 E2</td>
<td>Breeding generally occurs in spring, with eggs laid between August and October in the south-east (Debus and Czechura 1988), and between May and October in the north. Nests are usually in the tallest and most massive tree in a tall stand. (NSW NPWS 2002).</td>
</tr>
<tr>
<td>Dunmall's Snake</td>
<td>Furina dunmalli</td>
<td>V1</td>
<td>Breeding season and clutch size not known. Shelters in fallen timber and possibly also leaf litter and earth cracks (Ehmann 1992).</td>
</tr>
<tr>
<td>Squatter Pigeon (southern)</td>
<td>Geophs scripta scripta</td>
<td>V1 E2</td>
<td>Breeds from March to September in the tropics and from September to November in the southern parts of its range. The nest is a simple scrape in the ground lined with dry grass (Frith 1982; Crome and Shields 1992).</td>
</tr>
<tr>
<td>Grey Snake</td>
<td>Hemiaspis damelii</td>
<td>E2</td>
<td>Shelters under rocks, bark, logs and other debris (Richardson 2008).</td>
</tr>
<tr>
<td>Imperial Hairstreak</td>
<td>Jalmenus eubulus</td>
<td>V2</td>
<td>Only breeds in old-growth forest, preferably Bribalow (Common and Waterhouse 1981). The larvae feed exclusively on Acacia harpophylla and adults are most active in February and March although this depends on seasonal climatic conditions (Eastwood et al. 2008).</td>
</tr>
<tr>
<td>Square-tailed Kite</td>
<td>Lophoictinia isura</td>
<td>NT2</td>
<td>Nesting sites are generally located along or near watercourses, in the fork or on a large, horizontal limb of Angophora spp. or Eucalypt spp. (Jolly 1989; Cameron 1992).</td>
</tr>
<tr>
<td>Murray Cod</td>
<td>Maccullochella peelli peelli</td>
<td>V1</td>
<td>Spawn in spring-summer (Rowland, 1988). Eggs are laid on a hard substrate such as large structural woody habitat, rocks and clay surfaces, while in ponds and dams, captive cod have spawned inside hollow objects such as concrete pipes and metal drums, on fallen timber and directly on the substrate (Cadmullader 1979; Cadmullader and Gooley 1984; Gooley et al. 1995; Rowland 1988).</td>
</tr>
<tr>
<td>Rainbow Bee-eater</td>
<td>Merops ornatus</td>
<td>Mi</td>
<td>Breeds from August to January (Higgins 1999; Boland 2004). The nest is located in an enlarged chamber at the end of long burrow or tunnel (e.g. Comrie-Smith 1930; Morris 1977), in flat or sloping ground, in the banks of rivers, creeks or dams, in roadside cuttings, in the walls of gravel pits or quarries, in mounds of gravel, or in cliff-faces (Forshaw and Cooper 1987; Lill 1993; Higgins 1999; Boland 2004).</td>
</tr>
<tr>
<td>Australian Cotton Pygmy-</td>
<td>Nettapus coromandelianus albipennis</td>
<td>Mi</td>
<td>Uses standing dead trees with hollows close to water for roosting and breeding (NSW NPWS 2003; Pizzey and Knight 2003).</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Status^</td>
<td>Breeding Place Information</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------</td>
<td>---------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Eastern Long-eared Bat</td>
<td>Nyctophilus corbeni</td>
<td>V1 and 2</td>
<td>Little is known about its reproductive biology. Pregnant and lactating females have been trapped in November in central-western New South Wales and Queensland (Schulz and Lumsden 2010). Large hollows in trees are used as roost sites (Lumsden et al. 2008).</td>
</tr>
<tr>
<td>Brigalow Scaly-foot</td>
<td>Paradelma orientalis</td>
<td>V1 and 2</td>
<td>Lays two eggs in late spring or early summer (Greer 1989). Microhabitat includes hummock grasses, sandstone slabs and fallen bark. Shelters under rocks, logs and surface debris (Wilson and Knowles 1988; Agnew 1996).</td>
</tr>
<tr>
<td>Fitzroy River Turtle</td>
<td>Rheodytes leukops</td>
<td>V1 and 2</td>
<td>Lays multiple clutches of eggs seasonally in sand and gravel bars adjacent to the river. Nests have been found up to 15 m from water on flat sandbanks (Cogger et al. 1993; Cann 1998).</td>
</tr>
<tr>
<td>Australian Painted Snipe</td>
<td>Rostratula australis</td>
<td>V1</td>
<td>Breeds in response to wetland conditions rather than during a particular season. Lays 3-6 eggs in a shallow scrape nest (Lowe 1963; Marchant and Higgins 1993).</td>
</tr>
<tr>
<td>Golden-tailed Gecko</td>
<td>Strophurus taenicauda</td>
<td>NT2</td>
<td>Shelters in hollow limbs and stumps, under loose bark either on trees or on the ground.</td>
</tr>
<tr>
<td>Black-breasted Buttonquail</td>
<td>Turnix melanogaster</td>
<td>V1 and 2</td>
<td>Ground-dwelling bird that breeds mainly from October to December (Smyth and Young 1996). Nests consist of a scrape in the ground, lined with leaves, grass or moss. They are well-concealed and placed in the buttress root of a tree or sapling, the base of a fern or under a low bush or grass tussock (Marchant and Higgins 1993; Smyth and Young 1996).</td>
</tr>
</tbody>
</table>

^Status: ¹: Commonwealth (EPBC) listed: EX = Extinct; CE = Critically Endangered; E = Endangered; V = Vulnerable; Mi = Migratory Species, Ma = Marine Species. ²: State (NC Act) listed: EX = Presumed Extinct; E = Endangered; V = Vulnerable; NT = Near Threatened.
Table 3. Special Least Concern Species Known to or Potentially Occur in the Project Area

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status^</th>
<th>Breeding Place Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-beaked Echidna</td>
<td>Tachyglossus aculeatus</td>
<td>Least Concern</td>
<td>Usually shelter under thick bushes, in hollow logs, under piles of debris, or occasionally in burrows. Uses short burrows (less than 1 m long) as nursery (Augee et al. 2006).</td>
</tr>
<tr>
<td>Platypus</td>
<td>Ornithorhynchus anatinus</td>
<td>Least Concern</td>
<td>Breeding season varies but mating occurs around August in Queensland. Females construct an elaborate nesting burrow that may be up to 30 m long. Burrow entrances are normally above water level and often under a tangle of tree roots (Carrick et al. 2008)</td>
</tr>
</tbody>
</table>

^Status: ¹: Commonwealth (EPBC) listed: EX = Extinct; CE = Critically Endangered; E = Endangered; V = Vulnerable; Mi = Migratory Species, Ma = Marine Species.
²: State (NC Act) listed: EX = Presumed Extinct; E = Endangered; V = Vulnerable; NT = Near Threatened.

* Phascolarctos cinereus is listed as Vulnerable under the NC Act in south-east Queensland only.
5 References


Department of Sustainability, Environment, Water, Population and Communities (2011c). *Hirundapus caudacutus* in Species Profile and Threats Database, Department of Sustainability, Environment,


NSW Department of Primary Industries (DPI) (2007). Recovery plan for the endangered river snail (*Notopala sublineata*). NSW Department of Primary Industries.


APPENDIX 3 - SIGNIFICANT SPECIES MANAGEMENT PLAN FOR CYCAS MEGACARPA
QUEENSLAND CURTIS LNG PROJECT

Significant Species Management Plan
For *Cycas megacarpa*
(Cycadaceae)

Doc. No. QGC020-ENV-RPG-0002
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INTRODUCTION

1.1 Project Background

QGC, a wholly-owned subsidiary of the BG Business, has been granted development approval to expand its coal seam gas (CSG) extraction activities in the Surat Basin to supply CSG for export, via a gas export pipeline and a liquefied natural gas (LNG) processing facility on Curtis Island, near Gladstone.

The Export Pipeline extends approximately 380 km from the QGC Coal Seam Gas (CSG) Field near Miles to the Queensland Curtis LNG (QC LNG) Plant Facility on Curtis Island and will be cleared to its full 40 m width.

QGC was required to submit an Environmental Impact Statement (EIS) to meet the requirements as a significant project under the Queensland Government’s State Development and Public Works Organisation Act 1971 (SDPWO Act). Furthermore, the EIS was also required to address Matters of National Environmental Significance (MNES) under the Australian Government’s Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The draft EIS for the Queensland Curtis LNG Project was released to the public and was available for public comment on the 28th of August 2009.

During the EIS process, an assessment of flora, fauna and associated ecological issues for the proposed alignment was undertaken and can be found in the Queensland and Curtis LNG Project (Pipeline Component) Terrestrial and Freshwater Flora and Fauna assessment (Unidel Group 2009).

Flora and Fauna assessment identified 119 Endangered, Vulnerable or Rare (EVR) plant species that have been recorded as occurring or potentially occurring within the wider study area. Of these 119 EVR species, field surveys recorded one species within the 40 m wide Right of Way (ROW) along the proposed pipeline alignment (i.e. Cycas megacarpa). Approximately 150 C. megacarpa individuals, distributed among three populations, were found between KP 253 and 268.

Since the release of the Draft EIS, sections of the Export Pipeline alignment have been refined, requiring a reassessment of the presence of C. megacarpa.

Additionally, the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) required that a Significant Species Management Plan (SSMP) for Cycas megacarpa be submitted as part of the conditions pursuant to the issue of a Clearing Permit of Protected Plants as prescribed by the Nature Conservation Act 1992 (NC Act).

The purpose of this management plan is to guide the conservation management and rehabilitation of C. megacarpa during and after construction of the Export Pipeline.

1.2 Scope of Works

The scope of this Significant Species Management Plan includes:

- Assessment of the presence of C. megacarpa along the redefined Export Pipeline alignment;
• Assessment of local \( C. \ megacarpa \) populations within the proposed 40 m wide ROW including number of individual plants and population structure;

• Identification of appropriate measures to avoid, mitigate and compensate for potential impacts on \( C. \ megacarpa \) including ROW reduction, transplantation, and propagation; and,

• Development Approval conditions outlined in the Commonwealth Government approval for the QC LNG Project dated 22 October 2010 (refer to Table 1).

This Significant Species Management Plan was developed in accordance with the guidelines proposed by the \textit{National Multi-species Recovery Plan for Cycads} (Queensland Herbarium 2007).
Table 1 Commonwealth Development Approval Conditions for *Cycas megacarpa*

<table>
<thead>
<tr>
<th>Development Approval Condition</th>
<th>Description of Condition</th>
<th>Location in SSMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition 23</td>
<td>To offset unavoidable impacts to <em>Cycas megacarpa</em> from all activities associated with this approval, the proponent must:</td>
<td>Section 6.3 (a full offsets plan for the QCLNG project is currently being documented which will include offset conditions for <em>Cycas megacarpa</em>.)</td>
</tr>
<tr>
<td></td>
<td>a. within 12 months of the date of this approval, secure an area of at least 18 ha as an offset for receiving no less than 1104 translocated and / or propagated individuals;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. identify alternative recruitment methods if it is considered unlikely that translocation and propagation will be successful;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. notify the Department in writing of the acquisition or transfer of ownership of the area identified in condition 23(a) within one month of securing the land;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. if the proponent proposes any action within a proposed offset area, other than actions related to managing that area as an offset property, approval must be obtained, in writing form the Department. In seeking Departmental approval the proponent must provide a detailed assessment of the proposed action including a map identifying where the action is proposed to take place and an assessment of all associated adverse impacts on MNES. If the Department agrees to the action within the proposed offset site, the area identified for the action must be excised from the proposed offset and alternative offsets secured of equal or greater environmental value in relation to the impacted MNES;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. demonstrate that the measure for securing and managing the offset will ensure that the offset is protected in perpetuity.</td>
<td></td>
</tr>
<tr>
<td>Development Approval Condition</td>
<td>Description of Condition</td>
<td>Location in SSMP</td>
</tr>
<tr>
<td>--------------------------------</td>
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</tr>
<tr>
<td>Condition 24</td>
<td>The proponent must prepare a <em>Cycas megacarpa</em> Management Plan in consultation with an expert approved by the Department in writing.</td>
<td>This SSMP</td>
</tr>
</tbody>
</table>
| Condition 25                   | The *Cycas megacarpa* Management Plan must include:  
  a. measures to ensure all *Cycas megacarpa* within the ROW are avoided using, for example suitable trenchless technique(s) if necessary or, if avoidance is not possible, individual plants must be removed and kept offsite and replanted in the same location, or alternatively translocated. Where it can be demonstrated that removal and translocation is unlikely to succeed, translocation may be substituted by establishing propagated individuals  
  b. measures to propagate and plant *Cycas megacarpa* individuals removed or impacted by construction activities to maintain a population of no less than 1104 individuals within the offset site  
  c. a detailed methodology for translocation, propagation and planting, including a map of the location of the translocation site  
  d. details of funding required to secure, maintain and enhance the values of the offset site in perpetuity.  
  e. details of a suitably qualified person to undertake translocation, propagation and planting  
  f. details of erosion and sediment control measures to be implemented in the ROW in the Callide and Calliope Ranges  
  g. measures to rehabilitate the ROW in the Callide and Calliope Ranges | Section 6.0 (this SSMP) |
<table>
<thead>
<tr>
<th>Development Approval Condition</th>
<th>Description of Condition</th>
<th>Location in SSMP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>h. measures for the control and management of weeds, fire, feral animals, access and grazing in translocation sites</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. measures for the management, maintenance and protection of the population of <em>Cycas megacarpa</em> individuals in the offset site for a period of five years following final planting</td>
<td></td>
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<tr>
<td></td>
<td>i. measures for the management, maintenance and protection of the population of <em>Cycas megacarpa</em> individuals in the offset site for a period of five years following final planting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>k. performance measures, reporting requirements, trigger levels for corrective actions and identification of those actions to be taken to ensure performance measures are met</td>
<td></td>
</tr>
<tr>
<td></td>
<td>l. a reconciliation statement of impacts against agreed limit of disturbance must be updated by the proponent every 12 months from commencement of construction until complete</td>
<td></td>
</tr>
</tbody>
</table>
2.0 CYCAS MEGACARPA

2.1 Review of Existing Ecological Information

2.1.1 Description and Ecology

*Cycas megacarpa* is a small to medium sized cycad growing to 5 m tall and with a slender erect trunk 8 to 14 cm in diameter (Hyslop and Haskard 2005; Queensland Herbarium 2007). *C. megacarpa* foliage is mid to dark green with leaves between 70 and 110 cm in length and supporting numerous glossy leaflets. At the base of the leaves the leaflets are reduced to needle-like structures of approximately 0.5 cm long. Young leaves are light green, densely hairy with orange-brown hairs (Jones 2002).

*C. megacarpa* is dioecious, that is, male and female reproductive structures develop on separate individuals. Male plants produce orange-brown, hairy cones that are oval in shape, 18 cm long and 7 cm in diameter. Female plants produce ovoid seeds, green to light brown and approximately 35 mm to 45 mm in diameter (Hill 1998; Hill & Osbourne 2001; Jones 2002).

The seeds mature from March onwards when they drop to the ground. However, they do not germinate for at least nine months due to a delayed fertilisation process unique to cycads. Most cycads are fire dependant for successful reproduction but seedlings and seeds are vulnerable to fire. The effects of fire frequency, intensity and time of burn are poorly understood (Queensland Herbarium 2007).

Dispersal and recruitment for *C. megacarpa* are poorly known. Insects, in particular weevils (Ornduff 1992), are believed to contribute to the pollination of many cycads, however, there is no published information. Additionally, seeds are relatively large and highly toxic and few vertebrates (e.g. rodents and fruit bats) contribute to their dispersal. Dispersal range is considered to be less than a 100 m and is usually close to parent plants.

*C. megacarpa* has limited dispersal ability and generally germinate close to the parent plant. This results in fragmented populations with little propensity to colonise over larger areas. Further, if it is assumed that pollination occurs over short distances, then it is also likely that major populations are genetically isolated with little genetic flow between them (Queensland Herbarium 2007).

2.1.2 Legal Status

*C. megacarpa* is listed as Endangered under both the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Queensland Nature Conservation Act 1992* (NC Act). It is also listed under the Convention on International Trade in Endangered Fauna and Flora (CITES) under Appendix II and under the 2007 *International Union for Conservation of Nature and Natural Resources* (IUCN) Red List of Threatened Species.

2.1.3 Current Distribution and Habitat

*C. megacarpa* is endemic to south-east central Queensland and has a geographic distribution ranging from Bouldercombe in the north to near Woolooga in the south (Queensland Herbarium 2007). *C. megacarpa* is commonly found in woodland, open woodland and open forest, often in conjunction with a grassy understory (Jones 2002; Queensland Herbarium 2007). The species occurs in habitat dominated by *Eucalyptus crebra* and *Corymbia citriodora* as well as *Corymbia erythrophloia*, *Eucalyptus melanophloia* and *Lophostemon confertus*. It mostly grows on
undulating to hilly volcanic or mudstone geologies at altitudes of 40-680 m (Queensland Herbarium 2007).

Populations occur in both remnant and non-remnant vegetation. C. megacarpa is toxic to cattle and has been actively removed from grazing properties over the last 150 years.

The Queensland Herbarium (2007) recognises 46 populations of C. megacarpa, including approximately 373,000 individuals, distributed over 18,726 km². The known area of occupancy for Cycas megacarpa is 46 km². Density within populations varies from 1 to 307 plants per hectare (Queensland Herbarium 2007).

Three of these 46 populations occur adjacent to the Export Pipeline and contain relatively few individuals (Table 1).

Table 1. Cycas megacarpa Populations Identified in the Recovery Plan Adjacent to the Proposed Export Pipeline Alignment (Queensland Herbarium 2007).

<table>
<thead>
<tr>
<th>Population number</th>
<th>Location relative to Export Pipeline</th>
<th>Projected area of population (ha)</th>
<th>Projected number in population</th>
<th>Cycad density (#/ha)</th>
<th>Seedlings present</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>300 m west of KP 268</td>
<td>5</td>
<td>19</td>
<td>3.8</td>
<td>No</td>
</tr>
<tr>
<td>12</td>
<td>1.44 km of KP 268</td>
<td>5</td>
<td>4</td>
<td>1.3</td>
<td>No</td>
</tr>
<tr>
<td>15</td>
<td>733 m west of KP 256</td>
<td>50</td>
<td>35</td>
<td>8</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.0 FIELD SURVEY METHODOLOGY

3.1 Data Collection

Field survey for C. megacarpa was conducted in the Callide Range, approximately 30 km north-east of Biloela. The assessment aimed at recording the presence and approximate population densities and population structure of C. megacarpa within the proposed 40 m wide ROW of the Export Pipeline alignment. Following survey of the entire Callide and Calliope Ranges section of the ROW, three main sites were identified and further investigated (Figure 1, 2 and 3):

- Site 1 – Lot Plan 3SP217657, between KP 267.6 and 268, near the Dawson Highway;
- Site 2 – Lot Plan 4RN903, between KP 261.8 and 262; and
- Site 3 – Lot Plan 18RN1457, between KP 253 and 254, near Sunday Creek.

The survey was conducted on foot over a total of two days in June 2010 by Principal Ecologist Bruce Thomson and Environmental Scientist Sandrine Martinez.

Data recorded included:
• Exact location of each individual *C. megacarpa* present within the 40 m wide ROW;

• Each *C. megacarpa* individual was recorded in the following categories:
  
  o Seedling (J1) – Plants with three leaves of less;
  
  o Juvenile (J2) – Plants with more than three leaves and no trunk present;
  
  o Small Adult (A1) – Plants with trunk less than 1 m in height;
  
  o Large Adult (A2) – Plants with trunk greater than 1 m in height;
  
  o Fruiting (Fr) – Plants with seeds or male cones;
  
  o Senescing (Sen) – Plants with leaves dead or absent, and growing tip present but brown and appearing dead;
  
  o Dead (D) – Plants with no leaves or growing tip present;

• Sex determined for individuals with fruiting or flowering structures; and,

• General habitat features including vegetation and soil.

Each individual was recorded in only one category. Location coordinates were taken using handheld GPS (accuracy +/- 10-20 m).
Figure 1 Sites where *Cycas megacarpa* has been located along the Export Pipeline
Figure 2 Site 1 Cycas megacarpa
Figure 3 Site 2 Cycas Megacarpa
3.2 Data analysis

*Cycas megacarpa* (K.D. Hill, 1992) was identified in the field by its distinctive keeled, grey to green leaves with broad leaflets, and the large non-glaucous or weakly pruinose seeds. Specimens were taken from the three populations occurring along the proposed pipeline route and identification was confirmed at the Queensland Herbarium by Botanist Wayne Harris.

Numbers of *C. megacarpa* within the proposed 40 m wide ROW were totalled to provide estimates of population that would be potentially removed by pipeline construction. Each *C. megacarpa* individual recorded within the ROW at each site is shown in Figures 2 to 4.

The population structure of *C. megacarpa* was plotted and is shown in Figure 1.

Recommendations for measures to avoid, mitigate and offset impacts on *C. megacarpa* were explored and researched using existing information, such as recovery plans, scientific literature and survey reports.

4.0 RESULTS

4.1 Occurrence of *C. megacarpa*

Field surveys conducted in the Callide Range confirmed the presence of *C. megacarpa* at three locations along the Export Pipeline alignment. In all 328 *C. megacarpa* individuals were identified in the wider study area including 184 within the 40 m wide ROW (Figures 2 to 4).

All *C. megacarpa* plants discussed hereafter are the ones recorded within the 40 m wide ROW.

The largest population was identified at Site 3 with a total of 106 individuals. At this site the cycads occur along an approximately 300 m long section, giving an average density of nine cycads/ha (Table 2). About five isolated individuals also occur a few hundred meters farther south. Site 1 and 2 totalled 55 and 23 individuals respectively, giving an average density of four cycads/ha (Table 2).

Site 1 occurs approximately 300 m east of a population of *C. megacarpa* (i.e. Population 11) indentified by the Queensland Herbarium (2007; Table 1). It is likely that these two records form a single larger population as there is no physical barriers (e.g. road, paddock) to suggest otherwise, but this cannot be confirmed without a wider survey of the area.

Site 2 and 3, however, seem isolated from any of the other populations recorded by the Queensland Herbarium.

*C. megacarpa* plants observed generally occur with a spacing of a few meters between one another. Occasionally they occur as cluster of individuals, growing relatively close together. Where this occurs, plants are commonly similar in height suggesting origins from the same seed deposit.

Photographs of selected specimens are shown in Appendix 1.
4.2 Population Structure

At each of the three sites the cycads recorded show a wide range of age classes, from seedling to mature fruiting females and cone-bearing males (Table 2, Figure 1 and Appendix 1). Site 1 contains a majority of juvenile plants (45%) while Site 2 and 3 contain a majority of small adult plants (65% and 77% respectively). All sites have a variety of size classes demonstrating active recruitment. Fire histories for the sites are unknown.

Due to lack of fertile material, it was not possible to determine the sex of every individual plant. However, a total of nine fruiting female *C. megacarpa* were recorded and each site contained at least two female plants with seeds. Also, two plants with male cones were recorded, one at Site 1 and another at Site 3.

The Queensland Herbariums (2007; page 12) identifies a viable *C. megacarpa* population as having a large number of individuals (between 3500 and 4500 adults), a diversity of individual size classes, and obvious seedling recruitment. Additionally a healthy population should contain ca. 14% of reproductive-age plants taller than 1 m.

Of the 46 populations currently recognised, only seven are considered to be viable in the long-term. One of these seven important populations (Population 14) occurs approximately 4.5 km west of KP 256 (Site 3) on the Export Pipeline. This population occurs on freehold land on remnant Not of Concern vegetation and contains 14,400 individuals (Queensland Herbarium 2007).
Table 2 Population Structure of *Cycas megacarpa* Within the 40 m Wide ROW of the Export Pipeline Alignment

<table>
<thead>
<tr>
<th>Sites</th>
<th>Lot Plan</th>
<th>Growth Stage*</th>
<th>Total number</th>
<th>Density (cycads/ha)</th>
<th>% Juvenile</th>
<th>% Adult &lt; 1 m</th>
<th>% Adult &gt; 1 m</th>
<th>% Fruiting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3SP217657</td>
<td>J1 2 J2 23 A1 18 A2 5 Fr 5 Sen 0 D 2</td>
<td>55</td>
<td>4</td>
<td>45</td>
<td>35</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>4RN903</td>
<td>J1 0 J2 3 A1 15 A2 3 Fr 2 Sen 0 D 0</td>
<td>23</td>
<td>4</td>
<td>13</td>
<td>65</td>
<td>22</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>18RN1457</td>
<td>J1 1 J2 15 A1 81 A2 3 Fr 4 Sen 1 D 1</td>
<td>106</td>
<td>9</td>
<td>15</td>
<td>77</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grand total</td>
<td>3 41 A1 114 A2 11 Fr 1 Sen 3 D 3</td>
<td>184</td>
<td>17</td>
<td>25</td>
<td>63</td>
<td>11</td>
</tr>
</tbody>
</table>

* Growth Stage:

J1 = Seedling – up to three leaves

J2 = Juvenile – more than three leaves, no trunk

A1 = Small adult with trunk < 1 m in height

A2 = Large adult with trunk > 1 m in height

Fr = Fruiting – with seeds or male cone

Sen = Senescing – leaves dead, growing tip present but appearing dead

D = Dead – no leaves or growing tip present
4.3 *Cycas megacarpa* Habitat

*C. megacarpa* was recorded in woodland to open woodland, along gullies, rocky ridges and steep slopes. The vegetation consists mostly of Narrow-leaved Ironbark (*Eucalyptus crebra*) woodlands (REs 11.12.1, 11.12.3, 11.11.15 and 11.11.14; Site 1 and 3) and Spotted Gum (*Corymbia citriodora*) woodland (RE 11.12.6; Site 1).

Site 1 is located on a very steep (~45°) ridge overlooking the Dawson highway. At this site the *C. megacarpa* population is more dense on the northern face of the slope. The soil is sandy and very large granite boulders occur throughout the slope. Weeds (e.g. Cobbler Pegs, Creeping Lantana) are abundant on the southern side of the slope.

Site 2 is the only location where the vegetation is classified as non-remnant by the Queensland Herbarium mapping. The area is partially cleared. At this site *C. megacarpa* plants occur on a rocky hillslope with scattered vine forest species including *Ficus* and *Brachychiton*. The grassy understorey contains numerous weeds including Creeping Lantana and Velvet Tree Pear.

The vegetation at Site 3 consists of *Eucalyptus crebra* woodland (Res 11.11.15 and 11.11.4). *C. megacarpa* plants occur on a rocky hill slope and become sparse further downhill.
5.0 IMPACTS OF PROPOSED PROJECT ON CYCAS MEGACARPA

The present survey identified three sites containing *C. megacarpa* along the Export Pipeline, totalling 184 individual plants as occurring within the 40 m wide ROW. The populations were observed to extend either side of the ROW. Due to the constraints of the steep topography, it is not considered feasible to identify a route that will avoid all cycads in the Callide Range. The current alignment reduces impact from an estimated 320 plants to 184.

Potential impacts from conventional pipeline construction are likely to include:

- Direct loss of up to 184 plants and 2.8 ha* of suitable habitat;
- Erosion extending upslope and downslope from the disturbance area;
- Sedimentation of downhill habitats;
- Introduction and spread of weeds that could increase competition for resources and alter fire regimes; and,
- Increased dominance of grass on the cleared areas that increase competition for resources and alters fire regimes.

Additionally, and despite the fact that the impacted populations contain a relatively small number of individuals (less than the required viable number of 3500 - 4500 adult individuals (see Section 4.2), the loss of 184 individual *C. megacarpa* may represent loss of genetic diversity across the range of the species. Therefore, all populations should be considered to be worth preserving or, where appropriate, translocating into suitable habitat (Queensland Herbarium 2007)* in such a way that the genetic structure of the populations are maintained.

6.0 MITIGATION MEASURES

6.1 General Mitigations Measures

The following mitigation measures will minimise the potential impacts on *C. megacarpa* individuals and populations:

- Investigate the use of HDD methods to avoid impacts on the cycad population;
- Reduction of ROW width in sections containing individuals where possible and safe to do so;
- Demarking of adjacent populations with temporary fencing to avoid accidental damage;
- Placement of all disturbance areas outside the ROW (e.g. access tracks, camps, equipment storage areas) away from any cycad populations and in previously cleared areas wherever possible;

* Based on the 40 m wide ROW and the extent of occurrence of the cycad within the ROW. A worse case scenario would include isolated specimens along the Export Pipeline and increase that estimate to 6 ha.
• Development of a detailed erosion and sediment control plan as a component of the project Environmental Management Plan;

• Development of a weed management plan to monitor and control weeds along the pipeline alignment prior to and during construction and for a minimum period of two years post construction. The plan would specify requirements for weed hygiene, including ensuring all vehicles and machinery are certified weed free before commencing work on site and regular weed washdown to minimise introduction and spread of weeds; and,

• Rehabilitation of ROW areas in the Callide and Calliope Ranges not needed after the construction phase of the project as outlined the project Environmental Management Plan.

In addition to these measures QC LNG will be required to annually submit a reconciliation statement of areas disturbed, against the agreed limit of disturbance (3 ha of suitable habitat) (Condition 11 of Commonwealth Development Approval Conditions).

6.2 Translocation Management Plan

Translocation is the process whereby plants or regenerative plant material are deliberately transferred from a natural population to a location in the wild (Vallee et al. 2004). It is a requirement in the Commonwealth Government Approval that no less than 1104 plants are propagated and/or translocated to a suitable offset site.

Translocation includes a diverse range of methods but the most commonly used are transplanting of seedlings or mature plants and seed collection and propagation.

Best practice guidelines such as the Guidelines for the Translocation of Threatened Plants in Australia (Vallee et al. 2004) should be followed when translocating threatened plant species. Additionally, any available previous experience and professional horticultural advice should be sought.

Translocation of *C. megacarpa* should be conducted into suitable habitat or into nearby significant and preserved populations (Queensland Herbarium 2007). Such habitat should have the following characteristics:

• The same or similar regional ecosystem that is capable of supporting the species at an equivalent carrying capacity;

• As close as possible to the impacted site;

• Adjacent to existing populations of *C. megacarpa*; and,

• A suitable size to compensate for the proposed loss of habitat.

6.2.1 Objectives

The primary objectives of translocation are:

• No net loss in numbers of the species;
- No net loss in the area of habitat for the species; and,
- Improvement in the long-term protection and viability of the species in the wild (Queensland Herbarium 2007).

### 6.2.2 Transplanting

Transplanting of seedlings and mature plants of most cycads can be successful for impact mitigation and commercial harvesting (Queensland Herbarium 2007) providing that it is conducted in the spring before the onset of the wet season, it does not occur during exceptionally dry periods, and a solid root ball should be retained (Jones 2002).

Transplanting of *C. megacarpa* has been carried out on one occasion where 28 individual plants were relocated following the construction of the Burnett River Dam (Forster 2004). Survival after two years was less than 30% with 80% being considered a success. Survival was poor for *C. megacarpa* plants over 1 m in height and better for juvenile plants (Paul Forster pers. com., 2010). Most plants at the impacted sites in the ROW are below 1m in height. In contrast, almost 100% survival of translocated *C. megacarpa* was observed in November 2010 for a Main Roads project, involving the widening of the Dawson Highway. Anecdotal evidence would suggest that the better survival for this project was the result of better site preparation (P. Forster pers. comm., 2010).

Forster (2004) outlined a series of steps to be followed to successfully transplant *Cycas megacarpa* plants. These steps will be used in this project and are as follows:

1. Record known individuals at original population, including GPS location of each individual, together with an assessment of health. A herbarium voucher specimen should be submitted from this locality;
2. Mark each plant on one side with marker paint or fluorescent dye. This is to ensure that the plants are replanted with a similar north-south orientation, and may discourage poaching from the new locality;
3. Clean around individuals by hand or with machinery, such as a bobcat;
4. Trim excess or badly damaged foliage (from insect attack or mechanical damage) back to where the rachis is attached to the stems;
5. Spray trunks and foliage with an anti-transpirant;
6. Inject systemic insecticide (using a syringe) into trunks via small hole drilled in lower part of trunk with an electric drill (undiluted dimethoate is suitable);
7. Loosen soil around each individual using a trenching pattern (either by hand, or ideally with an excavator or backhoe);
8. Remove each individual whilst attempting to maintain a rootball of soil (ideally this should be done by hand for small plants or with an excavator or backhoe bucket for large plants);
9. Trim damaged roots with secateurs, and apply fungicide powder;
10. Wrap rootball and roots with dry hessian sacking. The hessian should be sewn if necessary;

11. Transport to new locality, taking care to avoid bruising of plant stems. Heavy plants should be loaded using a soft sling that is slung on a backhoe or excavator bucket and packed using rolls of hessian sacking or similar;

12. Dig holes at translocation locality by hand or with an excavator or backhoe. The soil should be loosened, and the hole should not be much deeper than the rootball of the plants being transplanted;

13. Position plants in new hole, remove hessian sacking and trim any further damaged roots. Ensure that the north-south orientation from the old locality is maintained;

14. Pack washed river sand around the roots and rootball. This will provide a suitable substrate for new roots;

15. Backfill with the original topsoil removed from the hole;

16. Spray the trunks and foliage a second time with an anti-transpirant;

17. Water thoroughly around each plant with ordinary water;

18. Water (5 – 9 litres) around each rootball with a systemic fungicide;

19. Water each plant about once a month (10 – 20 litres) depending on rainfall for the next 6 months or as appropriate;

20. When plants show signs of new growth spray thoroughly with a systemic insecticide to avert insect attack; and,

21. Monitor plants for new growth, death, insect attack, reproduction, gender etc.

In order to maintain the connectivity (gene flow) in populations that are bisected by the Export Pipeline, transplantation will be made immediately adjacent to the pipeline corridor. Alternately plants will be translocated to a suitable offset site.

### 6.2.3 Seed collection for propagation

*C. megacarpa* is mainly propagated from seeds (Jones, 2002). It is a slow growing species and maturity is reached between 10 to 20 years. Larger individuals produce suckers when damaged, which can be removed and re-rooted to provide additional plants (Forster 2004). A few specimens with new shoots growing from the base were observed during the field survey.

Seed of *C. megacarpa* can be collected from around March onwards when they ripen (they are orange or pink-purple in colour) and drop from the plants. At the time of the field survey (June 2010) the seeds observed were green and therefore unripe (Appendix 1) and still attached to the female plant. Ripe *C. megacarpa* seeds have since been observed on plants in October 2010.

There are restrictions in the *Nature Conservation (Protected Plants) Conservation Plan 2000* on taking seed of endangered cycads for commercial purposes, restricting seed collection to 50
seeds in a 12 month period for authorised propagators. There are no specific guidelines for C. megalacarpa seed collection in Queensland for the purposes of translocation. In the Northern Territory it is a requirement under the Management Program for Cycads in the Northern Territory of Australia (Parks and Wildlife Service of the Northern Territory 2009) that seed collection is limited to 25% of seed from any one plant in any one year. This prevents the removal of all seed in a particular area. However, where an area is approved to be cleared, all seed could be removed. If this guideline was applied to the three populations in the ROW then all seed from within the ROW could be removed, but only 25% of the seed from individuals outside of the ROW could be collected. To obtain the number of seed required, plants outside of the ROW would need to be sampled for seed collection.

6.2.4 Propagation from seed

In addition to transplanted individuals, a minimum of 1000 plants would need to be propagated to meet requirements in the Commonwealth Government Approval.

Propagation is complicated by the slow fertilisation of the embryo (up to 9 months) and the need to raise juveniles in nurseries for up to 5 years before planting out (Paul Forster pers. com., 2010).

There are limited details available on the success of propagation of C. megalacarpa from seed. Experience from the species Cycas orientis for mine rehabilitation at Gove in the Northern Territory (Rio Tinto Alcan Gove mine) indicates a 20% germination rate. From over 300 C. orientis seeds collected, approximately 60 seedlings were obtained at the one to two leaf stage (two years from sowing to reach the one to two leaf stage). However germination rates of C. megalacarpa seed can be greater than 50% provided seed are viable (P. Forster pers. comm.). Viability can be tested by placing seed in water. Seeds that sink are likely to be viable, while those that float are unlikely to contain a viable embryo (P. Forster pers. comm., 2010).

Methodology for cycad propagation from seed from the Palm and Cycad Society of Australia (Kraa 1989) indicates that moisture and warmth are required for germination, which may take a year or more. All flesh must be removed from seeds since it may contain inhibitors. If the flesh is hard and dry, it helps to soak the seeds in water for a day or two before cleaning. The soaking process may produce almost immediate germination of seeds which have been in storage for a period of three or four months. The conventional method of germination is to place the cleaned seeds on their sides half buried on washed sand. It is necessary to keep the medium moist but not too wet for as long as it takes to germinate the seed. Seeds of Cycas species are enclosed in a seed coat which splits apart slightly to allow the radicle to emerge. In all cycads the radicle will now begin to grow downwards to form a root. It is at this stage that seedlings should be planted into a container. It may take a few weeks or months for the radicle to split close to the seed and a leaf to emerge. By then the root system will be well developed. A good potting mix that is very well drained should be used to pot up the seedlings. Most cycads can be watered quite regularly so long as the mix drains very well.

Seedlings should be cultivated in pots in a well-structured, free draining mix. Also, the cultivated plants should be grown in strong light conditions. These plants can be transplanted to the wild after 5 years.

Transplanting of nursery grown stock would occur in a remote offset area. There is a real risk that transplanting may fail due to poor medium term survival. There is a risk of disease and weed introduction to wild populations from nurseries, even with nursery hygiene measures being implemented. Nursery grown plants would be watered about once a month depending on rainfall for the next 6 months or as appropriate, however plants would be watered sparingly during the dry season as excessive watering could promote root rotting.
6.3 Offset arrangements

6.3.1 Protecting of new populations and active management of habitat

The Commonwealth Government Approval for the QC LNG Project requires that an offset area of at least 18 ha must be secured to receive not less than 1104 translocated and/or propagated individuals.

Two potential freehold sites containing *C. megacarpa* were identified within 50 km of the impact area. Both property options were assessed for translocation suitability, weeds, vegetation cover, topography, soil, elevation and accessibility by heavy machinery used for translocation purposes. A condition assessment of the offset / translocation site offered by Mark McLachlan was conducted on the property of “Monomeath” (Lot 25 CTN 176), 25 km west of Ubobo in the Boyne Valley. This property is in the Southern Brigalow Belt Bioregion in close proximity to the Bioregional Boundary.

The 44 ha offset option of 11.11.4 is advanced regrowth and remnant not represented on the Queensland Herbarium’s Regional Ecosystem mapping. The proposed offset contains unmapped high quality vegetation dominated by *Eucalyptus crebra*, *Corymbia tessellaris*, *C. trachyphloia*, *C. erythrocorys*, *C. citriodora*, *Lophostemon confertus*, *Acacia disparrima* and *Alphitonia excelsa* on metamorphosed sediments on coastal hills and ranges. It has connectivity to the nearby Weitalaba National Park and existing remnant vegetation on the property. Attributes that enhanced the suitability of the McLachlan site for *Cycas megacarpa* translocation include:

- All weather easy access by heavy machinery, water trucks and general vehicles;
- Connectivity to nearby remnant vegetation;
- Minimum to nil impacts by grazing or agricultural practices;
- Less than 5% weed impact with no major weed species or density noted;
- The presence of existing *Cycas megacarpa* (both mature and regrowth);
- Minimum ongoing management costs due to the current condition and location of the site; and,
- Intact site vegetation, size of adjoining remnant areas and proximity to protected areas.

A benchmarking and Bio-Condition assessment of the selected site using Bio-Condition – A Terrestrial Vegetation Condition Assessment Tool for Biodiversity in QLD (Field Assessment Manual) version 2.0 May 2010 was conducted on 23 October 2010.

The McLachlan translocation scored a high Bio-Condition Score (80.5%) and Condition Class (Class 1). This is expected as the translocation site was compared to a pristine benchmark site that in all outward appearances was identical in composition, structure and floristic diversity.

The proposed translocation offset area on the McLachlan property supports low numbers of weed species with low - nil grazing impacts. The site supports the majority of the indigenous species commonly associated with the regional ecosystem 11.11.4.

Overall the 44 ha offset translocation sites offers very high biodiversity values, structure that is comparable, or better than existing remnant vegetation, has mature and immature *Cycas megacarpa*, landscape function, connectivity and context in the landscape.

The habitat would be managed to provide expansion of the current population of *Cycas megacarpa*. The protection of existing populations is consistent with the Action Plan (4.1) in the National Multispecies Recovery plan (Queensland Herbarium 2007). The proposed site is currently unknown as a *Cycas megacarpa* population.

In addition to translocation of *C. megacarpa* into the offset site, the area will be protected and recruitment will monitored and encouraged to achieve recruitment of seedlings from existing plants within the offset area. The presence of both mature and juvenile *Cycas megacarpa* already on the site demonstrates that successful translocation is likely.
The advantages of these offsetting arrangements are:

- Provides data on population dynamics and recruitment rates;
- Provides active management within a population;
- Protects a previously unknown population that is not protected under the Vegetation Management Act 1999;
- Educates landholders;
- Provides an incentive for landholders to be aware of this species and to retain them on freehold land;
- Restores occupied habitat to remnant structure, probably including pollinators and seed dispersers;
- Has a greater chance of success than transplanting and propagation (unknown) alone;
- Achieves habitat protection, fire management and new population identification objectives of the recovery plan;
- Allows some monitoring of regeneration in relation to fuel load; and
- The landholder is willing to cooperate.

6.3.2 Post translocation management

Post translocation management is required to be undertaken for five years. Management requirements to improve / maintain the site are minimal and are as follows:

- Monitoring, watering and management of Cycas megacarpa following translocation;
- Construction of “minimal disturbance” tracks to allow movement of water truck and management personnel;
- Fencing across the northern end of the Lot for a distance of approximately 1.2km;
- Stock exclusion (achieved by construction of fence);
- Localised weed control of Lantana camara; and,
- Active fire management, including construction of firebreaks.

Track removal may be required after translocation to prevent any inappropriate access, such as by illegal plant collectors. Should extensive insect attack occur on new growth within translocated or propagated plants, this will be treated with a systemic herbicide during the first five years.

6.3.3 Monitoring and evaluation
The translocation (offset) site would be monitored for a sufficient period (minimum of 5 years) to ensure the program has successfully established a suitable population of the species. Monitoring will include:

- Development of suitable performance criteria to measure the success of the population establishment (e.g. vegetation condition, survival, health, recruitment and reproductive status of populations);

- Monitoring of translocated populations (and a control population in an undisturbed area) on a twice annual basis for a minimum of 5 years to assess survival, health, recruitment and reproductive status;

- Monitoring of vegetation condition using Bio-Condition – A Terrestrial Vegetation Condition Assessment Tool for Biodiversity in QLD (Field Assessment Manual) version 2.0 May 2010; and,

- Reporting of results to relevant agencies on an annual basis.

Suggested performance criteria include

- A survival rate of 70% for translocated and propagated plants;
- Recruitment of seedlings from existing *C. megacarpa* plants in the offset area;
- Reproduction of translocated plants (production of cones or seeds);
- Translocated population achieves similar age and sex ratio to existing populations;
- Weed invasion is minimised or reduced;
- Condition of vegetation improves; and,
- Inappropriate fire events managed and controlled.

Trigger levels for corrective actions and the required actions include:

- Complete defoliation of new growth as a result of insect attack – undertake spraying of new growth of other individuals not defoliated with a systemic herbicide;

- Loss of greater than 30% of translocated or propagated plants – undertake further propagation;

- Uprooting of plants observed as a result of feral animal activity – undertake feral animal control;

- Wildfire observed in offset area – undertake monitoring of post-fire recovery; and,

- Infestations of Category 2 declared weeds observed within offset property, and infestations of other significant weeds observed that threaten *C. megacarpa* plants – undertake weed control, including hand removal if weeds are smothering *C. megacarpa* plants.
6.3.4 **Funding of actions under the National Multi-species recovery plan for cycads**

An alternative to direct offsetting is funding actions to facilitate implementation of the National Recovery Plan. This would allow capital to be directed to achieving broader conservation effort for a number of endangered species rather than addressing relatively small, site specific impacts. If coordinated with other projects impacting cycad species it is possible that a substantial part of the recovery Action Plan could be funded, providing an enduring and substantial impact to the recovery of these species.

7.0 **CONCLUSION**

This Significant Species Management Plan specifies guidelines to achieve the conservation management of *Cycas megacarpa* during construction of the Export Pipeline. It is anticipated that these guidelines will achieve mitigation of the impacts as described in Section 5 above and support the Clearing Permit application.
8.0 REFERENCES


APPENDIX 1 – Photographs

View of hill slope showing *Cycas megacarpa* and large granite boulders (Site 1, looking uphill)
Female *Cycas megacarpa* with seeds (Site 2)
Large adult (> 1 m in height) *Cycas megacarpa* (sex unknown; Site 3)
Seeds of a female plant *Cycas megacarpa* (Site 3)

Male cone *Cycas megacarpa* (Site 1)
Young adult (< 1 m in height) *Cycas megacarpa* (Site 3)

Young leaves growing on the tip of a *Cycas megacarpa* plant. (Site 3)
APPENDIX 4 - SIGNIFICANT SPECIES MANAGEMENT PLAN FOR *PHILOTHECA SPORADICA*
Philotheca sporadica

Significant Species Management Plan

QGC020-ENV-RPT-0005

Rev 0

Produced for: QGC
## Release authorisation

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<th>Michael Correll</th>
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<td>Trevor Meers / Sarah Harris</td>
</tr>
<tr>
<td>Approved</td>
<td>Steve Fox</td>
</tr>
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<td>Client</td>
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1 Introduction

1.1 Project Background

QGC Pty Ltd, a wholly-owned subsidiary of the B-G Group business, has been given approval to proceed with its plans to expand its coal seam gas (CSG) extraction activities in the Surat Basin. It is to supply CSG for export, via a gas export pipeline and a liquefied natural gas (LNG) processing facility on Curtis Island, near Gladstone.

QGC submitted a Environmental Impact Statement (EIS) to meet the requirements of a significant project under the Queensland Government’s State Development and Public Works Organisation Act 1971 (SDPWO Act). Furthermore, the EIS was also required to address Matters of National Environmental Significance (MNES) under the Australian Government’s Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The draft EIS for the Queensland Curtis LNG Project (The Project) was released to the public and was available for public comment on the 28th of August 2009.

The Project received approval from both State and Commonwealth Governments subject to a number of conditions, including a requirement to prepare a management plan demonstrating how QGC will manage and conserve the species, Philotheca sporadica (the Species) during both construction and operation phases of the Project.

For the purpose of this report the Project infrastructure has been divided into two categories:

- Pipeline: consists of a network of 730 km of Pipeline (including the gas collection header) that extends from the Surat basin in the Gas Fields up to Main Valve 7 (near Gladstone); and
- Gas Fields: includes wells, access tracks and other infrastructure (including the upstream infrastructure corridor) necessary for the extraction of gas.

1.2 Scope of Work

The scope of this Significant Species Management Plan (SSMP) includes:

- Assessment of the presence of P. sporadica along the Pipeline and Gas Fields;
- Assessment of local P. sporadica populations within the Pipeline and Gas Fields including the number of individual plants; and
- Identification of appropriate measures to avoid, mitigate and compensate for potential impacts on P. sporadica;

This SSMP was developed in accordance with the conservation advice for P. sporadica provided by the Minister/Delegate of the Minister on 3rd July 2008.

2 Assessment for the Presence of Philotheca sporadica

Ecological surveys were undertaken across the representative site for the entire Project footprint (see Figure 1). The Species was identified within the Gas Fields and it is anticipated that up to 10 ha of habitat occupied by these plants may be unavoidable due to linear infrastructure requirements. This includes the Upstream Infrastructure Corridor (UIC).

The Species is also required to be removed within the Pipeline (Gas Collection Header) near KP20. The alignment of the Pipeline (including the Gas Collection Header) has been revised to minimise the impact on the Species however it is anticipated that up to 1.2 ha of habitat occupied by the Species will be impacted.
Figure 1 Site Location and Area of Interest
Figure 2 Occurrence of *Philotheca Sporadica* beyond the Project Footprint

Figure 3 Mapped *Philotheca Sporadica* within the Pipeline Right of Way
Figure 4 Mapped *Philotheca Sporadica* within Pipeline Right of Way
2.1 Results

The field survey found approximately 284 individual plants within the Pipeline (Gas Collection Header) and approximately 312 individual plants within the Gas Fields (UIC) (see Figure 3 - 4 and Table 1).

Table 1: Number of *Philotheca sporadica* found within and adjacent to the Proposed Impact Area

<table>
<thead>
<tr>
<th>Location</th>
<th>No. of Plants (approx)</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Fields: Upstream Infrastructure Corridor (UIC)</td>
<td>312</td>
<td>1.43</td>
</tr>
<tr>
<td>Proposed Impact Area - Pipeline: Gas Collection Header (GCH)</td>
<td>284</td>
<td>1.08</td>
</tr>
<tr>
<td>Philotheca surveyed east of Pipeline (GCH)</td>
<td>670</td>
<td>X</td>
</tr>
<tr>
<td>Philotheca surveyed west of UIC</td>
<td>1586</td>
<td>X</td>
</tr>
</tbody>
</table>

X – not quantified

Beyond the ROW, the Species was found on both sides of the Pipeline, and it was estimated that at least 2,250 plants are in this location. Field survey staff observed that the Species was growing extensively in the area.

2.2 Development Approval Conditions

The Commonwealth Development Approval Conditions (22nd October 2010) include limitations on the area of habitat of the Species that can be cleared. This includes a maximum of:

- 5 ha of habitat area within the Pipeline (includes GCH); and,
- 10 ha of habitat area within the Gas Fields (includes UIC).

3 Existing Environment

3.1 Climate

A description of climate can be found in the following sections of the Project EIS:

Volume 3: Environmental Assessment of Gas Field Component, Chapter 2 Climate and Climate Change

Volume 4: Environmental Assessment of Pipeline Component, Chapter 2 Climate and Climate Change
3.2 Landform and Geology

A description of the landform and geology can be found in the following section of the project:

Volume 3: Environmental Assessment of Gas Field Component, Chapter 3 Topography and Geomorphology and Chapter 4 Geology and Soils

Volume 4: Environmental Assessment of Pipeline Component, Chapter 3 Topography and Geomorphology and Chapter 4 Geology and Soils

3.3 Vegetation

A description of the Terrestrial Ecology can in the following sections of The Project EIS:

Volume 3: Environmental Assessment of Gas Field Component, Chapter 7 Terrestrial Ecology

Volume 4: Environmental Assessment of Pipeline Component, Chapter 7 Terrestrial Ecology

3.4 Legal Status

*P. sporadica* is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is also listed as Vulnerable under the *Nature Conservation Act 1992* (NC Act) and the subordinate *Nature Conservation (Wildlife) Regulation 2006*.

Under the NC Act, a clearing permit is required for the taking of protected plants (native plants).

4 Plant Biology

4.1 Description

*P. sporadica* (Family Rutaceae) is an open to compact shrub growing to 150 cm high, with numerous branches (Halford, 1995). Each branch has many small, 1–4 mm long, hairless, club-shaped leaves along its length. The white flowers are solitary and occur on short stalks up to 0.7 mm long at the end of branchlets (Halford, 1995) (see Plate 1).
Plate 1 *Philotheca sporadica* found within the Gas Fields

Plate 2 Habitat of *Philotheca sporadica* (photo taken on the Pipeline near KP20)
4.2 Habitat

The species is found on residual hills which are remnants of laterised cretaceous sandstones (Plate 2). 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 (Dawson 1972 cited in DSEWPC 2009). It is generally found in low open forest of Acacia burrowii, Eucalyptus exserta, Eucalyptus crebra, Eucalyptus fibrosa subsp. nubila and Callitris glaucophylla (Halford 1995).

It is generally recorded within exposed or shallowly covered duricrusts however, it may also occur in nearby areas where suitable habitat occurs.

4.3 Reproductive Ecology

Flowering has been recorded from early August to mid October. Mature fruits have been observed in late November (Plate 3). Halford (1995) observed that only a small proportion of flowers set viable seed, but acknowledged that unusually dry seasonal conditions could have been the cause. From a sample of thirty seeds only one contained an embryo.

Plate 3 Flowering Philotheca sporadica near Kogan
4.4 Population Demographics

The DSEWPC (2008) conservation advice for *P. sporadica* identified that there were 11 known populations recorded with the Queensland Herbarium with a total population size of greater than 64,000 plants. Flora surveys conducted for the Project (including works associated with identifying properties suitable for vegetation offsets) have identified numerous populations, demonstrating that the Species is far more prevalent than previously documented. This is consistent with the work conducted by AECOM in 2009 (Translocation and Monitoring of *Philotheca sporadica* for Darling Downs Power Station Site) which states that numbers may be far greater than currently recorded for reasons including:

- Increased number of linear surveys for infrastructure requirements (similar to this project) have identified locations of the species;
- The species is often located in and around borders of dense scrub (making surveying difficult); and
- Small specimens of the dominant *Calytrix tetragona* shrub resemble *P. sporadica*.

Unidel has positively identified numerous large populations of *Philotheca sporadica* during flora survey work conducted for the Pipeline. Mapped locations of *Philotheca sporadica* can be found in Figure 3.

4.5 Project Impacts

The Project presents two key impacts on populations of the Species including:

- The destruction of plants during clearing operations for infrastructure; and,
- Changes in the frequency and/or intensity of fires in remnant vegetation which may have direct or serious impacts.

<table>
<thead>
<tr>
<th>Location</th>
<th>No. of Plants (approx)</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed Impact Area - Pipeline: Gas Collection Header (GCH)</td>
<td>284</td>
<td>1.08</td>
</tr>
</tbody>
</table>

Extracted from Table 1

Please refer to Attachment B for a list of the properties affected.

5 Threats

The current threat to this species is loss of habitat (DSEWPC, 2008). There is no quantitative data to indicate that the number of populations of this species is declining. DSEWPC identified that one previous collection site could not be located and there was anecdotal evidence which suggested that there has been at least some reduction in population sizes at seven sites due to habitat loss caused by road works, public utility infrastructure (gas pipeline and electricity line) or quarrying.

The lack of secure land tenure was identified as a threat to the long term viability of this species. Populations on roadsides are at risk from general road maintenance and inappropriate use of sites. Seven of the populations extend onto freehold land which has been used for intermittent grazing.

Populations within State Forest face habitat disturbance due to forestry practices and recreational use e.g. trail bike riding (Halford 1995).
At sites where fires had occurred, it was observed that a number of plants had been killed; however, a few had sprouted from the stem base just above ground level (Halford 1995).

6 General Mitigation Measures

The following mitigation measures are to be undertaken during construction and operation of the Project:

- Field environmental staff will be provided with information so that they can identify the Species; and,
- All well placements and pipeline routes will be surveyed for the Species during site inspections that will be conducted at the time of final site determination. Where this species is identified, measures will be put in place to avoid populations wherever possible.

Table 2 shows timeframes and recovery actions for the Species during and post construction.

Table 2 Timeframes for Rehabilitation and Recovery Actions

<table>
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<tr>
<th>Action</th>
<th>Timing</th>
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<tr>
<td>Site clearances conducted for this species facilitate avoidance</td>
<td>Prior to clearance works</td>
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<tr>
<td>Partial natural revegetation of construction areas in remnant vegetation</td>
<td>Following completion of infrastructure establishment</td>
</tr>
<tr>
<td>Complete revegetation of remnant areas</td>
<td>Immediately following project completion</td>
</tr>
<tr>
<td>Fire management</td>
<td>Throughout the life of the Project</td>
</tr>
</tbody>
</table>

The policy adopted by the Project in terms of fire management is suppression, unless fire is required:

- For ecological purposes (to invigorate fire-dependant species);
- To create buffers to prevent the uncontrolled spread of wildfire; and
- To protect project personnel or infrastructure.

The linear clearances created for pipelines will provide better opportunities for controlling wildfires in remnant vegetation areas. This may potentially result in enhanced management of fire in the Project area that will benefit the Species.

In areas set aside for the protection of the Species, fire management strategies will be developed in conjunction with expertise from DERM.

7 Offsets and Translocation

7.1 Vegetation Offsets

Within the Commonwealth Approval Conditions, QGC is required to submit an Offset Plan which includes 40 ha of *P. sporadica* habitat for the Pipeline and 80 ha of *P. sporadica* habitat for the Gas Fields. Relevant conditions from the Commonwealth can be found in Table 3.

Table 3 Relevant Commonwealth Development Approval Conditions

<table>
<thead>
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<th>Condition</th>
<th>Requirement</th>
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Commercial in Confidence
### Gas Field Component

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
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</table>
| 26  | Within 6 months of the commencement of the action the proponent must prepare an Offset Plan to provide an offset area of the approved disturbance limits relating to Matters of National Environmental Significants (MNES) within the project area. The offset area to be secured must be an area of private land which includes at least:  
  a. 80 ha of *Philotheca sporadica* habitat. |
| 27  | The Offset Plan must include details of the offset area including the timing an arrangement for securing properties, maps and site description, environmental values relevant to MNES, connectivity with other habitats and biodiversity corridors, a rehabilitation program, and mechanisms for long-term protecting, conservation and management. |
| 28  | The Offset Plan must be submitted for the approval of the Minister within 6 months of the commencement of the action. The approved Offset Plan must be implemented. |
| 31  | The proponent must secure the offset within 2 years of commencement. |

### Export Pipeline Component

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
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</table>
| 15  | Within 12 months of the commencement of pipeline development the proponent must prepare an Offset Plan to provide an offset area of the approved disturbance limits relating to *Philotheca sporadica* and Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT) within the project area. The offset area to be secured must be an area of private land which includes at least:  
  a. 40 ha of *Philotheca sporadica* habitat. |
| 16  | The Offset Plan must include details of the offset area including the timing an arrangement for securing properties, maps and site description, environmental values relevant to MNES, connectivity with other habitats and biodiversity corridors, a rehabilitation program, and mechanisms for long-term protecting, conservation and management. |
| 17  | The Offset Plan must be submitted for the approval of the Minister within 12 months of the commencement of gas field development. The approved Offset Plan must be implemented within 30 days of approval. |
| 20  | The proponent must secure the offset within 2 years of commencement. |

Compliance with the conditions (Table 3) will provide a conservation outcome that protects the Species habitat for the long term. This directly addresses the key threat which is habitat loss. Further advantages of an offset plan include:

- Reduced risk of pathogen introduction through translocation;
- Provides data on population dynamics and recruitment rates;
- Provides active management within a population;
• Protects a previously unknown population that is not protected under the Vegetation Management Act 1999;
• Educates landholders;
• Provides an incentive for landholders to be aware of this species and to retain them on freehold land;
• Restores occupied habitat to remnant structure, probably including pollinators and seed dispersers;
• Achieves habitat protection, fire management and new population identification objectives of the recovery plan; and,
• Allows some monitoring of regeneration in relation to fuel load.

At least 150 ha of remnant *P. sporadica* potential habitat have been identified in the QCLNG Project Terrestrial Offsets and Implementation Report previously provided to DERM. Since this report, additional fieldwork has confirmed that *P. sporadica* populations occur in these areas.

Additional areas of habitat have been identified on QGC owned land, totalling more than 800 ha. These areas are currently being verified and crosschecked with future development plans to check their suitability for offsets. It is anticipated there will be an abundance of land suitable for offsets, on land already controlled by QGC. Lots being investigated in the next 3 months include those shown in Table 4. The offset management plan is due for completion by end of February 2011.

**Table 4 QGC owned properties with potential for Philotheca sporadica Offset**

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<th>Lot and Plan</th>
<th>Landzone</th>
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<td>11.7.5</td>
<td>11.7.7</td>
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<td>20DY65</td>
<td>2.54</td>
<td>0.14</td>
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<td>Haddon</td>
<td>46/47BWR107</td>
<td>87.33</td>
<td>4.98</td>
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<td>Janda</td>
<td>2RP163880</td>
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<td>6.04</td>
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<td>Kangra Hills</td>
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<td>48BWR138</td>
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<td>15.87</td>
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7.2 Translocation

There is little information documented on previous translocation success for the Species. The most appropriate relevant translocation project was undertaken by AECOM in 2009 for the Darling Downs Power Station. Results of the project demonstrated mixed success. Direct relocation of plants had a less then 3% success rate. The most successful translocation technique was the propagation of cuttings in a nursery. AECOM (2009) reported a success rate of 17% of cuttings striking with a greater than 60% survival (at 15 months) once planted in the offset location.

Although translocating is possible, we do not consider it a feasible option for the following reasons:

- Field staff have recorded and observed extensive coverage of *P. sporadica* in the area of interest;
- Translocation is difficult and recent results on other projects have shown a poor success rate; and,
- The conservation advice for *P. sporadica* (DSEWPC, 2008) has identified the main threat to the species as loss of habitat. Under the Development Approval Conditions, QGC will be conserving at least 120 ha of *P. sporadica* habitat.

An Offset Management Plan is currently being prepared and will form part of a larger offset requirement for the whole Project. The offsets relating to the *P. sporadica* are still being finalised through ongoing discussions with DIP, DERM and DSEWPC. At a minimum, an area of 80 ha will be established as an offset for the impacts to the Species.
8 References

AECOM, 2009, *Translocation and Monitoring of Philotheca sporadica; Darling Downs Power Station Site*, AECOM, Brisbane.

