

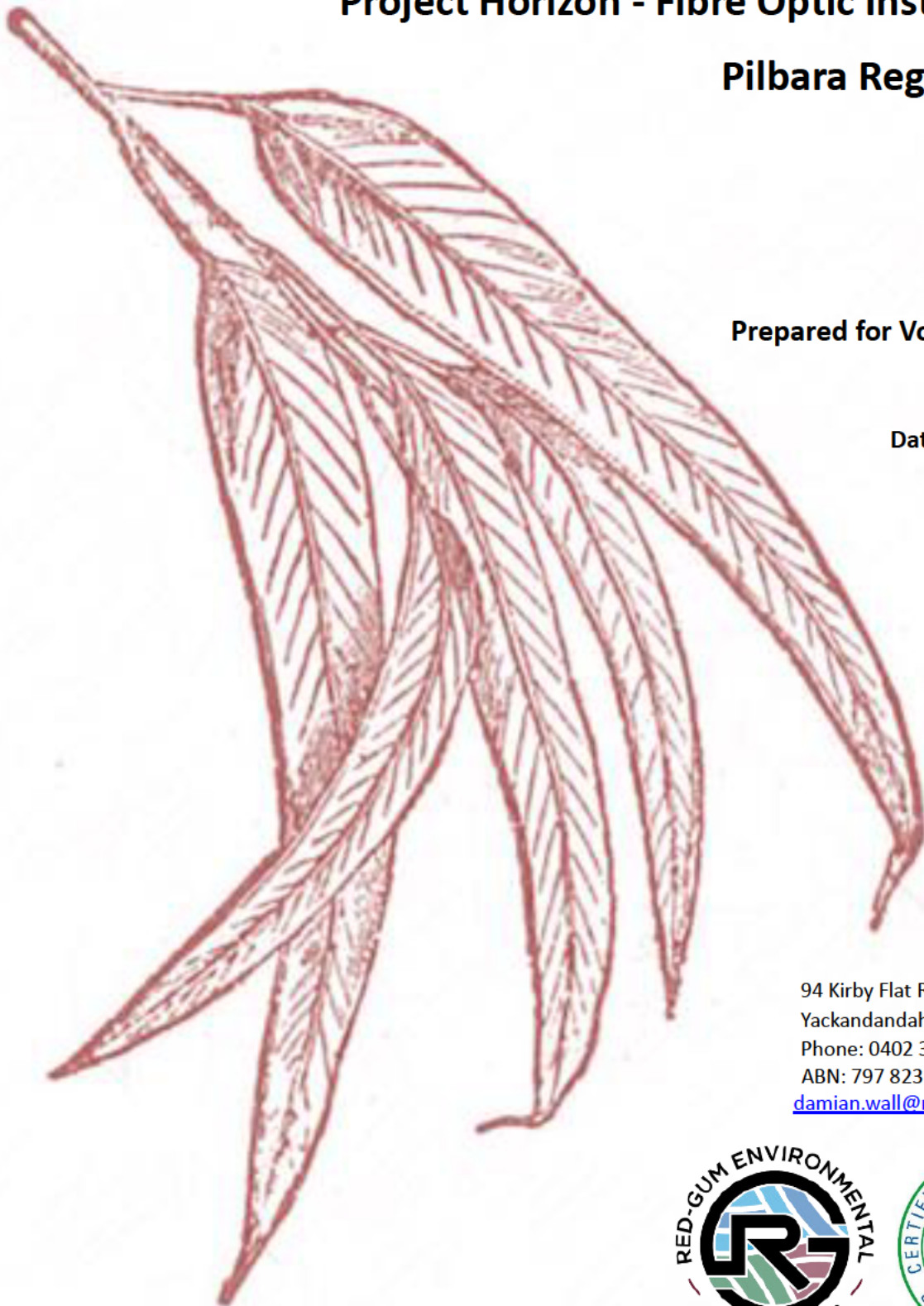
Detailed Flora and Vegetation Survey of Collier Range National Park

Project Horizon - Fibre Optic Installation.
Pilbara Region, WA.

Version 1.1

Prepared for Vocus Pty Ltd

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Executive Summary

Vocus Pty Ltd (Vocus) is seeking approvals to install a fibre optic cable through the road reserve that runs for a distance of approximately 16 kilometres through the road reserve of the Great Northern Highway which travels through Collier Range National Park, an area that is located approximately 142 kilometres south of Newman, in the Gascoyne IBRA bioregion. The road reserve is not gazetted as national park, but the area is mapped as an Ecologically Sensitive Area (ESA) given its proximity to the park, hence vegetation clearing permit requirements apply.

In late 2022, Red-Gum Environmental Pty Ltd (Red-Gum) was commissioned by Vocus to undertake a rapid survey of the entire ~850 kilometre cable alignment and report on the potential impacts of the development, outline legislative requirements or restrictions and recommend mitigation measures to reduce the impact to the receiving environment. Upon submission of the T-12 Section report, which deals with the Collier Range National Park area, a Request for Further Information (RFI) was issued by Department of Water and Environmental Regulation (DWER). The RFI requested that a pre-construction survey be completed according to EPA standards and that data for the study be submitted in the IBSA format via the IBSA submissions portal.

Following the initial RFI, a meeting was subsequently held between representatives of the WA approval authorities, Vocus and Red-Gum. An agreement was reached that targeted surveys would be required for the species mentioned in the original RFI, unless it could be proven with sufficient evidence that particular species would not be likely to be present. However, a desktop assessment revealed that data is insufficient for many of the RFI targeted species, and that all species were to be included for targeted survey in March 2024.

The aim of the targeted survey is to respond to the RFI requirements to conduct targeted surveys for six flora and four fauna species. The survey objective was to gather field data to build on that which was gathered as part of the rapid surveys, which were conducted in December 2002 and May 2023. In particular, 31 quadrats were assessed with the aim of searching for the targeted flora and fauna, as well as any other significant species or communities which may be present in the 16 kilometre-long study area. The survey took place between March 18 to 21 2024 and included surveying of 31 50 x 50 metre quadrats, targeted searches for flora and fauna, incidental searches (traverses) in between quadrat surveys, and mapping of vegetation types and conditions.

Two (2) vegetation community types were mapped in the study area. The majority of the study area is comprised of Hummock Grasslands, Shrub Steppe, with two smaller areas of Low Woodland, Open Low and Sparse Woodland; Mulga also encountered in the study area. The vegetation in the study area is considered to be of high to very high regional conservation significance, when compared to the areas outside of the national park. However, being in a road reserve, past disturbances (road construction and Telstra cable installation) and ongoing impacts from the road construction and ongoing uses has acted to increase the disturbances and threats in play throughout the study area. No WA or Commonwealth listed Threatened Ecological Communities (TECs) or WA priority Ecological Communities were located within the study area.

The assessment detected a total of 138 species or subspecies of flora, representing 75 genera. Species richness for the study sites (quadrats) ranged from 10 flora species to 41 at the most diverse site. No Commonwealth or WA listed threatened flora were recorded during the survey. None of the flora on the RFI list of targeted flora were recorded during the study. Furthermore, there were no other WA priority flora recorded. Only two introduced (exotic) flora were recorded in the study area, the majority

of which were recorded where the quadrat areas intersected an under-road drain in close proximity to the edge of the Great Northern Highway.

The majority of vegetation in the study area is considered locally significant when compared to that beyond the boundary of the national park, and is likely to be valuable habitat for a range of flora and fauna in the area. However, given that the vegetation represents a widely occurring vegetation association, habitat for the targeted flora and fauna is likely to be present over a large area beyond the study area limits. Given the proposed development is narrow and not typical of most vegetation clearing works, in that the vegetation impacts are temporary, and full rehabilitation of the impacted area is highly likely, it is not expected that the development will have significant impacts upon flora or vegetation in the study area. There are, however, a number of recommendations to ensure flora and vegetation impacts are minimised, including:

- Pre-construction searches for targeted species are to be conducted by an ecologist to ensure there are no specimens of significant flora on the proposed cable alignment.
- If threatened species are located in the field by contract staff or the ecologists/botanists involved in final route planning, then work must halt until an agreed approach can be determined via discussions with the appropriate authority involved (Department of Biodiversity, Conservation and Attractions).
- Micro-siting of the final alignment is to take place, and is to be based on avoidance of fauna habitat (burrows etc.) and the avoidance of any significant flora or vegetation habitats.
- If threatened flora are detected during micro-siting or construction, the appropriate approvals (via liaison with DBCA) and permits to conduct works (impacts) to the 50 metre radius ESA (applied around threatened flora records) are required (given a 50 metre ESA zone is not able to be avoided in a narrow road reserve corridor).
- All staff involved with construction project need to be tool-boxed (inducted) on the locations of known threatened species records on the route, as well as any species that are located during the construction works. The induction should include basic advice on identifying the known species that have been recorded and the steps to take if unsure, or if threatened species or communities are encountered during works.
- Any EPBC Act listed threatened species or communities encountered during the works will need a Significant Impact Criteria assessment (SIC) to be completed by a suitably qualified person (ecologist). Liaison with the responsible Commonwealth department is also recommended if EPBC Act species or communities are found or suspected during construction.
- The management of exotic vegetation (weeds) must be conducted to best practice standards, ensuring machinery is decontaminated prior to works starting in the ESA, and where any weed infestations are unavoidable, decontamination must be undertaken to ensure weeds are not pushed along the alignment into clean parts of the ESA.

The survey effort recorded 24 fauna species, including those identified via direct and indirect observations. Of the four RFI targeted fauna species, Mulgara were detected with high levels of confidence, and the remaining species of Greater Bilby and Western Pebble-mound Mouse are also considered likely to be present, as several suspect Greater Bilby burrows and two potential pebble-mounds were identified during field assessments. The results of DNA analysis of a predator (Feral Cat) scat revealed that the predator had recently consumed Crimson Chat (a native bird) and a native rodent (Myridae family), but no DNA of the targeted fauna species was present in the scat contents.

Despite the footprint of the development being narrow at a maximum of five metres wide, and the only significant impacts being involved with the narrow impact through the centre of the construction zone by the ripping tine, there are likely to be more potential impacts to fauna from the works than

there are for flora. Impacts may include crushing of fauna that are sheltering in vegetation or shallow burrows which collapse under the weight of the bulldozers, or unearthing of fauna by the ripping tine, resulting in potential death, injury or displacement of young. To minimise these potential impacts, the following recommendations have been made:

- The potential impacts are to be minimised as much as possible via pre-construction surveys and micro-siting of the final alignment to avoid burrows or other signs of recent fauna habitation, wherever possible.
- The results of this survey (burrow/habitat locations) will inform the final alignment of the cable route, and the construction is to be further micro-sited prior to construction to ensure Mulgara, Greater Bilby and Western Pebble-mound Mouse burrows are avoided, wherever possible, via fine scale alignment changes.
- An ecologist or a suitable trained wildlife handler should be present to follow machinery that is operating through the ESA. Appropriate equipment needs to be on hand to ensure any animals that are displaced or injured as a result of the construction are adequately rescued and cared for until they are relocated to a safer area away from the development, or until they can be taken to the nearest veterinarian or wildlife rescue facility for treatment and eventual reintroduction.
- If threatened fauna species are located in the field by contract staff or the ecologists/botanists involved in final route planning, then work must halt until an agreed approach can be determined via discussions with the appropriate authority involved (Department of Biodiversity, Conservation and Attractions).
- All staff involved with construction project need to be tool-boxed (inducted) on the locations of known threatened species records on the route, as well as any species that are located during the construction works. The induction should include basic advice on identifying the known species that have been recorded and the steps to take if unsure, or if threatened species are encountered during works.
- Any EPBC Act listed threatened fauna species encountered during the works will need a Significant Impact Criteria assessment (SIC) to be completed by a suitably qualified person (ecologist). Liaison with the responsible Commonwealth department is also recommended if EPBC Act species are found or suspected during construction.

As part of this report, the proposed development was assessed against the 10 Western Australian clearing principles. It must be noted, however, that the clearing associated with the proposed cable installation is not like traditional clearing operations, in that the prospect for the impacted vegetation in this case to rehabilitate and return to its former state is highly likely to take place, and that numerous controls and rehabilitation actions will be conducted to ensure impacts are minimised and rehabilitation is completed to the highest possible standard. It is concluded that, based on avoidance measures, proposed actions to mitigate environmental impacts, and the good prospects for the disturbed areas to fully rehabilitate over the short to medium term, that the project is not in significant conflict with any of the 10 vegetation clearing principles.

1 Introduction to the Project

Vocus Fibre Pty Ltd (Vocus) are planning the installation of a fibre optic cable in central and northern Western Australia, which is to be installed starting in the south of the project area from a location near Beringarra-Pindar Road, East Murchison, and runs for the most-part along the Great Northern Highway via Cue, Meekatharra, Newman and then terminates near the Fortescue Dave Forrest Airport, near Nullagine.

In addition to long runs of underground cable installations, there will also be controlled environment vault (CEV) installations at set distances along the alignment, generally located at each T-Section junction. The CEV structures will require an access track from the highway to be constructed to the CEV (10 metre wide impact zone with a length generally in the vicinity of 30 to 50 metres). The CEV facility, including the perimeter fence, will be approximately 20 by 20 metres (0.002 hectares), where secure buildings and solar panels will be situated, all of which will be considered impacted and lost because of the development.

Installation techniques for the fibre optic cable will involve a combination of ripping, trenching and under boring. For the ripping technique, a D-10 bulldozer with a blade width of five metres (the blade will remain lifted) will travel the alignment with a ripping tine on the rear of the machine that rips and inserts the cable as the machine travels. This is the main method for the installation, and the technique will involve an impact/loss zone of a maximum five metres wide, including factoring in the bulldozer footprint and other machinery (i.e. a small backhoe) travelling along the route and rehabilitating the rip line.

Under boring will take place where the cable must go under roads and other assets encountered along the route. Under boring involves installation of a bore pit at either end of the intended bore shot, then specialised machinery will bore a connection underground at an appropriate depth to avoid the assets on the route alignment. In instances where the bore pits are in native vegetation, the impact/loss area for the bore pads and associated machinery is an area of approximately ten metres by five metres. The maximum under bore shot length is 250 metres in each direction, so if the site allows a central bore to be situated on the alignment, an under bore installation can span 500 metres. However, in many cases a central bore will not be possible so the maximum shot length will generally be 250 metres. It is proposed that the route through the study area is to be ripped and not under bored.

1.1 Request for Information (RFI)

The report for T-12 Section was submitted to the approval authorities by Vocus in 2023. An RFI in response to the submission was received, with requests for further information about the section of the T-12 alignment that passes through the road reserve within Collier Range National Park. Item 1 in Schedule 1 of the DWER RFI (CPS 1027/1) dated 22 January 2024 (**Appendix 7.5**) outlined the requirement for Vocus Pty Ltd (Vocus) to provide a targeted survey for the following flora species:

- *Bothriochloa decipiens* var. *cloncurransis* (Priority 1)
- *Eremophila appressa* (Priority 1)
- *Eremophila fasciata* (Priority 3)

Item 2 in Schedule 1 of the same RFI requested that Vocus provide a desktop assessment to determine the likelihood of occurrence for the following species:

Flora:

- *Swainsona katjarra* (Priority 1)
- *Rhagodia* sp. Hamersley (M. Trudgen 17794) (Priority 3)
- *Thysanotus* sp. Desert East of Newman (R.P. Hart 964) (Priority 2)

Fauna:

- Brush-tailed mulgara (*Dasyercus blythi*) (Priority 4)
- Crest-tailed mulgara (*Dasyercus cristicauda*) (Priority 4)
- Greater Bilby (*Macrotis lagotis*) (Vulnerable under EPBC and BC Acts)
- Western Pebble-mound Mouse (*Pseudomys chapmani*) (Priority 4)

The RFI went on to state “If the assessment identifies that any of the species listed above has a moderate or higher likelihood of occurring within the proposed clearing area and a decision is made to grant the permit, further surveys will be required prior to commencing clearing to determine their presence within the mapped habitat”. This document provides the results of the likelihood assessment for these species. It was determined that, regardless of the likelihood of the species in question occurring in the study area, all ten (10) species were to be included for targeted surveys in March 2024, along the entire length of the proposed ~16 km route through Collier Range National Park.

The remainder of this report outlines the proposed methodology for the surveys and the field assessment results, as well as a discussion about the results and the potential impacts of the proposed development. Field assessment was conducted by ecologists from Red-Gum Environmental Consulting Pty Ltd (Red-Gum). The survey period was four days in the field and surveys were conducted by two Red-Gum staff, a Senior Ecologist and a Senior Botanist.

1.2 Survey Objective and Scope

The aim of the targeted survey is to respond to the RFI requirements to conduct a detailed single phase targeted survey for ten flora and fauna species, to determine their presence within or likely absence from the study area. The survey aimed to gather field data to build on that which was gathered as part of the rapid surveys, which were conducted in December 2022 and May 2023, in order to fulfill the RFI requirements. In particular, 31 quadrats were assessed as part of the latest survey, with the aim of searching for the targeted flora and fauna, as well as any other significant species or communities which may be present in the 16 kilometre-long and 50 metre-wide study area. The survey took place between March 18 to 21 2024 and included detailed surveying of the 31 quadrats, as well as targeted searches for flora and fauna, incidental searches (traverses) in between quadrat surveys, and mapping of vegetation type and conditions encountered along the study area. The components of the survey are as follows:

- A detailed single phase field survey of the study area.
- Data analysis and species identifications for samples collected or species photographed during field survey.
- Development of maps that show significant species records, vegetation types and vegetation condition classes across the study area.
- Preparation of a technical report (this report) detailing the aims, methodology and results of the field survey, as well as impact minimisation recommendations.

1.3 Study Area

The study area is an approximately 16 kilometre-long and 50 metre-wide area of road reserve that runs along the western side of the Great Northern Highway. The entire length of the study area intersects the ESA associated with Collier Range National Park. It should be noted that the gazettal of the park boundary does not include the road reserve of the Great Northern Highway, where the study area is located. However, the study area does intersect the area mapped as the ESA associated with the park, therefore the ESA rules around exemptions and permits for works in an ESA apply.

2 Legislative Context

The listing and protection of flora and fauna in Western Australia is governed by one Commonwealth administered Act and one WA administered Act, which are listed and described in more detail in the sections below:

- The Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- The Western Australian *Biodiversity Conservation Act 2016* (BC Act).

2.1 Commonwealth Legislation

There are a number of threatened species listed under the EPBC Act. Potential impacts to any EPBC listed threatened species will need to be assessed for their significance (SIC assessment) and a referral to the relevant Commonwealth department may be required, and offsets may be applicable if the impacts on the entity are deemed to be significant.

*There were no (zero) EPBC Act listed entities directly encountered during the survey. However, there is the potential for Greater Bilby (*Macrotis lagotis*) to be present on occasion or residing in the study area, with several potential Greater Bilby burrows being located. Impacts to EPBC Act listed species require a SIC assessment, hence a SIC assessment is required to be completed for Greater Bilby prior to construction being started. However, given the thin linear alignment and efforts being made to avoid significant vegetation and habitats, it is unlikely that this level of clearing would constitute a significant impact to flora or fauna species or faunal habitats (as per the Significant Impact Guidelines).*

In addition to the 69 WA Threatened Ecological Communities (TECs) (see **Section 2.2**), there are numerous nationally listed TECs which have been declared under the Commonwealth EPBC Act. Impacts to national TECs will need to undergo a SIC to determine if the impact will be of a significant nature. Any significant impacts to nationally listed TECs will be considered to be a matter of National Environmental Significance (MNES) and will require a referral to the Department of Climate Change, Energy, the Environment and Water (DECEW). Impacts to MNES may require an offset to be generated to account for the losses being experienced by the receiving nationally listed TEC.

There were no EPBC Act listed TECs encountered during the survey.

2.2 Western Australian Legislation

2.2.1 Threatened and WA Priority Species

There are many threatened species listed under the BC Act. Species are categorised according to their level of threat of extinction, with the categories in order of conservation significance listed as follows:

1. Critically endangered
2. Endangered
3. Vulnerable
4. Extinct species
5. Extinct in the wild
6. Specially protected species
7. Migratory species
8. Conservation dependent
9. Other specially protected
10. Priority species.

The Department of Biodiversity Conservation and Attractions (DBCA) administers the BC Act and maintains a non-statutory list of WA Priority Flora species. This list is regularly updated with species coming onto, coming off, or being re-categorised. Although WA Priority species have limited protections under the BC Act, they are still considered to be of conservation significance. However, they cannot be considered for listing under the BC Act until there is a greater understanding of the species distribution and the threats or impacts currently being imposed on them. Species on the Priority Flora list are categorised into five priority (P) categories, from P1 (being the highest importance), to P4 (being the lowest or least concern), based on the current level of knowledge and/or concern for the species. Clearing of any state-listed threatened flora species (or vegetation impacts within 50 metres of that species in areas where vegetation is contiguous) will require a vegetation clearing permit and a permit authorising the take of or disturbance to threatened flora. If the cable installation is likely to impact on threatened fauna habitat to a significant extent, then a permit may also be required.

There were no (zero) threatened flora species listed under the BC Act detected during the field surveys. There were, however, indirect signs (potential burrows) of threatened species (Greater Bilby) and indirect signs (burrows and tracks) of WA Priority fauna (Mulgara and Western Pebble-mound Mouse) were detected during targeted surveys.

2.2.2 Threatened and WA Priority Ecological Communities

There is a list of TEC which were endorsed under the BC Act by the Minister for Environment in June 2018. There are currently 20 critically endangered TECs, 17 endangered TECs, 28 vulnerable TECs and four (4) presumed destroyed TECs. Of these 69 WA TECs, 25 of them are concurrently listed as a threatened community under the Commonwealth's *Environmental Protection and Biodiversity Act 1999* (EPBC Act). Where the route alignment impacts a TEC (which is considered to be an ESA), a clearing permit is required and a permit to modify an occurrence of a TEC may also be required under the BC Act, if impacts are significant.

There were no (zero) threatened ecological communities listed under the BC Act detected during the field surveys.

There is also a non-statutory Priority Ecological Community (PEC) list for Western Australia containing an additional 390 ecological communities which are not listed as threatened, due to there being insufficient information on the communities for them to be considered a TEC. PECs are assigned to one of five different categories, with Priority 1 TEC being of highest concern (conservation significance) and Priority 5 being the lowest concern category. These communities are not considered to be currently threatened and are therefore not currently afforded the protection that TECs are given (DBCA 2021).

There were no (zero) WA Priority ecological communities listed under the BC Act detected during the field surveys.

2.2.3 Environmentally Sensitive Areas (ESAs)

The Western Australian Minister for the Environment can declare under section 51B of the *Environmental Protection Act 1986 Act* (EP Act) that an area of Western Australia or a class of areas in the state is a declared Environmentally Sensitive Area (ESA). The ESAs are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*. This dataset was obtained from the relevant department and formed the basis of site maps and site inspections for where the route alignment intersected these mapped ESAs. According to DWER (2020), Environmentally Sensitive Areas (ESAs) are any of the following:

- A declared World Heritage property as defined in section 13 of the *Environment Protection and Biodiversity Conservation Act 1999* of the Commonwealth.
- An area that is included on the Register of the National Estate, because of its natural heritage value, under the *Australian Heritage Council Act 2003* of the Commonwealth.
- A defined wetland and the area within 50 metres of the wetland (defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands).
- The area covered by vegetation within 50 metres of rare (threatened) flora, to the extent to which the vegetation is continuous with the vegetation in which the rare (threatened) flora is located.
- The area covered by a threatened ecological community.
- A Bush Forever site listed in Bush Forever volumes 1 and 2 (2000), published by the Western Australia Planning Commission.
- The areas covered by the *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*.
- The areas covered by the *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002*.
- The areas covered by the lakes to which the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* applies.
- Protected wetlands as defined in the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998*.

From the above categories, the most relevant ESA types for this assessment are:

1. Designated wetlands (Ramsar, conservation category and nationally important wetlands) and areas within 50 metres of a mapped designated wetland.
2. Areas within 50 metres of threatened flora species.
3. Areas determined to be a state or national TEC.
4. The area covered by vegetation within 50 metres of rare (threatened) flora, to the extent to which the vegetation is continuous with the vegetation in which the rare (threatened) flora is located.

5. Areas on the National Estate Register (i.e. Collier Range National Park).

The usual exemptions for low impact works like installation of subterranean cables do not apply to works within ESAs. Where works are entering these ESAs (and any others listed above) a permit must be granted to allow works to take place and may consist of a vegetation clearing permit, and for TECs may require an additional permit to modify an occurrence of a TEC. Further information for impacts to ESAs and clearing permits can be obtained from the Department of Water and Environmental Regulation (the department) via their Native Vegetation Regulation Branch by phone on (08) 6364 7098 or via email to info@dwer.wa.gov.au.

Despite the study area and proposed works not impacting the area gazetted as Collier Range National Park, the study area and works do impact the mapped ESA associated with the park, and hence the ESA permit requirements apply.

2.2.4 Surface Water Areas / Waterways

The Gascoyne River and its tributaries (located north of Meekatharra) and the Pilbara Surface Water Area are both designated Surface Water Proclamation Areas (SWA) declared under the *Rights in Water and Irrigation Act 1914* (RWI Act). There is a requirement in proclaimed SWAs that, where works in a waterway obstruct, interfere or destroy the bed or banks of a watercourse or wetland, the proponent will need to obtain a permit. Depending on the type of works, the permit will be a section 11, 17 or 21A permit issued under the RWI Act. The T-12 Section of the cable alignment does intersect a mapped SWA, therefore, there are permit requirements for this section under the RWI Act. Actions in SWAs which will require a permit include:

- Clearing of native vegetation.
- Altering the route or profile of the watercourse.
- Excavating the watercourse bed or banks.
- Stockpiling material and operating machinery on the watercourse bed or banks.
- Interfering with existing flow regimes through watercourses, by dams, weirs, pits, pumps, drains or pipelines.
- Placing material or objects that obstruct flow and cause water to pond and inundate land and native vegetation.
- Drilling, blasting or other exploration activities in the watercourse.
- Constructing structures in or across the watercourse, including dams, riffles, pylons or fish ways.
- Constructing roads, culverts, causeways or crossings across the watercourse for vehicle or animal access.
- Carrying out any other activity that interferes with riparian areas, pools or the water table in such a way that it alters the natural environment, interferes with the existing flow of water or the use of that watercourse by others.

The southern part of the study area through Collier Range National Park intersects with the Gascoyne SWA, and as such, there will be a permit required for intersecting those waterways in T-12 Section under the RWI Act. However, there are no major waterways in this part of the study area. Furthermore, a SWA permit has already been sought for the broader T-12 Section (Permit #PMB209204(1)).

2.2.5 Public Drinking Water Source Areas (PDWSAs)

Western Australia has Public Drinking Water Source Areas (PDWSAs) which have limitations on what development can happen in these areas in the interests of protecting vital drinking water resources. PDWSAs can be surface water sources such as dams, lakes and reservoirs, or can be the recharge areas associated with groundwater sources. The PDWSAs in the project area are declared through the *Country Areas Water Supply Act 1947* (CAWS Act) and have been developed in line with the recommendations made in the *Australian Drinking Water Guidelines*. The WA Department of Water and Environmental Regulation is responsible for the protection of PDWSAs.

The boundary of a PDWSA generally covers all key parts of the recharge area of unconfined groundwater resources, the area immediately surrounding the bore of a confined production groundwater source, or the catchment area of a key surface water resource. There are approximately 145 declared PDWSAs in WA and within the project area, there are two known PDWSAs. The first is north of Meekatharra and is a large Priority 1 PDWSA area (Meekatharra Water Reserve) with three Wellhead Protection Zones within the broader PDWSA. The second is a very large Priority 1 PDWSA area around Newman which has nine Wellhead Protection Zones within the broader PDSWA, six of which are intersected by the cable alignment. None of these zones are within the study area and therefore there are no restrictions or conditions upon any impacts made in these areas under the CAWS Act.

There are no (zero) PDSWAs in the immediate vicinity of the study area. Therefore, there are no restrictions or conditions to be applied to the works through the study area under the CAWS Act.

2.2.6 WA Vegetation Clearing Controls

Under the Western Australian *Environmental Protection Act 1986* (EP Act) it is an offence to clear native vegetation unless the clearing work is done in accordance with a clearing permit issued by the appropriate authority, or if an exemption applies to the land or type of clearing being undertaken. Schedule 6 of the EP Act contains the exemptions available under written laws or statutory processes, and these exemptions do apply to ESAs. There are also exemptions available for certain low-impact and routine land management practices and works, with these being prescribed in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (EP Regs), and these exemptions **do not** apply in ESAs. The route does intersect the Collier Range National Park (Collier Range NP) and there is an ESA layer covering the road reserve that passes through the park.

The route alignment does not enter any vegetation community ESAs, however an ESA vegetation clearing permit IS required for the ESA being intersected by the route through the road reserve that traverses through the Collier Range NP. This report is part of the application process for a permit to install the fibre optic cable through an ESA.

2.2.7 Introduced (Exotic) Flora

Introduced or exotic flora are those which have been introduced to Western Australia, many of which pose a threat to the state's biodiversity and natural values. The West Australian *Biosecurity and Agriculture Management Act 2007* (BAM Act) is the legislation that provides the legal framework for classifying weeds and for regulating the introduction and control of environmental and agricultural weeds in the state. There are also several pieces of subsidiary legislation (regulations) made under the BAM Act which guide processes that allow the Act to perform its functions. The *Biosecurity and Agriculture Management Regulations 2013* set out the categories of declared pests and prohibited

organisms. For weeds, there are three (3) categories, each of which have different levels of threat and impact levels:

- **Category 1 (C1) weeds.** Exclusion is the goal for these species, be that from the state, or parts of the state where exclusion of the species is a realistic option.
- **Category 2 (C2) weeds.** Eradication is the goal for these species be that from the state, or parts of the state where exclusion or eradication of the species is a realistic option.
- **Category 3 (C3) weeds.** Management is the goal for these species. It is accepted that these weeds are endemic to the state or parts of the state (not eradicable) and that they must be managed appropriately to limit their impacts on agriculture and the environment.

There are also weeds listed under Commonwealth law which are required to be managed in the interests of national biosecurity. These weeds are called Weeds of National Significance (WoNS). WoNS are high impact weeds which are causing or have the potential to cause significant environmental, economic, social and/or cultural impacts, and are species which will continue to spread if appropriate coordinated actions are not taken. Each WoNS species has specific guidelines to assist with species identification and management.

With respect to weeds that were detected during the targeted surveys, their categorisation, where appropriate, is provided in the data sheets and the flora species list (**Appendix 7.1**). There were no high threat weeds detected in the study area and it must be noted that there were very few weed species in general encountered in the study area. Where they were found, they tended to occupy the drainage areas immediately adjacent to the road (outside of the study area), and did not tend to spread into the adjoining areas of the study area or beyond. Areas of high threat weeds or large infestations of declared weeds have been mapped as part of the broader T-12 Section assessment, and will be added to the project CEMP. Any declared weeds will also be given a higher level of importance during construction/installation processes, with attempts to be made to avoid infestations via realignment, if possible, and decontamination to be completed in instances where machinery intersects an unavoidable infested area.

3 Survey Methodology

The section below provides an overview of the methodology used for the study and explains the overarching principles upon which the flora and vegetation survey and RFI targeted survey were based.

3.1 Desktop Review

A desktop review was conducted to ascertain information about the local and regional environment using a number of Western Australian and Commonwealth government resources, and covered items such as searches for previous surveys conducted in the area, disturbance history for the study area, as well as land classification systems such as bioregions, land systems, soils and geology. Species searches were also conducted using WA databases to determine what threatened flora and fauna and vegetation communities were located (previously recorded or modelled as likely to occur) in the vicinity of the study area. Where relevant, maps were produced to spatially represent some of the relevant items identified from the background search.

3.2 Data Standards

Data captured in field has been transcribed into the data package format required by the WA EPA's 'Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)', and once collated, will be submitted via the EPA's online IBSA Submissions Portal. The provision of the data in this format will support an assessment of compliance under the *Environmental Protection Act 1986* and provide information required for the EPA and DWER to conduct an environmental impact assessment (EIA) on the proposed development through the ESA. The survey methodology and the specific data to be captured during the surveys has been based on the requirements outlined in the EPA's 'Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment'.

3.3 Survey Type

The type of survey conducted is a flora and vegetation survey as per the EPA guidelines, as well as a targeted survey for the ten species outlined in the RFI. The survey gathered comprehensive information on the presence or absence of significant flora and fauna which have been discussed in the RFI, and recorded all flora located during the quadrat and traverse components of the survey. The survey also mapped vegetation types and quality across the study area. The placement of quadrats for the survey was influenced by vegetation types, to ensure an appropriate number of plots were established in all mapped vegetation types, as well as within any microhabitats such as rocky areas, waterways and sand dunes. Where a population of significant flora or fauna extend beyond the quadrat boundary, the full extent of the population was to be mapped. However, this was not practical for fauna in the field, as their burrows were widespread through much of the study area and beyond. The following sections describe more detail about the survey effort.

3.3.1 Flora Survey

The predominant survey type was flora and vegetation assessments (floristic composition) conducted within 50 metre x 50 metre quadrats, with quadrats fairly evenly spaced every 500 metres along the 16 kilometre cable alignment through the road reserve of the Great Northern Highway, in the vicinity of Collier Range NP (**Map 1**). There were additional quadrats placed at any main waterways or if obvious micro-habitat or changes in vegetation type occurred along the alignment (where these are

not already captured by a quadrat). According to EPA (2016) “Floristic composition vegetation classification is the preferred classification system for a detailed survey as the method is repeatable and is considered more suitable for identification of significant vegetation as it focuses on the suite of species present within a quadrat”.

Mapping for quadrat locations has been based broadly on the land systems of the Pilbara rangeland survey, conducted by Van Vreeswyk et al. (1987), to ensure sufficient quadrats are located in the various mapped land systems across the length of the study area. Finer detail vegetation assessment uses the NVIS system, defining the three dominant species from each of the three strata, being the upper, mid and lower stratum. The quadrat surveys were also supplemented by traverses (walking and recording any new or significant species encountered, and recording of all fauna tracks and burrows and predator scat sampling), as the survey team moved from one quadrat to the next. It is considered that this survey method was sufficient to gather in-depth data on the plants, animals and vegetation types present in the study area.

3.3.2 Fauna Survey

Locations of scats, tracks and burrows were recorded during quadrat surveys and while conducting traverses between quadrats. Survey ecologists also targeted areas where preferred habitat is present while moving through the entire 50 metre-wide study area. To supplement visual searches, any predator scats observed were collected and sent to fauna experts (Enviro DNA) for analysis. Where burrows were located, photographs were taken with scale (standard ruler) and burrows were GPS recorded. Engagement was made with DBCA (Tegan Payne – see **Appendix 7.6**), and identification of fauna species based on burrow size, location and construction methods were made via expert analysis of the photographs and via burrow descriptions and species location preferences. It was determined that delimiting searches would not be conducted to determine the extent of the burrow network, as the burrows were too numerous and widespread throughout much of the survey area and beyond.

3.3.3 Vegetation Units

The vegetation types (units) encountered were mapped according to the visible structural units and main species composition of the dominant strata (as per NVIS Level III vegetation association), as captured during field observations. **Table 3** outlines the data to be collected at each quadrat, providing sufficient information to map the vegetation units in the vicinity of the quadrats. While traversing from quadrat to quadrat, changes in vegetation type will be captured using in-field mapping technology and will be presented in the final report and IBSA data package. The vegetation types will then be mapped using ArcGIS Pro by plotting the boundaries captured in field onto aerial photos.

3.3.4 Vegetation Condition Mapping

The Trudgen (1988) scale is used for the assessment of vegetation condition within the Eremaean Botanical Province. The condition of vegetation was mapped at every quadrat where the survey was undertaken. The vegetation condition relates to vegetation structure observed, the level of disturbance noted within each of the three structural layers, and the likely ability of the vegetation to self-regenerate in the absence of further disturbance. **Table 1** below shows the categories that were used to assess vegetation condition.

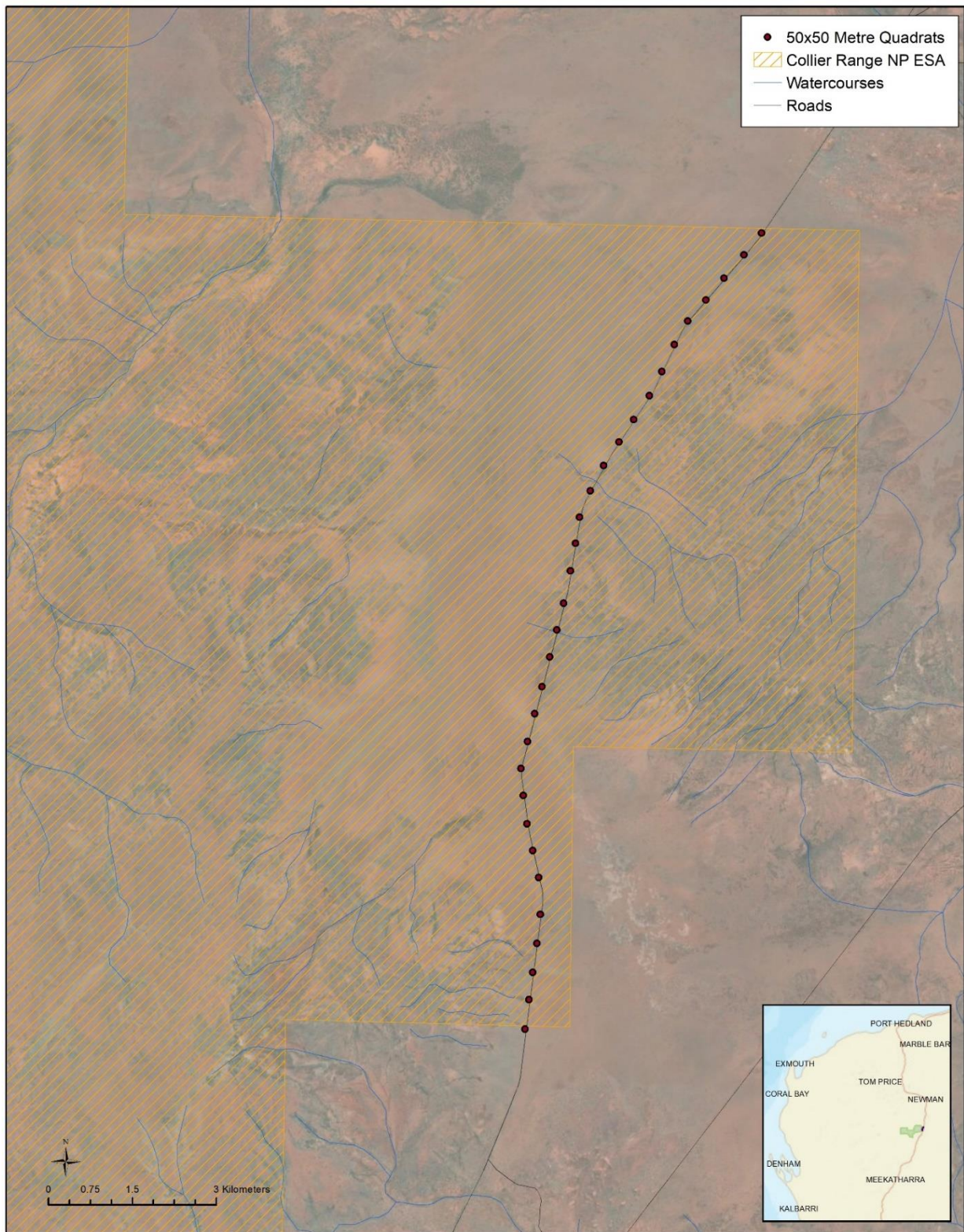
Table 1: Vegetation condition scale used to classify vegetation condition (Source: EPA 2016)

Trudgen (1988) Vegetation Condition Categories (Eremaean Botanical Province)	
Pristine	Not applicable to Eremaean Botanical Province.
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

3.4 Licensing and Permits

Permits to collect flora specimens to enable ecologists to press and submit voucher specimens were not obtained. A Regulation 62 flora permit was applied for through DBCA's Wildlife Licensing Branch on 19 February 2024, one month prior to the start of surveys. However, despite several attempts at following up the permit application with the permitting authority, the permit did not get processed in time by the relevant DBCA local district, and as a result a permit was not received prior to the surveys being completed. As of 17 April 2024, the permit had still not been received.

The lack of a permit was a limitation for the survey, as botanists were unable to legally take specimens of any unknown or hard to identify species. As a result photographs of plants and plant parts were relied upon for all plant identifications. It was fortunate that weather conditions leading into the survey were optimal, and the majority of species detected were carrying flowers, fruit or seeds, and were therefore able to be identified to species level.



Map 1: Location of 31 quadrats across the ~16 km study area (approx. 500m apart)

3.5 Survey Team

Two ecologists from Red-Gum were responsible for conducting the survey. Their experience and relevant qualifications are outlined in Table 2 below.

Table 2: Qualifications and experience of key ecology staff

Assessor name	Contact details	Relevant experience
<p>Damian Wall</p> <p>Bachelor of Applied Science (Parks, Recreation & Heritage), Master Environmental Management & Restoration, Graduate Certificate Cultural Heritage Management.</p>	<p>E: damian.wall@red-gum.com.au</p> <p>P: 0402 344 574</p>	<p>Damian is Managing Director and Senior Ecologist at Red-Gum Environmental Consulting Pty Ltd. Damian has authored 107 Cultural Heritage Due Diligence Assessments and 83 Cultural Heritage Management Plans across 4 states including WA and the NT. Damian has personally negotiated Native Title Agreements for large Petroleum Exploration companies for 6 years in QLD, NT, NSW & WA. He is an accredited Biodiversity and Native Vegetation assessor in both NSW and VIC. Damian has 20 years in the environmental industry and has conducted field work throughout the NT, WA and eastern states to author 96 Ecological Assessments (VIC), 49 Assessment of Significance (NSW) reports and 21 Review of Environmental Factor (NSW) documents. Damian is also a Geographic Information Systems (GIS) specialist proficient in all aspects of field data capture and presentation via ArcGIS.</p>
<p>Stuart Mendham</p> <p>Bachelor of Applied Science (Parks, Recreation & Heritage) (Hons).</p>	<p>E: stuart.mendham@red-gum.com.au</p> <p>P: 0482 175 831</p>	<p>Stuart is a Senior Field Botanist with over 20 years' experience in the fields of flora and fauna assessment and environmental management. Stuart's speciality is vegetation assessment, management and research, with an extensive knowledge of the vegetation of south-eastern Australia and the arid zones of Western Australia. Stuart is a Vegetation Quality Assessment Method (VQAM) accredited person in Victoria. Stuart is also experienced in the application of the NSW Biodiversity Assessment Method (BAM) (currently undergoing accreditation) and has performed NSW biodiversity impact assessments and developed vegetation offset plans under the guidance of accredited BAM assessors. Stuart has been a project manager on a number of large ecological assessments and has particular expertise in providing tailored and industry-specific recommendations to avoid and minimise the environmental impacts of major projects. Stuart also has a background in state government environmental management, fire management, pest and weed management and biosecurity portfolios, which affords Stuart the ability to make recommendations to address issues of this nature, as they relate to development and major infrastructure projects.</p>

3.6 Quadrat Data

The standard data to be captured in each quadrat was based on the EPA (2016) guidelines and on other similar botanical studies in the Pilbara and surrounding areas. Table 3 outlines the data collected by ecologists and describes what each data entry entails.

Table 3: Data to be recorded in the quadrat surveys

Data to be captured	Details of data
Date	Date of quadrat survey
Quadrat Code	Unique identifier i.e. Q001, Q002
Coord (NW corner)	GPS coordinate taken in quadrat's NE corner
Size/shape (std 50x50 2500m ²)	50 x 50 metres as per IBSA and EPA standards
Photos from NE corner	Photo taken from quadrat's NE corner, looking SE across the quadrat
Landform	Landform description i.e. stony plain, creek, sand dunes
Soil description	Description of surface soil type
Rock type	Description of surface rock type
Litter - percent cover	Estimated percentage cover of detached litter
Fire history	Estimated time since last fire (where known)
Vegetation condition	A condition rating for the vegetation based on the condition scales outlined in Keighery (1994) and Trudgen (1988) for the Eremaean Botanical Province.
Slope	Average percent slope for quadrat
Aspect	Aspect of quadrat
Disturbances	Describe any of the major disturbances that are visible in the quadrat, such as fire, grazing, vehicles, linear installations etc.
Quadrat marking method	The method used to mark the location of the quadrat (GPS recording in NE corner), or other, as necessary.
Vegetation type (NVIS - dominants for upper, mid and lower stratum)	Description of vegetation based on broad formation and height classes as per NVIS, listing the three dominant species in each stratum (upper, mid and lower).
Species	Full species list of every flora species within the quadrat, plus status (weed/native), average height, and abundance (count or estimate). Identifications via WA Florabase, reference material and other online resources. Unknown species unable to be collected, due to processing delay for the project Regulation 62 flora take permit.

3.7 Species-specific Survey Requirements

Where specific survey methods are required by any of the targeted species, these are briefly outlined below.

3.7.1 *Mulgara*

There are believed to be two *Mulgara* species in Western Australia. The tail variation is the distinguishing feature (Photo 1), however, there is some discussion on which species of *Dasyercus* are actually in WA, with confirmation of *D. blythi* presence, but scarce records of *D. cristicaudata* being available (Terrestrial Ecosystems 2013). The species occupy very similar habitats and produce similar burrows (Photo 2); therefore the same monitoring approach can be taken for both species, however distinguishing the different species from indirect observation only (burrows and tracks) is not possible.

In terms of guidance for surveys, monitoring and studies completed by Terrestrial Ecosystems (2013) recommend the following:

- Searches for burrows should only occur when the height of Spinifex (*Triodia* spp.) or shrubs is less than 500mm.
- The percentage cover of vegetation is less than 40% cover.
- The search effort is greater than two (2) persons per hectare per hour.
- Areas of taller (>500mm) grasses or shrubs, or where vegetation cover is greater than 40%, trapping is recommended over grid searching for burrows.



Photo 1: Tail variations in the two Mulgara species (Source: Terrestrial Ecosystems)

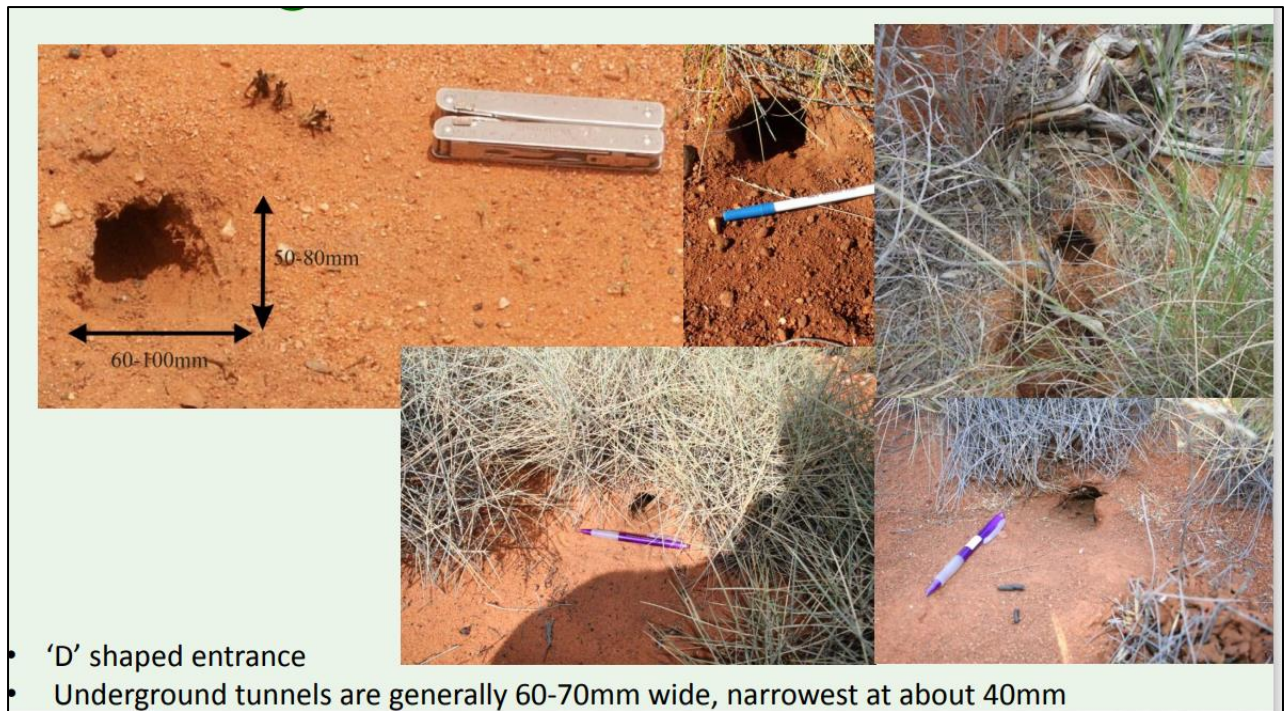


Photo 2: Mulgara burrows with a typical D-shaped entrance (top left) (Source: Terrestrial Ecosystems)

Species that may be confused with Mulgara, when basing their presence solely on the detection of burrows, is the Spinifex Hopping Mouse (*Notomys alexis*), shown in **Photo 3**. The latter tend to have mounds of excavated dirt at the entrance to their burrows, and burrows lack the D-shape of Mulgara burrows. According to Terrestrial Ecosystems (2013) fauna experts, it is easy to misidentify Mulgara burrows. Therefore, any potential burrow of an appropriate size and configuration were photographed and discussed with fauna experts to ensure species presence / absence is accurate. Some of the unidentifiable burrows may have also belonged to native rodents, known to be present (via scat DNA analysis) and which are known to burrow as well as build nests.



Photo 3: A Spinifex Hopping Mouse, while unlikely to be confused with Mulgara, their burrows are often misidentified as being Mulgara burrows.

According to Mulgara survey recommendations from the ‘Survey Guidelines for Australia’s Threatened Mammals: Guidelines for Detecting Mammals Listed as Threatened Under the EPBC Act’ (DCEEW 2011 p. 62-64), based on five hectare search areas, the techniques that are recommended are listed in Table 4 below.

The appropriateness of these techniques are described and where methods are not used, justification for the decisions are provided. It must be noted that the DCEEW recommendations are based on a five hectare survey area. Given that the study area is of a long, narrow linear nature, survey effort for such an area will be significantly less than a large five hectare study area would require.

Table 4: DCEEW recommended survey techniques for Mulgara over a 5 hectare area

Survey technique	Appropriate for this survey	Justification
Daytime habitat searches	Yes	Included in methodology.
Daytime searches for burrows, scats, pop-holes.	Yes	Included in methodology.
Collection of predator scats or owl casts or remains.	Yes	Included in methodology.
Hair tube sampling	No	Not suitable in a linear style survey that is progressively moving along a very long linear study area.
Elliot trapping	No	Not suitable in a desert when daytime temperatures are averaging over low to mid forty degree Celsius.
Pitfall trapping	No	Not suitable in a linear style survey that is progressively moving along a very long linear study area.
Spotlighting for active individuals	No	Not safe operating near a major highway or in sand dune terrain and unlikely to be a productive use of survey effort.
Baited camera traps	No	Unlikely to be a productive use of survey effort. Close proximity to main highway would significantly increase the risk of camera theft.

3.7.2 Greater Bilby

According to the DBCA ‘Guidelines for Surveys to Detect the Presence of Bilbies, and Assess the Importance of Habitat in Western Australia’ (2017), the most efficient and reliable survey technique to detect bilbies in the wild is the observation of tracks, scats and burrows (sign) by trained and experienced observers. The guidelines go on to state that “Bilbies are often sparsely distributed across large areas, and populations can move across the landscape, so a single survey may not detect bilby presence”. The preferred survey technique is dependent on the purpose of the survey and the environmental characteristics of the study area, as well as the size and shape of the study area.

The Guidelines (DBCA 2017) suggest a buffer zone extending six (6) kilometres beyond the perimeter of the study area should be surveyed using the same principles, especially in small sites. However, this is not feasible or practical. They recommend that for linear searches, transects must be spaced no more than 500 metres apart (preferable 200-400 m), with closer spacing in more densely vegetated areas, or if using plots, use less plots with supplementary linear searches. Plots can be more widely distributed and stratified in larger areas.

Based on these recommendations, the survey procedure for Greater Bilby was targeted surveys in 50 x 50 metre vegetation plots, as well as any suitable habitat visible just beyond the quadrat perimeters. Then searches were conducted during traverses between quadrat plot sites, searching for suitable habitat, sign, and burrows. Given the location of the study area within close proximity to the Great Northern Highway, in an area previously disturbed by a Telstra cable installation and road works, the probability of detecting Greater Bilby is relatively low, especially given the habit of predators using linear disturbances such as tracks, roads and fence lines to conduct their hunting and movements through their home territories, effectively increasing the predation pressure in areas like the study area. As per the Mulgara survey methodology, predator scats will also be collected with the purpose of identifying potential Greater Bilby remains.

3.7.3 Western Pebble-mound Mouse

There are no special survey requirements for this species. The methodology for surveying for this species was as per those used for other targeted fauna. Western Pebble-mound mouse has very distinctive burrows lined with pebbles or stones. The presence of stone of suitable size is a key habitat indicator for this species. In addition to quadrat searches for habitat and burrows (mounds), searches were conducted during traverses between quadrat plot sites, searching for suitable habitat, sign and burrows, as well as for predator scats that may contain the specie's remains.

3.8 Taxonomy & Nomenclature

3.8.1 Fauna Identification

Photographs of tracks, scats, bones and burrows were taken, and GPS coordinates recorded, and upon completion of fieldwork and initial analysis, photographs (or samples, where taken) were sent to qualified fauna experts to determine the species responsible. Where predator scats are found, these were GPS recorded, bagged and sent to fauna experts for scat DNA analysis.

3.8.2 Flora Identification

Identifications of species in field and from photographs taken during the assessment were assessed using WA Florabase resources and the WA State Reference Herbarium. Unknown species were to be collected, given a unique identifier, vouchered and submitted to WA Herbarium. However, as described, a flora collection permit was not provided in time by DBCA. As per EPA (2016), unfamiliar species that are difficult to key out, specimens of new populations of threatened and priority flora, specimens that appear to represent new species or that have atypical characteristics, and specimens of bioregional range extensions, including introduced (weed) species, would have been vouchered and sent to the Western Australia Herbarium for confirmation of identification. It was fortunate that the majority of species encountered had at least some specimens with flowers, fruits, seeds or other taxonomic identifiers to allow species to be identified.

Naming of species for data and reports was in accordance with Florabase, Western Australia's online herbarium. In instances where a common name is not listed, the Atlas of Living Australia (ALA) or other state herbariums may be consulted. Any species with no known common name will be solely identified using their scientific name.

3.9 Incidental Flora and Fauna

An incidental flora and fauna species list was maintained, and included a running list of all flora specimens observed within and beyond the boundaries of quadrats, and all fauna observed during the duration of the survey within and in close proximity to the study area (i.e. those visible from within and above the survey area). The study's flora and fauna lists (quadrat and incidental searches combined) are provided in **Appendix 7.1** and **7.2**.

3.10 Likelihood of Occurrence for Targeted Species (Significant Flora and Fauna)

The likelihood of the targeted flora and fauna species being present in the study area has been assessed against a range of criteria. A decision matrix in **Table 5** has been used to give consistency to assessing whether a species is likely or unlikely to be present in the study area, based on habitat presence/absence, known distributions of the species and the distance from the study area to the nearest verified record of the species.

Table 5: Likelihood assessment decision matrix

Species record categories	Habitat characteristics in study area			
	Preferred habitat present	Suitable habitat present or within known distribution	Marginal habitat only or just outside of known distribution	No suitable habitat present or well beyond known distribution
Recorded in study area	Present	Present	Present	NA
Recorded within 5km	Highly likely	Likely	Possible	Unlikely
Recorded within 5-20km	Highly likely	Likely	Possible	Unlikely
Recorded within 20-50km	Likely	Possible	Unlikely	Highly unlikely
Records >50km	Possible/Likely	Possible	Unlikely	Highly unlikely
Species not locally present / greater than 200km to nearest	Unlikely	Unlikely	Highly unlikely	No.

4 Results

4.1 Location of Project

The Project Horizon fibre optic cable installation project is intersecting (T-12 section) and approximately 16 kilometres of the road reserve associated with the Great Northern Highway (which is mapped as an ESA), which runs through Collier Range NP (**Map 1**). The study area is located approximately 142 kilometres south of Newman. The Collier Range NP is on the National Heritage Register and is also an ESA for Western Australia.

4.2 Study Area Overview

The cable route is, on average, a distance of 25 to 35 metres from the western edge of the Great Northern Highway. The study area for the flora and fauna targeted surveys is a 50 metre-wide strip, approximately 25 metres either side of the mapped cable centreline. To give an area of 2,500 metres squared, quadrats for the study were 50 metres by 50 metres wide, as per EPA (2016) standards. Quadrats have been mapped based on even spread across the study area, as well as ensuring any potential micro-habitats or vegetation changes were also captured.

4.3 Previous Surveys

There are no known previous surveys in the local vicinity of the study area. As part of the broader Project Horizon assessment process, the T-12 Section was assessed via a rapid assessment method in December 2022 and May 2023. This assessment ascertained the broad vegetation conditions along the study area on both sides of the road to help guide efforts to minimise impacts. This rapid assessment identified that, despite being in the road reserve, the high quality of vegetation associated with the ESA would require a permit to allow the infrastructure to be installed through the ESA, and outlined a variety of actions and controls to be put in place to ensure impacts to the ESA were minimised by the construction process.

4.4 Disturbance History

There is no data available on disturbance history for the study area. Field assessment did reveal the presence of fire scarring through some of the local landscape, with fires likely to have occurred within the last one to two years in some parts of the study area. Unfortunately, the DBCA fire history data does not show any recent fire events in the study area, so estimates of fire history were made in the field based on fire scars and regrowth heights of fire susceptible perennial species.

Disturbances associated with historical road development are the most obvious and significant of the disturbances that are or have been in operation in the study area. Road development involved re-shaping and contouring of some areas, as well as the installation of under-road drainage and parallel water catching drains in some areas, all of which have disturbed large parts of the study area. Despite this, weed numbers remain low, and the native vegetation has responded and recovered well. The main remaining disturbance is the previous Telstra cable installation, which runs through the study area at a distance of approximately 70 metres west of the Great Northern Highway, which has also rehabilitated well, despite some areas being insufficiently rehabilitated after installation by Telstra.

4.5 IBRA Region and Subregion

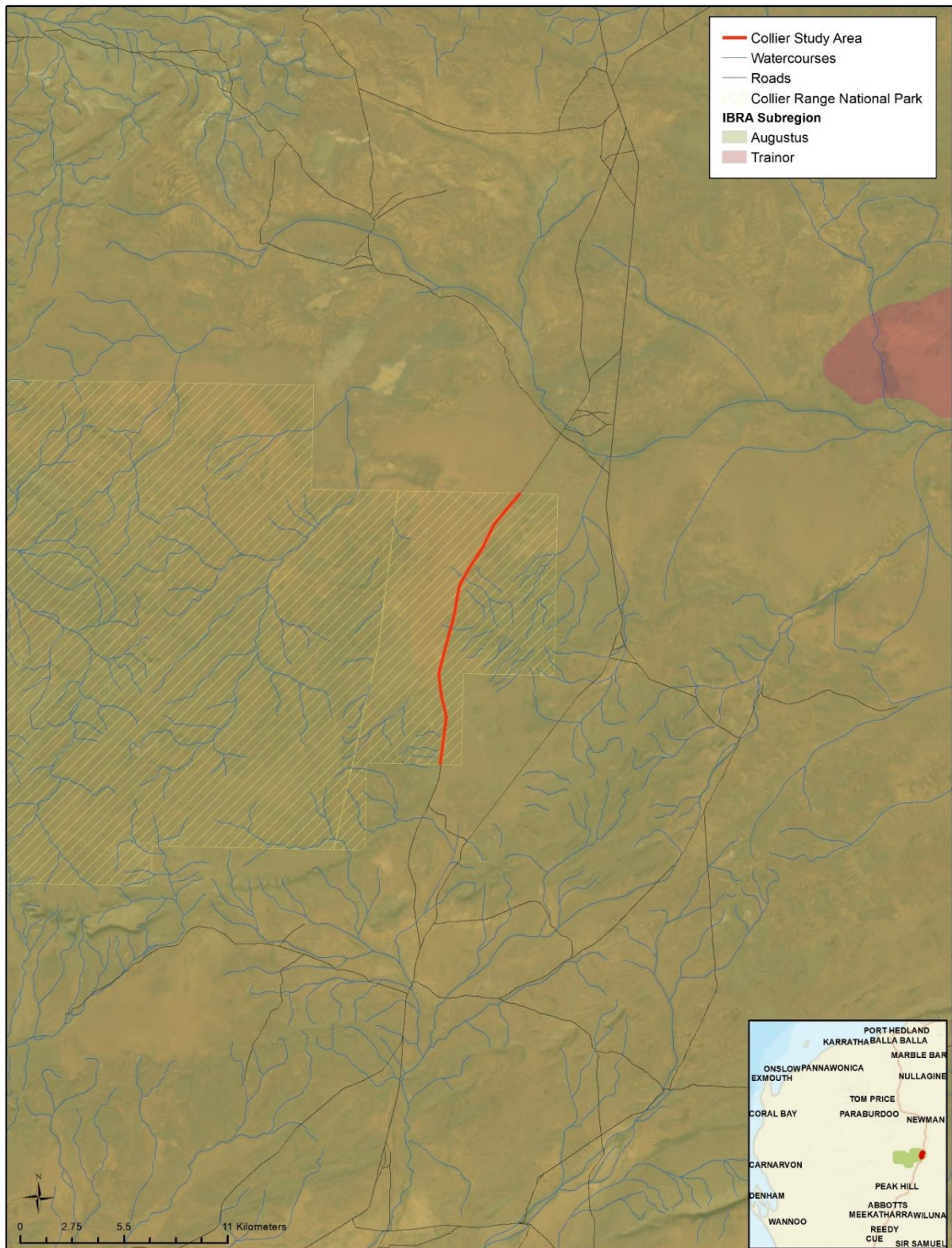
The study area is within the Gascoyne IBRA Region, and the IBRA Subregion of Augustus (**Map 2**). The Augustus Subregion is characterised by rugged sedimentary and granite ranges that are divided by flat valleys. The region is dominated by Mulga woodland, with Spinifex grasses (*Triodia* spp.) dominating shallower earthy loams and hardpans on the plains (Desmond et al 2001).

4.6 Land Systems

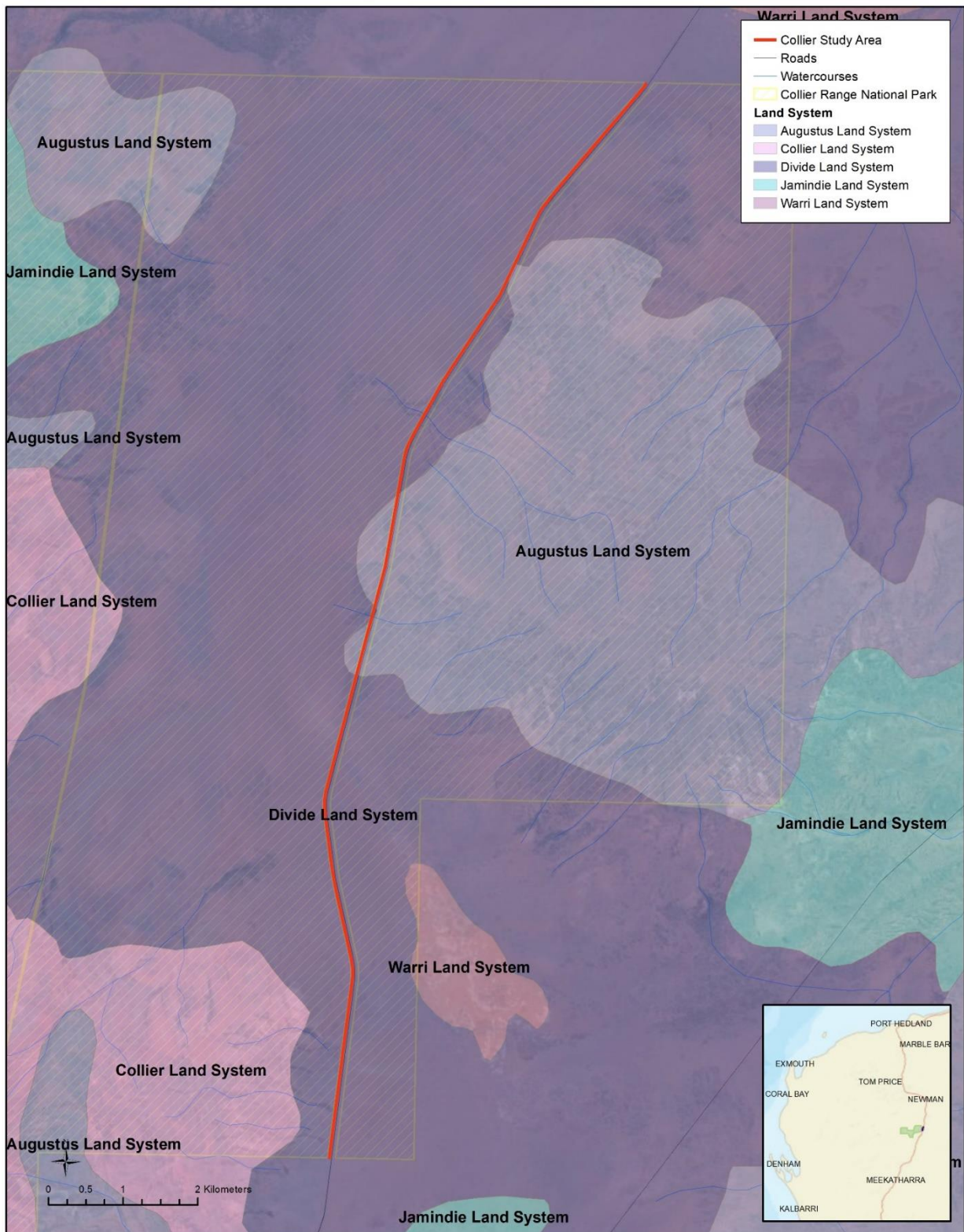
The study area intersects two mapped land systems, those being the Divide Land System and the Augustus Land System, and it is also in close proximity to the Collier Land System, which is just a short distance to the west (**Map 3**). The intersected land systems are described in **Table 6** below. The land system mapping is relatively accurate, as the boundaries of the land systems closely resembled those vegetation changes experienced on the ground.

Table 6: Description of Land Systems being intersected by the proposed development in the study area

Land System	Land System Description	Area (ha) (50m wide)	% of Study Area
Divide Land System	Gently undulating sandplains with minor dunes, supporting hard spinifex hummock grasslands with numerous shrubs.	60.8	78
Augustus Land System	Rugged ranges, hills, ridges and plateaux with skeletal soils supporting mulga and other acacia shrublands in southern parts or hard spinifex grasslands in northern parts.	17.2	22



Map 2: IBRA Subregions (within Gascoyne Bioregion) for the area around Collier Range National Park.



Map 3: Land Systems in the vicinity of the study area.

4.7 Conservation Reserve and Environmentally Sensitive Area

The study area is running through a road reserve (Great Northern Highway) that splits a conservation reserve (Collier Range NP), which is mapped on either side of the road reserve (**Map 1**). Collier Range NP, which is under the management of DBCA, is not mapped as occurring in the road reserve (study area), although the road reserve is mapped as an ESA, given the park is part of the National Estate Register, and a buffer applied to the park asset means that the road reserve is also classed as an ESA.

As mentioned in the previous section on ESAs (**Section 2.2.3**), the usual exemptions for low impact works like installation of subterranean cables do not apply to ESAs. Where works are entering these ESAs (and any others listed above) a permit must be granted to allow works to take place and may consist of a vegetation clearing permit, and for TECs may also require an additional permit to modify an occurrence of a TEC, if impacts are deemed sufficient to cause a significant impact, reduction in size or alteration to the ESA.

4.8 Climate and Weather Leading up to and During Survey

The climate of the study area is arid, with hot daytime temperatures and patchy generally unreliable rainfall, with the potential for significant daily rainfall totals during the wet season (over the summer months). A survey conducted six to eight (6-8) weeks post wet season (usually March – June) is the recommended timing of surveys in the Eremaean Botanical Province, according to EPA (2016). The weather history for the four months leading up to the study for the station at Newman Airport, WA, is provided in **Figure 1** below.

The average maximum temperature in the period of 1 December 2023 to 21 March 2024 is 40.3 degrees Celsius. A suitable weather event passed through the region on January 24 and 25, with Newman receiving 128.8 and 46 millimetres of rain respectively. It must be noted, however, that the study area is 142 kilometres south of Newman, and establishing whether the rainfall extended that far south and was of a similar quantity to the weather station readings is difficult to determine. Nevertheless, the weather systems in the wet season are generally far-reaching and it is assumed that substantial rainfall likely fell in the study area around the same time. There was a second significant rainfall event in the first week of March, which, along with the January event, meant conditions for survey between March 18 and 21 were ideal.

Despite the high average temperatures over the summer, the Collier Range NP survey was conducted in mid to late March 2024, which was approximately six to seven (6-7) weeks after the significant rainfall event that occurred late January, and a short time (about 10 days) after the follow-up rainfall event that occurred in early March. This is the ideal time to conduct floristic surveys according to the EPA (2016) guidelines, and the weather leading up to the survey was highly favourable, meaning numerous species were in flower or carrying enough seed or other diagnostic floristic material to be readily identifiable. Conditions during the survey were warm to hot, with a day of consistent drizzle occurring on day three of the survey.

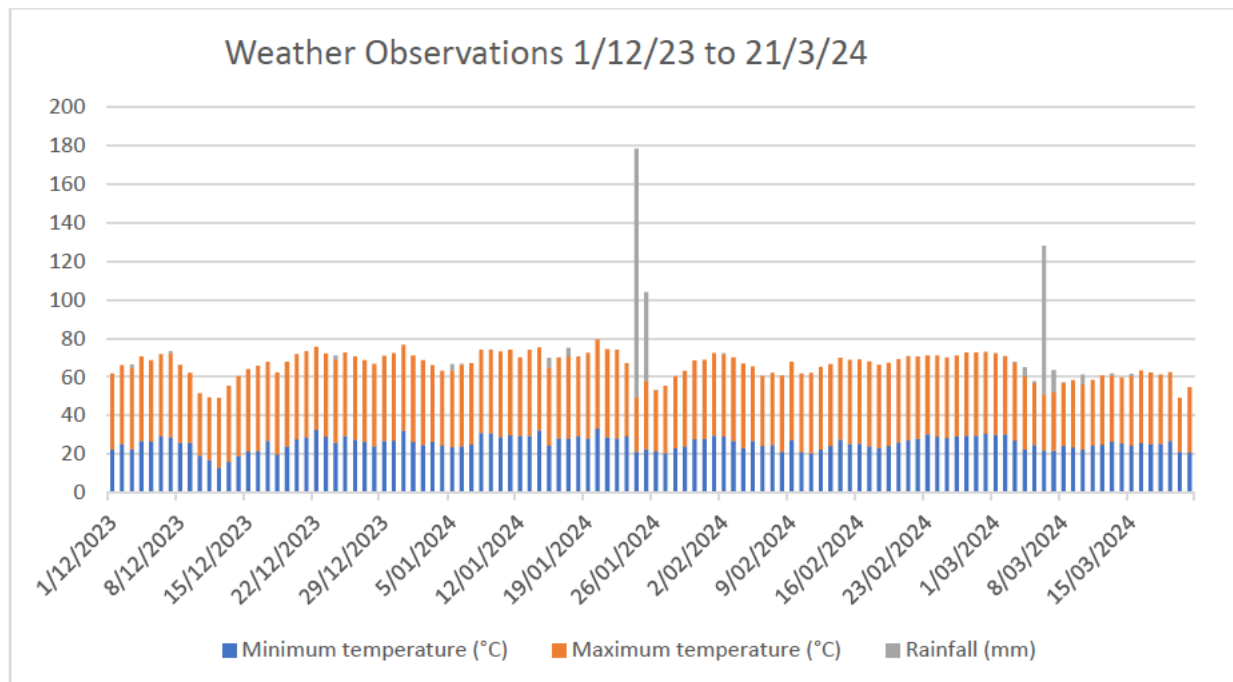


Figure 1: Average maximum temperature and total daily rainfall for Newman Airport from 1 December 2023 to 21 March 2024 (Source: BOM 2024)

4.9 Soils & Geology

Limited detailed information is publicly available on the soils and geology of Collier Range NP. Site assessments from December 2022 and May 2023 revealed consistent soils which aligned with the mapped Land Systems. The dominant soils were red sands to red loam, with some sand dune formations in the southern-most part of the study area, with these soils aligning with the mapped Divide Land System. The Augustus Land System in the central part of the study area was rockier, shrubbier, contained fewer *Spinifex* grasses and contained more hardpan than the remaining parts that were within the Divide Land System. These changes in soils influenced vegetation significantly, with quite distinctive difference in vegetation occurring between the two different land systems. Presence of fauna was also influenced by soil type, with fewer burrows observed in the Augustus Land System area.

4.10 Vegetation & Community Structure

The initial rapid assessment revealed that the southern section of the alignment through Collier Range NP consists of small to moderate size sand dunes, with moderate to high cover of vegetation, predominantly *Spinifex* grasses (*Triodia* spp.), but also has small shrubs, prostrate shrubs and a high diversity of herbaceous species. Approximately two (2) kilometres north of the southern boundary of the park, and the landscape begins to flatten out, with fewer sand dunes present, with the landscape tending to flat to gently undulating sandy plains. Aside from the small rockier and shrubbier central section of Augustus Land System, the soils remain very sandy throughout most of the 16 kilometre study area, and the vegetation remains relatively consistent. With few waterways of any significance in the study area, the vegetation types are consistent and overlap closely with land system mapping boundaries.

4.11 Variation & Microhabitats

There is limited variation in the vegetation and habitats within each of the two Land Systems present across the 16 kilometre section of park. There are few waterways within the study area, and there is little distinguishable difference between flora in these areas compared to that across the remainder of the site. There is little significant rock or major elevation changes throughout the study area, with the only exception being the presence of small to moderate sized sand dunes in the first two (2) kilometres (southern end) of the study area, before grading out to flatter plains, then a slightly elevated and rockier section in the central area where the Augustus Land System occurs, before once again grading out to flatter sandy plains. Quadrats were placed to ensure all of the variety in soils, slope and vegetation were captured by at least one quadrat and preferably by multiple quadrats. Conducting traversed between quadrats also ensured that flora and vegetation conditions were adequately recorded for the entire 16 kilometre study area.

4.12 Local & Regional Populations of Significant Flora and Fauna

The RFI and background review revealed the nearest threatened and WA Priority flora and fauna records to the study area were as outlined in Table 7 below:

Table 7: Distances from the study area to the nearest significant flora and fauna records

Species name	Common name	Nearest record from study area
<i>Bothriochloa. decipiens</i> var. <i>cloncurransis</i>	Pitted Bluegrass	Approximately >450 km.
<i>Eremophila. appressa</i>	Wispy Poverty Bush	~10 km
<i>E. fasciata</i>	Spaghetti Eremophila	~10 km
<i>Swainsona katjarra</i>	Birriliburu Swainsona	~15 km
<i>Rhagodia</i> sp. Hammersley	Nil	~5 km
<i>Thysanotus</i> sp. Desert East of Newman	Fringe Lily	~5 km
<i>Dasyercus blythi</i>	Brush-tailed Mulgara	Approximately >200 km
<i>Dasyercus cristicauda</i>	Crest-tailed Mulgara	Approximately >300 km
<i>Macrotis lagotis</i>	Greater Bilby	Approximately >170 km
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	Approximately ~60 km away

4.13 Likelihood of Occurrence Summary

The following table (Table 8) summarises the likelihood assessment findings for each species described in the DBCA RFI, and provides justification for the likelihood category selected. It must be noted that, although some species have a lower likelihood of occurring in the study area, it is acknowledged that existing data and survey effort is insufficient for most of these species, and on that basis ALL species listed in the RFI were included for targeted surveys.

Table 8: Overview of species likelihood of occurrence assessment

Species name	Common name	Likelihood rating	Justification	To be surveyed (Y/N)
Flora				
<i>Bothriochloa. decipiens</i> var. <i>cloncurrensis</i>	Pitted Bluegrass	Highly Unlikely	Nearest record approx. 450km away. Seems to prefer woodlands. Sand dunes/sandy soils in study area unlikely to be favourable.	Y – Despite ranking, will be included for survey.
<i>Eremophila. appressa</i>	Wispy Poverty Bush	Possible	Nearest records only <10km away. Sandy soils not suitable in study area, but cannot rule out as a potential as there may be pockets of suitable soils.	Y
<i>E. fasciata</i>	Spaghetti Eremophila	Likely	Record ~10km south. Sandy soils not suitable in study area, but cannot rule out as a potential as there may be pockets of suitable soils.	Y
<i>Swainsona katjarra</i>	Birriliburu Swainsona	Likely	Record within ~15km. Limited information on soil/habitat preferences. Likely based on proximity and tendency for other Swainsona to do well in sandy soils.	Y
<i>Rhagodia</i> sp. Hammersley	Nil	Possible	Very little info available. Possible based on two records in close proximity (<5km).	Y
<i>Thysanotus</i> sp. Desert East of Newman	Fringe Lily	Highly likely	Suitable sandy soils present, recorded ~5km east just outside NP.	Y
Fauna				
<i>Dasycercus blythi</i>	Brush-tailed Mulgara	Possible to likely	Despite >200km to nearest record, presence is possible due to limited surveys and underground habit.	Y
<i>Dasycercus cristicauda</i>	Crest-tailed Mulgara	Possible to likely	Despite >300km to nearest record, presence is possible due to limited surveys and underground habit.	Y
<i>Macrotis lagotis</i>	Greater Bilby	Possible	Despite nearest records being ~170km away, sandy soils and dunes with good Spinifex cover is ideal habitat.	Y
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	Possible	Despite nearest records being ~60km away, Spinifex cover is ideal habitat, however presence of pebbly rocks may be a limitation.	Y

4.14 Field Survey Results- Flora

The conditions leading up to and during the survey, although very hot, were ideal for survey to take place, with two major rain events occurring in the preceding three months. A large number of flora species encountered had flowers, seeds, pods or fruit present on many or at least some of the specimens, allowing identifications to be made for the majority of flora species encountered. There were, however, some species that were sterile and therefore unable to be accurately identified to species level.

The assessment detected a total of 138 species or subspecies of flora, representing 75 genera (Appendix 7.1). Species richness for the study sites (quadrats) ranged from 10 species in the least diverse to 41 species in the most diverse quadrat (Appendix 7.3). Only two exotic flora were detected during the survey, which is a low number when considering the proximity of the study area to the disturbed footprint and associated drainage areas of the Great Northern Highway.

4.14.1 Targeted Flora and Other Conservation Significant Flora

No flora listed in the RFI as targeted flora species were detected during the study area assessment or during the survey associated with the previous rapid assessment. There were also no threatened flora species or WA Priority flora species recorded in the study area. Furthermore, there were no unidentifiable plants detected that resembled or possessed the characteristics of any of the targeted flora species, or other known threatened or WA Priority species from the broader area.

4.14.2 Introduced Flora

Only two exotic flora were detected during the survey, which is a low number when considering the proximity of the study area to the disturbed footprint and associated drainage areas of the Great Northern Highway. The most common (but still not widespread) was *Cenchrus setiger*, which was detected in several areas at one location (not within a quadrat) in the south of the study area, with the other weed being *Brassica tournefortii*, which was only detected along a creek area at one quadrat (Q014) in the central part of the study area.

It must be acknowledged, however, that the road verge and spoon drains were not included for the survey as they did not fall within the 50 metre-wide study area footprint. Therefore, weed species numbers in the broader vicinity are certain to be much higher than those recorded during the assessment. To address the risk of weed spread during construction, strict measures are to be put in place during any construction to ensure machinery arrives on site clean, and that exotic species are not spread through the study area during construction works.

4.14.3 Range Extensions

There were no range extensions for any of the flora species identified during the assessment.

4.14.4 Unidentifiable Flora

There are a total of four unidentified flora species which were unable to be identified as a result of them having insufficient taxonomic characteristics (reproductive parts), as the plants were sterile at the time of survey (Table 9).

Table 9: Flora that were unable to be identified during the survey

Unidentifiable taxa	Comments
<i>Acacia</i> sp.	Sterile
<i>Eremophila</i> sp.	Sterile
<i>Eremophila</i> sp.	Sterile
<i>Ipomoea</i> sp.?	Sterile climber with foliage that resembles that found in the <i>Ipomoea</i> genus.

4.14.5 Vegetation Types

There are two dominant vegetation units (**Map 4**) (based on those described by Beard et al (1978)) and the boundaries of these overlapped closely with the mapped Augustus Land System and Divide Land System (**Map 3**). The most common vegetation unit is Hummock Grasslands, Shrub Steppe, which occurred throughout the northern and southern parts of the study area, and closely aligned with the locations of the Divide Land System.

The other vegetation unit encountered was Low Woodland, Open Low Woodland and Sparse Woodland; Mulga, which occurs in two locations in the central part of the study area, and aligns relatively closely with the mapped area of the Augustus Land System, although the northern-most occurrence found on the ground was not mapped in the WA land system modelling. These vegetation units are described in more detail in **Table 10** below and representative photographs are provided (**Photo 4** and **5**).

Table 10: Vegetation units encountered within the study area

Vegetation Type	Description	Quadrats	Extent in Study Area (Ha)
Hummock Grasslands, Shrub Steppe	Several <i>Acacia</i> , <i>Hakea</i> and <i>Grevillea</i> species present but scattered, with occasional <i>Codonocarpus</i> , over <i>Seringia</i> spp., <i>Scaevola parvifolia</i> subsp. <i>pilbarae</i> and <i>Senna</i> spp. over <i>Triodia basedowii</i> , <i>Triodia schinzii</i> and <i>Eragrostis eriopoda</i> hummock grassland.	Q001, Q002, Q003, Q004, Q005, Q006, Q007, Q008, Q009, Q010, Q011, Q012, Q018, Q019, Q020, Q022, Q023, Q024, Q025, Q026, Q027, Q028, Q029, Q030 and Q031.	62
Low Woodland, Open Low Woodland and Sparse Woodland; Mulga	<i>Acacia</i> , <i>Hakea</i> and <i>Grevillea</i> species (with occasional <i>Corymbia</i> spp.) over <i>Eremophila</i> spp., <i>Senna</i> spp. and <i>Ptilotus</i> spp. over occasional <i>Triodia basedowii</i> , <i>Paraneurachne muellerii</i> and <i>Calandrinia polyandra</i> .	Q013, Q014, Q015, Q016, Q017 and Q021.	17.1



Photo 4: Typical Hummock Grasslands, Shrub Steppe encountered



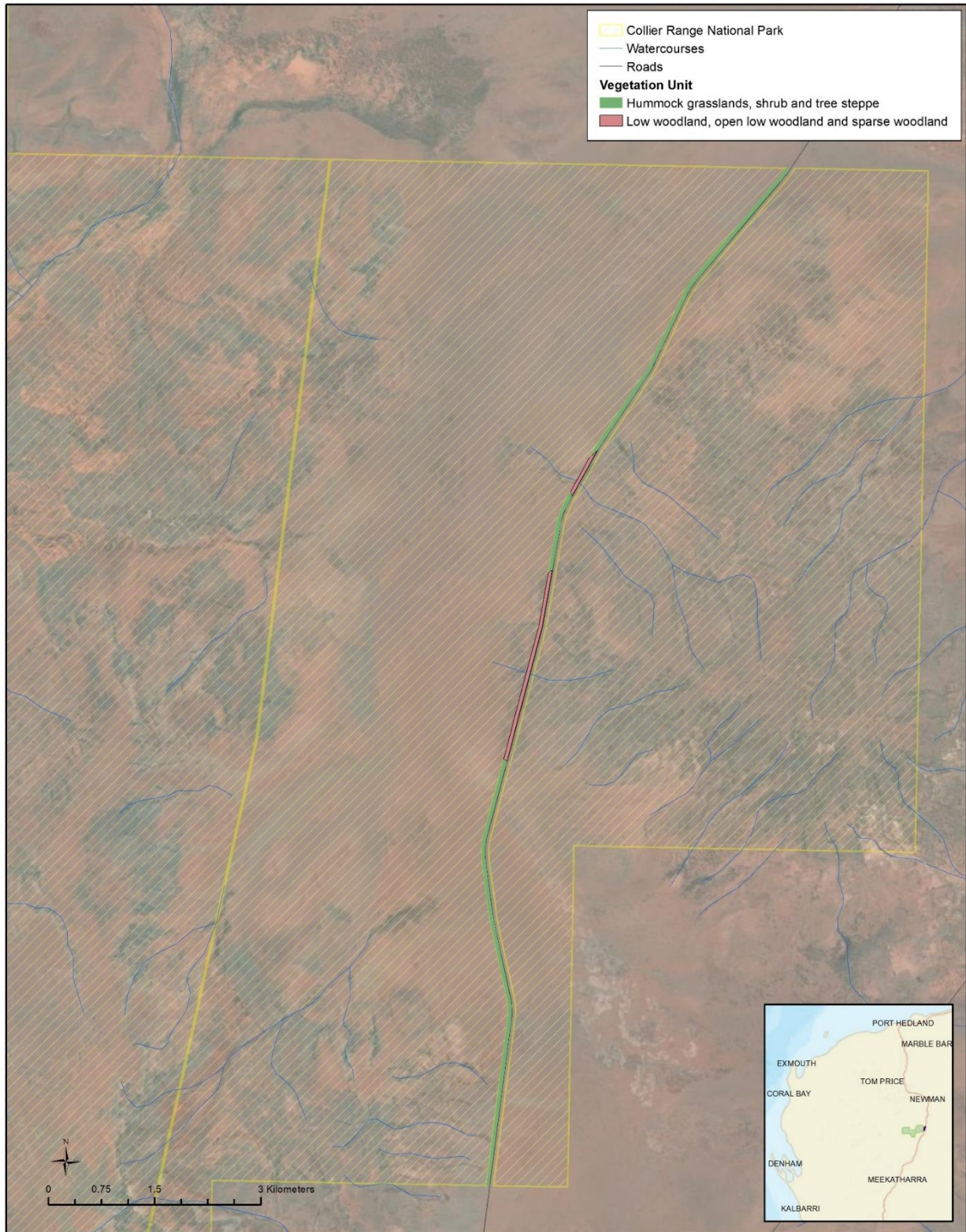
Photo 5: Typical Low Woodland, Open Low Woodland and Sparse Woodland; Mulga encountered

4.14.6 Vegetation Condition

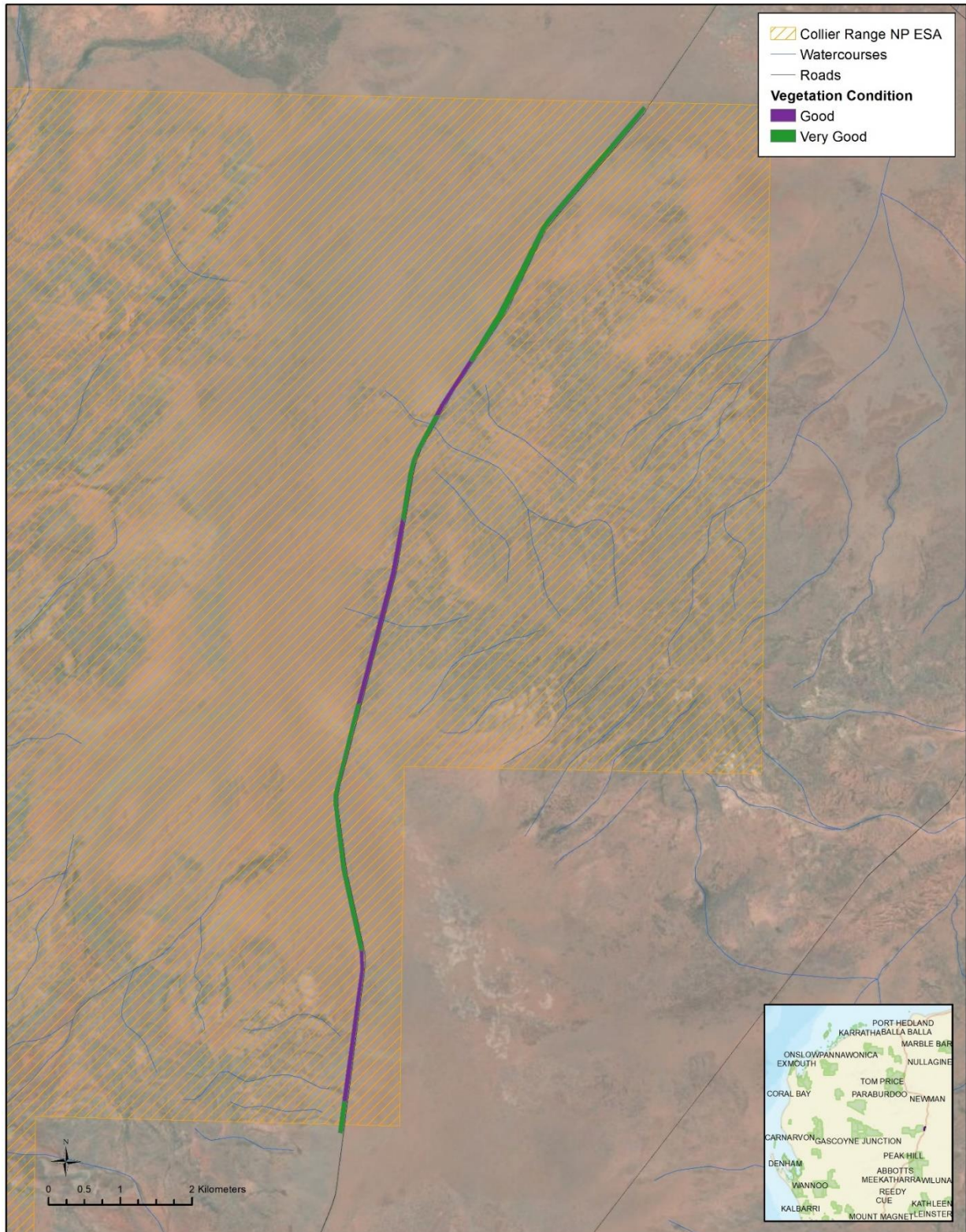
The majority of the study area was in very good condition according to the Trudgen (1988) scale, which is used for the assessment of vegetation condition within the Eremaean Botanical Province. There were several areas where vegetation condition was good, with the drop in quality a result of historical disturbances such as road works, and ongoing disturbances such as overland water flows (erosion) and increased grazing impacts in some places. **Map 5** shows the variation in vegetation quality across the study area.

4.14.7 Threatened and WA Priority Ecological Communities

There were no threatened or WA Priority ecological communities identified in the study area.



Map 4: Location of vegetation units across the ~16 km study area



Map 5: Vegetation condition recorded during the site assessment

4.15 Field Survey Results- Fauna

4.15.1 Targeted Fauna and Other Conservation Significant Fauna

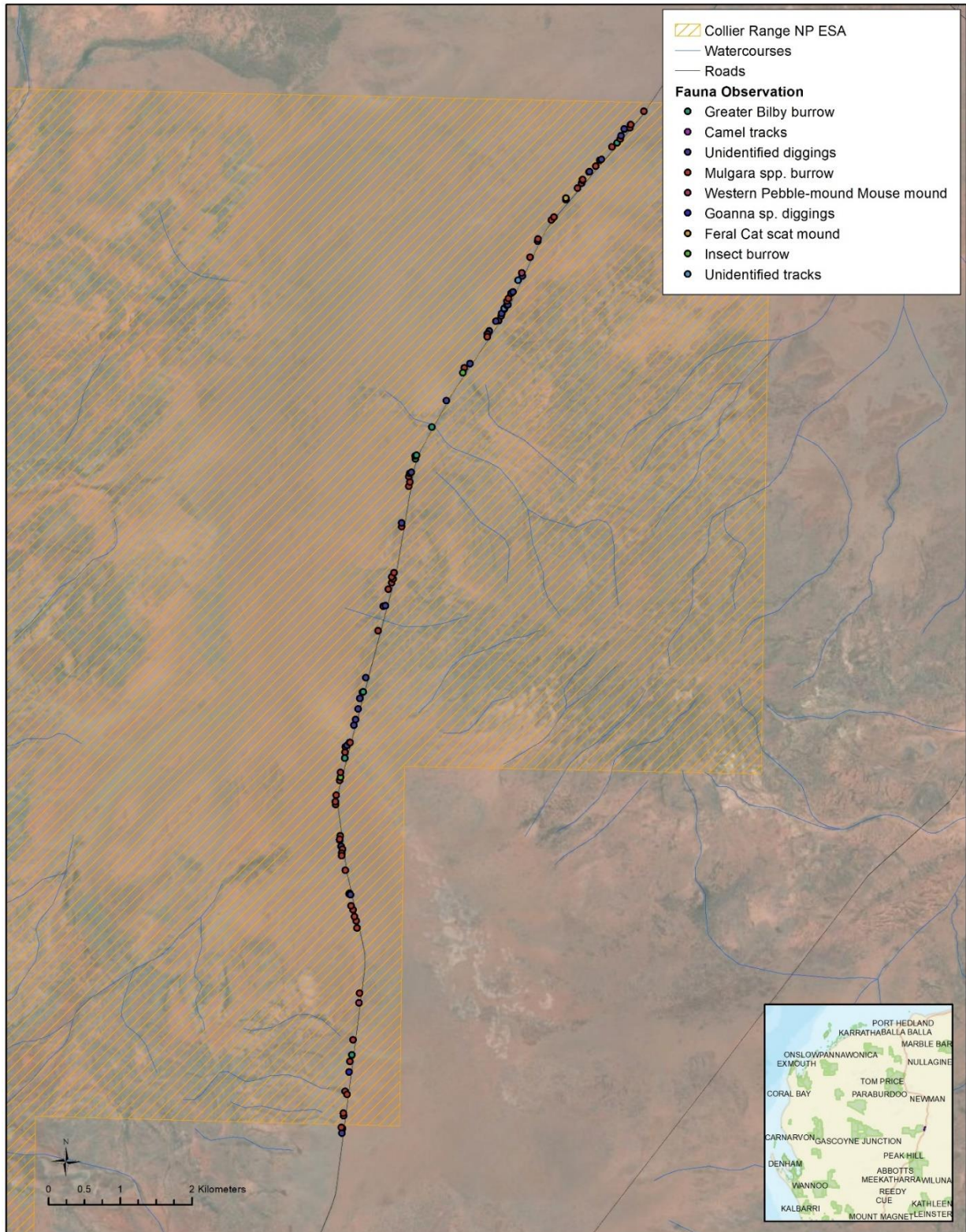
Despite significant ground being covered by foot along the entire 16 kilometre long study area, only one predator scat was detected and collected for analysis. DNA analysis of the lone suspected feral cat scat (**Appendix 7.4**) revealed that no targeted fauna species were present in the scat, with the two species identified being the fairly common native species of Crimson Chat (*Epthianura tricolour*) and a rodent (Muridae family). There was also Cat (*Felis catus*) hairs present in the scat, which would have been the result of self-grooming by the feral cat.

4.15.2 *Mulgara*

The field assessment detected a very large number of fauna tracks and burrows, and a limited number of fauna scats, with the majority of the study area footprint containing at least some signs of native fauna occupation. Based on advice from a local DBCA expert, the presence of *Mulgara* is considered certain, as a number of distinctive D-shaped *Mulgara*-style burrows were detected. The locations of these suspected *Mulgara* burrows are shown in **Map 6** and a typical burrow is shown in **Photo 6**.



Photo 6: Classic D-shaped *Mulgara* burrow with ruler for scale.



Map 6: Fauna habitat and sign observations

4.15.3 Greater Bilby

There were a number of potential Greater Bilby burrows detected during the assessment, however these were much less frequent than the Mulgara burrows. Given the dimensions of the entrances and the common location of these burrows at the bases of shrubs, the presence of Greater Bilby in the study area is possible, but cannot be confirmed nor ruled out based on the evidence obtained. **Map 6** shows the location of the potential Greater Bilby burrows, and a representative photo of a suspected burrow is provided at **Photo 7** and **8**.



Photo 7: Suspected Greater Bilby burrow, which are often located in or at base of shrubs, with ruler for scale



Photo 8: Suspected Greater Bilby burrow at the base of a shrub, with ruler for scale.

4.15.4 *Western Pebble-mound Mouse*

The presence of Western Pebble-mound Mouse in the study area is considered possible to likely, as there were two potential pebble-lined burrows located during the site assessment (**Map 6** and **Photo 9** and **10**). Despite searches for the species burrows and mounds being undertaken not only within each quadrat, but along traverses in between quadrats for the entire 16 kilometre-long study area, there were not large numbers of burrows (pebble-mounds) detected, and if the species is present, it is not as common as the Mulgara.



Photo 9: Suspected Western Pebble-mound Mouse burrow, with ruler for scale



Photo 10: Suspected Western Pebble-mound Mouse burrow, with ruler for scale

4.15.5 Other Native Fauna

There were numerous tracks, diggings and burrows detected that were not able to be conclusively identified. One of the most common encountered was Goanna (*Varanus* sp.) diggings (**Photo 11**), where the digging hole consistently terminated with an insect burrow at the apex. Advice was sought from a traditional owner, and these diggings were confirmed to be Goanna diggings, following their preference for preying on insects in their burrows.



Photo 11: Goanna scratching with insect burrow hole at tip of burrow, with ruler for scale

4.15.6 Introduced Fauna

There were numerous indirect signs of introduced fauna throughout the study area, including tracks and scats of cattle, camels (**Photo 14**), feral cats, horses (or donkeys) and rabbits. The presence of feral cats was confirmed via track (**Photo 12**) and scat (**Photo 13**) detection and cat (*Felis catus*) hair in the cat scat (self-grooming).



Photo 12: Suspected Feral Cat tracks, with ruler for scale

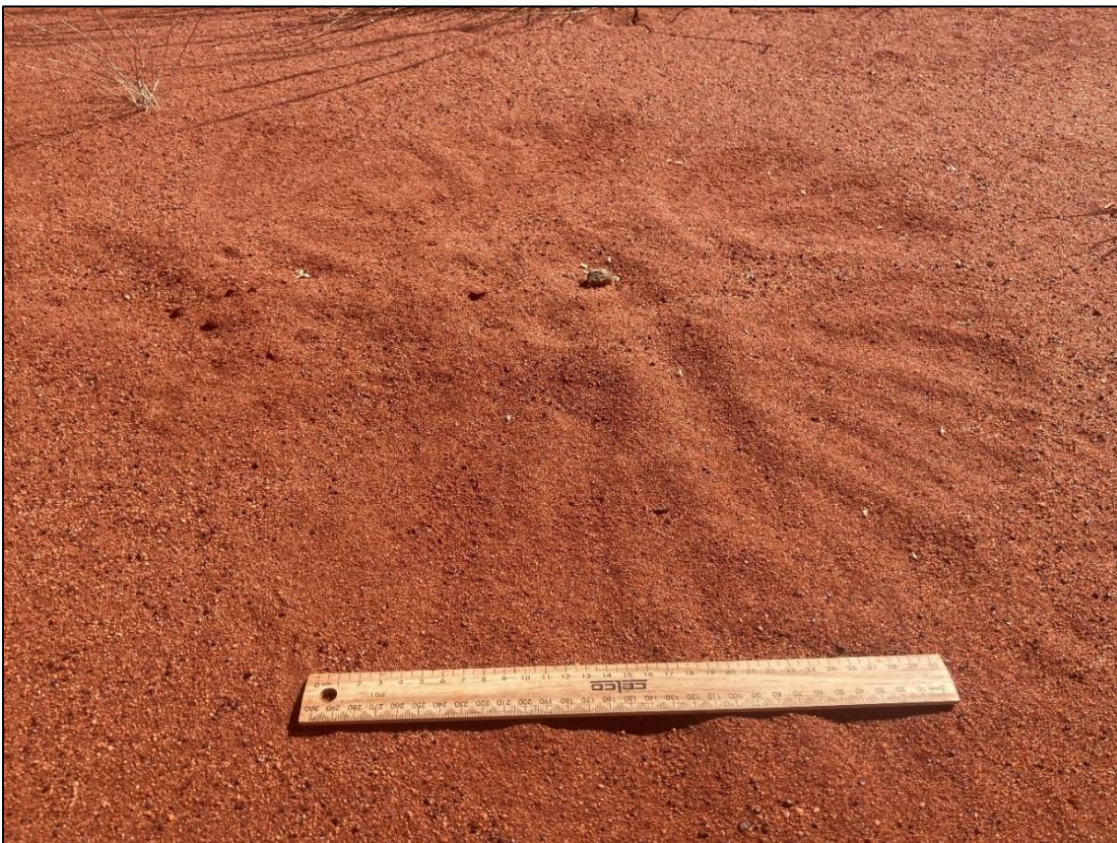


Photo 13: Suspected Feral Cat scat mound (sampled), with ruler for scale



Photo 14: Camel tracks, with ruler for scale

4.15.7 Range Extensions

No known range extensions were identified as part of the assessment.

4.15.8 Unidentifiable Fauna (Scats, Bones or Habitats)

There were a large number of smaller burrows which lacked the distinctive characteristics of Mulgara and Greater Bilby burrows, which were unable to be confidently identified through photo analysis due to the lack of any unique or distinguishing features. Small native marsupials such as Spinifex Hopping Mouse (*Notomys alexis*), or possibly other native mammals, are likely to be the occupants of these burrows, but insufficient evidence was gathered to help confirm this assumption.

4.16 Survey Limitations

The limitations and their potential/actual impact upon the survey results are outlined in **Table 11**.

Table 11: Potential limitations and their effect on the study

Limitation	Impacted the study (Y/N)	Comments
Competency/experience of survey personnel	No	The field assessment team and report authors have adequate experience with terrestrial flora and fauna surveys in arid regions of Australia and across the Pilbara region of WA.
Permits and licences required for the assessment	Yes	Permit applied for one month in advance but not issued by the authority prior to the survey starting. This prevented the field assessors from collecting plant specimens during the assessment. Voucher specimens were therefore unable to be sent to the herbarium to clarify identifications of unknown or suspect plant specimens. However, no potential specimens of any of the targeted flora were encountered, therefore the presence of these species is considered unlikely.
Scope and completeness of study	No	31 quadrat assessments over a study area length of ~16 km, as well as traverses (flora and fauna searches) in between quadrats, effectively walking the entire length of the study area, is considered to have provided a very thorough assessment of the study area.
Survey intensity/effort	No	As above. The survey effort is considered appropriate for the objectives of the survey, the survey area being assessed, and the species being targeted.
Data available on targeted species	No	A number of the flora being targeted lack sufficient detailed descriptions to assist with the identification of the species in the field, with several also lacking any pr adequate pictures of the plant or plant parts which would otherwise aid in the identification of the species. However, none of the potential targeted species were encountered during the survey, so the lack of species description information and/or pictures was not a limiting factor for the survey.
Proportion of flora identified	No	Weather leading into the survey was favourable and many plants were in flower or contained sufficient material to aid identifications. There were, however, a number of flora species that were sterile, and which could only be identified to genus level. On a few occasions, species were encountered that were unidentifiable based on the lack of suitable plant material.
Availability of adequate contextual information	No	The rapid assessment surveys conducted prior to this detailed survey, as well as the background assessment conducted as part of this survey, provided adequate contextual information for the study.
Timing of survey and weather conditions	No	There was very suitable weather leading up to the survey, including a major rain event in late January as well as a follow up rain event 10 days prior to surveys being undertaken. Survey conditions were therefore considered ideal.
Remote location and site access	Yes	The whole of the study area was accessible by foot and had easy access by vehicle, given the study area running adjacent to the highway. Some limitations were experienced, and affected the methodologies available for the fauna survey. Despite this, the methodology used for fauna survey is considered adequate for the purposes of the detailed flora and vegetation study.
Disturbances which may affect the results	No	No disturbances occurred during the survey which would have impacted the results.

5 Discussion

5.1 Presence of Targeted Flora

None of the targeted flora species were encountered during the survey. We can therefore say with confidence that no targeted flora were present during the survey. However, given seasonal variations, species lifecycles and climatic preferences, the presence of some of these species across the 16 kilometre long study area cannot be completely ruled out.

Each of the targeted flora species survey results are discussed in more detail below. Pre-construction surveys for targeted flora species and micro-siting of the final alignment to avoid species or high quality habitats are the main recommendations to help avoid and minimise impacts to targeted and other threatened or WA priority flora that may be encountered during construction.

5.1.1 *Eremophila* species

There were several unidentifiable *Eremophila* species located during surveys (specimens which were sterile and lacked sufficient identifying features such as flowers or fruit), however, none of these specimens had foliage or habits that were similar to the targeted species of *Eremophila fasciata* or *Eremophila appressa*. Given the species are long-lived shrubs and that conditions meant these species were thriving at the time of study, it can be said with reasonable confidence that the two targeted *Eremophila* species are unlikely to be present in the study area.

5.1.2 *Bothriochloa decipiens* var. *cloncurrensis*

There were no *Bothriochloa* species present in the study area. Given the substantial distance (~450km) to the nearest record of this species, and the fact the entire 16 kilometre study area was walked by two ecologists, as well as the ideal growing conditions that were present leading into the field assessment, it can be said with a relatively high level of confidence that the targeted *Bothriochloa decipiens* var. *cloncurrensis* is unlikely to be present in the study area.

5.1.3 *Swainsona katjarra*

There were no *Swainsona* species present within the study area. Unlike most of the other targeted flora, *Swainsona* are a reactive species that can be short-lived in arid environments, and may appear absent from an area if the preceding weather conditions or seasonal timing is not favourable for the species. Therefore, it cannot be said with any great level of confidence that the species is unlikely to be present in the study area based on the absence of plants during this study, especially given specimens have been located in similar environments nearby (approximately 15km away). It is recommended that the species be included on the list of species to search for and avoid during pre-construction inspections and micro-siting efforts through the area.

5.1.4 *Rhagodia* sp. *Hammersley*

There was one *Rhagodia eremaea* specimen located in the study area, which is a relatively common species in the region, but no other *Rhagodia* species were detected. Given the favourable conditions leading into the survey, and the presence of another *Rhagodia* in full flower, it is presumed that if the targeted species was present, it would have been detectable by ecologists. Despite, it can be said with a relatively high level of confidence that the targeted *Rhagodia* sp. *Hammersley* is unlikely to be present in the study area.

5.1.5 *Thysanotus* sp. Desert East of Newman

There was one specimen of the relatively common *Thysanotus manglesianus* located in the southern part of the study area, but no other specimens of the *Thysanotus* genus were seen. *Thysanotus* species are the least conspicuous of the targeted flora that were searched for, so it is difficult to have high levels of confidence that the survey would have picked up all *Thysanotus* species that were present in the study area. It is recommended that the species be included on the list of species to search for and avoid during pre-construction inspections and micro-siting efforts through the area.

5.2 Vegetation Condition & Extent

The vegetation in the study area is considered to have relatively low regional conservation significance, as the vegetation resembles that which is adjacent to the study area, and which is adequately protected within the Collier Range NP. Furthermore, the vegetation that exists beyond the study area, is of higher quality and is less disturbed than the vegetation within the study area, which has had historical disturbances from the road development and Telstra cable installation, and ongoing disturbances from continued road use, maintenance and other human impacts.

There were no state or Commonwealth listed TECs or PECs identified during the survey, with the vegetation encountered being representative of the broad vegetation associations of Hummock Grasslands; Shrub Steppe (which dominated), and Low Woodland, Open Low Woodland and Sparse Woodland; Mulga. It is considered that, based on the above, the vegetation within the study area are examples of two widespread communities which are well represented within a reserve as well as within areas that are unreserved across large parts of the Pilbara region. The quality of vegetation and flora habitat is very good through the majority of the study area. Habitat for potential threatened or priority flora is present, but is more extensively available and likely to be even higher quality beyond the boundaries of the study area, given the lower levels of disturbance in those areas.

Some commentary around the ten clearing principles are provided in **Table 12** below, with the aim of describing the potential for native vegetation impacts (from fibre optic cable installation techniques) within the study area to be at variance with any of the clearing principles. It must be noted, however, that the clearing associated with the proposed cable installation is not like traditional clearing operations, in that the prospect for the impacted vegetation in this case to rehabilitate and return to its former state is highly likely to take place, and that numerous controls and rehabilitation actions will be conducted to ensure impacts are minimised and rehabilitation is completed to the highest possible standard. It is concluded that, based on avoidance measures, proposed actions to mitigate environmental impacts, and the good prospects for the disturbed areas to fully rehabilitate over the short to medium term, that the project is not in significant conflict with any of the 10 vegetation clearing principles.

Table 12: Assessment of proposed study area impacts against the 10 clearing principles

Clearing Principle	Assessment of project against principle
A) Native vegetation should not be cleared if it comprises a high level of biological diversity	<ul style="list-style-type: none"> • Vegetation in the study area is generally of a diverse nature, which is expected given the proximity of the study area to a national park. • The vegetation in the study area is representative of vegetation types that are extensive throughout the Augustus subregion. • There are no PECs or TECs located within the study area • Suitable habitat is present for a number of threatened and WA Priority entities, however, there are no threatened flora or WA Priority flora known to be present within the study area. • Native vegetation clearing is not to be permanent, and the prospects of the impacted areas rehabilitating back to their original condition over the short to mid-term is good. • The biological diversity is not likely to be permanently reduced as a result of the proposed development actions.
B) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	<ul style="list-style-type: none"> • The study area contains suitable habitat for a variety of native fauna, including the threatened/WA Priority species of Mulgara and Greater Bilby. • Despite signs of these species being present, the species have large home ranges and there is abundant adjoining habitat available for these species either side of the study area. • Measures are to be put in place to minimise impacts to fauna and faunal habitats, including pre-construction surveys for fauna and habitats and micro-siting of final cable alignment to avoid as much habitat as possible.
C) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora	<ul style="list-style-type: none"> • There are no known rare flora present within the study area. • There are no flora habitats within the study area which are not present immediately adjacent to the study area.
D) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a Threatened Ecological Community (TEC)	<ul style="list-style-type: none"> • The vegetation in the study area is representative of vegetation types that are extensive throughout the Augustus subregion. • There are no PECs or TECs located within the study area.
E) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	<ul style="list-style-type: none"> • Aside from the narrow strip of road construction, there has been no significant clearing within or in proximity to the study area. • The study area is not a significant and isolated remnant patch of native vegetation.
F) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland	<ul style="list-style-type: none"> • There are no waterways or waterbodies in the study area. • There are few minor man-made drains associated with the road construction present in the study area, however these do not contain substantially different native vegetation values compared to the areas adjacent to these drainage areas, and are in fact generally less diverse than other areas due to water erosion impacts. • There are no wetlands present in the study area.
G) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	<ul style="list-style-type: none"> • The impacts associated with the fibre optic cable installation are relatively low when compared to other types of construction and development impacts. The biggest impacts are associated with the ripping tine which inserts the cable, which is to be rehabilitated after installation. • Measures are to be put in place to ensure the development footprint is adequately rehabilitated after construction stages are completed.

Clearing Principle	Assessment of project against principle
	<ul style="list-style-type: none"> • The CEMP has actions in place to ensure that works are not completed if high winds or significant rain events are expected during or a short time after construction takes place. • The vegetation clearing is temporary, and the prospects of full regeneration of vegetation in the study area in the short to medium term is good. • As a result of the above factors, it is highly unlikely that the clearing of vegetation is likely to cause any appreciable land degradation.
<p>H) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area</p>	<ul style="list-style-type: none"> • The impacts are taking place in the road reserve, which is adjacent to the Collier Range NP, and also not gazetted as park, the road reserve is mapped as an ESA. • The environmental values of the national park are not expected to be impacted in any way by the proposed development. • The prospect of full rehabilitation of the impacted areas in the short to medium term are good. • There are measures to be put in place via the project CEMP to ensure weeds, erosion and other construction issues are adequately managed to ensure there are no direct or indirect impacts on the adjoining national park.
<p>I) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water</p>	<ul style="list-style-type: none"> • There are no significant waterways in the study area. • There are measures to be put in place via the project CEMP to ensure sediment, erosion and other construction issues are adequately managed to ensure there are no direct or indirect impacts on the adjoining national park or nearby waterways. • The works are shallow and are not expected to impact or affect groundwater storages within the study area.
<p>J) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding</p>	<ul style="list-style-type: none"> • The proposed works are not likely to contribute to or exacerbate flooding risks or associated flood damage from future rain events.

5.3 Fauna

All targeted fauna are considered possible or likely to be present in the study area. There are likely to be some implications for fauna from the installation of the fibre optic cable through the study area, which contains numerous signs of fauna occupation, including Mulgara and potential Greater Bilby and Western Pebble-mound Mouse burrows, as well as other more common native fauna species. There are, however, numerous actions to be put in place as part of the T-12 Section report and the findings from this report, to help minimise the impacts to fauna species and to ensure measures are put in place to manage fauna issues and site rehabilitation adequately. The main impact minimisation measures to be put in place include:

- Given that the presence of an EPBC-listed species, Greater Bilby (Vulnerable), is possible in the study area, a SIC assessment is required to be completed for Greater Bilby prior to construction being started. If the SIC assessment reveals a significant impact is likely to Greater Bilby, the project must be referred to the Commonwealth Environment Minister for assessment.
- The potential impacts are to be minimised as much as possible via pre-construction surveys and micro-siting of the final alignment to avoid burrows or other signs of recent fauna habitation, wherever possible.
- The results of this survey (burrow/habitat locations) will inform the final alignment of the cable route, and the construction is to be further micro-sited prior to construction to ensure Mulgara,

Greater Bilby and Western Pebble-mound Mouse burrows are avoided wherever possible via fine scale alignment changes.

- An ecologist or a suitable trained wildlife handler should be present to follow machinery that is operating through the park and the areas of sensitivity to the south and north (areas with contiguous high quality vegetation). Appropriate equipment needs to be on hand to ensure any animals that are displaced or injured as a result of the construction are adequately rescued and cared for until they are relocated to a safer area away from the development, or until they can be taken to the nearest veterinarian or wildlife rescue facility for treatment and eventual reintroduction.
- If threatened fauna species are located in the field by contract staff or the ecologists/botanists involved in final route planning, then work must halt until an agreed approach can be determined via discussions with the appropriate authority involved (Department of Biodiversity, Conservation and Attractions).
- If threatened species are identified and can be avoided with a route realignment, then the species locations are to be flagged and recorded with a GPS, a more suitable route is to be determined to avoid impacting the species, and a temporary exclusion fence is to be erected around the species to prevent any inadvertent impacts during construction works.
- All staff involved with construction project need to be tool-boxed (inducted) on the locations of known threatened species records on the route, as well as any species that are located during the construction works. The induction should include basic advice on identifying the known species that have been recorded and the steps to take if unsure, or if threatened species or communities are encountered during works.
- Any EPBC Act listed threatened fauna species encountered during the works will need a Significant Impact Criteria assessment (SIC) to be completed by a suitably qualified person (ecologist). Liaison with the responsible Commonwealth department is also recommended if EPBC Act species or communities are found or suspected during construction.

5.4 Likely Impacts to Biodiversity from FOC Installation Works

As described previously in this report, there are some biodiversity impacts expected from the development that is being proposed. From a flora and vegetation perspective, given the installation and rehabilitation involves three passes of large machinery (bulldozers), there will be a total impact zone of five metres-wide being impacted to some extent by the works. The machinery tracks will flatten vegetation in their path, but this area and most of the five metre impact area will not have vegetation or the seedbank in the soil removed. The most significant impacts are to be associated with the narrow rip line where the ripping tine travels to expose the rip line and then installation of the cable occurs. The process of rolling and rehabilitating the rip line after installation is completed will, however, help to return sufficient seedbank into the bare ripped area, to allow for the eventual for restoration of the rip line with local native species via natural regeneration processes. Therefore, long term impacts to flora and vegetation in the study area from the proposed works are expected to be low.

There are more substantial potential impacts for fauna from the proposed development, as the act of walking heavy machinery over the study area may kill or injure fauna that are sheltering in vegetation or are in shallow burrows which may collapse under the weight of the machinery. There is also the prospect of the ripping tines collapsing burrows and/or unearthing fauna that are sheltering underground, resulting in death or injury to these animals.

The potential impacts are to be minimised as much as possible via pre-construction surveys and micro-siting of the final alignment to avoid burrows wherever possible. Wildlife handlers will also be present to search for and manage any displaced young or injured animals. The results of the survey (burrow locations) will inform the final alignment of the cable route, and the construction is to be further micro-sited to ensure Mulgara and Greater Bilby burrows are avoided wherever possible via fine scale alignment changes.

6 Recommendations to Minimise Biodiversity Impacts

The suggested recommendations from the above sections to help minimise the impacts of the development, and those already put forward in the T-12 Section report, are summarised in Table 13 below.

Table 13: Summary of recommendations to reduce impacts from the development

Topic	Recommendation source	Recommendation
Targeted / threatened flora	2023 T-12 Ecological Assessment / This report	The potential impacts are to be minimised as much as possible via pre-construction surveys and micro-siting of the final alignment to avoid targeted or other threatened flora, wherever possible.
	This report	<i>Swainsona katjarra</i> - It is recommended that the species be included on the list of species to search for and avoid during pre-construction inspections and micro-siting efforts through the area.
	This report	<i>Thysanotus</i> sp. Desert East of Newman - It is recommended that the species be included on the list of species to search for and avoid during pre-construction inspections and micro-siting efforts through the area.
	This report	Other targeted flora – Despite low likelihood of detection, it is recommended that the targeted species be included on the list of species to search for and avoid during pre-construction inspections and micro-siting efforts through the area.
	2023 T-12 Ecological Assessment	The areas within 50 metres radius of a threatened flora record (where the vegetation in that 50-metre zone is contiguous with that around the species record) is considered to be an ESA and afforded the same protection. No threatened flora was identified within the study area, however, if detected during micro-siting or construction, the appropriate approvals and permits to conduct works (impacts) to the 50 metre radius ESA are required. A permit may also need to be sought if a threatened flora species is listed in legislation as one of the classes of threatened species (i.e. NOT a priority 1, 2, 3 or 4 species) and the impact area will be in contiguous vegetation within 50 metres of the threatened flora species record. If the threatened flora species is not able to be avoided, consultation with the appropriate authority must be undertaken.
Targeted / threatened fauna	This report	Given that the presence of an EPBC-listed species, Greater Bilby (Vulnerable), is possible in the study area, a SIC assessment is required to be completed for Greater Bilby prior to construction being started. If the SIC assessment reveals a significant impact is likely to Greater Bilby, the project must be referred to the Commonwealth Environment Minister for assessment.

Topic	Recommendation source	Recommendation
	This report	The potential impacts are to be minimised as much as possible via pre-construction surveys and micro-siting of the final alignment to avoid burrows or other signs of recent fauna habitation, wherever possible.
	This report	The results of this survey (burrow/habitat locations) will inform the final alignment of the cable route, and the construction is to be further micro-sited prior to construction to ensure Mulgara, Greater Bilby and Western Pebble-mound Mouse burrows are avoided wherever possible via fine scale alignment changes.
	2023 T-12 Ecological Assessment	Efforts should be made to minimise impacts through the Collier Range NP by having an ecologist or similarly qualified person walk the route to micro-site the alignment by flagging out the route of least impact, prior to construction taking place. Micro-siting the alignment through areas of least vegetation and higher existing disturbance, and keeping the dozer blades lifted throughout the Collier Range National Park and the environmentally sensitive areas identified to the north and the south of the park will help minimise the impacts to the ground surface, high-quality vegetation, sensitive sand dunes and the fauna which are residing in the dunes and the Spinifex grasses.
	2023 T-12 Ecological Assessment	Given the evidence of high occupancy of mammals and reptiles in the Collier Range NP (scats, tracks and burrows were regularly encountered in the area), some of which may be sensitive species or threatened species, an ecologist or a suitable trained wildlife handler should be present when machinery is operating through the park and the areas of sensitivity to the south and north (areas with contiguous high quality vegetation). Appropriate equipment needs to be on hand to ensure any animals that are displaced or injured as a result of the construction are adequately rescued and cared for until they are relocated to a safer area away from the development, or until they can be taken to the nearest veterinarian or wildlife rescue facility for treatment and eventual reintroduction.
Threatened species (general)	2023 T-12 Ecological Assessment	If threatened species are located in the field by contract staff or the ecologists/botanists involved in final route planning, then work must halt until an agreed approach can be determined via discussions with the appropriate authority involved (Department of Biodiversity, Conservation and Attractions).
	2023 T-12 Ecological Assessment	If threatened species are identified and can be avoided with a route realignment, then the species locations are to be flagged and recorded with a GPS, a more suitable route is to be determined to avoid impacting the species, and a temporary exclusion fence is to be erected around the species to prevent any inadvertent impacts during construction works.
	2023 T-12 Ecological Assessment	All staff involved with construction project need to be tool-boxed (inducted) on the locations of known threatened species records on the route, as well as any species that are located during the construction works. The induction should include basic advice on identifying the known species that have been recorded and the steps to take if unsure, or if threatened species or communities are encountered during works.
EPBC Act TECs or species	2023 T-12 Ecological Assessment	Any EPBC Act listed threatened species or communities encountered during the works will need a Significant Impact Criteria assessment (SIC) to be completed by a suitably qualified person (ecologist). Liaison with the responsible Commonwealth department is also recommended if EPBC Act species or communities are found or suspected during construction.

Topic	Recommendation source	Recommendation
Waterways	2023 T-12 Ecological Assessment. This report	The study area lacks any significant waterways. However, where minor waterways and drains are encountered, it is recommended that all efforts be made to avoid any high value vegetation, trees and very large shrubs, the route should approach the shallowest banks of the waterway, and reinstatement works are to be completed using the minimal impact possible to achieve the desired level of trench rehabilitation.
Weeds	2023 T-12 Ecological Assessment / this report	Machinery must be thoroughly decontaminated prior to entering the ESA associated with Collier Range National Park. Machinery should also be decontaminated in instances where unavoidable weed infestations are intersected, prior to construction progressing further through the ESA.
	2023 T-12 Ecological Assessment	Where high threat weeds are seen, they must be avoided via cable route alignment adjustments (where possible during micro-siting), or the weed infestations should be removed prior to machinery entering the area. Once an infestation of weeds has been intersected and machinery is advanced clear of where the weeds are located, machinery must be adequately cleaned down and inspected for weed seeds/propagules prior to work continuing, to prevent further spread of the weed along the cable route.
	2023 T-12 Ecological Assessment	Machinery operators should be trained in identifying the key high threat weeds likely to be intercepted by machinery in the rangelands region of the Pilbara. The CEMP is to list some of the main and highly visible weed species to be on the lookout for.
	2023 T-12 Ecological Assessment	Machinery operators need to be wary of any species which are unfamiliar, and methods be put in place to identify any unknown and weed-like plants that are encountered along the route. This is not only important for avoiding high threat weeds which may be present but is also important for identifying any rare or threatened species of plants which may also be encountered along the cable installation route.
	2023 T-12 Ecological Assessment	Suitable open areas with hard surfaces and cleared areas away from waterways were mapped along T-12 Section and should be priority areas to be used as weed hygiene treatment areas. However, in cases where weed species are identified along the ESA route during construction, additional areas will need to be used along the route to ensure weed propagules are not pushed along the route by machinery.
	This report	Any weed hygiene (blow-down) areas used within the ESA must be fit for purpose (flat areas away from waterways and void of any vegetation). These areas, if used, are to be monitored for at least two years post construction to control any weeds that emerge.
Impact minimisation and management	2023 T-12 Ecological Assessment	Efforts should be made to minimise impacts through the Collier Range NP and any high quality waterways in the ESA by having an ecologist or similarly qualified person walk the route to micro-site the alignment by flagging out the route of least impact, prior to construction taking place. Micro-siting the alignment through areas of least vegetation and higher existing disturbance, and keeping the dozer blades lifted throughout the Collier Range National Park and the environmentally sensitive areas identified to the north and the south of the park will help minimise the impacts to the ground surface, high-quality vegetation, sensitive sand dunes and the fauna which are residing in the dunes and the Spinifex grasses.

Topic	Recommendation source	Recommendation
	2023 T-12 Ecological Assessment	A CEMP should contain details of key contacts for responsible authorities, wildlife rescuers and handlers, and flora experts, and need to contain more detail on the impact minimisation approach and the step-by-step process if threatened species or threatened communities are found or suspected of being present on the route alignment.
	2023 T-12 Ecological Assessment	Sand dunes with moderate to high cover of native vegetation are of significance in the arid regions of Western Australia and warrant protection. The sand dunes of high value support a completely different vegetation type to the surrounding landscape, and in turn support a unique assemblage of fauna species, many of which are threatened or at-risk species. Yet, sand dunes are highly susceptible to disturbance from human development, with relatively small ground disturbances able to start a cascade of degradation which can allow wind and water erosion to jeopardise the biodiversity values of the sand dune environment over time. Sand dunes are also often areas of cultural significance (artefacts and burial grounds) and warrant special protection where cultural heritage has been detected. In some cases, minor realignment and/or micro-siting the route through these areas will greatly reduce the impacts to these sensitive receiving environments
Aboriginal cultural heritage	2023 T-12 Ecological Assessment	Given the presence of known Aboriginal Heritage Places in the broader vicinity of the alignment, it is important that Vocus implements the recommendations of the survey which took place with the relevant Traditional Owner Group, prior to finalising the alignment and construction methodology for this area
	This report	The CEMP must include an unexpected finds protocol to adequately deal with European or Aboriginal cultural values or artefacts that are discovered during the construction process.

7 References

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7. Appendix

Appendix A: Flora List (Including Quadrat Species and Incidental Species from Traverses)

Scientific Name	Common Name	Status
<i>Abutilon cryptopetalum</i>	Hill Lantern-flower	Native
<i>Abutilon lepidum</i>	Abutilon	Native
<i>Abutilon leucopetalum</i>	Lantern Bush	Native
<i>Abutilon otocarpum</i>	Desert lantern	Native
<i>Acacia aneura</i>	Mulga	Native
<i>Acacia dictyophleba</i>	Sandhill Wattle	Native
<i>Acacia maitlandii</i>	Maitland's Wattle	Native
<i>Acacia melleodora</i>	Waxy Wattle	Native
<i>Acacia sp. sterile</i>	Unidentified red-stemmed wattle	Native
<i>Acacia abrupta</i>	Wattle	Native
<i>Acacia ancistrocarpa</i>	Fitzroy Wattle	Native
<i>Acacia inaequilatera</i>	Baderi	Native
<i>Acacia incurvaneura</i>	Narrow-leaf Mulga	Native
<i>Acacia kempeana</i>	Witchetty Bush	Native
<i>Acacia pachyacra</i>	Shiny-pod Wattle	Native
<i>Acacia pruinocarpa</i>	Black Gidgee	Native
<i>Acacia pteraneura</i>	Christmas Tree Mulga	Native
<i>Acacia ramulosa</i> var. <i>linophylla</i>	Bowgada	Native
<i>Acacia rhodophloia</i>	Dagger-leaved Wattle	Native
<i>Acacia synchronicia</i>	Bardy Bush / Bardi	Native
<i>Acacia tetragonophylla</i>	Dead Finish	Native
<i>Areocleome oxalidea</i>	Cleome	Native
<i>Afrohybanthus aurantiacus</i>	Orange Spade-flower	Native
<i>Alyogyne pinoniana</i>	Sand Hibiscus	Native
<i>Anthobolus leptomerioides</i>	Desert Broombrush	Native
<i>Aristida contorta</i>	Bunched Kerosene Grass	Native
<i>Aristida holathera</i>	Erect Kerosense Grass	Native
<i>Arivela viscosa</i>	Tickweed	Native
<i>Astrebla pectinata</i>	Barley Mitchell Grass	Native
<i>Boerhavia coccinea</i>	Tar Vine	Native
<i>Bonamia erecta</i>	Bonamia	Native
<i>Brachychiton gregorii</i>	Desert Kurrajong	Native
<i>Brassica tournefortii</i>	Mediterranean Turnip	Exotic
<i>Brunonia australis</i>	Native Cornflower	Native
<i>Calandrinia balonesis</i>	Broadleaf Parakeela	Native
<i>Calandrinia polyandra</i>	Parakeela	Native
<i>Calytrix carinata</i>	Fringe Myrtle	Native
<i>Cenchrus setiger</i>	Birdwood Grass	Exotic
<i>Cheilanthes sieberi</i>	Mulga Fern	Native
<i>Chrysocephalum apiculatum</i>	Common Everlasting	Native
<i>Chrysocephalum eremaeum</i>	Sandhill Everlasting	Native

Scientific Name	Common Name	Status
<i>Chrysopogon fallax</i>	Golden Beard Grass	Native
<i>Codonocarpus cotinifolius</i>	Native Poplar	Native
<i>Corchorus crozophorifolius</i>	Corchorus	Native
<i>Corymbia deserticola</i>	Desert Bloodwood	Native
<i>Corymbia eremaea</i>	Hills Bloodwood	Native
<i>Cymbopogon obtectus</i>	Silky Heads	Native
<i>Dampiera cinerea</i>	Dampiera	Native
<i>Dampiera dentata</i>	Dampiera	Native
<i>Dicrastylis cordifolia</i>	Dicrastylis	Native
<i>Dicrastylis exsuccosa</i>	Rusty Sand Sedge	Native
<i>Dicrastylis kumarinensis</i>	Kumarina Dicrastylis	Native
<i>Digitaria ammophila</i>	Silky Umbrella Grass	Native
<i>Dissocarpus paradoxus</i>	Curious saltbush	Native
<i>Duperreya commixta</i>	Climbing Bindweed	Native
<i>Dysphania rhadinostachya</i>	Green Crumbweed	Native
<i>Enneapogon polyphyllus</i>	Enneapogon	Native
<i>Enchylaena tomentosa</i>	Barrier Saltbush	Native
<i>Eragrostis eriopoda</i>	Woolybutt	Native
<i>Eremophila cuneifolia</i>	Pinyuru	Native
<i>Eremophila</i> sp. sterile	Unidentified Eremophila	Native
<i>Eremophila exilifolia</i>	Granite Poverty Bush	Native
<i>Eremophila forrestii</i>	Wilcox Bush	Native
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	Eremophila	Native
<i>Eremophila forrestii</i> subsp. <i>hastieana</i>	Wilcox Bush	Native
<i>Eremophila granitica</i>	Granite Poverty Bush	Native
<i>Eremophila latrobei</i>	Warty Fuschia Bush	Native
<i>Eremophila longifolia</i>	Weeping Emu Bush	Native
<i>Eremophila margarethae</i>	Sandbank Poverty Bush	Native
<i>Eriachne aristidea</i>	Three-awn Wanderie	Native
<i>Eriachne helmsii</i>	Woolly But / Buck Wanderrie Grass	Native
<i>Eulalia aurea</i>	Silky Browntop	Native
<i>Euphorbia</i> sp.	Euphorbia	
<i>Euphorbia drummondii</i>	Caustic Weed	Native
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	Desert Spurge/ Bottle Tree Caustic	Native
<i>Fimbristylis dichotoma</i>	Eight Day Grass	Native
<i>Gompholobium polyzygum</i>	Gompholobium	Native
<i>Gomphrena kanisii</i>	Gomphrena	Native
<i>Goodenia mueckeana</i>	Goodenia	Native
<i>Goodenia triodiophila</i>	Spinifex Goodenia	Native
<i>Gossypium robinsonii</i>	Desert Cotton	Native
<i>Grevillea eriostachya</i>	Honey Grevillea	Native
<i>Grevillea stenobotrya</i>	Rattle-pod Grevillea	Native
<i>Gyrostemon tepperi</i>	Tepper's Wheel-fruit	Native
<i>Hakea lorea</i>	Cork Tree	Native
<i>Hakea rhombales</i>	Walukara	Native

Scientific Name	Common Name	Status
<i>Hibiscus burtonii</i>	Burton's Hibiscus	Native
<i>Indigofera georgei</i>	Bovine Indigo	Native
<i>Indigofera monophylla</i>	Indigofera	Native
<i>Ipomoea</i> sp.?	Climber	Native
<i>Isotropis atropurpurea</i>	Poison Sage	Native
<i>Isotropis iophyta</i>	Eremaean Lamb's Poison	Native
<i>Kennedia prorepens</i>	Kal/Pil-Kal/Pilpa	Native
<i>Leichhardtia australis</i>	Bush Banana	Native
<i>Leptosema chambersii</i>	Upside-down Plant	Native
<i>Maireana georgei</i>	Satiny Bluebush	Native
<i>Maireana triptera</i>	Three-winged Bluebush	Native
<i>Monachather paradoxus</i>	Mulga Oats	Native
<i>Newcastelia hexarrhena</i>	Lamb's Tails	Native
<i>Paractaenum novae-hollandiae</i>	Reflexed Panic Grass	Native
<i>Paraneurachne muelleri</i>	Northern Mulga Grass	Native
<i>Petalostylis cassioides</i>	Butterfly Bush	Native
<i>Phyllota luehmannii</i>	Phyllota	Native
<i>Pittosporum angustifolium</i>	Native Willow	Native
<i>Portulaca oleracea</i>	Purslane	Native
<i>Prostanthera wilkieana</i>	Prostanthera	Native
<i>Psydrax latifolia</i>	Native Plum / Broad-leaf Native Current	Native
<i>Ptilotus exaltatus</i>	Tall Mulla Mulla	Native
<i>Ptilotus obovatus</i>	Cotton Bush	Native
<i>Ptilotus polystachyus</i>	Long Tails	Native
<i>Ptilotus schwartzii</i>	Horse Mulla Mulla	Native
<i>Rhagodia eremaea</i>	Tall Saltbush	Native
<i>Santalum lanceolatum</i>	Northern Sandalwood	Native
<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	Fanflower	Native
<i>Scaevola basedowii</i>	Leafless Fanflower	Native
<i>Sclerolaena convexula</i>	Tall Copper Burr	Native
<i>Sclerolaena cuneata</i>	Tangled Copperburr	Native
<i>Sclerolaena diacantha</i>	Grey Copper Burr	Native
<i>Senna artemesioides</i>	Silver Cassia	Native
<i>Senna artemesioides</i> subsp. <i>helmsii</i>	Blunt-leaved Cassia	Native
<i>Senna artemesioides</i> subsp. <i>x sturtii</i>	Bloodbush	Native
<i>Senna artemesioides</i> subsp. <i>oligophylla</i>	Limestone Cassia	Native
<i>Senna artemesioides</i> subsp. <i>filifolia</i>	Punty Bush	Native
<i>Senna glutinosa</i>	Senna	Native
<i>Senna notabilis</i>	Cockroach Bush	Native
<i>Senna glutinosa</i> subsp. <i>luerssenii</i>	Senna	Native
<i>Seringia exastia</i>	Fringed Fire-bush	Native
<i>Seringia velutina</i>	Velvet Fire-bush	Native
<i>Sida calyxhymenia</i>	Tall Sida	Native
<i>Sida fibulifera</i>	Silver Sida	Native
<i>Sida platycalyx</i>	Help Mallow	Native


Scientific Name	Common Name	Status
<i>Solanum centrale</i>	Desert Raisin	Native
<i>Solanum elaeagnifolium</i>	Solanum	Native
<i>Solanum lasiophyllum</i>	Flannel Bush	Native
<i>Themeda triandra</i>	Kangaroo Grass	Native
<i>Thysanotus mangleianus</i>	Mangles Fringed Lily	Native
<i>Tribulus hirsutus</i>	Tribulus	Native
<i>Tridoia schinzii</i>	Feathertop Spinifex	Native
<i>Triodia basedowii</i>	Lobed Spinifex	Native

Appendix B: Fauna List (Including Quadrat Species and Incidental Species from Traverses)

Common Name	Scientific Name	Status	Notes
Australian Bustard	<i>Ardeotis australis</i>		Deceased on roadside 2023
Australian Crow	<i>Corvus orru</i>		
Australian Ringneck	<i>Barnardius zonarius</i>		
Brown Song Lark	<i>Cincloramphus cruralis</i>		
Budgerigar	<i>Melopsittacus undulatus</i>		
Crimson Chat	<i>Epthianura tricolour</i>		DNA scat sample
Diamond Dove	<i>Geopelia cuneata</i>		
Dromedary Camel	<i>Camelus dromedarius</i>	Exotic	Foot prints
Dusky Woodswallow	<i>Artamus cyanopterus</i>		
European Rabbit	<i>Oryctolagus cuniculus</i>	Exotic	
Feral Cat	<i>Felis catus</i>	Exotic	Scat and tracks and DNA
Galah	<i>Elophus roseicapilla</i>		
Goanna	<i>Varanus sp.</i>		Tracks and diggings
Unidentifiable rodent	Muridae family		DNA scat sample
Horse/Donkey			
Painted Finch	<i>Emblema pictum</i>		
Peaceful Dove	<i>Geopelia placida</i>		
Peregrine Falcon	<i>Falco peregrinus</i>	OS - Other: Specially Protected	
Rainbow Bee-eater	<i>Merops ornatus</i>		
Sand? Goanna	<i>Varanus sp.</i>		Tracks and diggings
Wedge-tailed Eagle	<i>Aquila audax</i>		
Whistling Kite	<i>Haliastur sphenurus</i>		
Willie Wagtail	<i>Rhipidura leucophrys</i>		
Zebra Finch	<i>Taeniopygia guttata</i>		

Appendix C: Quadrat Survey Results

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Date	18/03/2024				
Quadrat Code	<i>Q001</i>				
Coord (NE corner)	-24.603109, -24.603109				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sand plain				
Soil description	Red sand to compact sandy loam				
Rock type	None observed				
Litter % cover	3%				
Fire history	None observed				
Vegetation condition	Very good				
Slope	1-2 degrees				
Aspect	South-east				
Disturbances	Telstra				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> , <i>Hakea lorea</i> and <i>Grevillea stenobotrya</i> over <i>Anthobolus leptomerioides</i> , <i>Eremophila</i> sp. and <i>Acacia kempeana</i> over <i>Triodia basedowii</i> , <i>Kennedia prorepens</i> and <i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia basedowii</i>	N	50	100	500
2	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	7	25	500
3	<i>Kennedia prorepens</i>	N	3	20	300
4	<i>Hakea rhombales</i>	N	1	180	25
5	<i>Eremophila forrestii</i> subsp. <i>hastieana</i>	N	0.5	120	3
6	<i>Dampiera dentata</i>	N	0.5	40	150
7	<i>Leptosema chambersii</i>	N	0.5	35	75
8	<i>Bonamia erecta</i>	N	0.4	40	120

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9	<i>Abutilon cryptopetalum</i>	N	0.3	15	180
10	<i>Goodenia mueckeana</i>	N	0.2	20	100
11	<i>Seringia velutina</i>	N	0.2	50	200
12	<i>Grevillea stenobotrya</i>	N	0.2	180	2
13	<i>Paraneurachne muelleri</i>	N	0.2	65	30
14	<i>Dicrastylis kumarinensis</i>	N	0.1	35	50
15	<i>Calandrinia polyandra</i>	N	0.1	10	5
16	<i>Eremophila</i> sp. sterile	N	0.1	150	1
17	<i>Ptilotus schwartzii</i>	N	0.1	40	20
18	<i>Hibiscus burtonii</i>	N	0.1	35	40
19	<i>Ptilotus polystachyus</i>	N	0.1	20	4
20	<i>Acacia kempeana</i>	N	0.1	160	2
21	<i>Thysanotus manglesianus</i>	N	0.1	150	5
22	<i>Anthobolus leptomerioides</i>	N	0.1	110	5
23	<i>Acacia abrupta</i>	N	0.1	200	1
24	<i>Eulalia aurea</i>	N	0.1	70	1
25	<i>Hakea lorea</i>	N	0.1	250	3
26	<i>Cymbopogon obtectus</i>	N	0.1	40	10
27	<i>Solanum centrale</i>	N	0.1	20	5
28	<i>Aristida contorta</i>	N	0.1	25	10

Date	18/03/2024				
Quadrat Code	Q002				
Coord (NE corner)	-24.59836, 119.6223				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sand plain				
Soil description	Red sand to red loam				
Rock type	None observed				
Litter % cover	3%				
Fire history	None observed				
Vegetation condition	Good				
Slope	Flat				
Aspect	Flat				
Disturbances	Grazing animals, telstra, fires, rubbish				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Corymbia deserticola</i> , <i>Acacia aneura</i> and <i>Acacia kempeana</i> over <i>Eremophila</i> sp., <i>Acacia tetragonophylla</i> and <i>Senna artemisioides</i> over <i>Triodia basedowii</i> , <i>Hibiscus burtonii</i> and <i>Eriachne helmsii</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia basedowii</i>	N	35	80	350
2	<i>Acacia aneura</i>	N	5	300	30
3	<i>Corymbia deserticola</i>	N	2	5	6
4	<i>Eriachne helmsii</i>	N	2	45	400
5	<i>Senna artemisioides</i> subsp. <i>xsturtii</i>	N	1.5	160	25



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6	<i>Hibiscus burtonii</i>	N	1.5	25	200
7	<i>Abutilon leucopetalum</i>	N	1	80	30
8	<i>Acacia rhodophloia</i>	N	0.8	250	12
9	<i>Eremophila</i> sp. 1 sterile	N	0.5	170	8
10	<i>Senna artemisioides</i>	N	0.5	130	10
11	<i>Acacia tetragonophylla</i>	N	0.5	200	5
12	<i>Acacia kempeana</i>	N	0.5	200	10
13	<i>Acacia pruinocarpa</i>	N	0.5	220	12
14	<i>Indigofera monophylla</i>	N	0.5	30	50
15	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.5	25	350
16	<i>Aristida holathera</i>	N	0.5	70	100
17	<i>Abutilon lepidum</i>	N	0.2	35	80
18	<i>Boerhavia coccinea</i>	N	0.2	15	80
19	<i>Solanum lasiophyllum</i>	N	0.2	35	10
20	<i>Seringia velutina</i>	N	0.2	60	20
21	<i>Paraneurachne muelleri</i>	N	0.2	90	50
22	<i>Bonamia erecta</i>	N	0.2	30	25
23	<i>Hakea rhombales</i>	N	0.2	200	3
24	<i>Duperreya commixta</i>	N	0.1	200	8
25	<i>Anthobolus leptomerioides</i>	N	0.1	100	1
26	<i>Sclerolaena cuneata</i>	N	0.1	8	20
27	<i>Eremophila forrestii</i>	N	0.1	120	3
28	<i>Chrysocephalum apiculatum</i>	N	0.1	35	10
29	<i>Sida fibulifera</i>	N	0.1	3	30
30	<i>Ptilotus schwartzii</i>	N	0.1	35	10
31	<i>Abutilon cryptopetalum</i>	N	0.1	55	8
32	<i>Acacia</i> sp. Sterile.	N	0.1	110	5
33	<i>Petalostylis cassioides</i>	N	0.1	60	2
34	<i>Alyogyne pinoniana</i>	N	0.1	70	2
35	<i>Afrohybanthus aurantiacus</i>	N	0.1	40	25

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36	<i>Paraneurachne muelleri</i>	N	0.1	45	50
37	<i>Maireana georgii</i>	N	0.1	20	5
38	<i>Calandrinia polyandra</i>	N	0.1	25	15
39	<i>Eremophila</i> sp. 2 sterile	N	0.1	50	2
40	<i>Senna glutinosa</i> subsp. <i>xluerssenii</i>	N	0.1	40	1
41	<i>Cymbopogon obtectus</i>	N	0.1	45	30

Date	18/03/2024				
Quadrat Code	Q003				
Coord (NE corner)	-24.5939, 119.6228				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sand plain				
Soil description	Red sand, sandy red loam				
Rock type	Red pebbles				
Litter % cover	3				
Fire history	None observed				
Vegetation condition	Good				
Slope	1 degree				
Aspect	South east				
Disturbances	Run off drain, telstra				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> and <i>Acacia abrupta</i> over <i>Petalostylis cassioides</i> and <i>Seringia velutina</i> over <i>Triodia basedowii</i> , <i>Indigofera monophylla</i> and <i>Scaevola parvifolia</i> subsp. <i>Pilbarae</i>				
	Species				
	Scientific name	Status (E/N)	% cover	Av height (cm)	Abundance
1	<i>Triodia basedowii</i>	N	60	85	600
2	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	2	30	250
3	<i>Petalostylis cassioides</i>	N	0.8	80	120
4	<i>Indigofera monophylla</i>	N	0.8	25	100
5	<i>Hakea rhombales</i>	N	0.6	160	3
6	<i>Eragrostis eriopoda</i>	N	0.3	35	150
7	<i>Ptilotus polystachyus</i>	N	0.2	40	100




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8	<i>Ptilotus exaltatus</i>	N	0.1	8	50
9	<i>Dampiera dentata</i>	N	0.1	25	30
10	<i>Goodenia triodiophila</i>	N	0.1	10	5
11	<i>Prostanthera wilkieana</i>	N	0.1	15	15
12	<i>Calandrinia polyandra</i>	N	0.1	20	50
13	<i>Leptosema chambersii</i>	N	0.1	25	80
14	<i>Corchorus crozophorifolius</i>	N	0.1	15	75
15	<i>Newcastelia hexarrhena</i>	N	0.1	25	60
16	<i>Goodenia mueckeana</i>	N	0.1	30	50
17	<i>Seringia velutina</i>	N	0.1	50	50
18	<i>Acacia abrupta</i>	N	0.1	200	1
19	<i>Bonamia erecta</i>	N	0.1	35	40
20	<i>Dicrastylis kumarinensis</i>	N	0.1	40	5
21	<i>Sida platycalyx</i>	N	0.1	25	10
22	<i>Codonocarpus cotinifolius</i>	N	0.1	40	1

Date	18/03/2024				
Quadrat Code	<i>Q004</i>				
Coord (NE corner)	-24.5892, 119.6235				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand, red pebbles				
Rock type	None observed				
Litter % cover	5				
Fire history	None observed				
Vegetation condition	Good				
Slope	1 degree				
Aspect	South east				
Disturbances	Drain, erosion, grazing				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Acacia kempeana</i> , <i>Acacia ancistrocarpa</i> and <i>Acacia ramulosa</i> var. <i>linophylla</i> over <i>Eremophila forrestii</i> subsp. <i>hastieana</i> , <i>Senna artemisioides</i> subsp. <i>xsturtii</i> and <i>Calytrix carinata</i> over <i>Triodia basedowii</i> , <i>Paraneurachne muelleri</i> and <i>Dampiera dentata</i>				
Species		Status (E/N)	% cover	Av height (cm)	Abundance
Scientific name					
1	<i>Acacia kempeana</i>	N	20	220	80
2	<i>Triodia basedowii</i>	N	10	70	150
3	<i>Eremophila forrestii</i> subsp. <i>hastieana</i>	N	2	160	50
4	<i>Acacia ancistrocarpa</i>	N	1.5	220	20

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5	<i>Acacia ramulosa</i> var. <i>linophylla</i>	N	0.5	400	3
6	<i>Acacia rhodophloia</i>	N	0.5	200	10
7	<i>Calytrix carinata</i>	N	0.5	20	30
8	<i>Senna artemisioides</i> subsp. <i>xsturtii</i>	N	0.3	100	50
9	<i>Seringia velutina</i>	N	0.2	40	60
10	<i>Acacia pruinocarpa</i>	N	0.2	300	5
11	<i>Paraneurachne muelleri</i>	N	0.2	40	50
12	<i>Dampiera dentata</i>	N	0.2	40	80
13	<i>Hakea rhombales</i>	N	0.2	180	4
14	<i>Anthobolus leptomerioides</i>	N	0.1	100	3
15	<i>Afrohybanthus aurantiacus</i>	N	0.1	40	30
16	<i>Goodenia mueckeana</i>	N	0.1	35	50
17	<i>Eragrostis eriopoda</i>	N	0.1	30	50
18	<i>Goodenia triodiophila</i>	N	0.1	25	20
19	<i>Enneapogon polyphyllus</i>	N	0.1	50	50
20	<i>Leptosema chambersii</i>	N	0.1	35	8

Date	18/03/2024				
Quadrat Code	<i>Q005</i>				
Coord (NE corner)	-24.5846, 119.624				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sand dune lower slope				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	2%				
Fire history	None observed				
Vegetation condition	Good				
Slope	1-2 degrees				
Aspect	North east				
Disturbances	Parallel drain				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Acacia ancistrocarpa</i> , <i>Acacia kempeana</i> and <i>Acacia aneura</i> over <i>Senna artemisioides</i> subsp. <i>sturtii</i> and <i>Petalostylis cassioides</i> over <i>Triodia basedowii</i> , <i>Paraneurachne muelleri</i> and <i>Dampiera dentata</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia basedowii</i>	N	35	100	350
2	<i>Dampiera dentata</i>	N	5	40	400
3	<i>Acacia ancistrocarpa</i>	N	2	180	15
4	<i>Paraneurachne muelleri</i>	N	2	40	500
5	<i>Eragrostis eriopoda</i>	N	1.5	40	250
6	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.5	45	50
7	<i>Petalostylis cassioides</i>	N	0.5	100	30

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8	<i>Leptosema chambersii</i>	N	0.5	40	75
9	<i>Seringia velutina</i>	N	0.5	50	80
10	<i>Enneapogon polyphyllus</i>	N	0.5	40	100
11	<i>Goodenia mueckeana</i>	N	0.3	20	70
12	<i>Senna artemisioides</i> subsp. <i>×sturtii</i>	N	0.3	50	15
13	<i>Bonamia erecta</i>	N	0.2	35	40
14	<i>Ptilotus exaltatus</i>	N	0.2	40	80
15	<i>Indigofera monophylla</i>	N	0.2	35	35
16	<i>Dicrastylis kumarinensis</i>	N	0.2	45	25
17	<i>Acacia kempeana</i>	N	0.2	130	6
18	<i>Calytrix carinata</i>	N	0.1	10	5
19	<i>Gompholobium polyzygum</i>	N	0.1	45	15
20	<i>Ptilotus schwartzii</i>	N	0.1	40	10
21	<i>Acacia aneura</i>	N	0.1	100	1
22	<i>Dampiera cinerea</i>	N	0.1	45	10

Date	18/03/2024				
Quadrat Code	Q006				
Coord (NE corner)	-24.5786, 119.6236				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	3				
Fire history	None observed				
Vegetation condition	Very Good				
Slope	Flat - 1 degree				
Aspect	East				
Disturbances	Drain, telstra				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> , <i>Hakea lorea</i> and <i>Grevillea stenobotrya</i> over <i>Acacia kempeana</i> , <i>Petalostylis cassioides</i> and <i>Alyogyne pinoniana</i> over <i>Triodia basedowii</i> , <i>Triodia schinzii</i> and <i>Goodenia mueckeana</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia basedowii</i>	N	45	100	450
2	<i>Triodia schinzii</i>	N	5	120	50
3	<i>Goodenia mueckeana</i>	N	1.5	20	400
4	<i>Seringia velutina</i>	N	1	60	80
5	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	1	30	200
6	<i>Leptosema chambersii</i>	N	1	30	250
7	<i>Grevillia stenobotrya</i>	N	0.7	300	4



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8	<i>Dicrastylis kumarinensis</i>	N	0.5	50	50
9	<i>Petalostylis cassioides</i>	N	0.5	90	12
10	<i>Bonamia erecta</i>	N	0.5	25	100
11	<i>Eragrostis eriopoda</i>	N	0.5	40	200
12	<i>Hakea rhombales</i>	N	0.4	300	6
13	<i>Hakea lorea</i>	N	0.3	160	5
14	<i>Alyogyne pinoniana</i>	N	0.3	110	3
15	<i>Acacia kempeana</i>	N	0.3	200	4
16	<i>Indigofera monophylla</i>	N	0.2	45	50
17	<i>Santalum lanceolatum</i>	N	0.2	250	4
18	<i>Grevillea eriostachya</i>	N	0.2	80	1
19	<i>Ptilotus exaltatus</i>	N	0.2	45	50
20	<i>Gyrostemon tepperi</i>	N	0.1	40	30
21	<i>Calytrix carinata</i>	N	0.1	40	10
22	<i>Codonocarpus cotinifolius</i>	N	0.1	500	2
23	<i>Calandrinia polyandra</i>	N	0.1	35	10
24	<i>Prostanthera wilkieana</i>	N	0.1	40	10
25	<i>Solanum lasiophyllum</i>	N	0.1	50	3
26	<i>Aristida contorta</i>	N	0.1	40	10

Date	18/03/2024				
Quadrat Code	Q007				
Coord (NE corner)	-24.5743, 119.6224				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	3%				
Fire history	None observed				
Vegetation condition	Very good				
Slope	1 degree - flat				
Aspect	East				
Disturbances	Drain, telstra				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea lorea</i> , <i>Santalum lanceolatum</i> and <i>Grevillea eriostachya</i> over <i>Senna artemisioides</i> subsp. <i>xsturtii</i> , <i>Gyrostemon tepperi</i> and <i>Codonocarpus cotinifolius</i> over <i>Triodia basedowii</i> , <i>Triodia schinzii</i> and <i>Seringia velutina</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia basedowii</i>	N	45	90	450
2	<i>Seringia velutina</i>	N	1.5	40	250
3	<i>Triodia schinzii</i>	N	1	120	15
4	<i>Goodenia mueckeana</i>	N	1	20	250
5	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	1	30	120
6	<i>Leptosema chambersii</i>	N	1	30	200
7	<i>Indigofera monophylla</i>	N	1	45	60



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8	<i>Dicrastylis kumarinensis</i>	N	0.8	50	50
9	<i>Gyrostemon tepperi</i>	N	0.8	70	10
10	<i>Eremophila forresti</i> subsp. <i>hastiana</i>	N	0.7	40	5
11	<i>Bonamia erecta</i>	N	0.5	40	70
12	<i>Aristida contorta</i>	N	0.4	40	100
13	<i>Hakea lorea</i>	N	0.2	110	2
14	<i>Paraneurachne muelleri</i>	N	0.2	40	50
15	<i>Grevillea eriostachya</i>	N	0.2	180	4
16	<i>Ptilotus exaltatus</i>	N	0.2	35	50
17	<i>Solanum centrale</i>	N	0.2	30	20
18	<i>Hibiscus burtonii</i>	N	0.1	40	10
19	<i>Santalum lanceolatum</i>	N	0.1	160	1
20	<i>Ptilotus polystachyus</i>	N	0.1	35	5
21	<i>Calytrix carinata</i>	N	0.1	10	5
22	<i>Senna artemisioides</i> subsp. <i>xsturtii</i>	N	0.1	70	2
23	<i>Ptilotus schwartzii</i>	N	0.1	35	10
24	<i>Codonocarpus cotinifolius</i>	N	0.1	50	5
25	<i>Goodenia triodiophila</i>	N	0.1	25	10

Date	19/03/2024				
Quadrat Code	<i>Q008</i>				
Coord (NE corner)	-24.57, 119.6213				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand				
Rock type	Red pebbles				
Litter % cover	2%				
Fire history	None observed				
Vegetation condition	Very Good				
Slope	Flat - 1 degree				
Aspect	North east				
Disturbances	Drain				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> , <i>Grevillea eriostachya</i> and <i>Acacia melleodora</i> over <i>Eremophila</i> sp., <i>Eremophila forrestii</i> subsp. <i>forrestii</i> and <i>Anthobulus leptomerioides</i> over <i>Triodia basedowii</i> , <i>Leptosema chambersii</i> and <i>Paraneurachne muelleri</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia basedowii</i>	N	35	90	350
2	<i>Leptosema chambersii</i>	N	1.5	30	250
3	<i>Grevillea eriostachya</i>	N	1.5	200	6
4	<i>Eremophila</i> sp. <i>sterile</i>	N	1	60	40
5	<i>Paraneurachne muelleri</i>	N	1	60	200



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6	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	1	35	100
7	<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	N	1	65	10
8	<i>Hakea rhombales</i>	N	0.7	160	12
9	<i>Anthobolus leptomerioides</i>	N	0.5	70	25
10	<i>Goodenia mueckeana</i>	N	0.5	20	80
11	<i>Acacia melleodora</i>	N	0.4	180	2
12	<i>Calytrix carinata</i>	N	0.2	70	5
13	<i>Acacia rhodophloia</i>	N	0.2	400	1
14	<i>Bonamia erecta</i>	N	0.2	45	40
15	<i>Dicrastylis kumarinensis</i>	N	0.2	45	40
16	<i>Psyrax latifolia</i>	N	0.2	120	1
17	<i>Goodenia triodiophila</i>	N	0.1	35	25
18	<i>Prostanthera wilkieana</i>	N	0.1	50	30
19	<i>Eremophila latrobei</i>	N	0.1	110	1

Date	19/03/2024				
Quadrat Code	Q009				
Coord (NE corner)	-24.5654, 119.6206				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	5%				
Fire history	None observed				
Vegetation condition	Very Good				
Slope	Flat				
Aspect	Flat				
Disturbances	Drain, telstra				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea lorea</i> , <i>Acacia pruinocarpa</i> and <i>Psyrax latifolia</i> over <i>Eremophila forrestii</i> , <i>Acacia melleodora</i> and <i>Hakea rhombales</i> over <i>Triodia basedowii</i> , <i>Bonamia erecta</i> and <i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia basedowii</i>	N	45	90	450
2	<i>Eremophila forrestii</i>	N	2	100	20
3	<i>Hakea rhombales</i>	N	2	120	15
4	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	1.5	25	250
5	<i>Bonamia erecta</i>	N	1.5	40	200
6	<i>Acacia pruinocarpa</i>	N	1.5	400	5



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7	<i>Dicrastylis kumarinensis</i>	N	1	40	100
8	<i>Goodenia mueckeana</i>	N	1	25	150
9	<i>Paraneurachne muelleri</i>	N	1	50	120
10	<i>Leptosema chambersii</i>	N	1	35	70
11	<i>Hibiscus burtonii</i>	N	0.7	30	30
12	<i>Eragrostis eriopoda</i>	N	0.6	40	80
13	<i>Ptilotus schwartzii</i>	N	0.5	30	30
14	<i>Gyrostemon tepperi</i>	N	0.5	110	7
15	<i>Seringia velutina</i>	N	0.5	60	15
16	<i>Solanum centrale</i>	N	0.4	35	50
17	<i>Prostanthera wilkieana</i>	N	0.3	30	40
18	<i>Hakea lorea</i>	N	0.3	320	3
19	<i>Goodenia triodiophila</i>	N	0.2	40	30
20	<i>Acacia melleodora</i>	N	0.2	80	3
21	<i>Acacia pteraneura</i>	N	0.2	120	2
22	<i>Anthobolus leptomerioides</i>	N	0.2	100	5
23	<i>Psyrax latifolia</i>	N	0.2	300	3
24	<i>Grevillea eriostachya</i>	N	0.2	90	2
25	<i>Triodia schinzii</i>	N	0.2	120	3
26	<i>Calandrinia polyandra</i>	N	0.1	25	40
27	<i>Eremophila forrestii</i> subsp. <i>hastiana</i>	N	0.1	25	5
28	<i>Codonocarpus cotinifolius</i>	N	0.1	80	3
29	<i>Acacia ancistrocarpa</i>	N	0.1	90	1

Date	19/03/2024				
Quadrat Code	<i>Q010</i>				
Coord (NE corner)	-24.5611, 119.6201				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Sandy with areas of red pebble				
Rock type	Red pebbles				
Litter % cover	3%				
Fire history	None observed				
Vegetation condition	Very good				
Slope	Flat				
Aspect	Slight north-east				
Disturbances	Very deep drain				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Grevillea stenobotrya</i> , <i>Hakea rhombales</i> and <i>Hakea lorea</i> over <i>Acacia melleodora</i> , <i>Acacia pteraneura</i> and <i>Eremophila cuneifolia</i> over <i>Triodia basedowii</i> , <i>Goodenia mueckeana</i> and <i>Calandrinia polyandra</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia basedowii</i>	N	30	90	300
2	<i>Goodenia mueckeana</i>	N	1.5	20	400
3	<i>Calandrinia polyandra</i>	N	1.5	15	350
4	<i>Leptosema chambersii</i>	N	1.5	30	250
5	<i>Hakea lorea</i>	N	1.5	150	20



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6	<i>Kennedia prorepens</i>	N	1.5	45	80
7	<i>Hakea rhombales</i>	N	1.5	100	15
8	<i>Paraneurachne muelleri</i>	N	1.2	70	100
9	<i>Ptilotus schwartzii</i>	N	1.2	35	120
10	<i>Eremophila cuneifolia</i>	N	1	90	10
11	<i>Triodia schinzii</i>	N	1	120	10
12	<i>Abutilon cryptopetalum</i>	N	0.8	45	40
13	<i>Eragrostis eriopoda</i>	N	0.8	45	120
14	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.8	30	100
15	<i>Solanum centrale</i>	N	0.7	35	30
16	<i>Acacia melleodora</i>	N	0.6	140	3
17	<i>Grevillea stenobotrya</i>	N	0.6	380	3
18	<i>Goodenia triodiophila</i>	N	0.5	30	25
19	<i>Gyrostemon tepperi</i>	N	0.5	80	12
20	<i>Grevillea eriostachya</i>	N	0.5	130	4
21	<i>Calytrix carinata</i>	N	0.4	45	20
22	<i>Ptilotus polystachyus</i>	N	0.4	30	20
23	<i>Aristida contorta</i>	N	0.3	40	50
24	<i>Bonamia erecta</i>	N	0.2	40	50
25	<i>Acacia pruinocarpa</i>	N	0.2	200	1
26	<i>Hibiscus burtonii</i>	N	0.2	70	20
27	<i>Acacia pteraneura</i>	N	0.2	110	5
28	<i>Dicrastylis kumarinensis</i>	N	0.2	45	10
29	<i>Prostanthera wilkieana</i>	N	0.2	25	25
30	<i>Indigofera monophylla</i>	N	0.2	40	10
31	<i>Codonocarpus cotinifolius</i>	N	0.1	40	5

Date	19/03/2024				
Quadrat Code	<i>Q011</i>				
Coord (NE corner)	-24.5567, 119.6212				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand to sandy loam				
Rock type	None observed				
Litter % cover	3%				
Fire history	None observed				
Vegetation condition	Very good				
Slope	Flat				
Aspect	Slightly west to north-west				
Disturbances	Deep drain				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> , <i>Acacia synchronicia</i> and <i>Acacia pteraneura</i> over <i>Grevillea eriostachya</i> , <i>Gyrostemon tepperi</i> and <i>Acacia kempeana</i> over <i>Triodia basedowii</i> , <i>Goodenia mueckeana</i> and <i>Bonamia erecta</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia basedowii</i>	N	40	100	400
2	<i>Bonamia erecta</i>	N	1.5	45	200
3	<i>Goodenia mueckeana</i>	N	1.2	20	300
4	<i>Eragrostis eriopoda</i>	N	1	40	200
5	<i>Hakea rhombales</i>	N	1	110	20
6	<i>Seringia velutina</i>	N	0.8	45	50
7	<i>Grevillea eriostachya</i>	N	0.8	80	10



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8	<i>Kennedia prorepens</i>	N	0.8	45	60
9	<i>Paraneurachne muelleri</i>	N	0.7	45	150
10	<i>Acacia synchronicia</i>	N	0.5	140	4
11	<i>Acacia pteraneura</i>	N	0.5	250	6
12	<i>Dicrastylis kumarinensis</i>	N	0.4	40	20
13	<i>Gyrostemon tepperi</i>	N	0.3	90	12
14	<i>Aristida contorta</i>	N	0.3	40	40
15	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	N	0.2	45	5
16	<i>Indigofera monophylla</i>	N	0.2	35	15
17	<i>Acacia kempeana</i>	N	0.2	90	2
18	<i>Eremophila cuneifolia</i>	N	0.2	120	5
19	Unidentifiable herb	unknown	0.2	10	40
20	<i>Duperreya commixta</i>	N	0.1	NA	5
21	<i>Abutilon cryptopetalum</i>	N	0.1	35	15
22	<i>Prostanthera wilkieana</i>	N	0.1	35	25
23	<i>Eriachne helmsii</i>	N	0.1	20	3
24	<i>Goodenia triodiophila</i>	N	0.1	35	30
25	<i>Hibiscus burtonii</i>	N	0.1	45	25
26	<i>Solanum lasiophyllum</i>	N	0.1	60	2
27	<i>Sida calyxhymenia</i>	N	0.1	30	5
28	<i>Senna glutinosa</i> subsp. <i>xluerssenii</i>	N	0.1	130	2
29	<i>Senna artemisioides</i> subsp. <i>xsturtii</i>	N	0.1	90	3
30	<i>Corchorus crozophorifolius</i>	N	0.1	45	15
31	<i>Petalostylis cassioides</i>	N	0.1	80	2
32	<i>Codonocarpus cotinifolius</i>	N	0.1	50	2

Date	19/03/2024				
Quadrat Code	<i>Q012</i>				
Coord (NE corner)	-24.5522, 119.6223				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Sandy to sandy loam				
Rock type	None observed				
Litter % cover	1%				
Fire history	1-2 years				
Vegetation condition	Very good				
Slope	Flat-1 degree				
Aspect	Slight north-west				
Disturbances	Telstra				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Corymbia desrticola</i> , <i>Grevillea eriostachya</i> and <i>Acacia inaequilatera</i> over <i>Acacia melleodora</i> , <i>Petalostylis cassioides</i> and <i>Codonocarpus cotinifolius</i> over <i>Triodia basedowii</i> , <i>Calandrinia polyandra</i> and <i>Paraneurachne muelleri</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia basedowii</i>	N	35	100	350
2	<i>Calandrinia polyandra</i>	N	1.5	25	300
3	<i>Paraneurachne muelleri</i>	N	1	50	175
4	<i>Themeda triandra</i>	N	0.8	80	50
5	<i>Petalostylis cassioides</i>	N	0.8	60	10



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6	<i>Indigofera monophylla</i>	N	0.7	45	25
7	<i>Corymbia deserticola</i>	N	0.5	400	1
8	Unidentifiable herb	unknown	0.5	35	30
9	<i>Codonocarpus cotinifolius</i>	N	0.5	140	15
10	<i>Calandrinia balonensis</i>	N	0.3	15	50
11	<i>Bonamia erecta</i>	N	0.3	45	15
12	<i>Portulaca oleracea</i>	N	0.3	5	40
13	<i>Acacia inaequilatera</i>	N	0.3	300	2
14	<i>Hibiscus burtonii</i>	N	0.2	60	15
15	<i>Aristida holathera</i>	N	0.2	60	50
16	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	N	0.2	50	2
17	<i>Acacia melleodora</i>	N	0.2	80	2
18	<i>Acacia pteraneura</i>	N	0.2	180	1
19	<i>Grevillea eriostachya</i>	N	0.2	200	2
20	<i>Senna glutinosa</i> subsp. <i>xluerssenii</i>	N	0.2	60	5
21	<i>Euphorbia drummondii</i>	N	0.2	5	20
22	<i>Acacia tetragonophylla</i>	N	0.1	160	1
23	<i>Eremophila forrestii</i> subsp. <i>hastieana</i>	N	0.1	120	1
24	<i>Eremophila latrobei</i>	N	0.1	40	5
25	<i>Psyrax latifolia</i>	N	0.1	120	2
26	<i>Duperreya commixta</i>	N	0.1	NA	3
27	<i>Dysphania rhadinostachya</i>	N	0.1	10	10
28	<i>Ptilotus obovatus</i>	N	0.1	50	1

Date	19/03/2024				
Quadrat Code	Q013				
Coord (NE corner)	-24.5478, 119.6235				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy stony plain				
Soil description	Red sand and red rock				
Rock type	Red pebbles and rocks				
Litter % cover	1%				
Fire history	1-2 years				
Vegetation condition	Good				
Slope	1-2 degrees				
Aspect	West - north west				
Disturbances	Soil has been disturbed				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Corymbia deserticola</i> , <i>Acacia kempeana</i> and <i>Acacia synchronicia</i> over <i>Hibiscus burtonii</i> , <i>Senna glutinosa</i> and <i>Petalostylis cassioides</i> over <i>Triodia basedowii</i> , <i>Calandrinia polyandra</i> and <i>Eragrostis eriopoda</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia basedowii</i>	N	8	70	100
2	<i>Calandrinia polyandra</i>	N	2	15	600
3	<i>Acacia kempeana</i>	N	2	120	50
4	<i>Petalostylis cassioides</i>	N	1.5	50	30




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5	<i>Hibiscus burtonii</i>	N	1	40	120
6	<i>Eragrostis eriopoda</i>	N	0.8	35	150
7	<i>Corymbia deserticola</i>	N	0.8	420	4
8	<i>Ptilotus exaltatus</i>	N	0.6	25	40
9	<i>Seringia velutina</i>	N	0.3	45	10
10	<i>Dampiera dentata</i>	N	0.3	40	30
11	<i>Afrohybanthus aurantiacus</i>	N	0.2	35	15
12	<i>Acacia synchronicia</i>	N	0.2	180	1
13	<i>Abutilon otocarpum</i>	N	0.2	50	5
14	<i>Senna glutinosa</i>	N	0.1	80	2
15	<i>Eriachne aristidea</i>	N	0.1	15	10
16	Unidentifiable grass	N	0.1	35	1
17	<i>Goodenia triodiophila</i>	N	0.1	35	15
18	<i>Ptilotus schwartzii</i>	N	0.1	40	10

Date	19/03/2024				
Quadrat Code	Q014				
Coord (NE corner)	-24.543, 119.6248				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Stony plain with some sand				
Soil description	Red loam and red sand				
Rock type	Red stone and pebbles				
Litter % cover	2%				
Fire history	None observed				
Vegetation condition	Good				
Slope	1-2 degrees				
Aspect	West				
Disturbances	Drain under road, erosion				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Acacia aneura</i> , <i>Acacia pruinocarpa</i> and <i>Acacia incurvaneura</i> over <i>Acacia rhodophloa</i> , <i>Psyrax latifolia</i> , and <i>Senna artemisioides</i> subsp. <i>×sturtii</i> , over <i>Calandrinia polyandra</i> , <i>Triodia basedowii</i> and <i>Ptilotus schwartzii</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Calandrinia polyandra</i>	N	5	20	1500
2	<i>Acacia aneura</i>	N	4	300	8
3	<i>Acacia incurvaneura</i>	N	3	250	15
4	<i>Triodia basedowii</i>	N	2	70	150
5	<i>Acacia rhodophloia</i>	N	2	220	25
6	<i>Senna artemisioides</i> subsp. <i>×sturtii</i>	N	2	100	50
7	<i>Hibiscus burtonii</i>	N	1	50	70

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8	<i>Senna artemisioides</i>	N	1	110	15
9	<i>Acacia pruinocarpa</i>	N	1	420	5
10	<i>Ptilotus schwartzii</i>	N	0.8	35	50
11	<i>Eremophila margarethae</i>	N	0.7	60	50
12	<i>Indigofera monophylla</i>	N	0.7	40	25
13	<i>Psyrax latifolia</i>	N	0.7	200	5
14	<i>Ptilotus obovatus</i>	N	0.6	80	10
15	<i>Solanum lasiophyllum</i>	N	0.6	50	25
16	<i>Abutilon cryptopetalum</i>	N	0.5	35	25
17	<i>Eragrostis eriopoda</i>	N	0.5	35	100
18	<i>Abutilon lepidum</i>	N	0.4	30	50
19	<i>Abutilon lepidum</i>	N	0.3	50	10
20	<i>Fimbristylis dichotoma</i>	N	0.2	30	50
21	<i>Dampiera dentata</i>	N	0.2	40	15
22	<i>Brassica tournefortii</i>	E	0.1	25	50
23	<i>Eremophila sp. sterile</i>	N	0.1	80	2
24	<i>Goodenia triodiophila</i>	N	0.1	50	5

Date	20/03/2024				
Quadrat Code	<i>Q015</i>				
Coord (NE corner)	-24.5386, 119.6259				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Rocky creek line				
Soil description	Hard pan, rock and red pebbles				
Rock type	Hard pan, rock and red pebbles				
Litter % cover	1%				
Fire history	None observed				
Vegetation condition	Good				
Slope	2-3 degrees				
Aspect	West				
Disturbances	Drain, road, erosion, rabbits				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Acacia rhodophloia</i> , <i>Acacia ancistrocarpa</i> and <i>Acacia pruinocarpa</i> over <i>Acacia pteraneura</i> , <i>Eremophila margarethae</i> and <i>Eremophila sp.</i> over <i>Triodia basedowii</i> , <i>Calandrinia polyandra</i> and <i>Chrysopogon fallax</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia basedowii</i>	N	5	80	50
2	<i>Calandrinia polyandra</i>	N	5	35	1200
3	<i>Acacia rhodophloia</i>	N	4	500	20
4	<i>Eremophila margarethae</i>	N	2	120	60
5	<i>Acacia pteraneura</i>	N	2	180	20
6	<i>Acacia pruinocarpa</i>	N	2	500	6
7	<i>Senna artemisioides</i> subsp. <i>xsturtii</i>	N	1.5	60	60
8	<i>Acacia ancistrocarpa</i>	N	1.5	200	8

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9	<i>Eremophila</i> sp. sterile	N	1.2	110	25
10	<i>Chrysopogon fallax</i>	N	1	110	80
11	<i>Solanum elaeagnifolium</i>	N	1	110	30
12	Unidentified exotic herb	E	1	10	500
13	<i>Eragrostis eriopoda</i>	N	0.9	40	200
14	<i>Paraneurachne muelleri</i>	N	0.8	40	180
15	<i>Indigofera monophylla</i>	N	0.7	45	20
16	<i>Codonocarpus cotinifolius</i>	N	0.7	120	5
17	<i>Abutilon leucopetalum</i>	N	0.5	50	40
18	<i>Corchorus crozophorifolius</i>	N	0.5	50	30
19	<i>Alyogyne pinoniana</i>	N	0.5	180	20
20	<i>Dampiera dentata</i>	N	0.5	40	50
21	<i>Paractaenum novae-hollandiae</i>	N	0.4	20	100
22	<i>Cheilanthes sieberi</i>	N	0.3	30	150
23	<i>Eremophila exilifolia</i>	N	0.3	70	20
24	<i>Senna glutinosa</i>	N	0.3	110	10
25	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	N	0.3	50	15
26	<i>Hibiscus burtonii</i>	N	0.2	100	20
27	Unidentified herb weed	E	0.2	50	10
28	<i>Euphorbia</i> sp. unidentified	unknown	0.2	20	100
29	<i>Solanum lasiophyllum</i>	N	0.2	50	20
30	<i>Arivela viscosa</i>	N	0.2	60	30
31	<i>Grevillea stenobotrya</i>	N	0.2	220	2
32	<i>Leichhardtia australis</i>	N	0.1	NA	3
33	<i>Ptilotus schwartzii</i>	N	0.1	40	10
34	<i>Tribulus hirsutus</i>	N	0.1	5	20
35	<i>Ipomoea</i> sp.?	unknown	0.1	NA	2
36	Unidentified herb	unknown	0.1	30	20
37	<i>Senna notabilis</i>	N	0.1	40	10
38	<i>Afrohybanthus aurantiacus</i>	N	0.1	25	5

Date	20/03/2024				
Quadrat Code	Q016				
Coord (NE corner)	-24.5343, 119.6271				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Stony sandy plain on a rise				
Soil description	Red sand and loam				
Rock type	Red stone and red pebbles				
Litter % cover	2%				
Fire history	None observed				
Vegetation condition	Good				
Slope	1 degree				
Aspect	West				
Disturbances	Erosion				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Acacia pruinocarpa</i> , <i>Acacia kempeana</i> and <i>Acacia ancistrocarpa</i> over <i>Acacia incurvaneura</i> , <i>Eremophila margarethae</i> and <i>Senna artemisioides</i> subsp. <i>helmsii</i> over <i>Triodia basedowii</i> , <i>Sida platycalyx</i> and <i>Eragrostis eriopoda</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia basedowii</i>	N	7	75	100
2	<i>Eremophila margarethae</i>	N	3	120	80
3	<i>Acacia ancistrocarpa</i>	N	3	300	15
4	<i>Acacia kempeana</i>	N	2	350	8
5	<i>Acacia incurvaneura</i>	N	1.5	180	12
6	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	N	1.5	50	30



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7	<i>Acacia pruinocarpa</i>	N	1.2	400	5
8	<i>Eragrostis eriopoda</i>	N	1	30	100
9	<i>Anthobolus leptomerioides</i>	N	1	110	20
10	<i>Abutilon cryptopetalum</i>	N	1	35	80
11	<i>Sida platycalyx</i>	N	1	45	100
12	<i>Paraneurachne muelleri</i>	N	0.9	45	120
13	<i>Aristida holathera</i>	N	0.8	45	50
14	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	N	0.7	100	10
15	<i>Calandrinia polyandra</i>	N	0.5	30	100
16	<i>Eremophila forrestii</i> subsp. <i>forrestii.</i>	N	0.4	80	5
17	<i>Solanum lasiophyllum</i>	N	0.2	60	5
18	<i>Ptilotus schwartzii</i>	N	0.2	35	15
19	<i>Acacia tetragonophylla</i>	N	0.1	100	1
20	<i>Maireana triptera</i>	N	0.1	40	5

Date	20/03/2024				
Quadrat Code	Q017				
Coord (NE corner)	-24.529, 119.6281				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Stony sandy rise				
Soil description	Red sand and loam				
Rock type	Red rock				
Litter % cover	1%				
Fire history	None observed				
Vegetation condition	Good				
Slope	1-2 degrees				
Aspect	West				
Disturbances	Vehicle tracks, erosion, roads, gravel depot/store				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Acacia incurvaneura</i> , <i>Acacia pruinocarpa</i> and <i>Acacia ancistrocarpa</i> over <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Abutilon cryptopetalum</i> and <i>Eremophila margarethae</i> over <i>Calandrinia polyandra</i> , <i>Triodia basedowii</i> and <i>Paraneurachne muelleri</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Calandrinia polyandra</i>	N	10	20	3000
2	<i>Acacia incurvaneura</i>	N	5	450	30
3	<i>Acacia pruinocarpa</i>	N	4	500	10
4	<i>Acacia ancistrocarpa</i>	N	1.5	160	10
5	<i>Triodia basedowii</i>	N	1	80	50
6	<i>Paraneurachne muelleri</i>	N	0.8	45	80



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7	<i>Eremophila margarethae</i>	N	0.8	100	20
8	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	N	0.7	100	50
9	<i>Acacia rhodophloia</i>	N	0.7	350	2
10	<i>Eragrostis eriopoda</i>	N	0.5	45	100
11	<i>Abutilon lepidum</i>	N	0.3	35	60
12	<i>Abutilon cryptopetalum</i>	N	0.3	80	40
13	<i>Grevillea stenobotrya</i>	N	0.3	500	1
14	<i>Portulaca oleracea</i>	N	0.2	10	50
15	Unidentifiable shrub	N	0.2	15	50
16	<i>Maireana triptera</i>	N	0.2	30	30
17	<i>Solanum lasiophyllum</i>	N	0.2	45	10
18	<i>Ptilotus schwartzii</i>	N	0.2	40	20
19	<i>Boerhavia coccinea</i>	N	0.1	10	5
20	Unidentifiable herb	unknown	0.1	70	1
21	<i>Acacia ramulosa</i> var. <i>linophylla</i>	N	0.1	60	1

Date	20/03/2024				
Quadrat Code	Q018				
Coord (NE corner)	-24.5246, 119.6289				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	1%				
Fire history	2-3 years				
Vegetation condition	Very good				
Slope	1 degree				
Aspect	West north-west				
Disturbances	Minimal				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea lorea</i> , <i>Acacia dictyophleba</i> and <i>Codonocarpus cotinifolius</i> over <i>Petalostylis cassioides</i> , <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Calytrix carinata</i> over <i>Triodia basedowii</i> , <i>Triodia schinzii</i> and <i>Bonamia erecta</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia basedowii</i>	N	22	100	220
2	<i>Triodia schinzii</i>	N	20	120	200
3	<i>Bonamia erecta</i>	N	3	40	250
4	<i>Goodenia mueckeana</i>	N	1.5	25	300
5	<i>Eragrostis eriopoda</i>	N	1	45	150



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6	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.9	30	120
7	<i>Paraneurachne muelleri</i>	N	0.8	45	100
8	<i>Seringia velutina</i>	N	0.8	60	50
9	<i>Calytrix carinata</i>	N	0.8	60	20
10	<i>Abutilon cryptopetalum</i>	N	0.8	50	70
11	<i>Abutilon leucopetalum</i>	N	0.7	50	50
12	<i>Acacia ancistrocarpa</i>	N	0.7	160	4
13	<i>Petalostylis cassioides</i>	N	0.7	80	10
14	<i>Hakea lorea</i>	N	0.7	4.5	2
15	<i>Prostanthera wilkieana</i>	N	0.6	30	40
16	<i>Dampiera cinerea</i>	N	0.6	35	80
17	<i>Ptilotus obovatus</i>	N	0.5	80	5
18	<i>Acacia kempeana</i>	N	0.5	160	3
19	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	N	0.5	70	15
20	<i>Acacia dictyophleba</i>	N	0.5	150	3
21	<i>Acacia aneura</i>	N	0.4	110	3
22	<i>Indigofera monophylla</i>	N	0.4	40	15
23	<i>Afrohybanthus aurantiacus</i>	N	0.3	40	30
24	<i>Ptilotus exaltatus</i>	N	0.2	50	35
25	<i>Grevillea eriostachya</i>	N	0.2	100	8
26	<i>Abutilon lepidum</i>	N	0.2	45	15
27	<i>Abutilon leucopetalum</i>	N	0.2	120	2
28	<i>Codonocarpus cotinifolius</i>	N	0.2	300	3
29	<i>Senna glutinosa</i> subsp. <i>xluerssenii</i>	N	0.1	100	1
30	<i>Fimbristylis dichotoma</i>	N	0.1	35	5

Date	20/03/2024					
Quadrat Code	Q019					
Coord (NE corner)	-24.5204, 119.6296					
Size/shape	50x50					
Photos (NE corner)	Yes					
Landform	Sandy plain					
Soil description	Red sand					
Rock type	None observed					
Litter % cover	2%					
Fire history	1-2 years					
Vegetation condition	Very good					
Slope	1 degree					
Aspect	West north-west					
Disturbances	Minimal					
Quadrat marking method	GPS and taped, not permanent.					
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> , <i>Hakea lorea</i> and <i>Codonocarpus cotinifolius</i> over <i>Calytrix carinata</i> , <i>Acacia melleodora</i> and <i>Eremophila</i> sp. over <i>Triodia basedowii</i> , <i>Triodia schinzii</i> and <i>Eragrostis eriopoda</i>					
	Species		Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name					
1	<i>Triodia basedowii</i>		N	30	90	300
2	<i>Triodia schinzii</i>		N	10	120	120
3	<i>Hakea rhombales</i>		N	2	250	10
4	<i>Eragrostis eriopoda</i>		N	1.5	35	250
5	<i>Seringia velutina</i>		N	0.8	70	20
6	<i>Hakea lorea</i>		N	0.8	320	5
7	<i>Eremophila</i> sp. sterile		N	0.7	150	4

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8	<i>Calandrinia polyandra</i>	N	0.7	25	80
9	<i>Codonocarpus cotinifolius</i>	N	0.6	300	5
10	<i>Aristida holathera</i>	N	0.5	65	30
11	<i>Corchorus crozophorifolius</i>	N	0.5	40	25
12	<i>Indigofera monophylla</i>	N	0.5	45	25
13	<i>Dicrastylis kumarinensis</i>	N	0.5	40	20
14	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.5	35	40
15	<i>Calytrix carinata</i>	N	0.5	30	30
16	<i>Acacia melleodora</i>	N	0.3	110	2
17	<i>Bonamia erecta</i>	N	0.3	35	50
18	<i>Solanum lasiophyllum</i>	N	0.2	60	5
19	<i>Goodenia mueckeana</i>	N	0.2	25	30
20	<i>Prostanthera wilkieana</i>	N	0.2	25	25
21	<i>Dampiera cinerea</i>	N	0.2	45	15
22	<i>Solanum centrale</i>	N	0.2	40	15
23	<i>Maireana triptera</i>	N	0.1	45	12
24	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	N	0.1	30	5

Date	20/03/2024				
Quadrat Code	Q020				
Coord (NE corner)	-24.516, 119.6314				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand to red sandy loam				
Rock type	None observed				
Litter % cover	2%				
Fire history	1-2 years				
Vegetation condition	Very good				
Slope	1 degree				
Aspect	West north-west				
Disturbances	Minimal, drain				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> , <i>Acacia kempeana</i> and <i>Grevillea eriostachya</i> over <i>Acacia pteraneura</i> , <i>Acacia sp.</i> and <i>Anthobolus leptomerioides</i> over <i>Triodia basedowii</i> , <i>Triodia schinzii</i> and <i>Scaevola parvifolia</i> subsp. <i>Pilbarae</i>				
	<u>Species</u>	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia basedowii</i>	N	30	90	300
2	<i>Triodia schinzii</i>	N	3	120	20
3	<i>Hakea rhombales</i>	N	2	200	15
4	<i>Acacia pteraneura</i>	N	0.8	75	25
5	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.8	35	70
6	<i>Grevillea eriostachya</i>	N	0.7	250	2
7	<i>Indigofera monophylla</i>	N	0.5	35	25



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8	<i>Calandrinia polyandra</i>	N	0.5	35	20
9	<i>Acacia kempeana</i>	N	0.5	160	4
10	<i>Monachather paradoxus</i>	N	0.3	40	20
11	<i>Eragrostis eriopoda</i>	N	0.3	40	30
12	<i>Acacia</i> sp. Sterile.	N	0.3	120	3
13	<i>Goodenia mueckeana</i>	N	0.3	20	50
14	<i>Anthobolus leptomerioides</i>	N	0.3	75	7
15	<i>Eremophila forrestii</i> subsp. <i>hastieana</i>	N	0.3	70	3
16	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	N	0.2	120	5
17	<i>Abutilon lepidum</i>	N	0.2	80	10
18	<i>Solanum lasiophyllum</i>	N	0.2	65	10
19	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	N	0.2	60	15
20	<i>Solanum centrale</i>	N	0.2	35	10
21	<i>Sida fibulifera</i>	N	0.2	35	20
22	<i>Sida platycalyx</i>	N	0.2	70	10
23	<i>Prostanthera wilkieana</i>	N	0.2	50	10
24	<i>Maireana georgei</i>	N	0.1	25	15
25	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	N	0.1	40	1
26	<i>Enchylaena tomentosa</i>	N	0.1	50	10

Date	20/03/2024				
Quadrat Code	<i>Q021</i>				
Coord (NE corner)	-24.5119, 119.6337				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand to red loam				
Rock type	None observed				
Litter % cover	2%				
Fire history	1-2 years				
Vegetation condition	Good				
Slope	1 degree				
Aspect	West north-west				
Disturbances	Water flow/erosion				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Acacia incurvaneura</i> , <i>Acacia pruinocarpa</i> , and <i>Hakea Lorea</i> over <i>Senna artemisioides</i> subsp. <i>oligophylla</i> , <i>Eremophila forrestii</i> subsp. <i>hastiana</i> and <i>Abutilon cryptopetalum</i> over <i>Triodia basedowii</i> , <i>Astrebla pectinata</i> and <i>Eragrostis eriopoda</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia basedowii</i>	N	15	80	150
2	<i>Astrebla pectinata</i>	N	5	45	200
3	<i>Acacia incurvaneura</i>	N	4	350	12
4	<i>Acacia pruinocarpa</i>	N	2	600	3
5	<i>Acacia ancistrocarpa</i>	N	1.5	180	8



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6	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	N	1.5	60	30
7	<i>Eremophila forrestii</i> subsp. <i>hastiana</i>	N	1.5	120	15
8	<i>Triodia schinzii</i>	N	1.5	120	15
9	<i>Abutilon cryptopetalum</i>	N	1	65	50
10	<i>Eragrostis eriopoda</i>	N	0.8	45	100
11	<i>Acacia ramulosa</i> var. <i>linophylla</i>	N	0.7	180	3
12	<i>Hakea lorea</i>	N	0.6	450	1
13	<i>Corchorus crozophorifolius</i>	N	0.5	45	30
14	<i>Maireana triptera</i>	N	0.4	50	20
15	<i>Calandrinia polyandra</i>	N	0.4	35	30
16	<i>Rhagodia eremaea</i>	N	0.2	180	1
17	<i>Abutilon lepidum</i>	N	0.2	45	10
18	<i>Brunonia australis</i>	N	0.2	35	20
19	<i>Goodenia mueckeana</i>	N	0.2	25	15

Date	20/03/2024				
Quadrat Code	Q022				
Coord (NE corner)	-24.5081, 119.6362				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Sand to sandy loam				
Rock type	None observed				
Litter % cover	1%				
Fire history	1-2 years				
Vegetation condition	Good				
Slope	Flat to 1 degree				
Aspect	West north west				
Disturbances	Minimal				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> and <i>Hakea lorea</i> over <i>Acacia ancistrocarpa</i> and <i>Eremophila forrestii</i> subsp. <i>hastiana</i> over <i>Triodia schinzii</i> , <i>Triodia basedowii</i> and <i>Calandrinia polyandra</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia schinzii</i>	N	25	130	250
2	<i>Triodia basedowii</i>	N	15	100	150
3	<i>Eremophila forrestii</i> subsp. <i>hastiana</i>	N	2	70	60
4	<i>Hakea rhombales</i>	N	1.5	100	13
5	<i>Calandrinia polyandra</i>	N	0.8	35	50




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6	<i>Hakea lorea</i>	N	0.3	160	2
7	<i>Eriachne aristidea</i>	N	0.2	45	10
8	<i>Acacia ancistrocarpa</i>	N	0.1	80	1
9	<i>Dicrastylis kumarinensis</i>	N	0.1	40	2
10	<i>Eragrostis eriopoda</i>	N	0.1	45	3

Date	20/03/2024				
Quadrat Code	Q023				
Coord (NE corner)	-24.5044, 119.6388				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Sand to sandy loam				
Rock type	NA				
Litter % cover	1%				
Fire history	No evidence				
Vegetation condition	Very good				
Slope	1-2 degrees				
Aspect	West, north-west				
Disturbances	Minimal, water run-off				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Corymbia deserticola</i> , <i>Grevillea eriostachya</i> and <i>Hakea rhombales</i> over <i>Gyrostemon tepperi</i> , <i>Acacia pteraneura</i> and <i>Acacia melleodora</i> over <i>Triodia schinzii</i> , <i>Triodia basedowii</i> and <i>Bonamia erecta</i>				
Species		Status (E/N)	% cover	Av height (cm)	Abundance
Scientific name					
1	<i>Triodia schinzii</i>	N	18	120	180
2	<i>Triodia basedowii</i>	N	15	70	150
3	<i>Gyrostemon tepperi</i>	N	1.5	120	20
4	<i>Bonamia erecta</i>	N	1	45	70
5	<i>Acacia pteraneura</i>	N	1	90	10
6	<i>Hakea rhombales</i>	N	0.8	180	8

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7	<i>Goodenia mueckeana</i>	N	0.8	20	50
8	<i>Hibiscus burtonii</i>	N	0.6	40	20
9	<i>Dicrastylis kumarinensis</i>	N	0.5	40	20
10	<i>Grevillea eriostachya</i>	N	0.5	400	1
11	<i>Calytrix carinata</i>	N	0.5	50	5
12	<i>Corymbia deserticola</i>	N	0.5	500	1
13	<i>Acacia melleodora</i>	N	0.5	150	3
14	<i>Paraneurachne muelleri</i>	N	0.4	45	50
15	<i>Indigofera monophylla</i>	N	0.3	40	20
16	<i>Eremophila forrestii</i> subsp. <i>hastiana</i>	N	0.3	50	4
17	<i>Hakea lorea</i>	N	0.3	250	1
18	<i>Eragrostis eriopoda</i>	N	0.2	40	30
19	<i>Calandrinia polyandra</i>	N	0.2	35	20
20	<i>Prostanthera wilkieana</i>	N	0.2	35	10
21	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.2	35	25
22	<i>Aristida contorta</i>	N	0.2	45	20
23	<i>Sida platycalyx</i>	N	0.2	40	10
24	<i>Codonocarpus cotinifolius</i>	N	0.1	200	1
25	<i>Solanum lasiophyllum</i>	N	0.1	35	3
26	<i>Newcastelia hexarrhena</i>	N	0.1	45	1
27	<i>Corchorus crozophorifolius</i>	N	0.1	40	5

Date	21/03/2024					
Quadrat Code	Q024					
Coord (NE corner)	-24.5005, 119.6415					
Size/shape	50x50					
Photos (NE corner)	Yes					
Landform	Sand plain					
Soil description	Red sand					
Rock type	None observed					
Litter % cover	2%					
Fire history	1-2 years					
Vegetation condition	Very good					
Slope	1 degree					
Aspect	West north-west					
Disturbances	Minimal - camels					
Quadrat marking method	GPS and taped, not permanent.					
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Codonocarpus cotinifolius</i> , <i>Hakea lorea</i> and <i>Acacia ancistrocarpa</i> over <i>Calytrix carinata</i> , <i>Eremophila forrestii</i> subsp. <i>hastiana</i> and <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> over <i>Triodia schinzii</i> , <i>Triodia basedowii</i> and <i>Eragrostis eriopoda</i>					
	Species		Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name					
1	<i>Triodia schinzii</i>		N	20	120	200
2	<i>Triodia basedowii</i>		N	7	85	120
3	<i>Acacia ancistrocarpa</i>		N	2.5	140	40
4	<i>Codonocarpus cotinifolius</i>		N	2.5	160	30
5	<i>Eragrostis eriopoda</i>		N	2	45	250
6	<i>Bonamia erecta</i>		N	2	35	100

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7	<i>Eriachne aristidea</i>	N	1.5	40	120
8	<i>Seringia velutina</i>	N	1.5	35	200
9	<i>Goodenia mueckeana</i>	N	1.5	20	300
10	<i>Dicrastylis kumarinensis</i>	N	1.5	45	80
11	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	1.5	25	80
12	<i>Paraneurachne muelleri</i>	N	1	50	120
13	<i>Hibiscus burtonii</i>	N	1	40	40
14	<i>Hakea lorea</i>	N	1	220	6
15	<i>Abutilon lepidum</i>	N	1	45	30
16	<i>Dissocarpus paradoxus</i>	N	1	35	80
17	<i>Calytrix carinata</i>	N	0.8	80	12
18	<i>Kennedia prorepens</i>	N	0.8	45	30
19	<i>Eremophila forrestii</i> subsp. <i>hastiana</i>	N	0.7	100	7
20	<i>Ptilotus exaltatus</i>	N	0.7	25	30
21	<i>Solanum centrale</i>	N	0.6	35	25
22	<i>Eriachne helmsii</i>	N	0.6	45	50
23	<i>Solanum lasiophyllum</i>	N	0.5	45	8
24	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	N	0.2	60	5

Date	21/03/2024				
Quadrat Code	Q025				
Coord (NE corner)	-24.4966, 119.6436				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sand plain				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	2%				
Fire history	1 to 2 years				
Vegetation condition	Very good				
Slope	1 degree				
Aspect	West north west				
Disturbances	Minimal				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea lorea</i> , <i>Acacia kempeana</i> and <i>Codonocarpus cotinifolius</i> over <i>Acacia ancistrocarpa</i> , <i>Gyrostemon tepperi</i> and <i>Acacia pruinocarpa</i> over <i>Triodia schinzii</i> , <i>Triodia basedowii</i> and <i>Bonamia erecta</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia schinzii</i>	N	25	120	250
2	<i>Triodia basedowii</i>	N	5	70	50
3	<i>Acacia ancistrocarpa</i>	N	2.5	140	25
4	<i>Bonamia erecta</i>	N	2.5	45	250
5	<i>Goodenia mueckeana</i>	N	1	25	120
6	<i>Kennedia prorepens</i>	N	1	40	50
7	<i>Gyrostemon tepperi</i>	N	0.9	110	12



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8	<i>Dicrastylis kumarinensis</i>	N	0.8	40	30
9	<i>Calytrix carinata</i>	N	0.8	60	20
10	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.8	30	120
11	<i>Seringia velutina</i>	N	0.5	45	25
12	<i>Indigofera monophylla</i>	N	0.5	35	15
13	<i>Leptosema chambersii</i>	N	0.5	25	20
14	<i>Codonocarpus cotinifolius</i>	N	0.4	400	2
15	<i>Hakea lorea</i>	N	0.4	110	5
16	<i>Eragrostis eriopoda</i>	N	0.4	45	50
17	<i>Acacia kempeana</i>	N	0.3	160	2
18	<i>Ptilotus schwartzii</i>	N	0.3	40	10
19	<i>Solanum centrale</i>	N	0.3	35	15
20	<i>Solanum lasiophyllum</i>	N	0.3	55	10
21	<i>Acacia incurvaneura</i>	N	0.2	80	2
22	<i>Calandrinia polyandra</i>	N	0.2	30	20
23	<i>Anthobolus leptomerioides</i>	N	0.2	80	5
24	<i>Acacia pruinocarpa</i>	N	0.2	130	1
25	<i>Abutilon cryptopetalum</i>	N	0.2	40	25
26	<i>Abutilon leucopetalum</i>	N	0.2	120	8
27	<i>Paraneurachne muelleri</i>	N	0.2	50	30
28	<i>Eriachne helmsii</i>	N	0.2	35	25
29	<i>Ptilotus exaltatus</i>	N	0.1	30	10
30	<i>Gomphrena kanisii</i>	N	0.1	35	10
31	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>	N	0.1	45	2
32	<i>Eremophila cuneifolia</i>	N	0.1	80	3
33	<i>Ptilotus obovatus</i>	N	0.1	60	1
34	<i>Sclerolaena diacantha</i>	N	0.1	35	3
35	<i>Dampiera cinerea</i>	N	0.1	30	10
36	<i>Seringia exastia</i>	N	0.1	70	2

Date	21/03/2024				
Quadrat Code	Q026				
Coord (NE corner)	-24.4922, 119.6457				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	1%				
Fire history	1-2 years				
Vegetation condition	Very good				
Slope	1 degree				
Aspect	West north-west				
Disturbances	Camels				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Pittosporum angustifolium</i> , <i>Hakea lorea</i> and <i>Hakea rhombales</i> over <i>Acacia melleodora</i> , <i>Psyrax latifolia</i> and <i>Codoncarpus cotinifolius</i> over <i>Triodia schinzii</i> , <i>Triodia basedowii</i> and <i>Bonamia erecta</i>				
Species		Status (E/N)	% cover	Av height (cm)	Abundance
Scientific name					
1	<i>Triodia schinzii</i>	N	30	120	300
2	<i>Triodia basedowii</i>	N	10	90	100
3	<i>Hakea rhombales</i>	N	1.5	120	12
4	<i>Bonamia erecta</i>	N	1.5	40	100
5	<i>Dicrasyllis kumarinensis</i>	N	1.5	45	120
6	<i>Calytrix carinata</i>	N	0.8	40	20

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7	<i>Gompholobium polyzygum</i>	N	0.8	45	45
8	<i>Hakea lorea</i>	N	0.7	140	3
9	<i>Pittosporum angustifolium</i>	N	0.5	250	1
10	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.5	25	30
11	<i>Seringia velutina</i>	N	0.3	40	15
12	<i>Acacia melleodora</i>	N	0.3	110	2
13	<i>Goodenia mueckeana</i>	N	0.3	25	40
14	<i>Psyrax latifolia</i>	N	0.2	110	3
15	<i>Codonocarpus cotinifolius</i>	N	0.2	70	2

Date	21/03/2024				
Quadrat Code	Q027				
Coord (NE corner)	-24.4884, 119.648				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	1%				
Fire history	1 to 2				
Vegetation condition	Very good				
Slope	1 degree				
Aspect	West, north-west				
Disturbances	Camels, drain				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea lorea</i> and <i>Codonocarpus cotinifolius</i> over <i>Acacia ancistrocarpa</i> , <i>Abutilon cryptopetalum</i> and <i>Petalostylis cassioides</i> over <i>Triodia schinzii</i> , <i>Triodia basedowii</i> and <i>Dicrastylis kumarinensis</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia schinzii</i>	N	23	120	230
2	<i>Triodia basedowii</i>	N	8	80	80
3	<i>Acacia ancistrocarpa</i>	N	4	140	40
4	<i>Dicrastylis kumarinensis</i>	N	2	45	300
5	<i>Paraneurachne muelleri</i>	N	0.8	45	50
6	<i>Petalostylis cassioides</i>	N	0.8	80	5



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7	<i>Bonamia erecta</i>	N	0.8	35	40
8	<i>Calytrix carinata</i>	N	0.8	60	20
9	<i>Seringia velutina</i>	N	0.7	40	30
10	<i>Goodenia mueckeana</i>	N	0.7	20	80
11	<i>Solanum lasiophyllum</i>	N	0.5	60	10
12	<i>Eragrostis eriopoda</i>	N	0.5	45	40
13	<i>Kennedia prorepens</i>	N	0.5	40	20
14	<i>Codonocarpus cotinifolius</i>	N	0.5	300	4
15	<i>Gyrostemon tepperi</i>	N	0.5	80	6
16	<i>Hakea lorea</i>	N	0.4	250	2
17	<i>Ptilotus obovatus</i>	N	0.3	60	5
18	<i>Eriachne helmsii</i>	N	0.3	45	30
19	<i>Ptilotus exaltatus</i>	N	0.2	50	20
20	<i>Solanum centrale</i>	N	0.2	45	10
21	<i>Abutilon lepidum</i>	N	0.2	45	10
22	<i>Abutilon cryptopetalum</i>	N	0.1	100	3
23	<i>Prostanthera wilkieana</i>	N	0.1	40	2
24	<i>Gomphrena kanisii</i>	N	0.1	25	15
25	<i>Seringia exastia</i>	N	0.1	80	10

Date	21/03/2024				
Quadrat Code	Q028				
Coord (NE corner)	-24.4849, 119.6511				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	1%				
Fire history	1 to 2 years				
Vegetation condition	Very good				
Slope	1 degree				
Aspect	West north-west				
Disturbances	Camels				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> , <i>Hakea lorea</i> and <i>Codonocarpus cotinifolius</i> over <i>Acacia kempeana</i> , <i>Calytrix carinata</i> and <i>Alyogyne pinoniana</i> over <i>Triodia schinzii</i> , <i>Triodia basedowii</i> and <i>Dicrastylis kumarinensis</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia schinzii</i>	N	20	120	200
2	<i>Triodia basedowii</i>	N	10	90	100
3	<i>Dicrastylis kumarinensis</i>	N	2	45	150
4	<i>Hakea rhombales</i>	N	1.5	130	12
5	<i>Bonamia erecta</i>	N	1.5	40	120



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6	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	1.5	30	200
7	<i>Calytrix carinata</i>	N	0.9	60	15
8	<i>Kennedia prorepens</i>	N	0.7	35	25
9	<i>Acacia kempeana</i>	N	0.7	80	4
10	<i>Calandrinia polyandra</i>	N	0.5	35	50
11	<i>Calytrix carinata</i>	N	0.5	60	10
12	<i>Goodenia mueckeana</i>	N	0.5	25	45
13	<i>Hakea lorea</i>	N	0.5	120	2
14	<i>Paraneurachne muelleri</i>	N	0.2	45	20
15	<i>Eragrostis eriopoda</i>	N	0.2	45	20
16	<i>Alyogyne pinoniana</i>	N	0.2	100	3
17	<i>Codonocarpus cotinifolius</i>	N	0.2	220	3
18	<i>Anthobolus leptomerioides</i>	N	0.1	100	1
19	<i>Acacia pteraneura</i>	N	0.1	70	1

Date	21/03/2024				
Quadrat Code	Q029				
Coord (NE corner)	-24.4813, 119.6542				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand				
Rock type	None observed				
Litter % cover	1%				
Fire history	1-2 years				
Vegetation condition	Very good				
Slope	1 degree				
Aspect	North-west				
Disturbances	Minimal				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> , <i>Codonocarpus cotinifolius</i> and <i>Acacia ancistrocarpa</i> over <i>Grevillea eriostachya</i> , <i>Acacia kempeana</i> and <i>Acacia pteraneura</i> over <i>Triodia schinzii</i> , <i>Triodia basedowii</i> and <i>Scaevola parvifolia</i> subsp. <i>Pilbara</i> <i>e</i>				
Species	Status (E/N)	% cover	Av height (cm)	Abundance	
Scientific name					
1	<i>Triodia schinzii</i>	N	18	120	180
2	<i>Triodia basedowii</i>	N	15	75	150
3	<i>Bonamia erecta</i>	N	1.5	30	80
4	<i>Scaevola parvifolia</i> subsp. <i>pilbara</i> <i>e</i>	N	1.5	35	120



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5	<i>Leptosema chambersii</i>	N	1.5	30	80
6	<i>Dicrastylis kumarinensis</i>	N	1	50	30
7	<i>Acacia ancistrocarpa</i>	N	1	200	5
8	<i>Kennedia prorepens</i>	N	0.8	40	20
9	<i>Codonocarpus cotinifolius</i>	N	0.8	220	6
10	<i>Hakea rhombales</i>	N	0.8	300	4
11	<i>Calytrix carinata</i>	N	0.7	50	13
12	<i>Grevillea eriostachya</i>	N	0.5	140	3
13	<i>Eriachne helmsii</i>	N	0.5	45	20
14	<i>Goodenia mueckeana</i>	N	0.4	25	30
15	<i>Seringia velutina</i>	N	0.3	50	10
16	<i>Acacia pteraneura</i>	N	0.2	90	2
17	<i>Acacia kempeana</i>	N	0.2	120	2
18	<i>Newcastelia hexarrhena</i>	N	0.1	35	1
19	<i>Acacia maitlandii</i>	N	0.1	70	1

Date	21/03/2024				
Quadrat Code	Q030				
Coord (NE corner)	-24.4775, 119.6577				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand to red loam				
Rock type	Occasional red pebbles				
Litter % cover	1%				
Fire history	1 to 2				
Vegetation condition	Very good				
Slope	Flat - 1 degree				
Aspect	West				
Disturbances	Minimal				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Hakea rhombales</i> , <i>Grevillea eriostachya</i> and <i>Hakea lorea</i> over <i>Acacia maitlandii</i> , <i>Petalostylis cassioides</i> and <i>Acacia kempeana</i> over <i>Triodia basedowii</i> , <i>Kennedia prorepens</i> and <i>Calandrinia polyandra</i>				
	Species	Status (E/N)	% cover	Av height (cm)	Abundance
	Scientific name				
1	<i>Triodia basedowii</i>	N	30	85	300
2	<i>Petalostylis cassioides</i>	N	2	55	25
3	<i>Hakea lorea</i>	N	1	220	5
4	<i>Kennedia prorepens</i>	N	1	35	30
5	<i>Acacia kempeana</i>	N	1	130	6
6	<i>Calandrinia polyandra</i>	N	0.8	35	60
7	<i>Acacia maitlandii</i>	N	0.8	90	10
8	<i>Grevillea eriostachya</i>	N	0.8	180	3



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9	<i>Scaevola parvifolia</i> subsp. <i>pilbarae</i>	N	0.7	30	40
10	<i>Calytrix carinata</i>	N	0.6	60	10
11	<i>Bonamia erecta</i>	N	0.5	30	20
12	<i>Triodia schinzii</i>	N	0.5	120	5
13	<i>Solanum lasiophyllum</i>	N	0.5	40	10
14	<i>Alyogyne pinoniana</i>	N	0.5	40	10
15	<i>Hakea rhombales</i>	N	0.4	150	4
16	<i>Newcastelia hexarrhena</i>	N	0.2	35	8
17	<i>Abutilon lepidum</i>	N	0.1	40	2

Date	21/03/2024				
Quadrat Code	Q031				
Coord (NE corner)	-24.4739, 119.6607				
Size/shape	50x50				
Photos (NE corner)	Yes				
Landform	Sandy plain				
Soil description	Red sand to sandy loam				
Rock type	Red pebbles				
Litter % cover	2%				
Fire history	1 to 2				
Vegetation condition	Very good				
Slope	Flat				
Aspect	Flat to slight north-west				
Disturbances	Cattle				
Quadrat marking method	GPS and taped, not permanent.				
Vegetation type (NVIS - 3 x dominants for upper, mid and lower stratum)	<i>Corymbia eremaea</i> , <i>Codonocarpus cotinifolius</i> and <i>Hakea lorea</i> over <i>Petalostylis cassioides</i> , <i>Acacia incurvaneura</i> and <i>Acacia maitlandii</i> over <i>Triodia basedowii</i> , <i>Kennedia prorepens</i> and <i>Scaevola parvifolia subsp. pilbarae</i>				
	Species				
	Scientific name	Status (E/N)	% cover	Av height (cm)	Abundance
1	<i>Triodia basedowii</i>	N	25	80	250
2	<i>Petalostylis cassioides</i>	N	2	60	40
3	<i>Acacia incurvaneura</i>	N	2	110	25
4	<i>Kennedia prorepens</i>	N	1.5	40	60
5	<i>Acacia maitlandii</i>	N	1.5	100	10
6	<i>Scaevola parvifolia subsp. pilbarae</i>	N	1	35	75
7	<i>Codonocarpus cotinifolius</i>	N	0.7	200	5



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8	<i>Eragrostis eriopoda</i>	N	0.7	40	100
9	<i>Paraneurachne muelleri</i>	N	0.4	50	50
10	<i>Corymbia eremaea</i>	N	0.4	600	1
11	<i>Acacia kempeana</i>	N	0.3	90	3
12	<i>Bonamia erecta</i>	N	0.3	30	20
13	<i>Solanum lasiophyllum</i>	N	0.3	45	10
14	<i>Hakea lorea</i>	N	0.2	130	2
15	<i>Acacia melleodora</i>	N	0.2	110	2

Appendix D: DNA sequencing analysis results



Project details		Analysis details	
Project code	ED_2446CR1	qPCR	-
Project name	Diet analysis of feral cat scat in WA using eDNA	Metabarcoding	Vertebrate 12S
Date of receipt of samples	28/03/2024	Total no. samples	5
Date of report	17/04/2024		
Client name	Red-Gum Environmental Consulting		
Client contact	Damian Wall		
Project manager	Emma Walker		
Project analyst	Dr Rachael Impey		



Table 2. Taxon by sample detection table with sequence reads.

	Kingdom	Phylum	Class	Order	Family	Genus	Species	Common Name	Status	EPBC BC	Site 1 1	Site 1 2	Site 1 3	Site 1 4	Site 1 5
Birds	Metazoa	Chordata	Aves	Passeriformes	Meliphagidae	<i>Epthianura</i>	<i>Epthianura tricolor</i>	Crimson Chat	Native	- -	35	0	0	0	0
Mammals	Metazoa	Chordata	Mammalia	Carnivora	Felidae	<i>Felis</i>	<i>Felis catus</i>	Cat	Introduced	- -	83746	9216	106335	80228	66240
	Metazoa	Chordata	Mammalia	Rodentia	Muridae			Family of rodent	-	- -	0	0	0	50	46

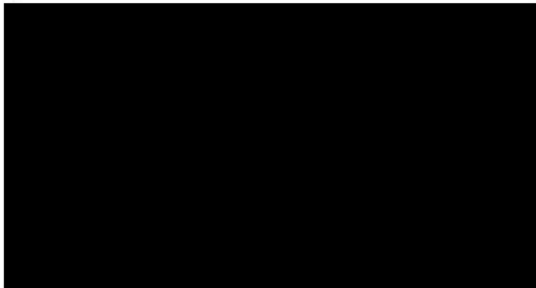
Appendix E: DWER RFI (Dated 22 January 2024)



Government of Western Australia
Department of Water and Environmental Regulation

Our ref: CPS 10271/1

Email: info@dwer.wa.gov.au



Dear [REDACTED]

APPLICATION TO CLEAR NATIVE VEGETATION UNDER THE *ENVIRONMENTAL PROTECTION ACT 1986* – REQUEST FOR FURTHER INFORMATION

I refer to Vocus Fibre Pty Ltd's (Vocus) application for a Purpose Permit under section 51E(1) of the *Environmental Protection Act 1986* (the EP Act), to clear up to 7.72 hectares of native vegetation within a 64.47 hectare footprint within the Great Northern Highway road reserve (PINs 11698376, 11698904 and 11698907), Kumarina (Shire of Meekatharra), for the purpose of installing underground telecommunications optic fibre cabling. The application was received by the Department of Water and Environmental Regulation (the department) on 12 July 2023.

Following on from your response to the initial request for information and the meeting held between Vocus and the department on 15 November 2023, a change in approach has been proposed to determine impacts to flora. Please provide the information set out in Schedule 1 (attached) by **23 February 2024**. You may request an extension (in writing), should you require additional time.

Until this information has been received, the department has suspended the assessment timeframe for your application ('stop the clock'). Please note, applications will remain in 'stop the clock' where surveys are not submitted in accordance with the Environmental Protection Authority's (EPA) *Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)*. This timeframe will recommence upon receipt of the required information.

If the required information is not received by the date set out above (or other date as agreed), the assessment process will recommence, and a determination will be made based on the information available. This is likely to result in the refusal of the application.

Prime House, 8 Davidson Terrace Joondalup Western Australia 6027

Locked Bag 10 Joondalup DC WA 6919

Telephone: 08 6364 7000 Facsimile: 08 6364 7001

www.dwer.wa.gov.au

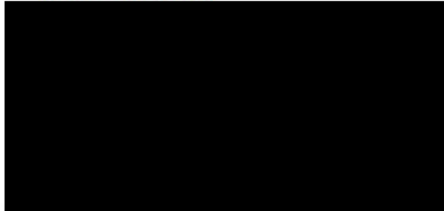
NV-L31 v5.0

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If you have any queries regarding the above information, please contact the Environmental Officer, as listed above.

Yours sincerely



MANAGER
NATIVE VEGETATION REGULATION

*Officer delegated under Section 20
of the Environmental Protection Act 1986*

22 January 2024

Att: Schedule 1

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3**Schedule 1 – Additional information requested**

Item	Information requirements	Specifications	Rationale
1.	<p>A targeted flora survey is required for the area proposed to be cleared.</p> <p>Please note that should threatened or priority flora be identified, additional surveys of surrounding areas will also be required to determine the species' local population size and distribution.</p>	<p>The survey is to be carried out by a <i>botanist</i> (see below for relevant definitions) and survey methodology must be consistent with the Environmental Protection Authority's (EPA) <i>Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment</i> (December 2016), copies of which are available at the EPA's website.</p> <p>All surveys must be submitted in accordance with the EPA's <i>Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)</i>, and submitted via the department's IBSA Submissions Portal. Please provide the corresponding IBSA Submissions Reference Number to the assessing officer, using the contact details located on the top right of the attached letter, once the survey has been submitted.</p> <p>NOTE: The department defines a "botanist" as a person who holds a tertiary qualification in environmental science or equivalent, and has a minimum of 2 years work experience in identification and surveys of flora native to the bioregion being inspected or surveyed, or who is approved by the CEO as a suitable botanist for the bioregion.</p>	<p>Based on the agreed approach, Vocus Fibre Pty Ltd will provide a targeted survey for the following flora species:</p> <ul style="list-style-type: none"> • <i>Bothriochloa decipiens</i> var. <i>cloncurrans</i> (Priority 1) • <i>Eremophila appressa</i> (Priority 1) • <i>Eremophila fasciata</i> (Priority 3) <p>If priority flora is identified within the proposed clearing area, further avoidance and mitigation measures are likely to be required.</p>
2.	<p>A desktop assessment and likelihood of occurrence assessment is required for the area proposed to be cleared.</p>	<p>The desktop assessment will not require submission to IBSA if it does not accompany survey reports, however, along with the assessment report, shapefiles of the identified habitats will be required to assist with the assessment of the application.</p>	<p>Based on the agreed approach, Vocus Fibre Pty Ltd will provide a desktop assessment to determine the likelihood of occurrence for the following species:</p> <ul style="list-style-type: none"> • Flora <ul style="list-style-type: none"> ○ <i>Swainsona katjarra</i> (Priority 1) ○ <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (Priority 3) ○ <i>Thysanotus</i> sp. Desert East of Newman (R.P. Hart 964) (Priority 2) • Fauna - <ul style="list-style-type: none"> ○ brush-tailed mulgara (<i>Dasyercus blythi</i>) (Priority 4) ○ crest-tailed mulgara (<i>Dasyercus cristicauda</i>) (Priority 4)

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Item	Information requirements	Specifications	Rationale
			<ul style="list-style-type: none"> o greater bilby (<i>Macrotis lagotis</i>) (Vulnerable) o western pebble-mound mouse (<i>Pseudomys chapmani</i>) (Priority 4) <p>If the assessment identifies that any of the species listed above has a moderate or higher likelihood of occurring within the proposed clearing area and a decision is made to grant the permit, further surveys will be required prior to commencing clearing to determine their presence within the mapped habitat.</p>

Appendix F: DBCA Advice- Burrow Identification (from email to D. Wall dated 19 March 2024)

Outline below of burrows etc.:

Bilby

- Burrows are usually at the base of trees, logs, and sand mounds. I've even seen them going into termite mounds!
- Burrows are in many soil types from sand, clay, and stony ground.
- The burrow often has a curved top with a flatter bottom.
- Usually, it is just one entrance to a burrow and this is more often the case in sandy ground. Harder ground can sometimes have more than one entrance if it is a well-used burrow.
- Scats are quite sandy with insects/ants and are similar to echidnas but have segmentation and rounded ends.
- Footprints are somewhat distinct. The back feet are longer than the front and if the sand is soft the claws sometimes drag in the sand. From memory the back feet tracks are 30-55mm in length. The front feet have long toes and imprint often as 3 parallel lines.
- Diggings may be nearby or in the area. These are round openings, about 10-50cm in depth. The opening usually has lots of tracks where they use their front feet to drag out the dirt and sometimes they come at it from multiple directions.

Things that are confused with Bilbies:

- The pesky rabbit. Their burrows can be confused with Bilby but are slightly smaller and may have more entrances, so it's important to look for scats. They have a similar gait and often the same sized feet. Their tracks are less distinct though because they are fluffy so you won't get the outline of pads in the way a Bilby has on their back feet. It will also be more oval-shaped in a rabbit.
- Goanna diggings are similar but the bottom of theirs is not as rounded like a bilby.

Mulgara

- Cannot really tell between the species sorry! If you ever find a way to then definitely let me know. Brush-tailed are usually in spinifex while crested are those cane grass sandy dunes.
- The burrows are often at the base of spinifex or the cane grass. It will be a similar height to width (60-80mm) and the top is like an arch with the bottom being rounded. Reptiles have that flat-base instead which helps distinguish the 2.
- Burrows can have a few entrances and sometimes little popholes. I have a cute video of a curious mulgara – if I ever find it then I will send it to you!

- Scats vary a lot. Definitely elongated but can be curved or straight and depending on what they eat then the size varies. They will have insects, lizards and fur in their scats.
- Tracks are pretty easy to identify because the back feet are a bit square/rectangular with often visible toe imprints if it is sandy. When moving, the back feet are placed in front of the front feet. So you get back feet that are aligned in the imprint and then the front feet are sometimes a bit uneven with each other.

Things that are confused with Mulgara:

Dunnart tracks - they have rounder back feet and are usually smaller depending on species.