3 THREATENED SPECIES ASSESSMENT

This section outlines the process used to determine the likelihood of occurrence of threatened species within the Solar Precinct footprint. This process is based on desktop research supplemented – where necessary – by a field survey. This section also describes the methodologies and results of those surveys. This section focusses on species that are listed as Vulnerable, Endangered or Critically Endangered under the *TPWC* and/or *EPBC Acts*.

The purpose of this assessment is to identify those species that may need to be included within the project's impact assessment, and those that can be reasonably excluded from further consideration because they are unlikely to occur within the Solar Precinct footprint.

Note: This process is not an impact assessment. That will be undertaken in the EIS.

3.1 Desktop 'likelihood of occurrence' assessment

The desktop 'likelihood of occurrence' assessment was undertaken to identify which threatened species have potential to occur within the Solar Precinct footprint. The assessment uses a broad-scale approach based on bioregional datasets to ensure that all relevant species are properly interrogated. This assessment also includes all threatened species identified in the TOR for the project (as relevant to the Solar Precinct footprint). Species identified to have the potential to occur within the Solar Precinct footprint are further investigated.

Procedure

The following procedure was used to undertake the likelihood of occurrence assessment for each relevant threatened species:

1) Collate a list of threatened flora and fauna records for the bioregion intersected by the Solar Precinct footprint (see Section 2.3) using the latest NT Flora and Fauna Atlas (February 2020 update). Bioregions give a broad area with largely similar habitat characteristics and species assemblages. Clipping data to them ensures all potential species are captured – especially in areas that have been poorly surveyed – in order to undertake a project-specific 'likelihood of occurrence' assessment.
2) Use the Protected Matters Search Tool (PMST) to determine species listed as threatened under the *EPBC Act* (undertaken in February 2021 – see Appendix D). A 100 km buffer was applied. The PMST is an online enquiry tool managed by the Commonwealth Department of Agriculture, Water and the Environment which interrogates a range of existing flora and fauna data, as well as using predictive modelling, to speculate on the presence of species within a search area.
3) Combine the results of steps 2 and 3 to generate a list of threatened species that may occur within the bioregion intersected by the Solar Precinct footprint. Species that are extinct are omitted from the assessment (but are in the summary table below).
4) Review details for each of those species – conservation status (Northern Territory and Commonwealth), habitat requirements, distribution, number of records (from the Northern Territory Fauna and Flora Atlas dataset), and presence inferences from the PMST report.
5) Analyse the likelihood that each species will occur within the Solar Precinct footprint by applying likelihood ratings defined in Table 3-1. This assessment uses the existing environment information described in Chapter 2 to estimate/infer habitat suitability of the area surveyed (which includes general habitat descriptions conducted as part of land type surveys – see Appendix A). Because the Solar Precincnt footprint is so large, a buffer was not applied.

Table 3-1. Ratings for the desktop threatened species likelihood of occurrence assessment

Likelihood rating	Likelihood of occurrence definition
HIGH	It is expected that this species occurs within the Solar Precinct footprint because there is core habitat and recent (post-2000) proximate records or knowledge that the species occurs in the local area.
MEDIUM	Species may occur within the Solar Precinct footprint because there is suitable habitat; however, there is evidence that lowers its likelihood of occurrence (known range contraction of the species in the region, no recent records within or close to the Solar Precinct footprint, substantial loss of habitat within the Solar Precinct footprint since previous records, species is naturally-rare or occurs at a low density etc.).
LOW	Species may occur, as a vagrant, within the Solar Precinct footprint; only marginally-suitable habitat is expected.
NONE	There is strong evidence that this species will not occur within the Solar Precinct footprint (i.e. there is no suitable habitat and/or the species is considered to be regionally-extinct).

Desktop results

The results from the desktop threatened species 'likelihood of occurrence' assessment are summarised in Table 3-2. Full details of each assessment are provided in Appendix E.

A total of 20 threatened species were assessed (an additional 7 for which there are historic records were omitted because they are considered regionally-extinct). Of these, one species was considered to have a 'High' likelihood of occurrence within the Solar Precinct footprint – Greater Bilby. Subsequently, this species was subject to targeted field study detailed below. The remaining species were either given likelihood ratings of 'Low' or 'None' – as such, no further assessment is required for species as there is a sufficient level of existing information which indicates that it is unlikely the species will be present (refer to Appendix E for justifications). A meeting was held with Alaric Fisher (Executive Director, Flora and Fauna Division, DEPWS) in October 2020 to confirm that desktop results aligned with the priorities of the department.

Table 3-2. Summary results of the desktop threatened species likelihood of occurrence assessment

Likelihood rating	Common name	Scientific name	Status	
			TPWC	EPBC
HIGH	Greater Bilby	*Macrotis lagotis*	VU	VU
MEDIUM	No species	-	-	-
LOW	Gouldian Finch	*Erythrura gouldiae*	VU	EN
	Grey Falcon	*Falco hypoleucos*	VU	VU
	Painted Honeyeater	*Grantiella picta*	VU	VU
	Night Parrot	*Pezoporus occidentalis*	CR	EN
	Princess Parrot	*Polytelis alexandrae*	VU	VU
	Yellow-spotted (or Floodplain) Monitor	*Varanus panoptes*	VU	-
NONE	Curlew Sandpiper	*Calidris ferruginea*	VU	CR
	Red Goshawk	*Erythrotriorchis radiatus*	VU	VU
	Australian Painted-snipe	*Rostratula australis*	VU	EN
	Masked Owl (northern mainland)	*Tyto novaehollandiae kimberli*	VU	VU
	Ghost Bat	*Macroderma gigas*	NT	VU
	Black-footed Rock-wallaby	*Petrogale lateralis MacDonnell Ranges race*	NT	VU
	Common Brushtail Possum (central)	*Trichosurus vulpecula vulpecula*	EN	-
	Central Rock-rat	*Zyzomys pedunculatus*	EN	CR
	Plains Death Adder	*Acanthophis hawkei*	VU	VU
	Great Desert Skink	*Liopholis kintorei*	VU	VU

Likelihood rating	Common name	Scientific name	Status	
			TPWC	EPBC
	Dwarf Desert Spike-rush	*Eleocharis papillosa*	VU	VU
	unnamed plant	*Typhonium sp. Sandover*	VU	-
OMITTED	Malleefowl *	*Leipoa ocellata*	CR	VU
	Western Quoll *	*Dasyurus geoffroii*	ER	VU
	Golden Bandicoot *	*Isoodon auratus (auratus)*	EN	VU
	Brush-tailed Bettong *	*Bettongia penicillata*	ER	EN
	Crest-tailed Mulgara #	*Dasycercus cristicauda*	VU	-
	Mala *	*Lagorchestes hirsutus*	EW	EN
	Red-tailed Phascogale *	*Phascogale calura*	ER	VU

Status: CR – Critically Endangered; EN – Endangered; VU – Vulnerable; EW – Extinct in the Wild; ER – Extinct Regionally; NT – Near Threatened;

** Extinct in the bioregion (Baker et al. 2005); # Outside species distribution (due to recent taxonomic changes)*

3.2 Greater Bilby (*Macrotis lagotis*) survey

The desktop likelihood of occurrence assessment identified Greater Bilby as having a high likelihood of occurrence within the Solar Precinct footprint due to recent regional records (see Figure 3-1) and the presence of suitable habitat. Subsequently, targeted surveys for Greater Bilby were conducted within the Solar Precinct footprint to assess the presence or likely presence of the species. Additionally, the southernmost 150 km of the OHTL was also included in the survey extent because it also supports suitable habitat (i.e. the Redsan land system) and traverses close to several historic and recent records of Greater Bilby. The survey of the OHTL is documented in the report entitled *Terrestrial ecological assessment for the OHTL and Murrumujuk facilities.*

3.2.1 Background information

The Greater Bilby is a rabbit-sized, omnivorous, burrowing marsupial that is listed as Vulnerable under the *EPBC Act* and the *TPWC Act*. The species also has cultural significance in the NT (Paltridge 2016; Walsh and the Custodians of the Bilby 2016).

In the NT, the Greater Bilby occurs in a wide range of habitats – including stony uplands, lateritic areas, hummock grassland, sand-plains, mulga scrub and woodlands, drainage depressions and palaeo-drainage systems (Southgate 1987; Southgate 1990). Vegetation within these areas predominantly consists of spinifex shrublands and open woodlands. Typical habitat consists of sandy soils dominated by hummock grasslands predominantly of three species of spinifex – *Triodia basedowii, T. pungens* and *T. schinzii* (Pavey 2006). Surveys in the Tanami Desert indicate that spinifex-dominated laterite rises and drainage lines are occupied more frequently than sand plains and dune fields (Southgate et al. 2018; Southgate et al. 2005).

A mosaic of different post-fire ages is preferred (Southgate & Carthew 2007). Fire seems to maintain the sparse vegetation the species favours, and promotes ephemeral plants used as primary and secondary food sources (Southgate & Carthew 2006; Southgate & Carthew 2007; Johnson 1989). However, large-scale burns may restrict breeding, impede dispersal and reduce food options/availability (Southgate & Carthew 2006).

The Greater Bilby is nocturnal and lives in deep burrows excavated in sand that are 2 to 3 metres long, and 100 to 150 mm in diameter, with a circular entrance. An individual may utilise over a dozen regularly-used burrows within its home range, and multiple burrows may be visited in a single night (Pavey 2006). Foraging distance from a burrow can range between 200 to 600 m (Johnston 1989). Greater Bilbies move over a wide area according to available food and vegetation cover conditions (associated with seasons and fires) (Southgate & Carthew 2006; Southgate & Carthew 2007; Southgate 1987; Johnson 1989), and the long-term seasonal home range may be large (up to hundreds of square kilometres) (Southgate 1987).

The species feeds on plant material (seeds and bulbs) and invertebrates such as beetles, termites and root-dwelling larvae (Pavey 2006a; Southgate & Carthew 2006). Food is either excavated from the soil (referred to as diggings or scratchings to a depth of 250 mm), live captured on the surface, or seeds eaten directly from the soil surface. In the Tanami Desert, seed and bulb plant foods are a major dietary component, in particular the seed of *Yakirra australiense* and the bulb of *Cyperus bulbosus* (Southgate & Carthew 2006). Other seed and bulb plants known to be foraged by Greater Bilby include *Scaevola parviflora, Calandrinia spp., Dactyloctenium radulans* and *Wurmbea deserticola* (Southgate & Carthew 2006). Invertebrates tend to be foraged when seed and bulb food plants become scarce (Southgate & Carthew 2006). Evidence of foraging for invertebrates is best observed by the presence of diggings, which are usually conspicuous and relatively numerous (Southgate et al. 2018). Diggings for root-dwelling larvae at the base of shrubs or forbs are unique to the Greater Bilby and are considered as a key identification characteristic (Southgate et al. 2018). Plants that are known to be targeted by Greater Bilby for root-dwelling larvae (in the NT) include *Acacia hilliana, A. lysiphloia, A. monticola, A. acradenia, A. melleodora, A. bivenosa, Senna notabilis* and *Indigofera georgei* (Southgate et al. 2018). These diggings can remain evident for months to years (Southgate 2017 pers. comm.); making surveys for occupancy or recent occupancy possible.

Predation is a major threat, with the Red Fox (*Vulpes vulpes*) and Feral Cat (*Felis catus*) being key predators (Abbott 2001; Pavey 2006a; Pavey 2006b; Southgate et al. 2007). Other threats include competition with Feral Rabbits (*Oryctolagus cuniculus*), pastoralism (Woinarski et al. 2014), and fire (described above).

3.2.2 Survey methodology

There are no historic Greater Bilby records within Solar Precinct footprint, but it is entirely within the Redsan land system, within which there are records to the north (2020), west (circa 1982) and south (2001). The purpose of the Greater Bilby survey within the Solar Precinct was to verify presence or absence (to a high level of certainty) of Greater Bilby burrows, and to assess the presence of core habitat features.

The survey approach, techniques, survey effort and survey team described below were supported by Dr Alaric Fisher (Executive Director, Flora & Fauna Division, DEPWS) and his colleagues prior to field mobilisation.

Survey approach

Surveying the presence of Greater Bilby relies on sign-based survey methods (i.e. tracks, burrows, diggings, scats), as the species is inherently sparse in the landscape (making direct observations uncommon) and they are difficult to capture (Southgate et al. 2018). A paper by Southgate et al. (2018) outlines the most suitable methods for surveying Greater Bilby (using sign-based protocols) and also techniques to assert species absence in an area. Advice from DEPWS Fauna Scientist (Dr Lauren Young) was also sought; she had recently conducted aerial surveys on Murranji Station (approximately 100 km to the north of the Solar Precinct footprint) that were successful at detecting for Greater Bilby. The adopted methodology also follows key elements of the Commonwealth survey guidelines for the species in terms of tracking and species detection in areas of suitable habitat (DSEWPaC 2011).

Due to the large size of the Solar Precinct footprint (10 x 12 km – 12,000 ha), it was decided that an aerial (helicopter) survey in combination with ground-based track-plot sampling would be the most effective techniques to detect the species. This approach has been proven to be successful at determining the presence or (likely) absence of Greater Bilby in the NT (assuming that observers have experience in Greater Bilby identification and that survey conditions – such as vegetation cover – are suitable) (pers. comm. Lauren Young 2020; Southgate et al. 2018; Southgate et al. 2005; EcOz 2016). This is also a standard detection method used in the Tanami region by Central Land Council and Territory Natural Resources Management.

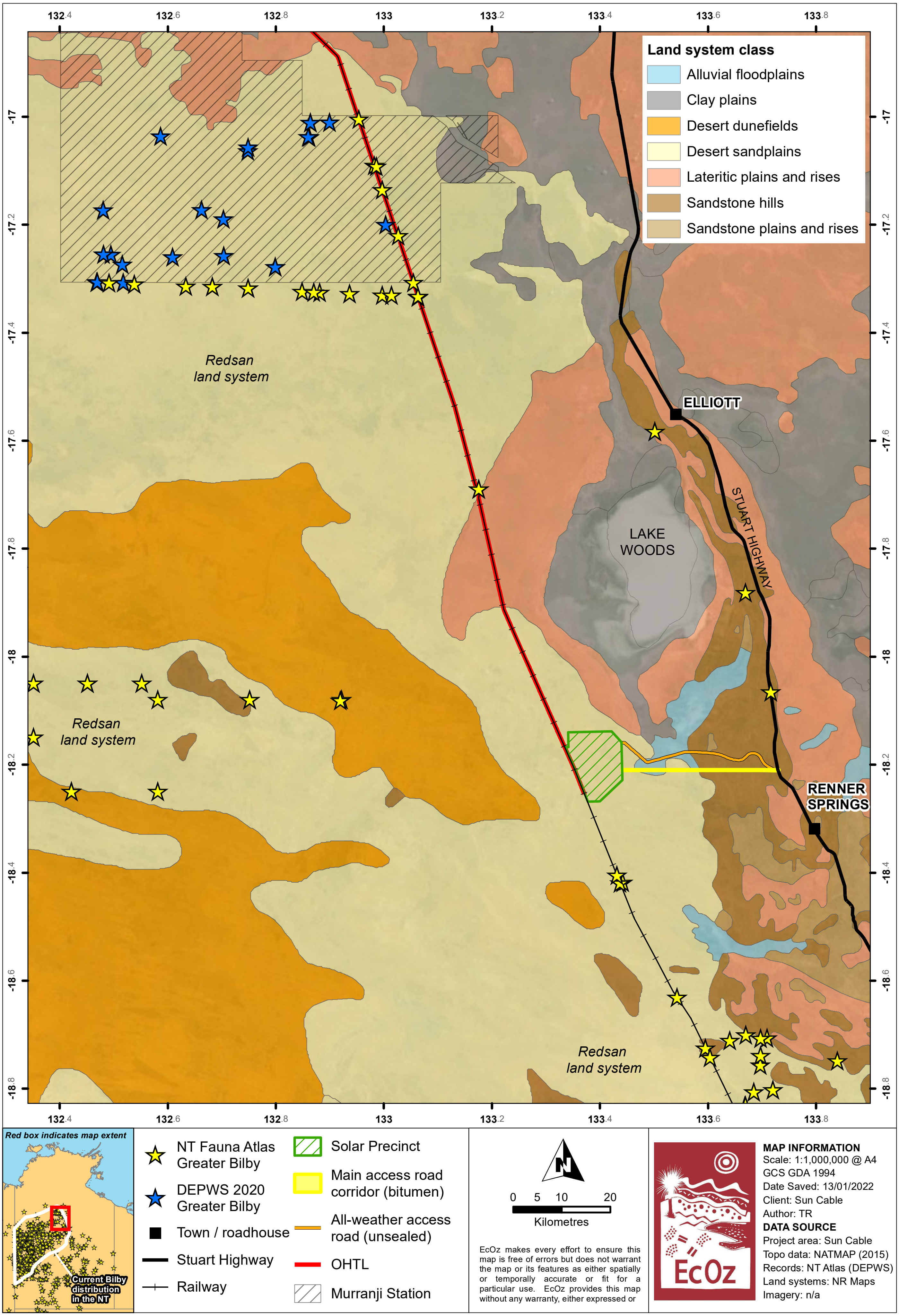

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Figure 3-1. Map of existing Greater Bilby records in the region of the Solar Precinct footprint

The decision to use aerial transects also allowed for a higher survey coverage than would have been possible using a ground-based 4WD (or ATV) transect survey, and also greatly reduced potential issues relating to access (i.e. when thick Acacia shrublands were encountered that would impede vehicle access).

The overarching approach was:

1) **Reference survey (Murranji Station records)**. A reference survey was conducted on Murranji Station (which is 100 km north of the Solar Precinct footprint and adjacent to the OHTL) so that observers could familiarise themselves with aerial and ground-based Greater Bilby sign; and also to confirm activity was currently detectable and present in the region.

2) **Solar Precinct footprint survey.** This included aerial transect survey (with ground-inspections where required), coupled with a habitat-based track-plot survey.

Survey timing and team

The survey occurred in November 2020. Because the species is nomadic and can breed year-round (depending on climatic sequences), there is no preferred time of year for conducting a Greater Bilby survey (DSEWPaC 2011).

The survey team consisted of three observers – two ecologists from EcOz (Tom Ewers-Reilly and Ella-Monique Mason) and one cultural monitor (Scott Henderson for the Solar Precinct footprint, and Raymond Dixon for the OHTL footprint). Tom Ewers-Reilly (team leader) has over 15 years' experience of fauna surveying in the NT. Tom is a well trained and experienced observer and has conducted several targeted Greater Bilby surveys that have involved both aerial and ground-based surveys that were successful at detecting the species, or asserting absence to a high degree of certainty (Tanami Regional Biodiversity Monitoring Program with Low Ecological Services between 2003-2006; Rover 1 surveys in Tennant Creek for Westgold Resources in 2012; Twin Bonanza Assessment for ABM Resources in 2012/13; Northern Gas Pipeline EIS for Jemena in 2016; Ammaroo Phosphate EIS for Verdant Minerals in 2017 – plus numerous fauna surveys in the arid zone).

Ella is an experienced field ecologist who has been involved in numerous fauna surveys in the NT. Both Cultural Monitors involved in this survey are expert trackers and were able to easily detect Greater Bilby burrows (and goanna burrows) from the helicopter and via ground-based tracking surveys.

Reference survey

Immediately prior to the survey, the observers visited a selection of sites on Murranji Station where Greater Bilby had been recently recorded (as part of DEPWS surveys described above) – see Figure 3-7. Reference sites were accessed via helicopter. At each reference site, an aerial inspection and a ground inspection was conducted. This involved recording types of sign(s), current activity status, habitat, and site photographs. Additional to reference sites, observers also recorded any other potential Greater Bilby sign along the reference site transect as per methodology described in the following section. Sites names associated with the reference survey were given 'RF' as a site ID prefix.

Aerial survey

Aerial transects were flown in an R44 helicopter at 40 to 60 km/hr and 20 to 30 m above the ground (using the Heli-Muster helicopter company who were involved in DEPWS Greater Bilby surveys on Murranji Station in mid-2020). The three observers were seated to provide the highest survey coverage (i.e. broadest field-of-view). The helicopter pilot used a GPS and AVENZA maps to navigate along pre-determined survey transects provided by EcOz. Aerial transects were flown in a north-south orientation at approximately 1 km spacing. A GPS track log was collected to provide evidence of survey effort – see Figure 3-11.

It is estimated that a survey extent 'strip' of 50 to 100 m was achieved (with width dependant on vegetation cover and helicopter speed). A higher strip width was possible in areas where vegetation cover was low. In areas of thicker vegetation that were thought to be suitable habitat for Greater Bilby (i.e. thickets of Turpentine *Acacia lysiphloia*), the helicopter pilot was asked to reduce speed and/or do a 'fly-around/loop' to improve detection probability due to lower visibility in these areas.

When a putative Greater Bilby sign was detected from the helicopter (such as a burrow/hole, large spoil heap, diggings), a site was recorded and an inspection was conducted to determine if the putative sign was from Greater Bilby, or another species such as Sand Goanna (*Varanus gouldii*). This initially involved a hover inspection (hovering over the site to allow a clear view of the sign). If it could not be accurately identified by a hover inspection, a ground inspection was conducted. The certainty of a site's identification was then allocated a confidence rating as per Table 3-3. The confidence ratings are based on protocols developed by Southgate et al. 2018 (provided in Table 3-4). In some circumstances, the helicopter could not land near the site (i.e. due to thick vegetation); consequently, the putative sign was allocated a confidence rating based on aerial observations only (which has limitations in terms of identification confidence, as explained in Table 3-4).

Table 3-3. Site categories used for the Greater Bilby aerial survey

Confidence rating	Criteria
Confirmed bilby	• There is sufficient evidence that sign is made by Greater Bilby. • This rating can only be made during a ground inspection (not aerial inspection).
Potential bilby	• The sign has characteristics of Greater Bilby but there is not enough evidence to provide a definitive assessment. • This is normally only applicable with aerial inspections as observers are unlikely to detect the details required to make a confident identification. However, it may also be relevant to ground inspections if sign is old or there is insufficient evidence (i.e. burrow or diggings in the open that are not coupled with definitive sign such as clear tracks or scats).
Unlikely bilby	• The sign is more likely attributed to another species (e.g. *Varanus gouldii* or *V. panoptes*); however, ground inspections were not conducted (due to landing concerns or other reason) to enable observers to make a definitive assessment.
Not bilby	• There is clear evidence (from aerial or ground inspections) that sign was not Greater Bilby.

Track-plot survey (Solar Precinct footprint only)

Although an aerial survey provides a comprehensive assessment of the area covered, there are risks of imperfect detection (false absence) of Greater Bilby sign (i.e. observer's miss a sign due to vegetation cover or some other reason). As such, ground-based surveys (using track-plot methods) were strategically undertaken within the Solar Precinct footprint to check for Greater Bilby occurrence (using identification protocols in Table 3-4). Their locations were based on presence of habitat rather than aerial observation of sign.

The track-plot sampling technique adopted for this survey is based on those described in Moseby et al. (2012), which is a standardised technique designed to assist in recording information on a range of fauna species in arid and semi-arid habitat types. This sampling technique is widely used for Greater Bilby presence / absence surveys in recent times (Southgate et al. 2018; Bradley et al 2015; EcOz 2016; EcOz 2018). This technique also incorporates the key components of survey guidelines for Greater Bilby advocated by the Commonwealth Government (DSEWPaC 2011).

The land type survey indicates that the Solar Precinct footprint does not support fluvial or residual habitat types (such as palaeo-drainage channels and lateritic rises) that are typically more suited / attractive to Greater Bilby occupation / persistence (these areas would normally require a high level of survey effort). As such, track-plot sites were located to evenly sample all land types present and to be spatially representative across the proposed footprint. Site selection favoured areas that support potential food resources (i.e. presence of healthy Turpentine *Acacia lysiphloia* may be a source of root-dwelling larvae, or recently burnt areas could support fire ephemeral plant species such as *Yakirra australiensis* that are known as an important food source for Greater Bilby[1]).

[1] However, fire scar mapping and land type survey noted that there have been no recent fires within the Solar Precinct footprint (last burn was approximately 4 to 5 years ago, see Section 2.8) and as such the presence of fire ephemeral plant species is expected to be minimal.

Table 3-4. Protocol used to assess confidence of Greater Bilby sign

(Information presented in this table is adapted from Southgate et al. 2018)

Sign type and description	Recommended actions
Sign can be used to confirm presence of Greater Bilby	
Multiple diggings into roots of RDL* vegetation Hole or diggings (usually less than 50cm in depth) under shrubs that support RDL. Direction or conical in shape with spoil evening distributed around the dig. Usually obvious and numerous. Can remain evident for months to years, depending on substrate and rainfall. No other species in arid / semi-arid Australia is known to expose and rip open plant roots containing larvae.	• Identify plant species harbouring RDL, collect botanical specimen if uncertain for identification post field trip, and assess age of diggings. • For further confidence, search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation.
Scats Typically in groups of 2 to 5 pellets and usually contain sand, plant and invertebrate material. They are firm, oblong-shaped, almost round in cross section, have a smooth coating, and rounded ends. Commonly found hidden within spoil of diggings; rarely found away from some form of digging activity. Can persist for several months. No other extant species in arid / semi-arid Australia produces scats with these characteristics.	• Collect several scats, store each set dry in separate paper bags or vials with silica gel beads and cotton wool; determine if juveniles are present (i.e. small pellets). • For further confidence, search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation.
Clear tracks (generally limited to fresh tracks only) Bilbies move with a quadrupedal bounding overstep gait; with the front imprints staggered and the hind imprints mostly parallel. The presence of fresh and clear tracks that have three distinct parallel marks (representing toes) from front feet, and slender (narrow) hind foot imprints with indistinct side toes are necessary to confirm presence using track-based sign. It is not sufficient to rely on gait pattern alone.	• Record group width and length of several sets, assess if juveniles present, photograph with a scale; estimate age of tracks. • For further confidence, search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation.
Sign can only be used to identify potential bilby presence / activity only	
Diggings other than for RDL These are similar to those described above for RDL, however they in the open targeting termites, spiders or bush onion bulbs. Several other taxa (including varanid lizards) can also produce similar diggings, as such presence cannot generally be confirmed solely on the detection of these type of diggings.	• Continue to search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation. • Record age and characteristics of diggings (i.e. identify what diggings are into – termites, spider burrows, seed stores of ants etc.)
Burrow or burrows Burrows are round, and may be single or multiple entrances. An apron of spoil of excavated sand is usually present. Several separate burrows are often found within a foraging area. Presence cannot generally be confirmed solely on the detection of a bilby-like burrow because other species can re-work inactive bilby burrows and make them appear active; as such, additional sign is often required to confirm presence. Figure 3-2 presents photographs comparing bilby and goanna burrow morphology.	• Continue to search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation. • Record dimensions of burrow circumference, photograph with scale, describe presence of soil apron and age since last activity.
Unclear tracks If tracks do not have features as described above (i.e. only the gait pattern is visible), there is insufficient evidence to confirm that the track is made from Greater Bilby as there are several other taxa that can produce similar gait patterns – such as rabbits, mulgara and rodents / rats.	• Continue to search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation. • Measure the length and width of several track groups, photograph with a scale. • Determine any other species responsible for tracks detected, estimate the age of tracks.

** RDL – Root-dwelling larvae; RDL vegetation are flora species that are known to support RDL.*

A track-plot site involved searching a 2-ha plot for approximately 30 minutes (by three observers) and recording the following information.

- Site location details (i.e. site name, GPS coordinate, time etc.) and site photograph.
- Habitat description (dominant vegetation, landform, soil type, fire history, other disturbances).
- Variables that may affect tracking conditions, such as time since rain, cloud cover, surface soil substrate, time of day, time of year etc.
- Presence and cover of food indicator species for Greater Bilby (described in Section 3.3.1).
- Sign (tracks, scats, diggings etc.) of all fauna species present within the track-plot site – including age and abundance estimate. If potential Greater Bilby sign is detected, protocol in Table 3-4 was used to confirm identification likelihood / confidence.
  - Age estimate – fresh (1 to 2 days); recent (3 to 7 days); old (> 7 days)
  - Abundance estimate – abundant (sign in 4 quarters of plot); common (signs in half the site); uncommon (found in ¼ of site); rare (only observed once).

Examples of Greater Bilby burrows (round and large entrance with well-dispersed spoil) (Murranji Station)

Examples of large goanna burrows (semi-circular shape, flat base, spoil fanned out at entrance) (Solar Precinct footprint)

Figure 3-2. Photographs showing the morphological differences of burrows between Greater Bilby and goannas

3.2.3 Results and discussion

The survey occurred between 3 and 6 November 2020. Conditions were excellent for tracking, with sunny days experienced during the survey (i.e. good shadows for identifying tracks and other features in the sand) and no rainfall at the study site in the week prior to survey (rain can cover up tracks and remove sign). Survey effort for Greater Bilby is presented in Figure 3-7 (includes reference survey, aerial survey and track-plot survey within the Solar Precinct footprint).

The main findings are that:

- Aerial survey (helicopter) and ground-based track-plots confirmed that there are no Greater Bilby burrows within the Solar Precinct footprint; nor was there evidence of previous occupation.
- Under better climatic conditions (i.e. increase food resources), Greater Bilby may occasionally utilise the area; however, the sandplain habitat types present within the Solar Precinct footprint (and existing land use impacts) are unlikely to support a persistent or regular occurrence of the species.

Reference survey

The reference survey involved visiting three known locations on Murranji Station where Greater Bilby had been recorded by DEPWS, as well as flying a low transect searching for any other putative Greater Bilby sign. A total of 50 km was flown as part of the reference survey (see Figure 3-7). At each reference site, Greater Bilby sign – burrow and fresh diggings – were successfully detected from aerial observations followed by a ground inspection to confirm identification and record current activity. Representative photographs of Greater Bilby sign and habitat are provided in Figure 3-3, Figure 3-5 and Figure 3-6.

This survey on Murranji Station also resulted in 12 additional sites (i.e. not previously recorded by DEPWS) that had burrows potentially made by Greater Bilby (noting that ground inspections were not undertaken at these sites, so the sign could not be confirmed). All confirmed and potential occurrences were located on the portion of Murranji Station that is west of the railway easement and the proposed OHTL. Locations are shown on Figure 3-7; the dataset is provided in Appendix F.

The habitat in the areas where Greater Bilby were confirmed is a flat sand plain that supports a Eucalyptus open woodland (*Corymbia opaca, C. dichromophloia, Eucalyptus pruinosa, Erythrophleum chlorostachys, Bauhinia cunninghamii*) with an Acacia open shrubland (*Acacia lysiphloia, A. shirleyi, Carissa lanceolata, Flueggea virosa, Atalaya hemiglauca*) over with a mix of hummock and tussock grasses (*Trioida pungens, Chrysopogon fallax*, *Paspalidium rarum, Enneapogon spp. Aristida spp.* and *Mnesithea formosa.* The area also supports patches of Bullwaddy (*Macropteranthes kekwickii*) and/or Lancewood (*Acacia shirleyi*) over tussock grass. Vegetation was in good condition with little sign of shrub and tree mortality from drought conditions (or other factors). A diversity of potential food options for Greater Bilby was observed in this area, such as *Yakirra australiense* (seed source) and large amounts of healthy (alive) *Acacia lysiphloia* (Greater Bilby prey on root-dwelling-larvae on this species) – noting that a targeted vegetation survey was not undertaken at reference sites and additional food resources are expected to be present.

NAFI fire history also shows that this area has burnt on numerous occasions over the past 20 years (in some areas up to 15 times); however, many of the fires have been relatively small in scale and 'patchy', which has created a fire-age mosaic often favoured by Greater Bilby. Fire history and apparent food availability present in the area are likely reasons why a persistent colony of the species is present.

Figure 3-3. Photographs (aerial and ground) of a Greater Bilby burrow at reference site RF01

Figure 3-4. Photographs of recently active Greater Bilby burrow at reference site RF21. This site had diggings for RDL in the close proximity to burrow.

Figure 3-5. Photographs of inactive Greater Bilby burrow at reference site RF22

Figure 3-6. Photographs of habitat on Murranji Station where Greater Bilby sign was observed

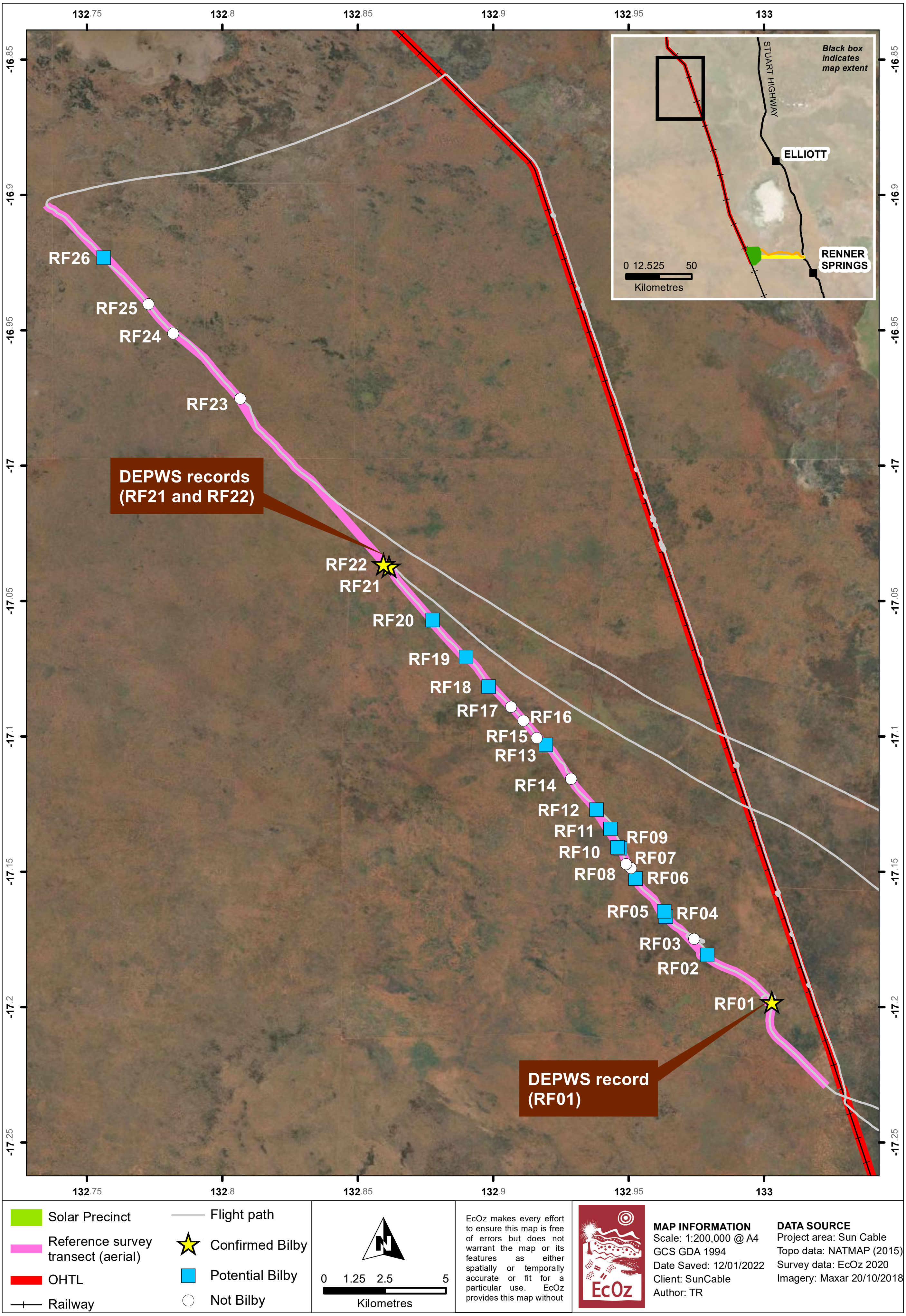

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Figure 3-7. Map of Greater Bilby reference survey results

Solar Precinct footprint

Tracking conditions were excellent within the Solar Precinct footprint. In most cases, vegetation cover was relatively sparse (due to below average rainfall over the past few years). This provided good visibility for aerial inspections and meant that sign identification could be made to a high level of certainty from the helicopter. Fresh burrows, diggings and scratchings were highly conspicuous from the air because excavated soil had a richer (red) colour in contrast to the sun-bleached paler surface soils (see example photograph in Figure 3-8).

Figure 3-8. Photograph of fresh spoil as seen from helicopter (in this case *V. gouldii*)

Approximately 346 km of aerial transect was surveyed within (and immediately surrounding) the Solar Precinct footprint, which equates to a survey coverage of approximately 15 - 30% of the footprint (assuming visibility between 50 m and 100 m from helicopter (see Figure 3-11). Forty-six sites were inspected as part of the aerial transect survey (i.e. potential Greater Bilby sign was observed from the helicopter). Follow-up inspections of these sites (41 hover inspections; and 5 ground inspections) confirmed that, in most cases, the putative aerial sign was 'not bilby' and was attributable to goanna (likely Sand Goanna (*Varanus gouldii*)). The exception was one site recorded as a 'potential sign' (site SF46), which had a collapsed burrow (entrance 20 x 30 cm) under the canopy of a Bloodwood (*Corymbia opaca*) that could not be definitively identified as Greater Bilby or another species (see photograph in Figure 3-9). Spoil was evenly scattered around the burrow entrance at SF46; however, no sign of Greater Bilby tracks, scats or diggings were found, despite a search within 100 m of the burrow site. This burrow is collapsed and old, and is more likely made by *Varanus gouldii*, of which sign was commonly observed at SF46 and most other areas of the Solar Precinct footprint.

Figure 3-9. Photograph of 'potential sign' of Greater Bilby at SF46

Additional to aerial transect sites, 19 track-plot sites were surveyed (site locations shown on Figure 3-11). No evidence of Greater Bilby was recorded; however, sign from other fauna species was observed at all sites (refer to Appendix F for track-plot dataset). Generally, fauna activity and diversity were fairly low, likely a result of the dry conditions being experienced in the region. No significant species were recorded.

The majority of the Solar Precinct footprint supports spinifex (*Triodia pungens*) loamy plains and shallow sandplains (land types within the Solar Precinct footprint are described in Section 2.6; and full land type report in Appendix A). That land type can provide suitable habitat for Greater Bilby – mainly involving the presence of good supplies of food resources – when the right conditions are experienced. However, the footprint is not considered to support 'core' habitat for the species, nor habitat that is likely to attract a persistent or semi-regular colony of Greater Bilby. This is because occupancy modelling in the NT indicates that palaeo-drainage lines remain more persistently suitable for occupation that other habitats such as sand plains and dune fields (Southgate et al. 2018).

The survey confirmed there is currently a very low availability of viable food resources for Greater Bilby within the footprint. Three flora species known as potential food plants in the Tanami Desert were observed:

- **Turpentine (*Acacia lysiphloia*)** – target food source is root-dwelling larvae. This species is widespread in the footprint (observed at most sites) and surrounding areas – however, most patches were dead as a result of dry conditions (see photograph in Figure 3-10). This reduces the likelihood that root-dwelling larvae currently persist in suitable abundances in the area.
- **Cockroach Bush (*Senna notabilis*)** – target food source is root-dwelling larvae. This species was only observed in very low numbers throughout the sandplains, station track windrows and around newly-established bores.
- **Camel Weed (*Scaevola parvifolia*)** – target food source is fruit and seed. This species was only observed at a few locations at low densities within the shallow sandplains.

It is noted that *Yakirra australiense* (provides edible seed) and *Cyperus bulbosus* (provides edible bulb) were not detected within the footprint, and these species are known to be a major dietary component of Greater Bilby in the Tanami Desert (Southgate & Carthew 2006). It is possible that these species may be present in the soil seed bank, but current conditions made them undetectable. However, those species were observed at the reference survey sites. It is likely that other food plant species are present in the area but are very sparse (and therefore were undetected during surveys) or they are not currently visible due to dry conditions.

In terms of threatening processes with the Solar Precinct footprint, cat tracks and sightings were recorded during the survey (along the OHTL); however, sign was not detected within the Solar Precinct footprint. Red Fox was not recorded during tracking surveys, and there are very few regional records in the NT Fauna Atlas – it is likely that this on the northern edge of distribution in the NT. The area is exposed to pastoral activities; however, this has resulted in only low impacts within the Solar Precinct footprint. A high level of cattle activity was present to the north and east of the footprint where bores and water points have been long established. Three new bores have been recently installed within the footprint (in 2019); however, large numbers of cattle have not likely been mustered into these areas as yet as cattle sign in the areas was relatively low.

The Solar Precinct footprint, and immediate surrounds, have been exposed to a fairly high fire frequency over the past 20 years (refer to Section 2.8) which, coupled with drought conditions, has led to a relatively low floral diversity and homogenous landscape – and, more importantly, a distinct scarcity of fire ephemeral plant species that are an important food source for Greater Bilby. This has likely reduced habitat quality for Greater Bilby in terms of provision of a diversity and (relative) abundance of food resources.

Based on aerial observations and fire mapping, the areas to the north and south of the Solar Precinct footprint appear to support similar habitat in similar condition to that surveyed within the Solar Precinct footprint, and may be suitable for Greater Bilby in boom times. Habitat to the east becomes less suitable because it more similar to that observed in the Atlas_Ms14 land system. Furthermore, there are no palaeo-channels or other core habitat features within 10 km to the north, east and south of the footprint. However, there may be better quality habitat to the west of the railway. If Greater Bilby is present in the local area, the main colonies are expected to be west of the railway (at this latitude).

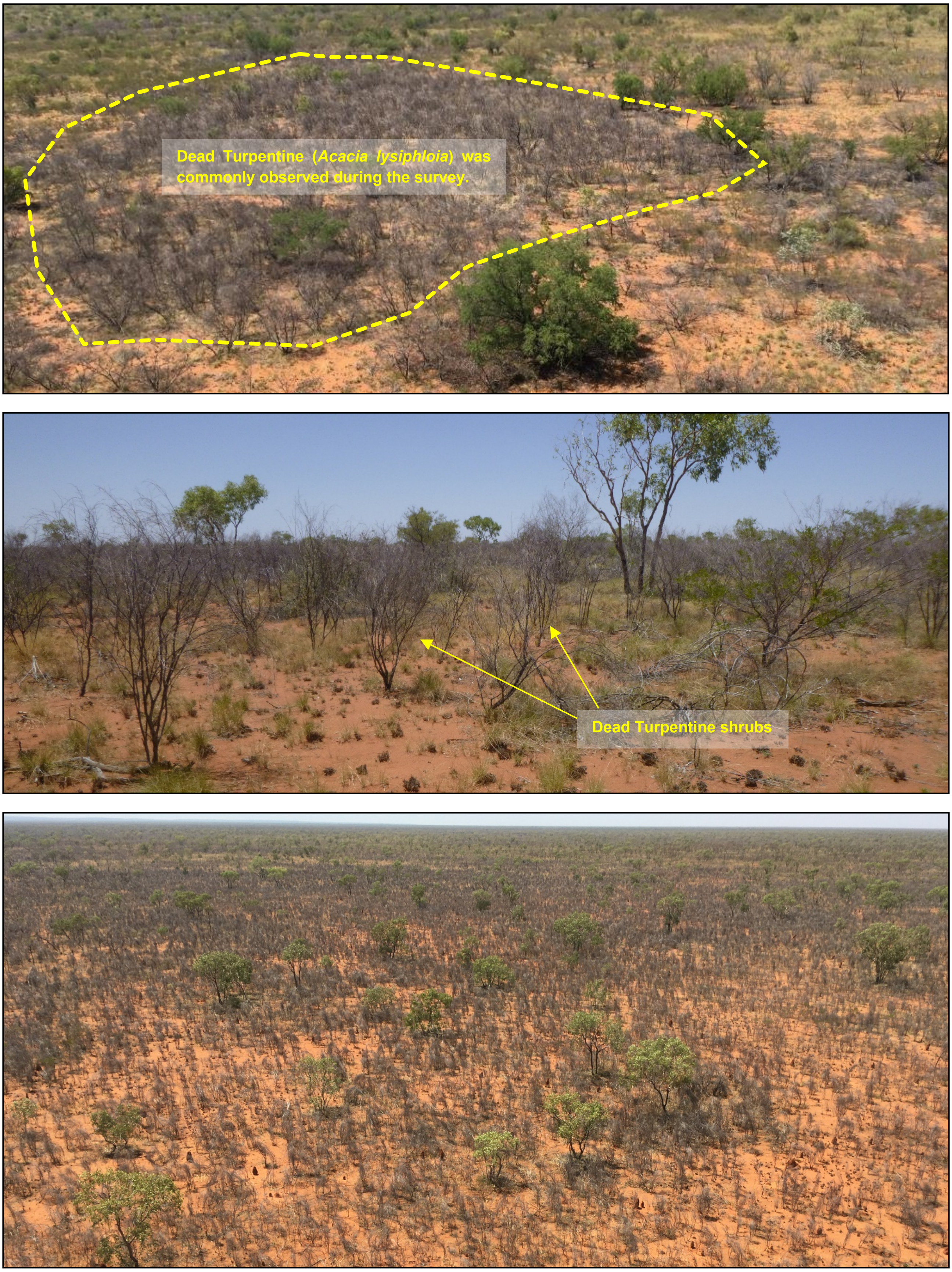
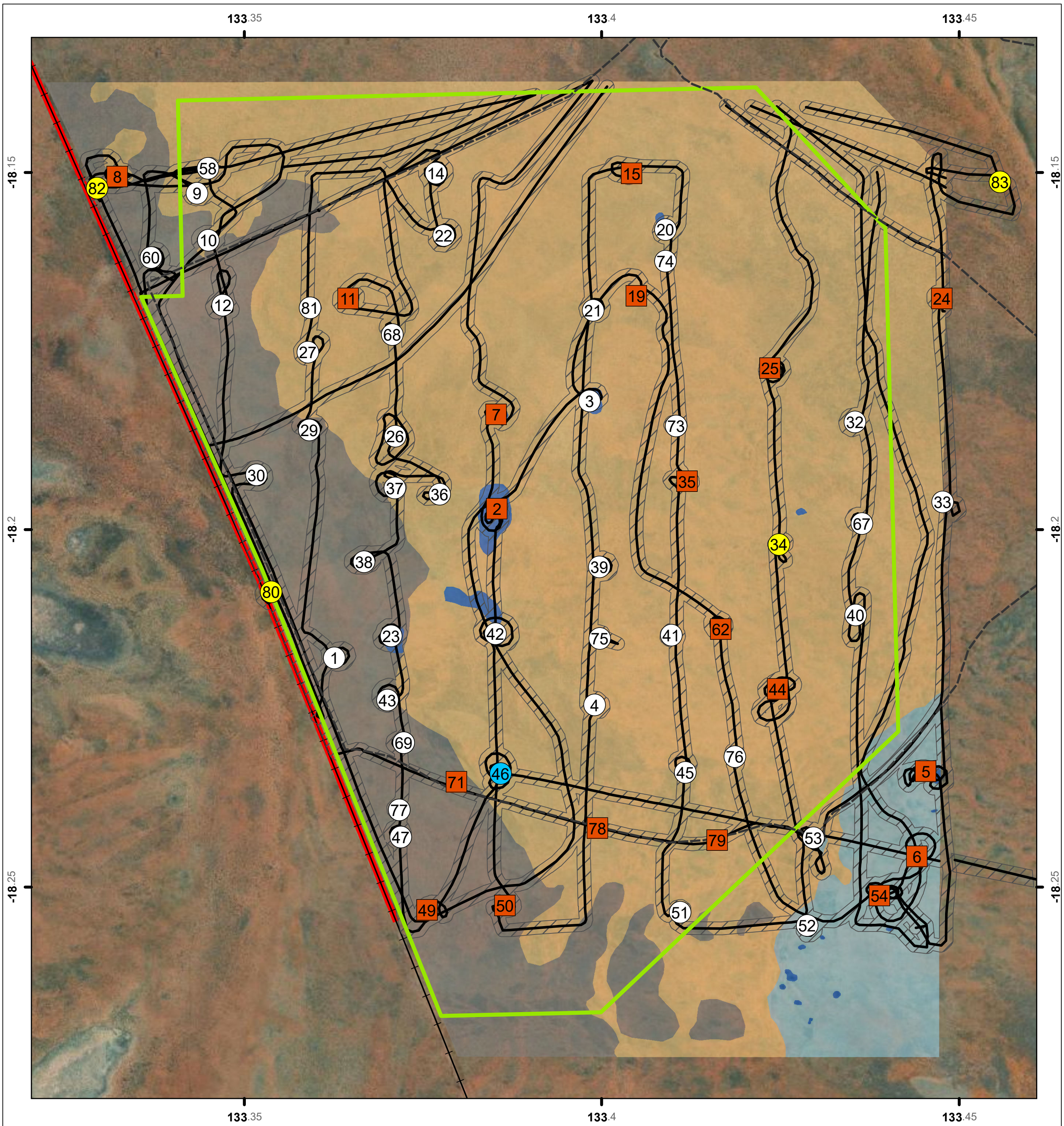


Figure 3-10. Photographs of dead Turpentine (*Acacia lysiphloia*) that was widespread throughout the Solar Precinct footprint and surrounding areas



LAND TYPE A - flat sandplain with Bloodwood (Corymbia opaca) and Turpentine (Acacia lysiphloia) predominantly over Soft Spinifex (Triodia pungens); (tussock grasses become more common to the north and east of survey area)

LAND TYPE B - flat to gently sloping loamy plain with Silver Box (Eucalyptus pruinosa) and Turpentine (Acacia lysiphloia) over Soft Spinifex (Triodia pungens)

LAND TYPE C - flat alluvial plain with Bloodwood (Corymbia opaca, malleed) and Melaleuca shrubs over Soft Spinifex (Triodia pungens)

LAND TYPE D - shallow depression with scattered Melaleuca shrubs, Dogwood (Acacia sericophylla) and Bloodwood (Corymbia opaca) over mixed tussock grasses and forbs

Aerial survey

- Not bilby - hover inspection only
- Not bilby - hover and ground inspection
- Potential bilby - hover and ground inspection
- Aerial transects (solar precinct)
- Estimated survey coverage (solar precinct)

Track-plot survey

- Track-plot site - no evidence of Greater Bilby

- Solar Precinct footprint
- OHTL
- Station tracks
- Railway

0 0.5 1 2
Kilometres

EcOz

MAP INFORMATION
Scale: 1:90,000 @ A4
GCS GDA 1994
Date Saved: 12/08/2021
Client: SunCable
Author: TR

DATA SOURCE
Project area: Sun Cable
Topo data: NATMAP (2015)
Survey data: EcOz 2020
Land types: EcOz 2020
Imagery: MAXAR 23/4/2020

Path: C:\Users\tom.reilly.ECOZ\OneDrive - Ecoz\Documents\01. EcOz GIS Projects (TR) - new\EZ20220 (Tom) - SunCable Baseline Ecology\01 Project Files\Report_Bilby_SolarFarm v3.mxd

Figure 3-12. Map of Greater Bilby survey effort and results within the solar precinct footprint

4 ACCESS ROADS

Two access roads will be required to connect the Solar Precinct to the Stuart Highway – a main sealed access road and an all-weather unsealed road. At the time of surveying, only an indicative east-west *access corridor* 1 km wide and approximately 35 km in length had been identified within Powell Creek Station – see Figure 4-1. That corridor was inspected using a helicopter. The sealed road has subsequently been located just to the south of that corridor (and therefore the helicopter flight path). However, the area surveyed is considered representative of the landscape traversed by the sealed road. This chapter gives an overview of the habitat types crossed by the access corridor (as surveyed), and the potential values therein.

The all-weather unsealed road has not been surveyed. From a review of aerial imagery, its route appears to cross similar habitats and vegetation types to the seal road, and it can therefore be assumed that the threatened species assessment presented in this chapter also applies to the unsealed road.

4.1 Existing land resource information

4.1.1 Land systems

The access road corridor spans three land systems – Redsan (in the west), Gosse (in the west) and Ashburton (in the east) (refer back to Figure 2-4).

The Redsan land system falls within the 'desert sandplains' group, and covers an extensive area of land within the northern and north eastern region of the Tanami Desert. Redsan is an area of gently undulating plain with deep sandy soil that supports an open Eucalyptus woodland (including (*Eucalyptus polycarpa, E. argillacea, E. setosa, E. pruinosa, E. microtheca, E. ferruginea*) over spinifex (mainly *Triodia pungens*) interspersed with areas of tussock grasses (i.e. *Aristida spp.*) (Stewart et al. 1970). The land system also supports standard / patches of Lancewood (*Acacia shirleyi*) and Bulwaddy (*Macropteranthes kekwickii*) along the south-eastern margin (Stewart et al. 1970).

The Gosse land system occurs to the east of the Solar Precinct and is part of the 'alluvial floodplains' group. The area is associated with run-off from drainages including Powell Creek, Bull Creek, Gleeson Creek and Hunter Creek. It is sandy, seasonally flooded flats and drainages that support Eucalyptus woodlands (Christian et al. 1954). Vegetation typically includes a low open woodland of *E. microtheca, E. pruinosa, A. sericophylla, Coymbia opaca*), a mid-open shrubland (*Carissa lanceolate, Acacia holosericea, Gossypium australe*) over tussocks grass (*Chrysopogon fallax, Eragrostis eriopoda*) with occasional areas dominated by hummock grass (*Triodia pungens*) (Wilson et al. 1990).

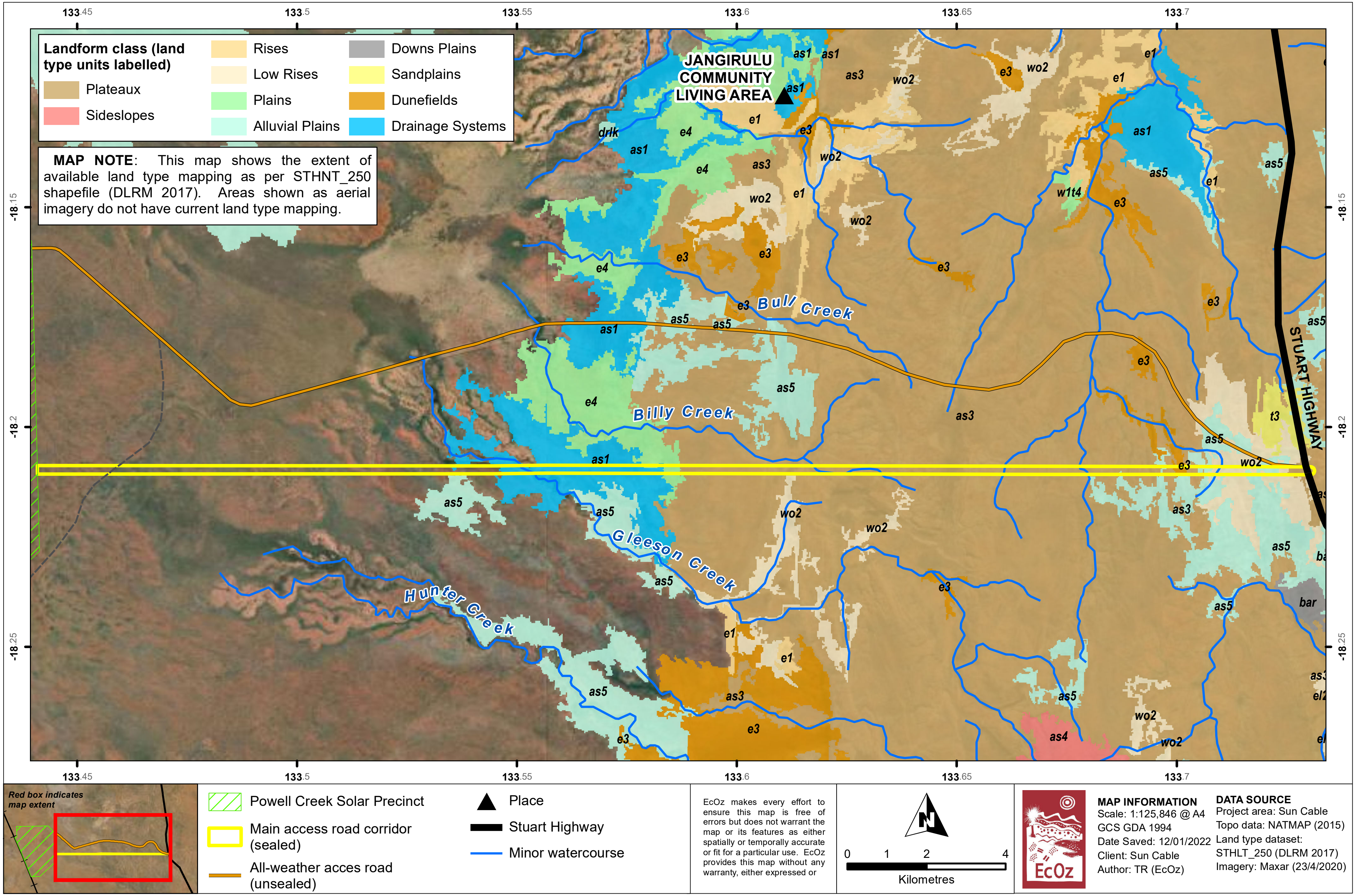
The Ashburton land system comprises of sandstone, hilly, dissected country with skeletal soils, lateritic remnants and numerous incised and localised drainages (Christian et al. 1954). The sandstone hills within the access corridor are part of the Ashburton Range, which comprise of hills, ridges and plateaux with a relief up to 70 m. It crosses several minor but distinct drainage lines. This includes Billy Creek, the lower reaches of Gleeson Creek and several other unnamed drainages and tributaries. These drainages can support permanent or semi-permanent waterholes / springs.

4.1.2 Land types

Land type mapping of the southern part of the Northern Territory was undertaken by the Department of Land Resource Management in 2017 to a scale of 1:250,000. Each land type is based on the existing landform, soil and vegetation described by land system mapping undertaken by CSIRO in the 1940s and 1950s and, where available, finer scale land unit mapping. The eastern part of the access corridor intersects the land type dataset (see Figure 4-1) and Table 4-1 provides descriptions of the five land types that are intersected by the corridor. The western part of the corridor, and the Solar Precinct footprint, fall outside (west of) the land type mapping dataset / extent.

Table 4-1. Existing land types that are intersected by the access corridor (dataset STHLT_250)

Type	Landform	Soil	Vegetation
Sandstone hills – low hills, hills and stony plateaux on sandstone, siltstone, quartzite and conglomerate (deeply weathered in places); outcrop with shallow stony soils			
as1	Drainage systems. Valley bottoms with stream lines	Kandolsols;	Low open woodland of *Eucalyptus pruinosa, Ventilago viminalis, Carissa spicata* over tussock grasses
as3	Plateaux. Nearly flat upland areas	Tenosols;	Low open woodland of *Eucalyptus leucophloia, Eucalyptus aspera* over hummock grass (*Triodia pungens*)
as5	Alluvial plains. Valley bottoms with stream lines	Tenosols / Kandolsols;	Eucalyptus low open woodland over tussock grasses (dominant species are *Eucalyptus pruinosa, Grevillea striata* and *Aristida pruinosa*)
Lateritic plains and rises – plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils			
e4	Dune fields Gentle slopes – some dunes	Tenosols	Mid open woodland of *Eucalyptus victrix, Lophostemon grandiflora* and *Ventilago viminalis* over tussock grasses
e4	Lateritic plains and rises low flat areas	Tenosols	Shrubland of *Jacksonia odontoclada* and *Acacia lysiphloia* over hummock (*Triodia pungens*) and tussock grasses
wo2	Low rises	Kandosols	Closed shrubland of *Acacia lysiphloia* over tussock grasses +/- emergent Eucalypts



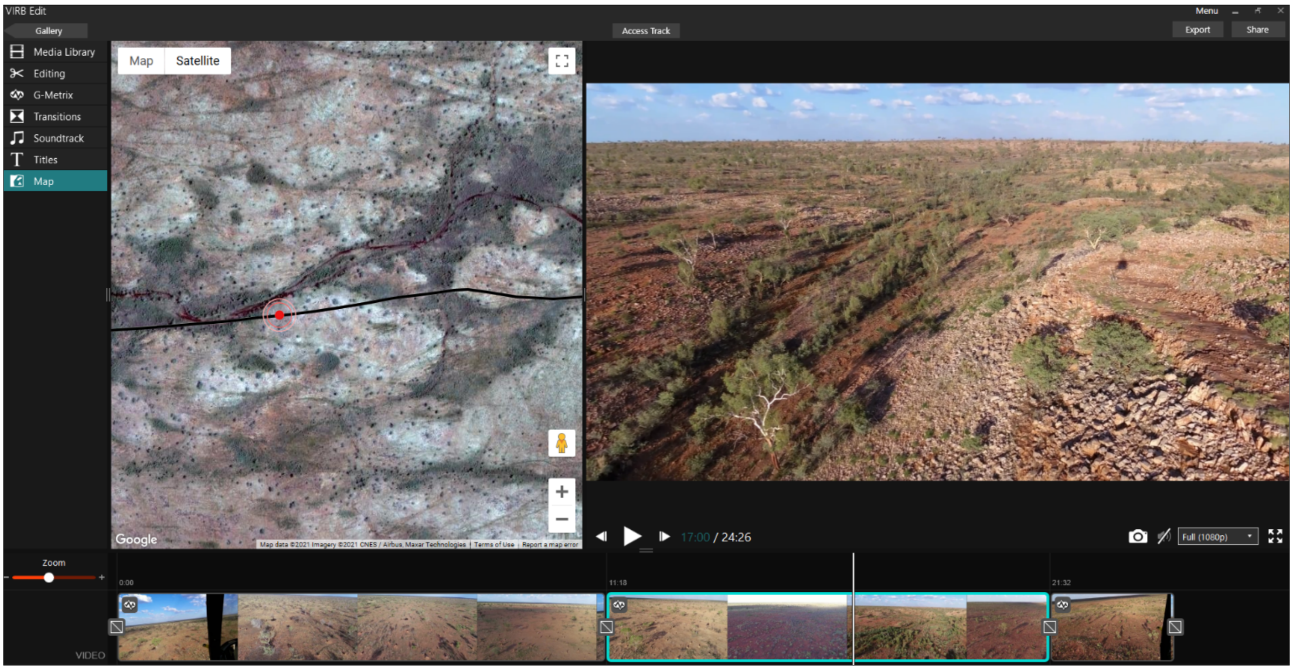
Path: C:\Users\tom.reilly.ECOZ\OneDrive - Ecoz\Documents\01. EcOz GIS Projects (TR) - new\EZ20220 (Tom) - SunCable Baseline Ecology\01 Project Files\Report_Access_LandTypes_v2.mxd

Figure 4-1. Map of available 1:250,000 land type mapping within the region of the proposed access roads to the Solar Precinct

4.2 Aerial inspection (general habitat assessment)

A helicopter survey was conducted by EcOz ecologists (Tom Ewers-Reilly and Ella Mason) and Cultural Monitor (Scott Henderson) on 5 November 2020. The flight path is shown in Figure 4-3. The purpose of the inspection was to conduct a high-level habitat assessment by describing major landforms and habitat types within the corridor to allow for a well-informed threatened species likelihood assessment (Section 4.3) and to assess the presence of any significant vegetation types.

The survey involved recording geo-referenced video footage (using Garmin VIRB – example of footage shown in Figure 4-2) and collecting aerial based notes on vegetation and habitat – with a particular focus on identifying riparian vegetation types and waterholes / springs. Additional to field surveys, a review of recent aerial imagery (Maxar 23/4/2020) was undertaken at a scale of 1:5,000 to identify any potentially significant / notable features within the 1 km corridor width (i.e. springs).



Left window shows flight path (black line) and the red dot 'indicates location of video footage; Right window shows video footage.

Figure 4-2. Snapshot of Garmin VIRB video footage from the access corridor aerial inspection

Thirty-four aerial inspection sites were recorded as part of the aerial survey. These sites were selected to represent the variation of landforms and habitat types encountered within the proposed access corridor (locations shown in Figure 4-3; photographs / brief descriptions provided in Appendix I).

In summary, the access corridor crosses the following landforms:

- Low-lying lateritic plains
- Alluvial plains
- Low rocky hills, ridges and slopes (with lateritic soils with sandstone outcropping)
- Minor drainages and tributaries, often associated with rocky tributaries.
- Flat to undulating plateaux
- Black soil plains (small patch only).

The aerial inspection of the access corridor confirmed the following main findings:

- DLRM land type descriptions (STHNT_250K, DLRM 2017) described in Section 4.1.2 are largely correct; however, there are errors in boundaries due to the larger scale of mapping survey (i.e. 1:250,000 vs. 1:5,000). Land type e3 was present in some areas; however, no dune formations were observed during the inspection.
- Minor drainages are present (ephemeral creeks and tributaries), which are considered to be significant riparian vegetation under the *Land Clearing Guidelines* (DENR 2020). An example photograph is provided below; more examples are provided in Appendix I.

- There is at least one occurrences of black soil at site 21 – a small, shallow and localised depression. Example photograph provided below and in Appendix I. Black soil in this location is not considered an ecological constraint, but will need to be considered in terms of road construction engineering if traversed (for geotechnical reasons).

- No waterholes or springs are present within corridor area; however, these features are present in the Ashburton Range and are considered to have regional ecological significance. An example photograph taken during the survey is provided in Figure 4-5.
- Rocky gullies and hill-sides can have overhangs and small caves; however, these features were not observed within the access corridor. If present, it is unlikely that these features inhabit threatened flora and fauna species (discussed in the Section 4.3); however, they are likely to hold local importance as habitat features are uncommon in the regional landscape. An example photograph of such, taken during the survey, is provided in Figure 4-5.

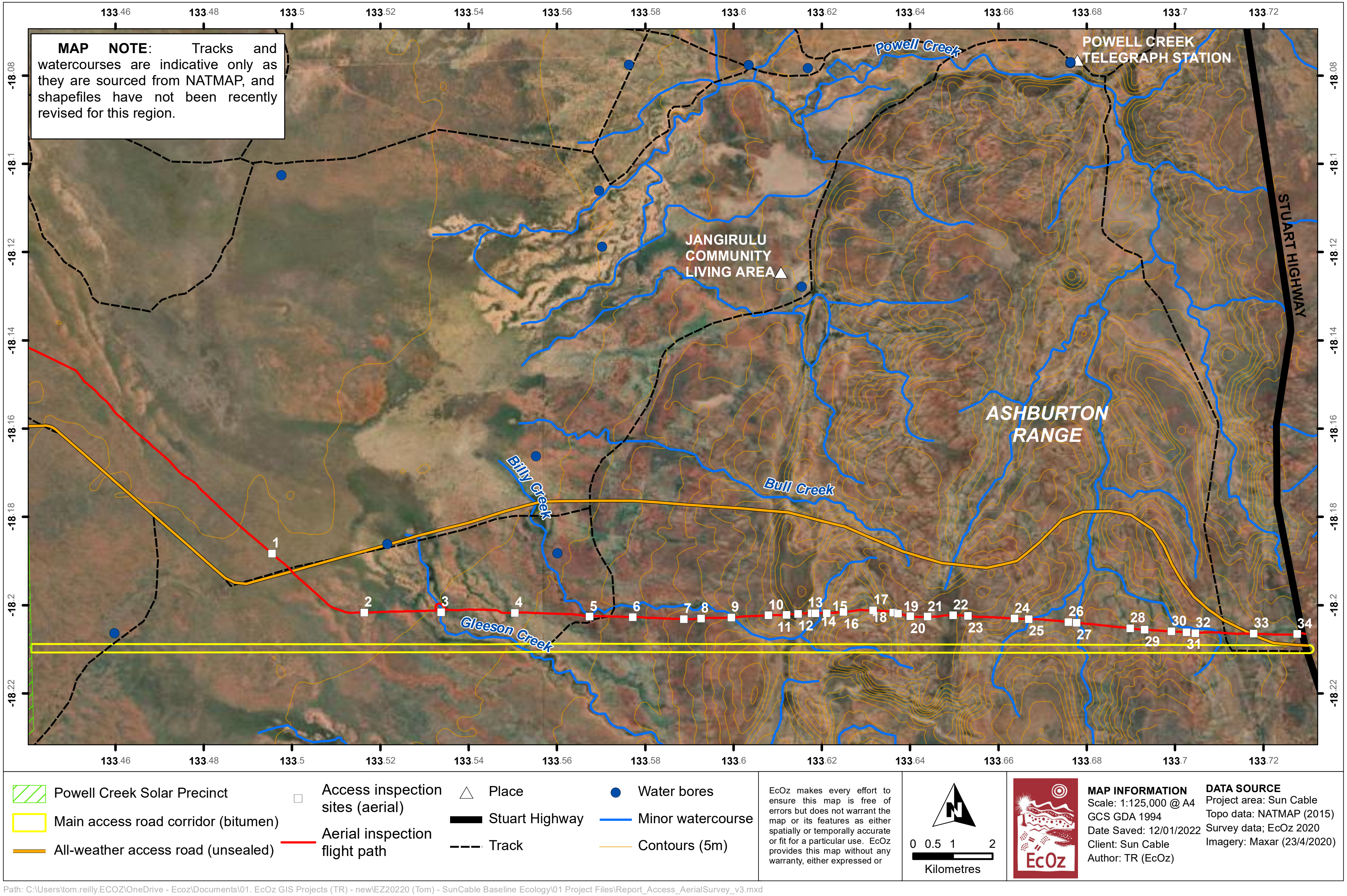


Figure 4-3. Map of access corridor aerial inspection

Figure 4-4. Photograph of a waterhole within the Ashburton Range, in the area surrounding the access corridor

Helicopter surveys and aerial imagery reviews do not indicate that these features are present within the proposed access road corridor.

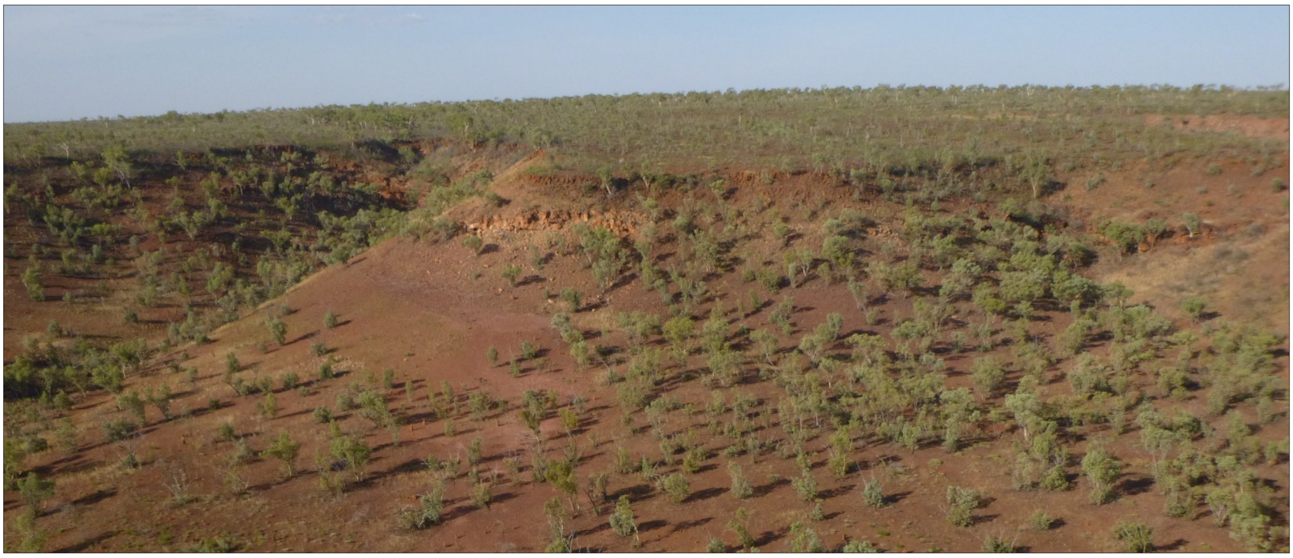


Figure 4-5. Photographs of steep rocky slopes, small cliffs and overhangs taken in the Ashburton Range to the north of the access corridor

4.3 Threatened species assessment

The access road corridor crosses both the Tanami and Davenport Murchison Ranges bioregions (descriptions and map provided in Section 2.3).

A likelihood of occurrence assessment has been undertaken for the threatened species recorded within the Tanami and/or Davenport Murchison Ranges bioregions, and is presented in Table 4-2. Species that are regionally-extinct have been excluded.

Based on desktop research and habitat data collected as part of the aerial survey, two species have a reasonable (i.e. high or medium) likelihood of occurring within the access road corridor (discussed below).

- **Grey Falcon (*Falco hypoleucos*).** This species is considered to have a high likelihood of occurrence due to proximity of records (NT Atlas), and the presence of potentially-suitable nesting habitat along some of the large drainages that support Eucalyptus species. Potential nest sites are more likely adjacent to permanent or semi-permanent water where larger trees (>10 m in height) are established.

  Aerial observations noted that trees within the proposed access corridor are generally <10 m in height and, as such, are considered to be marginally suitable for nesting. The entire corridor could be used for general foraging / hunting by an individual or pair; however, there are no unique characteristics within the corridor that make it a preferred hunting area for the species (i.e. suitable foraging habitat is widespread in the surrounding region). As such, although this species has been given a high likelihood of occurrence, it is naturally sparse in the landscape and so an observation of a hunting / foraging individual would be considered to be rare. More frequent observations would only be expected if a nesting site is present within, or close to, the corridor. There is no current evidence of nest occurrence.

- **Yellow-spotted Monitor (*Varanus panoptes*).** This species is considered to have a high likelihood of occurrence in the region, especially in floodplain and alluvial habitat linked to Lake Woods – which is where the majority of sightings / records of the species are according to NT Atlas and discussions with Cultural Monitors. The species is relatively widespread in the region, with the majority of records in the Barkly clay plains to the north-east of the access corridor. The access road corridor supports potential habitat for the species, and there is potential for foraging as well as burrowing in low land areas to the west of the range, and potentially also in the more substantial valley floors within the Ashburton Range.

The access corridor does not traverse habitat types that are likely to support, or be important to, migratory species. As discussed in Section 2.7.2, migratory species in the region will be associated with Lake Woods which is located approximately 22 km north of the access corridor.

Based on the results from the likelihood of occurrence assessment, it is very unlikely that any restricted-range threatened species occur within the access road corridor, and therefore there is no need for any targeted surveys to inform the risk assessment of the construction of the access road.

Table 4-2. Threatened species relevant to the access road corridor

Scientific name	Common name	Class	Status		Bioregion	Likelihood of occurrence	Justification
			TPWC	EPBC			
Calidris ferruginea	Curlew Sandpiper	Bird	VU	CR	Both	**Low**	No suitable wetland habitat
Charadrius leschenaultii	Greater Sand Plover		VU	VU	Davenport	**Low**	No suitable wetland habitat
Erythrotriorchis radiatus	Red Goshawk		VU	VU	Both	**Low**	Vagrant to the region only
Erythrura gouldiae	Gouldian Finch		VU	EN	Both	**Low**	Vagrant to the region only
Falco hypoleucos	Grey Falcon		VU	VU	Both	**High**	Recent proximate records and suitable foraging (but not nesting) habitat
Grantiella picta	Painted Honeyeater		VU	VU	Both	**Low**	Vagrant to the region only
Rostratula australis	Australian Painted-snipe		VU	EN	Both	**Low**	No suitable wetland habitat
Pezoporus occidentalis	Night Parrot		CR	EN	Tanami	**Low**	No suitable habitat (i.e. long unburnt patches of spinifex).
Polytelis alexandrae	Princess Parrot		VU	VU	Tanami	**Low**	Vagrant to the region only
Tyto novaehollandiae kimberli	Masked Owl (northern mainland)		VU	VU	Tanami	**Low**	Outside known range
Bothriembryon spenceri	Spencer's Tapered Snail	Invertebrate	VU	-	Davenport	**None**	Incorrect record. Restricted Range species only found near Chewings and Krichauff Ranges.
Macroderma gigas	Ghost Bat	Mammal	NT	VU	Both	**Low**	Outside current range; no suitable habitat.
Macrotis lagotis	Greater Bilby		VU	VU	Both	**Low**	No suitable habitat (i.e. spinifex sandplains).
Notomys fuscus	Dusky Hopping-mouse		EN	VU	Davenport	**None**	Historic records only in the NT; has not been recorded in the NT since 1939.
Petrogale lateralis (McDonnell Ranges race)	Black-footed Rock-wallaby (MacDonnell Ranges race)		NT	VU	Both	**Low**	No record of occurrence within Ashburton Range. No suitable den habitat in low ridgelines within corridor.

Scientific name	Common name	Class	Status		Bioregion	Likelihood of occurrence	Justification
			TPWC	EPBC			
Phascogale pirata	Northern Brush-tailed Phascogale		EN	VU	Davenport	**None**	Assumed to be an incorrect record. Outside current range. Species is restricted to the Top End.
Rattus tunneyi	Pale Field-rat		VU	-	Davenport	**None**	Outside current range / species distribution.
Trichosurus vulpecula vulpecula	Common Brushtail Possum (central and south-eastern)		EN	-	Both	**None**	Outside current range / species distribution. The low ranges highly unlikely to provide suitable habitat.
Zyzomys pedunculatus	Central Rock-rat		EN	CR	Both	**None**	Outside current range / species distribution. The low ranges highly unlikely to provide suitable habitat.
Liopholis kintorei	Great Desert Skink	Reptile	VU	VU	Both	**None**	Outside known range. No proximate records; no suitable habitat.
Varanus mertensi	Mertens' Water Monitor		VU	-	Tanami	**None**	Outside known range. Species is restricted to the Top End. No suitable habitat.
Varanus panoptes	Yellow-spotted Monitor		VU	-	Both	**High**	Recent proximate records and suitable habitat
Eleocharis papillosa	Dwarf Desert Spike-rush	Plant	VU	VU	Tanami	**None**	No suitable wetland habitat
Sporobolus latzii	Sporobolus		VU	-	Davenport	**None**	Restricted range species only known from one location in the Wakaya Desert; no suitable wetland habitat
Typhonium sp. Sandover	a Typhonium		VU	-	Tanami	**Low**	Restricted range species; only known to occur near Utopia in a drainage system not linked to project footprint.

5 CONCLUSION

5.1 Solar Precinct footprint

Based on detailed land type mapping and targeted threatened species surveys, the following conclusions can be made about ecological values within the Solar Precinct footprint.

Aspect	Final assessment
Significant vegetation	None present
Habitat condition	No weed records; however, weed infestations are present elsewhere in the region. Low level of pastoral impacts. Fires are relatively frequent, and may have reduced habitat quality.
Threatened species	The desktop 'likelihood of occurrence' assessment determined that only one threatened species has a reasonable likelihood of occurring within the Solar Precinct footprint – the Greater Bilby (*Macrotis lagotis*). Subsequently, a field survey and assessment were undertaken within the footprint to confirm presence and/or absence. The main findings are that: • Aerial survey (helicopter) and ground-based track-plots confirmed that there are no Greater Bilby burrows within the Solar Precinct footprint; nor was there evidence of previous occupation. • Under better climatic conditions, Greater Bilby may occasionally utilise the area; however, the habitat types present (and existing land use impacts) are unlikely to support a persistent or regular occurrence of the species.
Migratory species	There are no records of migratory species, nor is their habitat typically utilised by migratory species in central Australia.

5.2 Access roads

Based on desktop research and a helicopter fly-over over a representative lansdcape, the following conclusions can be made about ecological values associated with the access road corridor.

Aspect	Final assessment
Significant vegetation	There are numerous drainages within the low rocky ranges that support riparian vegetation. Such vegetation is considered significant under the *Land Clearing Guidelines* (DENR 2020).
Habitat condition	Not quantified, because ground surveys were not undertaken. Aerial observations indicated that vegetation is mostly intact and no weed infestations were observed. Nevertheless, drainage lines (in particular) may contain weeds and so these should be surveyed prior to construction.
Threatened species	The corridor is unlikely to support any restricted range threatened species. The two threatened species that are likely to occur – Grey Falcon and Floodplain Monitor – are habitat generalists and there is no evidence that the corridor contains important habitat for them.
Migratory species	There are no records or habitat typically utilised by the migratory species that can occur in central Australia.

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