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Appendix 5.1 – Supplementary Ecology Report Part 1 – Threatened Species

Supplement to the EIS – Threatened Species Surveys

Australia – Asia PowerLink

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DOCUMENT CONTROL RECORD

Job	EZ20220
Document ID	212298-142
Author(s)	Anna Lemon, Sara Maxsted, Tom Reilly and Sarah Ryan

DOCUMENT HISTORY

Rev	Reviewed by	Approved by	Issued to	Date
1	Glen Ewers	Glen Ewers	Joe Sheridan (Part 1 only)	19 August 2022
2	Glen Ewers	Glen Ewers	Joe Sheridan	30 September 2022
3	Glen Ewers	Glen Ewers	Joe Sheridan	8 November 2022
4	Glen Ewers	Glen Ewers	Joe Sheridan	16 November 2022
5	Glen Ewers	Glen Ewers	Joe Sheridan	17 November 2022

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Acknowledgements

The authors are grateful to Laurence Ah Toy of Koolpinyah Station and Parks and Wildlife Commission of the Northern Territory for providing land access to undertake surveys for threatened species in the OHTL Utilities Corridor, and to the station managers and cultural monitors who facilitated and assisted with the survey of the new components on Powell Creek Station.

1 INTRODUCTION

The Proponent intends to develop AAPowerLink (the Project) to generate, store, transmit and deliver renewable energy. The Project has multiple terrestrial environment components located within the NT. The electricity produced will be exported from the Powell Creek Solar Precinct via the OHTL to the Darwin Converer Site (DCS) at Murrumujuk (on Gunn Point, near Darwin), and then on to Singapore via the Subsea Cable System.

In April 2022, the Proponent submitted the Draft EIS for the Project. In the Draft EIS, it was acknowledged there were outstanding information gaps regarding terrestrial ecosystems – primarily relating to the fact that some Project components intersect habitat with a high likelihood of supporting certain, restricted-range species listed as threatened under the TPWC Act, EPBC Act or both. Those species are only detectable at certain times of the year, precluding targeted surveys being undertaken in time for the Draft EIS.

In addition, refinements were made to the Project footprint since the Draft EIS in areas for which threatened species surveys had not been carried out. Figures showing the refined Project footprint are provided in Chapter 2 SEIS. Refinements include:

- Preferred site option for the HVDC Electrode Line Corridor and DCS Electrode
- Preferred site option for the HVDC Electrode Line Corridor and Powell Creek Electrode
- Refined siting at the Solar Precinct for Ancillary Infrastructure.

Comments received on the Draft EIS during public consultation – detailed in Chapter 5 of the Supplement to the EIS (SEIS) recognised these information gaps and requested that additional surveying be undertaken.

This report presents the methods and results of the threatened species surveys that have been undertaken to support the impact assessments presented in the SEIS. As explained below, not all species mentioned in the Draft EIS comments have been surveyed. Moreover, there remain some portions of the Project footprint that have not been surveyed because land access permission has not yet been approved. These unsurveyed areas are within the OHTL Corridor[1], and mostly relate to the Adelaide River and Katherine deviation routes.

The comments received from the NT EPA, DEPWS and other stakeholders during the Draft EIS public consultation process generated a long list of threatened species for which further information was requested. In response, a screening process was undertaken to identify which threatened species are most vulnerable to impacts from the Project, and therefore warrant targeted surveying to inform impact avoidance.

For the large footprint of the Powell Creek Station infrastructure, any species with a reasonable chance of being present is vulnerable and so has been surveyed for Greater Bilby, Yellow-spotted Monitor, Grey Falcon and Gouldian Finch.

The remainder of the Project footprint is narrow and localised, such that the threatened species most vulnerable to impacts from construction of the OHTL Corridor and Gunn Point infrastructure are restricted-range species which, if present in the Project footprint and not avoided/managed, could experience a significant loss in population size or habitat. Particular focus was placed on flora species which cannot move out of the Project footprint. Restricted-range species were surveyed if desktop distribution modelling and field habitat assessments identified there was a reasonable chance of the species being present within the Project footprint. All threatened species mentioned in the Draft EIS comments are presented in Table 1-1, with justifications as to which of those were subject to targeted surveys.

[1] Note: Whilst the SEIS presents the OHTL Corridor as a single component, distinction has been made at times in this report between the OHTL Railway Corridor and the OHTL Utilities Corridor to aid in presenting the survey methods and results for certain species.

Table 1-1. Threatened species and locations surveyed for the SEIS

Note: The SEIS contains a significant impact assessment for every species in this table. Brush-tailed Mulgara was presented as a threatened species in the Draft EIS comments, but is no longer listed.

Species	Restricted range?	Project footprint within the species' distribution?	Likelihood the Project footprint contains core habitat?	Targeted survey?	Notes
Acacia praetermissa	Yes	No	Low	No	-
Arnhem Land Gorges Skink	Yes	No	Low	No	-
Arnhem Leaf-nosed Bat	Yes	No	Low	No	-
Atlas Moth	Yes	No	Low	No	-
Bare-rumped Sheath-tail Bat	No	Yes	Low	No	-
Black-footed Tree-rat (Kimberley and mainland Northern Territory)	No	Yes	Low	No	-
Cleome insolata	Yes	Yes	Moderate	Yes	• DCS surveyed • Species not detected • No suitable habitat elsewhere in the Project footprint
Crested Shrike-tit (northern)	No	Yes	Low	No	-
Darwin Cycad	Yes	Yes	High	No	• Known presence within the Gunn Point infrastructure and OHTL footprints from previous surveys • See SEIS for proposed measures to avoid impacts
Darwin Palm	Yes	Yes	Yes	Yes	• OHTL Utilities Corridor surveyed • Species not detected
Fawn Antechinus	No	Yes	Low	No	-
*Gouldian Finch	No	No	Moderate	Yes (habitat)	• Powell Creek Ancillary Infrastructure and Access Roads surveyed • Suitable breeding habitat recorded • See SEIS for proposed measures to avoid impacts
Ghost Bat	No	Yes	Low	No	• See SEIS for proposed measures to avoid impacts
*Greater Bilby	No	Yes	Low (Solar Precinct and Ancillary Infrastructure) Moderate (OHTL)	Yes	• Powell Creek infrastructure surveyed • Species detected • See SEIS for proposed measures to avoid impacts

Species	Restricted range?	Project footprint within the species' distribution?	Likelihood the Project footprint contains core habitat?	Targeted survey?	Notes
*Grey Falcon	No	Yes	Moderate	Yes (habitat)	• Powell Creek Ancillary Infrastructure and Access Roads surveyed • Suitable breeding habitat recorded • See SEIS for proposed measures to avoid impacts
Helicteres macrothrix	Yes	Yes	Moderate	Yes (habitat)	• OHTL Utilities Corridor surveyed • Suitable habitat not recorded • Habitat modelled as suitable within the Adelaide River OHTL deviation has not been surveyed
Howard River Toadlet	Yes	Yes	Yes	No	• Suitable habitat is present within the OHTL Utilities Corridor, but has not been surveyed • See SEIS for proposed measures to avoid impacts
Masked Owl (northern mainland)	No	Yes	Low	No	-
Mertens' Water Monitor	Yes	Yes	High	No	• Assumed presence along higher-order watercourses • See SEIS for proposed measures to avoid impacts
Mitchell's Water Monitor	Yes	Yes	High	No	• Assumed presence along higher-order watercourses • See SEIS for proposed measures to avoid impacts
Nabarlek (Top End)	Yes	Yes	Moderate	No	• Possible presence in rocky areas crossed by the OHTL Corridor • See SEIS for proposed measures to avoid impacts
Night Parrot	No	No	No	No	-
Northern Brushtail Possum	No	Yes	Low	No	-
Northern Brush-tailed Phascogale	No	Yes	Low	No	-
Northern Quoll	No	Yes	Moderate	No	• Possible presence in rocky areas crossed by the OHTL Corridor • See SEIS for proposed measures to avoid impacts
Painted Honeyeater	No	Yes	No	No	-
Partridge Pigeon (eastern subspecies)	No	Yes	Low	No	-
Plains Death Adder	No	Yes	No	No	-
Princess Parrot	No	Yes	Low	No	-

Species	Restricted range?	Project footprint within the species' distribution?	Likelihood the Project footprint contains core habitat?	Targeted survey?	Notes
Red Goshawk	No	Yes	Moderate	No	• Nesting potential within OHTL Corridor along higher-order watercourses • See SEIS for proposed measures to avoid impacts
Stylidium ensatum	Yes	Yes	High	Yes	• OHTL Utilities Corridor surveyed • Species detected • See SEIS for proposed measures to avoid impacts • Habitat modelled as suitable within the Adelaide River OHTL deviation has not been surveyed
Typhonium praetermissum	Yes	Yes	High	Yes	• DCS and OHTL Utilities and Railway Corridors surveyed • Species detected in DCS and OHTL Utilities Corridor • Habitat modelled as suitable within the HVDC Electrode Line Corridor for the DCS Electrode has not been surveyed • See SEIS for proposed measures to avoid impacts
Typhonium taylorii	Yes	Yes	High	Yes	• OHTL Utilities Corridor surveyed • Species detected • See SEIS for proposed measures to avoid impacts
Utricularia dunstaniae	Yes	Yes	High	Yes (habitat)	• OHTL Utilities Corridor surveyed • Species not detected
Water Mouse	No	Yes	Low	No	-
White-throated Grasswren	Yes	No	Low	No	-
*Yellow-spotted Monitor	No	Yes	High	Yes	• Powell Creek infrastructure surveyed • Species detected • See SEIS for proposed measures to avoid impacts

** Denotes a species with a reasonable likelihood of being present within the Powell Creek infrastructure footprint*

2 TYPHONIUM PRAETERMISSUM

Typhonium praetermissum is currently listed as Vulnerable under the *Territory Parks and Wildlife Conservation Act 1976 (*TPWC Act*)* and is not listed under the *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act*)*. *Typhonium praetermissum* is a small perennial herb with above ground parts present during the annual wet season, usually between December and April. This species occurs in open woodland and favours relatively unshaded areas in red brown clay and shallow, gravelly soils. Plants are typically found in small, relatively open (unshaded) patches of gravel or gravelly, sandy substrate supporting less than 20% vegetation ground cover, and located on the edge of lateritic plateau areas (NTH 2021).

The species is endemic to the greater Darwin region, extending from the Gunn Point area, south to Lake Bennett and west to Cox Peninsula. The NT Government has developed a habitat model for *Typhonium praetermissum* for the Greater Darwin region (Cuff and Green 2019).

Large areas of the region within which the DCS and OHTL Utilities Corridor are located are modelled as high-likelihood habitat. During the field survey that ground-truthed the land units within those two project components, the veracity of modelled high-likelihood habitat within them was assessed, and any additional areas that should be considered as high-likelihood habitat were identified.

Starting in early 2022, the high-likelihood habitat identified above was surveyed for *Typhonium praetermissum* to update the modelling information and to carry out seasonally-appropriate surveys as committed to in the Draft EIS, as detailed in this section of the report.

Note: A survey of the HVDC Electrode Line Corridor for the DCS Electrode in July 2022 confirmed the presence of high-likelihood habitat for *Typhonium praetermissum* within that footprint. Because the identification of this habitat occurred after the time that *Typhonium praetermissum* is detectable, that habitat has not been surveyed.

2.1 Methods

The survey for *Typhonium praetermissum* followed the detection survey methodology developed by DEPWS (Bickerton et al. 2020). As requested by the NT EPA in their direction, surveys were timed to ensure maximum detectability (i.e. January to March after sufficient rainfall, when flowering and/or adequate leaf tissue is available). To contextualise occurrences within the Project footprint, survey effort was extended into adjacent areas applying the same survey methods.

Because of its cryptic nature, the difficult conditions present in the Top End in the wet season and the detailed survey methodology, a large amount of time and resources is required. To maximise coverage of the large area of high-likelihood habitat within, and adjacent to, the Project footprint, the focus of the survey was on detection (i.e. presence/absence) rather than abundance. However, if a patch was detected within the corridor, ecologists did attempt to determine the extent of that local occurrence for context.

2.1.1 DCS

The DCS contains approximately 96 ha of suitable *Typhonium praetermissum* habitat. Detection surveys were undertaken within the DCS in February and March 2022, led by botanist Anna Lemon. In addition, approximately 140 ha of contiguous habitat to the south was also surveyed – see Figure 2-2.

Presence/absence surveys were undertaken to detect the species using parallel traverses spaced 17 m apart. Field teams were comprised of several qualified ecologists – Sara Maxsted, Glenn Low, Jessica English and Mathew Evans – to efficiently cover the large survey area. Surveyors used a handheld GPS to navigate along each transect and record each plant observed. Each surveyor visually inspected a 2 m width on either side of each transect line (4 m width transect), accounting for approximately 20% coverage of the total surveyed area. This transect width was based on the average distance that can be reliably observed, taking into account

vegetation cover, which at the time, was fairly dense in some sections of the survey area. This method was then applied within the adjacent surveyed area contiguous to the Project footprint to detect populations or individuals beyond the Project footprint.

2.1.2 OHTL Utilities Corridor

The OHTL Utilities Corridor is 60 m wide and extends for approximately 70 km from Cox Peninsula Road to the DCS (see Chapter 2 of the SEIS). Approximately 135 ha within the corridor was surveyed for *Typhonium praetermissum* by botanist Anna Lemon and ecologist Sara Maxsted in February and March 2022 – see Figure 2-3, Figure 2-4 and Figure 2-5.

Because this component of the Project covered an area greater than 100 ha, targeted meander traverses were employed to detect presence/absence of the species. The meanders generally followed a zig-zag pattern across the OHTL Utilities Corridor section to maximise the detectability of individuals. Surveyors used handheld GPS units to navigate through survey sites, recording each individual observed, and survey effort. Where individuals were found to be occurring within the OHTL Utilities Corridor, this method was then applied to the adjacent areas of the Project footprint to determine the extent of the sub-population outside the Project footprint.

Based on NT Government habitat modelling, there is high-likelihood habitat in Section 572 (crossed by ~1.7 km of the OHTL Utilities Corridor). However, despite multiple attempts, the Proponent was not able to contact the land-holder, meaning that access permission for this site was not gained, and so this area was not available for surveying.

2.1.3 OHTL Corridor Within Existing Railway Corridor

Approximately 28 ha of high-likelihood habitat was modelled as being present between KP 703 and KP 717 within the OTHL Corridor. A large portion of this was identified as potentially disturbed through high-resolution satellite imagery prior to field visits. A habitat assessment survey was undertaken by botanist Anna Lemon and ecologist Sara Maxsted on 2 March 2022; however, there was insufficient time to incorporate the results of the survey into the Draft EIS. Where possible, an assessment was made from within the Railway Corridor to confirm suitability of adjacent habitat with potential to support the species. The likelihood of *Typhonium praetermissum* being present in the OHTL deviation at Adelaide River is low.

2.2 Results

2.2.1 DCS

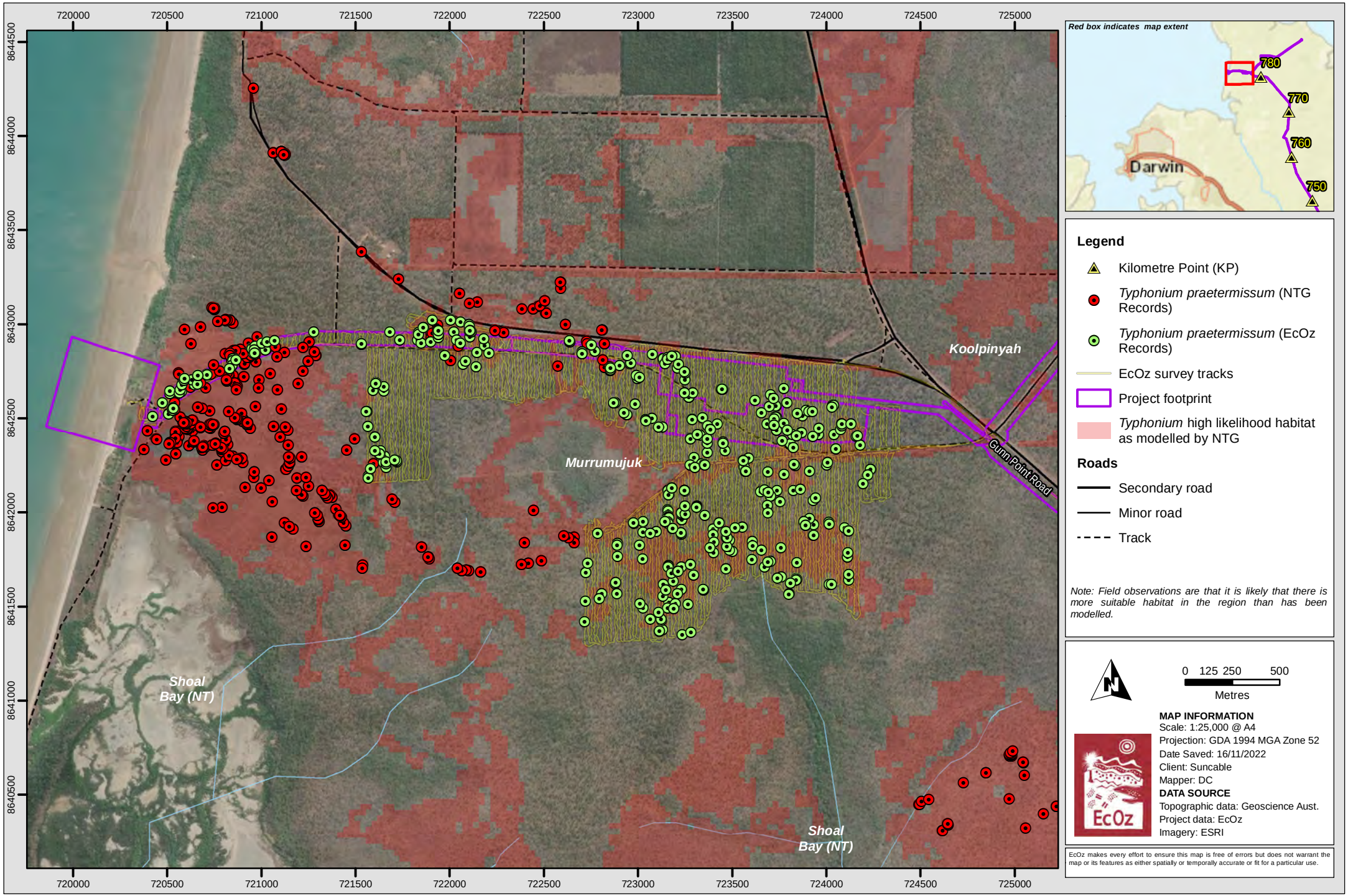
The survey recorded 197 *Typhonium praetermissum* plants within the DCS footprint – see Figure 2-1. In the suitable habitat that was surveyed to the south, another 289 individuals were observed – see Figure 2-2. There is a high proportion of individuals occurring along the route for the Underground Cable Corridor associated with the Cable Transition Facilities closest to the coast, with 56 plants recorded within that footprint. The remaining plants were found evenly distributed throughout the DCS.

These results were anticipated due to historical records of *Typhonium praetermissum* occurrences to the west of the DCS (Figure 2-2). Those records, and occurrences identified in this survey, are likely to all be members of the Murrumujuk sub-population identified by Cuff and Green (2019) and Stokeld et al. (2020); this sub-population is situated close to the coast and extends roughly 2.5 km inland. The records from this survey – combined with existing NT Government and Project Sea Dragon records – indicate a known population of more than 1,000 individuals present in this area.

The number of individuals present within the survey area is likely to be higher, given the large area covered in the surveys and spacing of parallel field traverses at 17 m apart.

From field observations, it is highly likely that the population extends further than what has been surveyed within the Gunn Point region. Therefore, the known sub-population's extent is likely to be greater than what has been recorded within the Project footprint and adjacent areas.

Figure 2-1. Photograph of *T. praetermissum* plant and its habitat at the Darwin Converter Site



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 2-2 Typhonium records and survey effort at DCS.mxd

Figure 2-2. Map showing *T. praetermissum* records and survey effort for the DCS

2.2.2 OHTL Utilities Corridor

A total of 416 individuals were recorded within, and proximate to, the OHTL footprint in six localities, of which two are likely to be new sub-populations given their distance from other known occurrences. Of these records, 237 individuals were observed within the Project footprint and 179 were outside the Project footprint – see Table 2-1.

Table 2-1. Number of *Typhonium praetermissum* recorded within and near the OHTL Utilities Corridor

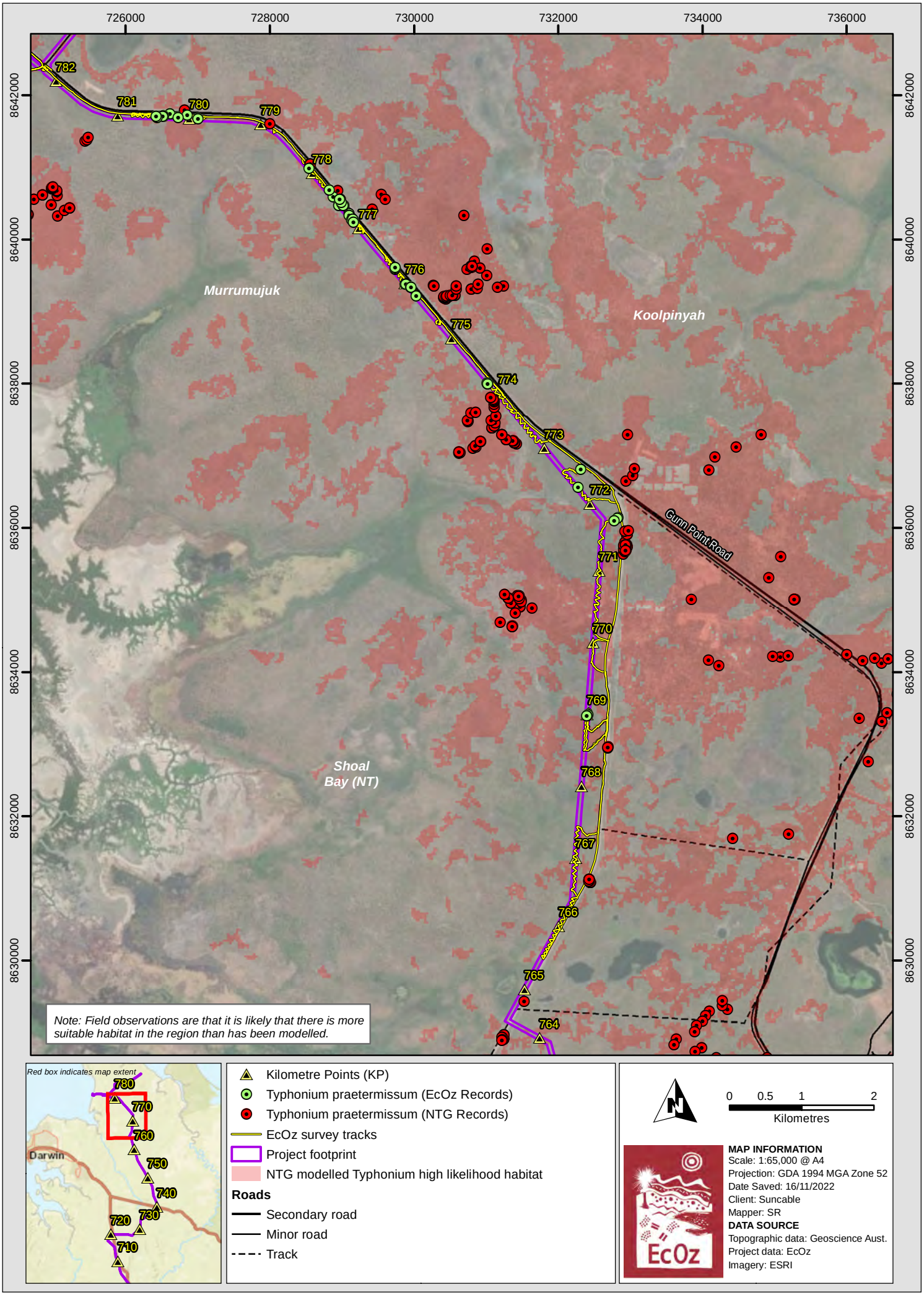
Location	KP	No. individuals	No. individuals within footprint
Gunn Point Road	768 - 781	52	46
Koolpinyah	760 - 762	12	12
Black Jungle	747 - 749	12	0
Herbert	744 - 745	9	5
Lambells Lagoon	736 - 742	209	84
Wak Wak	732 - 735	122	90
	Total	**416**	**237**

Small patches of *Typhonium praetermissum* were detected along Gunn Point Road, and within Koolpinyah Station (near Old Gunn Point Road) – see Figure 2-3 and Appendix C, Black Jungle Conservation Reserve and Herbert – see Figure 2-4 and Appendix C . The largest proportion of individuals were detected in the Lambells Lagoon and Wak Wak localities. No individuals were observed in the section modelled as high-likelihood habitat between Stuart Highway and Cox Peninsula Road (between KP 718 and 720).

Individuals observed along Gunn Point Road to the north were all found proximate to existing NT Government records and are likely to belong to the Gunn Point Road North and Koolpinyah (central Gunn Point) sub-populations – see Stokeld et al. 2020. The small population observed on Koolpinyah Station near Old Gunn Point Road is also likely to belong to the Koolpinyah (central Gunn Point) sub-population, given its proximity. The closest Lambells Lagoon patch is approximately 0.75 km away from a patch of individuals recorded by the NT Government in 2021 near Sunday Creek; however, no sub-population for these patches is specified. Additionally, the Lambells Lagoon records extend to the north along the OHTL Utilities Corridor in a fairly continuous stretch, with the furthest plant occurring 4.5 km away. Plants observed in the Wak Wak locality are closest to the Noonamah North sub-population, approximately 2 km to the west of the Utilities Corridor.

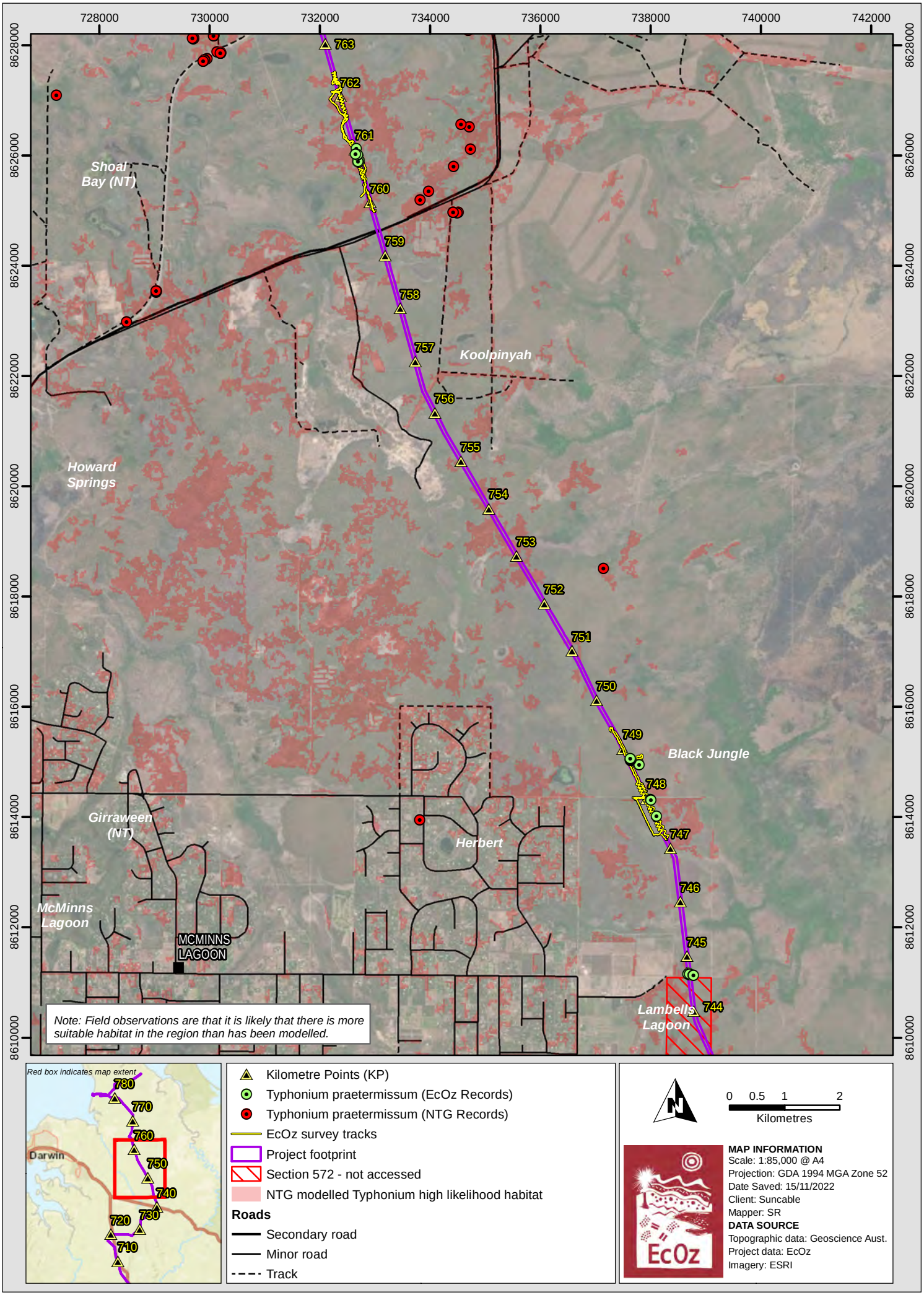
The Black Jungle and Herbert individuals observed during the surveys are not proximate to any known sub-populations. As a general rule, for individuals to be considered as part of an existing sub-population, they must occur less than 2.5 km away in continuous intact habitat considered suitable for the species (Cuff and Green 2019). The nearest sub-population to these records is 3.5 to 4 km to the north and west of the patch identified within Black Jungle, and approximately 5.5 km from the Herbert patch. None of the Black Jungle plants are situated within the Project footprint, all are adjacent. South of this, three plants were observed and, of these, only one was detected within the OHTL Utilities Corridor.

Some areas that were surveyed within modelled habitat that appeared to be suitable, resulted in no detected individuals. These included areas along Gunn Point Road, within Koolpinyah Station, and near Cox Peninsula Road.



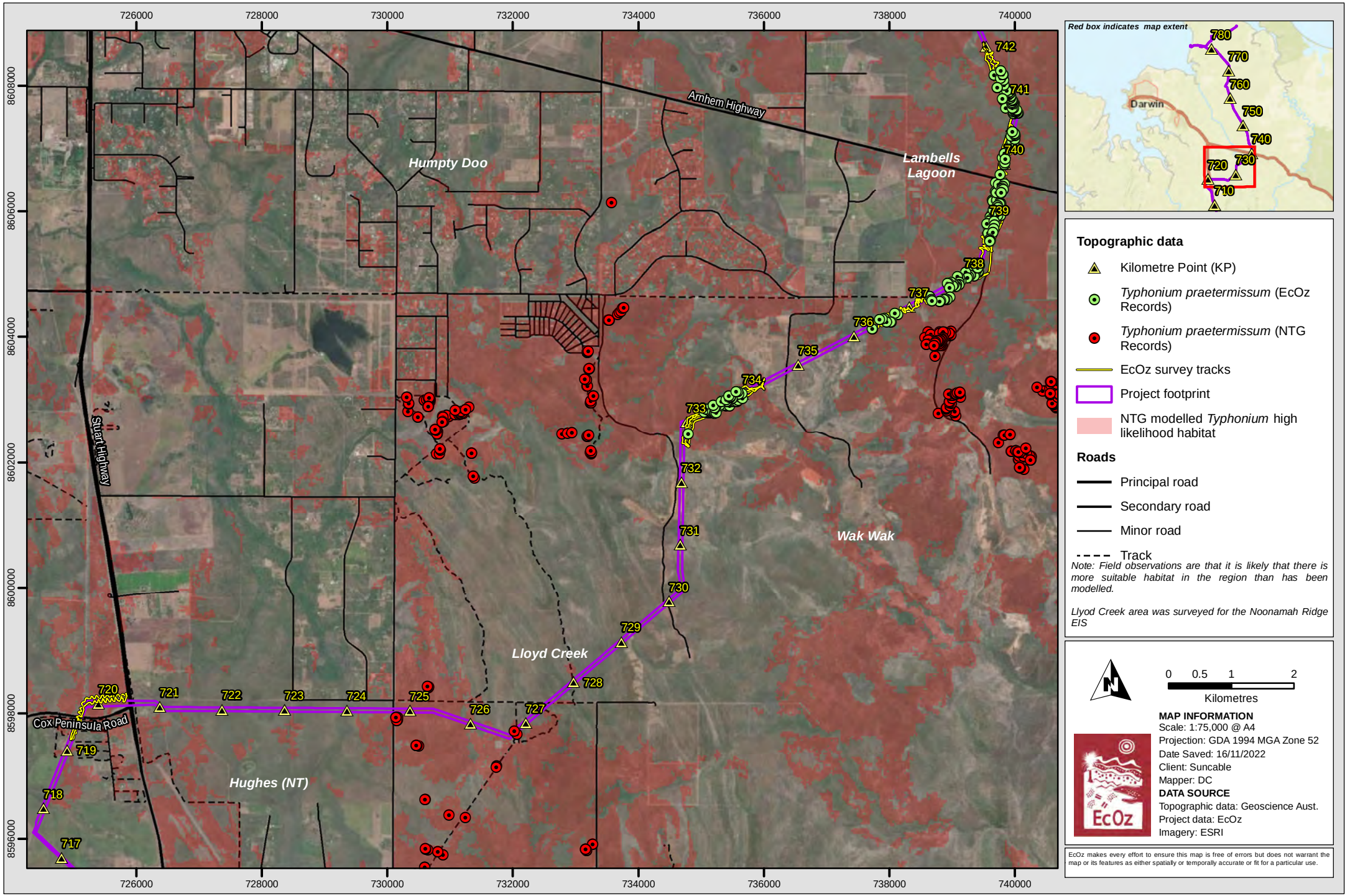
Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 2-3 and 2-4 T prae records and survey effort along the OHTL UC.mxd

Figure 2-3. Map of *T. praetermissum* records and survey effort along the OHTL Utilities Corridor (Gunn Point Road section)



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Gunn Point Road Typhonium praetermissum records and survey effort along the utilities corridor.mxd

Figure 2-4. Map of *T. praetermissum* records and survey effort along the OHTL Utilities Corridor (Koolpinyah, Black Jungle and Herbert sections)



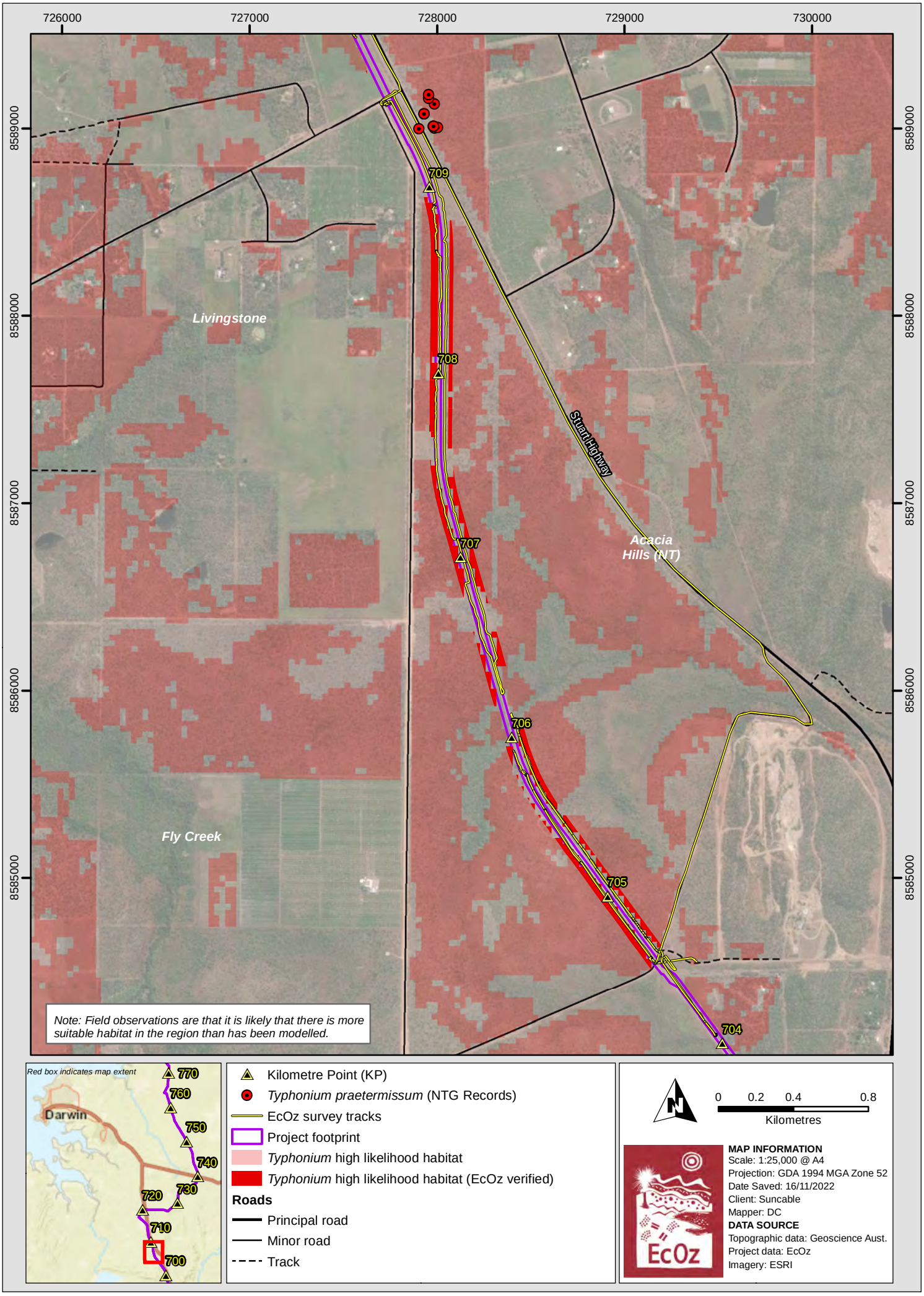
Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 2-5 Lambells Lagoon and Wak Wak - Tprae utilities corridor.mxd

Figure 2-5. Map of *T. praetermissum* records and survey effort along the OHTL Utilities Corridor (Lambells Lagoon and Wak Wak sections)

2.2.3 OHTL Corridor Within Existing Railway Corridor

The OHTL Corridor within the Existing Railway Corridor is a highly-modified environment, making it unsuitable for *Typhonium praetermissum* (see Figure 2-6). During the survey, it was noted some areas contained considerable re-growth, with stands of *Calytrix exstipulata*, *Acacia* spp., and dense *Sorghum intrans* patches observed throughout. There are areas modelled as high-likelihood habitat in land adjacent to the OHTL Corridor in this area; however, because access to these adjacent areas was not granted, they could not be assessed – see Figure 2-7.

Figure 2-6. Photographs of the OHTL Corridor within the Existing Railway Corridor showing examples of highly-modified, unsuitable habitat for *T. praetermissum*



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 2-7 Typhonium praetermissum habitat in the railway corridor.mxd

Figure 2-7. Map showing suitable habitat for *T. praetermissum* and survey effort

3 CLEOME INSOLATA

Cleome insolata is currently listed as Vulnerable under the TPWC Act and is not listed under the EPBC Act. *Cleome insolata* is a small herb with a conspicuous flower that is known to occur in low, open woodlands associated with *Grevillea pteridifolia, Melaleuca viridiflora, Melaleuca nervosa, Verticordia cunninghamii* and *Pandanus* species over *Dapsilanthus, Eriachne burkittii; Sorghum* and *Alloteropsis*, on seasonally-waterlogged sandy soils (NTH 2021) – often in association with sandsheet heath. This species is endemic to the NT and thought to be endemic to the Darwin region, where it is known from the Noonamah / Amys Creek area, Wishart Road on the outskirts of Darwin, and near Shoal Bay (Westaway and Cowie 2012).

There is no habitat modelling available for *Cleome insolata*. Instead, identification of suitable habitat within the DCS and OHTL Utilities Corridor was based on the land type and habitat surveying that was undertaken in September 2021 for the Draft EIS. The outcome of that work was that only one patch of habitat that could support the species was identified – at the DCS near the *Melaleuca* swamp. No suitable habitat was observed within the remainder of the Project footprint.

A seasonally-appropriate targeted survey were carried out within the DCS for *Cleome insolata* to provide additional information as requested by the NT EPA Direction Table 2, Comment No. 5.

3.1 Methods

A survey for the species was undertaken on 24 February 2022 by botanist Nicole Clark and ecologist Sarah Ryan in accordance with the survey methodology outlined in the *Northern Territory Guidelines for targeted surveys of threatened and significant plant species* (Cuff et al. 2020). Prior to the site assessment, a visit to a reference site along Kirkland Road was undertaken to ensure the detectability of the target species. At the reference site, the species was readily detectable with flowering and fruiting material present – see Figure 3-1. A targeted meander was subsequently undertaken at the DCS to detect the species and further assess habitat suitability. The meander focussed on areas that appeared most similar to the habitat characteristics of the reference site – namely lower *Sorghum* sp. grass density – following old tracks which had slightly higher gravel

Figure 3-1. Photograph of *Cleome insolata* habitat at the Kirkland Drive reference site

3.2 Results

No *Cleome insolata* plants were detected within the portion of the DCS that could be surveyed (a squatter's camp on the eastern side of the swamp precluded that area being surveyed). The ground cover species composition in that area was very similar to what was observed at the reference sites – with *Sorghum intrans*, various sedges and other small herbaceous plants noted (Figure 3-2). Despite these similarities, there was evidence to suggest a history of minor gravel mining at the DCS site. Given the species was not present during the meander and the lack of any proximate sandsheet habitat (with which this species is closely associated), it is concluded that there is a low likelihood that the species is present.

Figure 3-2. Photographs of habitat surveyed for *Cleome insolata* within the DCS

Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 3-4 Cleome insolata potential habitat and survey effort at DCS.mxd

Figure 3-3. Map of habitat surveyed for *Cleome insolata* and survey effort at the DCS

4 SANDSHEET HEATH SPECIES

Sandsheet heath occurs in seasonally-inundated infertile sandy soils overlaying an impermeable deposit of clay or laterite (DENR 2018e). There are several types of sandsheet heath, with typical upper and mid stratum species including *Grevillea pteridifolia*, *Banksia dentata*, *Melaleuca nervosa*, *Lophostemon lactifluus,* and *Verticordia cunninghamii* (Liddle et al. 2013). Ground species are generally a mix of herbs (including carnivorous *Utricularia spp.*) and sedges including *Dapsilanthus spathaceus*.

Sandsheet heath is regarded as a significant vegetation type because it covers a small land area (56 km^2) and is known to support a range of threatened and specialised species, such as the Howard River Toadlet (*Uperoleia daviesae*), bladderworts (*Utricularia spp.*) and *Typhonium taylori*. The Howard River Catchment has a high proportion of the sandsheet heath in the region, with other smaller areas within the Elizabeth River and Adelaide River catchments.

This section presents the methods and results of assessments that were undertaken for threatened species associated with sandsheet heath.

4.1 Habitat assessments

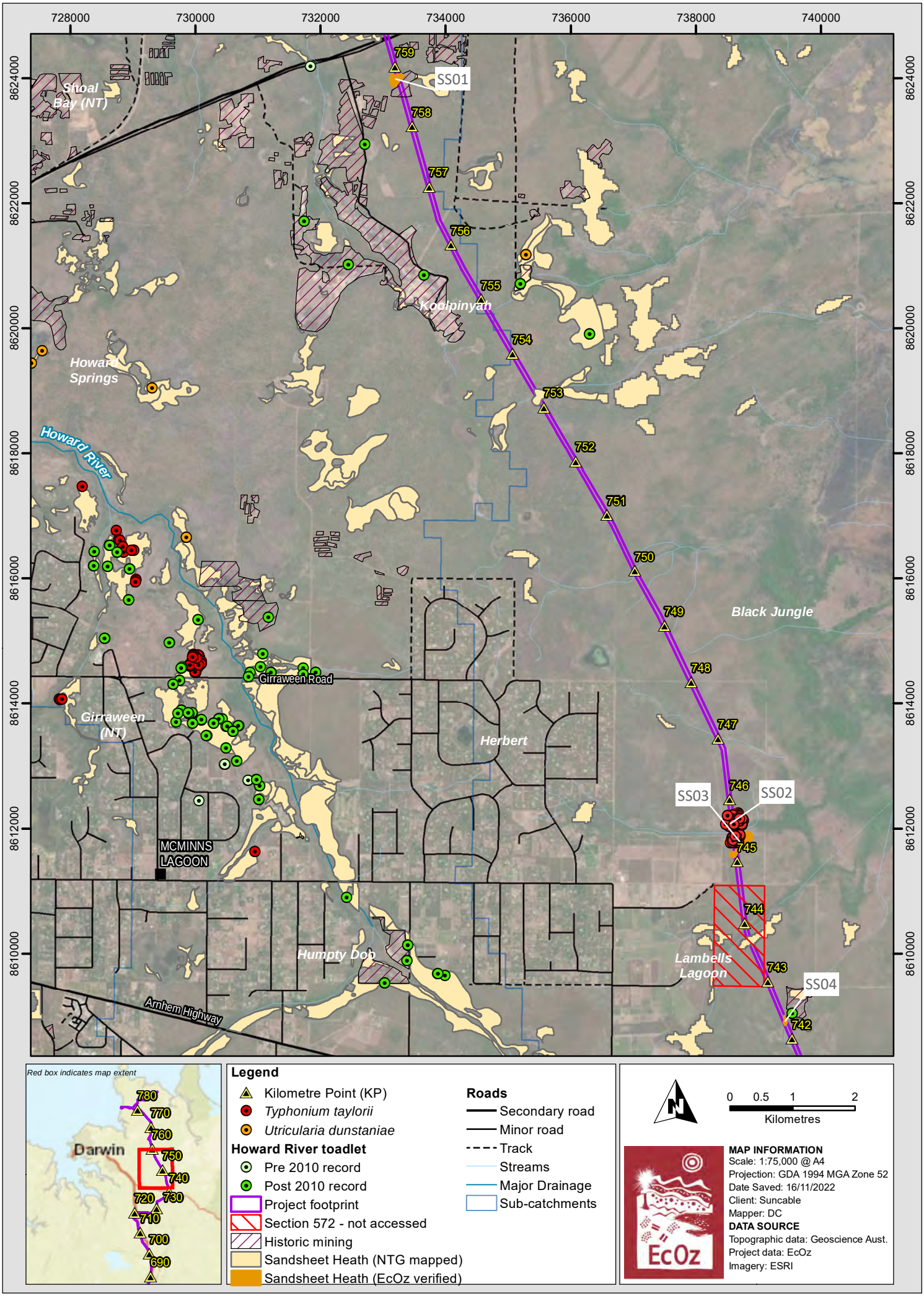
NT Government mapping of sandsheet heath shows this community as only being relevant to the OHTL Utilities Corridor – see Figure 4-5. A review of aerial imagery of the northernmost length of the OHTL Railway Corridor did not identify any likely sandsheet heath patches. During the September 2021 field survey, several potential sandsheet heath communities were identified near to, or intersecting, the OHTL Utilities Corridor. Subsequently, a follow-up survey was undertaken during optimal seasonal conditions (wet season) in March 2022 to verify habitat suitability for supporting the Howard River Toadlet along the whole of OHTL Utilities Corridor. Another survey in early May 2022 assessed whether these sites are suitable for supporting the threatened flora species *Typhonium taylori* and *Utricularia dunstaniae*. These species are discussed in more detail below.

The ten sandsheet heath communities confirmed as present are listed in Table 4-1 and depicted in Figure 4-1 and Figure 4-2. Detailed descriptions are presented in Appendix A. Of these, more than half showed signs of previous disturbance. Those that were relatively undisturbed were the Crocodile Creek sites (SS02 and SS03), one site within Koolpinyah (SS07), and one observed along Alverly Road in Noonamah (SS10). These were each assigned a map unit, based on similarities in vegetation structure and species composition to vegetation communities outlined in Liddle et al. (2013) and field advice from David Liddle. This survey meets the information requirements in Table 2, comment 28 of the NT EPA Direction on the Draft EIS.

Table 4-1. Sandsheet heath communities within, or proximate to, the OHTL Utilities Corridor

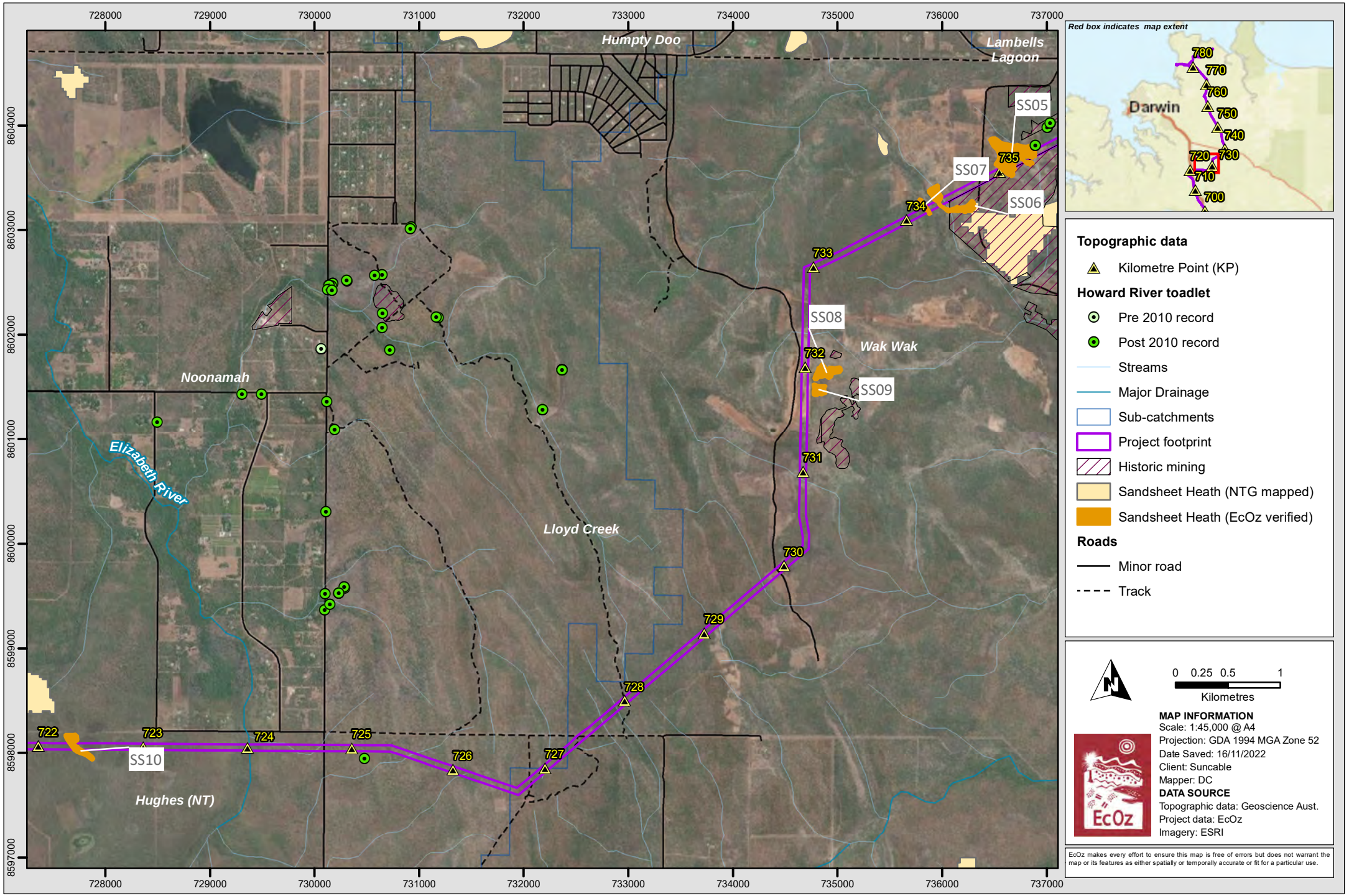
Site	Location	KP
SS01	Koolpinyah (north)	758 – 759
SS02	Herbert (Crocodile Creek - north)	745 – 746
SS03	Herbert (Crocodile Creek - south)	745 - 746
SS04	'Shano's Pit'	742 – 743
SS05	Koolpinyah (south)	735 – 736
SS06*	Koolpinyah (south)	734 - 735
SS07	Koolpinyah (south)	734 - 735
SS08*	Koolpinyah (south)	731 – 733
SS09*	Koolpinyah (south)	731 – 732
SS10	Alverly Road	722 – 723

** Situated adjacent to the OHTL Utilities Corridor or slightly intersecting*



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 4-1 Sandsheet heath habitat SS01 – SS04.mxd

Figure 4-1. Map of sandsheet heath habitat SS01 – SS04 along the OHTL Utilities Corridor



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 4-2 Sandsheet heath habitat SS05 – SS10.mxd

Figure 4-2. Map of sandsheet heath habitat SS05 – SS10 along OHTL Utilities Corridor

4.2 Howard River Toadlet

The Howard River Toadlet (*Uperoleia daviesae*) is a small, endemic frog species that was only formally described in 2005. The species is highly-restricted to shallow drainage systems that intersect sandsheet heath habitat of the Darwin region (Young et al. 2005; Fisher et al. 2011). Known to only the Howard and Elizabeth River catchments, the Howard River Toadlet is listed as Vulnerable under the TPWC Act and the EPBC Act. This is due to its restricted distribution and reliance on sandsheet habitats that are under pressure from peri-urban development, particularly as a result of sand extractive industries (Doyle 2001; Price et al. 2005; Woinarski et al. 2007).

The species has a highly-restricted distribution, even within suitable seasonally-inundated sandsheet heathland. Key features as per the EPBC Conservation Advice (TSSC 2021) for this species are:

- Predominantly sandy soil types (e.g. Oxyaquic or Redoxic Hydrosols)
- Micro-relief ('Debil-debil' or Swamp-hummock)
- Vegetation communities are characterised by an open overstorey of small trees and tall shrubs including *Melaleuca nervosa*, *Grevillea pteridifolia*, *Banksia dentata* and *Verticordia cunninghamii*, and a closed to open ground layer of mixed sedges, herbs and grasses with *Dapsilanthus spathaceus* being a prominent component (short tussock structure)
- Water seepage from surrounding woodland or laminar flows of shallow water across the sandsheet heath area.

4.2.1 Methods

A desktop assessment of known Howard River Toadlet records was undertaken prior to site assessments in the field, to inform the likelihood of the species occurring at identified sandsheet heath habitat within the OHTL Corridor. This section provides information to respond to NT EPA's Direction Table 2, Comment 10 regarding the need to carry out surveys during suitable site conditions if suitable habitat is present within the OHTL Corridor.

During the March 2022 reconnaissance survey, the sandsheet heath sites were assessed by ecologists Ruth Marr and Dr Stephen Reynolds, a Darwin-based herpetologist with extensive experience in conducting Top End frog surveys including many Howard River Toadlet surveys. Several sandsheet heath sites were confirmed as suitable habitat for the Howard River Toadlet along the OHTL Utilities Corridor.

A survey was subsequently undertaken following the draft *Survey Methodology for Uperoleia daviesae* (DEPWS, in prep). According to the methodology:

> *…each survey site should be 1 ha. The number of sites required depends on the size of the project footprint and the size, suitability and configuration of the habitat patch. Surveys should be planned to coincide with the onset of wet season monsoonal rains, and surveys should only take place after a sufficient rainfall event during the species peak activity period.*

To ensure that rainfall and conditions were appropriate for Howard River Toadlet detection, visits to local reference sites along Girraween Road and Jenkins Road were undertaken immediately prior to conducting the surveys each night. Both sites support a reliable population of Howard River Toadlet and so are suitable for determining species' presences through calling.

4.2.2 Results and discussion

Four sites were confirmed as suitable for supporting the Howard River Toadlet – SS01, SS04, SS05 and SS10 (for locations, see Figure 4-5) because of key habitat characteristics (see, e.g., Figure 4-3 and Figure 4-4) and proximity to previous records.

No calling was detected during visits to the reference sites; therefore, surveys could not be undertaken at each of the sites to verify their presence. This is likely due to surveys being conducted toward the end of the wet season and the fewer monsoonal troughs experienced later in the season. Further survey work in 2023 would be required to confirm presence/absence of Howard River Toadlet at SS01, SS04, SS05 and SS10. For the purposes of the SEIS impact assessment, it is assumed all four sites have the potential to support Howard River Toadlet.

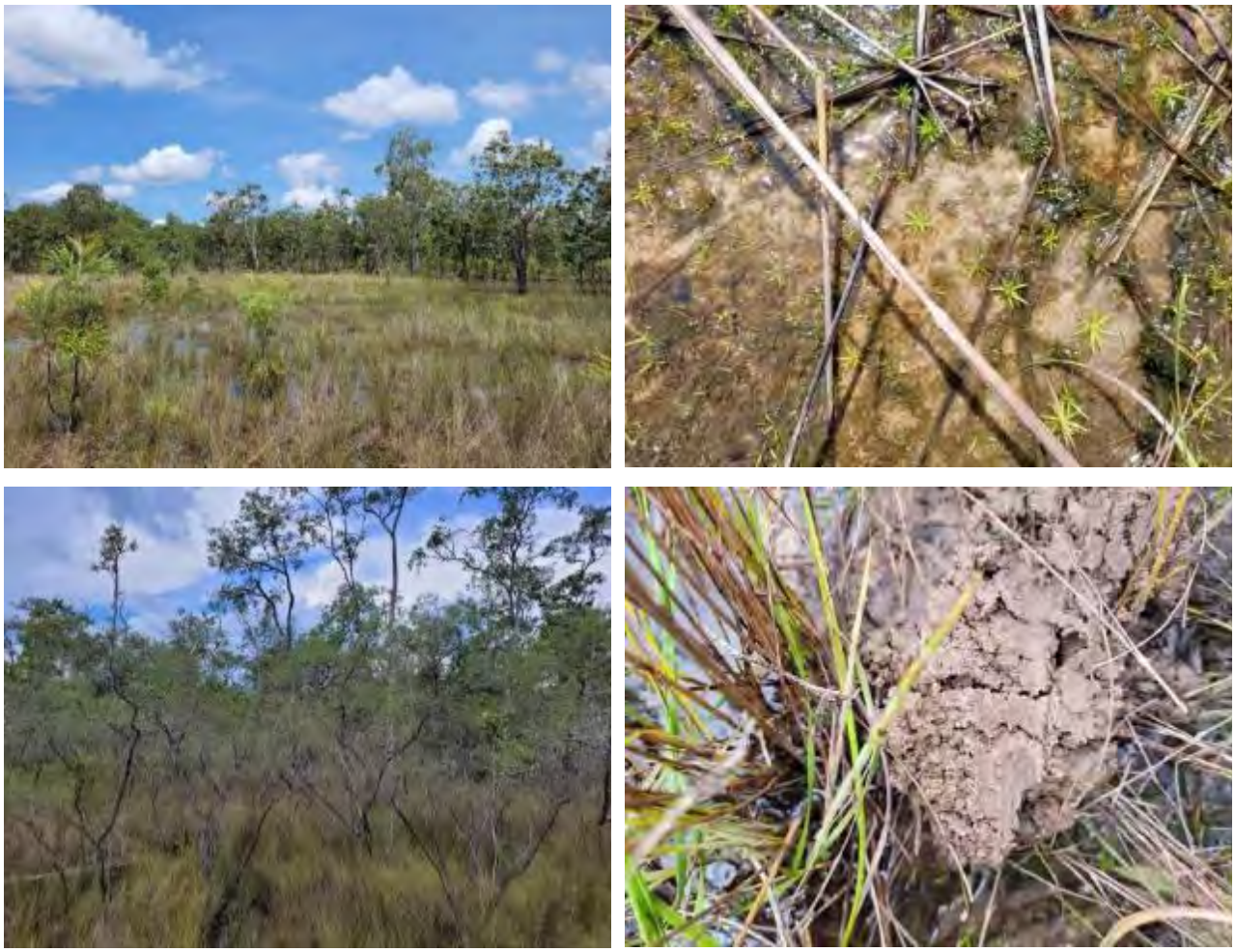
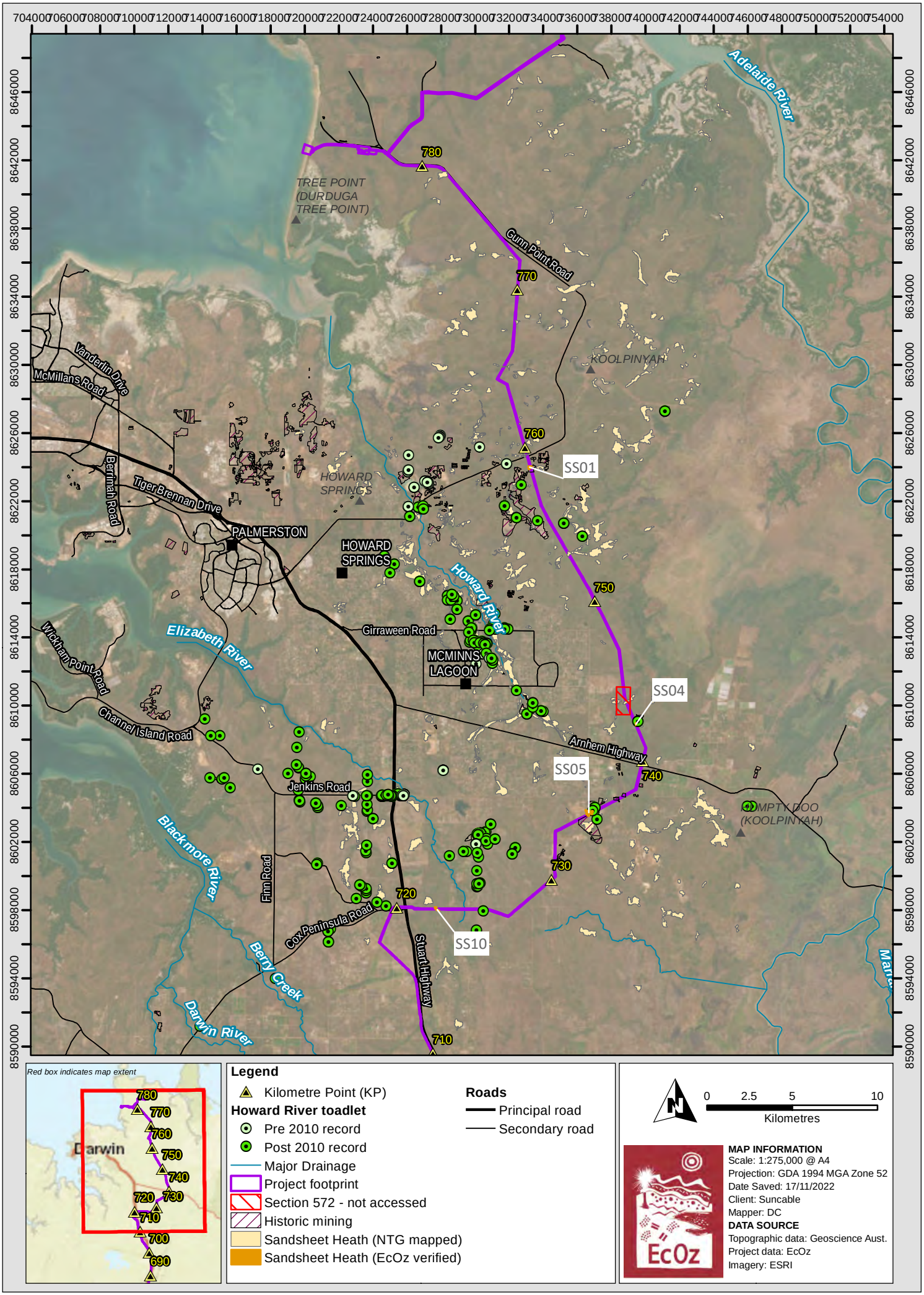


Figure 4-3. Photographs showing examples of habitat and soils for the Howard River Toadlet at SS01 (top) and SS10 (bottom)

Figure 4-4. Photographs showing unsuitable habitat and soils for the Howard River Toadlet at SS02



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 4-5 Toadlet potential habitat.mxd

Figure 4-5. Map showing high-likelihood Howard River Toadlet habitat relevant to the AAPowerLink infrastructure

4.3 Typhonium taylori

Typhonium taylori is a small perennial herb species endemic to the NT. The species is known from a very restricted area within the Howard River catchment, 30 km east of Darwin (Liddle & Trikojus 2010). The species is currently listed as Endangered under both the EPBC Act and the TPWC Act.

The plant is included in a suite of species of conservation significance that are restricted to seasonally-saturated, nutrient-poor, sand plains or adjoining riparian habitat in the Howard Sand Plains area (DEWHA 2008, Liddle & Trikojus, 2010; Kerrigan & Cowie, 2006) – see Figure 4-6. Like other *Typhonium* species, *T. taylori* is seasonally dormant during dry conditions, emerging from underground corms after the onset of monsoonal rain during the wet season (Liddle & Trikojus 2010). The leaf blade of *T. taylori* is only 45 mm long, triangular to elliptic or narrowly lanceolate (lance-shaped) and is most obvious from late December-May (Hay 1997; Liddle & Trikojus 2010). Flowering of the species occurs in January for typically no more than two days (Kerrigan & Cowie 2006; Liddle & Trikojus 2010).

Changes to the hydrology within the species habitat from impacts of sand mining, vegetation clearing associated with subdivision, and increased water demands from population expansion in the Darwin and Litchfield Shire, have been identified as potential threats to the species (Liddle & Trikojus 2010).

Figure 4-6. Photographs of high quality *Typhonium taylori* habitat near Girraween Road

4.3.1 Methods

Because its narrow distribution does not intersect with the Project footprint, *Typhonium taylori* was not considered a species of concern in the Draft EIS. However, during the March 2022 survey of potential sandsheet heath habitat along the OHTL Utilities Corridor, a small *Typhonium* species was detected at SS02 by Dr David Liddle (an expert on *Typhonium*) that appeared morphologically similar to *T. taylori*. The NT EPA Direction also requested a re-assessment of the likelihood of *T. taylori* in the OHTL Corridor to be undertaken due to occurrences within 7km of the Project footprint, and in recognition that potential habitat is likely to exist in the Howard Sand Plains. If suitable habitat for the species occurs within the Project footprint, then surveys were required to confirm presence / absence of the species.

Subsequently, a team of four lead by botanists Anna Lemon and Dr David Liddle, with ecologists Sara Maxsted and Jessica English, surveyed suitable habitat within the Project footprint, and in adjacent areas to determine the extent of this occurrence. Employing the survey methodology outlined in the *Northern Territory Guidelines for targeted surveys of threatened and significant plant species* (Cuff et al. 2020), a targeted survey for this species were undertaken between 31 March and 4 April 2022, with detectability of the species first confirmed

at a reference site along Girraween Road. Transects spaced 5 m apart were traversed within sandsheet habitats (SS02 and SS03) at a rate of approximately 1 km/h (as shown in Figure 4-7).

Due to the variability of leaf shapes and sizes across the population, *Typhonium taylori* plants were distinguished from other potential *Typhonium* species based on leaf lengths and overall smallness. Plants were identified as likely to be *Typhonium taylori* based on the conservative assumption that leaf lengths were less than 40 millimetres (mm) from the base of the petiole to the leaf apex. Genetic samples from individuals with a range of varying leaf shapes and sizes were taken to identify which species were present. Discretion regarding survey focus was used where habitat was visibly different or deemed unsuitable during the survey using a combination of analysis of aerial imagery and expertise provided by Dr David Liddle.

4.3.2 Results

A total of 675 *Typhonium* species records were collected at two sandsheet heath sites, SS02 and SS03 (between KP 745 and 746). Genetic analysis of 20 samples confirmed the presence of three *Typhonium* species at SS02 and SS03 – *Typhonium johnsonianum* and *Typhonium flagelliforme* (neither of which are threatened), and a species in the *Typhonium taylori* / *Typhonium sp. Charles Darwin* / *Typhonium mirabile* complex (in other words, the genetic analysis could not identify the plants to species level) – see Table 4-2.

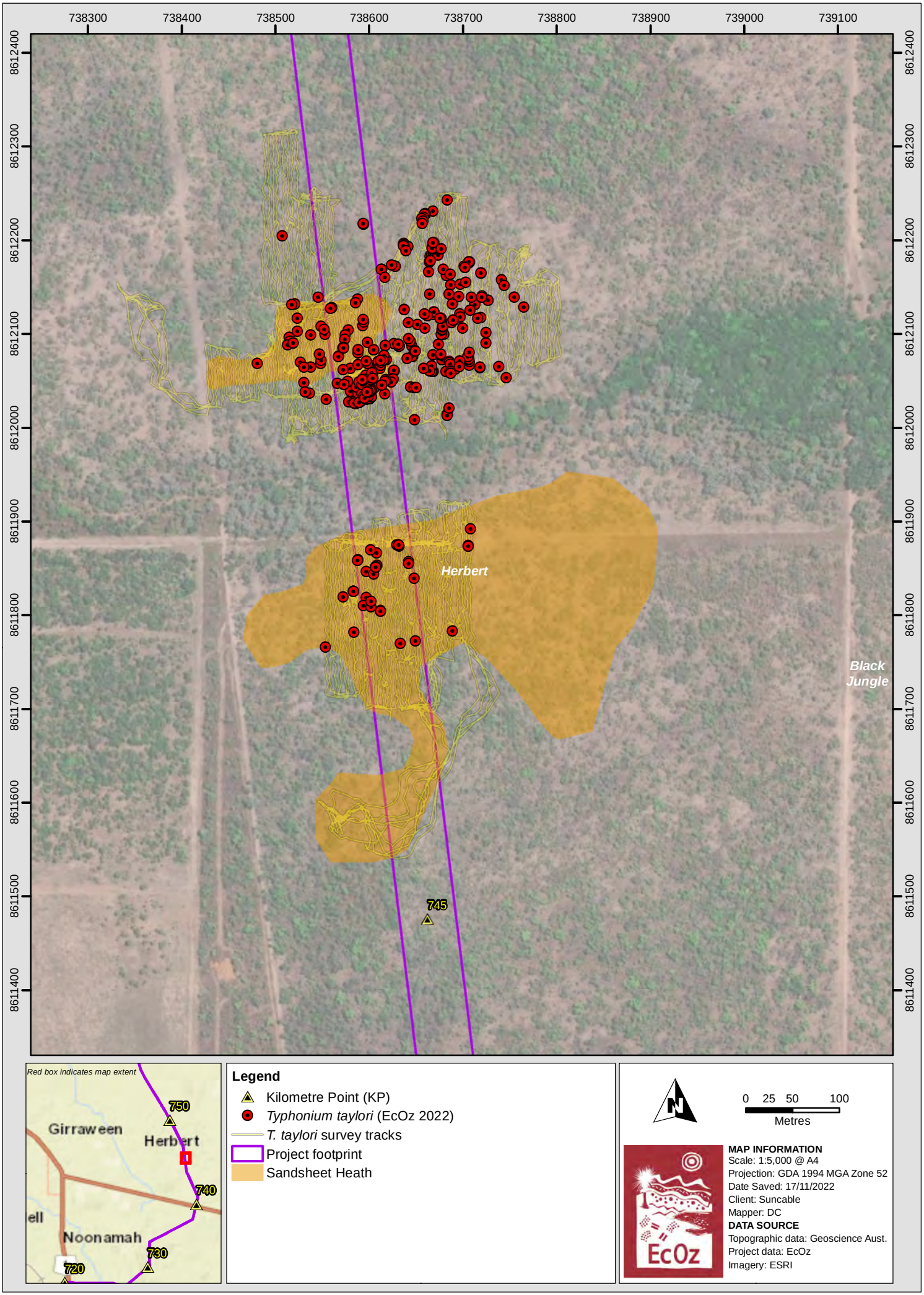
Typhonium mirabile is only known from the Tiwi Islands; *Typhonium sp. Charles Darwin* is only known from Cox Peninsula and Cobourg Peninsula. This suggests that the plants assigned to the complex are *Typhonium taylori* – namely, the 386 individual plants with leaves less than 40 mm long. Of those records, 153 were observed within the Project footprint. The remaining 289 records had leaves greater than 40 mm in length and are likely to be either *Typhonium johnsonianum* or *Typhonium flagelliforme*.

Table 4-2. Results from *Typhonium* genetic samples collected during 2022 at SS02 and SS03

Species	Date (2022)	KP	Number of plants
Typhonium complex	11 Feb	745 - 746	3
Typhonium complex	31 March - 4 April	745 - 746	10
Typhonium johnsonianum	31 March - 4 April	745 - 746	5
Typhonium flagelliforme	31 March - 4 April	745 - 746	2

The quality of the habitat supporting *Typhonium taylori* was reasonably consistent with habitat that is known to occur in sandsheet land unit 3a. This land unit is typically represented by an overstorey of *Melaleuca nervosa* and *Grevillea pteridifolia* low open woodland, with *Dapsilanthus spathaceus* sedgeland in understorey. The main difference between the site vegetation and land unit 3a was a distinct lack of *Dapsilanthus spathaceus*; however, many other sedges (namely *Fimbristylis spp.*) were present. The soils were comprised of a fine sand which contained a minor element of clay – see Figure 4-8.

All other sandsheet heath patches were determined to have a low likelihood of occurrence of *Typhonium taylori*, due to habitat being too dry, disturbed, or otherwise not conforming to habitat requirements for the species. One sample collected on 11 March 2022 for genetic analysis in the swamp near SS10 on Alverly Road was identified as *Typhonium johnsonianum*.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 4-7 Typhonium taylori records and survey effort at SS02 and SS03.mxd

Figure 4-7. Map of survey area showing *Typhonium* spp. records and survey effort at SS02 and SS03

Figure 4-8. Photographs of the survey area within SS02 & SS03 showing *Typhonium taylori* habitat

4.4 Utricularia dunstaniae

Utricularia dunstaniae is listed as Vulnerable under the TPWC Act and is not listed under the EPBC Act. *Utricularia dunstaniae* is a small, annual, terrestrial bladderwort, flowering between March and May. In the NT, it is associated with 'sandsheet heath' type habitats such as *Melaleuca nervosa* woodland or *Melaleuca verticordia* shrubland in wet sand – often in shallow water, frequently where water is percolating from the ground. The species tends to occur in slightly wetter micro-habitats than other sympatric *Utricularia* species (Kerrigan and Cowie 2015). *Utricularia dunstaniae* has a scattered distribution across north-western NT and is known to occur in the Darwin area (particularly the Howard Springs region), Kakadu National Park and Cobourg Peninsula.

4.4.1 Methods

Table 2, Comment 6 of the NT EPA Direction requested a re-assessment of the likelihood of the presence of this species in the OHTL Corridor. If suitable sandsheet heath habitat was found to occur, then surveys at an appropriate time of year were required to confirm species presence / absence. Accordingly, a habitat suitability assessment was undertaken by Anna Lemon and Dr David Liddle to determine the suitability of the sandsheet heath habitats mentioned above for supporting *U. dunstaniae* on 3 May 2022 within the OHTL Utilities Corridor. Prior to the habitat suitability assessment, a reference site on Girraween Road was visited to confirm species detectability and familiarise field ecologists with the habitat type (see Figure 4-9).

4.4.2 Results and discussion

No sandsheet heath habitats were identified as suitable for supporting *Utricularia dunstaniae*, based on habitat modification, lack of surface water and seepage from nearby source, and unsuitable vegetation composition, soil type and colour.

Sites were too dry to support the species or were highly-modified, therefore reducing the likelihood of occurrence at SS05, SS08, SS09 and SS10 – see Figure 4-10. The first site has a history of mineral extraction (likely sand), which was evident with the numerous wet areas (mined) where seepage was pooling, and dry sandy areas (intact) observed within the patch that supported more mature *Melaleuca nervosa* trees. Sandsheet site SS06 is adjacent to the OHTL Utilities Corridor and was too dry to be considered suitable habitat; the narrow section observed within the Project footprint was also highly modified. Site SS07 was the only intact site observed; however, this was relatively depauperate of other *Utricularia* sp. and SS08 and SS09 were observed to be too dry to support the target species.

The likelihood of *Utricularia dunstaniae* occurring within, or close to, the Project footprint is considered to be very low.

Figure 4-9. Photographs of high-quality *U. dunstaniae* habitat at the Girraween Road reference site

Figure 4-10. Photographs showing examples of unsuitable *Utricularia dunstaniae* habitat along the OHTL Utilities Corridor

5 DARWIN PALM

Darwin Palm (*Ptychosperma macarthurii*) is listed as Endangered under the TPWC Act and is not listed under the EPBC Act. In the NT, the Darwin Palm (*Ptychosperma macarthurii*) occurs in dense wet rainforests associated with lowland springs near the margins of riverine floodplains (NTH 2021). The soils typically comprise deep organic clay loams without humus development. The species is known from eight populations. According to Stokeld et al. (2020), the Black Jungle sub-population is by far the largest, with Crocodile Creek containing 70% of the NT population (Liddle et al. 2006). The OHTL Utilities Corridor passes within 500 m of a Darwin Palm record, and transects the drainage line along which that and many other records occur downstream.

5.1 Methods

Although NT EPA did not require further surveys, to ensure impacts to known sites containing species are avoided, a habitat suitability assessment survey for the Darwin Palm was undertaken on 14 and 15 June 2022 at three sites that were identified in September 2021. The assessment was conducted by botanists Anna Lemon and Dr David Liddle (who has undertaken numerous Darwin Palm surveys and is very familiar with the morphology and habitat type of the species). Prior to the survey, a nearby reference site was visited for the purposes of confirming plant identification and habitat type. Juvenile Darwin Palms are very similar to those of *Carpentaria acuminata*, so visiting the reference site also assisted with understanding key differences in juvenile morphology. Following this, the three sites were surveyed by two people spaced 5 to 10 m apart, traversing along riparian habitats (inclusive of at least 100 m either side of the Project footprint) to confirm the suitability and extent of the habitats. This is in accordance with the survey methodology outlined in the *Northern Territory Guidelines for targeted surveys of threatened and significant plant species* (Cuff et al. 2020).

The riparian sites of interest were:

- Black Jungle Conservation Reserve (KP 749 - 751)
- Crocodile Creek (KP 745 - 746)
- Elizabeth River (KP 723 - 725).

In addition to the sites surveyed above, there may also be suitable habitat in Section 572 (KP 743 – 744) but access permission for this site was not gained and so it was not surveyed.

5.2 Results

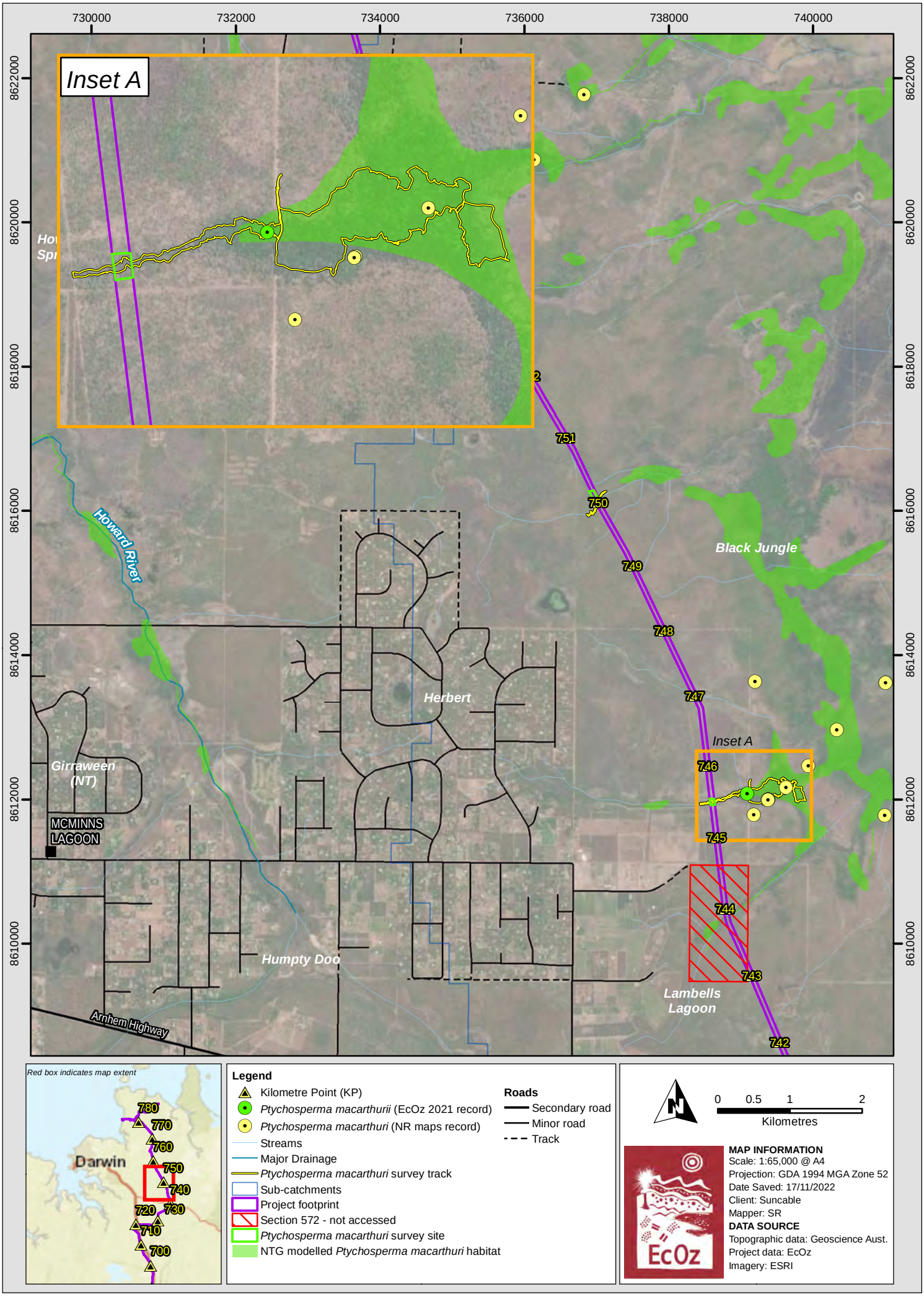
All of the habitats surveyed intersecting the OHTL Utilities Corridor were considered to be unsuitable for the Darwin Palm and no Darwin Palms were observed within the Project footprint (see Figure 5-1 and Figure 5-2). The riparian habitats mostly lacked a closed overstorey and the deep organic clay loams that the Darwin Palm is typically associated with. Invasive weed species were abundant along the edges of the riparian corridor associated with Crocodile Creek, particularly Curry Bush (*Murraya koenigii*) and Gamba Grass (*Andropogon gayanus*). The small, narrow riparian channel in Black Jungle (KP 749 - 751) contained several evergreen monsoon rainforest species; however, these were tightly confined to the watercourse, with an abrupt change in habitat to woodland less than 5 m from the incised channel.

One plant was recorded 500 m east of the Project footprint (KP 745 - 746) in rainforest associated with Crocodile Creek (see Figure 5-3). This is slightly upstream from other known records.

The likelihood of the Darwin Palm occurring within, or close to, the Project footprint is considered to be very low.

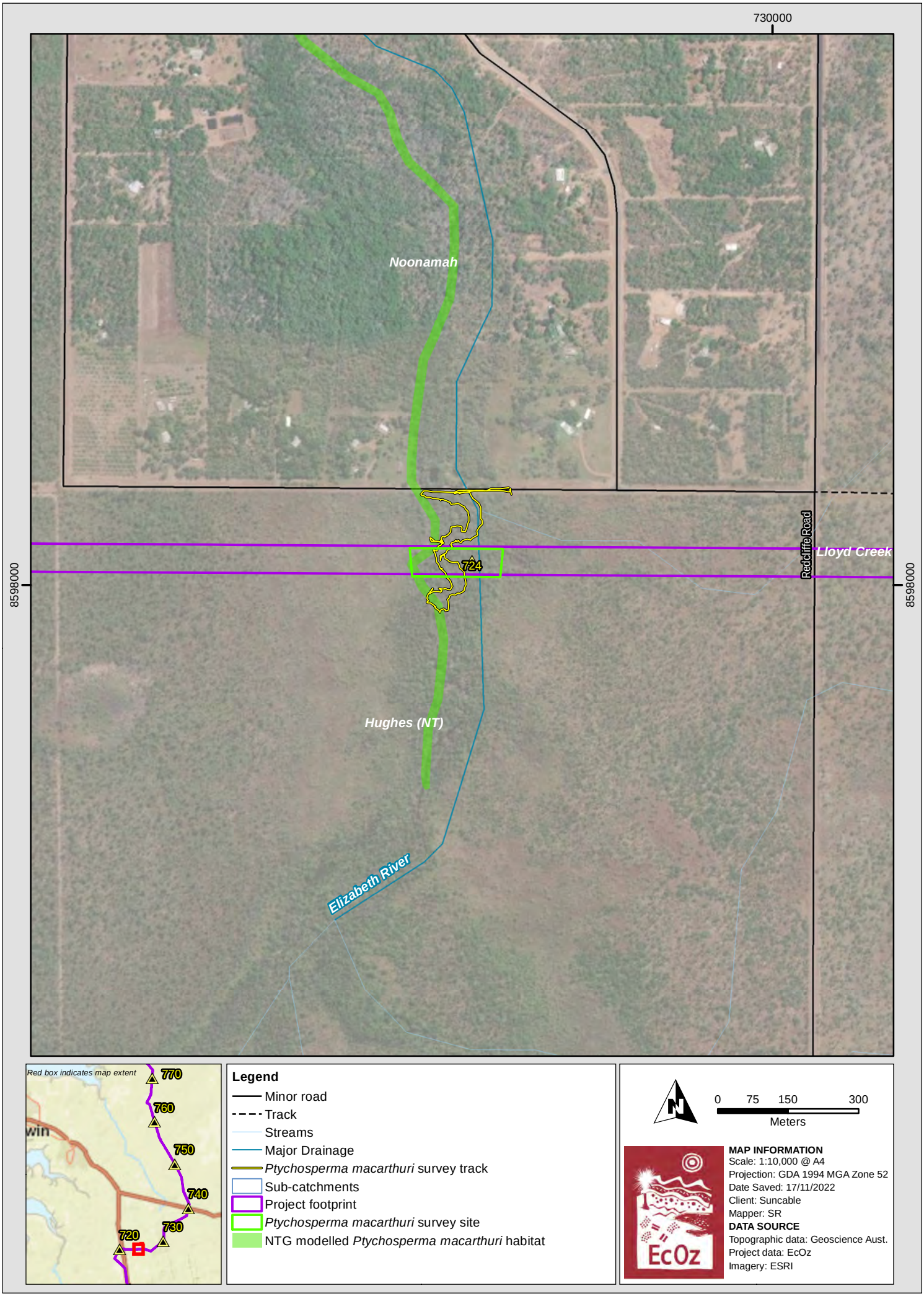
Figure 5-1. Photographs of riparian habitat within Black Jungle Conservation Reserve surveyed for Darwin Palm

Figure 5-2. Photographs of riparian habitat along Crocodile Creek (left) and Elizabeth River (right) surveyed for Darwin Palm



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 5-3 Darwin Palm survey and records Black Jungle.mxd

Figure 5-3. Map of Darwin Palm survey effort and records proximate to the Project footprint (Black Jungle)



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 5-4 Darwin Palm survey showing survey effort Hughes2.mxd

Figure 5-4. Map of Darwin Palm survey effort and records proximate to the Project footprint (south)

6 STYLIDIUM ENSATUM

The trigger plant, *Stylidium ensatum*, is endemic to the NT and is listed as Endangered under the TPWC and EPBC Acts. *Stylidium ensatum* inhabits margins of drainage areas in damp, heavy clay or peaty soil (Cowie and Westaway 2012), although it may prefer sandier or loamy soils (Ian Cowie, NT Herbarium, pers. comm. 2017). Suitable areas for *Stylidium ensatum* tend to be adjacent to *Lophostemon* swamps, where surface moisture is maintained into the early to mid-dry season (Nick Cuff, NT Herbarium, pers. comm., 2017). The preferred habitat for *Stylidium ensatum* generally supports *Melaleuca viridiflora*, *Eucalyptus alba* and *Lophostemon lactifluus*, but also perennial grasses such as *Eriachne burkittii*, *Pandanus spiralis*, *Osbeckia australiana* and scattered *Banksia dentata* (Donna Lewis, NT Herbarium, pers. comm. 2020).

The NT Government has mapped the extent of occurrence of *Stylidium ensatum* based on known recorded locations close to Darwin and a site at Hayes Creek (NTG 2016). Potential habitat for the species has been modelled from land unit and vegetation mapping, and defines areas of high, moderate and low likelihood habitat. It is at a coarser scale compared with the *Typhonium praetermissum* modelling, meaning that surveys of such areas less often result in records of the species. Modelling extends from the northern coast to Mataranka, and includes the area of the preferred OHTL route at Adelaide River.

Substantial areas of the region within which the DCS and OHTL Utilities Corridor are located are modelled as high-likelihood habitat for *Stylidium ensatum*. During the field survey that ground-truthed the land units within those two Project components, the veracity of modelled high-likelihood habitat within them was assessed, and any additional areas that should be considered as high-likelihood habitat were identified.

Suitable habitat for *Stylidium ensatum* was also identified during fieldwork at the DCS Electrode and HVDC Electrode Line Corridor.

Finally, the OHTL deviation at Adelaide River contains habitat modelled as moderate-likelihood for *Stylidium ensatum* (DEPWS 2016).

6.1 Methods

Surveys for *Stylidium ensatum* were undertaken using the methodology outlined in the *Northern Territory Guidelines for targeted surveys of threatened and significant plant species* (Cuff et al. 2020). In Table 2, Comment 8 of the NT EPA Direction, surveys for this species are required for the OHTL deviation at Adelaide River where it overlaps with DEPWS modelling and DCCEEW species distribution information. However, the 2022 survey window for *Stylidium ensatum* had closed before the Adelaide River deviation route was selected.

Botanist Anna Lemon and ecologist Sara Maxsted surveyed *Stylidium ensatum* habitat at the DCS and OHTL Utilities Corridor from 28 June to 6 July 2022 – see Figure 6-4 and Figure 6-5. Prior to undertaking the surveys, a visit to a reference population was made to ensure the species was readily detectable at the time of survey, and to become familiar with the species morphology and habitat.

Each of the potential habitats flagged during the September 2021 survey were visited, reassessed for suitability and surveyed. The following habitat features are preferred by *Stylidium ensatum* and were used to reassess habitat suitability in line with appropriate survey timing (NTG 2013):

- Margins of drainage systems; areas that are poorly drained with seasonal inundation or waterlogging and have hydrosols soils – i.e. they are saturated with water for extended periods, are generally a greyish colour and have a high organic content
- Shallow inundation or saturated soils in the mid dry season
- Overstorey consisting of *Melaleuca species* and/or *Lophostemon lactifluus, Pandanus spiralis*
- Ground layer incorporating grasses and herbs that occur in poorly-drained habitats
- Relatively open overstorey.

Following this reassessment, if the habitat was deemed suitable and/or the target species was observed, a targeted meander was employed to map out the population extent (including beyond the Project footprint, if required). Surveyors each carried GPS devices to record tracks, and waypoints were used to mark out the extent of the population as many plants were observed in small areas. The extent of the population was demarcated by traversing across areas of suitable habitat and adjacent habitat that was less favoured by the species. Waypoints were made every 2 to 5 m where the plant was occurring, focusing particularly along the damp edges of *Melaleuca* swamps. Areas of unsuitable habitat were traversed for approximately 10 m before returning to suitable habitat. Based on NT Government habitat modelling, there is potential for suitable habitat to occur in Section 572. However, access permission for this site was not gained and so it has not yet been surveyed for *Stylidium ensatum*.

The same method was employed for suitable habitat along Leaders Creek that intersect the HVDC Electrode Line Corridor by botanist Anna Lemon and ecologist Sarah Ryan between 21 and 25 July 2022 – see Figure 6-6.

6.2 Results

6.2.1 OHTL Utilities Corridor

During the surveys, six *Stylidium ensatum* patches were observed within, or proximate to, the OHTL Utilities Corridor. A total of 1,104 records were made, with 221 records occurring within the Project footprint – see Table 6-1, and Figure 6-4, Figure 6-5 and Figure 6-6.

Table 6-1. Number of *Stylidium ensatum* recorded within, and near, the OHTL Utilities Corridor

Location	KP	No. Records	No. Records within footprint
Leader's Creek Road*	n/a	149	0
Gunn Point Road (1)	769 – 770	98	48
Gunn Point Road (2)	767 – 768	254	48
Koolpinyah	762 - 764	148	0
Black Jungle Conservation Reserve*	745 – 746	4	0
Lambells Lagoon (Section 1580)	742 – 743	31	18
Alverly Road	722 – 723	420	107
	Total	**1,104**	**221**

**New records from the survey that are not within, or intersecting, the Project footprint*

Almost all the records were collected within the Gunn Point and Koolpinyah regions along the edges of *Melaleuca viridiflora* swamp systems with *Eucalyptus alba* present. Soils were typically poorly-drained with dark hydrosols (Figure 6-1). One patch was discovered south of Alverly Road in Noonamah within a sandsheet community that is situated along the edge of a swamp system. A few plants were detected along a firebreak within Black Jungle Conservation Reserve along the edge of a small ephemeral creek. Plants were observed occurring along the edge of the *Melaleuca viridiflora* swamp and extending into the sandsheet habitat (Figure 6-2). It has been noted that *Stylidium ensatum* has been detected in sandy habitats; however, it is not commonly observed (NTG 2013b).

The new records along Gunn Point Road, within Koolpinyah Station and along Alertly Road in Noonamah were all observed in suitable habitat near swamp systems that was not modelled as high-likelihood. The remaining sites were within, and/or proximate to, modelled habitat.

Figure 6-1. Photographs of suitable *Stylidium ensatum* habitat within the OHTL Corridor at the Gunn Point Road location

Figure 6-2. Photographs of suitable *Stylidium ensatum* habitat within the OHTL Corridor at the Alverly Road location in Noonamah

6.2.2 HVDC Electrode Line Corridor

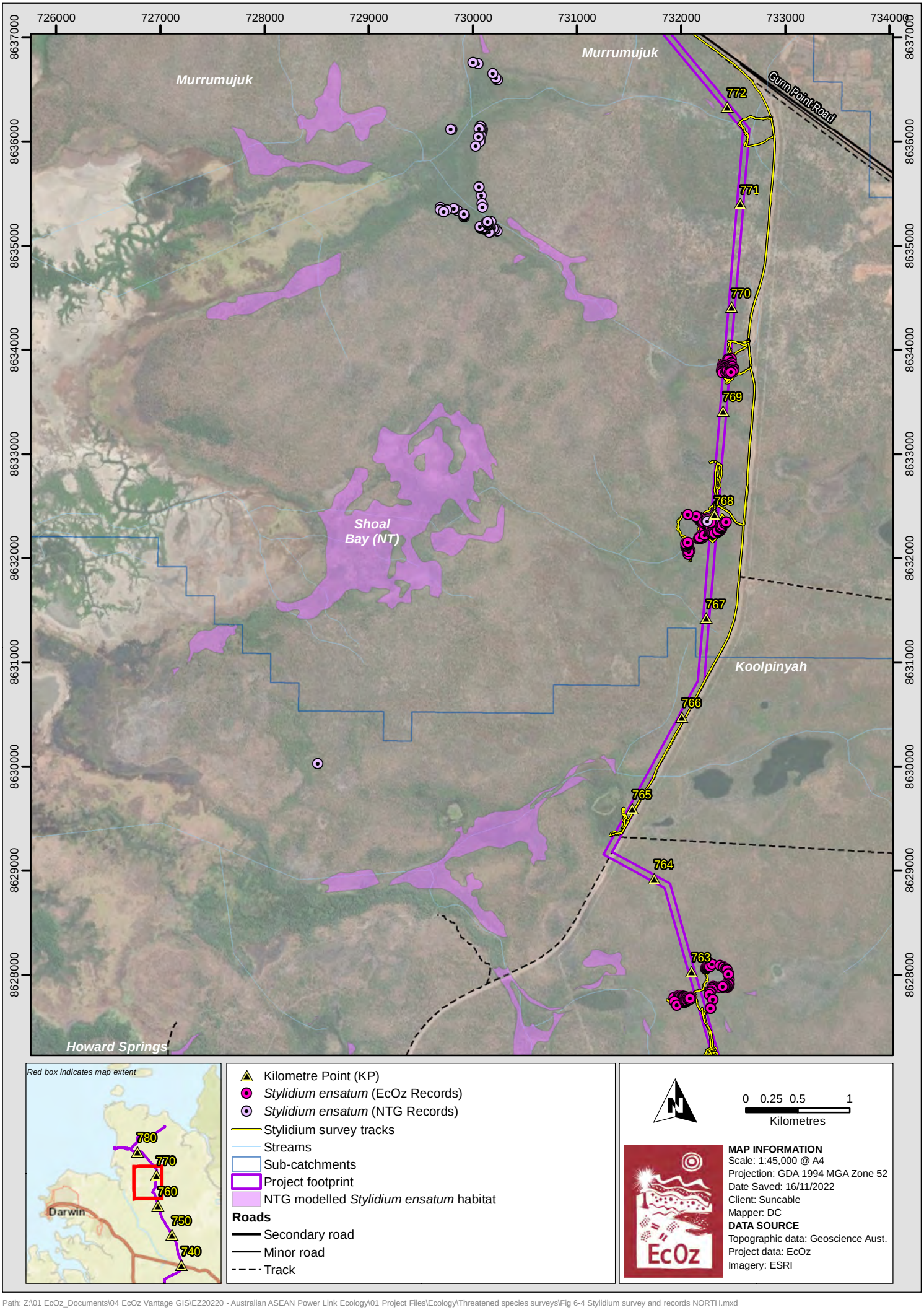
A total of 149 records were observed south of a known sub-population of 26 records, near Leaders Creek – see Figure 6-6. All records were observed outside the Project footprint, with the nearest record occurring approximately 60 m from the outer edge of the HVCD Electrode Line Corridor. The plants were observed within a linear swamp system (modelled high-likelihood habitat) that feeds into Leaders Creek (see Figure 6-3), increasing the extent of the existing population north of the area surveyed. No other *Stylidium ensatum* plants were observed within areas of high-likelihood modelled or suitable habitat intersecting the HVDC Electrode Line Corridor.

Figure 6-3. Photographs of *Stylidium ensatum* habitat (left) and plant (right) near the Gunn Point HVDC Electrode Line Corridor

6.2.3 OHTL Corridor Within Existing Railway Corridor

There are no known occurrences of *Stylidium ensatum* within the OHTL Corridor Within Existing Railway Corridor. An assessment of these areas via high resolution satellite imagery indicated that the areas within the OHTL Corridor Within Existing Railway Corridor r are likely to be significantly disturbed, and therefore unsuitable for *Stylidium ensatum*. Previous surveys conducted throughout suitable habitat along the Stuart Highway indicate species absence from those areas (NTG 2016). Therefore, the likelihood for *Stylidium ensatum* to occur within the OHTL Railway Corridor is low. No further surveys were considered necessary in this section of the Project footprint.

Habitat modelling identified high and moderate potential habitat adjacent to the Project footprint along the OHTL Corridor Within Existing Railway Corridor. The species may be present within that habitat; however, land access issues precluded those areas from being surveyed.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 6-4 Stylidium survey and records NORTH.mxd

Figure 6-4. Map of *S. ensatum* survey effort and records along Gunn Point Road and within Koolpinyah Station

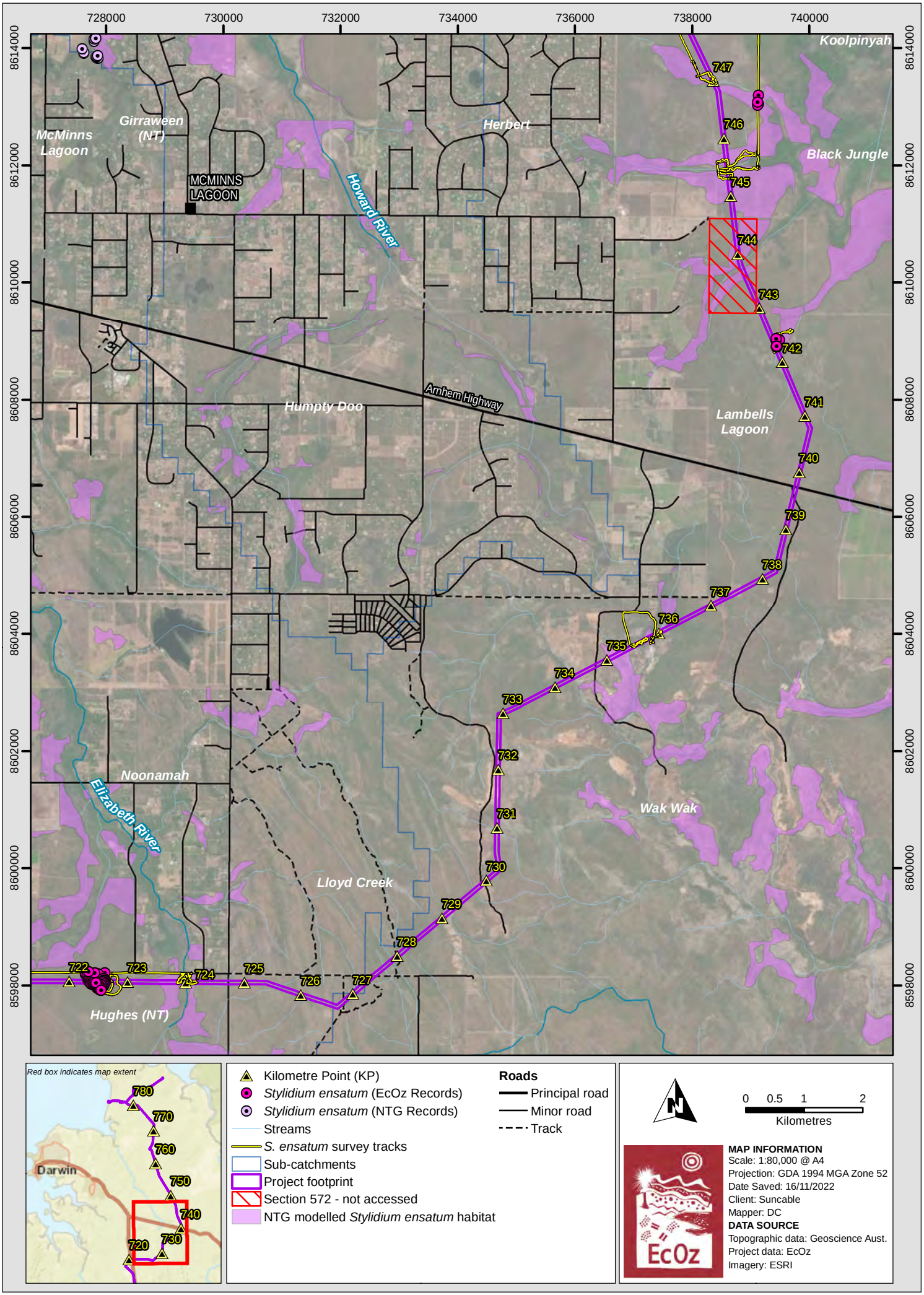


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Figure 6-5. Map of *S. ensatum* survey effort and records at Black Jungle, Lambells Lagoon and Noonamah

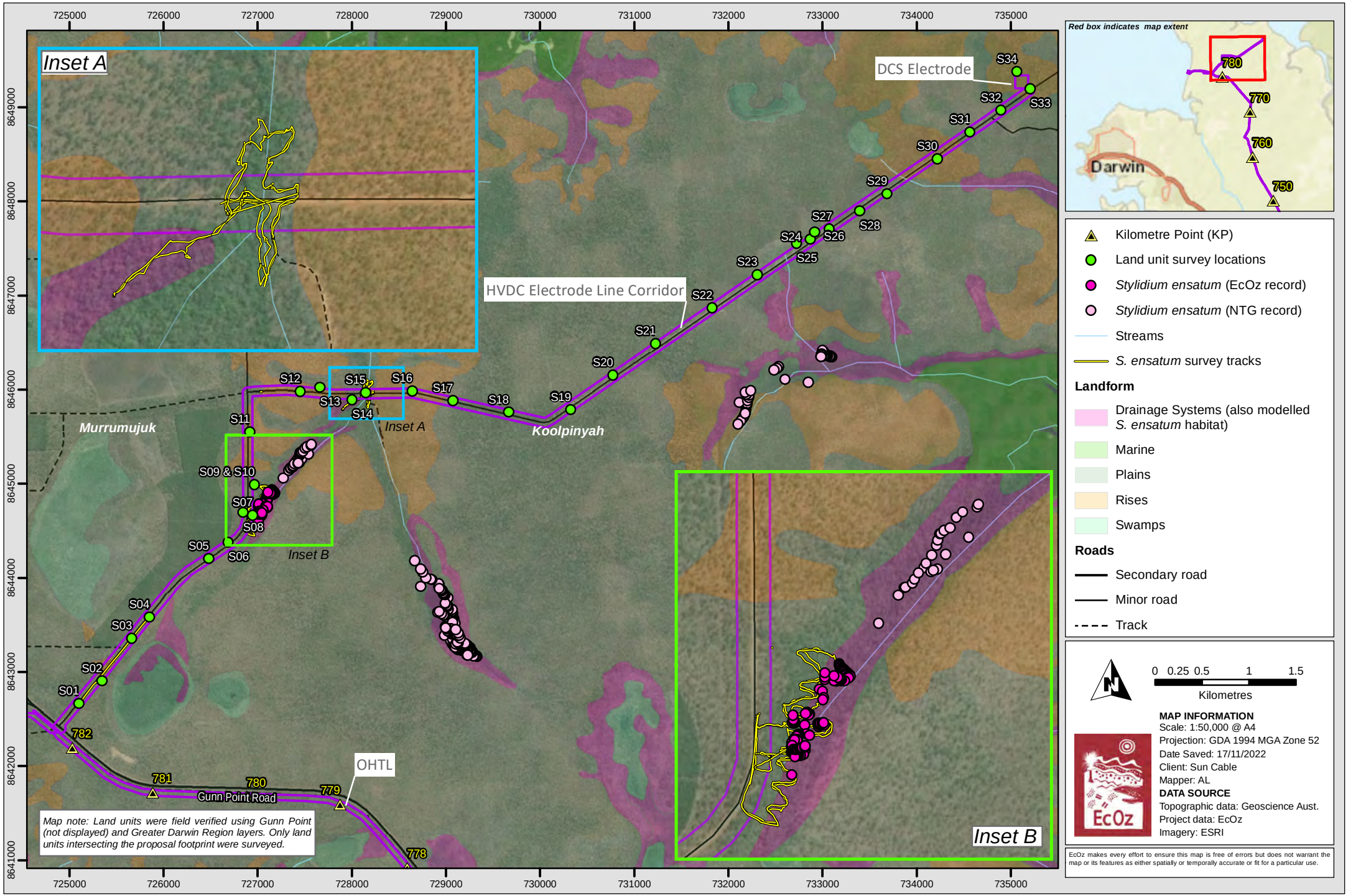

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Figure 6-6. Map of *S. ensatum* survey effort and records along HVDC Electrode Line Corridor

7 HELICTERES MACROTHRIX

Helicteres macrothrix is listed as Endangered under the TPWC and EPBC Acts. *Helicteres macrothrix* is a multi-stemmed sub-shrub, one of approximately 13 species of the genus *Helicteres* from the NT (Cowie 2011). The species grows to 50 cm tall with ascending to erect branches, pink to purple flowers, and fruits, leaves and branches that are green and woolly-hairy. The aerial parts of the plant are annual, with perennial root stock. The plant is known to re-sprout from root stock, often vigorously, after fire. *Helicteres macrothrix* has been recorded from three populations – near Mt Bundey, near Batchelor and in the Lake Bennett area. *Helicteres macrothrix* flowers from November to March, and fruits from January to March (DEPWS 2021). This species is associated with *Eucalyptus tectifica*, *E. miniata* and/or *E. tetrodonta* woodland on clayey soils derived from siltstone or sandier soils derived from the granite-like rock syenite.

The NT Government has mapped the extent of occurrence of *Helicteres macrothrix* based on known recorded locations (DEPWS 2021). Potential habitat for the species has been modelled from existing land unit, vegetation and geological mapping. This model serves as a guide to identify areas where the species may be present but is at a coarser scale compared with the *Typhonium praetermissum* modelling (DEPWS 2021), meaning that surveys of such areas less often result in records of the species.

One of the two known populations for the species occurs along the Stuart Highway, south of the Batchelor Road turn-off and proximate to the OHTL Railway Corridor; however, there are no records within the footprint area. An assessment of these areas via high-resolution satellite imagery indicates that the areas within the OHTL Railway Corridor are significantly disturbed. Therefore, the likelihood for *Helicteres macrothrix* to occur within the OHTL Railway Corridor is very low. The habitat modelling identifies potential habitat directly adjacent to the OHTL Railway Corridor. The species may be present within that habitat; however, land access issues precluded those areas from being surveyed.

In Table 2, Comment 9 of the NT EPA Direction, surveys for this species are required for the OHTL deviation at Adelaide River where it overlaps with DEPWS modelling and DCCEEW species distribution information. However, because land access for the deviation is still being secured, this survey has not yet been undertaken.

8 GREATER BILBY

The Greater Bilby is a rabbit-sized, omnivorous, burrowing marsupial that is listed as Vulnerable under the TPWC Act and EPBC Act. 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 species feeds on plant material (seeds and bulbs) and invertebrates such as beetles, termites and root-dwelling larvae (Pavey 2006; 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 are 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 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.

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 (Johnson 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).

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

The Project footprint (at Powell Creek Station) occurs on the north-eastern edge of the current distribution of Greater Bilby – see inset in Figure 8-2. There are no documented previous records of the species within the Project footprint; however, there are proximate records and the Redsan land system (which the Project footprint occurs within) and the Atlas_B32 land system (which occurs to the west of the Project footprint) contain suitable habitat.

8.1 Survey area

The specific survey areas are listed below and shown on Figure 8-1:

- Powell Creek Electrode (2 ha) and HVDC Electrode Line Corridor including access road (noting that this is positioned on an existing station track)
- Proposed locations of Solar Precinct Ancillary Infrastructure that occur within the Redsan land system
- Proposed Access Roads within the Redsan land system (noting these are existing station tracks).

The buffer area included the following:

- 2 km radius around the Powell Creek Electrode
- 2 km to the west of the OHTL Corridor within the existing railway corridor (Solar Precinct buffer)
- 8 km to the north of the Solar Precinct
- 1.5 km to the south of Solar Precinct (limited by property boundary)
- Between 2 and 10 km to the east of the Solar Precinct (within the Redsan land system)
- Targeted aerial survey in the OHTL Corridor within the existing railway corridor (22 km stretch)

The Access Tracks and Ancillary Infrastructure within the Ashburton Range (to the east) were not targeted because the habitat within this area is considered unlikely to support Greater Bilby. However, during other surveys in the Ashburton Range (e.g. for Gouldian Finch habitat), surveyors took the opportunity to look for signs of Greater Bilby presence.

The Solar Precinct and OHTL Corridor were previously surveyed for the Draft EIS.

In combination with previous survey efforts within the Solar Precinct (in November 2020), the current survey provides a comprehensive coverage of the Project footprint and surrounds, and addresses NT EPA Direction requirements to carry out surveys to confirm Greater Bilby presence/absence and inform measures to avoid impacts on individuals.

8.2 Survey team

The survey team consisted of two experienced observers – an ecologist and zoologist from EcOz (Tom Ewers-Reilly and Mark Carter) – plus the helicopter pilot. Tom and Mark have worked together on numerous Greater Bilby surveys in recent years 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.

Tom (team leader, senior ecologist) has 20 years' experience of fauna surveying in the NT. Some relevant projects include – Blue Energy (2022); Castile (2022); Territory Sands (2022); Sun Cable (2020); Verdant Minerals (2017); Jemena (2016); ABM Resources (2013) and Newmont (2003-2006).

Mark is an experienced zoologist with widespread experience conducting targeted surveys for Greater Bilby. Mark has designed, led and authored reports on Greater Bilby surveys, giving him a strong understanding of the animal's anatomy, behaviour and biology, and extensive first-hand experience of the species' field signs.

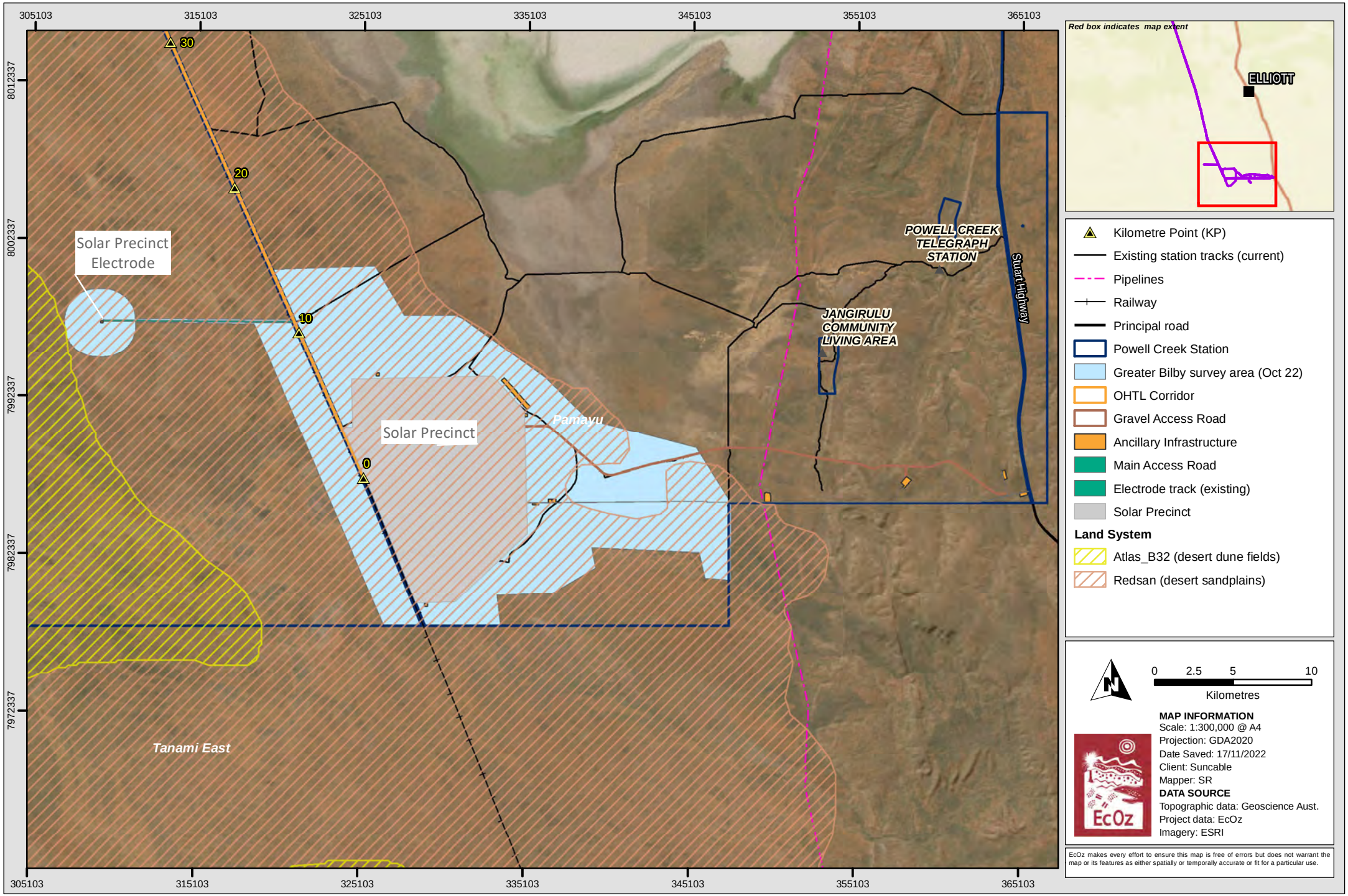

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Figure 8-1. Map of Greater Bilby survey area

8.3 Methodology

The survey was conducted between 24 and 25 October 2022. The survey involved strategic searches for Greater Bilby sign (i.e. tracks, burrows, diggings, scats) using a combination of aerial and ground-based observations. Survey design is based on protocols developed by Southgate et al. (2018), and 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). Other general references used to inform survey design included Moseby et al. (2012) and Southgate et al. (2005).

8.3.1 Aerial transects

Aerial transects were conducted at 800 – 1, 000 m spacings within the general survey area, and at 300 – 400 m spacings within the Powell Creek Electrode buffer area. The closer transect spacings within the Powell Creek Electrode buffer is because of the smaller survey area and due to habitat to the west being considered more likely to support bilby. Two transects were flown in the OHTL Corridor (within the existing railway corridor) on both the western and eastern sides of the railway track (noting there is approximately 60 – 80 m of bushland on each side) – see Figure 8-2.

The aerial survey was undertaken in an R44 helicopter (company HeliMuster), and was conducted at a speed of 40 to 60 km/hr at 20 to 30 m above the ground. Observers were positioned either side of the helicopter to maximise survey coverage. It is estimated that a survey extent 'strip' of 20 to 40 m was achieved (with width dependant on vegetation cover and helicopter speed due to wind conditions). In areas of thicker vegetation – i.e. thickets of Turpentine (*Acacia lysiphloia*) – the pilot was asked to reduce speed and/or do a 'fly-around/loop' to improve detection probability due to lower visibility in these areas.

The aerial survey sampled all landform and vegetation types within the survey area; however, additional effort and focus was applied to habitats that are generally known to support, or be favourable for, bilbies (i.e. freshly burnt areas, laterite rises, patches of shrubs that support root-dwelling larvae such as *Acacia lysiphloia* and drainage areas that may support food plants such as *Cyperus bulbosus*).

8.3.2 Survey protocols

During aerial transects, when putative (i.e. suspected / potential) Greater Bilby sign was observed (such as a burrow/hole, large spoil heap, diggings), the pilot was informed to loop back around to conduct a hover check of the sign. If the hover check clearly identified the sign was from another species, the site was marked as 'not bilby' (as per site categories defined in Table 8-1). If the observers suspected the sign could potentially be from bilby, a ground check was conducted to confirm identification (based on protocols developed by Southgate et al. 2018, summarised in Table 8-2). If Greater Bilby sign was confirmed or likely at a site, a wider search (ground and/or aerial) was conducted to determine the extent of the activity, and importantly, the location of any active (or inactive) burrows.

In addition to sign-based observations, more detailed fly-overs and/or ground checks were conducted when desirable habitat and/or bilby food plants were observed (i.e. *A. lysiphloia* patches, freshly burnt areas). This aimed to test whether false negative observations are being made during standard aerial transects (i.e. is bilby sign being missed by aerial transect observations). Previous experience with aerial surveying has demonstrated that fresh or recent bilby sign is rarely missed; however, old sign can be difficult to detect from the helicopter if the sign is totally or partially obstructed from view – this is because the soil colour of spoil becomes bleached over time and blends in with surrounding soils.

Table 8-1. Site categories used for the Greater Bilby aerial survey

Site category	Criteria
Confirmed bilby	• There is sufficient evidence that the sign is made by Greater Bilby (as per Table 8-3). • This rating can only be made during a ground inspection (not solely via aerial inspection).
Likely bilby	• There is strong evidence that the sign belongs to a Greater Bilby – such as a large round burrow with large characteristic spoil heap – however, there is no definitive sign present (i.e. scats, fresh tracks, RDL diggings – as described in Table 8-3). • This rating can only be made during a ground inspection (not solely via aerial inspection).
Potential bilby	• The sign has characteristics of Greater Bilby but there is not enough evidence to provide a definitive assessment (as per Table 8-3) (might be due to old sign). • This may be based on aerial or ground-based observations.
Unlikely bilby	• The sign is most 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. • This may be based on aerial or ground-based observations.

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

Table 8-2. 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 evenly distributed around the dig. Usually obvious and numerous. Can remain evident for months to years, depending on substrate and rainfall. Plants that are known to be targeted by Greater Bilby (in the NT) include *Acacia hilliana, A. lysiphloia, A. monticola, A. acradenia, A. melleodora, A. bivenosa, Senna notabilis* and *Indigofera georgei*. 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	
Diggings other than for RDL These are similar to those described above for RDL; however, they are in the open targeting termites, spiders or bush onion bulbs.	• Continue to search surrounding areas for scats, clear tracks and multiple diggings into roots of RDL vegetation.

Sign type and description	Recommended actions
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.	• 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.	• 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.

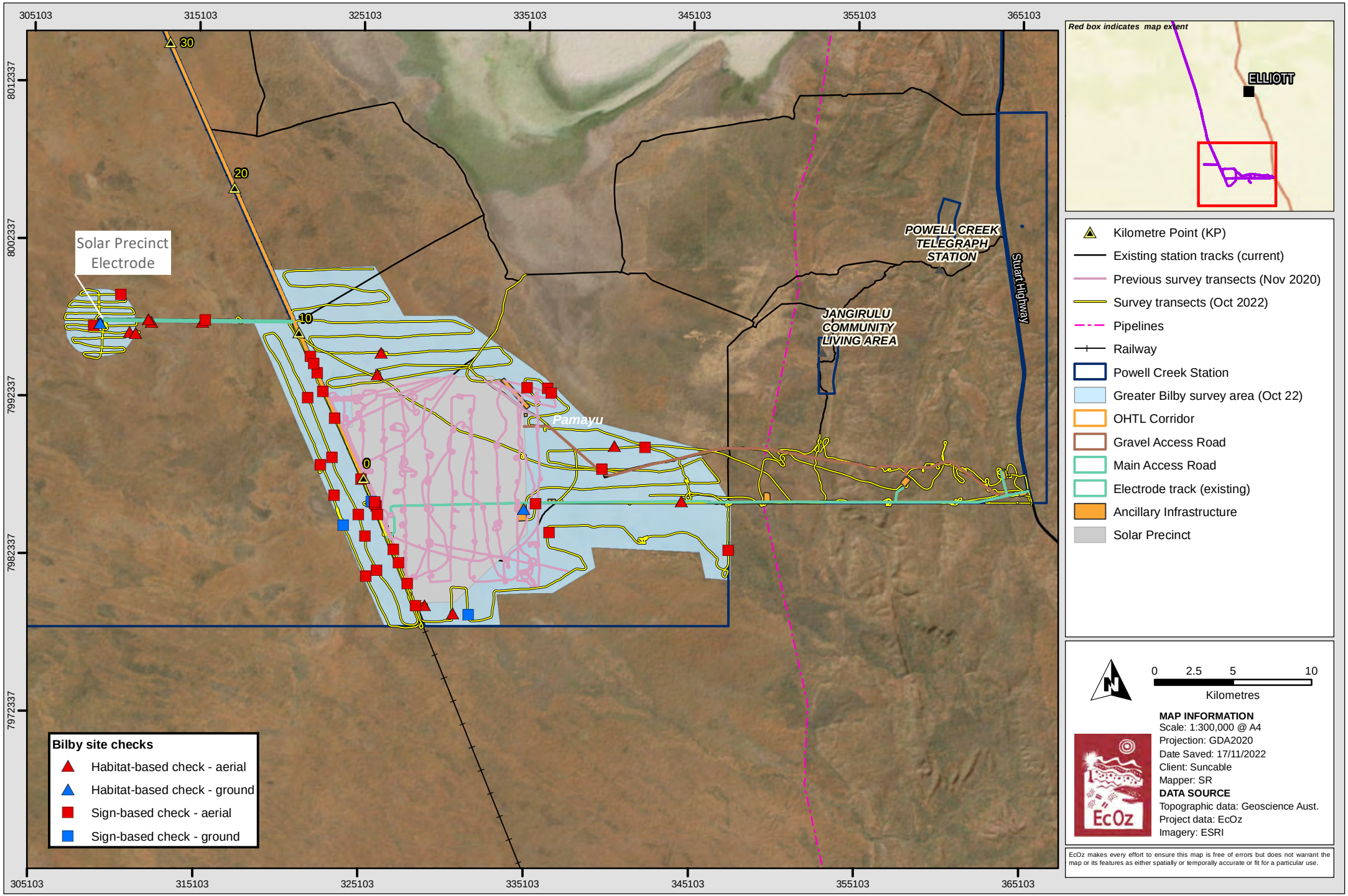

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Figure 8-2. Map of Greater Bilby survey effort (October 2022)

8.4 Results

8.4.1 Survey effort and condition

The survey covered 580 km of aerial transects and 7 km of pedestrian transects (see Figure 8-2). Forty-nine bilby check sites were conducted – 43 aerial checks and 6 ground checks. Of these, 36 sites were sign-based checks (i.e. putative sign was observed during initial flyover) and 13 sites were habitat-based checks (i.e. favourable habitat was identified but sign was not detected during initial flyover).

Conditions were suitable for both ground tracking and aerial observations, with sunny days experienced during the survey (i.e. good shadows for identifying tracks and other features in the sand) and no significant rainfall within the study area in the week prior to survey. Vegetation cover was mainly open shrubs/woodland (good aerial visibility) with only a few relatively dense patches of shrubs (average to poor aerial visibility). In the cases of low visibility, repeat fly-overs were undertaken if potential food plants were observed (i.e. *Acacia lysiphloia*), as well as several ground-based pedestrian transects.

Fresh burrows and diggings (from a range of species) were conspicuous from the air because excavated soil had a richer (red) colour in contrast to the sun-bleached, paler surface soils.

8.4.2 Observation results

No Greater Bilby sign was recorded within the Powell Creek Electrode (and HVDC Electrode Line Corridor) survey area, nor within any of the Solar Precinct Ancillary Infrastructure sites or along the Access Roads. The survey confirmed Greater Bilby sign at one site and potential Greater Bilby sign at seven sites – site details provided in Appendix B; shown on Figure 8-3. All sign and potential sign occurred within the existing railway corridor. These specific sites were not surveyed in 2020, but fell within this survey's buffer.

Site 49 is located within the railway easement on the western side of the railway tracks – 209 m from the western boundary of the Solar Precinct. This was the only site where bilby was confirmed to be active during the survey. Site observations are summarised below:

- Two active burrows are present (situated 22 m apart) and were easily detectable from the helicopter (see photographs in Figure 8-4; map inset in Figure 8-3).
    - Burrow 49-1 (Easting 325744, Northing 7985797; GDA2020): single active burrow with an approximate diameter of 150 mm. Located under a patch of *Acacia stipuligera* and wooden debris, with fresh spoil at the entrance. Another older-looking burrow also present in proximity (i.e. 2 m), likely an old entrance associated with the same burrow system.
    - Burrow 49-2 (Easting 325755, Northing 7985777; GDA2020): single active burrow with an approximate diameter of 150 mm. Located under an *Acacia lysiphloia* with fresh spoil at the entrance.
- Root diggings under Turpentine (*Acacia lysiphloia*) were present (see photograph in Figure 8-5), but were limited to within 50 m radius of the burrows. However, ground-based survey effort within the railway corridor could only be conducted from the fence line due to access agreements with Aurizon. Searches up to 400 m to the west of the burrows did not record any bilby diggings.
- Some diggings in the open were observed (but were far less common than RDL diggings). These diggings likely targeted spider holes, or potentially shallow sub-surface seed stores made by ants.
- Bilby tracks were observed within the immediate foraging area (i.e. within 50 m of burrows); however, a faint track was observed 100 m to the west – travelling in a westerly direction (and could not be followed further as the track became covered over – or too faint). Track size indicate female and/or sub-adult male (group length – 200 mm; group width – 70 mm; hind foot length 50 mm) (see photograph in Figure 8-5). There is no evidence that a large male is present.

- It is inferred that only one or two individuals occupy the site (based on the low abundance and localised nature of diggings, and only one size of track was observed (however, camera surveillance would be required to confirm).
- No scats found / observed, despite searches in spoil at digging sites.
- The site supports an open Acacia shrubland over Soft Spinifex (*Triodia pungens*), with scattered *Corymbia opaca* (see photographs in Figure 8-4). Common shrub species are *Acacia lysiphloia* (Turpentine) and *A. stipuligera*, and to a lesser extent *Grevillea refracta*. Apart from Turpentine, no other food plants were recorded. Small termite mounds and invertebrate holes (e.g. spiders) are present, and may be a food source at this site.
- This site also is one of the few patches of sandplain (within the survey area) that has not burnt within the past 10 years (according to NAFI data), which is potentially why mature patch of Acacia shrubs are present. The vegetation adjacent to the burrows burnt 5 and 7 years ago.

The seven potential bilby sites (51, 52, 53, 54, 94, 95 and 97) were all burrows located within the existing railway corridor, but outside of the OHTL Corridor. These burrow sites were not ground-checked due to railway corridor access requirements; however, while detailed hover inspections indicate that burrows are likely to be Greater Bilby (i.e. distinctly-circular entrance), they do not appear to be currently active (no fresh spoil, or proximate diggings). Three of these burrows (sites 51, 52 and 53) were close (< 500 m) to the active burrow site described above (site 49).

The remaining 28 sites where putative bilby sign was observed during the aerial survey were 'not bilby' as re-inspection clearly identified sign as goanna (either *Varanus gouldii* or *Varanus panoptes*).

- Twelve sites were large burrow thought to be made by the Floodplain Monitor (*Varanus panoptes*) – shown on Figure 8-3, example photograph provided in Figure 9-2, and site ID's and coordinates provided in Appendix B. These burrows all occurred within alluvial plain habitat, or on the fringes of clay pans. This is characteristic habitat for this species. This species is discussed in more detail in Section 9.
- Sixteen sites were attributed as Sand Goanna (*Varanus gouldii*). Burrows from this species are smaller than those made by adult *V. panoptes* (described above) and occurred in a spinifex sandplain habitat (more typically of *V. gouldii*); however, it is possible that juvenile *V. panoptes* may also be responsible for these burrows (cannot reliably distinguish without direct sighting). It is noted that Sand Goanna burrows and diggings were commonly observed during the survey, and as such, a large proportion of them were not recorded as putative bilby sign because the initial flyover confirmed sign as *Varanus spp.* (i.e. clearly not bilby).

It is noted that all of the targeted habitat-based checks (13 sites in total) did not detect any sign of Greater Bilby (based on two ground checks and 11 detailed low altitude aerial checks). This indicates it is unlikely that the false negative detections occurred during the aerial survey.

Infield discussions with Cultural Managers (Peter and Scott Henderson) indicated they may have observed bilby tracks during geotechnical surveys in 2021 to the west of Thommo's Bore – i.e. on the northern boundary of the Solar Precinct – although no pictures were collected to confirm identification. Cultural Managers did not encounter any burrows or diggings at this site. Whilst unconfirmed, this information indicates that bilby may be active (in small pockets) to the east of the OHTL Corridor in sandplain areas.

This survey, and the previous survey in 2020, indicates that Greater Bilby sign is concentrated to within the railway easement. To date, there is no evidence that Greater Bilby utilise habitat within the Solar Precinct to the east of the OHTL Corridor; however, the presence of immediately-adjacent, active burrows at site 49 means that it is possible that a portion of the western side of the Solar Precinct (at least) may be used for foraging by Greater Bilby.

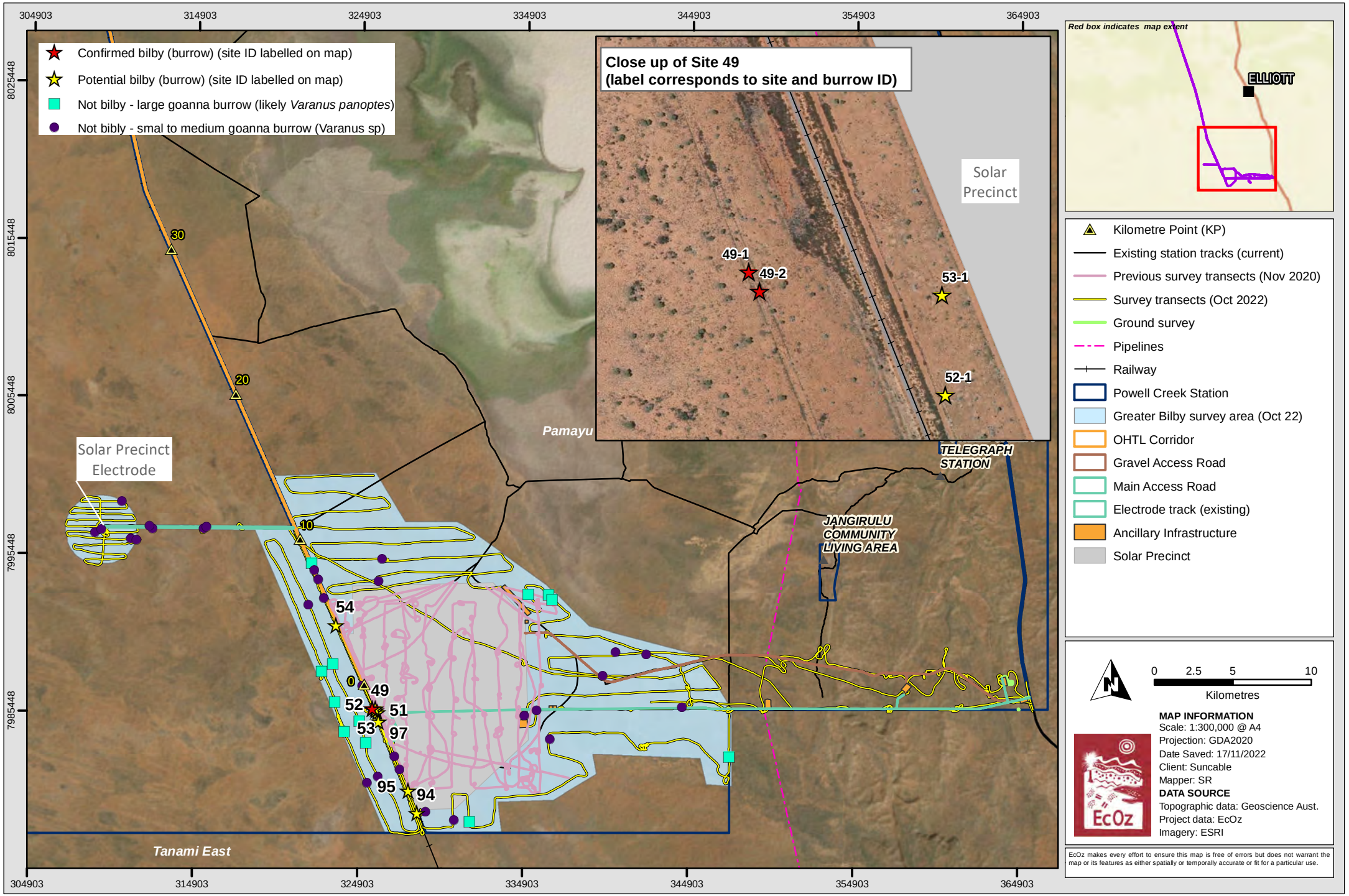

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Figure 8-3. Map of Greater Bilby survey results (October 2022)

Aerial view (yellow arrow pointing to fresh spoil under shrubs)

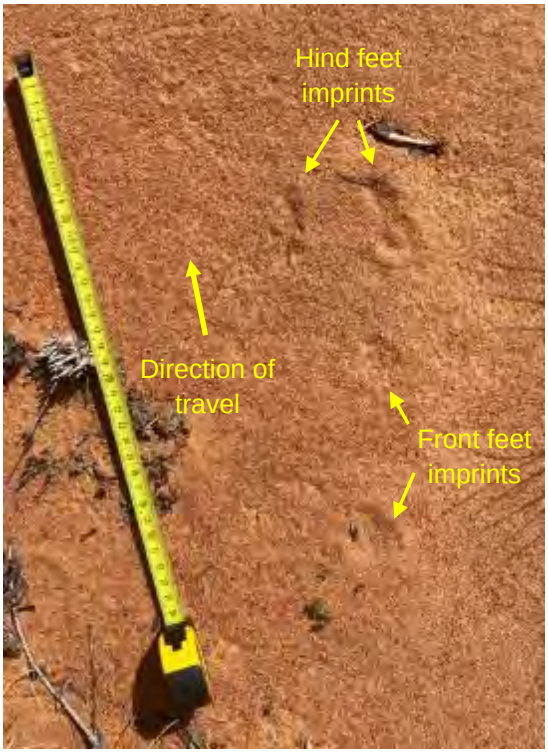
Aerial view (yellow arrow pointing to fresh spoil under shrubs)

Active burrow at site 49 (burrow ID 49-1)

Active burrow at site 49 (burrow ID 49-2)

Figure 8-4. Photograph of active Greater Bilby burrows at site 49

RDL digging



Greater Bilby tracks

Figure 8-5. Photographs of Greater Bilby sign observed at site 49

Figure 8-6. Photograph of general habitat at site 49 (where Greater Bilby sign was confirmed)

Figure 8-7. Aerial photograph of potential bilby burrow observed at Site 53 on the eastern side of railway. Not recently used as spoil is old and semi-bleached.

8.4.3 Habitat assessment

Overview

The current survey confirmed that the Ancillary Infrastructure components and Access Roads within the Ashburton Range are unlikely to support Greater Bilby. The majority of the Redsan portion of the Project footprint contains suitable habitat for the Greater Bilby – patches of *Acacia lysiphloia* (Turpentine) in association with Soft Spinifex (*Triodia pungens*) on sandplains. This habitat is widespread in the area (and the surrounding desert sandplains and dune fields in the Tanami Desert to the west) and is not unique to the survey area. No habitat characteristics that the Greater Bilby is strongly associated with – such as laterite rises, palaeo-channels or freshly-burnt areas – are present within the Project footprint. Moreover, apart from *Acacia lysiphloia* and termite mounds, there is currently a low abundance and richness of potential food plants available within the Project footprint.

It is possible that the railway corridor provides better quality habitat for Greater Bilby than surrounding habitat, due to the exclusion of cattle, presence of micro-habitat features such as depressions (from borrow pits), and evidence of more of a mosaic burn pattern. There is also anecdotal evidence that bilby favour linear structures such as railway lines and tracks (although, so do their predators).

Feral Cat (*Felis catus*) sightings and tracks were observed at several locations during the survey, including the site where Greater Bilby was confirmed (site 49). Feral Cats are a predator species of Greater Bilby and their apparent occurrence within the survey area may apply pressure on small, isolated occurrences of bilby – particular juveniles and females (as they are more susceptible to cat predation than mature males).

Pastoral activity may also play a role in habitat suitability for bilby in the area. Currently, there is a higher level of pastoral impact east of the railway – due to the presence of bores and tanks – with survey observations identifying a higher frequency of cattle pads, grazing impacts and hoof density. In addition, the managers of Powell Creek Station have recently installed new bores in the southern end of the station – including within the Solar Precinct footprint. This would likely have a negative impact on suitable bilby habitat moving forward. The land to the west of the Solar Precinct has no bores and is not currently used for cattle grazing, and so may provide better quality habitat for the Greater Bilby.

The Project footprint and surrounds have experienced relatively large-scale fires – particularly in the spinifex sandplains. Large-scale fires can reduce habitat quality for bilby (who prefer mosaic-type burning). It is likely that the mosaic of *Acacia lysiphloia* within the area is driven by fire scars and, as such, its presence across the landscape will likely vary between seasons and years based on fire history (and bilbies will move with those

changes). As discussed above, the active burrows at site 49 occur in an area that has not burnt for 10 to 11 years, and are on the edge of several different fire scars (thereby providing access to a range of fire ages), potentially due to the presence of the railway (fire break) and clay pan area to the west (very low fire frequency).

HVDC Electrode Line Corridor and Powell Creek Electrode

There was no evidence of Greater Bilby within the HVDC Electrode Line Corridor and Powell Creek Electrode Site, or within the surrounding 2 km buffer area. These Project footprints occur on a gently sloping sandplain that supports an open Acacia shrubland over spinifex (photographs provided in Figure 8-9). The dominant shrub species is *Acacia stipuligera* with a patchy occurrence of *A. ancistrocarpa*, *Brachychiton multicaulis, Grevillea refracta* and *Melaleuca viridiflora*. Scattered or sparse shrubs include *A. lysiphloia, A. sericophylla, Petalostigma nummularia, Petalostylis cassioides* and *Mirbelia viminalis*. The site also supports fire-impacted trees including *Eucalyptus victrix* and *Corymbia opaca* (current part of the shrub layer as they have been reduced to mallee form from repeat fire events). The presence of species such as *M. viridiflora* and *E. victrix* indicates that the sandplain becomes periodically wet, or there is an underlying clay layer that retains moisture to support these species.

It is considered that habitat within the HVDC Electrode Line Corridor and Powell Creek Electrode is suitable for Greater Bilby; however, similar habitat is widespread in the surrounding region and this component of the Project footprint does not provide any unique habitat characteristics specifically favoured by bilby. In fact, there is currently a low abundance and richness of potential food plants available (i.e. only scattered Turpentine observed). Nonetheless, food availability may change post-fire (as it can in most of this landscape), because many tree species that the Greater Bilby prefer are post-fire ephemerals.

Figure 8-8. Aerial photograph of the Electrode site

Figure 8-9. Photographs of sandplain habitat within the HVDC Electrode Line Corridor and Powell Creek Electrode

Access Roads

There is no evidence of Greater Bilby within or adjacent to the Access Roads, despite the sections of road within the Redsan land system to the west of Ashburton Range supporting suitable habitat for bilby. It is noted that Access Roads in this area (and on the Redsan land system) have been positioned on existing station tracks. Nonetheless, it should be assumed that vegetation in that land system surrounding the existing station tracks is suitable for bilby. Although several potential food plants were observed on the rocky hills (such as *Acacia hilliana, A. lysiphloia* and *A. monticola*) intersected by the sections of road within the Ashburton Range, the hard rocky substrate that dominates this area is not considered to be suitable habitat for Greater Bilby.

Ancillary Infrastructure

There is no evidence of Greater Bilby within the Ancillary Infrastructure areas or surrounds; however, suitable habitat is present within most sites where infrastructure is proposed in the Redsan land system area (see Table 8-3; representative photographs of Ancillary Infrastructure sites are provided in Figure 8-10, Figure 8-11 and Figure 8-12). Such habitat is widespread in the surrounding region and the Ancillary Infrastructure sites do not provide any unique habitat characteristics specifically favoured by bilby.

Cattle impacts within most of these areas was generally very low within sandplain habitat types. The Aerodrome was the infrastructure component within the Redsan area that had notable cattle presence (i.e. tracks commonly observed and minor grazing). This area is dominated by tussock grass which is more palatable to cattle than the spinifex grasslands that typically dominant the sandplains. The Aerodrome is also closer to long-term, established bores (i.e. Thommo's Bore) – bores shown on Figure 8-3.

Table 8-3. Greater Bilby suitability assessment of Ancillary Infrastructure areas

Name	Suitability	Habitat description
Main site office	Yes	Flat sandplain. Sparse *Acacia lysiphloia* shrubland over spinifex, with scattered trees (*Corymbia opaca*).
Security / site access	Yes	Flat sandplain. Sparse *Acacia lysiphloia* shrubland over spinifex, with scattered trees (*Corymbia opaca*).
Batch plant	Yes	Flat sandplain. Sparse *Acacia lysiphloia* shrubland over spinifex, with scattered trees (*Corymbia opaca*).
Aerodrome	Yes, but lower likelihood	Flat loamy plain, sandplain transition. Tussock grassland within scattered small trees (*Bauhinia cunninghamii, Corymbia opaca* and *C. flavescens*) and scattered shrubs (*Carissa lanceolata*, *Acacia lysiphloia, Hakea arborescens*). Some sandplain patches with spinifex.
Contractor (north)	Yes	Sandplain. *Acacia lysiphloia* and *Petalostigma nummularia* shrubland (patchy) over spinifex, with scattered trees (*Corymbia opaca, C. flavescens* and *Bauhinia cunninghamii*).
Contractor (south)	Yes	Sandplain. Open to patchy *Acacia lysiphloia* shrubland over spinifex, with scattered trees (*Corymbia opaca*).
Contractor (east)	Yes	Sandplain. Open to patchy *Acacia lysiphloia* shrubland over a combination of both spinifex and tussock grasses, with scattered trees (*Corymbia opaca*).
Temporary Construction Accommodation	No	Located on Ashburton Range. Undulating lateritic plateau with areas of sandstone outcrop. Open to sparse low Eucalyptus woodland over spinifex. Sparse shrubs.
Borrow Pit 1	No	Located on Ashburton Range. Gravel (laterite) plateau. Very low shrubland (*Acacia hilliana*) over spinifex, with sparse to isolated Snappy Gum trees (*Eucalyptus leucophloia*). Dense patches of *Acacia monticola* in sandy low points/ /shallow gullies.
Borrow Pit 2	Yes, but lower likelihood	Located on the western edge of Ashburton Range. Lateritic plain. Open low woodland (*Eucalyptus victrix, Ventilago viminalis, Hakea spp*.), patchy shrubland (*Acacia lysiphloia*) over tussock grass.
Vehicle Staging Area	No	Located on Ashburton Range. Lateritic plain. Low open woodland (*Eucalyptus leucophloia*) over spinifex. Patches of Acacia shrubs (*A. lysiphloia, A. monticola, A. holosericea*). *Melaleuca viridiflora* shrubs in old gravel pits / scrapes. Small patches of gravel plateau with low shrubland (*A. hilliana*) over spinifex.

Figure 8-10. Photographs of Aerodrome (considered to have low suitability for Greater Bilby)

Main site office

Security / site access

Batch plants

Contractor area (north)

Contractor area (south)

Contractor area (east)

Figure 8-11. Photographs of Ancillary Infrastructure sites that support suitable Greater Bilby habitat

Temporary Construction Accommodation

Borrow pit 1

Borrow pit 1 (aerial)

Borrow pit 2

Vehicle Staging Area

Figure 8-12. Photographs of Ancillary Infrastructure sites outside the Redsan land system

9 YELLOW-SPOTTED MONITOR

Yellow-spotted Monitor (*Varanus panoptes*) is listed as Vulnerable under the TPWC Act, but not listed under the EPBC Act. The distribution of this species coincides with most of the AAPowerLink Project, but for reasons explained in the Draft EIS, the potential presence of Yellow-spotted Monitor within the large area required for the Solar Precinct infrastructure is most relevant from an impact assessment perspective.

The Project footprint (at the Powell Creek Solar Precinct) occurs on the southern edge of the current distribution (see inset in Figure 8-1); however, there are isolated records as far south as Tennant Creek. There are no documented previous records of the species within the Project footprint, and only historic records from the surrounding area (from the 1970s) – noting that this may be due to paucity of survey effort rather than species' absence. However, discussions with DEPWS and Traditional Owners of the area indicate that the species is known to occur in the region – According to the NT Atlas and discussions with Cultural Managers, the Yellow-spotted Monitor has a high likelihood of occurrence in the region traversed by the Main Access Road and Gravel Access Road, especially in floodplain and alluvial habitat linked to Lake Woods, and fringing sandplains and open woodlands.

Previous surveys for the Solar Precinct in October 2020 (EcOz 2020) identified a large goanna burrow to the south-east of the Solar Precinct likely made by *V. panoptes* (location shown on Figure 9-1).

This survey aimed to supplement the previous survey within the Solar Precinct, and record potential burrows from *V. panoptes* within the Ancillary Infrastructure and surrounding areas.

9.1 Methodology

The survey was conducted between the 24 and 25 October 2022 by Tom Ewers-Reilly and Mark Carter. The survey involved strategic searches for large goanna burrows using a combination of aerial and ground-based observations. This was conducted at the same time (and used similar detection strategies) as Greater Bilby surveys (described in Section 8). Adults *V. panoptes* create large burrows, significantly larger than other *Varanus spp*. know to occur in the region (such as the widespread Sand Goanna *Varanus gouldii*). Burrows also tend to be wider than Greater Bilby, and have a flat, elongated bottom or kidney shape (in contrast to the circular entrance made by Greater Bilby).

For the purpose of this assessment, large goanna burrows (entrance width >150 mm; height >100 mm) were assumed to be made by *V. panoptes*. Burrow location was recorded by GPS and activity status was described (i.e. active if fresh spoil, digs and tracks are present; inactive if no recent activity). Basic habitat notes were recorded (i.e. landform and dominant vegetation).

9.2 Results and assessment

Twelve large goanna burrows were recorded as part of aerial surveys; all are assumed to be made by *V. panoptes* (example photograph shown in Figure 9-2; locations shown on Figure 9-1). None of these sites are within the Project footprint; however, site 98 is only 8 m to the east of the OHTL Corridor.

Ground inspection of an active burrow at site 42 had very large and relatively straight tail drags – which is further evidence of *V. panoptes*. Seven burrows had obvious signs of activity (sites 42, 43, 44, 46, 48, 87, 92 and 98), and burrows at sites 47, 57, 58 and 59 were either inactive or required ground inspection to confirm (as observations were mostly made from helicopter).

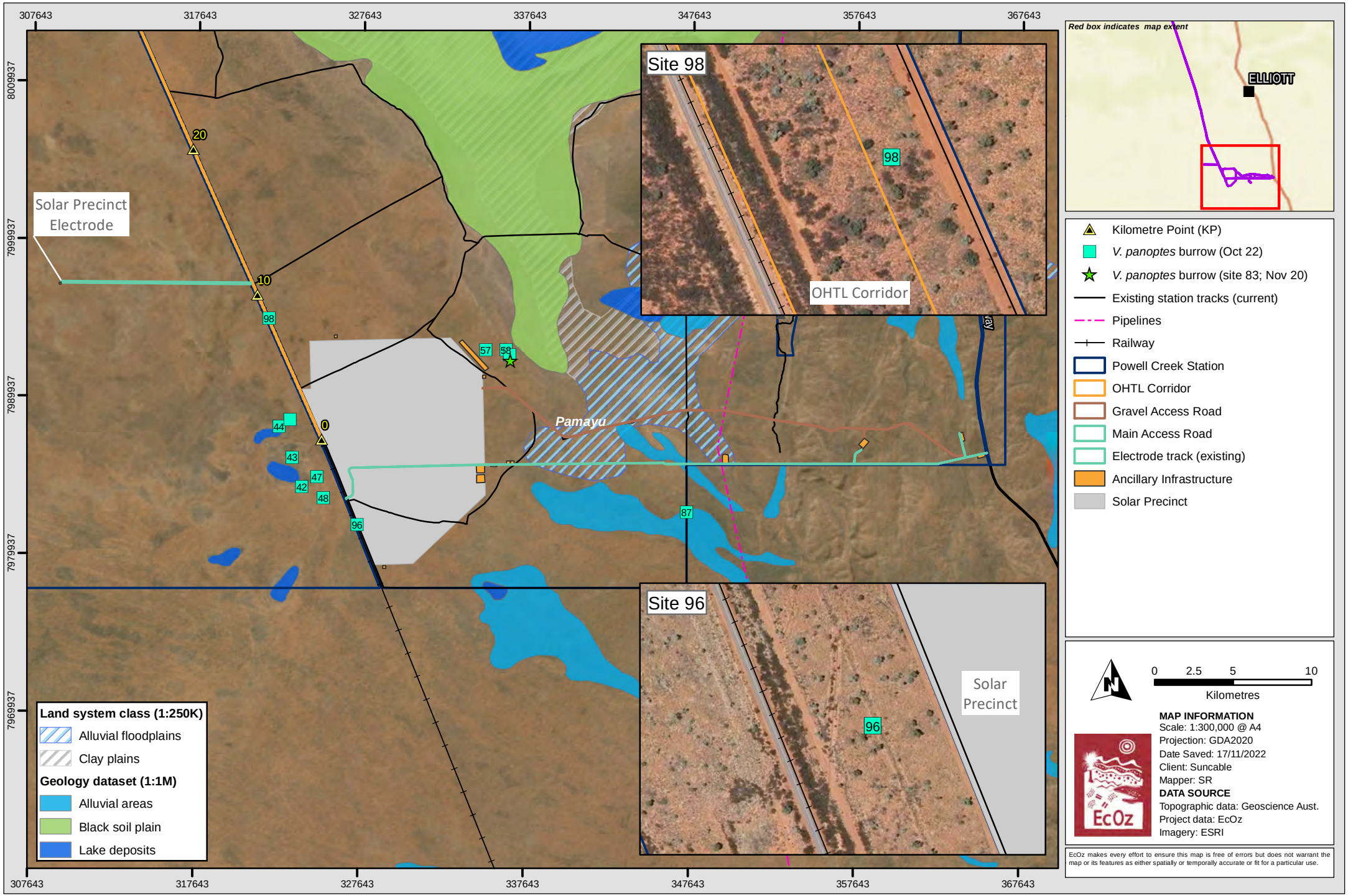
Sand Goanna (*Varanus gouldii*) was more commonly observed than *V. panoptes* (point data of *V. gouldii* was not systematically recorded) especially within sandplain-dominated areas such as the Solar Precinct.

The majority of potential *V. panoptes* burrows were observed close to alluvial areas (sites 57, 58, 59 and 87) and ephemeral lakes (site 42, 43, 44, 46, 47 and 48). Vegetation was Soft Spinifex grassland (*Triodia*

pungens) with open to scattered shrubs, Bloodwood trees (*Corymbia opaca* or *C. flavescens*) and/or Smooth-barked Coolabah (*Eucalyptus victrix*) and Silver Box (*Eucalyptus pruinosa*).

Only two sites (sites 92 and 98) had potential *V. panoptes* burrows that were situated away from alluvial-based habitat. Both sites occurred within the railway corridor adjacent to, but outside of, the OHTL Corridor in loamy plains that support spinifex with open Silver Box (*Eucalyptus pruinosa*). The railway corridor has numerous borrow pits and scrapes that often hold water for short periods of time post-rainfall. As such, the modified habitat within the railway corridor may create micro-habitat features characteristics suited to those preferred by *V. panoptes*. The survey did not detect any suspected *V. panoptes* burrows within the broad sandplains.

The survey indicates that it is likely that *V. panoptes* is present within the buffer zone of the Project footprint and adjacent to the OHTL Corridor (in the existing railway corridor). Suspected detections were more common within, or fringing, alluvial-based landforms. Although the species is more likely to occur in alluvial-based landforms (which fall outside Project footprint), *V. panoptes* is highly mobile, and could occur anywhere within the Project footprint outside of the rocky areas associated with the Ashburton Range.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Fig 9-1 Yellow-spotted monitor burrows.mxd

Figure 9-1. Map of sites where potential Yellow-spotted Monitor *(Varanus panoptes*) burrows were observed

Figure 9-2. Photograph of large goanna burrow at Site 42 (assumed to be *Varanus panoptes*)

Figure 9-3. Photograph (aerial) of potential *V. panoptes* burrow at site 44

10 GOULDIAN FINCH

Gouldian Finch (*Chloebia gouldiae*) is listed as Endangered under the EPBC Act and Vulnerable under the TPWC Act, although some sources believe that Gouldian Finch populations may have recently stabilised, and perhaps begun to increase and spread (Garnett et al. 2021).

The critical components of suitable habitat for the Gouldian Finch vary seasonally. In the dry season, the critical components are hollow-bearing Eucalyptus trees – species of relevance to the AAPowerLink Project are *Eucalyptus tintinnans, Eucalyptus leucophloia* and *Eucalyptus brevifolia* – with an understorey of the favoured species of annual grass and a nearby source of surface water. The established view is that Gouldian Finches feed on five grass species as the seeds of these species become seasonally available (Lewis 2007) – *Sorghum intrans, Alloteropsis semialata, Chrysopogon fallax, Triodia bitextura* and *Heteropogon triticeus* – and that birds will move from area to area as the seeds from each species become available (Dostine and Franklin 2002; Dostine et al. 2001). However, recent observations of Gouldian Finches eating the seeds of Gamba Grass in northern Darwin suggest that the species' diet is broader.

In the NT, most known breeding populations occur in the Top End, with some isolated records in the Barkly Tableland and in coastal areas of the Gulf of Carpentaria. Non-breeding birds disperse widely (Garnett et al. 2021). In 2022, there appears to have been an irruption of Gouldian Finches in the NT, with many records from outside of the species' usual distribution – from as far north as in Darwin's suburbs, to as far south as near Powell Creek Station, with observations of Gouldian Finch (including juveniles) on Newcastle Water Station drinking from a cattle water trough (pers. comm. Lauren Young 2021, DEPWS). Other than that – there are no documented records of the species within the Ashburton Range or surrounds.

The distribution of this species coincides with most of the AAPowerLink Project, but because the Solar Precinct infrastructure occurs at the southern extent of the species' current distribution (including recent sightings in the region – see inset in Figure 10-4) – and in response to Draft EIS comments received from EPWS – a targeted survey was undertaken of suitable breeding habitat relevant to the Solar Precinct infrastructure. In this region, tree hollows in mature Snappy Gum (*Eucalyptus leucophloia*) are the most likely trees to be used by Gouldian Finch for nesting purposes (O'Malley 2006; Garnett et al. 2011; Tidemann et al. 1992). Snappy Gum are known to occur on rocky slopes and plains on the Ashburton Range, of which some Project components are planned to be established – namely the Solar Precinct access tracks, two borrow pits and temporary construction accommodation.

Subsequently, a field survey was conducted to assess the quality of nesting habitat present in project components situated within the Ashburton Range, and map the general extent of Snappy Gum habitat in those areas. The presence of permanent or semi-permanent waterholes was also surveyed, because Gouldian Finch require suitable water source within 2 to 4 km of nest sites (O'Malley 2006). The Solar Precinct Electrode and Ancillary Infrastructure areas within the sandplains to the west of Ashburton Range do not support suitable nesting habitat for Gouldian Finch, and were not part of the survey area for this species.

10.1 Methodology

The survey was conducted on 24 and 25 October 2022 by Tom Ewers-Reilly and Mark Carter. Field work was undertaken using aerial observations (R44 helicopter) to fly over project components and inspect for the presence of Snappy Gum trees and nearby waterholes. If Snappy Gum trees were observed, a ground-based assessment was undertaken to assess potential nesting suitability for Gouldian Finch (described below).

Mature trees were examined to check whether a hollow was present or not. If hollows were present, then data were collected to allow assessment of potential suitability of that hollow for Gouldian Finches, which have relatively specific hollow preferences (Harden et al 1986; Brazill-Boast et al. 2010; Brazill-Boast et al. 2011). Individuals or groups appear to first select patches of habitat with high densities of potential nesting sites, and breeding pairs then select specific nest sites based on a suite of preferred hollow morphometric attributes

(Brazill-Boast et al. 2010). For the purpose of this assessment, suitable Gouldian Finch hollows were defined as follows:

- Occurring in a large mature (robust) tree
- Hollow is living tissue (i.e. not a dead wood hollow)
- Hollow entrance diameter between 25 to 100 mm (Gouldian Finch prefer smaller entrance diameters)
- Hollow goes relatively deep into the trunk
- Hollow is at least 2 m above the ground
- Hollow is no more than 45º from horizontal (Gouldian Finch prefer horizontal hollows).

In addition, each hollow was checked for evidence of finch use, by examining the hollow for nesting material. Gouldian Finch, Long-tailed Finch, Zebra Finch and Double Barred Finch may all breed in hollows, although only the Gouldian Finch is an obligate hollow-nester (Higgins et al. 2006). These finches all line the hollows with fine grass to create their nest (NA 2022). Gouldian Finches build the simplest structure – a flat grass platform or shallow cup at the base of the cavity, whereas other finches typically build a more elaborate grass nest dome with a short side tunnel. For all finches, the presence of nestling faecal material indicates a nest that has successfully produced young.

Potential feeding grasses were also opportunistically recorded. This aimed to confirm the general presence and abundance of potential foraging areas for Gouldian Finch. Common dietary grass species include *Alloteropsis semialata, Chrysopogon fallax, Panicum decompositum, Triodia* spp*., Xerochloa* spp*., Sorghum* spp*., Schizachyrium* spp*.* and *Themeda triandra* (Dostine et al. 2001; Dostine and Franklin 2002).

Aerial imagery was used to identify potential waterholes and springs, which were then ground-truthed during field survey. Larger creeks and drainages are assumed to hold intermittent pools during and post wet season.

Systematic bird-watching to observe Gouldian Finch was not undertaken as part of this survey. Instead, it was assumed the species is present in the area and nesting-habitat avoidance is considered as the key mitigation to avoid significant impact to the species. Opportunistic ground-checks did occur where possible.

10.2 Results and assessment

The survey confirmed that Snappy Gum (*Eucalyptus leucophloia*) is present within the rocky hills and plateau of the Ashburton Range component of the Project footprint. Snappy Gum trees were typically present as a low open woodland or scattered to sparse trees, with a spinifex grass (*Triodia spp*.) understorey. Representative photographs are provided in Figure 10-2.

The survey indicates that mature Snappy Gum is most likely to occur within the Project footprint at Borrow Pit 1, the Vehicle Staging Area and various locations on the Main Access Road (including but not limited to sites 2, 16, 18, 19, 20, 21, 23 and 24) and a few locations on the gravel road (including, but not limited to, sites 69, 70, 75 and 77) – location shown on Figure 10-4.

The majority of Snappy Gum trees have been impacted by fire within the Project footprint. This has affected both the structure of the trees with potential breeding hollows, and the structure and mosaic of the understorey Triodia hummocks. Most Snappy Gum trees have multiple thin stems around a large, degraded, burnt stem (i.e. mallee structural formation) (see photographs in Figure 10-2). This structure is not conducive to supporting hollows typically used by Gouldian Finch. In fact, very few of the fire impacted trees that have been reduced to multiple stems had hollows of any type.

Mature Snappy Gum were present in the area (but relatively uncommon), and supported hollows of varying shapes and sizes (example photographs shown in Figure 10-1); but no suitable Gouldian Finch nesting hollows were observed (as per definitions in methodology). However, it is noted that extensive ground checks of the entire footprint were not undertaken as part of this survey.

No waterholes were identified within, or adjacent to, the Ancillary Infrastructure on the Ashburton Range. The drainages and small creeks within the Project footprint area may support small episodic pools during the wet season – however, none contained water at the time of survey. Waterholes/springs were observed in the

surrounding area (greater than 2 km) – these locations may provide better quality nesting habitat for Gouldian Finch (shown on Figure 10-4).

One targeted bird-watching site survey (duration 1 hour) was undertaken at water pools within the Hunter River (located on the western side of Ashburton Range). A wide diversity of bird species was observed at this location (including the Zebra Finch); however, Gouldian Finches were not observed. Zebra Finch grass nests were observed in dead Snappy Gum hollows on a few occasions (example photographs shown in Figure 10-3).

Potential foraging grasses are present in the general area (mostly in the alluvial plain and drainages areas), with the following species encountered – *Triodia spp.* (widespread), *Chrysopogon fallax* (common), *Panicum decompositum* (uncommon), and *Themeda triandra* (uncommon). The presence of these species confirm that suitable foraging areas are present in the area.

In summary, the survey indicates that that Snappy Gum trees within, and in the vicinity of, the Project footprint are unlikely to be used for Gouldian Finch for nesting purposes. Some areas may be used as foraging grounds; however, it is assumed that better quality nest sites are located elsewhere within the range system (i.e. closer proximity to waterholes). However, as a precaution, it should be assumed that mature Snappy Gum trees on Ashburton Range have potential to support suitable nesting hollows for Gouldian Finch.

Figure 10-1. Photograph (example) of mature Snappy Gum present in the area

Although the survey did not observe any viable nesting hollows for Gouldian Finch, mature trees such as those in this photograph should be treated to potentially support suitable nesting hollows for Gouldian Finch.

Figure 10-2. Photographs of Snappy Gum open woodlands within the Ashburton Range

Figure 10-3. Photograph of Zebra Finch nest in hollows on Snappy Gum within the Ashburton Range

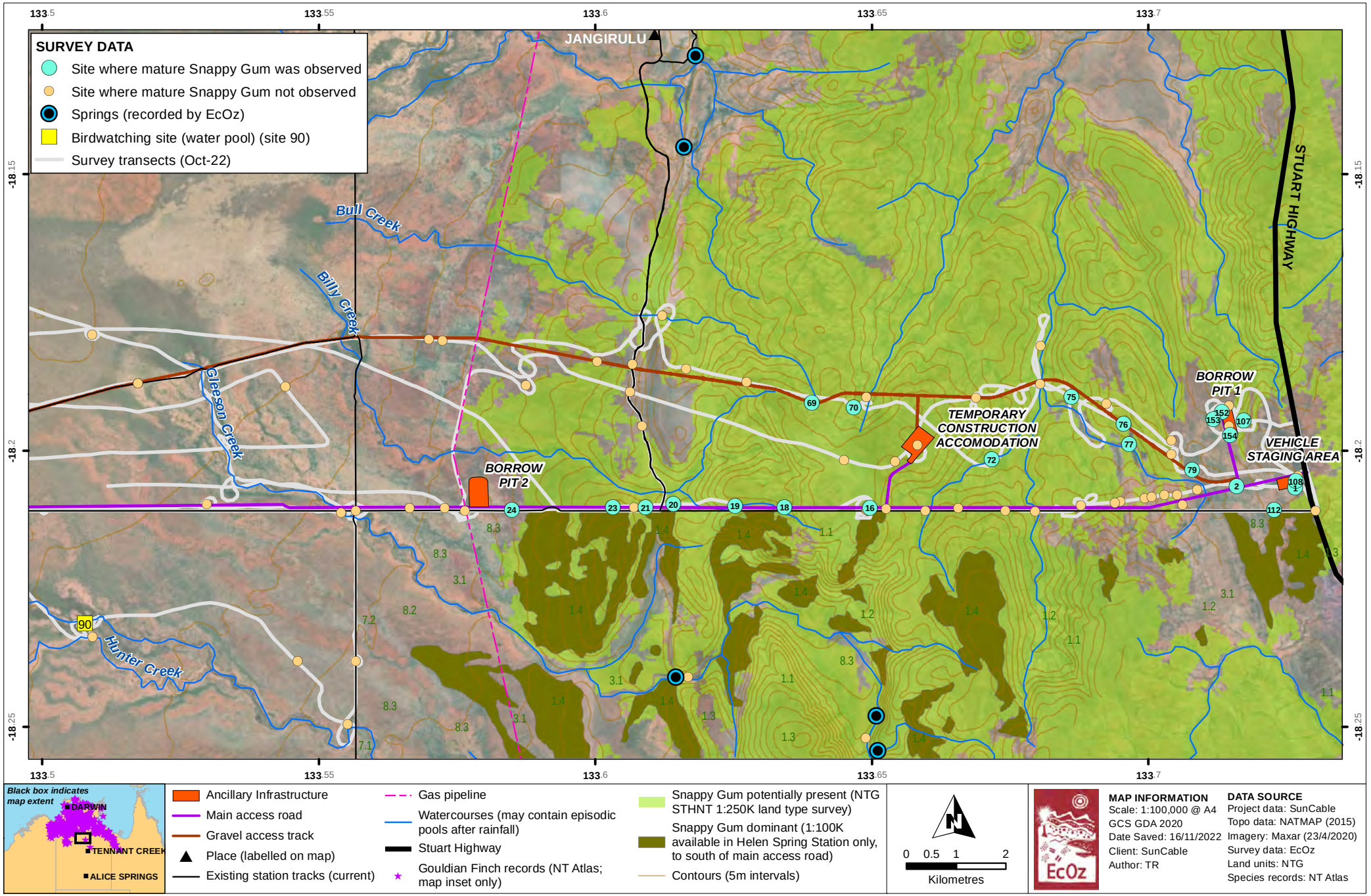


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Figure 10-4. Map of the Gouldian Finch nesting habitat survey (October 2022)

11 GREY FALCON

Grey Falcon (*Falco hypoleucos*) is listed as Vulnerable under both the EPBC Act and the TPWC Act. There is an undated record of the species within the Ashburton Range. Potential impacts to Grey Falcon from the project are primarily associated with direct clearing (or disturbance) of current or suitable nesting habitat; therefore, the survey and assessment for this species focused on identifying suitable nesting habitat within the Powell Creek project footprint and surrounding area.

A study of breeding records from 2003 to 2011 by Schoenjahn (2013) documented 38 breeding events of the species, which noted that breeding (nest) sites were south of Daly Waters. Based on this, the Project footprint occurs within the breeding range of the species. Grey Falcons occupy nests (often built by other bird species) in the tallest trees along watercourses (Garnett et al. 2011). Nesting normally occurs between June to November (Ward 2012), as such the survey falls at the end of the normal nesting season for the species. Grey Falcons are also known to nest on telecommunication towers (Ward 2012) – which are not present within the Project footprint or proximate.

Grey Falcons are most likely to be present in the area when large flocks of small to medium-sized birds are present – such as Budgerigar and Zebra Finch – as these are target prey.

11.1 Methodology

To help address a Draft EIS comment from DEPWS, a Grey Falcon breeding habitat survey was conducted on 24 and 25 October 2022 by Tom Ewers-Reilly and Mark Carter. Field work was undertaken using aerial observations (R44 helicopter) to fly over project components and inspect for the presence of tall trees established along creek lines. The main tree species of interest for nest establishment in this region is the River Red Gum (*Eucalyptus camaldulensis*).

All drainages / creek lines that support River Red Gum were recorded as potential nesting habitat for Grey Falcon. These drainages were also checked for the presence of raptor nest in the tree canopies (checks were conducted by flying up and down the drainage line for a few hundred metres).

11.2 Results and assessment

The survey did not observe any suspected Grey Falcon nests, nor was the species observed during bird-watching. However, the survey identified several waterways with River Red Gum on their banks (sites 11, 29, 66, 72, 73, 74, 88 and 90), which are suitable for use by Grey Falcon for nesting (representative photographs provided in Figure 11-1; waterways relevant to the Project footprint are shown on Figure 11-2). The largest River Red Gum trees were mostly present within the lower reaches of Hunter Creek, Bull Creek and Gleesone Creek (see sites 29, 88 and 90) – as such, those areas are likely to be more suitable for Grey Falcon nesting. However, vegetation clearing will not be required in these areas as existing station tracks are utilised for the Access Roads.

In summary, the survey did not identify any suspected nests of Grey Falcon within the footprint or surround; however, suitable nesting trees (River Red Gums) are present on some watercourses on the Ashburton Range, and associated alluvial plains to the west.

Site 11 – moderate drainage (un-named) within Ashburton Range that supports Sparse River Red Gum

Site 29 – major drainage (Gleeson Creek) located in the alluvial flood-out area to west of Ashburton Range

Site 73 – moderate drainage (un-named) within Ashburton Range that supports Sparse River Red Gum

Site 88 – major drainage (Hunter Creek) located in the alluvial flood-out area to west of Ashburton Range

Figure 11-1. Photographs of drainages that support River Red Gum within the general area

These areas may be suitable nesting habitat for Grey Falcon.

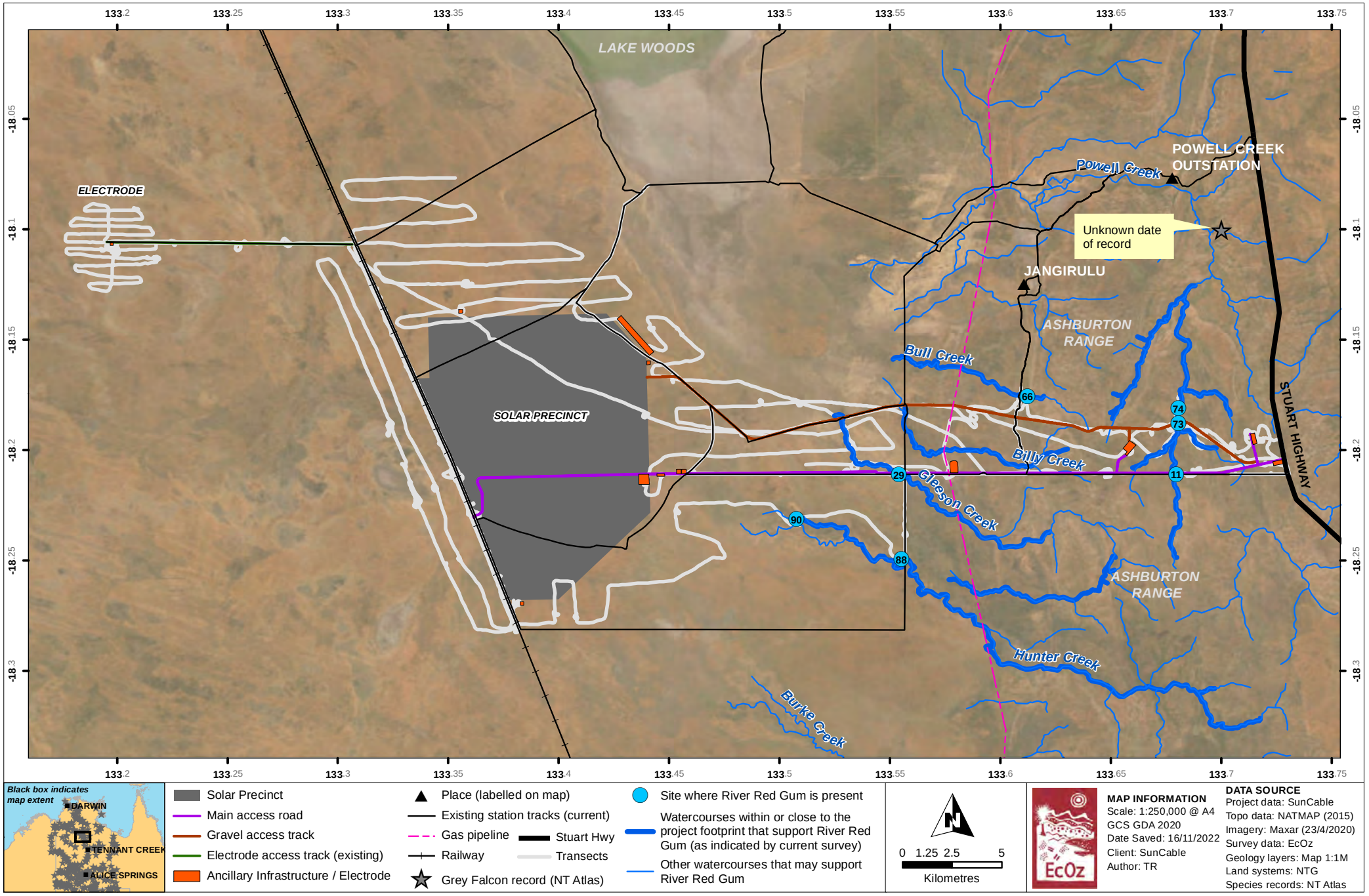

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Figure 11-2. Map of Grey Falcon survey results (October 2022)

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APPENDIX A SANDSHEET HEATH DESCRIPTIONS

Site name	SS01	Site location (GDA 2020):	733199, 8623979
Vegetation type	Open shrubland to low open woodland.		
Soil type (surface)	Fine sandy surface soils with minor silty clay.		
Other site notes	Previously disturbed, likely sand or gravel extraction.		
Vegetation	**Upper stratum**	**Mid stratum**	**Ground stratum**
Height range (m)	8 – 10 m	4 – 6 m	1 – 1.5 m
Dominant species	*Melaleuca viridiflora* *Lophostemon lactifluus* *Melaleuca nervosa* *Corymbia polycarpa*	*Grevillea pteridifolia* *Lophostemon lactifluus*	*Dapsilanthus spathaceus* *Xyris* sp. *Eriachne triseta* *Cartonema* sp. *Buchnera* sp.

Site name	SS02	Site location (GDA 2020):	738546, 8612085
Vegetation type	Low open woodland, upper and mid-stratums dense in patches.		
Soil type (surface)	Fine sandy surface soils with minor silty clay.		
Other site notes	Signs of feral animal presence observed, Gamba Grass observed nearby and throughout parts of site, *Typhonium spp*. present, potentially *Typhonium taylori*.		
Vegetation	**Upper stratum**	**Mid stratum**	**Ground stratum**
Height range (m)	6 – 10 m	4 – 6 m	0.5 – 1.0 m
Dominant species	*Melaleuca nervosa*	*Pandanus spiralis* *Syzygium eucalyptoides* ssp. *bleeseri* *Planchonia careya*	*Panicum* sp. *Fimbristylis* sp. *Murdannia* sp.

Site name	SS03	Site location (GDA 2020)	738701, 8611787
Vegetation type	Low open woodland, upper and mid-stratums dense in patches.		
Soil type (surface)	Fine sandy surface soils with minor silty clay.		
Other site notes	Signs of feral animal presence observed, Gamba Grass observed nearby and throughout parts of site. Site located south of riparian channel (Crocodile Creek). Similar to SS02.		

Vegetation	Upper stratum	Mid stratum	Ground stratum
Height range (m)	6 – 10 m	4 – 6 m	0.5 – 1.0 m
Dominant species	*Melaleuca nervosa*	*Pandanus spiralis* *Syzygium eucalyptoides* ssp. *bleeseri* *Planchonia careya*	*Panicum* sp. *Fimbristylis* sp. *Murdannia* sp.

Site name	SS04	Site location (GDA 2020)	739428, 8608921
Vegetation type	Low open woodland, upper and mid-stratums dense in patches.		
Soil type (surface)	Fine sandy surface soils with minor silty clay.		
Other site notes	Minor elements of sandsheet intersecting the project footprint, cleared patch to north-west supporting *Utricularia* spp. retaining surface water in July. Howard River Toadlet recorded near the site in 2019. Site surveyed for *Stylidium ensatum* in July, which was observed within the project footprint.		

Vegetation	Upper stratum	Mid stratum	Ground stratum
Height range (m)	8 – 12 m	2 – 6 m	0.5 – 1.0
Dominant species	*Melaleuca nervosa* *Lophostemon lactifluus* *Eucalyptus alba*	*Pandanus spiralis* *Verticordia cunninghamii* *Pandanus spiralis*	*Sorghum intrans* *Eriachne* sp. *Fimbristylis* sp.

Site name	SS05	Site location (GDA 2020)	736669, 8603715
Vegetation type	Low open woodland, mid-stratums relatively sparse. Grass and/or sedgeland groundstorey.		
Soil type (surface)	Fine sandy surface soils.		
Other site notes	Site appeared to have been associated with historical mining activity, with abrupt changes in surface water levels (i.e. sand piles, dry areas, very wet areas). *Melaleuca nervosa* trees were noticeably larger in unmined and somewhat drier areas.		

Vegetation	Upper stratum	Mid stratum	Ground stratum
Height range (m)	4 – 6 m	2 – 4 m	0.5 – 1.0 m
Dominant species	*Melaleuca nervosa* *Grevillea pteridifolia*	*Verticordia cunninghamii*	*Dapsilanthus spathaceus* *Sorghum intrans* *Utricularia* spp. *Drosera* sp.

Site name	SS06	Site location (GDA 2020)	736075, 8603268
Vegetation type	Low open woodland, mid-stratum sparse. Grass and/or sedgeland groundstorey.		
Soil type (surface)	Fine sandy surface soils, moist but no surface water observed.		
Other site notes	Site appeared similar to SS05, however, vegetation was relatively intact. No seepage or surface water was observed. Nearby activities have possibly altered hydrology of the sandsheet, with evidence of historical mining activity nearby.		

Vegetation	Upper stratum	Mid stratum	Ground stratum
Height range (m)	6 – 10 m	2 – 6 m	0.5 – 1.0 m
Dominant species	*Melaleuca nervosa*	*Grevillea pteridifolia*	*Sorghum intrans* *Drosera* sp.

Site name	SS07	Site location (GDA 2020)	735821, 8603226
Vegetation type	Low open woodland, relatively open mid-stratums. Grass and/or sedgeland groundstorey.		
Soil type (surface)	Fine sandy surface soils with minor silty clay. Surface water observed. Organic materials observed on top of sands.		
Other site notes	Small intact sandsheet, seepage observed. Some feral pig damage observed. Sandsheet fringing nearby creek.		

Vegetation	Upper stratum	Mid stratum	Ground stratum
Height range (m)	6 – 8 m	2 – 4 m	< 0.5 – 1.0
Dominant species	*Melaleuca nervosa* *Grevillea pteridifolia*	*Pandanus spiralis*	*Eriocaulon* sp. *Xyris* sp. *Utricularia* spp.

Site name	SS08	Site location (GDA 2020)	734894, 8601643
Vegetation type	Low open woodland, relatively open mid-stratums. Grass and/or sedgeland groundstorey.		
Soil type (surface)	Light brown sandy soils, with minor organic component.		
Other site notes	Signs of feral animal presence observed. Vegetation and soil components consistent with sandsheet. Non sandsheet like components - gravelly, sand colour, lack of surface water making it unsuitable for *Typhonium taylori* and *Utricularia dunstaniae*. Disturbance up slope to west.		

Vegetation	Upper stratum	Mid stratum	Ground stratum
Height range (m)	6 – 10 m	2 – 6 m	0.5 – 1.0 m
Dominant species	*Melaleuca nervosa* *Grevillea pteridifolia* *Planchonia careya*	*Verticordia cunninghamii* *Grevillea pteridifolia*	*Dapsilanthus spathaceus* *Fimbristylis* sp. *Murdannia* sp.

Site name	SS09	Site location (GDA 2020)	734822, 8601471
Vegetation type	Low open woodland, relatively open mid-stratums. Grass and/or sedgeland groundstorey.		
Soil type (surface)	Light brown sandy soils, with minor clay component.		
Other site notes	Same as SS08. Vegetation and soil components consistent with sandsheet. Non sandsheet like components - gravelly, sand colour, lack of surface water making it unsuitable for *Typhonium taylori* and *Utricularia dunstaniae*. Disturbance up slope to west.		

Vegetation	Upper stratum	Mid stratum	Ground stratum
Height range (m)	6 – 10 m	2 – 6 m	0.5 – 1.0 m
Dominant species	*Melaleuca nervosa* *Grevillea pteridifolia* *Planchonia careya*	*Verticordia cunninghamii* *Grevillea pteridifolia*	*Dapsilanthus spathaceus* *Fimbristylis* sp. *Murdannia* sp.

Site name	SS10	Site location (GDA 2020)	727679, 8598142
Vegetation type	Low open woodland, with dense shrubland (heath-like) in mid-stratum, dense sedgeland understorey.		
Soil type (surface)	Fine sandy surface soils with minor silty clay.		
Other site notes	Complex long unburned sandsheet heath community, occurring around western edge of *Melaleuca* swamp. Surface water observed in March, not in May.		

Vegetation	Upper stratum	Mid stratum	Ground stratum
Height range (m)	6 – 8 m	2 – 4 m	0.5 – 1.0 m
Dominant species	*Melaleuca nervosa*	*Verticordia cunninghamii* *Banksia dentata*	*Dapsilanthus spathaceus* *Fimbristylis* sp. *Murdannia* sp. *Utricularia* spp.

APPENDIX B GREATER BILBY SITE DATA (24-26 OCTOBER 2022)

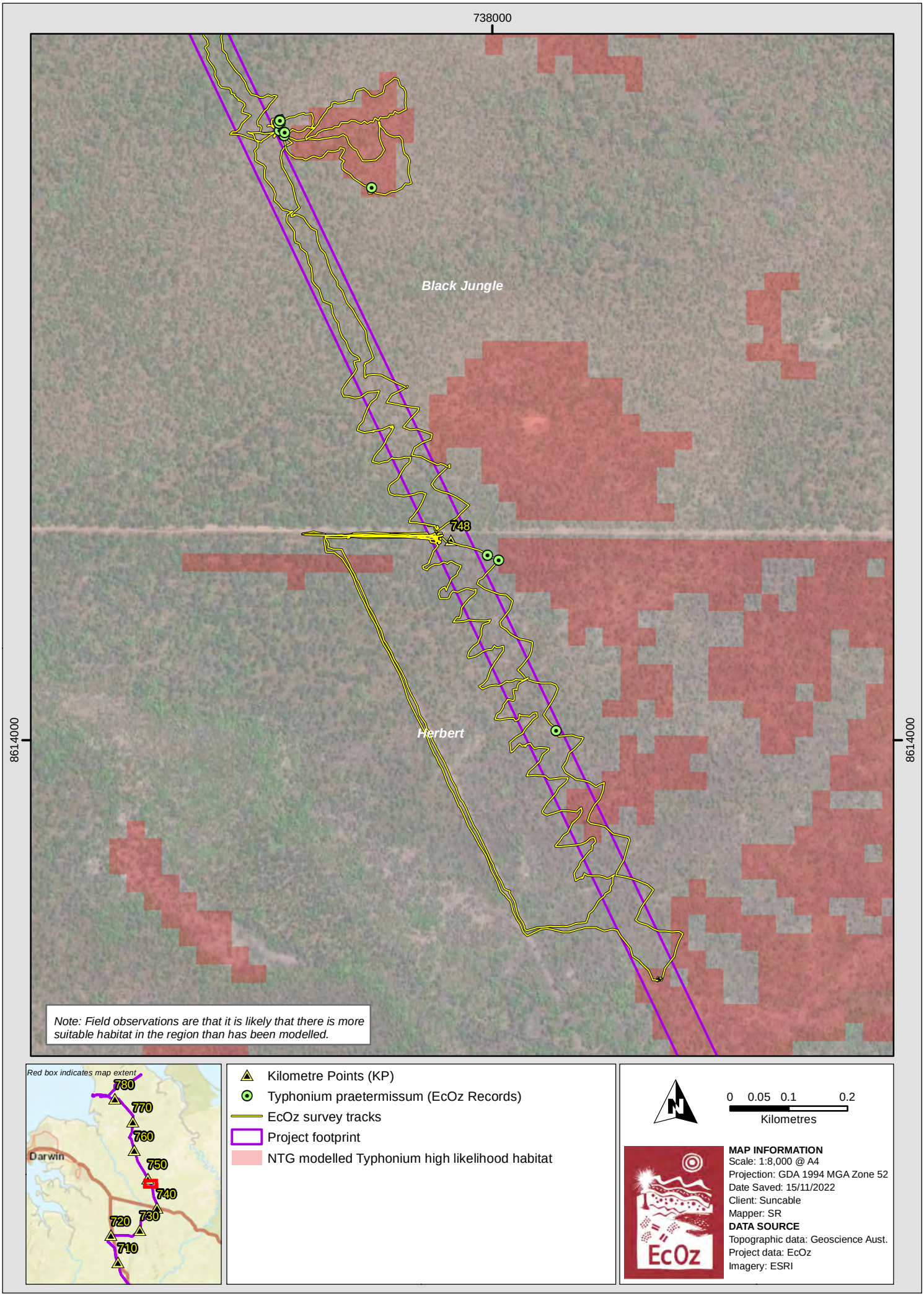
GREATER BILBY OBSERVATION DATA									
Site	**Easting**	**Northing**	**Area**	**Method**	**Category**	**Species**	**Sign**	**Landform**	**Details**
42	324064	7984288	Solar Precinct buffer - west of railway	Sign check - ground	Not bilby	*Varanus panoptes (likely)*	Burrow - active	Loamy plain	Large goanna burrow and fresh tracks
43	323470	7986171	Solar Precinct buffer - west of railway	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - active	Loamy plain	Large goanna burrow and fresh tracks
44	322651	7988107	Solar Precinct buffer - west of railway	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - active	Loamy plain	Large goanna burrow and fresh tracks
45	321819	7992339	Solar Precinct buffer - west of railway	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - active	Sandplain	Medium goanna burrow and fresh tracks; assumed Sand Goanna
46	323326	7988576	Solar Precinct buffer - west of railway	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - active	Loamy plain	Large goanna burrow and fresh tracks
47	324960	7984956	Solar Precinct buffer - west of railway	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - inactive	Loamy plain	Large, old collapsed goanna burrow
48	325380	7983593	Solar Precinct buffer - west of railway	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - active	Loamy plain	Large goanna burrow and fresh tracks
49	325744	7985797	Railway corridor	Sign check - ground	Confirmed	*Macrotis lagotis*	Burrow - active	Sandplain	2 active burrows; RDL digs (Turpentine), tracks, no scats, digs within 50m of burrows
51	326044	7985542	Railway corridor	Sign check - aerial	Potential	*Macrotis lagotis*	Burrow - inactive	Sandplain	Circular burrow; no fresh spoil; didn't ground check as within railway corridor
52	325943	7985669	Railway corridor	Sign check - aerial	Potential	*Macrotis lagotis*	Burrow - inactive	Sandplain	Circular burrow; no fresh spoil; didn't ground check as within railway corridor
53	325939	7985775	Railway corridor	Sign check - aerial	Potential	*Macrotis lagotis*	Burrow - recently used	Sandplain	Circular burrow; no fresh spoil but may have been used this season(?); didn't ground check as within railway corridor
54	323491	7991069	Railway corridor	Sign check - aerial	Potential	*Macrotis lagotis*	Burrow - inactive	Sandplain	Round burrow, low spoil, likely inactive, didn't ground check as within rail corridor
57	335131	7993090	Ancillary Infrastructure area – general	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - recently used	Loamy plain	Large goanna burrow under Conker berry; fresh spoil
58	336377	7993084	Ancillary Infrastructure area - general	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - recently used	Loamy plain	Large goanna burrow under Conker berry; fresh spoil
59	336600	7992770	Ancillary Infrastructure area - general	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - recently used	Loamy plain	Large goanna burrow under Conker berry; fresh spoil
85	335696	7985743	Ancillary Infrastructure area - Security	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area

GREATER BILBY OBSERVATION DATA									
Site	**Easting**	**Northing**	**Area**	**Method**	**Category**	**Species**	**Sign**	**Landform**	**Details**
87	347402	7982873	Ancillary Infrastructure area - general	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - active	Alluvial plain	Large goanna burrows in soil mound; potentially active
92	331690	7978659	Ancillary Infrastructure area - general	Sign check - ground	Not bilby	*Varanus panoptes (likely)*	Burrow - active	Sandplain	Large goanna burrow, potentially Panoptes, active (fresh spoil and tracks)
94	328488	7979215	Railway corridor	Sign check - aerial	Potential	*Macrotis lagotis*	Burrow - inactive	Sandplain	Potential bilby burrow, old, spoil has washed away
95	327962	7980622	Railway corridor	Sign check - aerial	Potential	*Macrotis lagotis*	Burrow - inactive	Sandplain	Potential bilby burrow, old, spoil has washed away
96	327437	7981938	Railway corridor	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - active	Sandplain	Medium goanna burrow under Bloodwood; relatively fresh spoil; assumed Sand Goanna
97	326127	7984982	Railway corridor	Sign check - aerial	Potential	*Macrotis lagotis*	Burrow - inactive	Sandplain	Potential bilby burrow, old, spoil has washed away
98	321978	7994961	Railway corridor	Sign check - aerial	Not bilby	*Varanus panoptes (likely)*	Burrow - active	Sandplain	Large goanna burrow; fresh spoil
131	342309	7989368	Ancillary Infrastructure area - general	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Alluvial plain	Small goanna burrows and digs in area
133	339709	7987971	Ancillary Infrastructure area - general	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Loamy plain	Small goanna burrows and digs in area
135	336529	7983922	Ancillary Infrastructure area - general	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area
137	327116	7982754	Railway corridor	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area
138	325111	7987222	Solar Precinct buffer - west of railway	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area
139	322748	7992755	Railway corridor	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area
140	322401	7993931	Railway corridor	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area
141	322164	7994507	Railway corridor	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area
142	315587	7997225	Electrode access road	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area
145	308812	7996793	Electrode buffer	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area
148	310449	7998800	Electrode buffer	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area
150	325455	7981061	Solar Precinct buffer - west of railway	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area

GREATER BILBY OBSERVATION DATA									
Site	**Easting**	**Northing**	**Area**	**Method**	**Category**	**Species**	**Sign**	**Landform**	**Details**
151	326108	7981450	Solar Precinct buffer - west of railway	Sign check - aerial	Not bilby	*Varanus gouldii (likely)*	Burrow - recently used	Sandplain	Small goanna burrows and digs in area

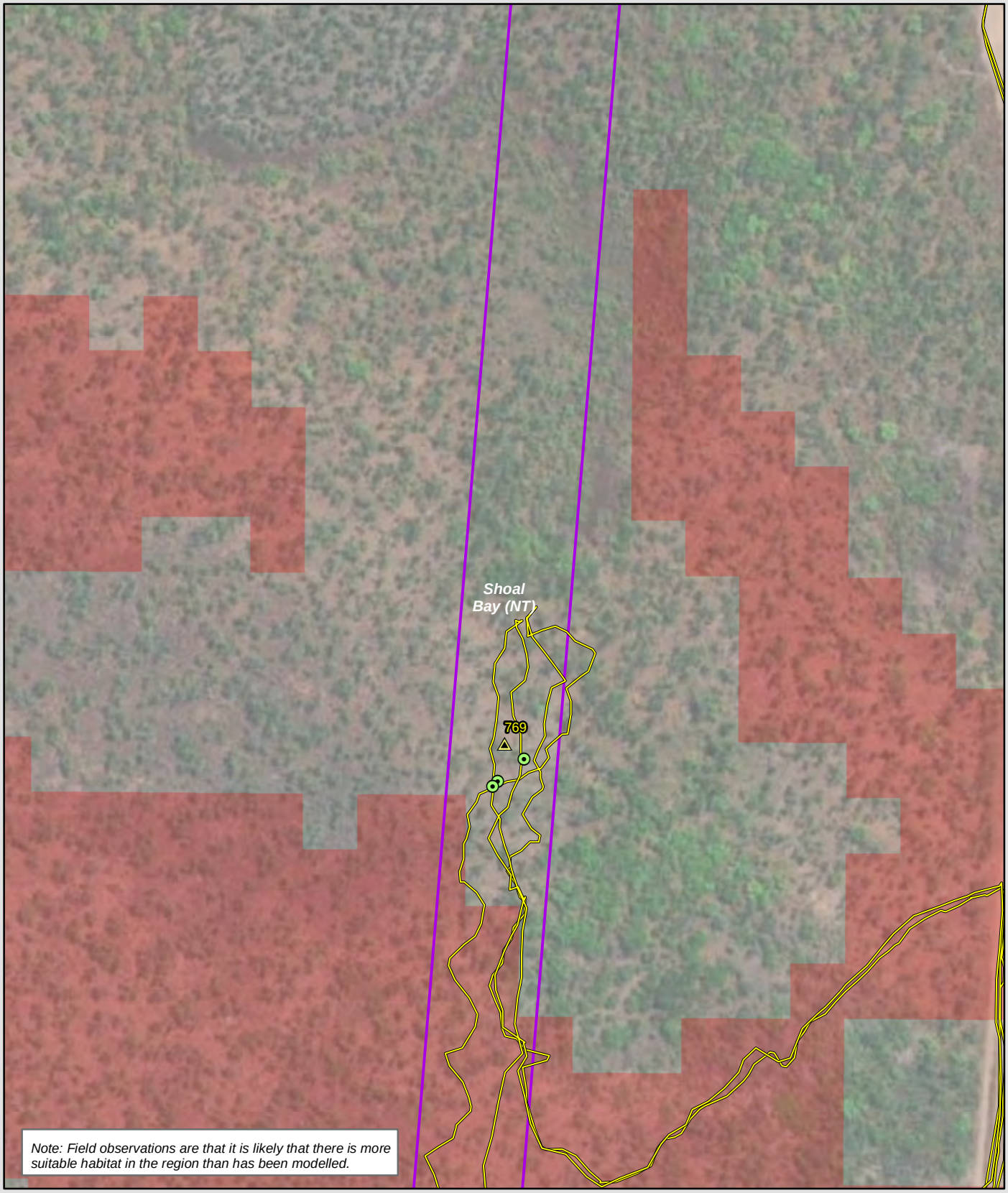
GREATER BILBY HABITAT BASED CHECK SITES							
Site	**Easting**	**Northing**	**Area**	**Method**	**Category**	**Landform**	**Reason for landing**
38	315415	7997115	Electrode access road	Habitat - aerial check	Not bilby	Sandplain	A. lysiphloia patch
39	309197	7997002	Solar Precinct Electrode site	Habitat - ground check	Not bilby	Sandplain	Scattered A. lysiphloia
55	326043	7993868	Ancillary area - Contractor (north)	Habitat - aerial check	Not bilby	Sandplain	Acacia lysiphloia present (scattered to patchy)
84	334971	7985395	Ancillary area - Main site office	Habitat - ground check	Not bilby	Sandplain	Patchy A. lysiphloia
93	329029	7979277	Ancillary area - Contractor (south)	Habitat - aerial check	Not bilby	Sandplain	Scattered A. lysiphloia
132	340452	7989472	Ancillary area - general	Habitat - aerial check	Not bilby	Sandplain	A. lysiphloia patch
134	344526	7986002	Ancillary area - general	Habitat - aerial check	Not bilby	Loamy plain	Scattered A. lysiphloia
136	330740	7978740	Ancillary area - general	Habitat - aerial check	Not bilby	Sandplain	A. lysiphloia patch
143	312312	7997082	Electrode access road	Habitat - aerial check	Not bilby	Sandplain	A. lysiphloia patch
144	312131	7997255	Electrode access road	Habitat - aerial check	Not bilby	Sandplain	A. lysiphloia patch
146	310991	7996422	Electrode buffer	Habitat - aerial check	Not bilby	Sandplain	A. lysiphloia patch
147	311346	7996355	Electrode buffer	Habitat - aerial check	Not bilby	Sandplain	A. lysiphloia patch
149	326260	7995252	Ancillary Infrastructure area - general	Habitat - aerial check	Not bilby	Loamy plain	Scattered A. lysiphloia

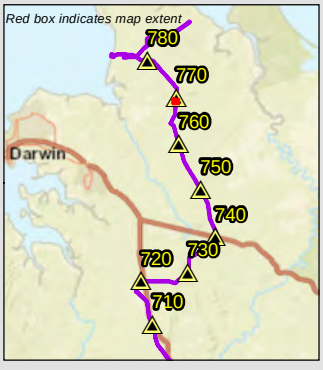
APPENDIX C *TYPHONIUM PRAETERMISSUM* POPULATIONS



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Gunn Point Road Typhonium praetermissum records and survey effort along the utilities corridor.mxd

Map of *Typhonium praetermissum* survey effort and results - Black Jungle





- Kilometre Points (KP)
- Typhonium praetermissum (EcOz Records)
- EcOz survey tracks
- Project footprint
- NTG modelled Typhonium high likelihood habitat

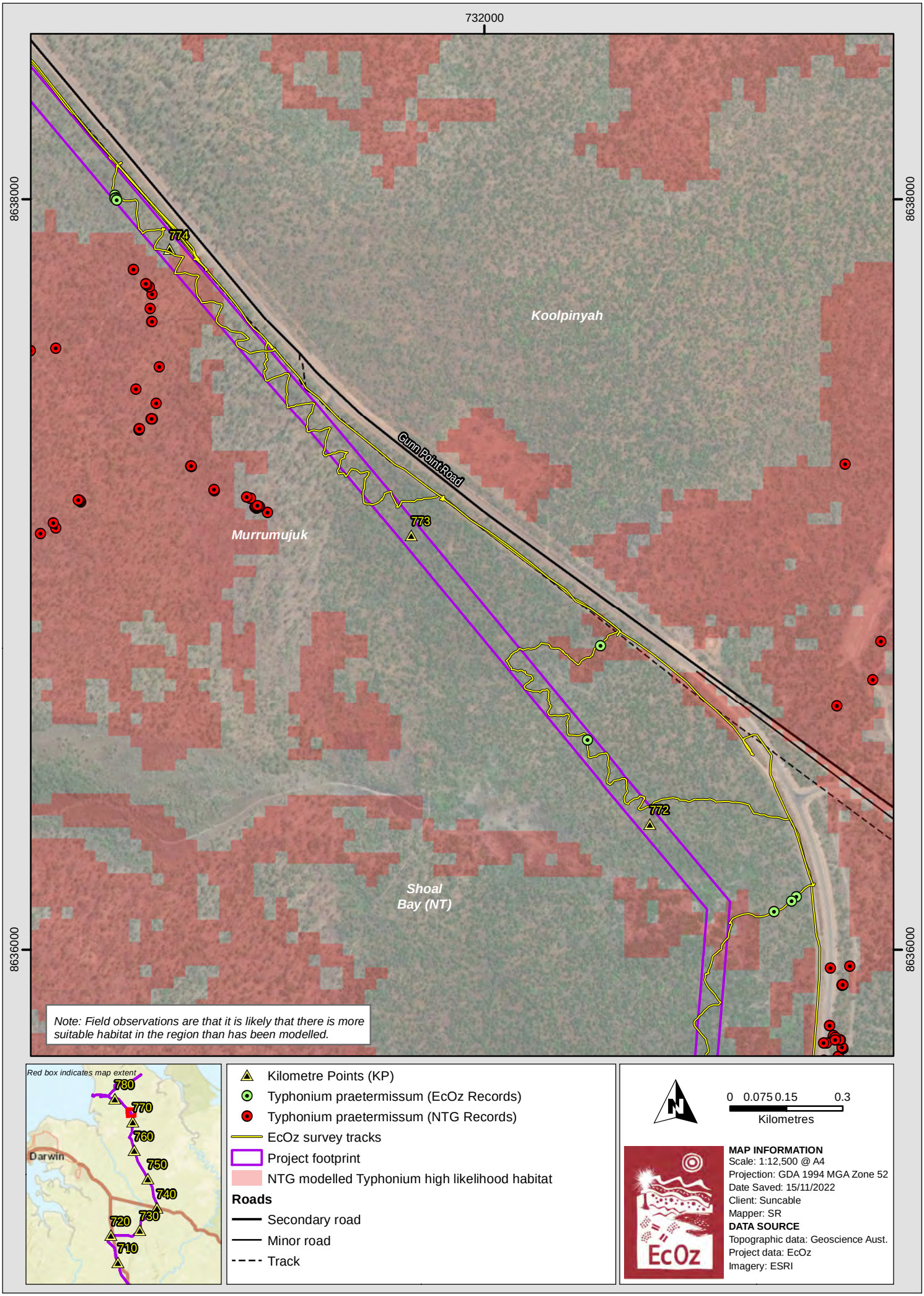
0 0.0225 0.045 0.09
Kilometres

MAP INFORMATION
Scale: 1:3,000 @ A4
Projection: GDA 1994 MGA Zone 52
Date Saved: 15/11/2022
Client: Suncable
Mapper: SR

DATA SOURCE
Topographic data: Geoscience Aust.
Project data: EcOz
Imagery: ESRI

Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Gunn Point Road Typhonium praetermissum records and survey effort along the utilities corridor.mxd

Map of *Typhonium praetermissum* survey effort and results - Gunn Point Road - Map 1 of 5



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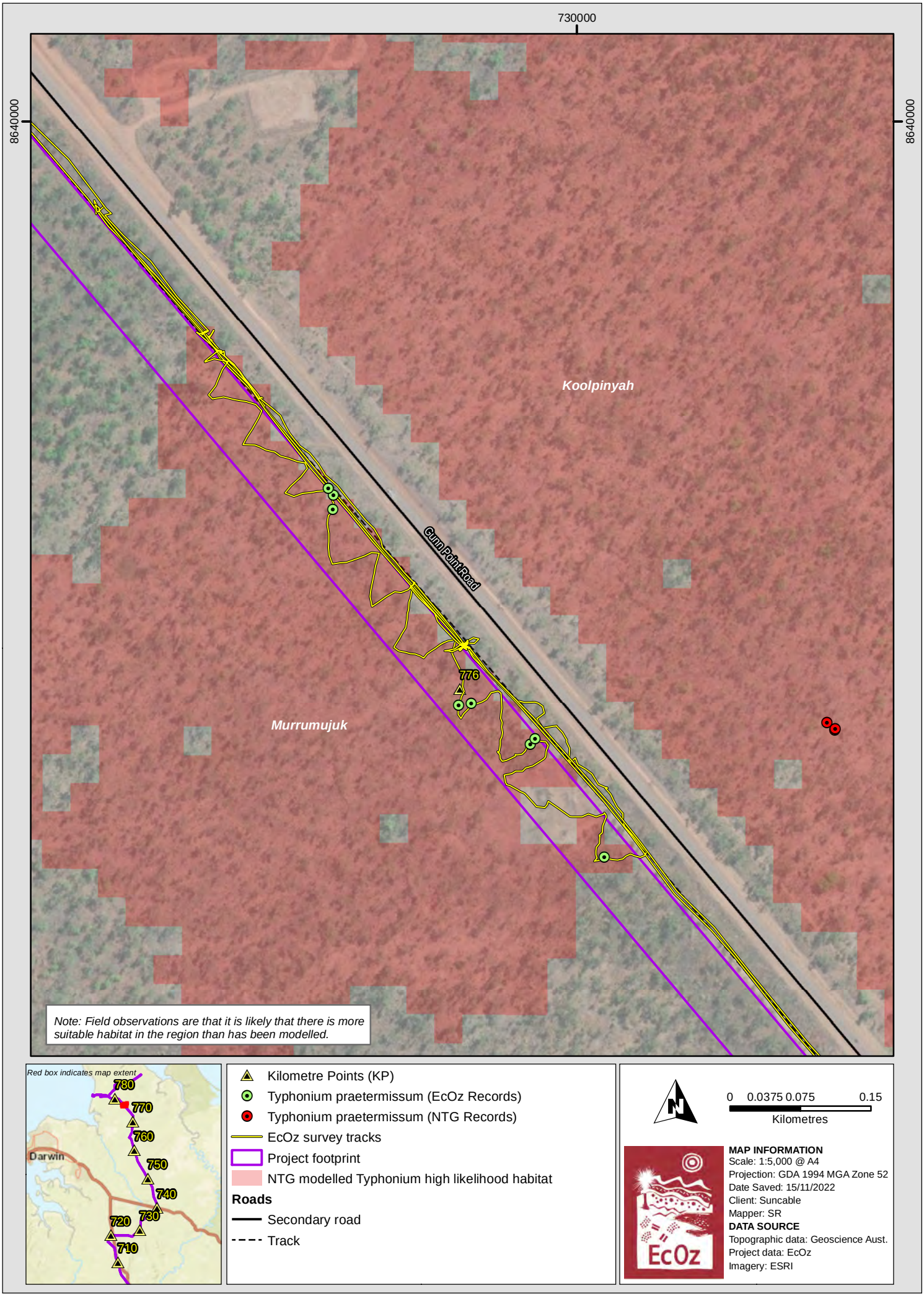
Map of *Typhonium praetermissum* survey effort and results - Gunn Point Road - Map 2 of 5



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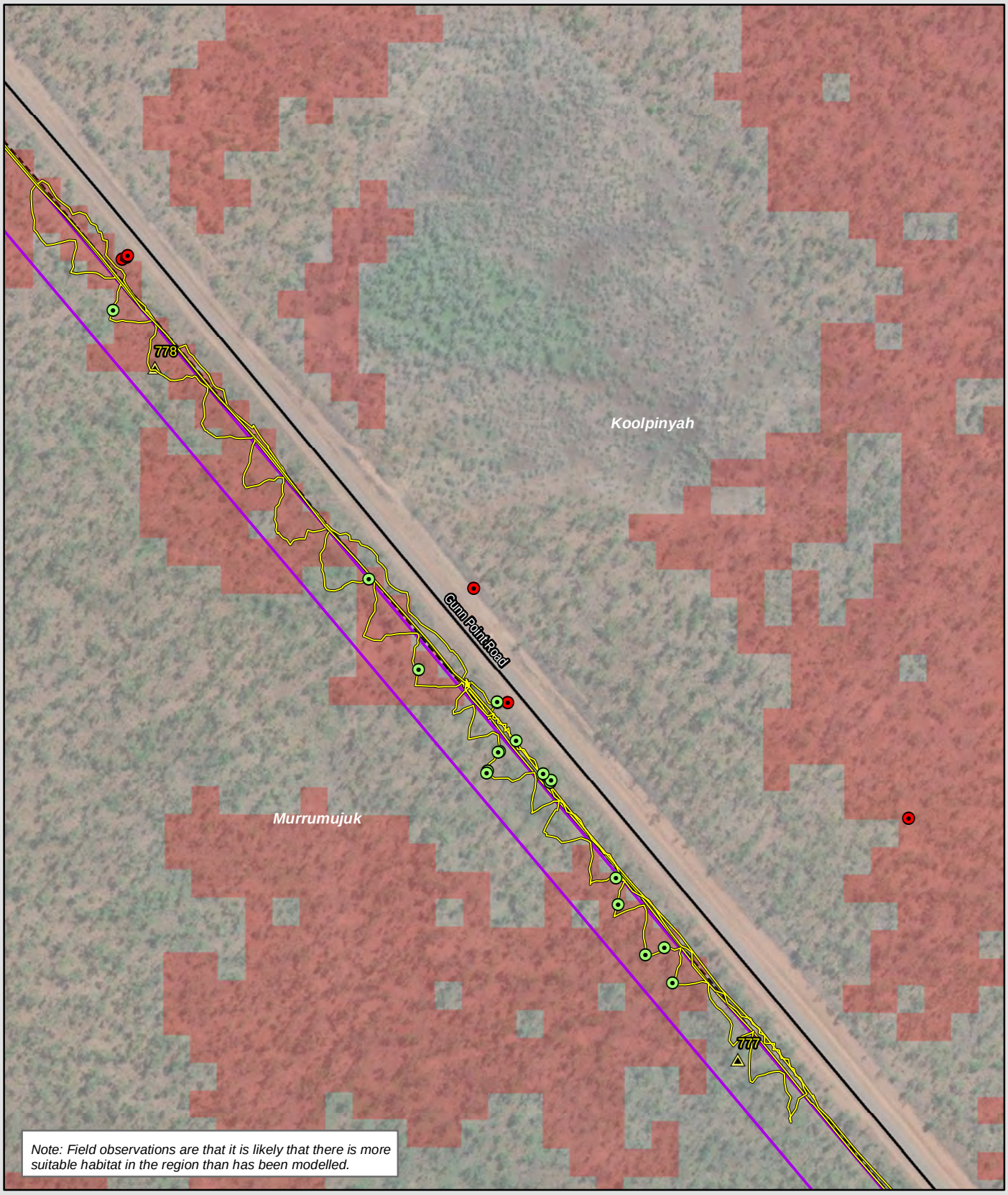
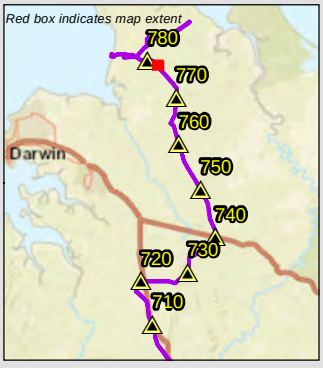
Map of *Typhonium praetermissum* survey effort and results - Gunn Point Road - Map 3 of 5





- Kilometre Points (KP)
- Typhonium praetermissum (EcOz Records)
- Typhonium praetermissum (NTG Records)
- EcOz survey tracks
- Project footprint
- NTG modelled Typhonium high likelihood habitat

Roads

- Secondary road
- Track

N

0 0.045 0.09 0.18

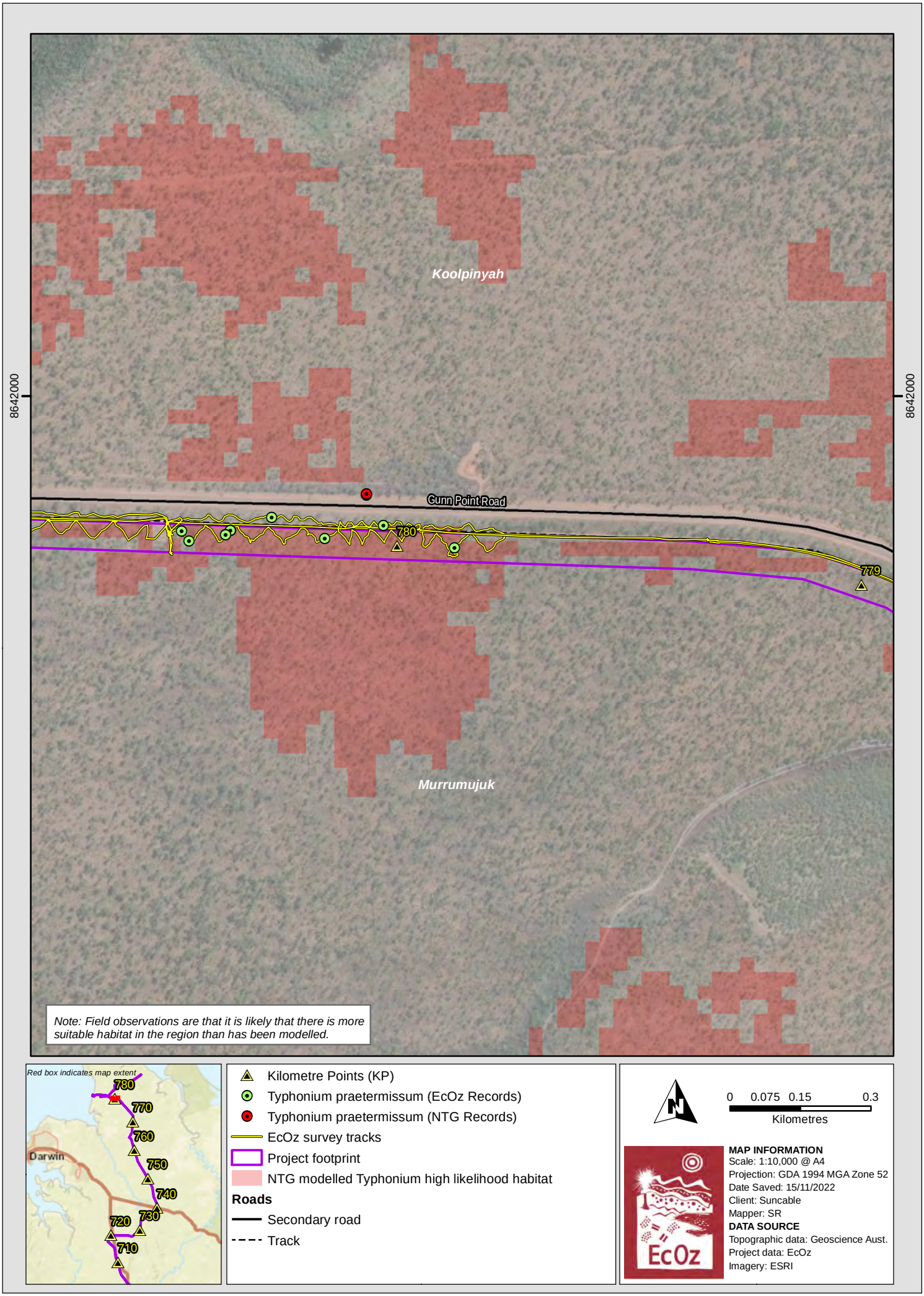
Kilometres

MAP INFORMATION
Scale: 1:6,000 @ A4
Projection: GDA 1994 MGA Zone 52
Date Saved: 15/11/2022
Client: Suncable
Mapper: SR

DATA SOURCE
Topographic data: Geoscience Aust.
Project data: EcOz
Imagery: ESRI

Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Gunn Point Road Typhonium praetermissum records and survey effort along the utilities corridor.mxd

Map of *Typhonium praetermissum* survey effort and results - Gunn Point Road - Map 4 of 5



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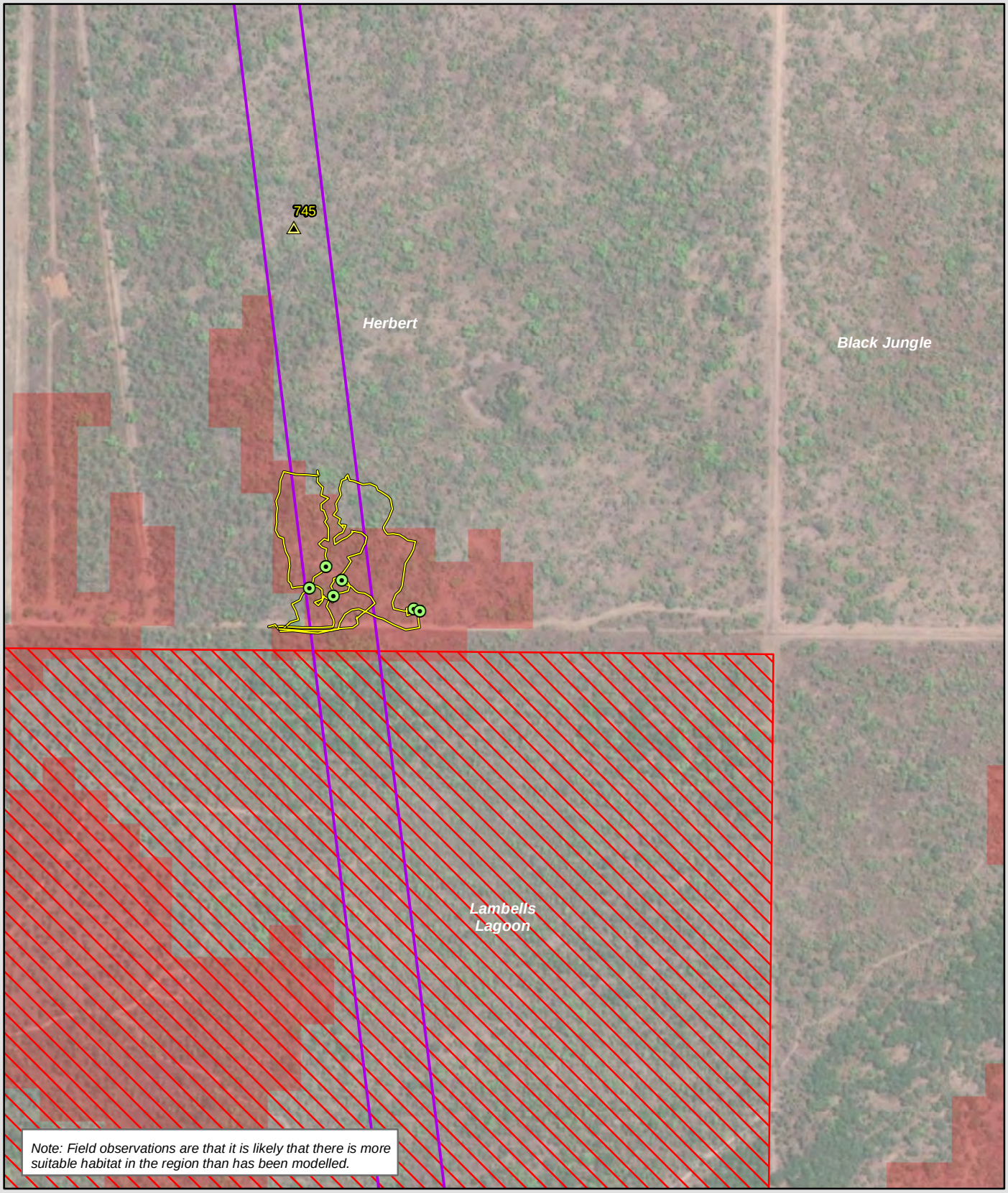
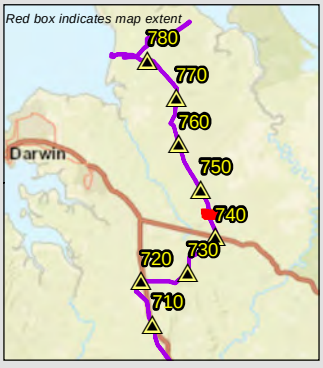
Map of *Typhonium praetermissum* survey effort and results - Gunn Point Road - Map 5 of 5





Kilometre Points (KP)
Typhonium praetermissum (EcOz Records)
EcOz survey tracks
Project footprint
Section 572 - not accessed
NTG modelled Typhonium high likelihood habitat

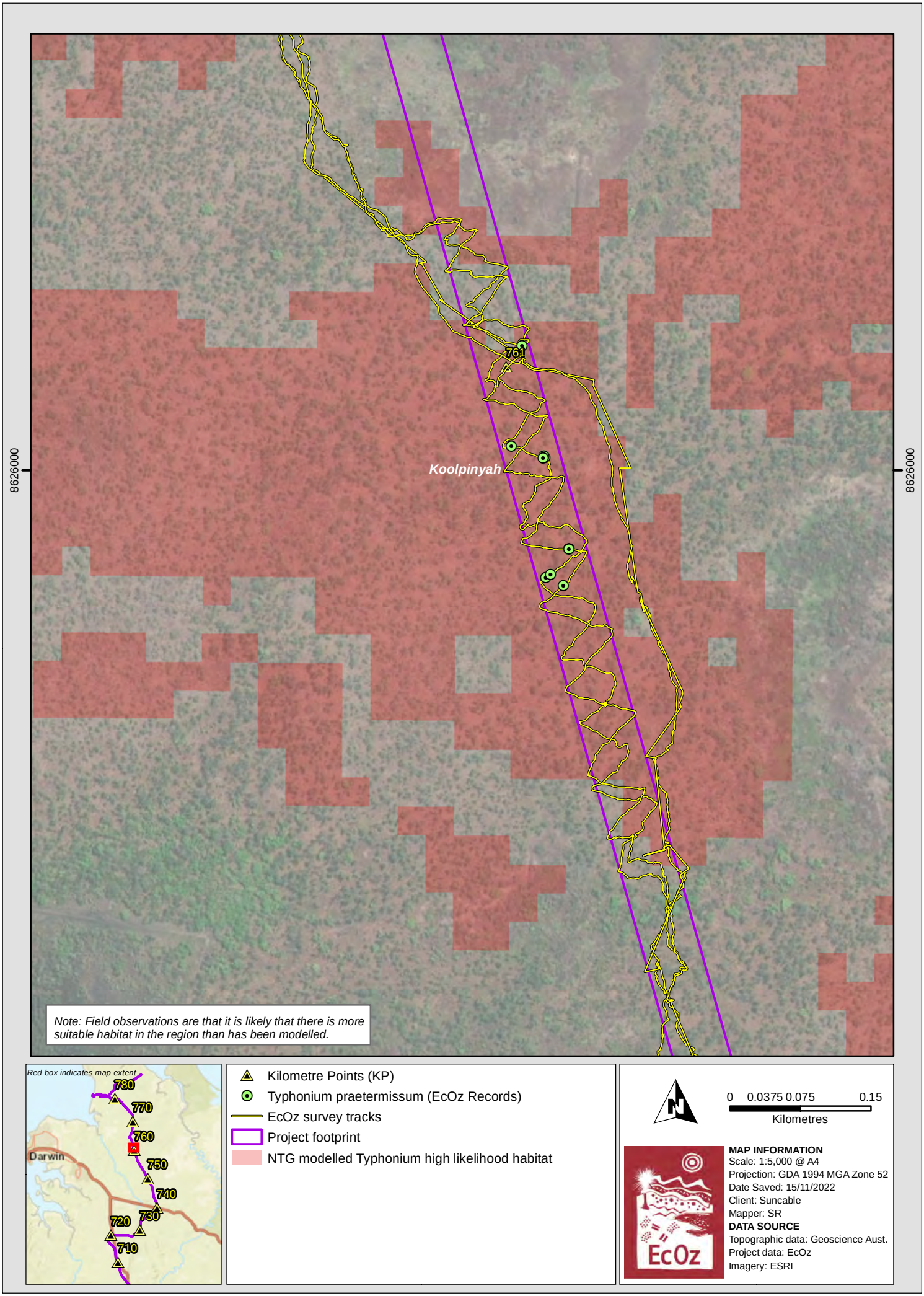
0 0.0375 0.075 0.15
Kilometres

MAP INFORMATION
Scale: 1:5,000 @ A4
Projection: GDA 1994 MGA Zone 52
Date Saved: 15/11/2022
Client: Suncable
Mapper: SR

DATA SOURCE
Topographic data: Geoscience Aust.
Project data: EcOz
Imagery: ESRI

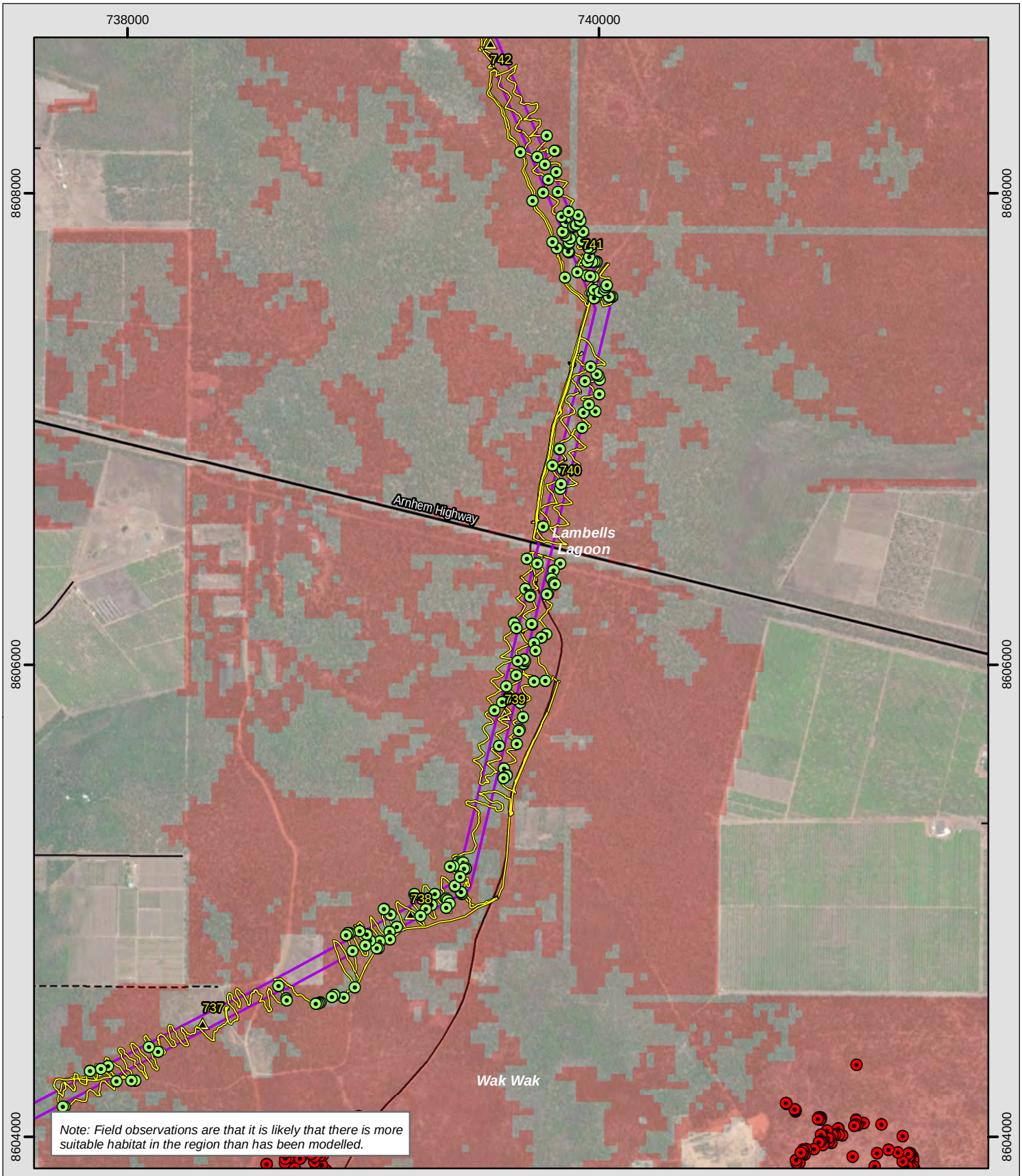
Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Gunn Point Road Typhonium praetermissum records and survey effort along the utilities corridor.mxd

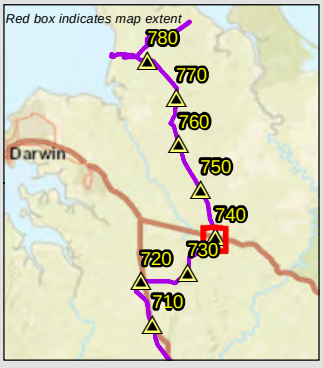
Map of *Typhonium praetermissum* survey effort and results - Herbert



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Gunn Point Road Typhonium praetermissum records and survey effort along the utilities corridor.mxd

Map of *Typhonium praetermissum* survey effort and results - Koolpinyah





- Kilometre Points (KP)
- Typhonium praetermissum (EcOz Records)
- Typhonium praetermissum (NTG Records)
- EcOz survey tracks
- Project footprint
- NTG modelled Typhonium high likelihood habitat

Roads

- Secondary road
- Minor road
- Track

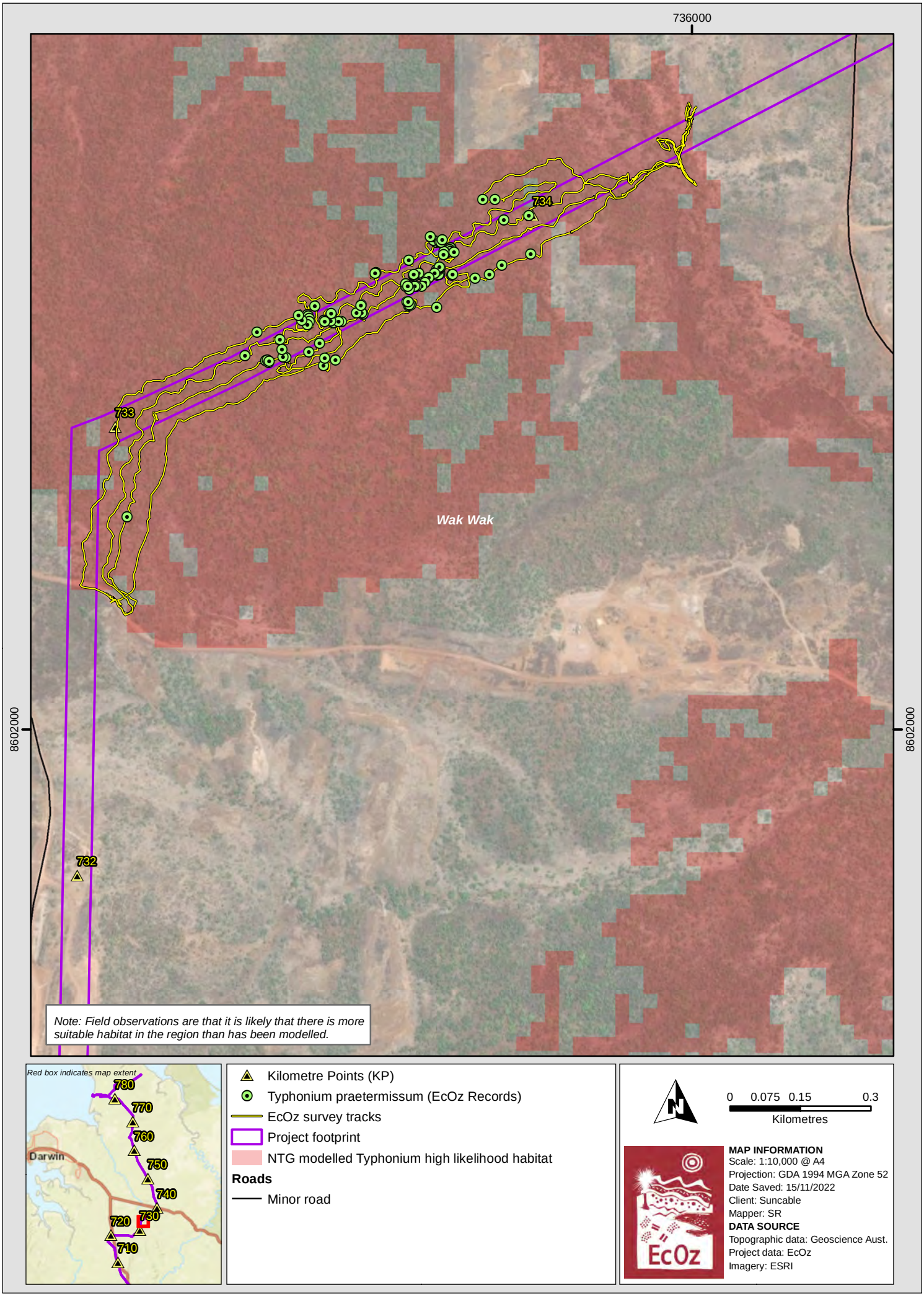
0 0.15 0.3 0.6
Kilometres

MAP INFORMATION
Scale: 1:22,000 @ A4
Projection: GDA 1994 MGA Zone 52
Date Saved: 15/11/2022
Client: Suncable
Mapper: SR

DATA SOURCE
Topographic data: Geoscience Aust.
Project data: EcOz
Imagery: ESRI

Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20220 - Australian ASEAN Power Link Ecology\01 Project Files\Ecology\Threatened species surveys\Gunn Point Road Typhonium praetermissum records and survey effort along the utilities corridor.mxd

Map of *Typhonium praetermissum* survey effort and results - Lambells Lagoon



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Map of *Typhonium praetermissum* survey effort and results - Wak Wak

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