7 Star finch

7.1 EPBC Act legal status

Endangered - listed 16 July 2000

7.2 Biology and ecology

7.2.1 Characteristics

The Star finch (eastern) or Star finch (southern) (*Neochmia ruficauda ruficauda*) is a small and compact bird. Adults of both sexes are greyish-olive with a red face and bill, bold white spots on the head, breast and flanks, a cream belly and vent, and a crimson tail. The males and females are not known to differ in appearance, although the other more common and better-known subspecies of the Star finch, *Neochmia ruficauda clarescens* and *Neochmia ruficauda subclarescens*, are sexually dimorphic (ie the sexes differ in appearance) (Higgins et al 2006), and it is highly likely that the Star finch (eastern) is sexually dimorphic as well, but this dimorphism is yet to be recorded (TSSC 2008).

The Star finch (eastern) occurs in pairs and in small flocks of up to 20 (or rarely, 50) birds. No information is available on the breeding dispersion but, like other subspecies of the Star finch, it probably nests in loose colonies (Higgins et al 2006).

The total population of the Star finch (eastern) is estimated to consist of 50 or less breeding birds. This estimate is considered to be of low reliability. No permanent populations (or, more specifically, areas of permanently occupied habitat) have been identified (Garnett & Crowley 2000).
7.2.2 Known distribution

The Star finch (eastern) occurs in central Queensland and its population is extremely limited. Garnett and Crowley (2000) considered it critically endangered and Higgins et al (2006) considered it had an estimated total population of 50 individuals. This taxon is extinct in New South Wales (TSSC 2008).

The distribution of this subspecies is poorly known, and it has disappeared from much of its former range. The most recent records occur in an area from near Wowan, north to Bowen, west to beyond Winton. It is possible that the subspecies could occur (or occurred) north of Bowen, based on historic records of Star finches at Mount Surprise and in the Cloncurry-Mount Isa region, but these records cannot be definitively attributed to the eastern subspecies. The Star finch (eastern) is suspected to occur in four discrete subpopulations (Holmes 1996, 1998)

The Star finch (eastern) occurs within the Desert Channels, Burdekin and Fitzroy (Queensland) Natural Resource Management Regions. It has been recorded from damp grasslands, sedgelands or grassy woodlands near permanent water or areas of regular inundation. Occasionally, individuals have been reported in disturbed habitat and suburban areas (TSSC 2008).

The extent of occurrence is estimated to be 300,000 km². However, this estimate, which is based on published maps, is considered to be of low reliability. The distribution of the Star finch (eastern) is probably severely fragmented (Garnett & Crowley 2000).

7.2.3 Known species populations and their relationship with the GTP footprint

Based on wetland maps data, this species was recorded in 1994 from Arcadia Valley. However, no individuals were identified during any of the survey periods (Ecologica Consulting 2012).

This species is a granivore and is normally associated with grasslands or grassy woodlands. Habitat is present within the GTP footprint, however it is considered to be both degraded and altered (eg Buffel grass) due to clearing and current land uses such as agriculture and grazing (Ecologica Consulting 2012).
7.2.4 Biology and reproduction

The Star finch (eastern) has been recorded nesting in November (Holmes 1996, Storr 1984). The single clutch recorded contained four eggs (Storr 1984). Its breeding biology is otherwise unknown, although a likely but uncertain record from the Cardwell district in Queensland described the nests as 'bottle-shaped' and said that the nests were often placed in trees at heights of ten to thirty feet (approximately 3 to 9 m) above the ground (Barnard 1926).

Other aspects of the breeding biology of the Star finch (eastern) are likely to be similar to those described for the Star finch at the species level (DSEWPaC 2012d).

At the species level, the Star finch is a monogamous species (Higgins et al 2006, Immelmann 1982). It breeds in loose colonies that often include nests of the Chestnut-breasted mannikin (*Lonchura castaneothorax*).

It has been recorded breeding in all months of the year, although eggs have only been recorded from February to May and in September (Higgins et al 2006).

The Star finch builds a globular (or possibly bottle-shaped) nest that is made from grass and placed in a shrub or tree or amongst grass, sedges or reeds (Campbell 1900, Coate et al 2001, Higgins et al 2006, Holmes 1998, Immelmann 1982, North 1907-09).

The female lays three to six or seven white eggs that are incubated by both sexes for a period of approximately 13 days (Campbell 1900, Higgins et al 2006, Immelmann 1982, North 1907-09, Robinson 1939).

7.3 Habitat

The Star finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water (Garnett 1993, Gould 1865, Holmes 1996). It also occurs in cleared or suburban areas such as along roadsides and in towns (Baldwin 1975, Cayley 1932, Holmes 1996 & 1998, Marshall 1932).

The Star finch (eastern) was observed on the Namoi River in New South Wales, on sloping river banks covered with grass and herbs, and amongst beds of rushes growing along the side of the river (Gould 1865).

Studies at nine former sites of the Star finch (eastern) found that the habitat consisted mainly of woodland. These habitats are dominated by trees that are typically associated with permanent water or areas that are regularly inundated; the most common species are *Eucalyptus coolabah, Eucalyptus tereticornis, Eucalyptus tesselaris, Melaleuca leucadendra, Eucalyptus camaldulensis* and *Casuarina cunninghamii* (Holmes 1996).

Sites from which recent records have been obtained have been dominated by grasses or have been in areas where the native vegetation has been partially cleared (DSEWPaC 2012d). For example, at Wowan, the Star finch (eastern) was recorded near a road running through grassland (formally eucalypt woodland interspersed with vine forest) with some scattered shrub regrowth, and at Aramac, it was recorded in the grounds of a hotel (Holmes 1996 & 1998).

These latter records support earlier reports from Blackall in Queensland, where the Star finch (eastern) was said to have foraged in the streets and yards of the township (Cayley 1932, Marshall 1932), and at Inverell in New South Wales, where 20 were observed feeding in fig trees near a house (Baldwin 1975).
The Star finch (eastern) overlaps with the following EPBC Act listed threatened ecological communities (TSSC 2008):

- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
- The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin
- Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South)
- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

### 7.4 Habitat assessment

Information obtained from BPA (ie Brigalow Belt South Fauna Expert Panel Report (EPA 2006)), together with expert advice, site based species records and pre-clearance survey data have been used to define a set of assumptions that have been used to identify areas of habitat that are consistent with the definitions of ‘core habitat’, ‘essential habitat’ and ‘general habitat’ that have been presented in Part 1 of this SSMP. The Star finch habitat assessment assumptions are presented below.

#### 7.4.1 General assumptions

The following general habitat assumptions have been made based on current scientific knowledge of this species:

- The species occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water (DSEWPaC 2012d). As such, ‘non-remnant’ areas within 1 km of areas mapped as ‘riverine’, ‘lacustrine’ and pulstrine’ Wetland Regional Ecosystems as well as ‘riverine’, lacustrine’ and ‘pulstrine’ waterbodies on the Queensland Wetland Mapping (Version 3.0) are considered habitat for this species.
- Area that the species utilised are dominated by trees that are typically associated with permanent water or areas that are regularly inundated; the most common associated dominant vegetation species are *Eucalyptus coolabah*, *Eucalyptus tereticornis*, *Corymbia tessellaris*, *Melaleuca leucadendra*, *Eucalyptus camaldulensis* and *Casuarina cunninghamii* (Holmes 1996)

#### 7.4.2 Core habitat

‘Core habitat’ consists of ‘essential habitat’ in which the species is known and the habitat is recognised under relevant recovery plans or other relevant plans/policies/regulations. Also included within this category are populations that are limited geographically within the region.

For the Star finch, all areas identified in the habitat assumptions above, which overlap with areas identified in the BPA mapping that have been identified as containing a ‘State’ or ‘Regional’ ‘Corridor’ (J-Rating) and/or ‘Core Habitat’ (H-Rating) and/or ‘Habitat for EVR Taxa’ (A-Rating) have been mapped as ‘core habitat’. However, it should be noted that this species is considered to be locally extinct within the area (Brigalow Belt South Fauna Expert Panel Report).
KP0 to KP30

No individuals of this species have been identified within the general vicinity of KP0 to KP30 and no habitat identified during the pre-clearance surveys overlaps with areas identified in the BPA mapping as containing a 'State' or 'Regional' 'Corridor' (J-Rating) and/or 'Core Habitat' (H-Rating) and/or 'Habitat for EVR Taxa' (A-Rating); therefore no ‘core habitat’ exists within this section of the GTP.

KP30 to KP40

No individuals of this species have been identified within the general vicinity of KP30 to KP40 and no habitat identified during the pre-clearance surveys overlaps with areas identified in the BPA mapping as containing a ‘State’ or ‘Regional’ ‘Corridor’ (J-Rating) and/or ‘Core Habitat’ (H-Rating) and/or ‘Habitat for EVR Taxa’ (A-Rating); therefore no ‘core habitat’ exists within this section of the GTP.

KP40 to KP130

No individuals of this species have been identified within the general vicinity of KP40 to KP130 and no habitat identified during the pre-clearance surveys overlaps with areas identified in the BPA mapping as containing a ‘State’ or ‘Regional’ ‘Corridor’ (J-Rating) and/or ‘Core Habitat’ (H-Rating) and/or ‘Habitat for EVR Taxa’ (A-Rating); therefore no ‘core habitat’ exists within this section of the GTP.

KP130 to KP312

No individuals of this species have been identified within the general vicinity of KP130 to KP312 although habitat identified during the pre-clearance surveys overlaps with areas identified in the BPA mapping as containing a ‘State’ or ‘Regional’ ‘Corridor’ (J-Rating) and/or ‘Core Habitat’ (H-Rating) and/or ‘Habitat for EVR Taxa’ (A-Rating); therefore ‘core habitat’ exists within this section of the GTP.

The location of the ‘core habitat’ for this species is shown in Figure 7.2c and Figure 7.2d.

KP312 to KP408.81

No individuals of this species have been identified within the general vicinity of KP312 to KP408.81 although habitat was identified within the Calliope Range (KP317.5 to KP318.5), Larcom Creek (KP378) and KP405.5 to KP407.5 during the pre-clearance surveys (Santos GLNG 2013). This habitat overlaps with areas identified in the BPA mapping as containing a ‘State’ or ‘Regional’ ‘Corridor’ (J-Rating) and/or ‘Core Habitat’ (H-Rating) and/or ‘Habitat for EVR Taxa’ (A-Rating); therefore ‘core habitat’ exists within this section of the GTP.

The location of the ‘core habitat’ for this species is shown in Figure 7.2e and Figure 7.2f.

KP408.81 to KP409.04

No individuals of this species have been identified within the general vicinity of KP408.81 to KP409.04 and no habitat identified during the pre-clearance surveys overlaps with areas identified in the BPA mapping as containing a ‘State’ or ‘Regional’ ‘Corridor’ (J-Rating) and/or ‘Core Habitat’ (H-Rating) and/or ‘Habitat for EVR Taxa’ (A-Rating); therefore no ‘core habitat’ exists within this section of the GTP.

KP413.57 to KP419.69

No individuals of this species have been identified within the general vicinity of KP413.57 to KP419.69 and no habitat identified during the pre-clearance surveys overlaps with areas
Part 2 – Management Plans

7.4.3 Essential habitat

‘Essential habitat’ is an area containing resources that are considered essential for the maintenance of populations of the species (e.g. potential habitat for breeding, roosting, foraging, shelter, for either migratory or non-migratory species). ‘Essential habitat’ is defined from known records and/or expert advice (including the findings of pre-clearance surveys). As there are no current site-based observations for the Star finch within or adjacent to (i.e. within 10 km) the GTP Project and the BPA expert panel (EPA 2006) states that the Star finch is considered to be locally extinct in the Brigalow Belt South Bioregion, there is no ‘essential habitat’ considered to occur within the GTP footprint. As this species was not observed within KP0 to KP30, KP30 to KP40, KP40 to KP130, KP130 to KP312, KP312 to KP408.81, KP408.81 to KP409.04 and KP413.57 to KP419.69 of the GTP during pre-clearance surveys, no ‘essential habitat’ for this species is considered to exist between these sections of the GTP.

7.4.4 General habitat

‘General habitat’ consists of areas or locations that are used by transient individuals or where species may have been recorded but where there is insufficient information to assess the area as essential/core habitat. ‘General habitat’ also includes areas defined from known records or habitat that is considered to potentially support a species according to expert knowledge of habitat relationships, despite the absence of specimen backed records. ‘General habitat’ may include areas of suboptimal habitat for species. As potential habitat for many species contained within this SSMP may include most of the regional ecosystems of the Brigalow Belt Bioregion, the ‘general habitat’ category restricts the habitat to a more limited and realistic set of environmental parameters that are supported by literature and field-based observation.

For the Star finch all areas that meet the habitat assumptions that are not contained within areas that overlap with areas identified in the BPA mapping that have been identified as containing a ‘State’ or ‘Regional’ ‘Corridor’ (J-Rating) and/or ‘Core Habitat’ (H-Rating) and/or ‘Habitat for EVR Taxa’ (A-Rating) have been mapped as ‘general habitat’. However, it should be noted that this species is considered to be locally extinct within the area (Brigalow Belt South Fauna Expert Panel Report).

**KP0 to KP30**

No ‘general habitat’ for this species exists in this section of the GTP.

**KP30 to KP40**

KP30 to KP32.25 has been identified during pre-clearance surveys as meeting the criteria of ‘general habitat’ for this species.

The location of the ‘general habitat’ for this species within this section of the GTP is shown in Figure 7.2a.

**KP40 to KP130**

The location of the ‘general habitat’ for this species within this section of the GTP is shown in Figure 7.2b.
Figure 7.2a: Star Finch (Neochmia ruficauda ruficauda) Habitat Ratings Based on Predictive Modelling

Source:
Gas Transmission Pipeline (GTP): Santos, Apr 2012.
Aerial: BING, Feb 2011.

Version: a
Date: 26/11/2012
KP130 to KP312

KP183 to KP190, KP207 to KP210, Dawson River area (KP233 to KP235), Sellheim Creek area (KP280 to KP280.75) and KP295.6 to KP300.2 has been identified during the pre-clearance surveys as meeting the criteria of ‘general habitat’ for this species (Santos GLNG 2012).

The location of the ‘general habitat’ for this species within this section of the GTP is shown in Figure 7.2c and Figure 7.2d.

KP312 to KP408.81

Pre-clearance surveys identified ‘general habitat’ for this species within Calliope Range (KP319) and Harper Creek (KP360.3) (Santos GLNG 2013).

The location of the ‘general habitat’ for this species within this section of the GTP is shown in Figure 7.2e and Figure 7.2f.

KP408.81 to KP409.04

No ‘general habitat’ for this species exists in this section of the GTP.

KP413.57 to KP419.69

Pre-clearance surveys did not identify ‘general habitat’ for this species within this section of the GTP.

7.4.5 Unlikely habitat

‘Unlikely habitat’ areas are those areas that do not contain records of the particular species and contain no habitat values to support the presence or existence of resident or migratory individuals or populations of the species.

7.5 Anticipated threats and potential impacts as a result of the GTP

- Loss and degradation of known remnant habitat and non-remnant habitat for the Star finch (eastern subspecies) within the GTP ROW and ancillary work areas (species is considered to be sedentary)
- Predation caused by fragmentation and habitat degradation
- Changes to local foraging behaviour due to increased vehicle movement, noise, lighting etc
- Stress, injury and mortality to animals due to increases in construction noise, vehicle movement, lighting and clearing
- Destruction of nests
- Barriers to movement of individuals

The main historical cause of the decline in range of the Star finch (eastern) is uncertain, but is likely to have been habitat degradation caused by over-grazing and trampling of habitat by livestock (Garnett & Crowley 2000).

The current identified threats include the continued degradation of habitat by livestock; predation by introduced species such as feral cats (*Felis catus*) and European red foxes.
Source: Gas Transmission Pipeline (GTP): Santos, Apr 2012.
Aerial: BING, Feb 2011.

Figure 7.2c: Star Finch
(Neochmia ruficauda ruficauda)
Habitat Ratings Based on Predictive Modelling
KP130 to KP312
Figure 7.2e: Star Finch
(\textit{Neochmia ruficauda ruficauda})

Habitat Ratings Based on Predictive Modelling
KP312 to KP408.81

Source:
Gas Transmission Pipeline (GTP): Santos, Apr 2012.
Aerial: BING, Feb 2011.
Figure 7.2f: Star Finch (Neochmia ruficauda ruficauda) Habitat Ratings Based on Predictive Modelling
KP312 to KP408.81

Source:
Gas Transmission Pipeline (GTP): Santos, Apr 2012.
Aerial: BING, Feb 2011.
(Vulpes vulpes); invasive weeds; and poisoning by contaminants, such as cyanide, employed in mining operations (Holmes 1998, Garnett & Crowley 2000).

7.6 Unavoidable impact from GTP

Areas of proposed disturbance associated with clearing and construction activities for the GTP between KP0 to KP30, KP30 to KP40, KP40 to KP130, KP130 to KP312, KP312 to KP408.81, KP408.81 to KP409.04 and KP413.57 to KP419.69 for the Star finch are presented in Table 7.1. It is important to note that this unavoidable impact is considered minor and temporary in the context of the wide spread extent of ‘general habitat’ in the region. The location of this habitat is shown in Figure 7.2a, Figure 7.2b, Figure 7.2c, Figure 7.2d, Figure 7.2e and Figure 7.2f.

A cumulative total of proposed clearing of habitat for the Star finch is provided in Table 7.1.

Table 7.1 Cumulative total of Star finch habitat to be cleared

<table>
<thead>
<tr>
<th>Location</th>
<th>‘General habitat’</th>
<th>‘Core habitat’</th>
<th>Total habitat area per GTP section</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP0 to KP30</td>
<td>0 ha</td>
<td>0 ha</td>
<td>0 ha</td>
</tr>
<tr>
<td>KP30 to KP40</td>
<td>6.94 ha</td>
<td>0 ha</td>
<td>6.94 ha</td>
</tr>
<tr>
<td>KP40 to KP130</td>
<td>100.42 ha</td>
<td>2.98 ha</td>
<td>103.40 ha</td>
</tr>
<tr>
<td>KP130 to KP312</td>
<td>309.76 ha</td>
<td>3.30 ha</td>
<td>313.06 ha</td>
</tr>
<tr>
<td>KP312 to KP408.81</td>
<td>21.48 ha</td>
<td>9.64 ha</td>
<td>31.12 ha</td>
</tr>
<tr>
<td>KP408.81 to KP409.04</td>
<td>0 ha</td>
<td>0 ha</td>
<td>0 ha</td>
</tr>
<tr>
<td>KP413.57 to KP419.69</td>
<td>0 ha</td>
<td>0 ha</td>
<td>0 ha</td>
</tr>
<tr>
<td>Total habitat area</td>
<td>438.60 ha</td>
<td>15.92 ha</td>
<td>454.52 ha</td>
</tr>
</tbody>
</table>

7.7 Management practices and methods

7.7.1 Pre-construction mitigation measures

Measures to avoid impact

- Prior to the commencement of construction clearing, a suitably qualified and experienced EO will confirm the buffer zones (‘No Go’ zones) and where necessary barriers and signs will be erected

Measures to minimise impacts

- Pre-clearing ecological surveys have been undertaken by a suitably qualified Ecologist(s) in accordance with the Survey Guidelines for Australia’s Threatened Birds
- Prior to site entry, all site personnel will be appropriately trained and made aware of the sensitive environs in which they will be working (refer Part 1, Section 7.7)

7.7.2 Construction phase mitigation measures

Measures to avoid impact

- All reasonable and practical measures will be taken to locate site offices, construction camps, stockpiling/lay down areas and plant and equipment storage areas (including
heavy machinery) on existing cleared lands. As per other conditions these structures would be located at least 100 m away from a watercourse

Measures to minimise impacts

- All vegetation clearing within known Star finch habitat will comply with clearing approval conditions (eg NC Act and other statutory approvals)
- Implementation of the Fauna Handling Procedures (refer Appendix C)
- A licensed and experienced spotter catcher(s) will be onsite during all clearing activities and will ensure any injured animals are given to an appropriate wildlife carer group or vet (refer Appendix C). DSEWPaC and DEHP will be notified within 24 hours of any native animal injuries or deaths

Vehicle and machinery speed limits will be restricted to 20 km/hr (maximum speed limit of 50 km/hr in the GTP footprint) within key areas where the Star Finch have been identified with appropriate signage erected

- The clearing footprint within the above-listed locations and all ‘No Go’ zones will be adequately marked out for the clearing crew
- Clearing activities within these areas will be supervised by the relevant EO
- Clearing will be conducted in a sequential manner and in a way that directs escaping wildlife away from the clearing activities and into adjacent natural areas
- Measures will be in place to facilitate fauna movement, including gaps between stockpiles and pipe strings
- Ensure equipment is regularly maintained and is in good working order
- Where practicable, direct any lighting associated within night works away from sensitive areas or use engineering solutions to limit light spillage
- The construction phase component of the LRMP will be implemented
- Weather permitting, rehabilitation of all areas identified will commence immediately after the pipeline has been lowered in and backfilled (refer LRMP). With the exception of operational constraints, revegetation will be consistent with the plant density, floristic composition and distribution of the adjacent communities

7.7.3 Operational phase mitigation measures

Measures to avoid impact

- To avoid impacting on regenerating Star finch habitat, vehicle and pedestrian access will be restricted to the defined access tracks to and from the ROW and the defined access track within the ROW

Measures to minimise impacts

- Implementation of the Fauna Handling Procedures (refer Appendix C)
- The operational phase component of the LRMP will be implemented
- The operational phase of the PWMP will be implemented to minimise the risk of weed and pest animal establishment within the above-listed locations
7.7.4 Decommissioning phase mitigation measures

Measures to minimise impacts

- Implementation of the Fauna Handling Procedures (refer Appendix C)
- A decommissioning plan will be developed by GLNG Operations and provided for approval. The plan will aim to address the requirements of AS2885 and also to ensure environmental harm is avoided, including:
  - The Project area no longer contains hazardous contaminants and is left in stable condition
  - All the above ground infrastructure is removed
  - All areas disturbed by above ground infrastructure are rehabilitated in accordance with the relevant conditions
- For a minimum of five years after the completion of rehabilitation, rehabilitated areas will be monitored on a yearly basis
- The monitoring programme will include:
  - Methods to monitor subsidence and erosion rates at rehabilitated buried transmission pipeline corridors and buried flow lines
  - Monitoring of indicators identified in the LRMP at analogue sites to measure progressive and final rehabilitation success relevant to the final land use(s)
  - Frequency and seasonality of monitoring analogue sites and rehabilitated areas to assess rehabilitation success
  - Identification of the experimental design for analysing analogue and rehabilitated site data including statistical methods of analyses