

ARC Pipeline EPBC Act MNES Ecological Assessment Report

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ARC Pipeline Pty Ltd

Level 30, 180 Ann Street, Brisbane QLD 4000



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Definitions

Term	Definition
Broad Vegetation Group	A pragmatic, higher level grouping of regional ecosystems and vegetation communities that provide an overview of the vegetation across Queensland (Neldner et al., 2021). They describe major ecological patterns and relationships across Queensland, independent of bioregions and land zones, and facilitate comparisons with vegetation in other States and internationally.
Critical Habitat	As per 'Habitat critical to the survival of a species or ecological community'
Habitat critical to the survival of a species or ecological community 'Critical Habitat'	Habitat critical to the survival of a species or ecological community' refers to areas that are necessary: • for activities such as foraging, breeding, roosting, or dispersal • for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • to maintain genetic diversity and long term evolutionary development, or • for the reintroduction of populations or recovery of the species or ecological community. Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act
Habitat type	Broad, informal groupings of habitats having equivalent structure, function, and responses to disturbance.
Indicative Footprint	The 30 m wide Indicative Footprint associated with the construction of the pipeline, along with additional workspaces, laydown area, access tracks and cathodic protection beds.
Regional Ecosystem	A vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil. Regional Ecosystems are described in the Regional Ecosystem Description Database, produced by the Queensland Herbarium.
Regrowth	Is non-remnant vegetation that has a significant woody component but fails to meet the structural and/or floristic characteristics of remnant vegetation. Includes vegetation that has regrown after clearing or been heavily thinned or logged (Neldner et al., 2022).
Regulated vegetation	Vegetation that is mapped within the Regulated Vegetation Management Map produced by DNRME.

Term	Definition
Remnant vegetation	A regional ecosystem that has not undergone recent clearing. It is defined under the Queensland Vegetation Management Act 1999 as: (b) forming the predominant canopy of the vegetation— (i) covering more than 50% of the undisturbed predominant canopy; and (ii) averaging more than 70% of the vegetation's undisturbed height; and (iii) composed of species characteristic of the vegetation's undisturbed predominant canopy.
Right of Way	The Right of Way is a 30 m wide (15 m either side of the centre line) disturbance corridor which constitutes the Project's 'Indicative Footprint'.
Study Area	The 100 m wide survey corridor (50 m either side of the RoW centre line), as well as additional areas to allow for access tracks, the laydown area and siting the cathodic protection beds.
Suitable habitat	A species preferred environment required to sustain a viable population. Suitable habitat may include breeding, foraging and shelter resources for fauna or preferred environmental conditions of flora.
The Project	Atlas to Reedy Creek (ARC) high pressure gas pipeline
Threatened Ecological Community	Critically endangered, endangered and vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*
Threatened species	Extinct (EX), extinct in the wild (XW), critically endangered (CE), endangered (E), vulnerable (V) or conservation dependent (CD) under the Environment Protection and Biodiversity Conservation Act 1999 or Extinct (EX), Extinct in the wild (EW), Critically Endangered (CE), Endangered (EN), Vulnerable (VU) or Near Threatened (NT) under the Nature Conservation Act 1992.
Vegetation community	An area of vegetation which is relatively uniform with respect to structure and floristic composition.

Abbreviations

Abbreviation	Description
ARC	Atlas to Reedy Creek
AU	Assessment Unit
Biosecurity Act	*Biosecurity Act 2014 (Qld)*
DAWE	Department of Agriculture, Water and the Environment
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (formerly Department of Agriculture, Water and Environment (DAWE))
DAF	Queensland Department of Agriculture and Fisheries
DBH	Diameter at Breast Height
DES	Queensland Department of Environment and Science

Abbreviation	Description
DNRME	Former Queensland Department of Natural Resources, Mines and Energy (now Department of Resources)
DoR	Department of Resources
DotE	Department of the Environment
EA	Environmental Authority
EAR	Ecology Assessment Report
E2M	E2M Pty Ltd
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ESA	Environmentally Sensitive Area
GBO	General Biosecurity Obligation
GPS	Global Positioning System
HVR	High-value regrowth
HDD	Horizontal Directional Drilling
LIKT	Locally Important Koala Tree
MNES	Matters of National Environmental Significance
NC Act	*Nature Conservation Act 1992* (Qld)
NC Koala Plan	*Nature Conservation (Koala) Conservation Plan 2017* (Qld)
PL	Petroleum Lease
PMST	Protected Matters Search Tool
Ramsar	Wetlands of International Importance
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
RoW	Right of Way
Senex	Senex Energy Pty Ltd
SRI	Significant Residual Impact
TEC	Threatened Ecological Community
VM Act	*Vegetation Management Act 1999* (Qld)
WONS	Weed of National Significance

Executive Summary

Arc Pipeline Pty Ltd (a subsidiary of Senex Energy Pty Ltd) commissioned E2M Pty Ltd (E2M) to conduct a terrestrial ecological assessment for the proposed Atlas to Reedy Creek (ARC) pipeline (hereafter 'the Project') which will transport natural gas from the proposed gas processing facility located on PL 209 to the Reedy Creek to Wallumbilla Pipeline north of Yuleba.

Situated west of Wandoan in the Surat Basin, the Project consists of a 30 m wide, 57 km long Right of Way (RoW) and associated infrastructure, including workspace, laydown yards, access tracks and cathodic protection beds. Collectively, the RoW, associated infrastructure and work areas form an Indicative Footprint, measuring approximately 186.2 ha. With the addition of a 10 % buffer to account for final adjustments to the siting of the RoW and associated work areas/infrastructure, the maximum disturbance area for the Project is estimated at 206.9 ha.

The Study Area for the Project encompasses the Indicative Footprint with a ~35 m buffer applied (totalling 654.4 ha). The dominant land use within this area is cattle grazing. Numerous watercourses and smaller drainage lines intersect the Study Area and Indicative Footprint, including Woleebee Creek. Neighbouring infrastructure includes the Origin Energy Woleebee Lateral pipeline and the Jemena Atlas Gas Pipeline. The Project has been located adjacent to existing linear infrastructure, namely roads and existing pipeline easements.

The terrestrial ecological assessment conducted for the Project identified a number of Matters of National Environmental Significance (MNES) known or likely to occur within and/or adjacent the Indicative Footprint, including two Threatened Ecological Communities (TECs) and potential habitat for MNES species known or likely to occur within and/or adjacent the Indicative Footprint.

The Study Area comprises large tracts of pastureland used for cattle grazing. Fragmented tracts of remnant vegetation occur throughout the landscape, with up to 28.39 ha of remnant native woodland vegetation requiring clearing within the Indicative Footprint (comprising approximately 15.4% of the total Indicative Footprint area). Areas of vegetation to be removed within the Indicative Footprint are generally less than 0.5 ha at each occurrence. Fauna habitat and vegetation types identified within and adjacent to the Indicative Footprint (hereafter 'the Study Area'), include:

- remnant and high value regrowth eucalypt woodland
- *Acacia shirleyi* woodland
- *Acacia harpophylla* woodland
- riparian woodland; and
- pastureland.

The current ecological assessment identified eight MNES known or likely to occur within and/or adjacent to the Indicative Footprint, comprising two Threatened Ecological Communities (TEC) and potential habitat for six threatened MNES fauna species, as summarised in the table below. No MNES threatened flora species are likely to occur within or adjacent to the Indicative Footprint and No World/National Heritage sites, Wetlands of International Importance, Great Barrier Reef Marine Parks or Commonwealth Marine Areas are located within proximity to (within 10 km of) the Indicative Footprint.

MNES	EPBC Act status	Maximum Impact Area within the indicative footprint (ha)*	Comment	Significant Impact Assessment
Known to occur				
Brigalow dominant and co-dominant TEC	Endangered	1.01 ha	Approximately 0.92 ha of Brigalow TEC was observed within the Indicative Footprint in association with four patches of RE 11.9.5 and 11.5.16. Other potential brigalow REs were observed within the Study Area but did not meet the condition criteria for the TEC.	**Significant Impact Unlikely**
Poplar Box Grassy Woodland on Alluvial Plains TEC	Endangered	0.088 ha	Approximately 0.08 ha of Poplar Box was observed within the Indicative Footprint in association with one patch of RE 11.3.2. Other potential Poplar Box TEC were observed within the Study Area but did not meet the condition criteria for the TEC.	**Significant Impact Unlikely**
Likely to occur				
Adclarkia dulacca **Dulacca woodland snail**	Endangered	4.80 ha Critical Habitat (across 28 patches)	Approximately 4.37 ha of suitable habitat was observed within the Indicative Footprint in association with remnant and regrowth 11.9.5, remnant 11.7.2 and 11.5.16. No individuals were recorded during field surveys.	**Significant Impact Unlikely**
Calyptorhynchus lathami lathami **glossy black-cockatoo**	Vulnerable	28.31 ha Critical Habitat (across 59 patches)	Approximately 25.74 ha of potential glossy black-cockatoo habitat is present within the Indicative Footprint. Seven REs were found to contain breeding and/or foraging habitat: RE 11.9.5, RE 11.3.2, RE 11.3.25, RE 11.3.19, RE 11.5.4, 11.5.16 and RE 11.9.1. No individuals were recorded during field surveys and no evidence (such as feeding orts) were recorded.	**Significant Impact Unlikely**
Geophaps scripta scripta **Squatter Pigeon (southern)**	Vulnerable	11.18 ha of Critical Habitat 20.76 ha of General Habitat (across 73 patches)	Approximately 29.04 ha of potential squatter pigeon habitat is present within the Indicative Footprint across a range of RE's. No individuals were recorded during field surveys.	**Significant Impact Unlikely**

MNES	EPBC Act status	Maximum Impact Area within the indicative footprint (ha)*	Comment	Significant Impact Assessment
Hirundapus caudacutus **white-throated needletail**	Vulnerable	206.9 ha General Habitat (aerial species)	Suitable roosting and foraging habitat for the species occur within and adjacent the Indicative Footprint.	**Significant Impact Unlikely**
Phascolarctos cinereus **koala**	Endangered	35.08 ha of Critical Habitat (across 64 patches)	Koala habitat occurs across 64 discrete patches of vegetation within the Indicative Footprint. Most of the koala habitat within the Study Area is eucalypt-dominated woodland containing LIKTs, while the remaining habitat supports ancillary trees, such as brigalow (*A. harpophylla*) and other acacias that facilitate shelter and dispersal between adjacent areas of suitable foraging habitat containing LIKTs. Scratches attributable to koala were recorded at one location within the Study Area during surveys.	**Significant Impact Unlikely**
Petauroides volans **Greater glider (southern and central)**	Endangered	29.84 ha of Critical habitat (across 47 patches)	The Indicative Footprint contains 27.13 ha of potential foraging, denning and associated dispersal habitat comprising remnant woodland and open forest with feed and den trees (including REs 11.3.4, 11.3.18, 11.3.19 and 11.3.25, and 11.5.1). Scratches potentially attributable to greater glider were observed within the Study Area.	**Significant Impact Unlikely**

*An additional 10% buffer has been applied to areas of mapped habitat within the Indicative Footprint (ha) to account for final adjustments to the RoW and siting of associated infrastructure.

Construction and operation of the ARC pipeline has the potential to both directly and indirectly impact the aforementioned MNES. A suite of planning and management actions will be implemented to avoid, minimise and mitigate potential Project impacts on these matters, including (but not limited to):

- limiting clearing to the minimum extent required to facilitate safe construction
- refinement and realignment of the Project to avoid and minimise clearing/disturbance of remnant vegetation
- using horizontal directional drilling to minimise disturbance to major riparian corridors (i.e., Woleebee and Yuleba Creeks)
- pre-clearing surveys to locate and remove fauna from areas subject to disturbance
- monitoring and control measures to avoid, minimise and mitigate indirect impacts on flora and fauna adjacent the Indicative Footprint, including (but not limited to):

    - dust and noise suppression
    - monitoring and control of weed species, and
    - erosion monitoring and control
- development and implementation of Species Management Programs to avoid impacts on animal breeding places
- narrowing of the RoW to allow selective retention of habitat tress for koala, greater glider (southern) and glossy black-cockatoo (including nest/den trees and launch trees facilitating dispersal/movement of greater gliders)
- installation of glide poles to facilitate movement/dispersal of greater gliders where the RoW intersects potential movement corridors (e.g., vegetated riparian corridors)
- installation of salvaged hollows and/or nest boxes to replace actively utilised tree hollows for greater glider and glossy black-cockatoo
- relocation of fallen woody debris/timber cleared during construction to provide cover for Dulacca woodland snails where the RoW intersects areas of known (occupied) habitat for the species, and
- Rehabilitation of work areas following construction using native ground cover species where other 'fire promoting' (e.g., buffel grass) do not already occur.

Assessment against the *MNES Significant Impact Guidelines 1.1* (the Guidelines) was conducted to determine if the Project is likely to result in a significant impact to the aforementioned MNES, taking into account the aforementioned impact avoidance and mitigation measures. Based on this assessment, the Project is unlikely to result in a significant residual impacts on MNES when considering the context, scale and intensity of Project impacts on terrestrial flora and fauna.

A separate assessment of cumulative impacts for the ARC pipeline and associated Atlas Stage 3 Gas Project (the subject of a separate referral under the EPBC Act) determined that these projects would not result in a significant cumulative impact on the aforementioned MNES.

1 Introduction

This report details the MNES ecological values verified for the Atlas to Reedy Creek (ARC) pipeline, the proposed mitigation strategies to minimise direct and indirect impacts on these values during construction, operation and decommissioning of the Project and a significant impact assessment for MNES known or likely to occur.

1.1 Project background and setting

Arc Pipeline Pty Ltd propose to construct the Atlas to Reedy Creek (ARC) pipeline ('the Project') to transport natural gas from the proposed gas processing facility located on PL 209, to the Reedy Creek-to-Wallumbilla Pipeline north of Yuleba. The ARC pipeline will be utilised to transport gas extracted from Senex's gas tenements near Wandoan including the Atlas Stage 3 Gas Project (the subject of a separate referral to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)).

The ARC pipeline project consists of a 30 m wide, 57 km long Right of Way (RoW), and associated infrastructure, including workspace, laydown yards, access tracks and cathodic protection beds. Collectively, the RoW and associated infrastructure form an Indicative Footprint, measuring approximately 186.2 ha. With the addition of a 10 % buffer to account for final adjustments to siting of the RoW and associated work areas/infrastructure, the maximum disturbance area for the Project is estimated at 206.9 ha

The ecological assessment undertaken for the Project by E2M Pty Ltd focuses on a 100 m wide corridor, encompassing the indicative 30 m RoW, additional workspace and laydown areas, and cathodic protection bed locations, which together make up the 654.4 ha assessment area (herein referred to as the Study Area) (see Figure 1).

The Project and Study Area are located in the Surat Basin near Wandoan, Queensland, where the dominant land use is cattle grazing (Image 1). Numerous watercourses and smaller drainage lines intersect the Study Area, including Woleebee Creek. Neighbouring infrastructure includes the Origin Energy Woleebee Lateral Pipeline and the Jemena Atlas Gas Pipeline. As shown in Image 2, these pipelines are located within a 40 metre-wide cleared corridor adjacent the proposed ARC pipeline alignment.

The majority of native vegetation within the Study Area and surrounds has been previously cleared for grazing and, for this reason, the remaining woody vegetation cover is highly fragmented (see Figure 1). Areas of more contiguous native vegetation cover adjacent the Study Area, including Combabula State Forest, have also been subject to significant disturbance as a result of third party gas extraction operations (including clearing of access tracks and gas well pads for the Combabula North gas field operated by APLNG Pty Ltd).



Image 1. Typical topography and vegetation along the proposed ARC pipeline



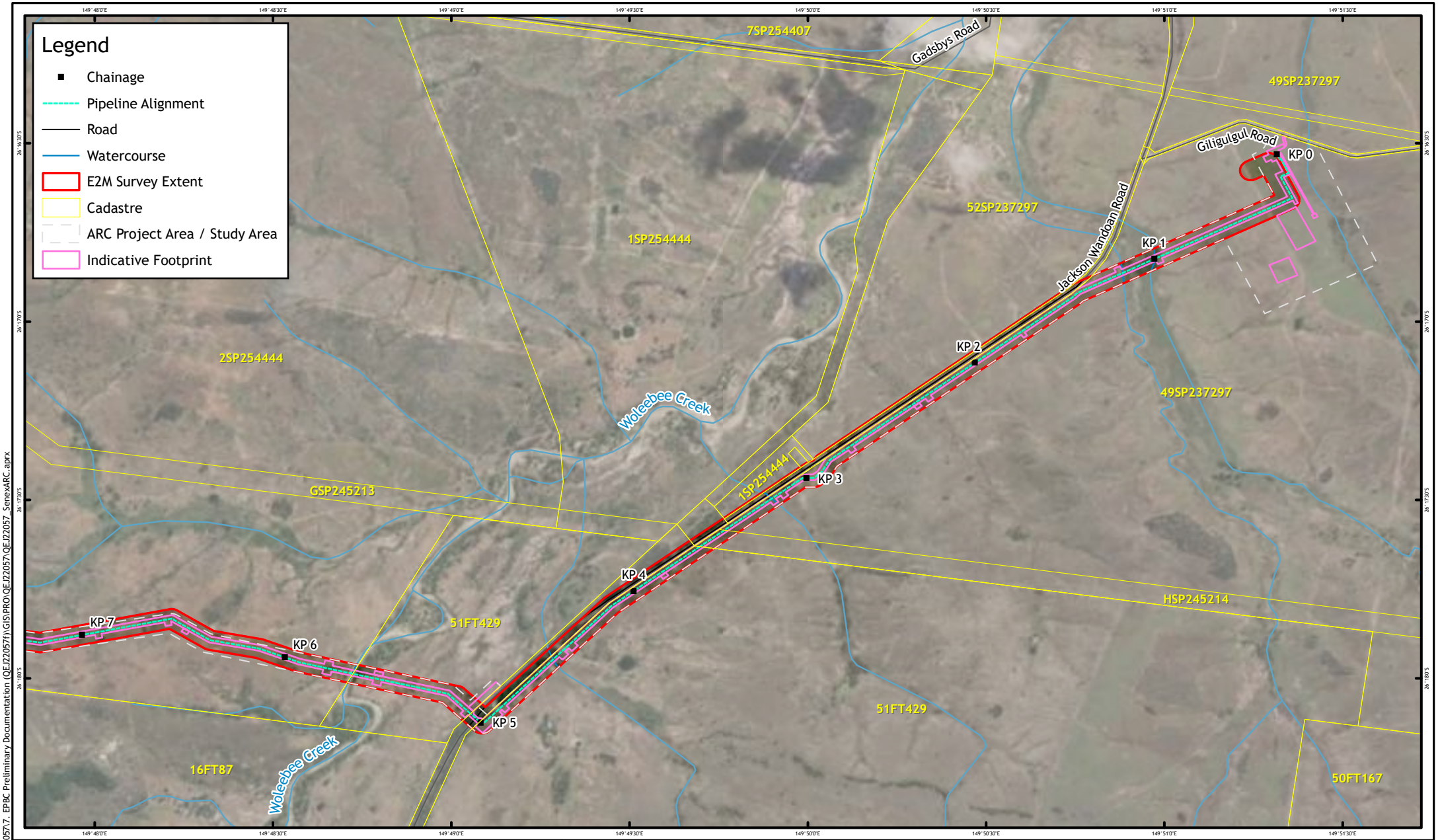
Image 2: Existing pipeline corridor adjacent the Indicative Footprint (APLNG Woleebee Lateral - PPL163)

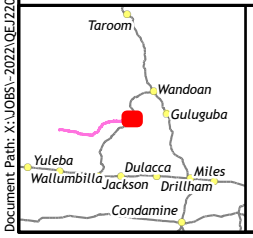
1.2 Scope and objectives

The objective of this assessment is to identify and evaluate the MNES terrestrial ecological values within the Study Area, and identify unavoidable impacts that may result from the Project and mitigation measures to minimise these impacts. The scope of the assessment includes:

- a comprehensive desktop review of available vegetation mapping, environmental database records and published reports
- flora and fauna surveys and habitat assessments with a focus on threatened/protected wildlife and wildlife habitat (including migratory species)
- ground truthing the occurrence, extent and condition of regulated vegetation including Threatened Ecological Communities (TECs) and Regional Ecosystems (REs)
- recording any other Matters of National Environmental Significance (MNES)
- identification of watercourses traversing the Study Area under the *Water Act 2000* (Qld)/*Environmental Protection Act 1994* (Qld)
- recording biosecurity matters observed within the Study Area (e.g., Weeds of National Significance (WONS) and *Biosecurity Act 2014* (Qld) restricted matters)
- assessing the ecological processes essential to the maintenance of local ecosystem function (e.g., habitat connectivity, ecologically threatening processes)
- identifying impacts that may result from the Project and suitable mitigation measures to minimise these impacts, and
- determining the significance of residual project impacts on MNES known and likely-to-occur within and/or adjacent the Indicative Footprint.

While the current assessment focuses on Project-specific impacts to MNES, consideration has also been given to cumulative impacts of the ARC pipeline and associated Atlas Stage 3 Gas Project (the subject of a sperate referral under the EPBC Act).





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FIGURE 1: STUDY AREA OVERVIEW

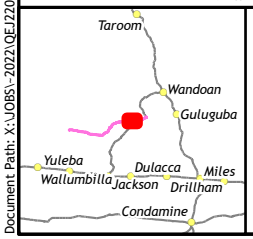
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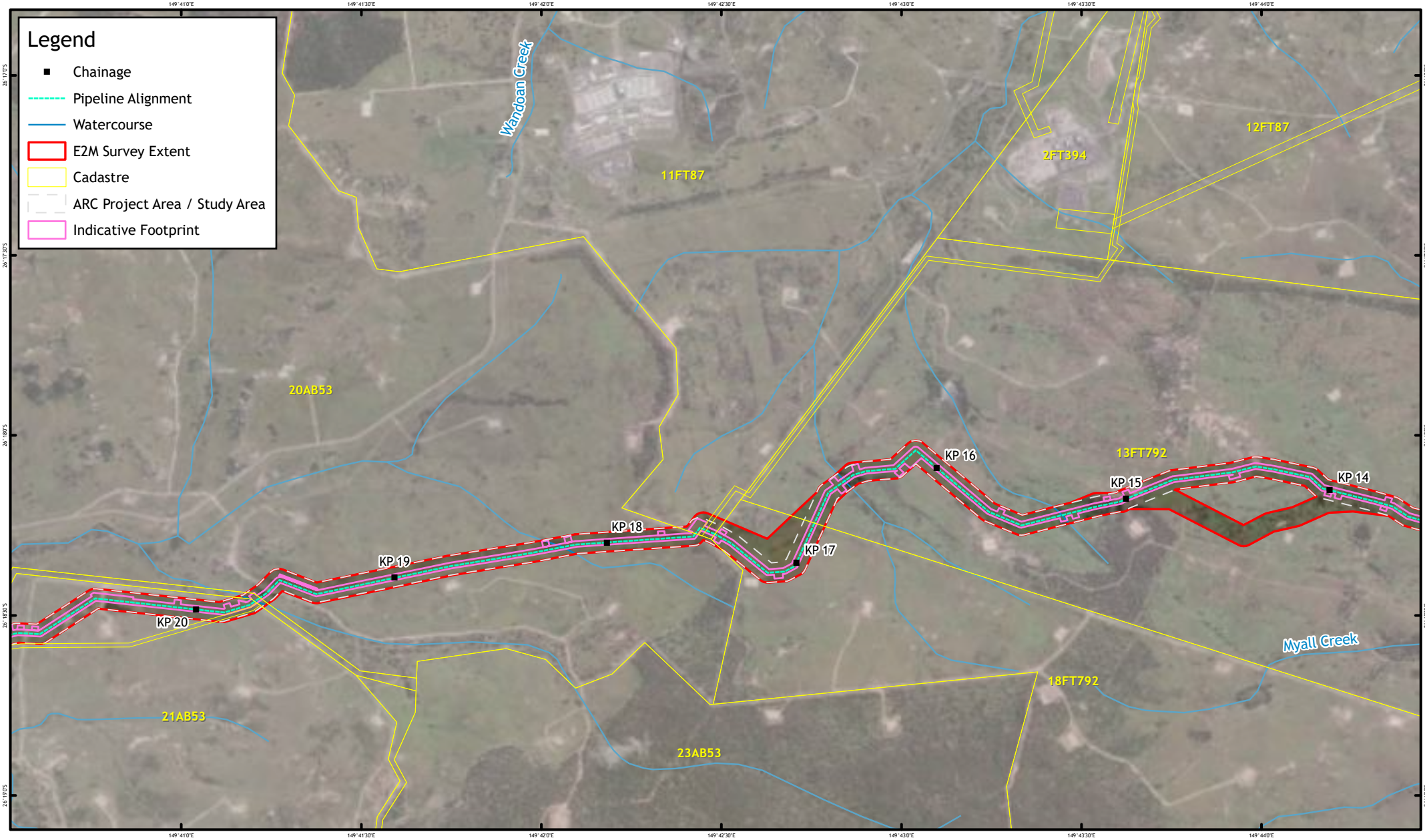
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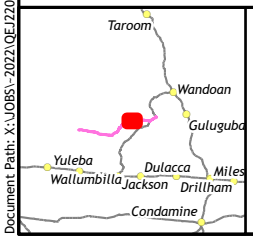
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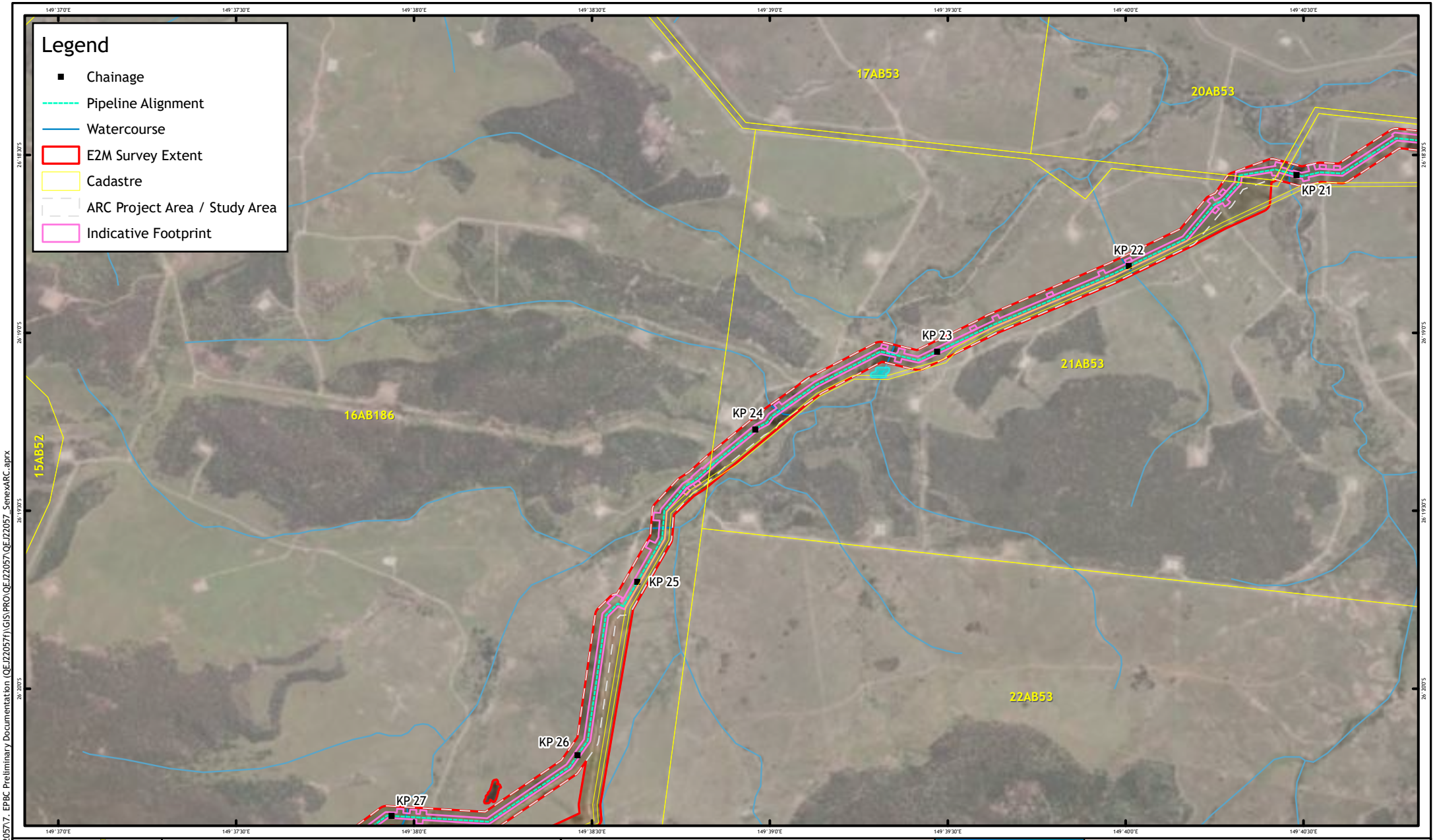
FIGURE 1: STUDY AREA OVERVIEW

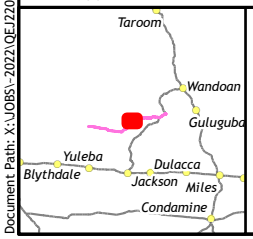
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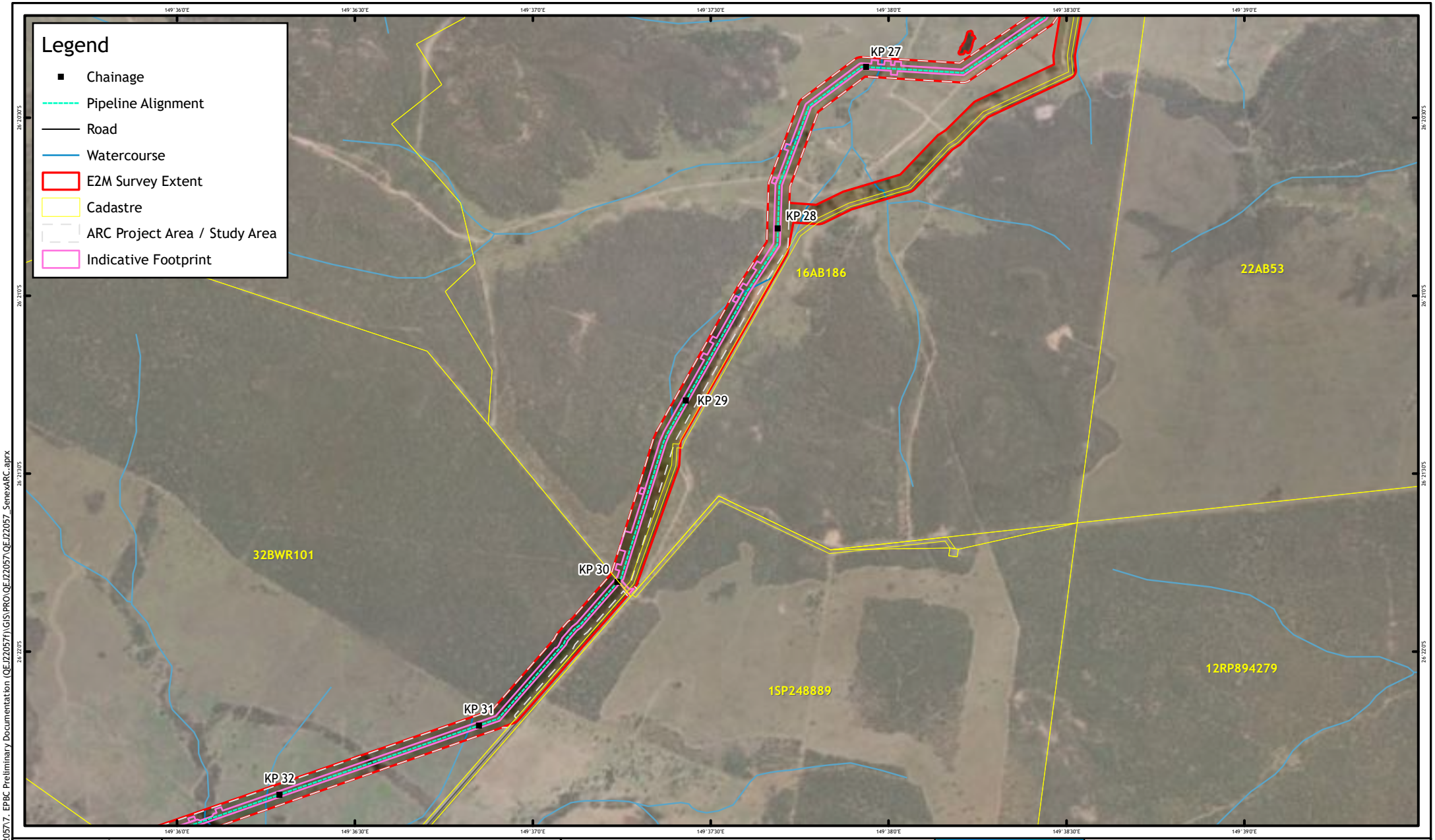
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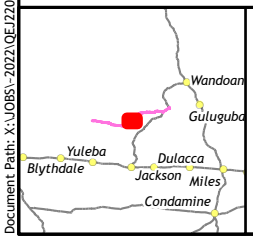
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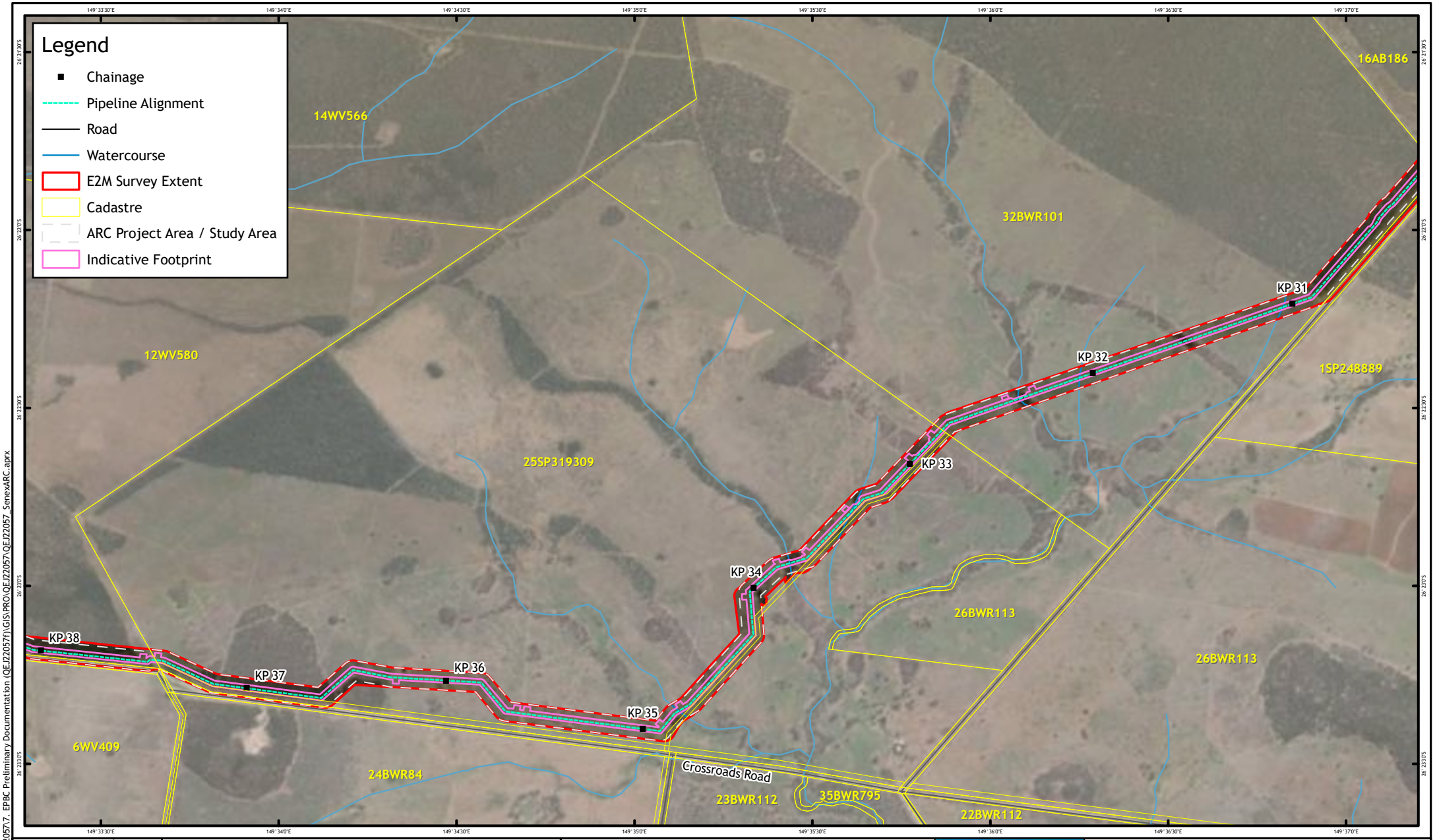
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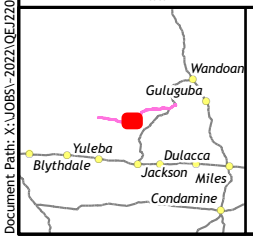
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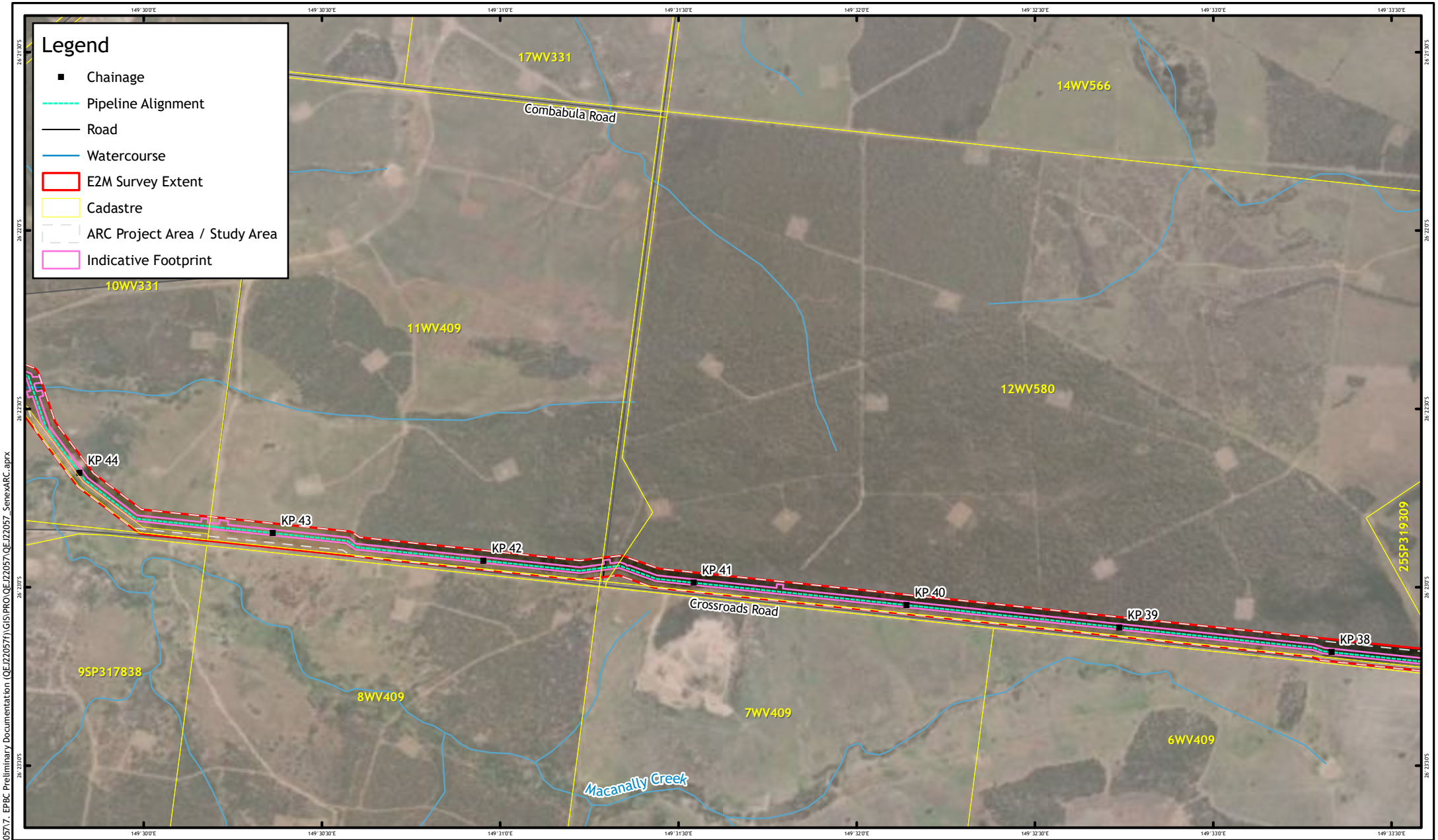
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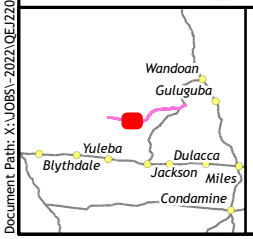
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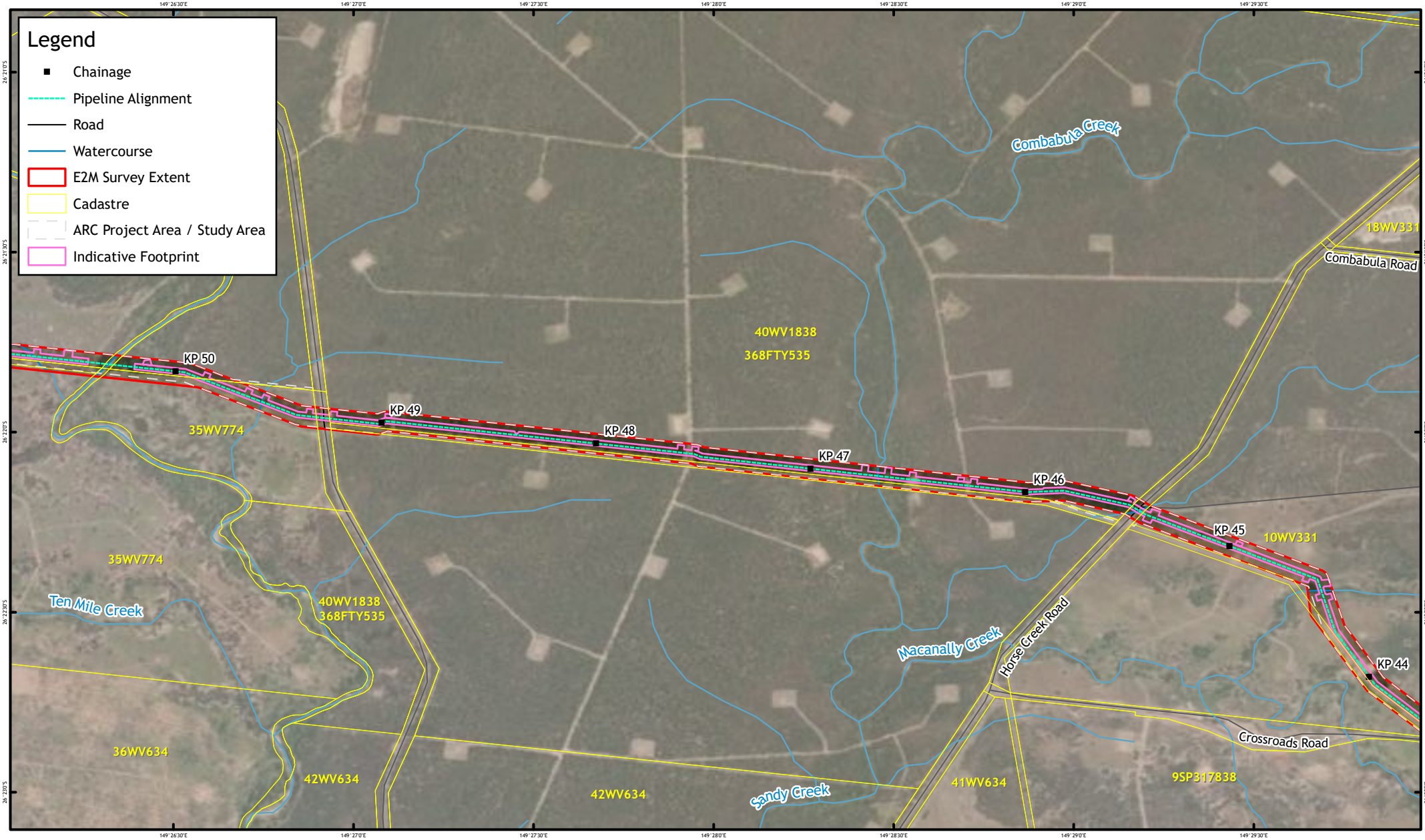
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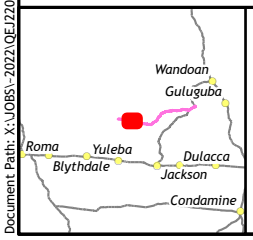
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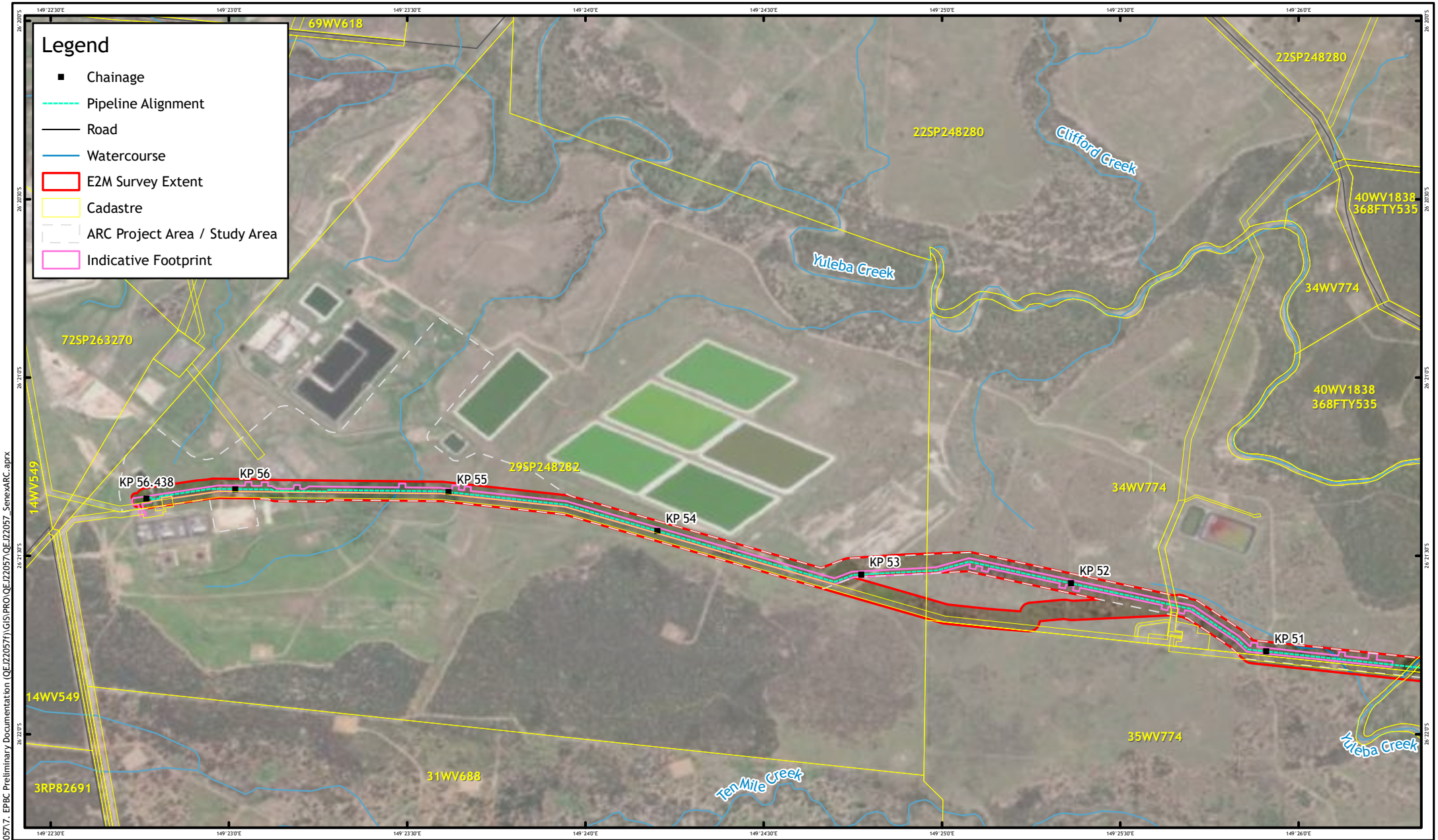
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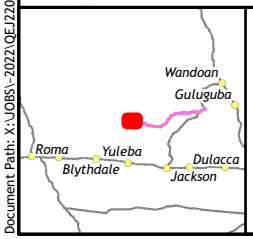
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2 Method

The terrestrial ecological values of the Study Area were evaluated through a comprehensive desktop assessment and field surveys. The following sections detail the methods employed to conduct both the desktop and field assessments.

2.1 Study Area and Indicative Footprint

This report focuses on the ARCP alignment as depicted in Figure 1. The assessment has been limited to the Study Area, namely a 100 m wide corridor, encompassing the Indicative Footprint and additional workspaces, as well as additional areas where necessary to allow for the laydown area, access tracks and siting of the cathodic protection beds. In some instances, where the Study Area is adjacent to road infrastructure or parallel right of ways, the bounds of the Study Area were reduced to the boundary of the adjacent Indicative Footprint. Flora and fauna surveys were conducted both within the Indicative Footprint (within the project area) and the wider Study Area (areas adjacent to the project area).

Maximum impact areas for each MNES have been calculated based on the Indicative Footprint plus 10% to allow for potentially required final refinements (e.g. to accommodate cultural heritage finds, landholder negotiations and construction contractor requirements). The impact assessment has assumed that the cathodic protection beds and any additional workspaces not already included in the Indicative Footprint will be located outside any areas of remnant vegetation, high value regrowth or threatened species habitat.

It is noted that the actual 30 m RoW and workspace Indicative Footprints may in some cases vary from the Indicative Footprint as an outcome of further consultation with landholders or the discovery of cultural heritage items or other localised constraints identified during construction or preclearing surveys. To account for this uncertainty, a 10% buffer has been applied to area calculations used to assess/quantify Project impacts on MNES known or likely to occur within the Indicative Footprint.

Any additional workspaces, if required, will be located within the Study Area and will be located to avoid impacts to terrestrial ecological values that are additional to the maximum disturbance limits specified.

2.2 Desktop assessment methods

A desktop review was undertaken of relevant databases, mapping, imagery and published literature to identify potential ecological values within the Study Area, including:

- Protected Matters Search Tool (PMST) Report as issued by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), using a search buffer of 10 km from the ARCP alignment
- Regulated Vegetation Management Mapping issued by the Department of Resources (DoR)
- Vegetation Management Supporting Map (DoR)
- Wildlife Online Extract issued by the Department of Environment and Science (DES), for conservation significant species recorded within 10 km and 50 km of the Study Area
- Protected Plants Flora Survey Trigger Map issued by DES
- Nature Conservation (Koala) Conservation Plan 2017 (NC Koala Plan) – Koala Habitat Region Map
- Map of Queensland Wetland Environmental Values (Department of Environment and Science (DES, 2020))

- Atlas of Living Australia species search results (including records within 10 km and 50 km of the Study Area)
- GeoScience Australia 1:100,000 drainage network of Queensland, and
- Previous ecological assessments commissioned by ARC Pipeline Pty Ltd / Senex.

2.3 Likelihood of occurrence assessment methods

Information from the desktop review was used to assess the likelihood of MNES occurring within the Study Area prior to undertaking field surveys. For this initial assessment, MNES species were assessed as 'likely to occur', 'possibly occurring' or 'unlikely to occur' based on findings from the desktop review. The likelihood of MNES occurring within the Study Area was re-assessed following the completion of field surveys, taking into account the results of both desktop and field investigations (including flora and fauna habitat assessments and surveys)

For the updated likelihood of occurrence assessment, the likelihood of MNES species occurring within or immediately adjacent to the Indicative Footprint was assessed as 'known', 'likely', or 'unlikely' based on the criteria outlined below.

- **Known to occur**: the species was detected within the Indicative Footprint and/or Study Area during surveys.
- **Likely to occur**: sufficient suitable habitat to support the species is present within and/or adjacent the Indicative Footprint and/or the Study Area, and
  - the species has previously been recorded within the desktop search extent (i.e., within 10 km of the Indicative Footprint), and
  - though not detected during surveys the species is still considered likely to occur within or adjacent the Disturbance Footprint, given:
    - survey limitations (as detailed in section 2.9), and/or
    - the potential for seasonal/intermittent usage of habitat by fauna species within the Study Area.
- **Unlikely to occur**: there are no records of the species within the desktop search extent and the species was not detected during surveys, and/or
  - the Study Area lies outside the species' current known distribution, and/or
  - the Study Area does not contain suitable habitat for the species, and/or
  - suitable habitat within the Study Area and immediate surrounds has been isolated/fragmented or reduced to such an extent that the species is unlikely to occur (considering the species' mobility, connectivity with and proximity of the Study Area to areas of known habitat within the broader landscape, and area of suitable habitat required to support the species).

2.4 Field assessment methods

Field surveys were conducted to identify and document the presence, extent and condition of terrestrial ecological values within the Study Area, with a particular focus on MNES considered likely to occur in the initial desktop likelihood of occurrence assessment.

2.4.1 Survey timing and weather conditions

Surveys to assess vegetation cover, habitat suitability for MNES and the presence/absence of MNES flora were conducted by four E2M ecologists (two teams each consisting of two ecologists) between 3 to 14 October 2022. Conditions during these initial surveys were fine and warm with relatively low cloud cover and daily maximum temperatures ranging from 21°C to 31°C. No rain was recorded during the survey window however the region received above average winter rainfall during the three months (July to September) preceding the first survey[1]. Almost 30 mm of rain was recorded in the two weeks preceding this survey and most water points, including creek lines, contained standing water.

Targeted fauna surveys were completed between 11 to 20 April 2023 by two E2M ecologists. Conditions during these surveys were fine and warm with relatively low cloud cover and daily maximum temperatures ranging from 25°C to 29°C. No rain was recorded during the survey window; however, approximately 155 mm of rain was recorded in the month preceding the survey, with almost 29 mm of rain recorded in the two weeks prior to the survey. Most water points, including creek lines, contained standing water.

The habitat quality assessment survey was completed between 31 July to 5 August 2023 by two ecologists. Conditions during surveys were fine and warm with relatively low cloud cover and daily maximum temperatures ranging from 23°C to 27°C. No rain was recorded during the survey window, the region received slightly below average rainfall during the three months (May to July) preceding the field assessment[1]. Approximately 21.4 mm of rain was recorded in the month preceding the survey, with 4.4 mm of rain recorded in the two weeks before the survey. No creek lines contained standing water.

2.4.2 Flora Survey

2.4.2.1 Regional Ecosystems

Ground-truthing and validation of vegetation community mapping within the Study Area was conducted in accordance with the *Methodology for Surveying and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner et al., 2022). Using this methodology, Quaternary vegetation surveys were undertaken within the Study Area. Quaternary surveys are a rapid assessment tool used to verify RE (i.e., ecologically dominant layer) and designate structure and condition status.

A total of 282 Quaternary type assessments were undertaken throughout the Study Area. The location of survey sites is depicted in Appendix A.

Vegetation was characterised as:

- **Remnant vegetation** - communities that conform with the definition of 'remnant vegetation' under the Queensland *Vegetation Management Act 1999* (VM Act) and referenced by Neldner et al. (2022). Specifically, this comprises 'vegetation, part of which forms the predominant canopy of the vegetation:
  - Covering more than 50% of the undisturbed predominant canopy
  - Averaging more than 70% of the vegetation's undisturbed height; and
  - Composed of species characteristic of the vegetation's undisturbed predominant canopy.'
- **High-value regrowth (HVR)** – vegetation communities that conform with the definition under the VM Act and referenced by Neldner et al. (2022). Specifically, this comprises native vegetation regrowth

[1]Rainfall data recorded at Miles Constance Street (weather station 042112), approximately 50 km southeast of the Study Area (Bureau of Meteorology, 2021)

that is greater than 15 years old and meets the minimum cover requirements specified by Neldner et al. (2022).

- **Non-remnant** – all areas that are not mapped as remnant vegetation or HVR. This includes vegetation communities that have been historically cleared/disturbed or heavily modified.

Information provided in the RE Technical Descriptions for the Brigalow Belt (DES, 2018) and structural formations of vegetation as defined by Specht (1970) served as a baseline for the undisturbed canopy, height and species with which to compare the field data and ascertain vegetation class.

2.4.2.2 Threatened Ecological Communities

In conjunction with Quaternary assessments, Threatened Ecological Communities (TEC) assessments were undertaken in the field within relevant vegetation communities to verify if key diagnostic characteristics and condition thresholds for EPBC Act listed TECs were met. Specific condition criteria and characteristics used for the assessment are based on information provided within approved listing advice published for each TEC identified within the desktop assessment. The location of each survey assessment site is documented in Appendix A.

2.4.2.2.1 Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC

To determine whether patches of vegetation containing Brigalow (*Acacia harpophylla*) meet the condition requirements of a Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (hereafter Brigalow TEC) (Department of the Environment (DotE), 2013a), areas of brigalow were assessed against the following criteria:

- presence of *A. harpophylla* as dominant or co-dominant species within the tree layer
- patch size ≥0.5 ha, and
- exotic perennial plants cover <50% of the patch (with weed cover assessed within a minimum area of 0.5 ha (i.e., 100 m by 50 m)).

Brigalow patches failing to meet these criteria do not meet the condition requirements for the Brigalow TEC.

Assessment against the Brigalow TEC criteria (Department of the Environment, 2013) were conducted at 12 sites (Appendix A).

2.4.2.2.2 Poplar Box Grassy Woodlands on Alluvial Plains TEC

Within the Brigalow Belt bioregion, the Poplar Box grassy woodland on Alluvial Plains TEC (Poplar Box TEC) typically comprises REs dominated by *Eucalyptus populnea* on land Zones 3 and 4. *E. populnea* woodland communities on these land zones were assessed against the following criteria to determine their TEC status in accordance with the conservation advice notice for the Poplar Box TEC (Department of the Environment and Energy (DEE), 2019):

- a tree canopy crown cover >10% at patch scales
- a tree canopy that shows the following characteristics:
  - canopy trees can reach potential height of at least 10 m or more
  - a dominance of poplar box (*Eucalyptus populnea*) and/or hybrids of poplar box with other *Eucalyptus* spp. within the canopy layer
  - a crown cover of shrubs to small trees (1-10 m height) less than 30%; and
- a ground cover dominated by perennial native grasses, other native herbs and sometimes chenopods.

Areas of *E. populnea* woodland failing to meet these criteria do not meet the condition requirements for the Poplar Box TEC.

2.4.2.3 Threatened flora

The random meander technique (Cropper 1993) was used to survey for potential threatened flora throughout the study area. This method is particularly suitable for locating species that typically occur at low densities or that may be distributed in isolated clumps.

2.4.2.4 Opportunistic observations

Flora species not detected via other survey methods, including pest species, were recorded opportunistically. Where observed, restricted biosecurity species identified under the Queensland *Biosecurity Act 2014* (Biosecurity Act) and Weeds of National Significance (WoNS) were recorded. Estimated weed densities were categorised as follows:

- Scattered - 1-2 individuals/10m^2
- Low - 3-4 individuals/10m^2
- Moderate - 5-6 individuals/10m^2; and
- High - >7 individuals/10m^2.

2.5 Fauna survey methods

Fauna assessment methods included habitat assessments and targeted surveys for likely-to-occur MNES species.

2.5.1 Fauna habitat assessments

Fauna habitat values were assessed throughout the Study Area in order to characterise broad fauna habitat types present and to determine the presence/extent of suitable habitat for target MNES species, based on:

- dominant flora species present
- presence and nature of water sources
- soil type
- abundance of non-juvenile koala habitat trees
- abundance of glossy black-cockatoo feed trees
- koala habitat tree species
- abundance of large hollow bearing trees
- abundance of hollow bearing logs
- presence/abundance of coarse woody debris and loose rock
- gilgai abundance and depth
- soil crack abundance and depth
- leaf litter abundance and depth
- ground cover composition and density

- presence/absence of rock piles/caves and/or disused mine shafts
- abundance of decorticating bark
- abundance of stag trees
- abundance of mistletoe
- foraging resources
- breeding habitat features; and
- presence and severity/scope of threats.

The suitability of habitat for MNES species was assessed according to known habitat associations and the specific habitat requirements of each species as documented in DCCEEW's SPRAT database, conservation advice notices, recovery plans and other relevant published literature (see Section 4 and 8 for further details).

The location of fauna habitat assessment sites is depicted in Appendix A.

2.5.2 Target MNES fauna survey

Fauna surveys undertaken by E2M ecologists targeted MNES species identified as likely to occur during the initial (desktop-based) likelihood of occurrence assessment. Survey methods employed during surveys were based on survey guidelines for threatened species published by the Commonwealth and Queensland Governments, including:

- *A review of koala habitat assessment criteria and methods* (Youngentob et al., 2021)
- *Draft referral guidelines for the nationally listed Brigalow Belt reptiles* (DSEWPC, 2011a)
- *Survey guidelines for Australia's threatened birds* (DEWHA, 2010)
- *Survey guidelines for Australia's threatened mammals (*DSEWPC, 2011b)
- *Survey guidelines for Australia's threatened reptiles* (DSEWPC, 2011c);and
- *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland V.4* (Eyre et al., 2022).

The survey methods and survey effort applied by E2M ecologists during field surveys targeting MNES fauna species are outlined in Tables 1 and 2.

Table 1: MNES fauna survey methods

MNES	Survey methods
Dulacca woodland snail *(Adclarkia dulacca)*	Diurnal active searches targeting Dulacca woodland snail were undertaken in areas of preferred habitat within the Study Area (i.e., brigalow woodland). Searches focused on microhabitat features providing shelter for the species (i.e., logs, coarse woody debris and rocks). Nocturnal surveys targeting surface-active animals were not undertaken due to the dry conditions during survey. The survey was undertaken by a suitably qualified ecologist with training from a leading expert in woodland snails and previous experience surveying for threatened woodland snails.

MNES	Survey methods
glossy black-cockatoo *(Calyptorhynchus lathami lathami)*	Surveys for glossy black-cockatoos were conducted whilst traversing the Study Area on foot, and focused on areas containing feed trees (i.e., *Allocasuarina*/*Casuarina* spp.) and/or potential nest trees (i.e., large hollow-bearing eucalypts). Surveys targeting this species included ort searches (i.e., searches for the chewed remains of *Allocasuarina*/*Casuarina* cones).
squatter pigeon (southern) **(***Geophaps scripta scripta)*	Diurnal surveys for squatter pigeon (southern) were conducted in areas of remnant and non-remnant vegetation while traversing the Study Area on foot and while driving to/from survey sites.
white-throated needletail *(Hirundapus caudacutus)*	Detection of the white-throated needletail within the Study Area was based on incidental/opportunistic observations made during diurnal surveys.
koala *(Phascolarctos cinereus)*	The following methods were employed in all patches of suitable Koala habitat within the Study Area: • diurnal and nocturnal (spotlighting) surveys targeting foraging/resting animals • koala scat surveys using the spot assessment technique (SAT) (targeting feed and shelter trees >10 cm diameter at breast height [DBH]) • inspection of smooth-barked eucalypts for scratch marks attributable to koala and searches for scat around scratch-marked trees; and • call playback surveys involving broadcasting of male koala bellowing was undertaken at night in areas of suitable koala habitat (i.e., watercourses).
greater glider (southern and central) *Petauroides volans*	The following survey methods were employed in all patches of greater glider habitat within the Study Area: • daytime searches for signs of the species' presence, such as potential scratches on tree trunks and scats beneath trees; and • spotlight surveys in suitable habitat.

2.6 Fauna survey effort

Diurnal and nocturnal fauna surveys were conducted within areas of suitable habitat for target MNES fauna species across the entirety of the Study Area (see Appendix A for site coverage and the location of survey sites). Surveys conducted within the Study Area aimed to meet prescribed survey effort guidelines for target MNES species as detailed in Table 2, below.

2.7 Field assessment of habitat quality

Field assessments of habitat quality for known and likely-to-occur MNES fauna were carried out in accordance with the Guide to Determining Terrestrial Habitat Quality Version 1.2 (Department of Environment and Heritage Protection [DEHP], 2017) (hereafter 'the Habitat Quality Guide'), unless otherwise indicated. Habitat quality assessments were undertaken by two E2M ecologists in late July/early August of 2023 and included the collection of:

- site-based attribute data, and
- species habitat attribute data in accordance with the Habitat Quality Guide (see below for details).

For the assessment of habitat quality, the Indicative Footprint was first delineated into Assessment Units (AUs). An AU refers to an area or a group of areas within the matter area (in this case, the Indicative Footprint) that is homogenous in vegetation community classification (i.e., RE) and broad condition state (i.e., remnant, high value regrowth, non-remnant). Each AU reflects a particular community with similar structure, function and quality of habitat. Sampling sites were then selected for each AU and site-based attribute data and species habitat attribute data was collected at each sampling site.

A total of 21 AUs were delineated within the Study Area with the majority of AUs comprising less than 1 ha. Habitat quality within these AUs was assessed across a total of 29 sites, with the number of assessment sites for AUs with a total area greater than 1 ha determined according to Table 1.2 in the Habitat Quality Guide. For AUs with a total area of less than 1 ha (the majority of AUs within the Study Area), a single assessment site was used to assess habitat quality.

2.7.1 Site-based attributes

Site-based attribute data were collected within 100 m x 50 m areas (including various sub-plots) for each Assessment Unit (AU), weighted in accordance with the Habitat Quality Guide and compared to BioCondition benchmark values for the relevant RE benchmark (Queensland Herbarium, 2023). A summary of the site-based attributes assessed is provided in Table 3.

Table 2: Summary of fauna survey effort undertaken within the Study Area

	Conservation status		Prescribed Commonwealth survey methods and effort	Prescribed Queensland survey methods and effort	Survey effort undertaken within the Study Area
	EPBC Act	NC Act			
Birds					

squatter pigeon (southern subspecies) (*Geophaps scripta scripta*)	Vulnerable	Vulnerable	• Diurnal bird surveys (area or transect) of 15 hrs over 3 days for areas less than 50 ha[2]	• No species-specific guideline is provided, however general diurnal bird survey methods and effort are[3]:
				  ◦ 6 x 5 – 10 min area searches within a 100 x 100 m survey site
				  ◦ Incidental detection of the species while conducting other surveys or moving across the overall survey site
					• 44 hrs of diurnal fauna surveys targeting bird, reptile and mammal species across the Study Area, over eight days and involving two suitably qualified ecologists (= 88 person hours total)
					• Incidental detection of the species while traversing the Study Area.

Southeastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	Vulnerable	Vulnerable	• NA	Recommended survey guidelines[4] include a combination of the following per 50 ha of project area:	• 7.5 hours undertaking feeding sign (ort) searches • 44 hrs of diurnal fauna surveys targeting bird, reptile and mammal species across the Study Area, over eight days and

[2] *Survey guidelines for Australia's threatened birds* (DEWHA, 2010)

[3] *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland V.4* (Eyre et al., 2022)

[4] Hourigan, C. 2012. Glossy black-cockatoo, *Calyptorhynchus lathami*. Targeted species survey guidelines. Queensland Herbarium, Department of Environment and Science, Brisbane.

	Conservation status		Prescribed Commonwealth survey methods and effort	Prescribed Queensland survey methods and effort	Survey effort undertaken within the Study Area
	EPBC Act	NC Act			
				• 5 hrs diurnal bird survey effort across a minimum of one day • 4 hours of searching for foraging and nesting signs for a minimum of four days	involving two suitably qualified ecologists (= 88 person hours total) • Incidental detection of the species while traversing the Study Area
White-throated needletail (*Hirundapus caudacutus*)	Vulnerable	Vulnerable, Migratory	• NA • Incidental sightings are most likely to occur between October and April in eastern Australia	• NA • Incidental sighting are most likely to occur between October and April in eastern Australia	• 44 hrs of diurnal fauna surveys targeting bird, reptile and mammal species across the Study Area, over eight days and involving two suitably qualified ecologists (= 88 person hours total) • Incidental detection of the species while traversing the Study Area
Mammals					
koala (*Phascolarctos cinereus*)	Vulnerable	Vulnerable	• Survey effort is not prescribed but several direct and indirect survey methods are prescribed including (DSEWPC, 2011): • Nocturnal spotlighting; and • SAT surveys.	• No species-specific guideline is provided, however general terrestrial mammal survey methods and effort are: • 2 x 30 min active nocturnal and/or spotlight searches within a 100 x 100 m survey site. • 2 sessions of call playback at midpoint of survey site.	• 36 hrs of spotlighting across eight nights involving two suitably qualified ecologist (= 72 person hours in total) • 44 hrs of diurnal fauna surveys targeting bird, reptile and mammal species across the Study Area, over eight days and involving two suitably qualified ecologists (= 88 person hours total) • Incidental detection of the species while traversing the Study Area

	Conservation status		Prescribed Commonwealth survey methods and effort	Prescribed Queensland survey methods and effort	Survey effort undertaken within the Study Area
	EPBC Act	NC Act			
				• Scat and sign search and incidental detection can coincide with the active searches.	• Eight call-playback sessions • 12 SAT surveys involving two suitably qualified ecologist
greater glider (*Petauroides volans*)	Vulnerable	Vulnerable	• There are no Commonwealth survey guidelines for this species.	• No species-specific guidelines are available, however general arboreal mammal survey methods and effort (detailed in Eyre et al., 2022) include[5]: • 2 x 30 min spotlight searches within a 100 x 100 m survey site. • Scat and sign search and incidental detection can coincide with the active searches.	• 36 hrs of spotlighting across eight nights involving two suitably qualified ecologist (= 72 person hours in total) • Incidental scat and scratch searches
Invertebrates					
Dulacca woodland snail (*Adclarkia dulacca*)	Endangered	Endangered	• Suggested survey methods and effort (detailed in TSSC, 2016[6]), include: • active searches involving raking accumulated leaf litter and	• NA	• A total of 3.5 hours of dedicated survey effort (i.e., active ground searches including timber flipping and log-rolling) was undertaken in areas of preferred habitat for the species.

[5] *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland V.4* (Eyre et al., 2022)
[6] Threatened Species Scientific Committee, 2016. Conservation advice for the Dulacca woodland snail *Adclarkia dulacca*.

	Conservation status		Prescribed Commonwealth survey methods and effort	Prescribed Queensland survey methods and effort	Survey effort undertaken within the Study Area
	EPBC Act	NC Act			
			turning logs searching for living adults or dead shells of juveniles and subadults • presence/absence should be determined using at least 2 person hours targeting areas of preferred snail microhabitat • ideal survey timing is October to March following heavy rainfall		• 36 hrs of spotlighting across eight nights involving two suitably qualified ecologist (= 72 person hours in total, including nocturnal surveys of suitable Dulacca woodland snail habitat.

Table 3: Summary of site-based attributes

Attribute	Description	Assessment plot
Large trees	Number of large trees per hectare, as determined by existing BioCondition benchmarks for the associated RE	100 m x 50 m
Tree canopy height	Median canopy height in metres of the ecologically dominant layer	100 m x 50 m
Recruitment (%)	The proportion of overstorey species present at a site that are regenerating (<5 cm diameter at breast height [DBH])	100 m x 50 m
Tree canopy cover (%)	Vertical projection of the tree canopy crown cover along a transect	100 m transect
Shrub layer cover (%)	Vertical projection of the shrub layer cover of native shrubs	100 m transect
Coarse woody debris	The length of fallen woody logs and other coarse woody debris (>10 cm diameter and >0.5 m in length) per hectare	50 m x 20 m
Native plant species richness	Native plant species richness, comprising all life forms (i.e., trees, shrubs, grasses and forbs/other)	100 m x 50 m (trees) 50 m x 10 m (shrubs, grasses, forbs/other)
Non-native plant cover (%)	Percentage cover of non-native/weed plant species	50 m x 10 m
Native perennial grass cover (%)	Average percentage cover of native perennial grass species	Five 1 m x 1 m
Organic litter cover	The average percentage cover of organic material such as fallen leaves, twigs, and branches <10 cm diameter	Five 1 m x 1 m

2.7.2 Species habitat attributes

In accordance with the Habitat Quality Guide (DEHP, 2017), the capacity of an AU to support a species (for all or part of its life cycle, whether permanently or from time to time) was assessed with reference to:

- Quality and availability of food and habitat required for foraging,
- Quality and availability of habitat required for shelter and breeding,
- Quality and availability of habitat required for mobility, and
- Absence of threats.

Indicators used to assess and score the above attributes in the field were developed with reference to published literature on the biology/ecology of each target species (including, but not limited to, conservation advice notices, SPRAT profiles, and recovery plans). Habitat indicators used to assess and score habitat attributes for target species are detailed in Appendix P.

The assessment of species habitat attributes (using the aforementioned indicators) was conducted at each assessment site and informed by field observations (and where necessary GIS assessment of vegetation mapping).

2.7.3 Threats scoring for TECs

The absence of threats to TECs within the Indicative Footprint was also assessed and scored at each assessment site, as detailed in Table 4.

Table 4: Threats to TECs

Threats	Assessment method
Clearing/thinning of vegetation	Field assessment of threat scope and severity (at patch level) in accordance with version 1.3 of the Habitat Quality Guide (DES, 2020).
Fragmentation	GIS assessment of patch connectedness [/5] and patch size [/10] scores (see section on Site Context scoring, below)
Grazing impacts	Field assessment of threat scope and severity (at patch level) in accordance with version 1.3 of the Habitat Quality Guide (DES, 2020).
Fire	Field assessment of threat scope and severity (at patch level) in accordance with version 1.3 of the Habitat Quality Guide (DES, 2020).
Weeds	Percentage non-native plant cover within 50 m x 10 m BioCondition assessment plot (see above).

2.7.4 Habitat quality scoring for MNES

Habitat Quality scoring for relevant MNES was undertaken in accordance with the EPBC Act Offsets Assessment Guide (hereafter 'the Offsets Guide') using the Modified Habitat Quality Assessment method (MHQA), as detailed in Appendix O and summarised below.

The MHQA uses habitat quality data collected in accordance with version 1.2 of the state (Queensland) *Guide to Determining Terrestrial Habitat Quality version 1.2* (DEHP, 2017) to derive separate scores for:

- Site Condition, accounting for 30% of the overall habitat quality score for MNES fauna species and 70% of the overall Habitat Quality score for TECs (as detailed in section 2.7.4.1),
- Site Context, accounting for 30% of the overall Habitat Quality score for MNES species and 30% of the overall Habitat Quality score for TECs (as detailed in section 2.7.4.2), and
- Species Stocking Rate, accounting for 40% of the overall Habitat Quality score for MNES species (as detailed in section 2.7.4.3).

Scores for each of these components were used to calculate an overall Habitat Quality score out of 10 in accordance with the Offsets Guide.

2.7.4.1 Site Condition scoring

Site Condition scores for MNES were derived using the scoring matrix shown in Table 5, below.

Table 5: Site Condition Scoring

Attribute	Score	0	3		5
Recruitment of woody perennial species in EDL	Score	0	3		5
	Benchmark	<20%	≥20-75%		≥75%
Native plant species richness for all life forms (i.e., trees, shrubs, grasses and forbs/other)	Score	0	2.5		5
	Benchmark	<25%	≥25-90%		≥90%
Tree canopy height	Score	0	3		5
	Benchmark	<25%	≥25-70%		≥70%
Tree canopy cover	Score	0	2	3	5
	Benchmark	<10%	≥10-<50%	>200%	≥50-≤200%
Shrub canopy cover	Score	0	3		5
	Benchmark	<10%	≥10-<50% or >200%		≥50-≤200%
Native perennial grass cover	Score	0	1	3	5
	Benchmark	<10%	≥10-50%	≥50-90%	≥90%
Organic leaf litter	Score	0	3		5
	Benchmark	<10%	≥10-<50% or >200%		≥50-≤200%
Large trees	Score	0	5	10	15
	Benchmark	0	0-50%	≥50-100%	≥100%
Coarse woody debris	Score	0	2		5
	Benchmark	<10%	≥10-<50% or >200%		≥50-≤200%
Non-native plant cover	Score	0	3	5	10
	% of non-native plants	>50%	≥20-50%	≥5-25%	<5%

For TECs, scores for each the attributes listed in Table 5 were combined to yield a Site Condition score out of 80. This number was then converted to a score out 7 which was used to calculate Habitat Quality.

For MNES fauna, additional attributes detailed in Table 6 (below) must also be considered, yielding a Site Condition score out of 100. This number was then converted to a score out 3 which was used to calculate Habitat Quality.

Table 6: Additional Site Condition attributes for MNES fauna

Attribute	Indicative score	1	5	10
Quality and availability of food and foraging habitat	**Indicative score***	**1**	**5**	**10**
	Description	Poor	Moderate	High
Quality and availability of shelter and breeding habitat	**Indicative Score***	**1**	**5**	**10**
	Description	Poor	Moderate	High

* Scores for quality and availability of foraging and shelter/breeding habitat are indicative only. Detailed criteria for scoring these attributes are provided in Appendix P.

2.7.4.2 Site Context scoring

Site Context was scored using the attributes listed in Table 7, below. For TECs, Site Context comprises a score out of 46 which is subsequently converted to a score out 3 for the calculation of Habitat Quality. While for MNES fauna, Site Context comprises a score out of 56 (due to the inclusion of 'species mobility capacity' as a Site Context attribute) which is converted to a score out of 3 for the calculation of Habitat Quality.

Table 7: Site Context scoring

Attribute	Score					
Size of patch	**Score**	**0**	**2**	**5**	**7**	**10**
	Description	<5ha	5-25ha	26-100ha	101-200ha	>200ha
Connectedness	**Score**	**0**	**2**	**4**		**5**
	Description	0-10%	>10-<50%	50-75%		>575% or >500ha
Context	**Score**	**0**	**2**	**4**		**5**
	Description	<10% remnant	>10-30% remnant	>30-75%		>75% remnant
Ecological corridors	**Score**	**0**	**4**		**6**	
	Description	Not within	Sharing a common boundary		Within (whole or part)	
Role of site location to species overall population in the state	**Score**	1	4		5	
	Description	Not or unlikely to be critical to species' survival	Likely to be critical to species' survival		Critical to species survival	
Threats to species	**Indicative score***	**1**	**7**		**15**	
	Description	High threat level (i.e., likely to result in death, irreversible damage)	Moderate threat level		Low threat level (i.e., likely to survive)	

Attribute		Score			
Species mobility capacity (fauna only)	**Indicative Score***	**1**	**4**	**7**	**10**
	Description	Severely restricted	Highly restricted	Moderately restricted	Minor restriction

* Scores for species threats and species mobility are indicative only. Detailed criteria for scoring these attributes are provided in Appendix P.

2.7.4.3 Species Stocking Rate scoring

Species Stocking Rate (SSR) was scored separately for each MNES fauna species using the attributes listed in Table 8. The scoring of SSR attributes was the same as that detailed below except for species presence, which was scored as follows:

- Present within Study Area or present adjacent Study Area (with connectivity to known [occupied] habitat within Study Area surrounds) = score of 10
- Present within wider Study Area surrounds only, with limited connectivity to known habitat on adjoining properties = score of 5
- Presence not detected within Study Area and habitat within Study Area isolated from known habitat on adjoining properties = score of 0.

The SSRs for MNES fauna comprises a score out of 70 which is subsequently converted to a score out of 4 for the calculation of Habitat Quality.

Table 8: Species Stocking Rate attribute scoring

Attribute		Score			
Presence detected on or adjacent to site	**Score**	**0**		**10**	
		No		Yes	
Species usage of the site*	**Score**	**5**	**10**	**15**	
		Dispersal	Foraging	Breeding	
Approximate density (per ha)	**Score**	**0**	**10**	**20**	**30**
		Scored using the criteria detailed in Appendix S.			
Role/importance of species population on site	**Score**	**0**	**5**	**10**	**15**
	Total from Table 9 (below)	0	5-10	11-20	21-30

* In order to account for variation in habitat usage across the Indicative Footprint, habitat usage was scored separately for each Habitat Quality assessment site.

Table 9: Scoring species population/site importance

Attribute	Score		
Key source population for breeding	**Score**	**0**	**5**
		No	Yes
Key source population for dispersal	**Score**	**0**	**5**
		No	Yes
Necessary for maintaining genetic diversity	**Score**	**0**	**5**
		No	Yes
Near the limit of the species range	**Score**	**0**	**10**
		No	Yes

2.8 Habitat mapping and categorisation

Data from desktop and field investigations (as detailed above) were used to map areas of suitable habitat for MNES species assessed as likely to occur within the Study Area based on known habitat associations and species' habitat requirements (as documented in DCCEEW's SPRAT database, conservation advice notices, recovery plans and other relevant published literature) (see Sections 4 and 8 for further details).

For MNES fauna species assessed as likely to occur, suitable habitat within the Study Area was further categorised as 'Habitat critical to the survival of the species' (Critical Habitat) or 'General Habitat' based on the definitions provided below.

- **Critical Habitat:** as per the *MNES Significant Impact Guidelines 1.1* (the Guidelines), this includes areas that are necessary or critical:
  - for activities such as foraging, breeding, roosting, or dispersal
  - for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
  - to maintain genetic diversity and long term evolutionary development, or
  - for the reintroduction of populations or recovery of the species or ecological community.

Such habitat includes habitat identified in a recovery plan or conservation advice notice for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.

- **General Habitat**: habitat used opportunistically by dispersing individuals that does not meet the above definition.

Species recovery plans, listing advice notices and other relevant literature were reviewed to determine the criteria for 'Critical Habitat' for each threatened species known or likely to occur, as detailed in Section 4.2.3 for each species.

2.9 Assumptions and limitations

Ecological surveys have a range of inherent limitations associated with the seasonal timing of surveys, variable weather and climatic conditions, and species behaviour/detectability. As such, any survey conducted represents a 'snapshot' in time and may not provide a true indication of species presence/absence within an area. This applies particularly to mobile fauna species which may utilise habitat on a seasonal or intermittent basis.

In light of the identified limitations, a precautionary approach was adopted when assessing the likelihood of species occurring within the Study Area. Specific limitations associated with the survey of MNES species assessed as likely to occur are discussed within Section 4.

The review of relevant legislation undertaken for this assessment was restricted to documents available and applicable at the time of submission of this report. Any new or newly enacted legislation applied by any level of government following the finalisation of this document may require additional assessment.

The impact assessment has assumed that the cathodic protection beds and any additional workspaces not already included in the Indicative Footprint will be outside of naturally vegetated areas, high value regrowth and any threatened species habitat, in accordance with the proponent's commitment to adopt the avoid, minimise, mitigate hierarchy throughout development of the Project.

The actual Project disturbance footprint may differ slightly from the Indicative Footprint due to landholder requirements, the discovery of cultural heritage items and/or other localised constraints identified during construction or preclearing surveys. To account for this, maximum impact areas for each MNES have been calculated based on the Indicative Footprint plus a 10% allowance for necessary in-field adjustments to the RoW as detailed in Section 5, Section 6 and Significant Impact Assessments provided in the appendices.

Any additional workspaces, if required, will be located within the Study Area and will be located to avoid impacts to MNES that are additional to the maximum disturbance limits specified.

3 Desktop Assessment Results

3.1 Commonwealth matters (MNES)

The DCCEEW Protected Matters Search Tool (PMST) was used to identify MNES known to occur or potentially occurring within 10 km of the Study Area (hereafter 'the desktop search extent'). The PMST report identified a number of MNES with potential to occur within the Study Area (as detailed in Appendix B). Searches of Wildlife Online (WO) and Atlas of Living Australia (ALA) databases also yielded records of a number MNES within the desktop search extent (as shown in Appendix E). Cumulatively, the following MNES were identified as occurring or potentially occurring within 10 km of the Study Area:

- a total of 39 terrestrial threatened species, comprising:
  - 29 listed threatened fauna species
  - 10 listed threatened flora species
- 11 migratory (terrestrial, wetland, marine) birds
- five listed Threatened Ecological Communities (TECs), including:
  - Poplar Box Grassy Woodland on Alluvial Plains (Endangered)
  - Brigalow (*Acacia harpophylla* dominant and co-dominant) (Endangered)
  - Coolibah-Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (Endangered)
  - Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (Endangered); and
  - Weeping Myall Woodlands (Endangered)
- four Wetlands of International Importance (Ramsar) located downstream of the Study Area (identified within PMST report), namely:
  - Banrock Station Wetland Complex (1,200 to 1,300 km to the south-west)
  - The Coorong, and Lakes Alexandrina and Albert Wetland (1,300 to 1,400 km to the south-west)
  - Narran Lake Nature Reserve (400 – 500 km to the south-west); and
  - Riverland (1,100 to 1,200 km to the south-west)

No World Heritage Properties or National Heritage Places listed under the EPBC Act occur within the Study Area.

3.2 Likelihood of occurrence assessment results

An initial likelihood of occurrence assessment based on the desktop review identified the following MNES as likely to occur within the Study Area:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) – Endangered TEC under EPBC Act
- Poplar Box Grassy Woodland on Alluvial Plains - Endangered TEC under EPBC Act
- Coolibah-Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregion – Endangered TEC under EPBC Act

- Weeping Myall Woodlands – Endangered TEC under EPBC Act
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions – Endangered TEC under EPBC Act
- Ooline (*Cadellia pentastylis*) – Vulnerable (EPBC Act and NC Act)
- Dulacca woodland snail (*Adclarkia dulacca*) - Endangered (EPBC Act and NC Act)
- glossy black-cockatoo (south-eastern)(*Calyptorhynchus lathami lathami*) – Vulnerable (EPBC Act and NC Act)
- koala (*Phascolarctos cinereus*) – Endangered (EPBC Act and NC Act)
- greater glider (southern and central) (*Petauroides volans*) – Endangered (EPBC Act and NC Act)
- white-throated needletail (*Hirundapus caudacutus*) – Vulnerable (EPBC Act and NC Act), and
- squatter pigeon (southern) (*Geophaps scripta scripta*) - Vulnerable (EPBC Act and NC Act).

The likelihood of MNES occurring within the Study Area was subsequently reassessed following the completion of field surveys. Updated likelihood of occurrence assessments for potentially occurring MNES based on desktop and field investigations are provided in Appendix D.

4 Field Survey Results

4.1 Flora survey results

For ease of reading, the scientific name of each species has only been mentioned in the first instance where that species is described in the text. Exotic/non-native weed species are highlighted with an asterisk (*).

4.1.1 Flora diversity

A total of 207 flora species were recorded within the Study Area, comprising 160 native and 47 introduced species. A detailed list of flora species observed within the Study Area is provided in Appendix H.

4.1.2 Threatened flora

The desktop review identified 15 threatened flora species as known to occur or potentially occurring within 10 km of the Study Area. Of these 15 species, one (1) species was assessed as 'likely to occur' in the initial desktop likelihood of occurrence assessment, based on the presence of suitable habitat within the Study): Ooline (*Cadellia pentastylis*).

Ooline is listed as Vulnerable under the EPBC Act and NC Act. It is a medium-sized spreading tree growing to 10 m and rarely to 25 m high. Leaves are glossy green, paler and dull underneath, and 1–7 cm long, 1.5–2 cm wide, with broad rounded tips. Leaf venation is prominent on both leaf surfaces when dry. Flowers are usually single, with white petals 5–7 mm long and occur sporadically. Fruit are a cluster of up to five brown coloured drupes, 3–5 mm in diameter, surrounded by papery, red sepals (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2008).

Populations exist 2 km North of the Study Area. Approximately 0.59 ha of RE 11.10.8 was found to contain suitable habitat for the species within the Study Area, with ~0.11 ha of this occurring within the Indicative Footprint. However, no populations/individuals of this species were observed during the field surveys and, as such, the species is considered unlikely to occur within or adjacent to the Indicative Footprint.

All other threatened flora species identified in the initial (desktop) assessment are considered unlikely to occur within the Study Area due to a lack of suitable habitat, absence of previous records within the desktop search extent and surrounds, and/or failure to detect the species during survey of the Study Area, despite appropriate timing and survey effort (see below and Appendix D, for details).

4.1.3 Ground-truthed Regional Ecosystems

Approximately 28.39 ha of remnant vegetation and 0.76 ha of high value regrowth (HVR) REs were ground-truthed within the Indicative Footprint, comprising 15.4% of the total Indicative Footprint. A summary of REs recorded in the Indicative Footprint is provided in Table 10 and the location/extent of REs present within the Study Area depicted in Appendix F. Most areas of remnant and high value regrowth vegetation recorded within the Indicative Footprint comprise the edges of vegetation patches adjacent to existing gas pipelines. Detailed summaries of REs identified during the field survey are provided in Table 10.

Table 10: Ground-truthed vegetation communities within the Indicative Footprint

Ground-truthed Regional Ecosystem	Vegetation Description	GTRE VM Act Status	GTRE Biodiversity Status	Vegetation type	Areas within the Indicative Footprint (ha)
11.3.2	*Eucalyptus populnea* woodland to open woodland. Occasionally, *E. melanophloia or E. crebra* may be present. A secondary tree layer may occur and include species such as *Geijera parviflora, Eremophila mitchellii, Acacia salicina, Cassia brewsteri*, and *Acacia excelsa*. The ground layer is dominated by a range of tussock grasses, including *Chloris spp., Enteropogon spp.,* and *Aristida spp*. Occurs on Cainozoic alluvial plains with variable soil types including texture contrast, deep uniform clays, massive earths and sometimes cracking clays.	Of Concern	Of Concern	Remnant	0.52
				High value regrowth	0.08
11.3.4	*Eucalyptus tereticornis* woodland to open forest. Other tree species that may be present include *E. camaldulensis, Corymbia tessellaris, C. clarksoniana, E. melanophloia, E. platyphylla or Angophora floribunda. E. crebra* and *Lophostemon suaveolens* may be locally common. A shrub layer is usually absent, and a grassy ground layer is prominent, and may include any of *Bothriochloa bladhii subsp. bladhii, Aristida spp., Heteropogon contortus, Dichanthium spp.* and *Themeda triandra*. Occurs on Cainozoic alluvial plains and terraces. Occurs on variety of soils, including deep cracking clays, medium to fine textured soils, and deep texture-contrast soils.	Of Concern	Of Concern	Remnant	0.009
11.3.18	*Eucalyptus populnea* and/or *E. melanophloia* woodland. Other canopy species include *Callitris glaucophylla, E. crebra, E. chloroclada* and *Angophora leiocarpa*. A secondary tree or shrub layer may occur, including *Allocasuarina luehmannii, Callitris glaucophylla, Geijera parviflora, Eremophila mitchellii* and *Alstonia constricta*. The ground layer is usually dominated by perennial grasses, including *Bothriochloa decipiens, Enteropogon acicularis, Triraphis mollis, Eragrostis lacunaria* and *Aristida*	Least Concern	No concern at present	Remnant	0.20

Ground-truthed Regional Ecosystem	Vegetation Description	GTRE VM Act Status	GTRE Biodiversity Status	Vegetation type	Areas within the Indicative Footprint (ha)
	spp. Occurs on levees, higher alluvial plains and terraces associated with drainage lines. The soils are mainly deep, uniform red sands, or deep, texture contrast soils with a sandy, thick surface horizon overlying neutral, blocky to massive subsoil's. Small areas occur on red massive earths and alluvial soils.				
11.3.19	*Callitris glaucophylla* woodland usually with codominant eucalypts including *Corymbia tessellaris, C. clarksoniana* that form a well-defined but discontinuous open forest to woodland canopy. Other trees such as *Eucalyptus melanophloia, Angophora melanoxylon* or *E. populnea* may also occur as an emergent tree layer. Scattered tall shrubs, such as Acacia excelsa, *Alstonia constricta* and *Callitris glaucophylla* are often present. The ground layer is sparse to dense, depending on the tree density, and is dominated by grasses. Common grasses include *Heteropogon contortus, Eriachne helmsii, Aristida holathera var. holathera, Aristida calycina var. praealta* and *Perotis rara*. The forb diversity is relatively low but may become seasonally prominent. Occurs on rises associated with the levees and higher alluvial plains and terraces of major river systems.	Least Concern	No concern at present	Remnant	0.91
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland to open forest. Other tree species, including *Casuarina cunninghamiana, E. coolabah, Melaleuca bracteata, Melaleuca viminalis, Livistona spp.* (in north), *Melaleuca spp.* and *Angophora floribunda*, may occur. A tall shrub layer may occur, including *Acacia salicina, A. stenophylla* and *Lysiphyllum carronii*. Low shrubs are present, but rarely form a conspicuous layer. The ground layer is open to sparse and dominated by perennial grasses, sedges or forbs. Occurs on fringing levees and banks of major rivers and drainage lines of alluvial plains throughout the region.	Least concern	Of concern	Remnant	0.87

Ground-truthed Regional Ecosystem	Vegetation Description	GTRE VM Act Status	GTRE Biodiversity Status	Vegetation type	Areas within the Indicative Footprint (ha)
11.5.1	*Eucalyptus crebra* and/or *E. populnea* +/- *Angophora leiocarpa* +/- *E. woollsiana* (in south of bioregion) woodland to open woodland. A low tree layer dominated by *Allocasuarina luehmannii* +/- *Melaleuca decora* +/- *Callitris glaucophylla* +/- *C. endlicheri* is usually present. In some areas *Allocasuarina luehmannii* low woodland is the dominant layer. The ground cover is usually sparse and dominated by perennial tussock grasses. Occurs on flat to gently undulating plains formed from weathered sandstones.	Least concern	No concern at present	Remnant	20.18
				High value regrowth	0.43
11.5.4	*Eucalyptus chloroclada, Callitris glaucophylla, Angophora leiocarpa* woodland. Occasional canopy species may include *A. floribunda* and *E. crebra* or *E. rhombica*. A low tree layer is usually present that includes species such as *Allocasuarina luehmannii, A. inophloia* and *Callitris endlicheri*.	Least concern	No concern at present	Remnant	1.57
11.5.16	*Casuarina cristata* and/or *Acacia harpophylla* open forest. Occurs in depressions on Cainozoic sandplains. Associated with gilgai with 1 m local relief and 5-6 m in diameter.	Endangered	Endangered	Remnant	0.73
11.7.2	Monospecific stands of *Acacia spp*. forest/woodland on Cainozoic lateritic duricrusts. *Acacia shirleyi* and/or *Acacia catenulata* usually predominate the woodland to low woodland to low open forest tree canopy (7-12m high). Other Acacia spp. That commonly occur and occasionally dominate the tree layer include A. *rhodoxylon, A. burrowii, A. sparsiflora, A. crassa* and *A. blakei*. Emergent eucalypt species such as *Eucalyptus thozetiana, E. crebra, E. decorticans* and *E. exserta* may be present. A low shrub layer is sometimes present and dominated by species such as *Acalypha*	Least concern	No concern at present	Remnant	3.0

Ground-truthed Regional Ecosystem	Vegetation Description	GTRE VM Act Status	GTRE Biodiversity Status	Vegetation type	Areas within the Indicative Footprint (ha)
	eremorum, Croton phebalioides and *Carissa ovata*. The ground layer is extremely sparse and dominated by grasses such as *Aristida caput-medusae, Paspalidium rarum, Urochloa foliosa*.				
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* or *Acacia harpophylla* open forest to woodland. *Casuarina cristata* is more common in southern parts of the bioregion. A prominent low tree or tall shrub layer dominated by species such as *Geijera parviflora* and *Eremophila mitchellii*, and occasionally with semi-evergreen vine thicket species is often present. The latter include *Flindersia dissosperma, Brachychiton rupestris, Excoecaria dallachyana**.	Endangered	Endangered	Remnant	0.14
				High value regrowth	0.14
11.9.5a	*Acacia harpophylla* predominates and forms a moderately continuous canopy. Other tree species such as *Eucalyptus populnea*, *Casuarina cristata*, *Cadellia pentastylis* and *Brachychiton spp*. may also be present in some areas and form part of the canopy or emerge above it.	Endangered	Endangered	Remnant	0.18
				High value regrowth	0.10
11.10.8	Semi-evergreen vine thicket and microphyll rainforest. Occurs on medium to coarse-grained sediments that may be subject to local enrichment from adjacent rocks such as basalt as well as seepage.	Of concern	Of Concern	Remnant	0.11

4.1.4 Threatened Ecological Communities

The Commonwealth PMST report identified five TECs as potentially occurring within the Study Area (refer to Section 3.1 and Table 11, below), two of which were also identified within the Study Area and Indicative Footprint during surveys - Brigalow (dominant and co-dominant) ecological community (hereafter 'Brigalow TEC'), and Poplar Box Grassy Woodland on Alluvial Plains TEC (hereafter 'Poplar Box TEC'). The location and extent of TECs within the Indicative Footprint is summarised in Table 11 and depicted in Appendix G.

Table 11: Summary of TECs recorded within the Indicative Footprint

TEC	EPBC Act Status	Presence within the Indicative Footprint
Brigalow (Acacia harpophylla) dominant and co-dominant ecological community	Endangered	Known Approximately 4.81 ha of Brigalow TEC was observed within the Study Area, with 0.92 ha located within the Indicative Footprint. This TEC occurs within the Indicative Footprint in association with four patches of REs 11.9.5 and 11.5.16 (refer to Appendix G for locations). Other potential brigalow REs were observed within the Indicative Footprint (refer to Appendix F) but did not meet the condition criteria for the TEC.
Coolibah-Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregion	Endangered	**Not Present** Vegetation consistent with the TEC was not observed within the Study Area or the Indicative Footprint.
Weeping Myall Woodlands	Endangered	**Not Present** Vegetation consistent with the TEC was not observed within the Study Area or the Indicative Footprint.
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	**Not Present** One Semi-evergreen vine thicket (SEVT) RE (11.10.8) was observed within the Study Area as depicted in Appendix F. However, this RE is not included in the list of SEVT communities for the Brigalow Belt Bioregion included in the conservation advice notice and recovery plan for this TEC ((Threatened Species Scientific Committee [TSSC], 2001).

TEC	EPBC Act Status	Presence within the Indicative Footprint
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	**Known** Approximately 0.28 ha of Poplar Box TEC (mapped as RE 11.3.2) was observed within the Study Area, with 0.08 ha located within the Indicative Footprint, as depicted in Appendix G. Other areas of potential Poplar Box TEC were observed within the Study Area but did not meet the condition criteria for the TEC.

4.1.4.1 Brigalow (*Acacia harpophylla*) dominant and co-dominant TEC

The Brigalow TEC community occurs within the Brigalow Belt Bioregion and includes twelve REs featuring Brigalow (*Acacia harpophylla*) as the dominant or co-dominant species within the ecologically dominant layer. To qualify as the Brigalow TEC, an occurrence of brigalow must meet the minimum threshold conditions pertaining to patch size and weed encroachment detailed within the Approved Conservation Advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community (Department of the Environment (DotE), 2013a).

Several patches of brigalow-dominated REs were recorded within the Indicative Footprint during the field assessment, including remnant and regrowth RE 11.9.5 and 11.5.16 (refer to Appendix G). Four of these patches (comprising a total area of 0.92 ha) met the condition criteria/thresholds of the Brigalow TEC.

Other identified patches of brigalow did not meet the condition thresholds for TEC with exotic perennial cover exceeding 50%. Exotic species present within these patches included *Megathyrsus maximus** (Guinea grass), *Chloris gayana** (Rhodes grass), *Cenchrus ciliaris** (buffel grass), *Melinis repens** (red Natal grass) and *Urochloa mosambicensis** (sabi grass).

Approximately 4.81 ha of Brigalow TEC was observed within the Study Area, with 0.92 ha located within the Indicative Footprint.

4.1.4.2 Poplar Box Grassy Woodland on Alluvial Plains

The Poplar Box TEC comprises grassy woodlands and open woodlands on active alluvial plains along the east coast of Australia (Department of the Environment and Energy (DEE), 2019). Poplar Box TECs are assigned a Condition Class (Class A, B or C) according to:

- crown cover dominance of canopy trees
- percentage cover of native perennial vegetation in the ground layer
- native species richness within the ground layer; and
- density of mature trees (>30 cm DBH).

A total of 0.08 ha of Poplar Box TEC was observed within the Indicative Footprint (Appendix G). The Poplar Box TEC was found to conform with Condition Class C.

Other areas of poplar box woodland did not meet the threshold conditions due to:

- the dominance of exotic species in the ground layer, including *Cenchrus ciliaris** (Buffel grass), *Megathyrsus maximus** (Guinea grass), and *Urochloa mosambicensis** (sabi grass); and

- the crown cover of the shrub/small tree layer exceeding 30%.

4.1.5 Pest flora

Three weed species listed as Weeds of National Environmental Significance (WONS) and/or as restricted matter under the Queensland *Biosecurity Act 2014*, were recorded within the Study Area (see
Table 12 for details). All three of these pest flora species were observed as scattered individuals across the Study Area.

Other environmental weed species observed during the field survey include *Cenchrus ciliaris* (buffel grass), *Eragrostis curvula** (African lovegrass), *Vachellia farnesiana** (mimosa bush), *Xanthium occidentale** (Noogoora burr), *Pimelea trichostachya** (annual rice flower), *Megathyrsus maximus** (Guinea grass), and *Urochloa mosambicensis** (sabi grass).

Table 12: Listed weed species recorded within the Study Area

Scientific name	Common name	WONs	Biosecurity Act 2014 Status
*Harrisia martinii**	Harrisia cactus	-	Category 3
*Opuntia stricta**	Common prickly pear	WONS	Category 3
*Opuntia tomentosa**	Velvety prickly pear	WONS	Category 3

4.2 Fauna survey results

4.2.1 Fauna diversity

Fifty-four fauna species were recorded within the Study Area during field surveys, including 51 native and three pest species (cane toad, pig and rabbit). Birds accounted for the majority (74%) of the fauna species recorded during surveys; whereas mammal species, reptiles and amphibians accounted for 16.7%, 5.6% and 3.7% of the fauna species records, respectively. A full list of vertebrate fauna species encountered during surveys is provided Appendix H.

4.2.2 Habitat assessment

Fauna habitat identified within the Study Area can be delineated into six broad habitat types based on vegetation community, structure and/or class. Each of these habitat types is described in detail below.

4.2.2.1 Remnant eucalypt woodland

Most of the ground-truthed habitat within the Study Area comprises remnant eucalypt woodland, protected at the State level under the VM Act and categorised as RE 11.5.1, 11.5.4 and 11.3.4. This habitat type accounts for approximately 22.19 ha of the remnant vegetation occurring within the Indicative Footprint (Table 10), as depicted in Appendix F.

Dominant canopy species in areas of remnant woodland include narrow-leaved ironbark (*E. crebra*), poplar box (*E. populnea*) and red or Baradine gum (*E. chloroclada*). All three of these species are considered locally important koala trees (LIKTs) within the Brigalow Belt Bioregion (Youngentob et al., 2021) (koala habitat values are discussed further in Section 4.2.3.3 of this report). Other marsupials, such as kangaroos and wallabies, are likely to utilise the woodland as refuge habitat during the heat of the day. Remnant woodland habitat within the Study Area includes mature trees and stags that provide nesting/roosting habitat for arboreal mammals (e.g., gliders and possums), hollow nesting birds (e.g. parrots) and roosting microbats. The ground layer within areas of remnant woodland includes leaf litter and woody debris, providing habitat for a range of small mammals and reptile species.

4.2.2.2 HVR eucalypt woodland

Areas defined under the VM Act as High Value Regrowth (HVR) eucalypt woodland habitat were identified within the Study Area (Table 10), as depicted in Appendix F. These areas have been subject to thinning and/or clearing in the recent past. HVR eucalypt woodland within the Indicative Footprint features many of the same canopy species as remnant woodland areas; however, canopy cover and canopy height are lower. The open canopy and lack of mature trees within the HVR eucalypt is likely to preclude species reliant on large tree hollows and dense canopy cover. Coarse woody debris and leaf litter was still present and continues to provide habitat to ground-dwelling fauna. HVR eucalypt woodland makes up a relatively small proportion (approximately 0.76 ha) of habitat available within the Indicative Footprint.

4.2.2.3 Lancewood (*Acacia shirleyi*) woodland

Lancewood (*A. shirleyi*) woodland occurs on Land zone 7 and is characterised by shallow/rocky skeletal soil on 'jump ups'. The dominant tree species within this habitat type do not form hollows, precluding hollow-dependent species such as gliders, possums and cavity nesting birds. Areas of Lancewood woodland may, however, provide habitat for a range of small bird and reptile species. This habitat type makes up a relatively small proportion (approximately 3.0 ha) of habitat available within the Indicative Footprint.

4.2.2.4 Brigalow (*Acacia harpophylla*) woodland

The Indicative Footprint includes 0.92 ha of brigalow (*A. harpophylla*) woodland comprising REs 11.5.16 and RE 11.9.5 (Table 10), as depicted in Appendix F. Brigalow woodland within the Indicative Footprint provides suitable habitat for a suite of conservation significant fauna species including the glossy black-cockatoo (see Section 4.2.3.1), and Dulacca woodland snail. Brigalow woodland habitat within the Indicative Footprint includes areas of mixed brigalow/belah (*Casuarina cristata*) providing suitable foraging habitat for the glossy black-cockatoo. Areas of brigalow woodland within the Indicative Footprint appear to have limited amenity for ground-dwelling reptiles and small mammals due to impacts associated with grazing (including the presence of buffel grass which reduces the abundance of leaf litter and coarse woody debris).

4.2.2.5 Riparian woodland forest

Riparian woodland/forest habitat within the Indicative Footprint includes 2.59 ha of remnant mature *Eucalyptus/Angophora* woodland and open forest associated with creek lines/drainages (comprising REs 11.3.2, 11.3.18, 11.3.19 and 11.3.25) (Table 10) and 0.08 ha of regrowth 11.3.2 as depicted in Appendix F. This habitat type contains a high abundance of tree hollows, dense canopy cover, a complex understorey, abundant coarse woody debris and leaf litter. Riparian woodland/open forest within the Indicative Footprint provides suitable habitat for koala, birds (including squatter pigeon and glossy black-cockatoo where suitable foraging or breeding resources occur), hollow-dependant mammals such as greater glider, reptiles and amphibians.

4.2.2.6 Pastureland

Areas of pastureland within the Indicative Footprint have been cleared of native vegetation and reseeded with exotic pasture grasses to support grazing of livestock. Areas of pastureland generally have low amenity for native fauna due to a lack of floristic and structural diversity and exposure to ongoing disturbance from cattle grazing. Isolated trees within areas of cleared pasture may have some (limited) amenity for koala and a subset of native bird species.

4.2.3 MNES fauna

Though scratches attributable or potentially attributable to koala and greater glider were observed within the Study Area during surveys, none of the MNES species assessed as 'likely to occur' in the initial desktop assessment were observed within the Study Area during surveys.

The Study Area, does, however contain suitable habitat for eight MNES fauna species considered 'likely to occur' in the initial (desktop) likelihood of occurrence assessment, including: glossy black-cockatoo (south-eastern), koala, squatter pigeon (southern), greater glider (southern/central), Dulacca woodland snail, white-throated needletail. Habitat for these 'likely to occur' MNES species is discussed in further detail below.

Mapping showing the location and extent of habitat for 'likely to occur' species across the Study Area is provided in Appendices I-N, while area calculations for habitat present within the Indicative Footprint (including a 10% allowance for the siting of as yet un-sited infrastructure and minor in-field adjustments to the pipeline alignment) are provided below.

4.2.3.1 Glossy black-cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*)

Listed as Vulnerable under the EPBC Act and NC Act, the glossy black-cockatoo (south-eastern) (*Calyptorhynchus lathami lathami)* feeds almost exclusively on the fruit/cones of *Casuarina* and *Allocasuarina* trees and is most commonly encountered in woodland vegetation dominated by *Allocasuarina* and *Casuarina spp.* and areas of open sclerophyll forest and woodland where these species occur in the subcanopy (including woodland and open forest communities dominated by *Eucalyptus*, *Corymbia* and/or *Angophora* spp.) (DCCEEW, 2022). In the Brigalow Belt Bioregion, glossy black-cockatoos have also been recorded in mixed *Allocasuarina*, *Casuarina*, *Callitris* and *Acacia harpophylla* woodland communities (Glossy Black Conservancy, 2021). Glossy black-cockatoos are hollow nesters and rely upon large hollows in eucalypt trees and stags for successful breeding and recruitment (DCCEEW, 2022).

Suitable habitat for glossy black-cockatoo within the Indicative Footprint includes:

- Scattered areas of remnant eucalypt woodland and open forest containing suitable nest trees/stags with a low-to-moderate abundance of feed trees (*Allocasuarina* and/or *Casuarina* spp.) mapped as REs 11.3.2, 11.3.25, 11.3.19, 11.5.1 and 11.5.4 (Table 10), and
- patches of remnant and regrowth brigalow (*Acacia harpophylla*), belah (*Casuarina cristata*) and cypress pine (*Callitris glaucophylla*) woodland containing low-to-moderate densities of *Casuarina cristata* providing suitable foraging habitat for the species (mapped as REs 11.9.5, 11.9.5a, and 11.5.16).

Collectively, these areas of habitat contain the resources necessary to meet the species' foraging, breeding and shelter requirements, and, as such, are considered Critical Habitat for the species (see DCCEEW, 2022). In total, the Indicative Footprint contains 25.74 ha of Critical Habitat for the glossy black-cockatoo (south-eastern) comprised of 59 discrete patches of vegetation, as shown in Appendix I.

Other areas of remnant and cleared/non-remnant vegetation within the Study Area are not considered important or necessary, or are otherwise unsuitable for dispersal, foraging or breeding and, as such, are not considered Critical Habitat for the species.

Despite the presence of suitable breeding and foraging habitat, no glossy black-cockatoos or evidence of glossy black-cockatoo presence was observed during field surveys; however, the species has previously been recorded in and around Combabula State Forest within 2 km of the Study Area (see Appendix E and Pavey and Vanderduys, 2016). The species may therefore occur within the Study Area and Indicative Footprint, given:

- the availability of potentially suitable foraging and nesting habitat within and adjacent the Study Area,
- the species' mobility, and
- previous occurrence records within the surrounding landscape.

4.2.3.2 Squatter pigeon (southern) (*Geophaps scripta scripta*)

The squatter pigeon (southern) is a ground-foraging granivore associated with dry, open sclerophyll woodlands and savannahs on well-draining soils. Requiring daily access to drinking water, the species seldom occurs far (>3 km) from water (DCCEEW, 2023; Squatter Pigeon Workshop, 2011).

In the Brigalow Belt bioregion, the species occurs mainly in remnant and regrowth woodland dominated by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* species on:

- sandy or loamy soils associated with low, gently sloping, flat to undulating plains and foothills (including land zones 3 and 5); and
- lateritic (duplex) soils on low 'jump-ups' and escarpments (i.e., land zone 7) (Squatter Pigeon Workshop, 2011; DAWE, 2020b).

Feeding mainly on fallen seed, squatter pigeons prefer to forage in areas of lower, more open ground cover (including the margins of dirt roads and cattle yards) where the ground stratum comprises mostly native, perennial tussock grasses, and/or a mix of perennial tussock grasses and low shrubs/forbs, with a projective foliage cover of ~33% (DCCEEW, 2023; TSSC, 2015; Squatter Pigeon Workshop, 2011).

While predominantly ground-dwelling, the species roosts in trees overnight and, as such, requires access to canopy trees for shelter (Squatter Pigeon Workshop, 2011). Nests are typically constructed in remnant woodland vegetation beneath grass tussocks, bushes or alongside fallen logs in areas of woodland within 1 km of water (DCCEEW, 2023; Squatter Pigeon Workshop, 2011).

Within the Indicative Footprint, suitable foraging and/or breeding habitat comprises areas of remnant and regrowth *Eucalyptus*, *Corymbia*, *Acacia* and *Callitris* woodland/open forest with suitable ground cover (see above) within 3 km of a suitable seasonal or permanent water source (i.e., a dam, trough and/or S04 or S05 watercourse)[7]. This includes areas of remnant and regrowth vegetation mapped as REs 11.3.2, 11.3.4, 11.3.18, 11.3.19, 11.3.25, 11.5.1, 11.5.4, 11.5.16 and 11.7.2 (see Table 10 for details).

Areas of suitable foraging and breeding habitat within 1 km of a suitable water source are considered Critical Habitat for the species; while areas of potential foraging, shelter and/or dispersal habitat 1-3 km from suitable water are considered General Habitat.

[7] Smaller (SO1,2 and 3) watercourses within the Study Area appear to hold water only briefly after heavy rain and, as such, are unlikely to provide a reliable source of drinking water for foraging or breeding birds.

General Habitat within the Indicative Footprint includes:

- areas of remnant and regrowth vegetation 1-3 km of a water source mapped as REs 11.3.2, 11.3.4, 11.3.18, 11.3.19, 11.3.25, 11.5.1, 11.5.4, 11.5.16 and 11.7.2, with or without suitable ground cover (see above), and
- areas of remnant and regrowth woodland < 3km of a suitable water source unlikely to support foraging or breeding (comprising REs 11.9.5, 11.9.5a and 11.10.8) which could facilitate dispersal of birds between areas of suitable foraging and/or breeding habitat.

Other areas of non-remnant/cleared habitat supporting mostly dense grass cover of exotic pasture grasses (predominantly buffel [*Cenchrus ciliaris*]) and areas > 3km from a suitable water source have limited amenity for the species and, as such, have not been mapped as suitable habitat.

Suitable habitat for the squatter pigeon (southern) within the Indicative Footprint is shown in Appendix J and includes 10.16 ha of Critical Habitat and 18.87 ha of General Habitat comprised of 73 discrete patches of vegetation.

Though previously recorded within surrounding landscape, the squatter pigeon (southern) was not detected within the Study Area during surveys, which suggests that the species is likely to utilise habitat within the Study Area on an occasional or intermittent basis only (a view supported by the paucity of contemporary squatter pigeon records from the surrounding landscape.

4.2.3.3 White-throated needletail (*Hirundapus caudacutus*)

The white-throated needletail (*Hirundapus caudacutus*) is a wide-ranging migratory species which visits Australia during spring and summer. An aerial forager, the white-throated needletail forages over a wide range of habitats, including modified agricultural landscapes (Threatened Species Scientific Committee, 2019). As such, the entirety of the Indicative Footprint (totalling 206.9 ha including the 10% buffer) may be considered foraging and/or dispersal habitat for the species. Birds visiting Australia are also known to roost in dense canopy foliage and the hollows of taller canopy trees, trees at the edges of clearings and trees on ridges and spurs (Threatened Species Scientific Committee, 2019). Canopy trees at the edge of paddocks may therefore provide roosting habitat for the species as well.

As a wide-ranging and highly mobile migratory species, the white-throated needle tail is likely to utilise habitat within the Study Area on an intermittent basis only; and, while not recorded during surveys, the species is still considered likely to occur within the Study Area, given:

- the timing of fauna surveys was likely suboptimal for detection of white-throated needletail, with the majority of birds having left southern Australia by mid-April
- the presence of suitable foraging and roosting habitat above and/or within the Study Area and immediate surrounds, and
- previous occurrence records within the desktop search extent.

4.2.3.4 Greater glider (*Petauroides volans*)

The greater glider (southern and central) (*Petauroides volans*) is a folivorous, nocturnal gliding possum inhabiting eucalypt forests and woodlands of eastern Australia which is found in highest abundance in remnant eucalypt forests on fertile soils, with relatively old trees and abundant hollows (DCCEEW, 2002).

In Queensland, the greater glider (southern and central) is typically associated with remnant forest and woodland containing one or more of the following feed tree species: *Corymbia citriodora, Eucalyptus moluccana, E. tereticornis, E. crebra, C. intermedia* and/or *E. portuensis* (Eyre et al., 2022a). Tree size is also an important determinant of habitat suitability with trees >30cm DBH more likely to be used for foraging and canopy trees >50cm DBH more likely to support hollows suitable

for denning/shelter (i.e., large-volume tree hollows with an aperture of 10 cm of greater) (Eyre et al., 2022a; Goldingay, 2011).

The availability of suitable hollows (i.e., large volume hollows with an opening > 10 cm wide) is an important determinant of habitat occupancy, with animals requiring at least two-four den trees for every 2 ha of suitable forest habitat (Eyre et al., 2022). Habitat occupancy is also dependent on patch size, with larger patches of suitable habitat (>20 ha) more likely to support the species (Eyre et al., 2022a). With an average home range of < 3ha, the species can, however, occupy smaller habitat patches (<20 ha) where these are connected to larger patches of suitable habitat (Eyre et al., 2022a).

Within the Indicative Footprint and Study Area, suitable denning and foraging habitat for the species consists of remnant woodland and open forest with a moderate to high abundance of feed trees (with >30% of canopy trees comprising feed trees) and/or a moderate-to-high density of den trees (>2-4 suitable den trees per ha and large volume hollows with an opening > 10 cm wide) comprising REs 11.3.4, 11.3.18, 11.3.19 and 11.3.25, and 11.5.1[8]. Suitable foraging and denning habitat for the species includes areas of remnant woodland/forest contiguous with larger areas of suitable habitat (>20 ha) adjacent the Study Area as well as a smaller patches of suitable habitat with connectivity through to larger habitat patches. Totalling 22.17 ha, these areas contain the resources necessary to meet the species' foraging, breeding and shelter requirements, and, as such, are considered Critical Habitat for the species. Areas of marginal or otherwise unsuitable woodland facilitating movement/dispersal of animals between areas of suitable denning and/or foraging habitat (totalling 4.96 ha and including areas of woodland mapped as REs 11.3.2, 11.5.4 and 11.7.2) are also considered Critical habitat for the species.

The extent of suitable habitat for greater glider within the Indicative Footprint and adjoining Study Area is shown in Appendix K.

No greater gliders were recorded during the survey; however, an abundance of large hollow bearing trees suitable for denning by greater gliders were recorded within the Study Area, particularly in Combabula State Forest and on Combabula station. A number of these trees were heavily scratched and exhibited scratches potentially attributable to greater glider (Image 3).



Image 3: Scratches on hollow-bearing *Angophora leiocarpa*

The failure to detect greater gliders (central and southern) during surveys, suggests the species is present at low abundance within the Study Area and surrounds and/or that habitat within the Study Area is used on an occasional or intermittent basis only. The paucity of records of greater glider

[8] Feed and den tree density estimates are based on the results of Habitat Quality Assessments detailed in section 4.3.

within the desktop search extent (see Appendix E) support this view suggesting the species is generally scarce within the surrounding landscape.

4.2.3.5 Koala (*Phascolarctos cinereus*)

The National Recovery Plan for the EPBC Act listed Koala (*Phascolarctos cinereus*) (DAWE, 2022) defines koala habitat as 'the total set of resources required by koalas to meet the needs of individual survival and reproduction' emphasizing the value placed on the arrangement of those resources in a landscape to maintain viable metapopulation processes. In this way, habitat can be considered at multiple scales, both what is required for individual koalas to meet their food and shelter requirements and what is required for koala populations to remain viable (DAWE, 2022). The National Recovery Plan also identifies eucalypt species classified as Locally Important Koala Trees (LIKTs) (see Youngentob, 2021). LIKTs are defined as a tree from a species that is regularly browsed by koalas in a particular Koala Management Bioregion, such that it could be considered a substantial portion of the koala's diet. LIKT species commonly occurring within the Study Area, often as a dominant component of woodland communities include:

- river red gum (*Eucalyptus camaldulensis)*
- Baradine gum (*Eucalyptus chloroclada*)
- narrow-leaved ironbark *(Eucalyptus crebra)*
- Queensland peppermint (*Eucalyptus exserta)*
- broad-leaved red ironbark *(Eucalyptus fibrosa*)
- silver-leaved ironbark (*Eucalyptus melanophloia)*
- poplar box (*Eucalyptus populnea*); and
- blue gum (*Eucalyptus tereticornis)*.

Commonly occurring ancillary habitat trees identified within the Study Area include:

- brigalow (*Acacia harpophylla)*
- willow wattle (*Acacia salicina)*
- spotted gum (*Corymbia citriodora)*
- pink bloodwood (*Corymbia intermedia*); and
- Moreton Bay ash (*Corymbia tessellaris)*.

The fauna survey included extensive koala surveys across most patches of koala habitat (Appendix L). The surveys resulted in indirect evidence of koala (possible scratches on a tree) at one location within the Study Area during the field surveys (Appendix A). The tree was located within riparian woodland dominated by mixed Eucalypt woodland. No other evidence of koala was recorded during the survey, suggesting that koalas are present at very low densities or are not frequently utilising the Study Area. The paucity of koala records within the Study Area and surrounds (including the broader desktop search extent) suggests the population density of koalas within the Study Area and adjoining habitat areas is very low.

To accurately quantify the extent of koala habitat, each patch of woody vegetation within the Indicative Footprint was individually assessed for LIKT presence/abundance, location, size and connectivity (Appendix L). A total of 64 discrete patches totalling 31.90 ha were quantified. The patches range in size from 2m^2 to 5 ha and include isolated habitat trees (e.g. paddock trees) important for movement/dispersal of koalas (Youngentob et al., 2021) as well as larger contiguous areas of woodland (e.g. woodland in the south of Combabula State Forest).

The existing peer-reviewed published literature does not support making a distinction between 'breeding' and 'non-breeding' habitat for the koala as both males and breeding females can live in high and low quality habitat (Youngentob, et al. 2021). However, for the purpose of this report, breeding habitat is synonymous with foraging habitat and mapped and discussed as Critical Habitat. Approximately 31.90 ha of Critical Habitat is mapped within the Indicative Footprint (see Table 13 for details).

Koala population viability is, in part, subject to the efficacy of dispersal habitat. Koalas have the ability to walk across the ground for tens or even hundreds of metres (Youngentob et. al., 2021; Ramsay 1999, Marsh et al. 2014b). Dispersing koalas have been recorded to move up to 20 km from their natal home range, with average distances reported at 3.5 km in southeast Queensland (Dique et. al. 2003). Koalas are most susceptible to predation, vehicle strike and misadventure whilst on the ground, therefore, habitat that provides shelter and food to help koalas move more safely for longer distances across the landscape is essential. For the purpose of this report, the spatial extent of dispersal habitat required to support koalas is quantified and mapped to include isolated 'paddock' trees, scattered trees or any other patch or pocket of vegetation not suitable to sustain the foraging/breeding requirements of a koala in and of itself but may assist in safe dispersal between/among neighbouring habitats. Areas of non-remnant vegetation providing dispersal habitat for koala within the Indicative Footprint (totalling 3.10 ha) are also mapped as Critical Habitat for the species (see Table 13 for details).



Image 4: Likely Koala scratches on blue gum (*Eucalyptus tereticornis)* in riparian habitat

Table 13: Koala habitat within the Indicative Footprint

GTRE	Brief description	Vegetation Class	Koala Trees	Habitat Type	Area (ha)
11.3.2	Poplar box (*E. populnea*) woodland	Remnant	LIKT	Critical	0.52
		Regrowth	LIKT	Critical	0.085

GTRE	Brief description	Vegetation Class	Koala Trees	Habitat Type	Area (ha)
11.3.25	Blue gum (*E. tereticornis*) or river red gum (*E. camaldulensis*) woodland on fringing banks of drainage lines	Remnant	LIKT	Critical	0.87
11.3.4	Blue gum woodland on alluvial plains	Remnant	LIKT	Critical	0.009
11.3.18	Poplar box woodland with silver-leaved ironbark (*E. melanophloia*)	Remnant	LIKT	Critical	0.20
11.3.19	White cypress pine (*Callitris glaucophylla*) woodland with scattered sub-dominant Eucalyptus spp.	Remnant	Ancillary	Critical	0.91
11.5.1	Mixed eucalypt woodland (narrow-leaved ironbark (*E. crebra*), poplar box, rusty gum (*Angophora leiocarpa)* with sub dominant white cypress pine and bull oak (*Allocasuarina luehmannii)*	Remnant	LIKT	Critical	20.18
		Regrowth	LIKT	Critical	0.43
11.5.4	Baradine gum (*E. chloroclada*) with white cypress pine and rusty gum woodland	Remnant	LIKT	Critical	1.57
11.5.16	Brigalow (*A. harpophylla*) with she-oak (*Casuarina cristata*)	Remnant	Ancillary	Critical	0.73
11.7.2	*Acacia* spp. woodland	Remnant	Ancillary	Critical	2.96
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks	Remnant	Ancillary	Critical	0.14
11.9.5a	*Acacia harpophylla* predominates and forms a moderately continuous canopy	Remnant	Ancillary	Critical	0.18
NA	Paddock trees/scattered trees within 100 m of a koala habitat patch	Non remnant	LIKT and Ancillary	Critical	3.10
				Total Critical Habitat	**31.90**
				TOTAL	**31.90**

4.2.3.6 Dulacca woodland snail

The Dulacca woodland snail (*Adclarkia dulacca*) occurs in remnant patches of vine thicket, brigalow woodland, lancewood and ironbark woodland on ridges, and *Eucalyptus woollsiana* woodland containing suitable cover, in the area between Miles and Dulacca, south to Meandarra (Threatened Species Scientific Committee, 2016). The Dulacca woodland snail is also known to occur in areas of brigalow regrowth and, less commonly, areas of cleared brigalow where logs, woody debris or other

suitable microhabitat sites (including rocks and loose bark at the base of trees) remain. The species lives under rocks and timber and likely feeds on fungi, lichen, algae and other detritus/biofilm growing on organic litter. Threats to the species include clearing and fragmentation of habitat, invasion by buffel grass, high intensity fire, predation by rats and mice, and trampling by cattle (Threatened Species Scientific Committee, 2016).

While not detected during surveys, the Study Area contains suitable habitat for the species including 4.37 ha of Critical Habitat within the Indicative Footprint. Critical Habitat for Dulacca woodland snail within the Indicative Footprint includes remnant and regrowth RE 11.9.5, remnant REs 11.7.2, 11.5.16 and RE 11.10.8 containing suitable shelter and potential foraging habitat for the species. The extent of potential habitat for the species within the Study Area is shown in Appendix M.

The dry conditions during surveys were considered suboptimal for the detection of the species, with the Study Area and surrounds receiving below-average rainfall in the three months preceding surveys (Bureau of Meteorology, 2023). As such, failure to detect the species need not indicate species' absence from the Study Area and the species is still considered 'likely to occur' within the Study Area, given:

- the presence of suitable habitat within and adjacent the Study Area, and
- known occurrence of the species within 10 km of the Study Area [see Appendix E]).

4.2.3.7 Migratory species

The PMST report identified ten migratory species as potentially occurring within 10 km of the Study Area (refer to Appendix B for details). Of these species, only the white-throated needletail was assessed as likely to occur within the Study Area (see Section 4.2.3.3).

4.2.4 Pest fauna

Pest animal species detected within the Study Area during surveys include the cane toad (*Rhinella marina**), feral pig (*Sus scrofa**) and rabbit (*Oryctolagus cuniculus**). Both the rabbit and feral pig are listed as restricted matter (category 3, 4, 5 and/or 6) under the *Biosecurity Act 2014* and all three species are the subject of federal (Commonwealth) threat abatement plans.

4.3 Habitat quality assessment results

A summary of Habitat Quality scores for target MNES known or likely to occur within the Indicative Footprint is provided in Table 14. Scores for each of the habitat attributes contributing to the assessment of Habitat Quality are detailed in Appendix N. Area weightings used to calculate Habitat Quality scores for MNES (as detailed in appendix N) are based on the maximum impact area, which includes a 10% buffer to allow for fine adjustments to the siting of the RoW and other Project infrastructure.

Overall habitat quality scores for MNES fauna ranged from 5 (Squatter pigeon and Greater glider) to 6 (Dulacca woodland snail, Koala and South-eastern glossy black-cockatoo). The low-to-moderate Habitat Quality scores for the majority of MNES fauna reflects the low abundance/density of animals and overall patchiness of habitat within the Indicative Footprint and wider Study Area.

The moderate habitat quality score for Poplar Box TEC (5) reflects the limited extent and low quality of Poplar Box woodland TEC within the Indicative Footprint and scarcity/patchiness of this TEC within the surrounding landscape. The overall habitat score for Brigalow TEC (6) is similarly reflective of the small, isolated patches of moderate quality Brigalow woodland within the Indicative Footprint and fragmentation of this TEC within the surrounding landscape.

Table 14: Overall habitat quality score for MNES

Target Protected Matter	Mean unweighted Site Condition Score (/3)*	Mean unweighetd Site Context Score (/3)*	Mean unweighted Species Stocking Rate Score (/4)*	Final area-weighted Habitat Quality score (/10)**
MNES Fauna				
Squatter pigeon (southern subspecies) *Geophaps scripta scripta*	1.96	1.21	1.39	5
Koala *Phascolarctos cinereus*	1.82	1.35	2.00	5
Greater glider *Petauroides minor*	1.73	1.32	1.59	5
South-eastern glossy black-cockatoo *Calyptorhynchus lathami lathami*	1.75	1.47	2.10	6
Dulacca woodland snail *Adclarkia dulacca*	1.85	1.31	2.00	6
White-throated needletail *Hirundapus caudacutus*	1.68	1.88	2.00	5
Threatened Ecological Communities	**Mean unweighted Site Condition Score (/7)**	**Mean unweighetd Site Context Score (/3)**	**Final area weighted Habitat quality score (/10)**	
Poplar Box Grassy Woodland on Alluvial Plains	4.64	0.52	5	
Brigalow (*Acacia harpophylla* dominant and co-dominant)	5.16	0.87	6	

*Mean non-area-weighted score averaged across assessment units.

** Final area-weighted scored score rounded to nearest whole number.

4.4 Ecological function

4.4.1 Wetlands and watercourses

The Study Area is intersected by Woleebee Creek, Sandy Creek, Yuleba Creek, and several other unnamed watercourses (refer to Appendix P for state mapped watercourses intersecting the Study

Area). Most watercourses and drainage lines present within the Study Area are highly degraded due to historical agricultural management practices, including clearing, the sewing of exotic pasture grasses, weed invasion and altered hydrology due to the construction of farm dams.

4.4.2 Corridors and connectivity

The Study Area is located within a highly disturbed and fragmented landscape due to the history of agricultural development in the region. The Study Area is located outside a state-wide terrestrial biodiversity corridor, but is intersected by multiple regional riparian corridors associated with Woleebee Creek and Yuleba Creek (DES, 2021). Combabula State Forest provides the majority of the terrestrial connectivity values within the Study Area (DES, 2021), with isolated patches of remnant vegetation scattered throughout the Study Area.

In regard to habitat connectivity, it is noted that clearing associated with linear infrastructure adjacent the RoW (including roadways, fence lines, Jemena pipeline and the 40 m-wide Australia-Pacific LNG [APLNG] pipeline construction corridor APLNG pipeline construction corridor) already poses a barrier to dispersal for less mobile fauna species, including both greater glider and Dulacca woodland snail (as detailed in Appendix T and sections 5.2.1 and 5.2.2.2)

5 Project Impacts and Proposed Mitigation Measures

5.1 Project activities

The Project will include construction, operation, decommissioning and rehabilitation of a buried, steel, high-pressure, natural gas transmission pipeline. The design, construction and operation will be in accordance with Australian Standard 2885 (Pipelines - Gas and liquid petroleum). The Project will result in a 57 km long linear disturbance corridor within a 30 m wide RoW. Activities associated with construction of the pipeline will include:

- Clearing and stockpiling of vegetation and grading of the 30 metre RoW
- Additional clearing and construction works associated with the establishment of temporary facilities such as work areas for equipment and pipe delivery and storage, as well as access tracks and turn-around areas for construction
- Pipe stringing and delivery (image 5)
- Pipe-welding and coating
- Excavation of pipeline trench
- Horizontal directional drilling for the pipeline crossing under Woleebee Creek and Yuleba Creek
- Pipe laying and backfilling (Image 6)
- Installation of end of pipeline facilities and connection to existing infrastructure
- Hydrotesting (filling with water and pressurising it to above maximum operating pressure), and
- Backfilling of pipeline with soil and rehabilitation of RoW and temporary facilities (recontouring and establishment of ground cover) (Image 7).

Areas of ground disturbance will be subject to progressive rehabilitation during the 6-month construction period, with recontouring and restoration taking place within 3 months of initial disturbance (as detailed in the ARCP Rehabilitation Plan [SENEX-ARCP-EN-PLN-003]).

The exact timing/scheduling of construction has yet to be determined and will depend on a range of factors, including the finalisation of approvals, site access, resourcing constraints (i.e., the availability of workers, machinery), and conditions on ground. As such, no assumptions have been with regard to the timing of construction works.

During the anticipated 40-year operational life of the pipeline, access along the RoW will be maintained via periodic slashing of vegetation (up to 10 m either side of the pipeline) and, where necessary, cutting and poisoning of woody regrowth. Weed and erosion monitoring and management will also be undertaken periodically, as required under the ARC Pipeline Environmental Management Plan. During the operational phase of the Project, maintenance and repairs to the pipeline may necessitate minor earthworks works along sections of RoW; however, these areas will be rehabilitated following disturbance.

Routine operations and maintenance programs may include ground and aerial patrols, routine inspection and overhauls of infrastructure, repairs (which may include excavating the pipeline), cleaning the pipeline, easement maintenance including access tracks and signage, and control of weed species or vegetation impeding line of site between pipeline markers.

While no additional permanent fencing is required along the RoW, maintenance works may necessitate the erection of short sections of temporary fencing around hazards and work areas.

When decommissioning the Project at end of life, Senex's overall objective is to leave the RoW in a condition that is safe and stable and meets the agreed post-disturbance land use, as detailed in the ARCP Rehabilitation Plan (SENEX-ARCP-EN-PLN-003).

The ARCP will be isolated, capped and purged of hydrocarbons and liquids. The anode beds will be disconnected, and the steel pipeline will remain in situ, where practical and safe to do so to avoid disturbing re-established vegetation. If left in-situ, an abandonment plan will be developed in accordance with regulatory requirements to ensure that ground subsidence and the risk of contamination of the soil or groundwater is minimised.

If it is either unsafe or not practical to leave the steel pipeline in-situ, the infrastructure will be removed using similar methods as construction, and in compliance with AS2885 and other State legislation and approvals.



Image 5: Example of pipeline stringing within cleared Right of Way



Image 6: Example of pipe being lowered into trench (Source: McConnell Dowell)



Image 7: Example of Senex pipeline RoW rehabilitation

5.2 Potential project impacts

The Project has the potential to impact ecological values within and/or adjacent the Indicative Footprint both directly and indirectly, as detailed in Sections 5.2.1 and 5.2.2, below. Measures to avoid, minimise and mitigate impacts on flora and fauna are discussed in Section 5.3, while residual impacts on MNES flora and fauna are discussed in Section 5.4.

5.2.1 Direct impacts

Construction of the pipeline will require the removal of native vegetation cover, including remnant and regrowth vegetation providing habitat for native flora and fauna species. This includes TECs and habitat for MNES species likely to occur within the Indicative Footprint. Woody vegetation cleared from the Indicative Footprint will not be allowed to regrow during the 40-year life of the Project, and possibly longer (depending on subsequent land use/management within the RoW). As such, the resulting loss of woodland habitat within the RoW is considered permanent.

Construction and clearing activities, including trenching and pipe-laying could also result in the acute disturbance, injury and mortality of fauna/flora (including MNES species), with potential mortality/injury of fauna within trenches occurring prior to and during pipe laying and backfilling of the pipeline trench.

Vehicular traffic during construction and operational phases of the Project (including vehicles used in periodic monitoring and maintenance activities, including slashing of woody regrowth) could also result in injury/mortality of fauna within the Indicative Footprint.

Measures to avoid, minimise and mitigate these impacts are outlined in Section 5.3.

5.2.2 Indirect impacts

Potential indirect impacts of the Project on MNES known or likely to occur within and/or adjacent the Indicative Footprint, include:

- entrapment of fauna in open excavation areas and steel piping during construction

- acute disturbance of fauna (including breeding animals) immediately adjacent the RoW during clearing and construction works, due to noise, dust and light pollution
- impacts on native vegetation (including TECs) immediately adjacent the RoW resulting from:
  - changes in surface and groundwater hydrology due to altered drainage/runoff patterns, and
  - soil and water contamination due to fuel spills and/or wastewater discharge during construction and maintenance/repair of the pipeline
- increased runoff and erosion resulting in downstream impacts on watercourses, during and after construction
- contamination of waterways with fuel and wastewater during pipeline installation, testing and pipeline maintenance
- accidental ignition of vegetation adjacent the Indicative Footprint during pipe-welding
- accidental injury and/or death of fauna in the pipe trench, open pits and/or sumps during construction (prior to backfilling of trenches)
- entanglement/injury of fauna in discarded waste (including rope, wire, plastic packaging and containers)
- reduced resilience of fauna and/or flora to future climate change (due to reduced mobility/ connectivity between refugial habitat areas)
- reduced connectivity and dispersal/movement between woodland/open forest habitat areas, due to:
  - earthworks (trenching) during pipeline construction
  - windrowing/piling of cleared timber alongside the RoW, and
  - loss of tree cover/shelter habitat along the RoW.
- the introduction of edge effects that may impact upon flora and fauna adjacent the Indicative Footprint following clearing (in instances where the RoW intersects intact woodland/open forest), and
- introduction and spread of invasive weeds and pest animal species.

With limited capacity for dispersal/movement through areas of cleared habitat, clearing of vegetation within the Indicative Footprint poses a particular threat to greater glider (southern) and Dulacca woodland snail, as detailed in Sections 5.2.2.1 and 5.2.2.2 (below).

In regard to koala, it is noted that additional clearing along the ARCP RoW is unlikely to impede movement/dispersal, given dispersing animals will travel hundreds of meters across open ground in order to access feed and shelter trees (Youngentob et. al., 2021; Ramsay 1999, Marsh et al. 2014b).

And, while movement across areas of open ground may increase the susceptibility of koalas to predation, it is unlikely that clearing along the RoW would substantially increase koala mortality rates above existing (background) levels, given:

- the amount of time koalas are likely to spend on the ground already given the current extent of clearing within and adjacent the Indicative Footprint
- limited evidence of feral predators (canid species) within the Study Area during surveys, and
- other existing threats to koala (including vehicular traffic) operating within and adjacent the Indicative Footprint.

5.2.2.1 Impacts on greater glider (southern) habitat connectivity

To help assess potential impacts of clearing on greater glider habitat connectivity, the potential movement of greater gliders (southern) between areas of suitable habitat either side of the RoW has been subject to more detailed analysis. The analysis of glider movement undertaken to assess Project impacts on habitat connectivity takes into account:

- information on tree height collected by Senex ecologists along the RoW (as detailed in Senex, 2024)
- existing impediments to glider movement/dispersal within and/or adjacent the ROW (including roadways, fencing, the Jemena gas pipeline RoW and APLNG construction corridor) identified in the field and/or satellite imagery, and
- current knowledge of the species movement/dispersal behaviour, as summarised below.

Greater gliders typically move through woodland and forest habitat by gliding from tree-to-tree without coming to ground and moves awkwardly when on the ground (where it is also highly susceptible to predation). Available evidence suggests greater gliders are unlikely to cross clearings >50 m except in taller forest/woodland habitat where tall trees (> 30 m height) may allow the species to glide further (Taylor and Goldingay, 2009; T. Eyre. pers. comm). In areas of lower forest/open woodland, where canopy trees typically measure <20 m, this distance is likely to be less (due to a reduction in launch tree height and glide distance) (T. Eyre, pers. comm.). To assess the potential for Project impacts on habitat connectivity along the ROW, maximum horizontal glide distances across the ROW have been calculated based on tree height and the distance between launch trees either side of the ROW, assuming a maximum glide angle of between 31 to 40 degrees from horizontal (see Taylor and Goldingay, 2009 and Wake et al., 1970). In calculating safe glide distances across the RoW, launch tree height has been adjusted to account for uncertainty regarding: (1) the height at which gliders will attempt to launch themselves from a tree, noting that gliders may not launch from the highest point in the tree canopy; and (2) safe landing height (given the potential for entanglement in dense shrub cover and/or fencing upon landing). For this reason, the estimated launch height of gliders has been calculated as follows: launch height = tree canopy height in metres, less 2 metres.

Given the above, it is likely that gliders would come to ground when (1) attempting to cross sections of the RoW measuring 30 m across where the height of canopy trees either side of the ROW is less 20 m or less, and (2) areas where the combined width of the RoW and abutting cleared infrastructure corridors (i.e., combined area of contiguous clearing) exceeds 40 m. This includes mapped habitat at the following locations:

- between chainages 20980-21300 (i.e. between KP 20 and KP 22)
- between chainages 23200-23300 (i.e., between KP 23 and KP 24)
- between chainages 24600-24760 (i.e., between KP 24 and KP 25)
- between chainages 30000-30900 (I.e., between KP 20 and KP 31)
- between chainages 31500-31550 (i.e., between KP 31 and KP 32)
- between chainages 33700-33800 (i.e., between KP 33 and KP 34)
- between chainages 32830-32950 (i.e., between KP 32 and KP 33)
- between chainages 36580-37450 (i.e., between KP 36 and KP 38)
- between chainages 40700-42600 (i.e., between KP 40 and KP 43)
- between chainages 44480-44520 (i.e., between KP 44 and KP 45)
- between chainages 45460-45800 (i.e., between KP 45 and KP 46)

- between chainages 45800-46530 (i.e., between KP 46 and KP 47)
- between chainages 46800-47570 (i.e., between KP 46 and KP 48), and
- between chainages 49650-50180 (i.e., between KP 49 and KP 51).

In considering potential Project impacts on habitat connectivity for greater glider, it is noted that movement of gliders across much of the Project Study Area is already compromised by past clearing/fragmentation of habitat due to grazing as well as construction of roadways, the Jemena pipeline RoW and 40 m-wide APLNG construction corridor situated south of the Project RoW (between KP 45 and KP 50), with barbed wire fencing posing an additional risk in some areas. Further clearing adjacent these existing disturbance areas is therefore likely inconsequential in terms of glider movement/dispersal within the surrounding landscape. Efforts to avoid/minimise Project impacts on glider movement/dispersal (as detailed in Section 5.3.2.19) have therefore focused on maintaining habitat connectivity along intact movement/dispersal corridors (e.g., riparian corridors) within the Project Study Area.

5.2.2.2 Impacts on Dulacca woodland snail habitat connectivity

Construction of the ARC pipeline will necessitate the clearing of mapped potential habitat for the Dulacca woodland snail potentially disrupting snail movement/dispersal across the RoW. To help determine Project impacts on Dulacca woodland snail habitat connectivity, the potential movement of snails between areas of suitable habitat either side of the RoW has been subject to detailed assessment, taking into account:

- the quality of suitable habitat either side of the ROW, and
- existing connectivity between areas of potential habitat either side of the ROW, including barriers to dispersal (e.g., cleared areas devoid of cover).

In assessing the potential for Project impacts on the movement/dispersal of Dulacca woodland snail it is assumed that the species is unlikely to traverse cleared areas devoid of cover > 20 m across, given:

- the species' nocturnal behaviour
- diurnal shelter requirements, and
- limited capacity for dispersal (assuming an average maximum speed of 4 cm/minute [see Pembury Smith and Ruxton, 2021]).

Clearing widths 20 m or greater could therefore potentially compromise movement/dispersal of woodland snails and between areas of retained habitat either side of the RoW.

Given the above, clearing of vegetation along the ROW could inhibit dispersal/movement of Dulacca woodland snail between areas of retained patches either side of the ROW between chainages 13200 and 13300 (i.e., between KP 13 and KP 14).

5.3 Impact avoidance, minimisation and mitigation

5.3.1 Impact avoidance

Arc Pipeline Pty Ltd prepared an initial alignment for E2M to conduct a desktop review and scouting exercise (Appendix Q). The initial alignment was located adjacent to the Darling Downs Pipeline (Jemena) and the Woleebee Lateral Pipeline (Origin) to minimise fragmentation of native vegetation and associated edge effects. The scouting exercise aimed to rapidly assess portions of the initial alignment that were identified during the desktop assessment as potentially supporting MNES, to determine if and how impacts on MNES could be avoided. As a result, a second alignment was identified to minimise impacts to MNES (Appendix Q). This alignment has been refined to further minimise Project impacts on habitat connectivity and potential denning/nesting resources

for greater glider and glossy-black cockatoo following further detailed field investigations conducted by Senex ecologists, as detailed in Appendix T (see also Section 5.3.2.19).

The detailed ecology assessment resulted in the development of the current alignment (Figure 1). Realignments that resulted from the scouting exercise and detailed ecology assessment included:

- Avoidance of a large remnant patch of Brigalow TEC near KP36, along with smaller patches along the alignment
- Avoidance of Poplar Box TEC (realignments were identified to utilise existing disturbance within Poplar Box TEC to avoid impacts)
- Avoiding and minimising disturbances to remnant and high value regrowth by slight realignments, particularly within areas of scattered vegetation. This included locations at:
  - KP 8.5 – KP 10
  - KP 23.75
  - KP 34; and
  - KP 37.5.
- Minimising impacts to koala habitat by realigning to retain scattered stands of LIKTs.
- Avoiding impacts to watercourses by utilising existing disturbances within riparian vegetation. Impacts on riparian habitat were further minimised by siting crossings to avoid the Project running parallel to watercourses (through direct crossing), resulting in less vegetation clearing and preventing erosion and sedimentation issues post-construction. Minor realignments to minimise impacts to watercourses and watercourse vegetation occurred at:
  - KP 21
  - KP 23.25
  - KP 33.75
  - KP 35; and
  - KP 44.75.
- Avoiding direct impacts to riparian habitat and riparian vegetation along Yuleba and Woleebee Creeks through the use of horizontal directional drilling (HDD) (a method which allows for the installation of underground pipelines without trenching, thereby circumventing the need for vegetation clearing)[9].
- Additional narrowing of the RoW to allow the retention of habitat trees (including glider launch trees, koala feed and shelter trees and potential nest/den trees) at selected locations along the RoW (as detailed in Senex, 2024) (see Appendix T).
- Within open grazed areas, isolated habitat trees (including potential koala habitat trees) were avoided where possible by realigning the Project disturbance footprint. Final siting of as yet un-sited infrastructure and in-field adjustments to the pipeline alignment will be undertaken in accordance with the Environmental Protocol for Field Development and Constraints Analysis [SENEX-QLDS-EN-PRC-019] in order to avoid all MNES and preferentially minimise disturbance to other biodiversity values.

[9] HDD operations will allow for the retention of riparian vegetation ~100 m either side of Woleebee and Yuleba Creeks.

5.3.2 Impact minimisation and mitigation measures

Potential Project impacts on ecological values during construction, operation and decommissioning of the pipeline will be managed and mitigated in accordance with the following plans/procedures:

- ARCP Environmental Management Plan (SENEX-ARCP-EN-PLN-001)
- Contingency Procedures for Emergency Environmental Incidents (SENEX-QLDS-EN-PRC-024)
- Queensland Weed Hygiene Procedure (SENEX-QLD-EN-PRC-023) (to ensure compliance with the *Biosecurity Act 2014*)
- Site-specific weed management plan, detailing prevention, monitoring and control measures within the Indicative Footprint (including measures to manage control the spread and establishment of environmental weeds other than WONS or plants listed as Prohibited Matter under state and federal legislation)
- Queensland Erosion and Sediment Control Procedure [SENEX-QLDS-EN-PRC-003]
- Queensland Fauna and Stock Management Plan (SENEX-QLDS-EN-PRC-021)
- ARCP Rehabilitation Plan (SENEX-ARCP-EN-PLN-003)
- ARCP Significant Species Management Plan (SENEX-ARCP-EN-PLN-002)
- Species Management Programs to address impacts on native animal breeding places (as required under the NC Act 1992)
- ARCP Biodiversity Offset Strategy addressing residual impacts on MNES flora and fauna.

Relevant measures for minimising/mitigating Project impacts on ecological values within and/adjacent the Indicative Footprint included in the abovementioned plans are detailed below. Unknown and unpredictable impacts identified during monitoring and maintenance activities will be addressed through relevant incident management and emergency response procedures (as detailed in Contingency Procedures for Emergency Environmental Incidents [SENEX-QLDS-EN-PRC-024]).

5.3.2.1 General environmental management controls

- No firearms, traps, nets or pets are permitted on site with the exception of traps that are authorised by the Environment Manager for use in ecological assessments.
- No fires are permitted on site.
- Feeding of native animals is not permitted.
- Personnel must stay within areas approved for operations (cleared work zones) and not drive off approved access tracks or enter exclusion areas or 'no-go' zones.
- All rubbish and waste materials including cigarette butts are to be disposed of in the appropriate bins, or in the absence of bins, removed daily from site. All personnel are responsible for ensuring that sites remain litter free.
- Only water from a Senex approved source will be used.
- Adequate and properly maintained firefighting equipment will be present on site and potential ignition sources controlled.

5.3.2.2 Vehicle management controls

- Vehicles and personnel will only enter and exit the site at designated access points from designated access tracks and roads. Vehicles, plant, machinery and equipment will remain on formed access tracks at all times unless agreed otherwise as specified in the CCA and identified in the ATW.

- All gates will be left in the condition in which they are found. Damage caused to gates or fences by Senex activities is to be reported to the Senex Site Supervisor immediately.
- Vehicles will carry adequate firefighting equipment including a fire extinguisher.
- The integrity of private roads and tracks will be maintained at all times.
- All vehicles will be maintained weed free.
- Vehicle speed limits (maximum 40km/hr) will apply throughout construction.
- Personnel will remain within areas approved for operations (cleared work zones) and not drive off approved access tracks or enter exclusion areas or 'no-go' zones.
- Limiting storage of equipment and machinery to the Disturbance Footprint, and not within stands of adjacent retained vegetation.

5.3.2.3 Pest and weed management

- Activities will be planned so that movement of vehicles, plant, machinery and equipment avoid moving between properties, corridors or areas with weed infestations.
- Site specific weed management requirements will be defined prior to access to any property or work site.
- Pest and weed management control activities will be undertaken as directed by Senex.
- Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or CCA provisions, and local, state and national regulatory requirements.
- Vehicle hygiene procedures will be implemented where risk of weed introduction or spread is identified.
- All vehicles, plant and equipment will be maintained weed free.
- A biosecurity plan has been developed by Senex (Biosecurity Management Plan [SENEX-CORP-EN-PLN-003]). Site specific weed management requirements will be defined prior to access to any property or work site and outlined in the ATW, to be followed by all staff and contractors.
- Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds. Landowner approval may also be required for imported soils and gravel.
- Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or Conduct and Compensation Agreement (CCA) provisions, and local, state and national regulatory requirements.

5.3.2.4 Chemical use and fuel storage

- All fuel, oil and chemicals will be stored, transported and handled in accordance appropriate standards including AS 3780:2008 – The storage and handling of corrosive substances, AS 1940:2004 – The storage and handling of flammable and combustible liquids, AS 3833:2007 – Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers.
- Bulk fuel tanks stored outside a bunded area will be contained within a self- bunded tank with safety valves.
- Appropriate spill response equipment will be available on site and/or with vehicles, and regularly maintained.

- An inventory of all chemicals maintained on each site will be maintained by the Senex Site Supervisor.
- Safety Data Sheets (SDS) will be maintained on site at all times and for all chemicals.
- Storage areas will be sealed, bunded, and adequately ventilated.
- Storage and refuelling areas will be preferentially located away from watercourses, sensitive areas and any source of ignition as determined by the Senex Site Supervisor.
- Incompatible substances will be segregated according to SDS specifications.
- All flammable liquids used will be stored and dispensed only from approved containers.
- Substances not in use will be sealed and safely stored in a secure area.
- Substance storage/containment and disposal will be in accordance with the SDS (including personal protective equipment, ventilation, spill containment and precautions to avoid fire).
- Containment bunds and/or sumps will be drained periodically of accumulated rainwater to prevent overflow and subsequent pollution of the surrounding land and watercourses.

5.3.2.5 Cultural Heritage

- Corporate cultural heritage inductions.
- Cultural heritage clearance will be undertaken prior to commencing any works other than preliminary walk-over type surveys (for example, ecology surveys and bore baseline assessments) within the Project Area.
- No works will be undertaken, or access permitted within areas marked as cultural heritage 'no go' areas.
- The Senex Site Supervisor will be notified immediately if any cultural heritage sites, objects or remains are located. Should this occur, work must cease immediately.

5.3.2.6 Produced water management

- No discharges of water to land or surface waters will occur without authorisation from the Senex Site Supervisor having consulted with the Senex Environment Manager.
- Produced water may be used for dust suppression and construction purposes provided the use:
  - does not result in negative impacts on the composition and structure of soil or subsoils;
  - is not directly or indirectly released to waters;
  - does not result in runoff from the construction site; and
  - does not harm vegetation surrounding the construction site.
- The use of produced water for dust suppression will:
  - not cause on-site ponding or runoff;
  - be directly applied to the area requiring suppression;
  - not harm vegetation surrounding the area being dust suppressed; and
  - not cause visible salting.
- Produced water may be disposed of for domestic purposes or stock purposes and must meet the irrigation or livestock watering criteria as relevant to those purposes in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000). It will be disposed of in

accordance with the BUAs were approved by Senex Site Supervisor having consulted with the Senex Environment Manager.

- Pipeline wastewater (for example, hydrostatic test water or trench water), may be released to land provided, if it meets the following water quality parameters:
  - electrical conductivity does not exceed 3000µS/cm;
  - sodium adsorption ratio (SAR) not exceeding 8;
  - pH between 6.0 and 9.0;
  - heavy metals (measured as a total) meet the respective short-term trigger value in section 4.2.6, Table 4.2.10- Heavy metals and metalloids in Australian and New Zealand Guidelines for Fresh and Marine Water Quality; and
  - does not contain biocides.
- Pipeline wastewater will be released in a way that does not result in visible scouring or erosion or pooling or run-off or vegetation die-off.

5.3.2.7 Noise and vibration and light

- Potentially impacted sensitive receptors will be identified in the ATW.
- Prior to construction and other noisy activities, landholders will be notified of the nature and expected duration of noisy activities.
- Construction hours will be in accordance with approval conditions and requirements of the *Environmental Protection (Noise) Policy 2008*.
- Noise impacts and requirements for noise mitigation will be considered during the engineering design and site planning processes. Noise impacts will be minimised by adopting measures in the EPP Noise hierarchy as appropriate (for example, locating activities at suitable distances from noise sensitive places).
- Facility specific noise modelling will be undertaken during the design phase.
- Noise modelling or assessment will be undertaken for temporary and operational activities to assess expected noise emissions at potential sensitive receptors.
- Operators of construction equipment will be made aware of potential noise impacts and will be required to employ techniques and/or equipment to minimise noise emissions where necessary.
- No vehicles or equipment are to move outside the cleared work zone to prevent unnecessary land and vegetation disturbance.
- Night construction works will be largely avoided and use of artificial lighting limited to hydrotesting activities and HDD operations, as detailed below.
  - Hydrotesting activities will be conducted over a period of ~25 days, focusing primarily on sections KP 0, 29.5, and 56 of the RoW. Nightworks during this period will necessitate the operation of three tower lights throughout the night, 7 days a week.
  - HDD will be conducted at Woleebee and Yuleba Creeks over a ~3 week period, with each side of the HDD operation illuminated by three tower lights operating continuously throughout the night, 7 days a week.

5.3.2.8 Air Quality

- Landholders or residents of any adjacent sensitive places will be advised of planned works prior to the commencement of activities.

- Staff and contractors will be made aware through general site induction and training of the potential to generate dust emissions and mitigation and management measures that will be implemented.
- Vehicles, plant and equipment will be regularly maintained to ensure all machinery is in good working order and does not generate excessive air emissions. Plant and equipment will be operated in their proper and effective condition.
- Vehicles will be operated in a fuel-efficient manner and will not be left turned on or idling at the site for longer than required.
- Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation.
- Disturbed areas and access roads will be watered using a water cart/truck on an as-required basis to minimise the potential for environmental nuisance due to dust. Watering frequency may be increased (for example, during periods of high risk (prolonged dry periods and under windy conditions), if excessive levels of dust is visible or as reasonably requested by the landholder). Dust suppression using produced water must comply with approval conditions.
- No vehicles or equipment are to move outside the cleared work zone to prevent unnecessary land and vegetation disturbance.
- Vehicle speed limits (maximum 40km/hr) will apply throughout construction.
- Night ROW construction works will be avoided.

5.3.2.9 Waste Management

- Waste will be appropriately managed to avoid or minimise the potential for:
  - Release of hazardous waste to land or waters either through inappropriate waste disposal or accidental release;
  - Inadequate waste management leading to inappropriate disposal or inadequate re-use and recycling; or
  - Impacts to the environment, land use or well-being of people resulting from inappropriate storage, handling or disposal of waste.
- All waste generated will be stored, handled and transported in accordance with the waste and resource management hierarchy, waste and resource management principles, appropriate standards and regulatory requirements as outlined in the Senex Waste Management Procedure – Qld Operations [SENEX-QLDS-EN-PRC-022].
- The SDS for materials will be referenced to assist with the appropriate identification for handling and disposal of waste material.
- All wastes will be transported in covered or sealed containers to prevent the loss of waste materials during transport.
- All sites will be kept free from litter.
- Items of general waste are not to be disposed of in trench or pits.
- Waste material (including domestic waste) will be collected and stored in covered bins to prevent loss and scavenging by animals.
- Recyclable materials will be segregated (for example, glass and cans, scrap metals, used chemical and fuel drums and timber pallets) in designated containers for recycling where reasonably practicable.

- All wastes regulated wastes will be transported offsite by a licensed contractor to a suitably licensed facility for reuse, recycling or disposed unless authorised under the EA as being able to be disposed of on-site.
- All waste materials will be removed from site once activities are completed.
- Green waste may be used on site for both rehabilitation and sediment and erosion control.
- Only licensed waste contractors may collect, transport and dispose of regulated waste from the site.

5.3.2.10 Land disturbance and flora management

- During project planning for un-sited infrastructure, the Environmental Protocol for Field Development and Constraints Analysis [SENEX-QLDS-EN-PRC-019] will be used to avoid and minimise disturbance to biodiversity values within and adjacent to the Indicative Footprint.
- Vegetation will not be cleared unless authorised under a Senex ATW. The ATW must be approved prior to any vegetation clearance or disturbance occurring.
- Using horizontal directional drilling to minimise disturbance of timbered vegetation at the crossing of Woleebee Creek.
- Positive visual markings or pegs will be used to physically demarcate the extent of proposed pipeline disturbance and vegetation to be removed.
- Any sensitive areas, such as ESAs or threatened plants/communities adjacent to the work area will be communicated via toolboxes to project staff and contractors.
- 'No-go' areas will be GPS located, made available through GIS for the Project and clearly marked (for example, with bunting, signage and/or flagging tape). Construction staff and contractors will be prohibited from accessing No-go areas and access will be by authorised persons for relevant activities only.
- Wherever practicable, in temporary workspaces, vegetation will be removed at ground level by cutting or slashing rather than removing root stock.
- Hollow-bearing trees present along the edges of the RoW (up to 5-10 m from the edges of the RoW) will be selectively retained within exclusion areas identified in the Habitat Connectivity Pre- and Post-Disturbance Report prepared by Senex (Senex, 2024) (see Appendix T). Natural vegetation buffers along creeks and rivers shall not be disturbed unless authorised under an ATW and only at the location specified.
- Measures to minimise stormwater entering significantly disturbed land that is not subject to transitional rehabilitation will be implemented and maintained.
- Sediment and erosion control measures to prevent soil loss and deposition beyond significantly disturbed land will be implemented and maintained.
- Coarse woody debris cleared from the Indicative Footprint will be retained and redeployed adjacent to the RoW as habitat for terrestrial fauna.
- Hollows from hollow bearing trees, where cleared, will be retained for reuse as habitat.
- Cleared vegetation/green waste that cannot be used on-site for rehabilitation and/or sediment erosion control will be stockpiled to facilitate re-spreading or salvaging for use in rehabilitation/habitat restoration works.
- Vehicles or equipment will remain within authorised work zones, particularly during vegetation clearing activities to prevent unnecessary land and vegetation disturbance.

- Limiting storage of equipment and machinery to the Indicative Footprint (i.e. not within stands of adjacent, retained vegetation).
- Rehabilitation of the Indicative Footprint following construction to a safe, stable and self-sustaining landform.
- Rehabilitation of work areas following construction using native ground cover species where other 'fire promoting' (e.g., buffel grass) do not already occur.

5.3.2.11 Fauna and stock management

- Implement the Queensland Fauna Stock Management Procedure [SENEX- CORP-EN-PRC-021].
- Implementation of ARCP Significant Species Management Plan [SENEX-ARCP-EN-PLN-002]in the areas of potential MNES fauna habitat.
- Pre-clearance surveys will be undertaken by a suitably experienced and licensed[10] spotter-catcher. Where MNES fauna or habitat currently occupied by MNE fauna such as hollows is found, the control measures of the ARCP Significant Species Management Plan [SENEX-ARCP-EN-PLN-002] will be applied.
- Where clearing in MNES habitat, a qualified fauna spotter-catcher will conduct a search immediately prior to clearing of woody vegetation for the presence of fauna species. Where fauna is detected, the spotter catcher will assess and implement the most appropriate method to avoid or minimise impacts on that fauna as a result of clearing, including relocation to suitable nearby habitat.
- Prior to clearing and construction works, pre-clearance fauna surveys will be undertaken by suitably experienced and qualified spotter-catchers to identify and translocate fauna at direct risk from clearing activities.
- During clearing, a 10 meter 'No-Go' zone will be established around habitat trees or other shelter sites occupied by MNES fauna, to allow animals to disperse voluntarily or with the assistance of a spotter-catcher.
- Management of fauna identified during clearing will include relocating individuals to adjacent habitat and treatment/care of injured animals.
- Active work areas hazardous to fauna other than the pipe trench (including pits and sumps), will be fenced off with shade cloth or covered to prevent fauna access.
- The open ends of welded pipes will be capped/covered over to prevent fauna entry during pipeline construction.
- During construction works, work areas and excavations (trenches) will be checked for fauna that may have become trapped.
- Exit ramps (with a <45 degree incline) will be maintained at either end of the open trench and temporary earth or wooden ramps installed at 1 kilometre intervals to facilitate fauna escape from the pipeline trench during construction.
- During construction, hessian sacks providing shelter for fauna will be deployed at 100 m intervals along sections of open trench.
- During construction and maintenance operations, open excavations (including trenches) will be inspected for trapped fauna by a qualified spotter catcher twice daily (once in the morning and

[10] The collection and translocation of Dulacca woodland snails will be carried out by fauna spotter catchers operating under a Wildlife Spotter Catcher Endorsed Rehabilitation Permit (WSCRP) (issued under S12(e) Nature Conservation (Administration) Regulation 2006)

once in the late afternoon). Trenches will also be inspected for trapped animals immediately prior to pipe laying and back-filling.

- To reduce the risk of fauna drowning in the pipeline trench, if severe weather (flooding rain) is forecast, the pipeline trench will be temporarily backfilled as far as practicable to mitigate flooding and ESC risk.
- Where activities may impose barriers to the movement of fauna for extended period of time, reasonable measures will be implemented to facilitate fauna movement around or through active work areas, such as breaks in stockpiled cleared vegetation at least every 50m.
- Steel piping and spoil will be placed on opposite sides of the pipeline trench to deter fauna from crossing over/entering the trench during pipeline construction.
- Any restrictions placed on stock movements in the vicinity of work areas will be agreed with landholders and identified in the ATW so that any disruption is minimised.
- Where necessary, following the identification of animal breeding places in the pre-clearance surveys, Species Management Programs (SMPs) will be developed and implemented to minimise disturbance of animal breeding place (as required under the NC Act).

5.3.2.12 Watercourse and wetlands

- Petroleum activities within any wetland area or watercourse will be carried out in accordance with an approved ATW. Watercourse crossings will be limited to those strictly necessary for construction or operation of infrastructure and only at locations approved in the ATW.
- Other than linear infrastructure, petroleum activities will be 200 metres from a wetland, lake or spring; or 100 metres from the outer bank of a watercourse.
- Construction and maintenance of linear infrastructure will be conducted in accordance with the following preference:
  - when no water is present,
  - in times of no flow, and
  - in times of flow but in a way that does not impede low flow.
- Construction and maintenance of infrastructure resulting in a significant disturbance to a wetland or watercourse will be undertaken by a suitably qualified person in accordance with the guideline Activities in a watercourse, lake or spring associated with a resource activity or mining operations.
- ROW soil or spoil stockpiles will be placed to minimise stormwater entering significantly disturbed land that will be exposed throughout construction.
- Sediment and erosion control measures to prevent soil loss and deposition beyond significantly disturbed land will be implemented and maintained throughout construction and rehabilitation until such time as groundcover has established and the ROW has met the rehabilitation acceptance criteria.
- Watercourse crossing points will be adequately stabilised to prevent erosion.
- Positive visual markings or pegs will be used to identify the extent of any vegetation to be removed.
- ‘No-go’ areas will be GPS located and clearly marked (for example, with bunting and/or flagging tape).
- Construction activities will be managed to minimise interference with overland flow paths.

- Clean stormwater will be diverted around land disturbed for ancillary aboveground infrastructure wherever practicable.
- For linear Infrastructure (for example, pipelines) – construction or maintenance activities in wetlands or a watercourse will only be carried out under the authorisation of an ATW and under the supervision of a suitably qualified environmental representative to ensure conditions of the EA are achieved.

5.3.2.13 Soil and erosion management

General

- Works on site will not commence until the Contractors erosion and sediment control procedures have been approved by the Senex Site Supervisor and are installed as required on significantly disturbed land.
- ROW soil or spoil stockpiles will be placed to minimise stormwater entering significantly disturbed land will be that will be exposed throughout construction.
- Sediment and erosion control measures to prevent soil loss and deposition beyond significantly disturbed land will be implemented and maintained.
- Sediment and erosion control will be managed in accordance with the Senex Queensland Erosion and Sediment Procedure [SENEX-QLDS-EN- PRC-003] and the Contractor's erosion and sediment control procedures.
- Erosion and sediment control structures will be inspected periodically and after rain events and maintenance carried out.
- All contaminated soils will be managed and remediated in accordance with EP Act requirements.
- Where soil is moved to the site, a weed declaration will be provided.

Erosion and Sediment Control

- Ensure stormwater passes through the site in a controlled manner and at non- erosive flow velocities. Divert clean water from work sites where transitional rehabilitation is not planned to be undertaken.
- Complete transitional rehabilitation such that the duration that disturbed soils are exposed to the erosive forces of wind rain and flowing water is less than 6 months.
- Implement erosion and sediment control measures to all work-related disturbances.
- Minimise negative impacts to land or properties adjacent to the activities (including roads).
- Be periodically inspected at worksites as required, before expected rainfall events, and after rain events and maintenance undertaken as per the Queensland Erosion and Sediment Control Procedure [SENEX- QLDS-EN-PRC-003].

Topsoil

- Soil stripping (where necessary) will not be undertaken in periods of high wind, rainfall or within the immediate period after rainfall to help avoid soil degradation.
- Topsoil (approx. upper 100 to 200 mm depending on soil type), which contains the bulk of the natural seed bank and organic matter will be stockpiled separately from subsoil.
- Topsoil is to be stockpiled in mounds no greater than 2 metres height except where not possible on watercourse crossing approaches due to ROW limitations.

- Topsoil will not be mixed with subsoil either during stockpiling or during re-placement on disturbed areas.
- Topsoil stockpiles will be located away from watercourses, natural drainage and flow lines to minimise erosion and waterway sedimentation.
- Erosion and sediment controls will be established around topsoil stockpiles to minimise the loss of soil during rain and slumping events. Stockpiles and sediment controls are to be routinely checked.
- Once construction activities are complete, soil horizons will be reinstated in the order in which they are excavated to the extent practicable by pipe displacement.

5.3.2.14 Environmental incident notification

- Personnel who observe an environmental incident including a spill will immediately notify the Contractor Site Supervisor who will then notify the Senex Site Supervisor.
- In the event of a chemical, oil or fuel spill, the spill will be contained and cleaned up as outlined in the Senex Spill Response Plan [SENEX-CORP-ER- PLN-006].
- Contractors will have in place procedures for spill response which are in accordance with the Senex Spill Response Plan [SENEX-CORP-ER-PLN- 006] and will include details requirements for:
  - minimising release
  - containing spilled material
  - raising the alarm and response
  - locations of spill kits; and
  - management of contaminated material if necessary.
- Any spills will be assessed by the Senex Site Supervisor supported by the Senex Environment Manager as required to determine appropriate remediation options such as the removal of contaminated material.
- Incident reports will contain information required by the HSE Management System and Incident Reporting and Investigation Procedure [SENEX-CORP- HS-PRC- 004].
- Emergency Response drills will be performed to ensure readiness and identify opportunities for improvement.

5.3.2.15 Measures for minimising risks of ignition of vegetation adjacent to the ROW

- Adequate and properly maintained firefighting equipment will be present on site and potential ignition sources controlled.
- Fire prevention training and toolbox meetings to ensure all personnel are fully aware of the potential of fire to start in work areas.
- To reduce the risk of fire, hot works (welding) will only be undertaken in areas cleared of vegetation along the RoW.
- Welding crews undertaking hot works will also be equipped with fire extinguishers and trained to put out spot fires safely.

5.3.2.16 Measures for minimising disturbance and clearing of native vegetation

- Vegetation will not be cleared unless authorised under the Access to Work (ATW) permit. The ATW will be approved prior to any vegetation clearance or disturbance occurring.

- Un-sited infrastructure (laydown and cathodic protection beds) will not be placed in remnant or high value regrowth vegetation.
- Clear demarcation of the clearing footprint and the establishment of 'No-Go' zones around areas of retained vegetation (using flagging and signage). No-go areas will be prohibited to enter for construction staff and contractors and will only be accessed by authorised persons for relevant activities, where necessary.
- Limiting disturbance of TECs to 1.01 ha of Brigalow TEC; and 0.088 ha of Poplar Box TEC (these figures being inclusive of 10% buffer additional to the Indicative Footprint).
- Any sensitive areas, such as ESAs or threatened plants/communities adjacent to the work area will be communicated via toolboxes to project staff and contractors.
- Cleared vegetation/green waste not used on-site for rehabilitation and/or sediment erosion will be left in windrows unless it has been identified for re-spreading or salvaging for use in rehabilitation/habitat restoration works.
- All 'No-Go' areas will be GPS located, made available through GIS for the Project and clearly marked e.g., bunting, flagging tape.
- Rehabilitation of disturbed areas following construction as described in the Rehabilitation Plan [SENEX-ARCP-EN-PLN-003]

5.3.2.17 Measures for minimising indirect impacts to adjacent habitat areas

- Sediment and erosion control to be managed in accordance with the Erosion and Sediment Control Procedure [SENEX-QLDS-EN-PRC-003] and the Contractor's erosion and sediment control procedures.
- Erosion and sediment control structures will be inspected periodically and after rain events and maintenance carried out.
- Watercourse crossing points will be adequately stabilised to prevent erosion.
- Construction period in waterways will be minimised, and managed in accordance with relevant Queensland Accepted Development requirements for operational work that is constructing or raising waterway barrier works.
- Construction and maintenance of linear infrastructure near watercourses will be conducted in accordance with the following preference: when no water is present, in times of no flow, in times of flow but in a way that does not impede low flow.
- Positive visual markings or pegs will be used to identify the extent of any vegetation to be removed in proximity to watercourses.
- 'No-Go' areas around watercourses will be GPS located and clearly marked (for example with bunting and/or flagging tape).
- Construction activities will not interfere or block natural drainage e.g., disturbing channel contours.

5.3.2.18 Measures for minimising project impacts on mortality, injury and disturbance of fauna

- Site inductions and pre-start meetings will be held for all personnel attending the work site. The information discussed will include flora and fauna management issues at the site and any specific requirements.
- No firearms, traps, nets or pets permitted on site or in camp.
- Feeding of domestic or native animals is not permitted.

- During construction works, work areas and excavations (trenches) will be checked for fauna that may have become trapped and if trenches remain open after daily site works have been completed, fauna ramps will be put in place.
- Steel piping and spoil will be placed on opposite sides of the pipeline trench to deter fauna from crossing over/entering the trench during pipeline construction.
- Active work areas hazardous to fauna other than the pipe trench (including pits and sumps), will be fenced off with shade cloth or covered to prevent fauna access.
- The open ends of welded pipes will be capped/covered over to prevent fauna entry during pipeline construction.
- During construction, hessian sacks providing shelter for fauna will be deployed at 100 m intervals along sections of open trench.
- Open sections of the pipeline trench will be inspected for fauna twice daily: once in the morning and once in the late afternoon.
- Open trenches will be checked for fauna immediately prior to backfilling.
- Exit ramps (with a <45 degree incline) will be maintained at either end of the open trench and temporary earth or wooden ramps installed at 1 kilometre intervals to facilitate fauna escape
- If significant weather event is forecast, trench will be temporarily backfilled as far as practicable to mitigate flooding and ESC risk.
- Prior to undertaking activities that result in significant disturbance of land in areas of native vegetation, an ecological survey will be undertaken by a suitably qualified person.
- Preliminary Desktop Assessment and Ecological Survey will be conducted to identify the likelihood of habitat features to support fauna, particularly threatened species.
- Vegetation clearing will be undertaken in a sequential manner to direct fauna towards adjacent habitat and not into other hazardous areas.
- Fauna will be preferentially allowed to move off on their own accord. Where this does not occur and immediate access is required, a fauna spotter-catcher will relocate the animal.
- A suitably qualified and licensed fauna spotter/catcher (including koala spotter experience) will be present during all vegetation clearing works. The Code of Practice - Care of sick, Injured or Orphaned Protected Animals in Queensland (Department of Environment and Science (DES), 2013) will be used as a guide to inform fauna management strategies.
- During clearing, a 10 meter 'No-Go' zone will be established around habitat trees or other shelter sites occupied by MNES fauna, to allow animals to disperse voluntarily or with the assistance of a spotter-catcher.
- Management of fauna identified during clearing will include relocating individuals to adjacent habitat or treating injuries.
- In order to avoid/minimise mortality of Dulacca woodland snails during clearing and construction works, animals located within the RoW during targeted pre-clearance surveys will be translocated to nearby suitable habitat. Methods for the survey/collection and relocation of Dulacca woodland snail are detailed in the Dulacca woodland Snail translocation strategy provided in Appendix U of this report.
- Management measures for koala identified in the Nature Conservation (Koala) Conservation Plan 2017 will be implemented during clearing and construction works.
- The following measures are to be implemented specifically for the Koala, noting these will only apply when the Koala is present:

- Monitoring to occur of any Koala with a high risk of entering the vicinity of the job front to occur through the construction phase.
- Each morning prior to works the clearing team will meet to discuss and understand the measures needed to be taken in regard to koalas. The fauna spotter catcher will assess if any Koalas are in present danger of clearing works that day and for all stages of clearing.
- If any Koala is present or have the likelihood of entering the clearing front, restricted work measures will be in place to allow safe movement away from the work area.
- Clearing of trees will be carried out in stages that allow Koalas in the area being cleared enough time to move out of the clearing site without human intervention.
- Ensuring that between each stage and the next there is at least one period of 12 hours that starts at 6pm, on a day and ends at 6 am on the following day during which no trees are cleared at that site.
- No tree in which a Koala is present, and no tree with a crown overlapping a tree in which a Koala is present will be cleared.
- If a koala is not injured or ill but refuses to move from the clearing area on its own accord after two days, the fauna spotter catcher can choose to liaise with ARCP P/L and this may result in contact being made with the Queensland government to negotiate appropriate methods for removal and relocation.
- If an animal is incapable of moving from the clearing area due to injury or illness and is in direct harm from clearing equipment, it will be captured by a qualified fauna spotter catcher and either relocated into suitable habitat or taken for medical assistance.

- The following steps will be undertaken for greater glider and glossy black-cockatoo only:
  - Pre-dawn surveys (conducted 2 hours before sunrise) will be conducted in areas of suitable habitat immediately prior to clearing in order to document the location of any hollows occupied by glossy black-cockatoo and greater glider along the RoW (irrespective of whether the species has been previously detected in the disturbance footprint). This will be in addition to fauna spotter-catcher surveys (refer to ARCP Significant Species Management Plan (SENEX-ARCP-EN-PLN-002).
  - Greater gliders will be removed from active den trees within the clearance footprint immediately prior to clearing and translocated to suitable habitat adjacent the RoW.
  - In instances where greater gliders cannot be safely extracted from hollows, den trees will be felled slowly (i.e., in sections) in order to minimise the risk of injury/mortality.
  - Where vegetation clearing is occurring during breeding season for glossy black-cockatoo and greater glider, suitable hollows will be searched during pre-clearance survey.
- Management of koalas within the Indicative Footprint during clearing/construction works will follow additional procedures in accordance with current Queensland regulatory guidelines (If Koala are detected within the Disturbance Footprint or immediately adjacent during pre-clearance surveys), as detailed in the following codes and operational policies (and as summarised in Table 15, below).
  - Code of Practice Care of Sick, Injured or Orphaned Protected Animals in Queensland – Nature Conservation Act 1992 (2023), and
  - Operational policy – Release of rehabilitated koalas and the take and release of Koalas in imminent danger (2019).

Table 15: Koala Encounter Procedure

Procedure	Guidance Suggestions
Encountering koala	• Clearing of koala habitat trees (outside of breeding and foraging habitat areas) is carried out in a way that ensures koalas occupying the area that is being cleared have enough time to move out of the area without human intervention. • The clearing must be carried out in stages. • Between each stage and the next there is at least one period of 12 hours (starting at 6 pm on a day and ending at 6am on the following day) during which no trees are cleared on the site. • If a koala is in a tree, that tree is not to be cleared. If the crown of a tree overlaps with a tree that a koala is in, that tree is not to be cleared.
Treating sick/injured koala	• DES is the agency responsible for the assessment and licensing of individuals and organisations for the purposes of wildlife rehabilitation. • Contact to be made with DES or a person who holds a permit that specifically provides for the rehabilitation of koalas. • A person who rescues a protected animal, but is not a licensed rehabilitator, must surrender it to a licensed rehabilitator or conservation officer within 72 hours of taking the animal into care as stated in section 56(2) of the *Nature Conservation (Animals) Regulation 2020*. • The principles surrounding injury/illness of koala include; duty of care, avoiding harm, avoiding risk to human health and safety, relieving suffering and taking fair, reasonable and appropriate measures.
Relocation of koala	• An appropriately qualified person may take an apparently health koala from the wild when it is found to be in clear and imminent danger. • The koala should be released back to its prescribed natural habitat. If a koala is to be released outside of its prescribed natural habitat, the appropriately qualified person is to apply for approval. • The release is in accordance with procedures outlined in the *Code of Practice Care of Sick, Injured or Orphaned Protected Animals in Queensland – Nature Conservation Act 1992*.

5.3.2.19 Measures for minimising project impacts on connectivity areas and movement/dispersal of MNES fauna

Measures for minimising Project impacts on habitat connectivity and the movement/dispersal of MNES fauna across the RoW during construction will include:

- Progressive, back-filling and rehabilitation of pipeline trenches, so as to minimise the amount of time trenches are left open.
- Where construction activities may impede fauna impose barriers to the movement of fauna for longer than two weeks, provisions will be made to facilitate fauna movement around or through active work areas outside of work hours.

- Ensuring breaks in timber windrows at 50m intervals to facilitate dispersal/movement of fauna across the RoW.

Longer term impacts on habitat connectivity and movement/dispersal of MNES fauna across the RoW during construction will be mitigated via the following measures:

- Minimising the width of vehicular access tracks used for construction and maintenance of the ARC pipeline.
- Use of HDD to avoid disturbing vegetated riparian corridors facilitating movement/dispersal of MNES fauna (including koala and greater glider) across the wider landscape (i.e., at Yuleba and Woleebee Creeks).
- Narrowing of the RoW from 30 m to 20 or 25 m where the Indicative Footprint intersects vegetated corridors facilitating local movement/dispersal of koala and greater glider.
- Ensuring natural vegetation along water courses remains undisturbed unless authorised under an ATW (i.e., ensuring that disturbance of riparian vegetation occurs only at locations indicated on the Site Environmental Instruction).

To facilitate movement of greater gliders across the RoW and minimise Project impacts on greater glider habitat connectivity, the following mitigation measures will also be implemented:

- Narrowing sections of the ROW from 30 m to 20-25 m in order to retain taller trees facilitating glider movement across the RoW (as detailed in Senex, 2024) (see Appendix T).
- The installation of one or more 15-20 m tall glider poles within 6-15 m of the centre of the RoW, where the RoW intersects vegetated/riparian corridors facilitating movement/dispersal of greater gliders (southern) within the project Study Area and surrounds. This includes the installation of glider poles at the following locations:
  - between chainages 20980-21300 (i.e., between KP 20 and KP 22)
  - between chainages 23200-23300 (i.e., between KP 23 and KP 24)
  - at chainage 31500-31550 (i.e., between KP 31 and KP 32)
  - between chainages 323320-32380 (i.e., between KP 32 and KP 33)
  - between chainages 32830-32950 (i.e., between KP 32 and KP 33)
  - between chainages 33700-33800 (i.e., between KP 33 and KP 34), and
  - between chainages 44480-44520 (i.e., between KP 44 and KP 46).

In regard to the efficacy of glider poles, it is noted that: (1) installation of glide poles has been shown to facilitate movement of gliding possums across major road crossings (Talyor, 2023), and (2) that glide pole usage has now been documented in a wide range of glider species, including southern greater glider (Taylor, 2023). As such, the installation of suitably tall glide poles is likely to facilitate movement of greater gliders across the RoW (by allowing animals to cross the ROW without coming to ground).

Additional measures to mitigate Project impacts on Dulacca woodland snail habitat connectivity due to clearing include:

- Stockpiling and subsequent reinstatement of suitable cover (coarse woody debris and rocks) cleared from the RoW, where the RoW intersects know (occupied) habitat for Dulacca woodland snail, in order to facilitate movement/dispersal between areas of retained habitat either side of the RoW (noting that the species is known to utilise woody debris for cover in areas subject to clearing (TSSC, 2016)).

5.3.2.20 Measures for minimising project impacts on the lifecycle MNES species

Measures being implemented to minimise Project impacts on the lifecycle of MNES species known or likely to occur within the RoW include the following:

- Selective retention of hollow-bearing trees known or likely to support denning/nesting of greater glider and glossy black-cockatoo (southern) along the edges of the RoW within exclusion areas identified in the Habitat Connectivity Pre- and Post-Disturbance report prepared by Senex (Senex, 2024) (see Appendix T).
- Where unavoidable clearing necessitates the removal of active denning/nest trees, the removal of nest/denning hollows will be addressed by the installation of natural hollows (hollow tree limbs) salvaged from the Indicative Footprint during clearing works, and/or artificial nest boxes suitable for greater glider and glossy black cockatoo (e.g., 'Cocaktubes') within areas of retained habitat along/adjacent the RoW [11].
- Wherever possible, clearing of potential breeding habitat for the glossy black-cockatoo and greater glider will be undertaken outside the species' peak breeding season, i.e., March-August for the glossy black-cockatoo (Hourigan, 2012) and March-June for greater glider (southern) (DCCEEW, 2022a).
- Where vegetation clearing is occurring during the breeding season for glossy black-cockatoo and greater glider, suitable hollows will be searched during pre-clearance surveys.
- If MNES species are found nesting/breeding along or immediately adjacent the ROW during pre-clearing surveys, Project impacts on breeding places for these species will be managed in accordance with an approved Species Management Program (SMP), as required under state legislation (i.e., the Nature Conservation Act 1992 [NC Act]).
- If disturbance of an active glossy black-cockatoo nest site cannot be avoided, and if permitted under an approved SMP, sitting birds (if present) will be dispersed from the nest site and chicks or eggs carefully removed from by a qualified spotter catcher. Eggs or chicks extracted from an active nest site will be taken to a suitably qualified wildlife carer for captive-rearing.
- If disturbance of greater glider denning trees is required during the breeding season, and if permitted under an approved SMP, dependent young will be removed from active den sites by a licensed spotter catcher and taken to a suitably qualified wildlife carer for captive rearing.

5.3.2.21 Measures for minimising project impacts on watercourses and drainage lines

- No unauthorised discharges of water to land or surface waters.
- Installation of erosion and sediment control measures to protect watercourses.
- Installation of erosion and sediment control measures to ensure stormwater passes through the site in a controlled and at non-erosive flow velocities.
- Ensuring storage of vehicles, equipment and machinery is excluded from watercourses.
- Locating stockpiles in flat areas away from watercourses.

[11] Usage of artificial nest boxes is now well-documented in both the greater glider and glossy black cockatoo with 'Cocaktube' nest boxes having been used successfully to facilitate breeding/recruitment of both Carnaby's black—cockatoo (Groom, 2010) and glossy black-cockatoos in areas where natural hollows are in short supply (see Groom, 2010; World Wildlife Fund for Nature, 2021).

- Fuel, oil and chemicals will be stored as per the controls in the Environmental Management Plan [SENEX-ARCP-EN-PLN-001]
- Accidental damage or destruction of riparian habitat will be reported and investigated immediately, in accordance with the Contingency Procedures for Emergency Environmental Incidents [SENEX-QLDS-EN-PRC-024] and Incident Reporting and Investigation Procedure [SENEX-CORP-HS-PRC-004].
- Project impacts on areas of riparian habitat will also be minimised through:
  - Narrowing of the RoW where the Indicative Footprint intersects vegetated riparian corridors (at selected locations along the RoW shown in the Habitat Connectivity Pre- and Post-Disturbance report prepared by Senex [see Appendix T]).
  - Use of HDD to avoid impacts on higher value riparian habitat/vegetation at Woleebee Creek (the largest watercourse traversed by the pipeline which is designated as a significant regional riparian and wildlife corridor) and Yuleba Creek.

5.3.2.22 Rehabilitation

Rehabilitation of disturbed areas will be undertaken in accordance with the 'ARCP Rehabilitation Plan (SENEX-ARCP-EN-PLN-003)'. In accordance with this plan, transitional rehabilitation (also known as reinstatement or partial rehabilitation) will be undertaken on disturbance associated with ongoing operational activities where part of the disturbed area is no longer required, in order to stabilise disturbed land during the operational phase, thereby minimising ongoing potential impacts on surrounding environmental values (e.g. minimising erosion and potential for weed establishment). Transitional rehabilitation will generally involve re-contouring the land surface where required, replacing topsoil, and direct seeding groundcover species (pasture or native grasses depending on the final post-disturbance land use) or allowing natural recruitment of plant species, with ongoing maintenance.

The following rehabilitation methods will be utilised to achieve transitional and final rehabilitation criteria:

- vegetation clearing and stockpiling
- natural regeneration
- soil management
- erosion and sediment control
- direct seeding
- reinstatement of connectivity for MNES species
- habitat feature reinstatement
- weed and pest management, and
- maintenance and rework.

Significantly disturbed areas that are no longer required for the on-going petroleum activities, will be rehabilitated within 12 months (unless an exceptional circumstance in the area to be rehabilitated (e.g., a flood event) prevents this timeframe being met) and be maintained to meet the following acceptance criteria:

- any contaminated land resulting from petroleum activities is remediated and rehabilitated
- the areas are:
  - non-polluting

- a stable landform
- re-profiled to contours consistent with the surrounding landform

- surface drainage lines are re-established
- topsoil is reinstated; and
- either:
  - groundcover, that is not a declared pest species, is growing; or
  - an alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained.

5.3.2.23 Monitoring programs

Monitoring actions to assess the effectiveness of impact minimisation and mitigation measures identified above are detailed below. The recommended frequency of these actions (as detailed below) will allow for timely intervention when addressing Project impacts on flora and fauna.

- Daily monitoring for evidence of vehicles leaving designated areas and machinery operating outside of designated areas during clearing and construction works.
- Daily monitoring of clearing activities to ensure compliance with measures to minimise clearing/disturbance of native vegetation.
- Monitoring of active animal breeding places in accordance with applicable Species Management Programs during clearing and construction works.
- Daily inspection of trenches and/or other excavations prior to commencement of works for trapped fauna.
- Daily monitoring of dust deposition on native vegetation immediately adjacent the construction area.
- Conducting checks on vehicles and machinery to ensure they hold a valid and up to date Weed Hygiene Declaration prior to entering/accessing work areas.
- Quarterly monitoring for new weed infestations during construction of the pipeline and annual monitoring of weeds during the operational phase of the Project, plus annual monitoring of weeds for 5 years following decommissioning of the pipeline (or longer if ongoing control of weeds is required).
- Daily inspection of onsite machinery and equipment for any hydrocarbon leaks/releases.
- Daily inspection of construction areas for signs of soil contamination.
- Daily inspection of onsite erosion and sediment control devices in areas of potential MNES occurrence.
- If any Dulacca Woodland Snail are found to occur within proposed disturbance areas, monitoring in accordance with Section 3 of the ARC Pipeline Atlas to Reedy Creek Dulacca Woodland Snail Translocation Strategy (Appendix U) will occur.
- Species specific monitoring programs to assess Project impacts and determine the efficacy of impact mitigation measures will be developed and implemented for any other MNES fauna species detected within the or immediately adjacent the Indicative Footprint or immediately adjacent during pre-clearance surveys.

5.4 Residual project impacts

5.4.1 Direct impacts

Residual project impacts on MNES, including the maximum area of potential impact for each MNES, are detailed below. In estimating the maximum area of potential impact, a 10% buffer has been included to account for final adjustments to the RoW and siting of infrastructure. Accordingly, these estimates are considered to be conservative.

5.4.1.1 Native vegetation clearance

While the Project is configured to avoid areas of native vegetation (see Section 5.2) as much as possible, minor clearing is still required at scattered locations along the RoW. Following route realignment (see Section 5.3.1) and the implementation of mitigation measures outlined above, the Project has the potential to result in impacts to native vegetation, including the permanent removal of:

- Up to 28.39 ha of remnant vegetation; and
- Up to 0.76 ha of high value regrowth vegetation.

Following implementation of avoidance and mitigation measures detailed in Section 5.2 and 5.3, the Project will result in the loss of up to 1.01 ha of Brigalow TEC (with 10% buffer included) which equates to less than 1% of potential Brigalow TEC occurring within a 10 km buffer of the Study Area. The Project will also result in the permanent removal of up to 0.088 ha of Poplar Box TEC (with 10% buffer included). The current extent of potential Poplar Box in Southern Downs subregion is 125,339 ha based on (Accad et al., 2019). The Project would not significantly reduce the extent of Poplar Box TEC as the Project impact on potential TEC within the Southern Down subregion would be <0.0001%.

The loss of potential MNES fauna habitat within the Indicative Footprint is detailed in Table 16. The area of habitat loss reported in this table represents the cumulative impact of minor clearing across multiple sites/habitat patches within the Indicative Footprint. The area of clearing/habitat loss within most (~78% of) affected patches is less than 0.5 ha, with the single largest area of habitat loss comprising 5 ha. The native vegetation communities and habitat types to be cleared are present immediately adjacent the Indicative Footprint and in the broader landscape surrounding the Project and, as such, the extent of habitat subject to clearing represents a small fraction (<0.25%) of habitat available to MNES species within the surrounding landscape (see Table 16 for details).

Table 16: Summary of MNES target fauna habitat loss

MNES	EPBC Act Status	Updated Likelihood of Occurrence (post field surveys)	Maximum disturbance limit (ha)*		Habitat potentially available within 10 km radius of Indicative Footprint (ha)	Habitat impacted by Project as a % of availability within 10 km of the Indicative Footprint (%)
			Critical	General		
glossy black-cockatoo	Vulnerable	Likely	28.31	0	28,685.5	0.1%

MNES	EPBC Act Status	Updated Likelihood of Occurrence (post field surveys)	Maximum disturbance limit (ha)*		Habitat potentially available within 10 km radius of Indicative Footprint (ha)	Habitat impacted by Project as a % of availability within 10 km of the Indicative Footprint (%)
			Critical	General		
squatter pigeon	Vulnerable	Likely	11.18	20.76	13,161.94	0.24%
white throated needletail	Vulnerable	Likely	0	206.9	139,154.08	0.13%
koala	Endangered	Likely	35.08	0	25,327.88	0.14%
greater glider	Endangered	Likely	29.84	0	25,327.88	0.12%
Dulacca woodland snail	Endangered	Likely	4.80	0	2,839.214	0.17%

*An additional 10% buffer has been applied to areas of mapped habitat within the Indicative Footprint (ha) to account for final adjustments to the RoW and siting of associated infrastructure.

5.4.1.2 Injury and mortality of fauna

With the successful implementation of avoidance and mitigation measures outlined in section 5.3, the Project is unlikely to result in high levels of fauna mortality or injury, though some low level mortality/injury of animals is still possible, mainly during clearing and construction works. Some low level mortality of ground-dwelling fauna may also occur during periodic slashing and pipeline maintenance works, however the risk and level of fauna mortality/injury during these phases is comparatively low.

5.4.2 Indirect impacts

5.4.2.1 Disturbance of fauna adjacent the footprint

With the successful implementation of impact avoidance, minimisation and mitigation measures detailed in Section 5.3 (along with monitoring and adaptive management of Project impacts on flora and fauna species detected within or immediately adjacent the Disturbance Footprint during pre-clearance surveys), the Project will cause minimal disturbance to fauna occupying habitat adjacent the Indicative Footprint, with the majority of disturbance occurring during clearing and pipeline construction activities. Disturbance of fauna during operation and decommissioning of the pipeline is likely to be negligible.

5.4.2.2 Degradation of habitat

With the successful implementation of impact avoidance and mitigation measures identified in Section 5.3 (along with monitoring and adaptive management of Project impacts on significant flora detected within or immediately adjacent the Disturbance Footprint during pre-clearance surveys), the Project is unlikely to seriously degrade habitat for flora and fauna adjacent the Indicative Footprint. In regard to potential edge effects associated with clearing, it is noted that the vast majority of clearing will involve the removal of habitat already subject to edge effects and, as

such, the Project is unlikely to substantially increase the severity or extent of edge effects adjacent the Indicative Footprint.

5.4.2.3 Habitat fragmentation and reduced mobility of fauna

With the majority of tree clearing occurring alongside an existing cleared infrastructure corridor, the Project is only likely to result in minor, localised fragmentation of flora and fauna habitat. Widening of this corridor may, however, inhibit movement of fauna reliant on tree cover and fallen timber for cover for movement and dispersal, including likely-to-occur MNES specie such as greater glider and the Dulacca woodland snail. In areas of known and/or likely habitat, impacts on movement/dispersal of these species will be ameliorated by the selective retention of mature trees, installation of glider poles, and reinstatement/deployment ground cover (i.e., coarse woody debris and rocks) following construction of the pipeline (see section 5.3.2.19 for further details).

In regard to Project impacts on koala movement/dispersal, it is unlikely that construction of the ARC pipeline would significantly inhibit koala movement/dispersal across the Project Study Area surrounds, given:

- clearing along the RoW is unlikely to constrain koala movement across the wider landscape (noting that the species will readily travel tens, even hundreds of metres on the ground in order to access foraging and/or shelter trees (Youngentob et. al., 2021; Ramsay 1999, Marsh et al. 2014b)),
- careful avoidance of isolated shelter trees important for facilitating koala movement/dispersal between more widely-separated areas of suitable koala foraging habitat (e.g., isolated trees in large clearings/paddocks),
- retention of riparian vegetation facilitating dispersal of koala and other arboreal species across the wider landscape, along Woleebee and Yuleba Creeks,
- narrowing of the RoW where the Indicative Footprint intersects vegetated corridors likely to facilitate movement/dispersal of koala and other arboreal fauna across the wider landscape, and
- potential use of glider poles as refuge poles by koala moving/dispersing along vegetated corridors.

5.4.2.4 Reduced resilience to climate change

The Project is unlikely to result in the loss of drought refuge areas or significantly constrain fauna access to refugial habitat areas necessary for the survival of flora and fauna species in the face of climate change. As such, the Project is unlikely to reduce the resilience of fauna and flora species to climate change.

6 Legislative compliance

6.1 EPBC Act - Significant Impact Assessment

As discussed in Section 4, eight MNES were identified as known or likely to occur within and/or adjacent the Indicative Footprint, including two TECs and six threatened fauna species (as detailed in Table 21).

With avoidance and minimisation taking priority, a range of mitigation measures (detailed in Section 5) are being implemented to address unavoidable Project impacts on these matters.

To determine whether the Project is still likely to result in a significant impact upon MNES, potential Project impacts were assessed against the *MNES Significant Impact Guidelines 1.1* (SotE, 2013) (the Guidelines). In accordance with the aforementioned guidelines, the significance of impacts on MNES was assessed having regard to the 'context and intensity' of impacts, including:

- 'The sensitivity, value, and quality of the environment being impacted', and
- 'The intensity, duration, magnitude and geographic extent of the impacts' (see p.2 of the Guidelines).

. For 'likely to occur' MNES fauna this included consideration of:

- the intensity, duration, magnitude and geographic extent of Project impacts (noting that clearing/disturbance of potential MSES fauna habitat is spread across multiple discrete patches scattered over 52 km of pipeline and, that the area of habitat impacted at each occurrence is mostly < 0.5 ha),
- existing land use and threats to the species (and resulting impacts on habitat quality/suitability) within and adjacent the Indicative Footprint, noting that the Study Area is located within a highly disturbed and fragmented landscape due to past clearing and impacts associated with grazing (including the spread of invasive pasture grasses such as buffel grass [*Cenchrus ciliaris**]),
- existing habitat values for and current occupancy/usage of habitat within the Indicative Footprint by target MSES species (noting that survey results indicate, at best, limited or occasional usage of habitat by MNES fauna species within the Study Area), and
- the relative importance of habitat for likely-to-occur MSES species within and adjacent the indicative Footprint taking into account the extent, condition and availability of similarly suitable and known (occupied) habitat within the surrounding landscape.

Detailed significant impact assessments for each of the aforementioned MNES are provided in Appendix Q. Impact assessments undertaken for these MNES determined that significant impacts are unlikely once the avoid, minimise, mitigate hierarchy has been applied, as summarised in Table 17 and in Sections 6.1.1 to 6.1.8, below.

A separate assessment of cumulative impacts of the ARC Pipeline Project and associated Atlas Stage 3 Gas Project (the subject of a separate referral under the EPBC Act) is provided in Section 6.1.9, below. This assessment determined that the ARC Pipeline Project and Atlas Stage 3 Gas Project together would not result in a significant impact on the aforementioned MNES.

Table 17: MNES known or likely to occur within the Indicative Footprint and SIA outcome

MNES	EPBC Act status	Maximum Disturbance Required*	Impact Assessment Outcome
Known to occur			
Brigalow dominant and co-dominant TEC	Endangered	1.01 ha	**Significant Impact Unlikely** Refer to Section 0 and Appendix Q
Poplar Box Grassy Woodland on Alluvial Plains TEC	Endangered	0.088 ha	**Significant Impact Unlikely** Refer to Section 6.1.2 and Appendix Q
Likely to occur			
Dulacca woodland snail *(Adclarkia dulacca)*	Endangered	4.80 ha of Critical Habitat (across 28 patches)	**Significant Impact Unlikely** Refer to Section 6.1.3 and Appendix Q
glossy black-cockatoo *(Calyptorhynchus lathami lathami)*	Vulnerable	28.31 ha of Critical Habitat (across 59 patches)	**Significant Impact Unlikely** Refer to Section 6.1.4 and Appendix Q
squatter Pigeon (southern) *(Geophaps scripta scripta)*	Vulnerable	11.18 ha of Critical Habitat 20.76 ha of General Habitat (across 73 patches)	**Significant Impact Unlikely** Refer to Section 6.1.5 and Appendix Q
white-throated needletail *(Hirundapus caudacutus)*	Vulnerable	206.9 ha General Habitat (comprising the airspace above the Indicative Footprint and potential roost trees at the edges of clearings)	**Significant Impact Unlikely** Refer to Section 6.1.6 and Appendix Q
koala *(Phascolarctos cinereus)*	Endangered	35.08 ha of Critical Habitat (across 64 patches)	**Significant Impact Unlikely** Refer to Section 6.1.7 and Appendix Q
greater glider *(Petauroides volans)*	Endangered	29.84 ha of Critical Habitat (across 47 patches)	**Significant Impact Unlikely** Refer to Section 6.1.8 and Appendix Q

*An additional 10% buffer has been applied to areas of mapped habitat within the Indicative Footprint (ha) to account for final adjustments to the RoW and siting of associated infrastructure.

6.1.1 Brigalow TEC

The project will impact a maximum area of up to 1.01 ha of Brigalow TEC (including 10% buffer) as described in Section 4.1.4.1 and depicted in Appendix G. As outlined in Section 5, impacts to Brigalow TEC were avoided by route realignment where possible. Mitigation measures will also be implemented as per Section 5 to minimise impacts to adjacent Brigalow TEC to be retained.

To determine if the Project is likely to have a significant impact on the Brigalow TEC, an assessment in accordance with the Guidelines was conducted (as detailed in Appendix R). Based on this assessment, the Project is unlikely to result in a significant overall impact on this TEC.

6.1.2 Poplar Box TEC

As outlined in Section 5, impacts to Poplar Box TEC have largely been avoided by route realignment where possible. Mitigation measures will also be implemented as per Section 5 to minimise impacts to adjacent Poplar Box TEC to be retained.

The Project will, however, result in the unavoidable loss of up to 0.088 ha (including 10% buffer) of Poplar Box TEC from within the Indicative Footprint, as described in Section 4.1.4.2 and depicted in Appendix G. To determine if the Project is likely to have a significant impact on Poplar Box TEC, an assessment in accordance with the Guidelines was conducted and is included in Appendix R.

Based on this assessment, the Project is unlikely to result in a significant impact on the Poplar Box TEC.

6.1.3 Dulacca Woodland Snail

As discussed in Section 4.2.3.6, the Project will result in the unavoidable loss of up to 4.80 ha (with 10% buffer included) of potential Dulacca woodland snail (*Adclarkia dulacca*) habitat comprising 28 patches of remnant and regrowth RE 11.9.5 and remnant REs 11.7.2, 11.5.16 and 11.10.8 (as depicted in Appendix M). As outlined in Section 5, additional Project impacts on the Dulacca woodland snail will be mitigated through the implementation of the following measures:

- Relocation of animals located within the RoW to areas of nearby suitable habitat (as detailed in the translocation strategy provided in Appendix U).
- Redistribution of coarse woody debris and rock cover along the RoW to facilitate movement of animals between areas of known occupied habitat (noting that in other areas the species is known to occur in cleared paddocks where suitable cover [i.e., rocks and fallen timber] remains).

To determine if the Project is likely to have a significant impact on Dulacca woodland snail, an assessment in accordance with the Guidelines was conducted as detailed in Appendix R. With the implementation of proposed mitigation measures, the unavoidable removal of 4.80 ha of potential Dulacca woodland snail habitat was determined to be unlikely to result in a significant impact.

6.1.4 Glossy Black-Cockatoo

As indicated in Section 4.2.3.1, the Project is likely to result in the unavoidable loss of up to 28.31 ha (with 10% buffer included) of potential glossy black-cockatoo foraging and breeding habitat from within the Indicative Footprint which is considered Critical Habitat for the species (as depicted in Appendix I). As detailed in section 5, additional impacts on this species will be mitigated via the following measures:

- development and implementation of an SMP to mitigate Project impacts on breeding birds within or immediately adjacent the Indicative Footprint

- retention of suitable hollow-bearing trees at the edges the RoW (where safe to do so), and
- installation of nest hollows salvaged from the RoW and/or artificial nest boxes alongside the RoW to account for the loss of nest hollows identified during pre-clearance surveys.

To determine if the Project is likely to have a significant impact on glossy black-cockatoo, an assessment in accordance with the Guidelines was conducted (Appendix R). Based on this assessment, the overall impact on this species is unlikely to result in a significant impact on the species.

6.1.5 Squatter Pigeon

As outlined in Section 4.2.3.2 and depicted in Appendix J, the Project is likely to result in the unavoidable loss of up to 11.18 ha of potential breeding and foraging habitat considered Critical Habitat for the species, and another 20.76 ha of potential foraging/dispersal habitat considered General Habitat (including 10% buffer). As outlined in Section 5, a range of mitigation measures will be implemented to minimise additional impacts to the species/ species' habitat, including:

- development and implementation of an SMP to mitigate Project impacts on breeding activity (should nesting birds be detected within or immediately adjacent the Indicative Footprint during pre-clearance surveys), and
- monitoring and management of invasive weed species.

To determine if the Project is likely to result in a significant impact, an assessment of the significance of Project impacts on the squatter pigeon (southern) was conducted in accordance with the Guidelines (as detailed in Appendix R). Based on this assessment, the Project is unlikely to result in a significant impact on this species.

6.1.6 White-Throated Needletail

As outlined in Section 4.2.3.3, the entire airspace above the Indicative Footprint provides suitable foraging habitat for the species with canopy trees adjacent cleared areas providing roosting opportunities for the species. However, as the species does not breed within Australia, no suitable breeding habitat occurs within or adjacent the Indicative Footprint.

To determine if the Project is likely to have a significant impact on the white-throated needletail, an assessment in accordance with the Guidelines was conducted (as detailed in Appendix R). Based on this assessment, it was determined that the Project is unlikely to result in a significant impact on this species.

6.1.7 Koala

As outlined in Section 4.2.3.5, construction of the ARC pipeline will necessitate the removal of up to 64 discrete patches of potential koala foraging, shelter and dispersal habitat totalling 35.08 ha (all of which is considered Critical Habitat for the species) from the Indicative Footprint. These patches are depicted and described in Appendix L.

As outlined in Section 5, additional Project impacts on koala will be mitigated with the implementation of the following strategies:

- A suitably qualified and licensed fauna spotter/catcher (with previous koala spotting and handling experience) is to be present during all vegetation clearing works, in order to: identify animals at risk from clearing activities, to move these animals out of harm's way and, where necessary, assist with the recovery of injured animals (in accordance with guidelines for the care of sick, Injured or Orphaned Protected Animals in Queensland (Department of Environment and Science (DES), 2013) be used as a guide to inform fauna management strategies; and

- During construction works, work areas and excavations (trenches) will be checked for fauna that may have become trapped; and if trenches remain open after daily site works have been completed, fauna ramps will be put in place to allow animals to escape from trenches.

To determine if the Project is likely to have a significant impact on koala, an assessment in accordance with the Guidelines was conducted (as detailed in Appendix R). Based on this assessment, it was determined that the Project is unlikely to result in a significant impact to this species.

6.1.8 Greater Glider

As outlined in Section 4.2.3.4 the Project is likely to result in the removal of a maximum of up to 29.84 ha (with 10% buffer included) of potential denning, foraging and dispersal habitat for greater glider (considered Critical Habitat for the species), as depicted in Appendix K. As outlined in Section 5, a range of mitigation measures will be implemented to minimise impacts to this species, including:

- pre-clearing surveys to locate active hollows utilised by greater glider and relocation of animals to suitable den trees nearby
- selective retention of mature trees to facilitate movement of greater gliders between areas of known/likely habitat either side of the Indicative Footprint (i.e., where suitable habitat for greater glider occurs on both sides of the RoW)
- installation of 15-20 m tall glider poles where the RoW intersects vegetated riparian corridors likely to facilitate local movement/dispersal of greater gliders, and
- installation of nest boxes along/adjacent the RoW to replace actively utilised hollows should any be found to be present.

To determine if the Project is likely to have a significant impact on greater glider, an assessment in accordance with the Guidelines was conducted (as detailed in Appendix R). This assessment determined that the Project is unlikely to result in a significant impact with the implementation of suitable mitigation measures (following avoidance and minimisation of direct impacts to potential habitat).

6.1.9 Cumulative impacts on MNES

The ARC pipeline will service the Atlas Stage 3 Gas Project, which Senex Energy Pty Ltd (Senex) is proposing to develop west of Wandoan. Potential impacts of the Atlas Stage 3 Project on MNES, as detailed in the *Atlas Stage 3 Gas Project EPBC Act Ecology Significant Impact Assessment Report* (ERM, 2023), are the subject of a separate referral under the EPBC Act.

To address cumulative impacts of the Atlas Stage 3 Gas Project and ARC pipeline projects on MNES, consideration has been given to the combined impact of both projects on known and likely-to-occur MNES identified in the current (ARCP Ecological Assessment) report. An assessment of cumulative impacts on these MNES, based on information contained in the *Atlas Stage 3 Gas Project EPBC Act Ecology Significant Impact Assessment Report*, is provided below.

As indicated in the *EPBC Act Ecology Significant Impact Assessment Report* (ERM, 2023), the Atlas Stage 3 Gas Project will avoid direct impacts on known and likely-to-occur MNES, with the exception of koala (see below for further details). Indirect impacts on MNES (e.g., degradation of and disturbance of MNES fauna habitat) will also be avoided or mitigated through various mitigation/management measures, including (but not limited to):

- weed and pest animal monitoring and management,
- dust suppression, and
- measures to avoid and mitigate petroleum hydrocarbon spills and accidental ignition of fires.

In regard to koala, it is noted that construction of the Atlas Stage 3 Gas Project will necessitate clearing up to 530 ha of potential koala dispersal habitat consisting of cleared grazing land with scattered/isolated paddock trees. While substantial, the resulting loss of koala dispersal habitat is unlikely to impede koala movement/dispersal across the Project Area or wider surrounds given:

- wells and access tracks constructed within the Project Area are unlikely to impede koala dispersal/movement,
- retention of potential dispersal habitat (grazing land with scattered paddock trees) elsewhere within the Project Area, and
- retention of dispersal habitat along Woleebee Creek (a locally important vegetated, riparian corridor likely to facilitate dispersal/movement koala across the broader landscape).

Given the above, and noting that the ARC pipeline is unlikely to result in a significant impact on MNES (having regard to the scale, context and intensity of direct impacts on MNES), it is unlikely that ARC pipeline and Atlas Stage 3 Gas Project would together result in a significant impact on MNES prescribed under the EPBC Act.

7 Summary and conclusion

ARC Pipeline Pty Ltd (a subsidiary of Senex Energy Pty Ltd) commissioned E2M Pty Ltd (E2M) to conduct a terrestrial ecological assessment for the Atlas to Reedy Creek (ARC) pipeline project ('the Project') in order to:

- identify MNES protected under the EPBC Act 1999 that may be impacted by the Project
- identify impact avoidance, minimisation and mitigation measures for the Project's potential impacts on MNES, and
- evaluate the significance of any residual impacts upon MNES in accordance with the MNES Significant Impact Guidelines 1.1 (the Guidelines) (DotE, 2013).

The ecological assessment undertaken for the Project identified eight MNES known or likely to occur within and/or adjacent the proposed disturbance footprint (Indicative Footprint), comprising:

- two Threatened Ecological Communities (Brigalow and Poplar Box Threatened Ecological Communities), and
- suitable habitat for six threatened fauna species – i.e., koala, greater glider (central and southern), glossy black-cockatoo (southern), squatter pigeon (southern), Dulacca woodland snail, and white-throated needletail) - none of which were observed within the Study Area during field surveys but are still considered likely to occur within the Indicative Footprint.

Assessment against the MNES Significant Impact Guidelines 1.1 (DotE, 2013b) (the Guidelines) was conducted to determine if the Project is likely to result in a significant residual impact on the aforementioned MNES, with the significance of Project impacts determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity'(DotE, 2013b, p. 2). Based on this assessment, the Project is unlikely to result in a significant impact on any of the aforementioned MNES given the context and limited intensity/severity of impacts on these MNES.

A separate assessment of cumulative impacts for the ARC pipeline and associated Atlas Stage 3 Gas Project (the subject of a separate referral under the EPBC Act) determined that these projects would not result in a significant cumulative impact on the aforementioned MNES.

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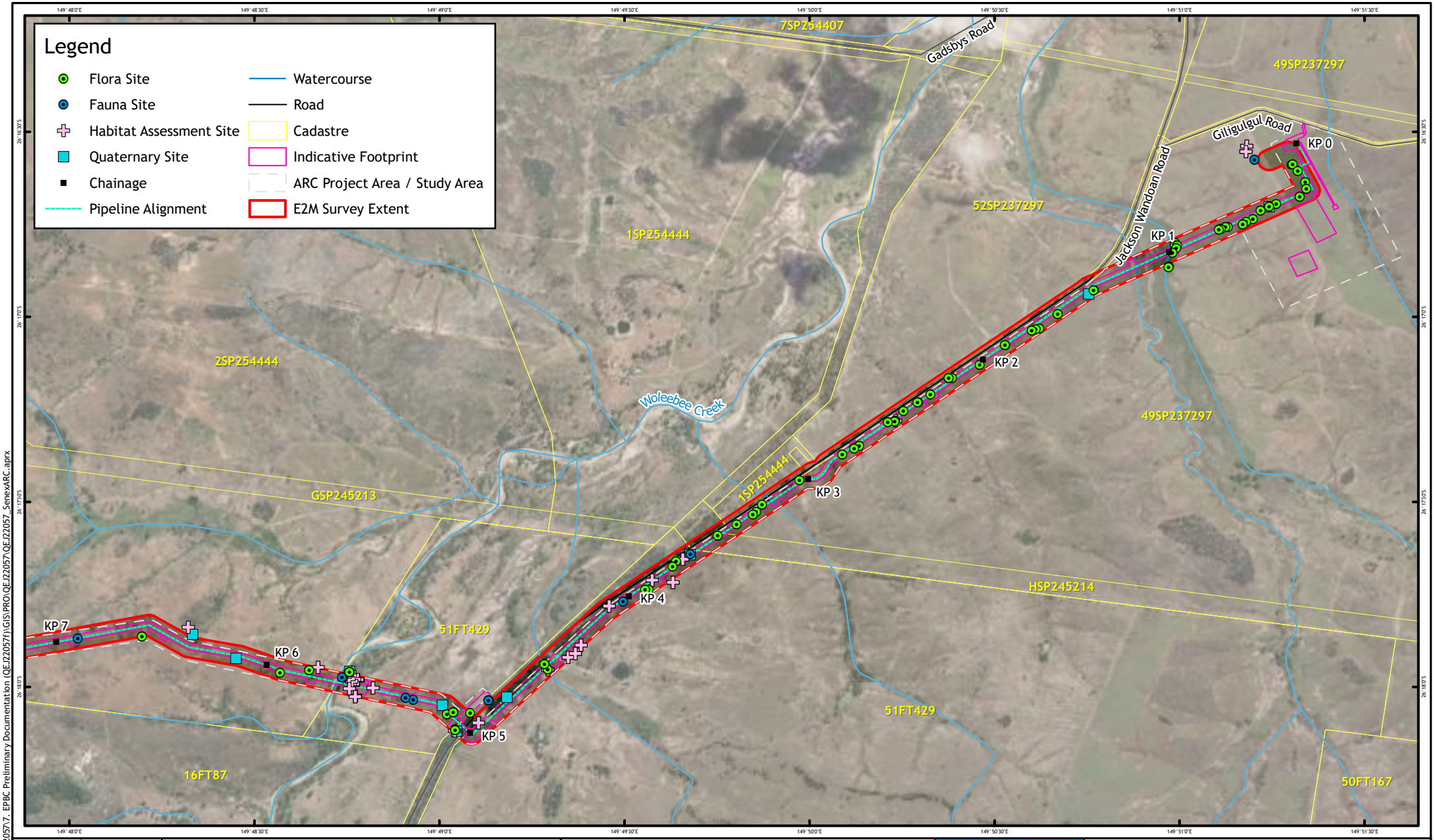
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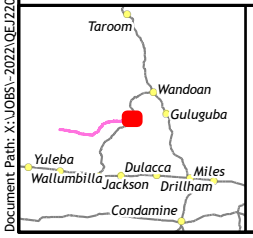
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Appendix A Field Survey Sites





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Kilometres

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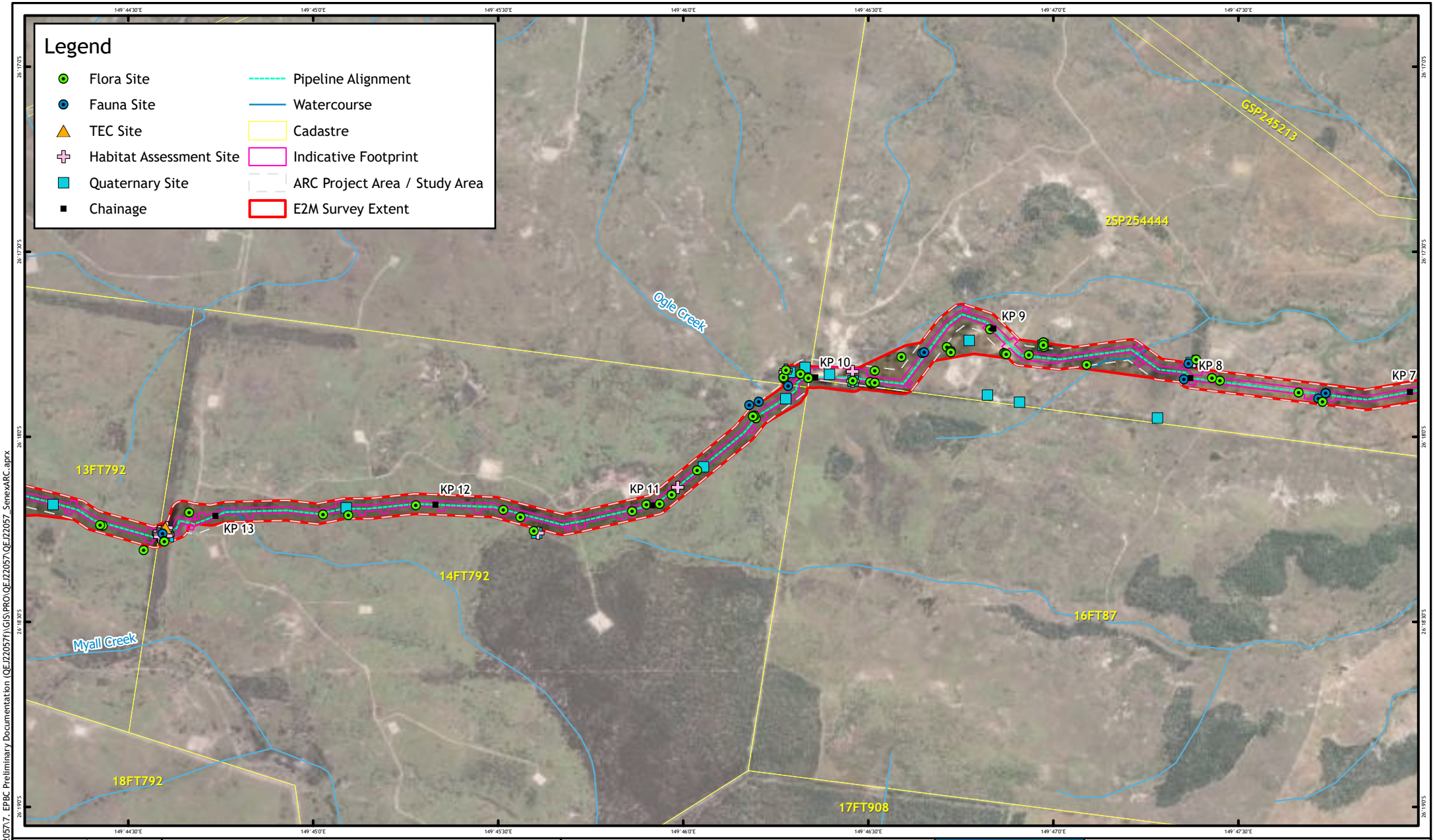
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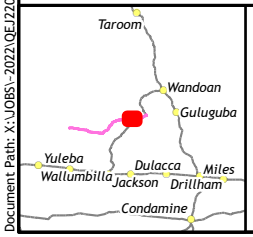
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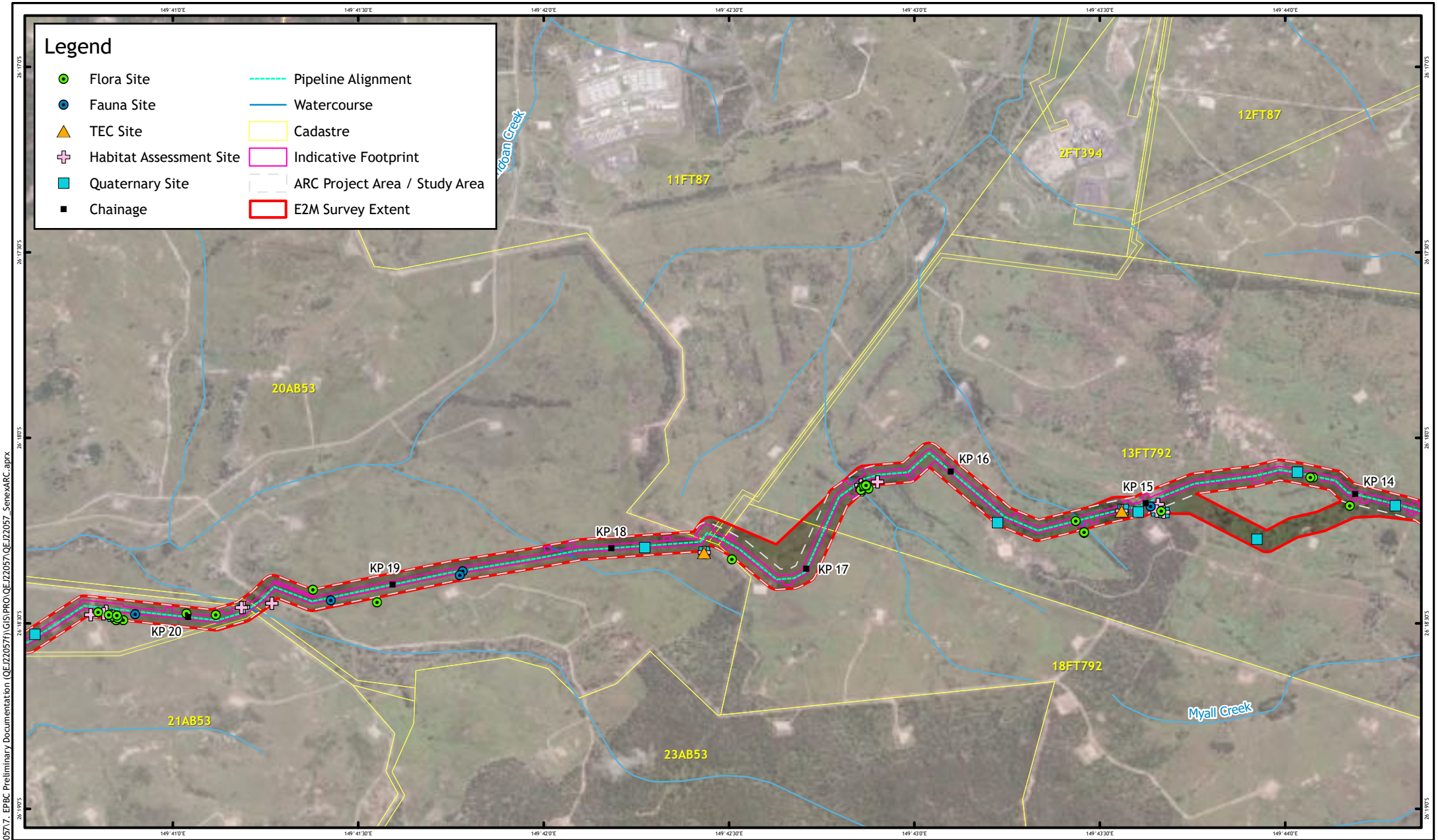
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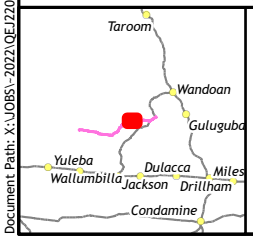
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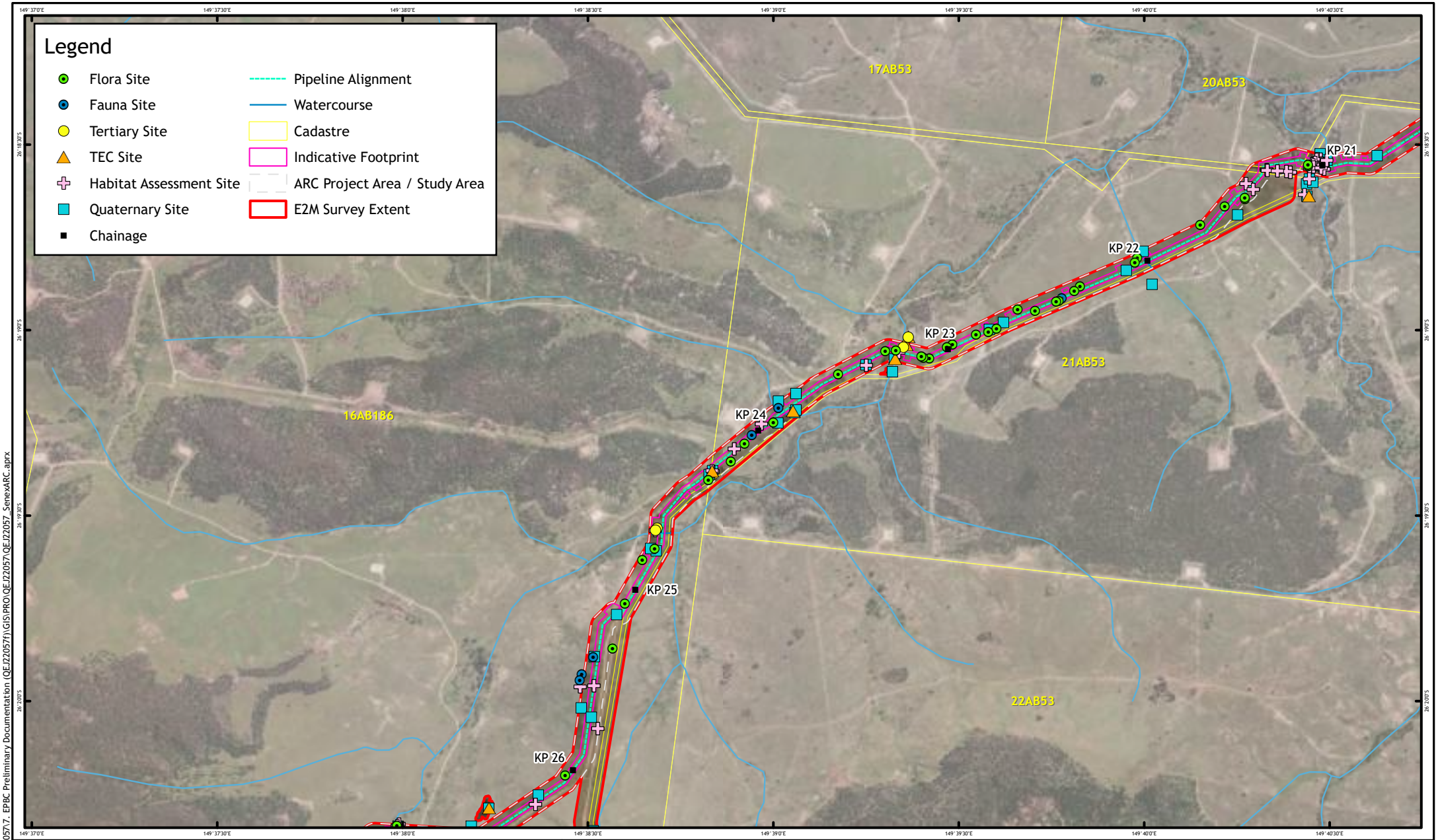
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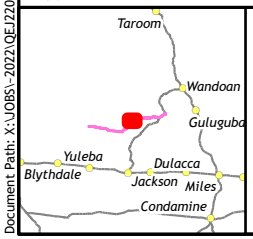
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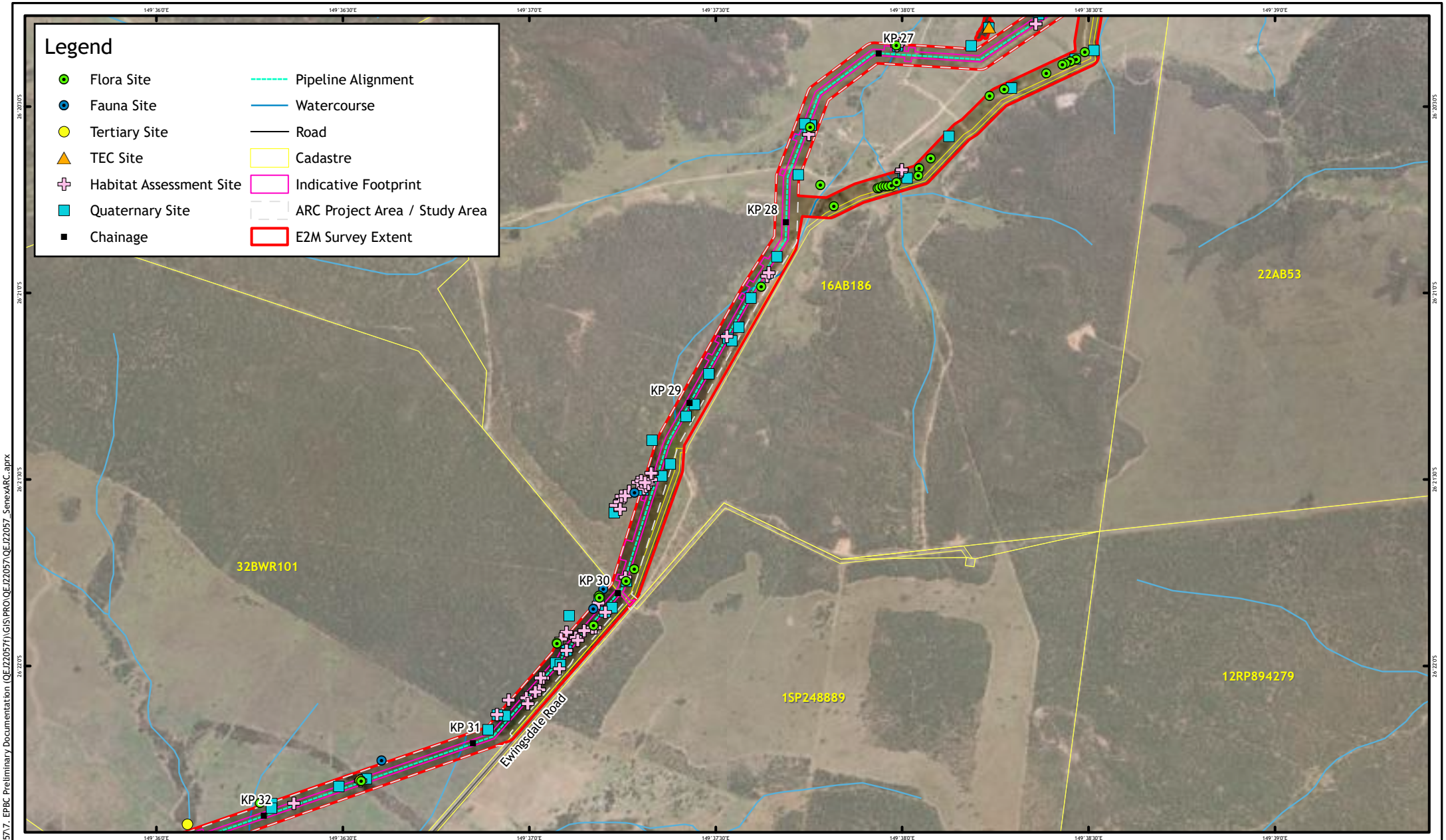
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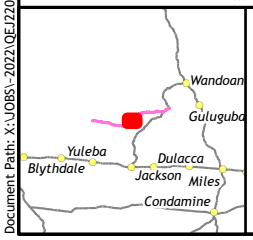
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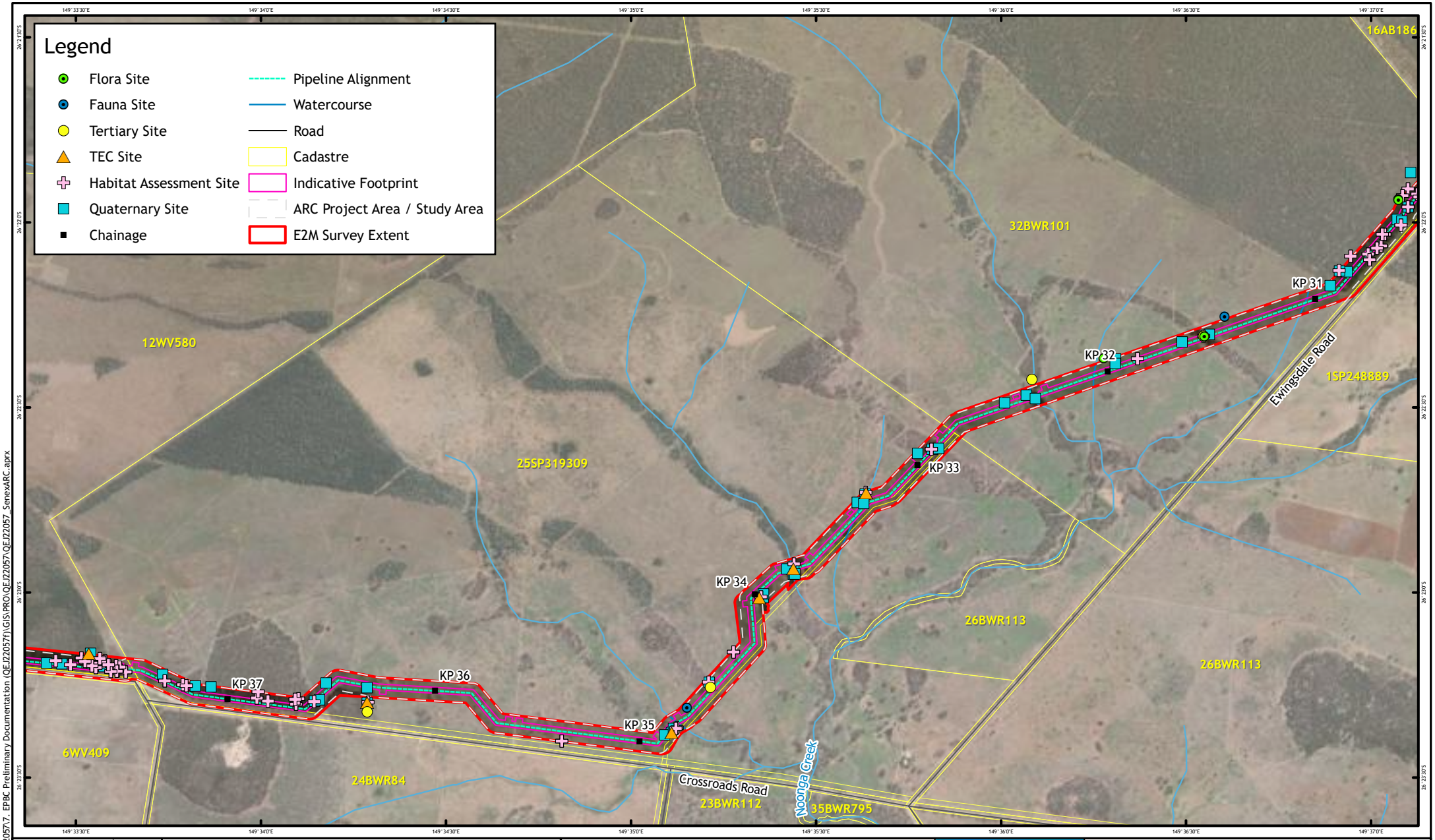
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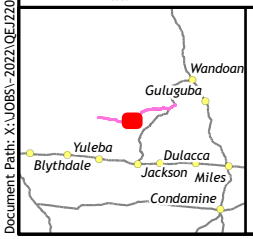
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Scale 1:25,000 (A4)

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Kilometres

Coordinate System: GCS GDA 1994

Notes:
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Rev	Description	Drawn	Approved	Date
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3	Issued for Use	GO	LW	14/07/2023

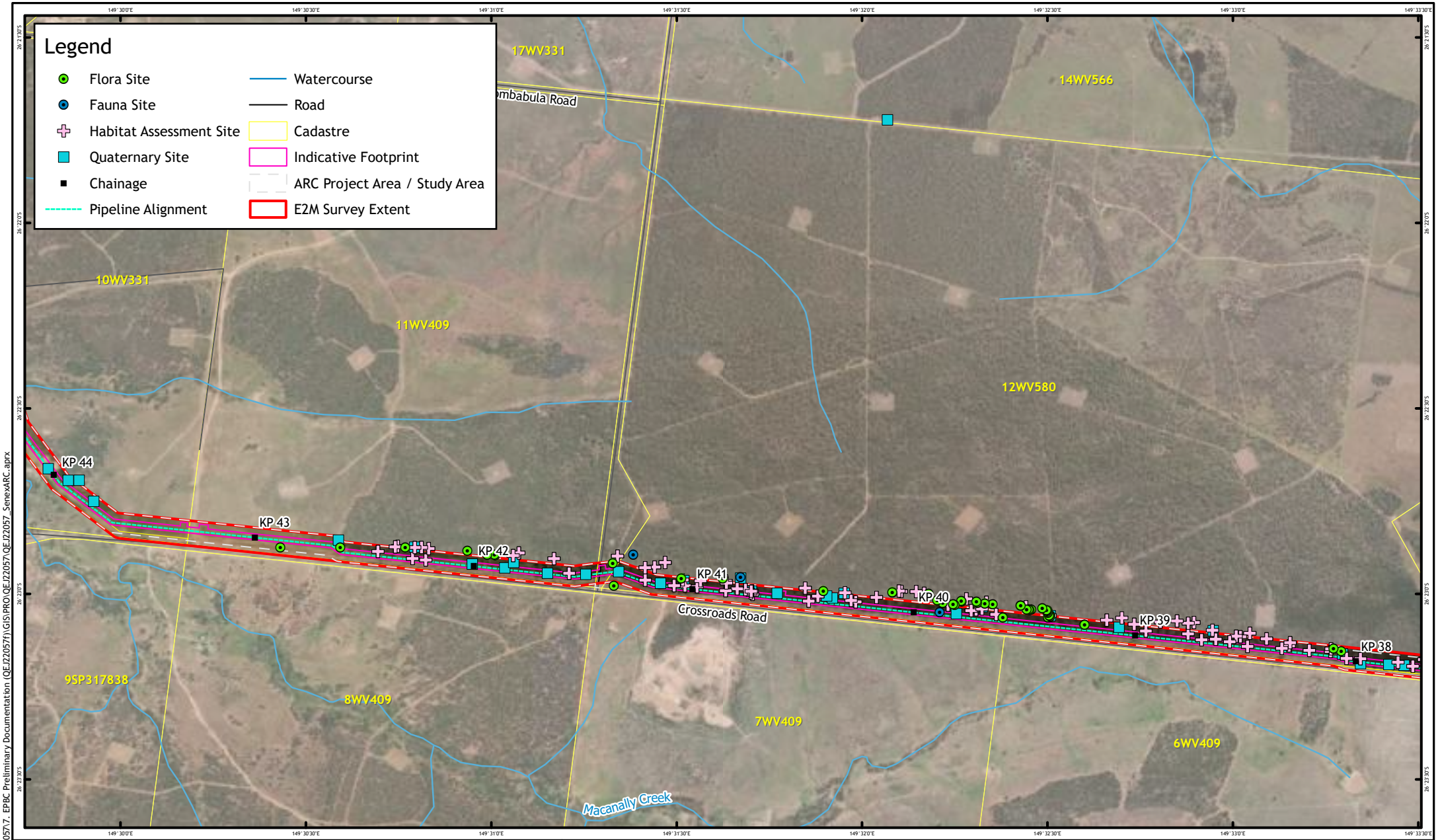
APPENDIX A: FIELD SURVEY SITES

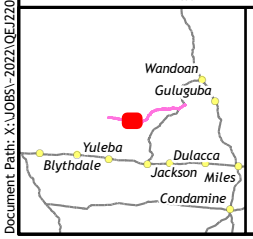
MNES Ecological Assessment Report
Senex Energy Limited

Map Number	Job Number	Rev
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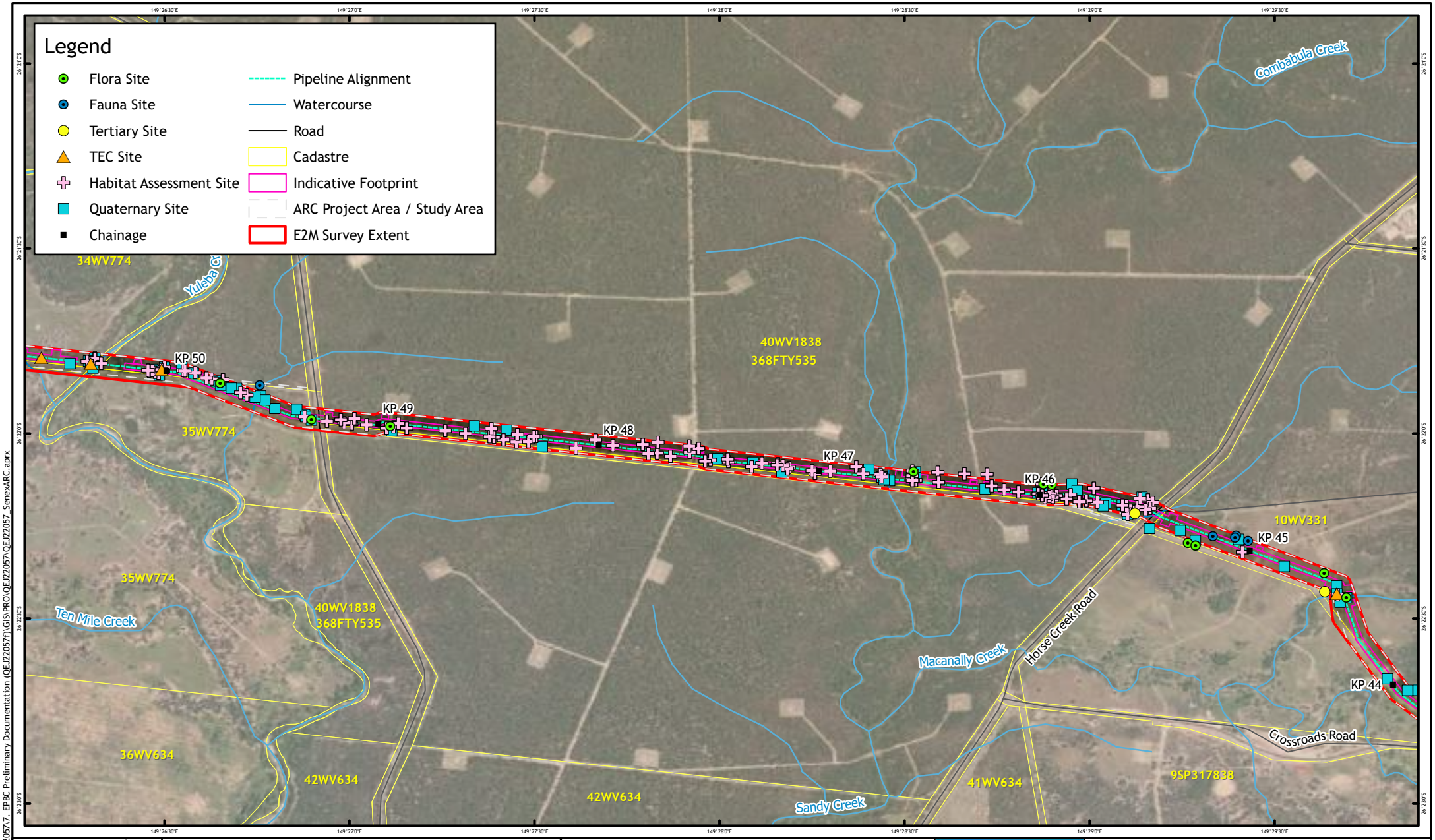
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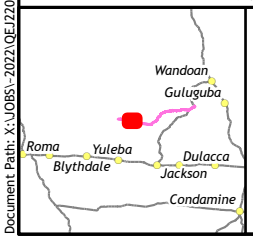
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Senex Energy Limited

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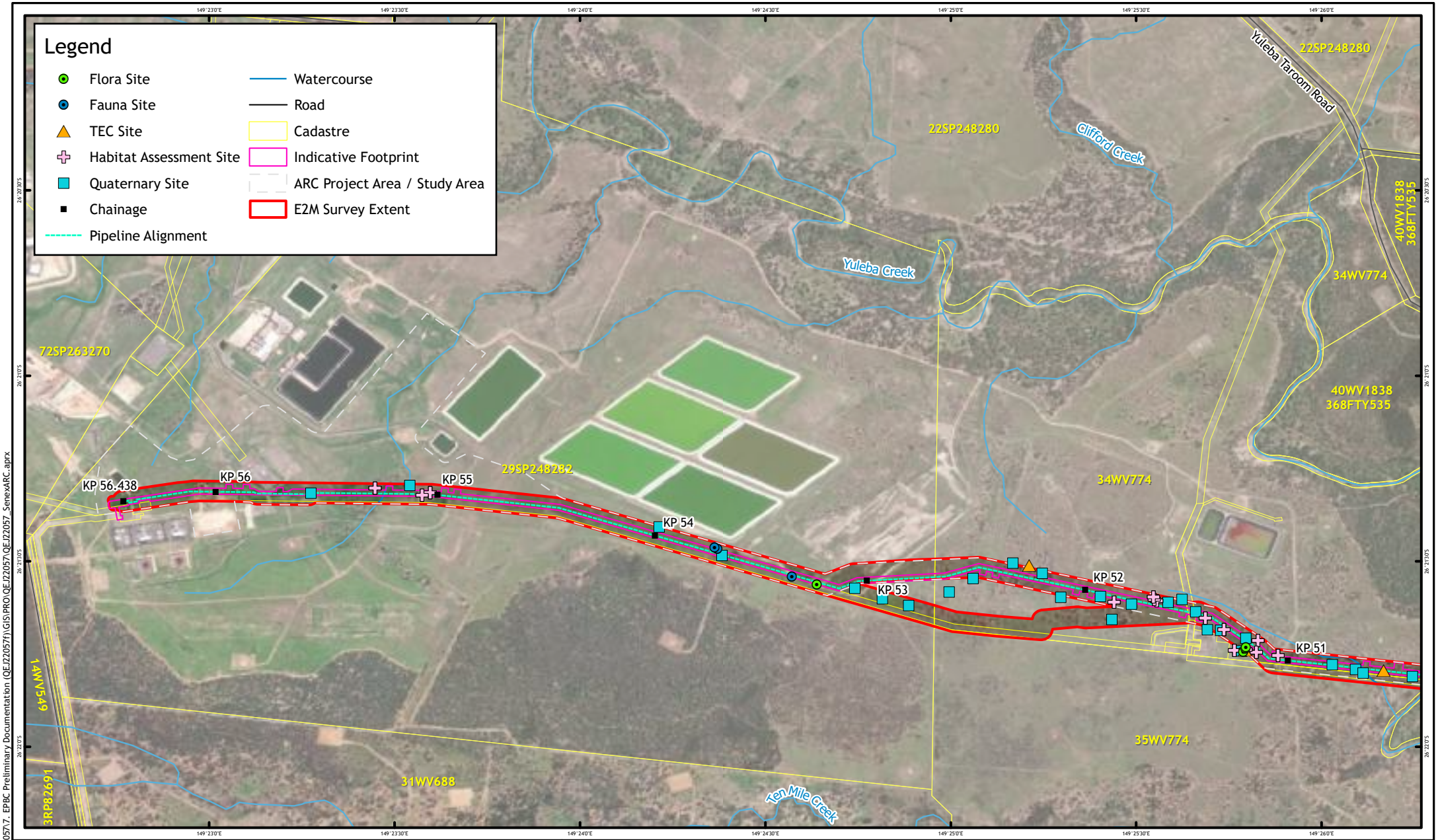
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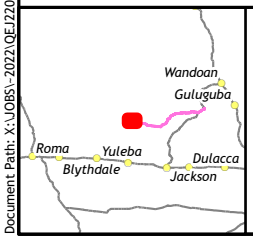
MNES Ecological Assessment Report
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APPENDIX A: FIELD SURVEY SITES

MNES Ecological Assessment Report
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Appendix B Desktop Assessment Results

Australian Government

Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 27-Feb-2024

Summary

Details

- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat

Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	42
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	18
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)	[Resource Information]
Ramsar Site Name	Proximity
Banrock station wetland complex	1200 - 1300km upstream from Ramsar site
Narran lake nature reserve	400 - 500km upstream from Ramsar site
Riverland	1100 - 1200km upstream from Ramsar site
The coorong, and lakes alexandrina and albert wetland	1300 - 1400km upstream from Ramsar site

Listed Threatened Ecological Communities	[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species	[Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text

Scientific Name	Threatened Category	Presence Text
BIRD		
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
[Stagonopleura guttata](#) Diamond Firetail [59398]	Vulnerable	Species or species habitat may occur within area
FISH		
[Maccullochella peelii](#) Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
MAMMAL		
[Chalinolobus dwyeri](#) Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat may occur within area
[Dasyurus hallucatus](#) Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area
[Macroderma gigas](#) Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
[Nyctophilus corbeni](#) Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
[Petauroides volans](#) Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area
[Petaurus australis australis](#) Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area
PLANT		
Acacia curranii		
Curly-bark Wattle [3908]	Vulnerable	Species or species habitat likely to occur within area
Arthraxon hispidus		
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
Cadellia pentastylis		
Ooline [9828]	Vulnerable	Species or species habitat known to occur within area
Calytrix gurulmundensis		
[24241]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Homopholis belsonii		
Belson's Panic [2406]	Vulnerable	Species or species habitat may occur within area
Lepidium monoplocoides		
Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area
Polianthion minutiflorum		
[82772]	Vulnerable	Species or species habitat may occur within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Vincetoxicum forsteri listed as Tylophora linearis		
[92384]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Xerothamnella herbacea [4146]	Endangered	Species or species habitat may occur within area
REPTILE		
Anomalopus mackayi Five-clawed Worm-skink, Long-legged Worm-skink [25934]	Vulnerable	Species or species habitat may occur within area
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Elseya albagula Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat may occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat likely to occur within area
Hemiaspis damelii Grey Snake [1179]	Endangered	Species or species habitat likely to occur within area
Rheodytes leukops Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Vulnerable	Species or species habitat may occur within area
SNAIL		
Adclarkia cameroni Brigalow Woodland Snail [83886]	Endangered	Species or species habitat may occur within area
Adclarkia dulacca Dulacca Woodland Snail [83885]	Endangered	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		

Scientific Name	Threatened Category	Presence Text
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat may occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area overfly marine area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Atlas Stage 3 Gas Project	2022/09410		Assessment
Atlas to Reedy Creek Pipeline	2023/09585		Assessment
Coal Seam Gas Field Development for Natural Gas Liquefaction Park, Curtis Island	2008/4059		Post-Approval
Development of Existing Coal Seam Gas Fields	2008/4398		Post-Approval
Controlled action			
Construct and operate 447km high pressure gas transmission pipeline	2009/4976	Controlled Action	Post-Approval
Expansion of Coal Seam Gas Fields	2009/4974	Controlled Action	Post-Approval
Queensland Curtis LNG Project - Pipeline Network	2008/4399	Controlled Action	Post-Approval
Reedy Creek to Glebe Weir Pipeline Project	2011/6181	Controlled Action	Post-Approval
Santos GLNG Gas Field Development Project, QLD	2012/6615	Controlled Action	Post-Approval
Wandoan Coal Project - Coal Seam Methane Water Supply South	2008/4287	Controlled Action	Post-Approval
Not controlled action			
Construction of a new communications facility	2011/6196	Not Controlled Action	Completed
Delga Solar Farm, 1039 Gadsbys Road, Woleebee, Qld	2019/8411	Not Controlled Action	Completed
High Voltage Transmission line Development	2007/3230	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Project Atlas CSG Project, between Wollumbilla and Wandoan, Qld	2018/8329	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Reedy Creek to Wallumbilla gas transmission pipeline, sthrn Qld	2017/7888	Not Controlled Action	Completed
Referral decision			
Development of an underground longwall coal mine	2011/6129	Referral Decision	Completed
Development of the Norwood underground longwall coal mine project	2011/6130	Referral Decision	Completed

Bioregional Assessments

SubRegion	BioRegion	Website
Maranoa-Balonne-Condamine	Northern Inland Catchments	BA website

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

Queensland Government

WildNet species list

Search Criteria: Species List for a Defined Area
Species: Animals
Type: Native
Queensland status: Rare and threatened species
Records: Confirmed
Date: Since 1980
Latitude: 26.355 to 26.237
Longitude: 149.3818 to 149.8501
Email: karalyn.fletcher@e2mconsulting.com.au
Date submitted: Monday 24 Oct 2022 10:56:12
Date extracted: Monday 24 Oct 2022 11:00:02

The number of records retrieved = 3

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V	V	1
animals	reptiles	Boidae	*Aspidites ramsayi*	woma		NT		1
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		2

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Queensland Government

WildNet species list

Search Criteria: Species List for a Defined Area
Species: All
Type: Native
Queensland status: Rare and threatened species
Records: Confirmed
Date: Since 1980
Latitude: 26.355 to 26.237
Longitude: 149.3818 to 149.8501
Email: karalyn.fletcher@e2mconsulting.com.au
Date submitted: Monday 24 Oct 2022 11:03:53
Date extracted: Monday 24 Oct 2022 11:10:03

The number of records retrieved = 4

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V	V	1
animals	reptiles	Boidae	*Aspidites ramsayi*	woma		NT		1
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		2
plants	land plants	Surianaceae	*Cadellia pentastylis*	ooline		V	V	6/6

CODES

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Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: Native
Queensland status: Rare and threatened species
Records: Confirmed
Date: Since 1980
Latitude: -26.3512
Longitude: 149.8010
Distance: 15
Email: karalyn.fletcher@e2mconsulting.com.au
Date submitted: Monday 24 Oct 2022 13:43:12
Date extracted: Monday 24 Oct 2022 13:50:03

The number of records retrieved = 11

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V	V	3
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		2
animals	snails	Camaenidae	*Adclarkia cameroni*			V	E	1
plants	land plants	Leguminosae	*Acacia curranii*	curly-bark wattle		V	V	1/1
plants	land plants	Leguminosae	*Acacia wardellii*			NT		2/2
plants	land plants	Myrtaceae	*Calytrix gurulmundensis*			V	V	10/9
plants	land plants	Myrtaceae	*Eucalyptus curtisii*	Plunkett mallee		NT		1/1
plants	land plants	Myrtaceae	*Micromyrtus carinata*	Gurulmundi heath-myrtle		E		17/14
plants	land plants	Rhamnaceae	*Cryptandra ciliata*			NT		1/1
plants	land plants	Solanaceae	*Solanum stenopterum*			V		1/1
plants	land plants	Surianaceae	*Cadellia pentastylis*	ooline		V	V	37/10

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: Native
Queensland status: Rare and threatened species
Records: Confirmed
Date: Since 1980
Latitude: -26.2821
Longitude: 149.8499
Distance: 15
Email: karalyn.fletcher@e2mconsulting.com.au
Date submitted: Monday 24 Oct 2022 13:44:44
Date extracted: Monday 24 Oct 2022 13:50:06

The number of records retrieved = 12

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		V	V	2
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V	V	3
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	1
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		E	E	1
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		2
plants	land plants	Leguminosae	*Acacia curranii*	curly-bark wattle		V	V	2/2
plants	land plants	Leguminosae	*Acacia wardellii*			NT		2/2
plants	land plants	Myrtaceae	*Calytrix gurulmundensis*			V	V	6/5
plants	land plants	Myrtaceae	*Micromyrtus carinata*	Gurulmundi heath-myrtle		E		8/6
plants	land plants	Poaceae	*Homopholis belsonii*	Belson's panic		E	V	1/1
plants	land plants	Rhamnaceae	*Cryptandra ciliata*			NT		1/1
plants	land plants	Surianaceae	*Cadellia pentastylis*	ooline		V	V	30/4

CODES

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Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: Native
Queensland status: Rare and threatened species
Records: Confirmed
Date: Since 1980
Latitude: -26.3045
Longitude: 149.7074
Distance: 15
Email: karalyn.fletcher@e2mconsulting.com.au
Date submitted: Monday 24 Oct 2022 13:44:14
Date extracted: Monday 24 Oct 2022 13:50:09

The number of records retrieved = 4

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V	V	2
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		E	E	1
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		1
plants	land plants	Surianaceae	*Cadellia pentastylis*	ooline		V	V	8/8

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

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The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: Native
Queensland status: Rare and threatened species
Records: Confirmed
Date: Since 1980
Latitude: -26.3423
Longitude: 149.6302
Distance: 15
Email: karalyn.fletcher@e2mconsulting.com.au
Date submitted: Monday 24 Oct 2022 13:43:44
Date extracted: Monday 24 Oct 2022 13:50:12

The number of records retrieved = 5

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Boidae	*Aspidites ramsayi*	woma		NT		1
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		1
plants	land plants	Leguminosae	*Acacia wardellii*			NT		1/1
plants	land plants	Solanaceae	*Solanum stenopterum*			V		1/1
plants	land plants	Surianaceae	*Cadellia pentastylis*	ooline		V	V	6/6

CODES

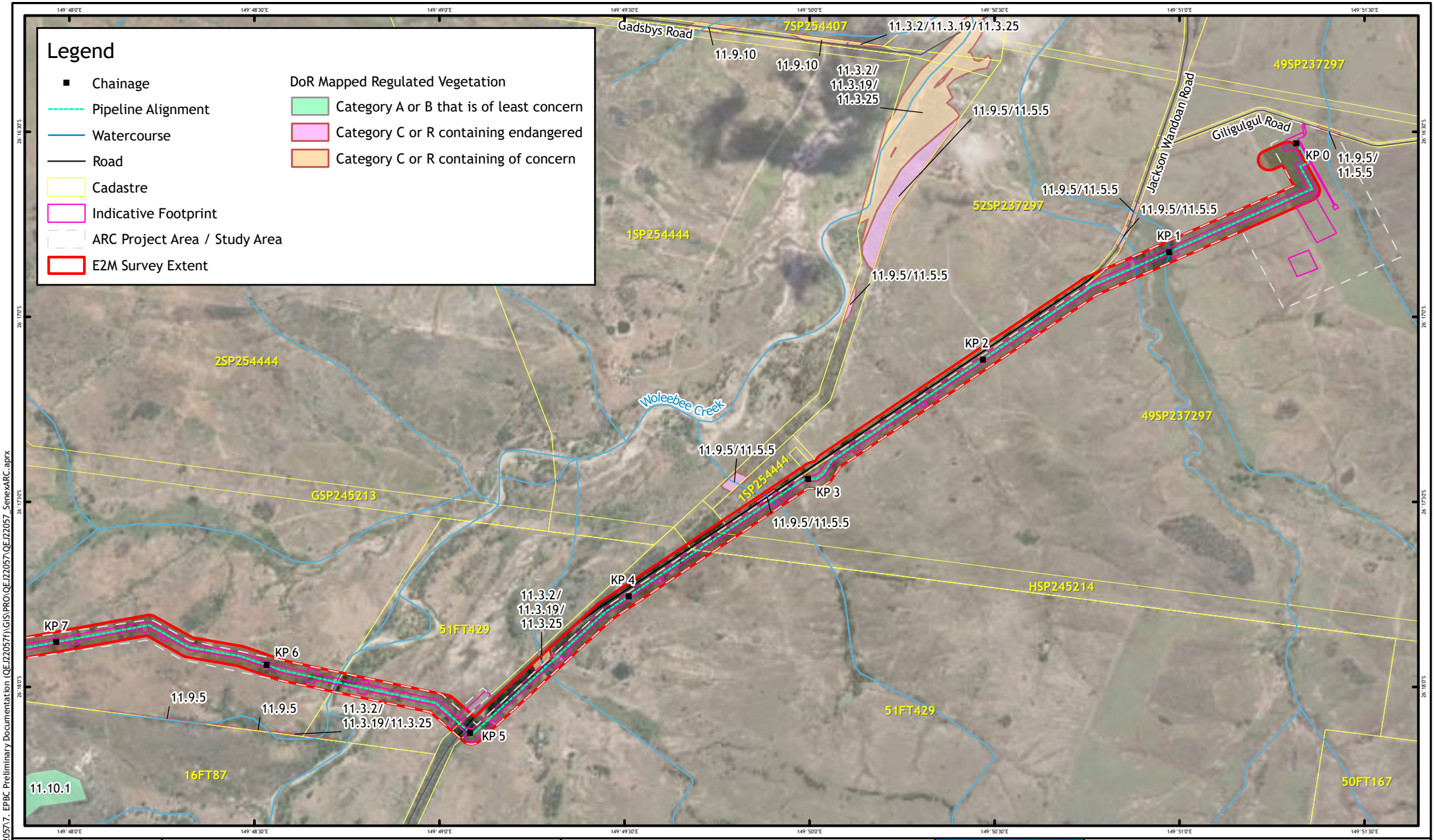
I - Y indicates that the taxon is introduced to Queensland and has naturalised.

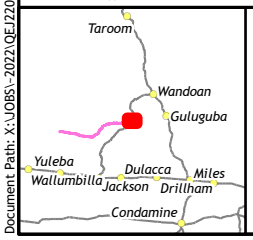
Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Appendix C DoR Mapped Regulated Vegetation





N

Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
Aerial Imagery: © ESRI 2022
Cadastre: © DoR 2022
Ordered Drainage: © DoR 2022
Road: © DoR 2022
Mapped Vegetation: © DoR 2024

Rev	Description	Drawn	Approved	Date
4	Issued for Use	GO	AP	26/02/2024
3	Issued for Use	GO	LW	14/07/2023

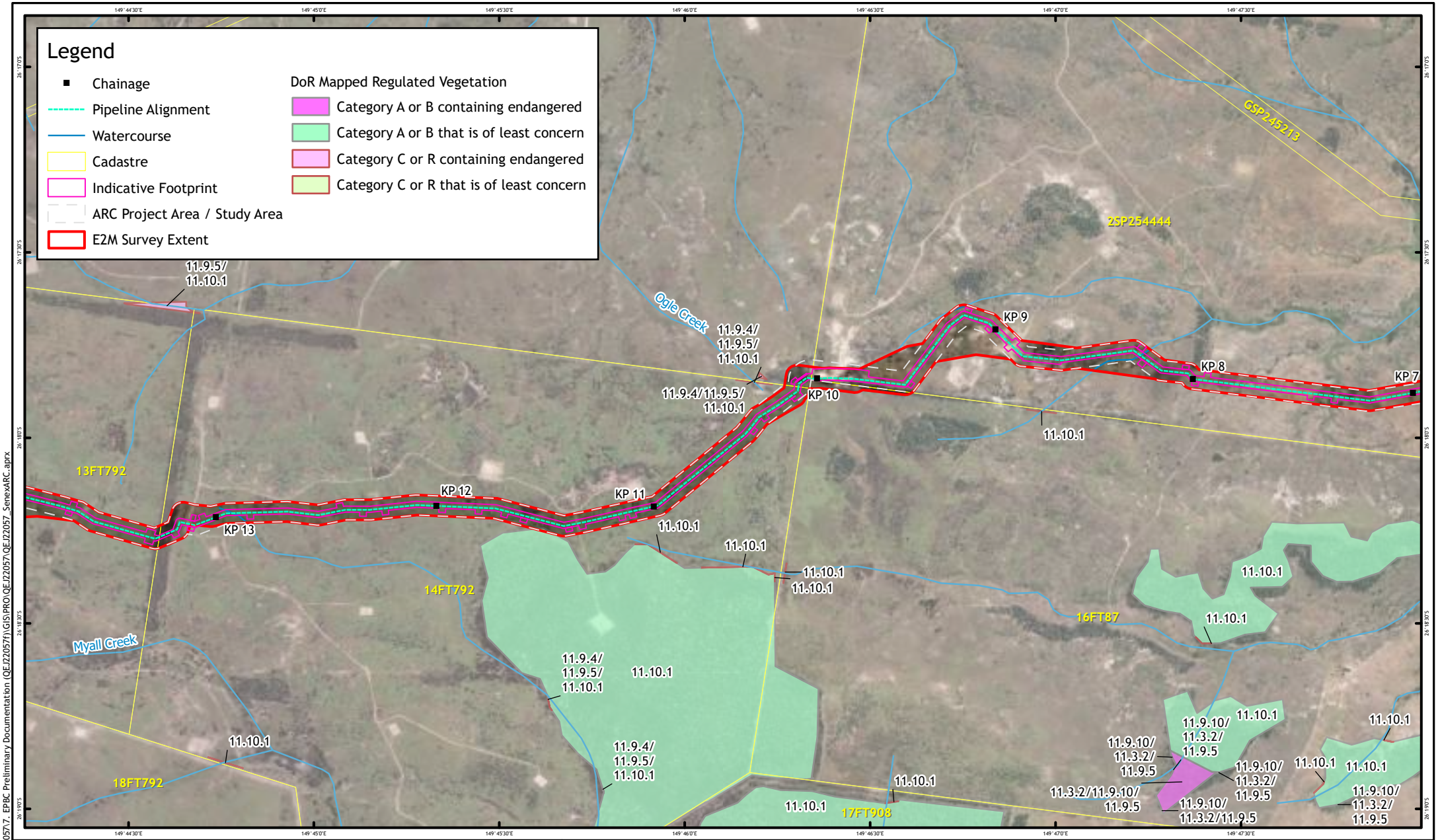
APPENDIX C: DoR MAPPED REGULATED VEGETATION

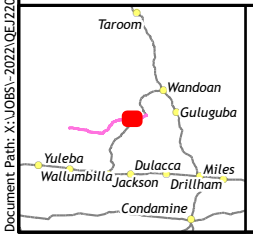
MNES Ecological Assessment Report
Senex Energy Limited

Map Number	Job Number	Rev
1 of 9	QEJ22057	4

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N

Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
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Ordered Drainage: © DoR 2022
Road: © DoR 2022
Mapped Vegetation: © DoR 2024

Rev	Description	Drawn	Approved	Date
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3	Issued for Use	GO	LW	14/07/2023

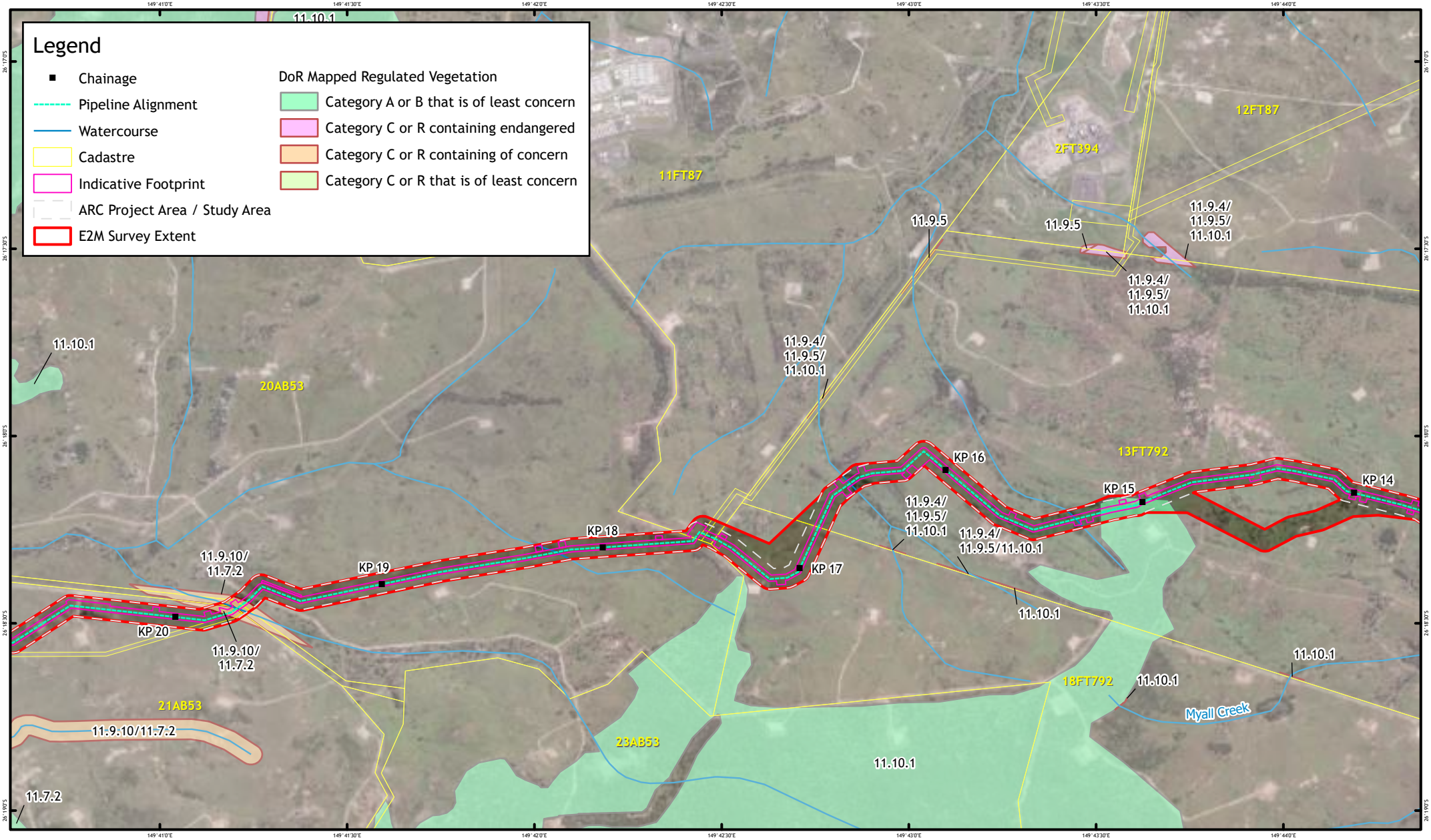
APPENDIX C: DoR MAPPED REGULATED VEGETATION

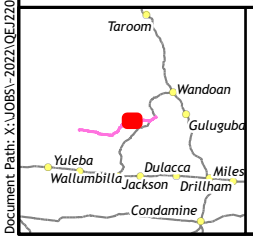
MNES Ecological Assessment Report
Senex Energy Limited

Map Number	Job Number	Rev
2 of 9	QEJ22057	4

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N

Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
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Cadastre: © DoR 2022
Ordered Drainage: © DoR 2022
Road: © DoR 2022
Mapped Vegetation: © DoR 2024

Rev	Description	Drawn	Approved	Date
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3	Issued for Use	GO	LW	14/07/2023

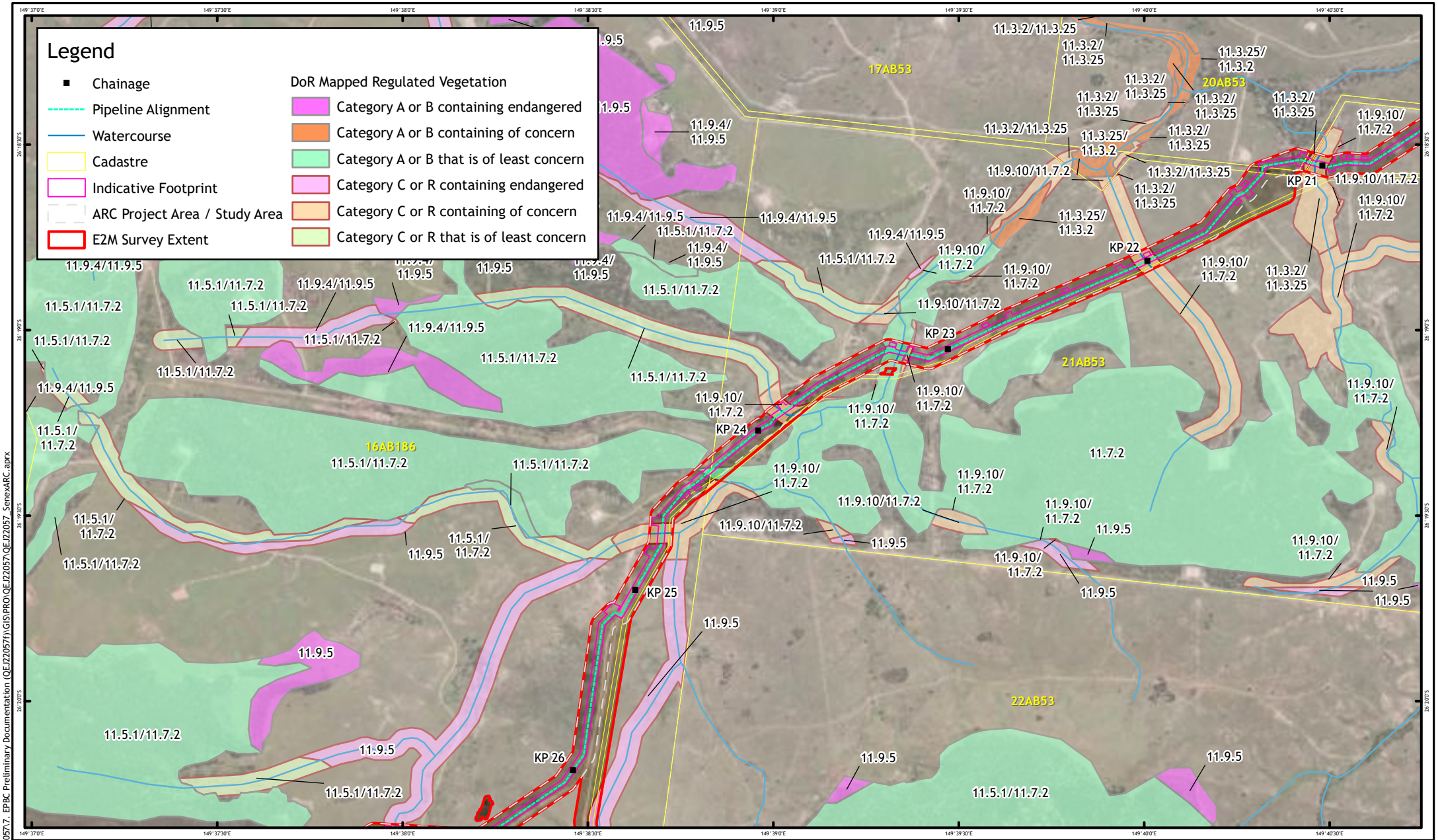
APPENDIX C: DoR MAPPED REGULATED VEGETATION

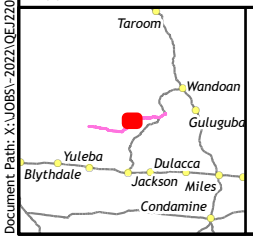
MNES Ecological Assessment Report
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Map Number	Job Number	Rev
3 of 9	QEJ22057	4

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N

Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
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Cadastre: © DoR 2022
Ordered Drainage: © DoR 2022
Road: © DoR 2022
Mapped Vegetation: © DoR 2024

Rev	Description	Drawn	Approved	Date
4	Issued for Use	GO	AP	26/02/2024
3	Issued for Use	GO	LW	14/07/2023

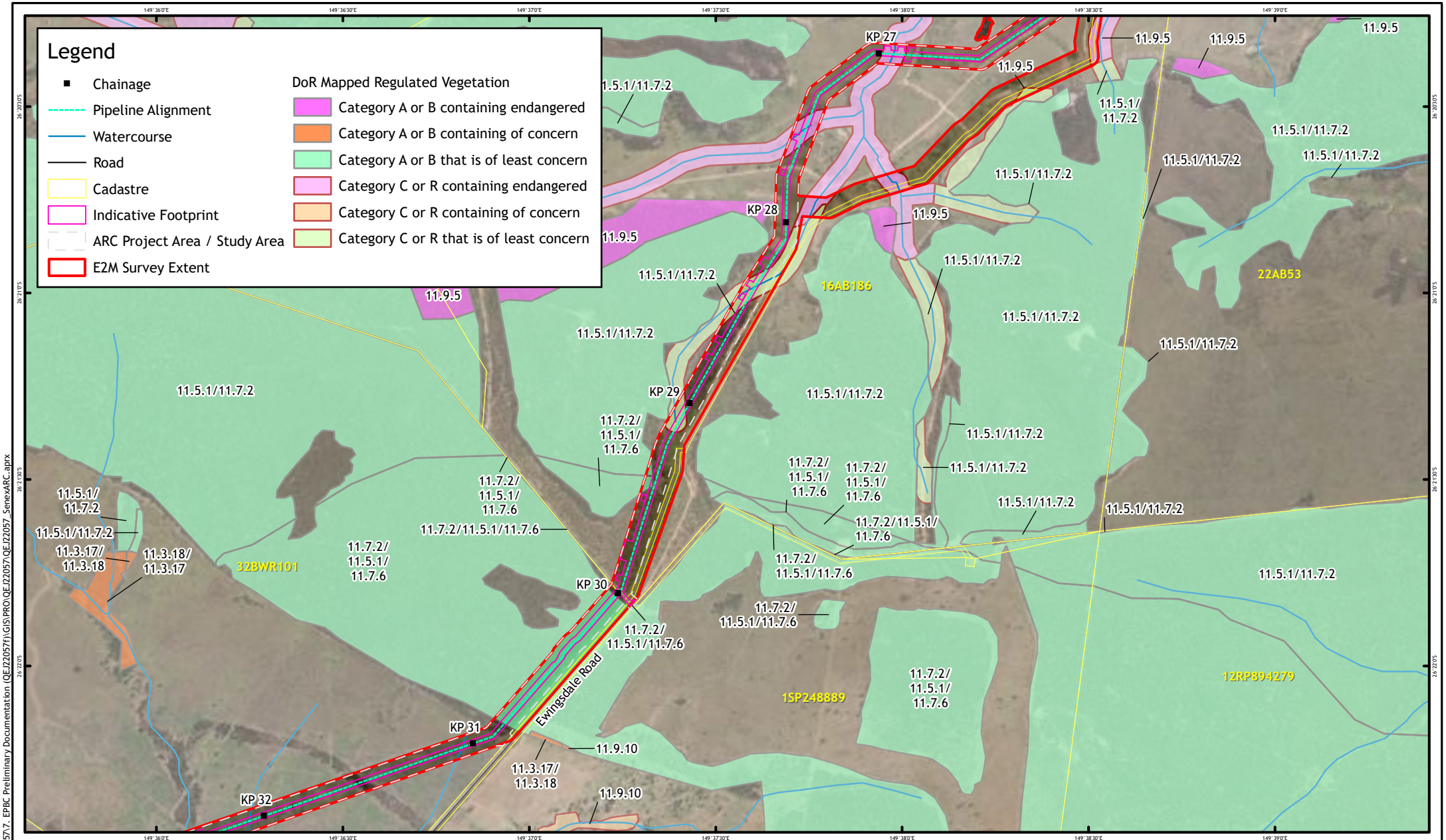
APPENDIX C: DoR MAPPED REGULATED VEGETATION

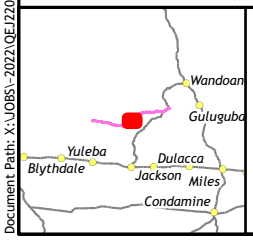
MNES Ecological Assessment Report
Senex Energy Limited

Map Number	Job Number	Rev
4 of 9	QEJ22057	4

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N

Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
Aerial Imagery: © ESRI 2022
Cadastre: © DoR 2022
Ordered Drainage: © DoR 2022
Road: © DoR 2022
Mapped Vegetation: © DoR 2024

Rev	Description	Drawn	Approved	Date
4	Issued for Use	GO	AP	26/02/2024
3	Issued for Use	GO	LW	14/07/2023

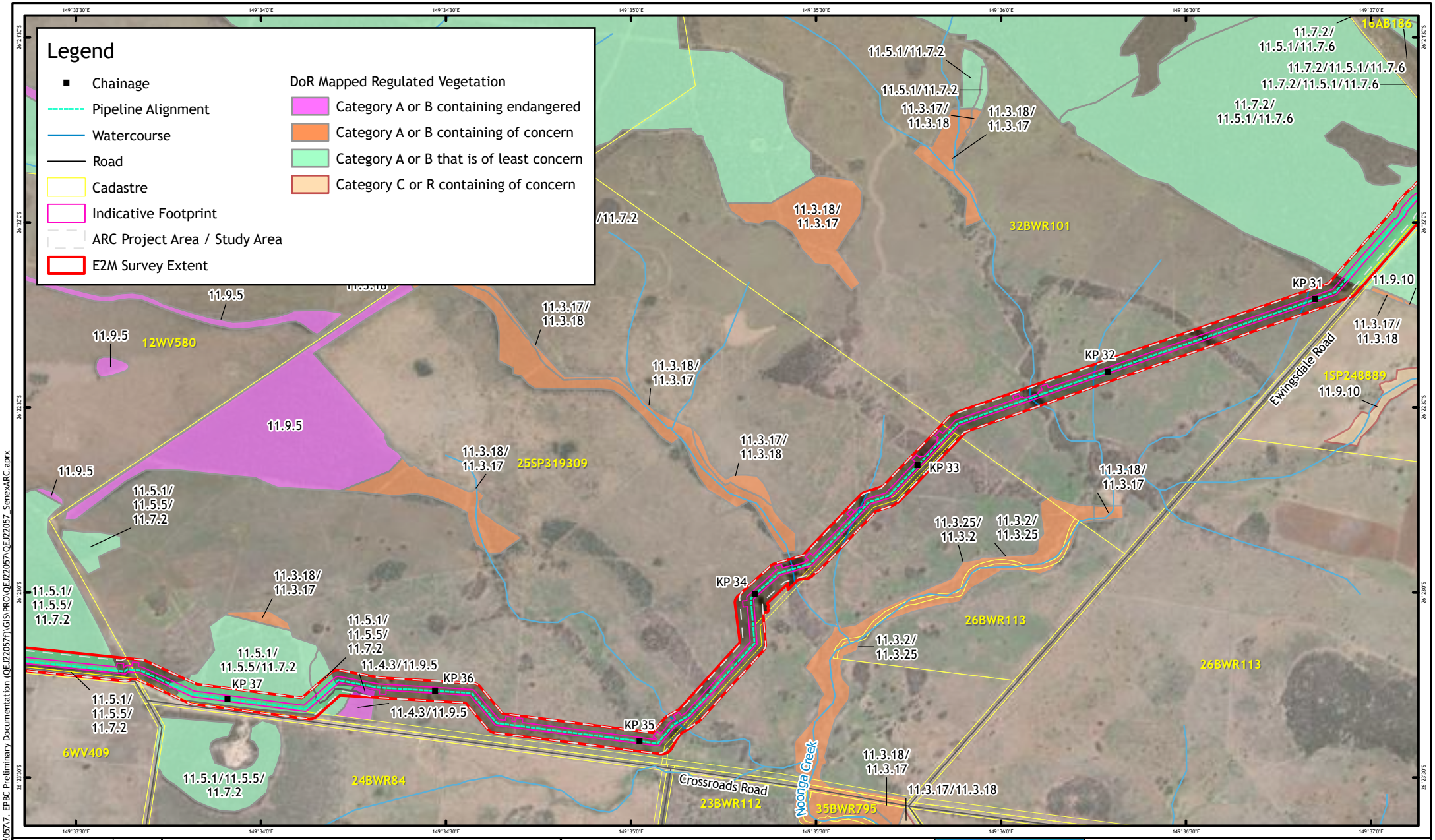
APPENDIX C: DoR MAPPED REGULATED VEGETATION

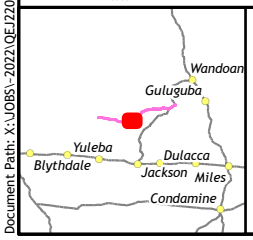
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Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
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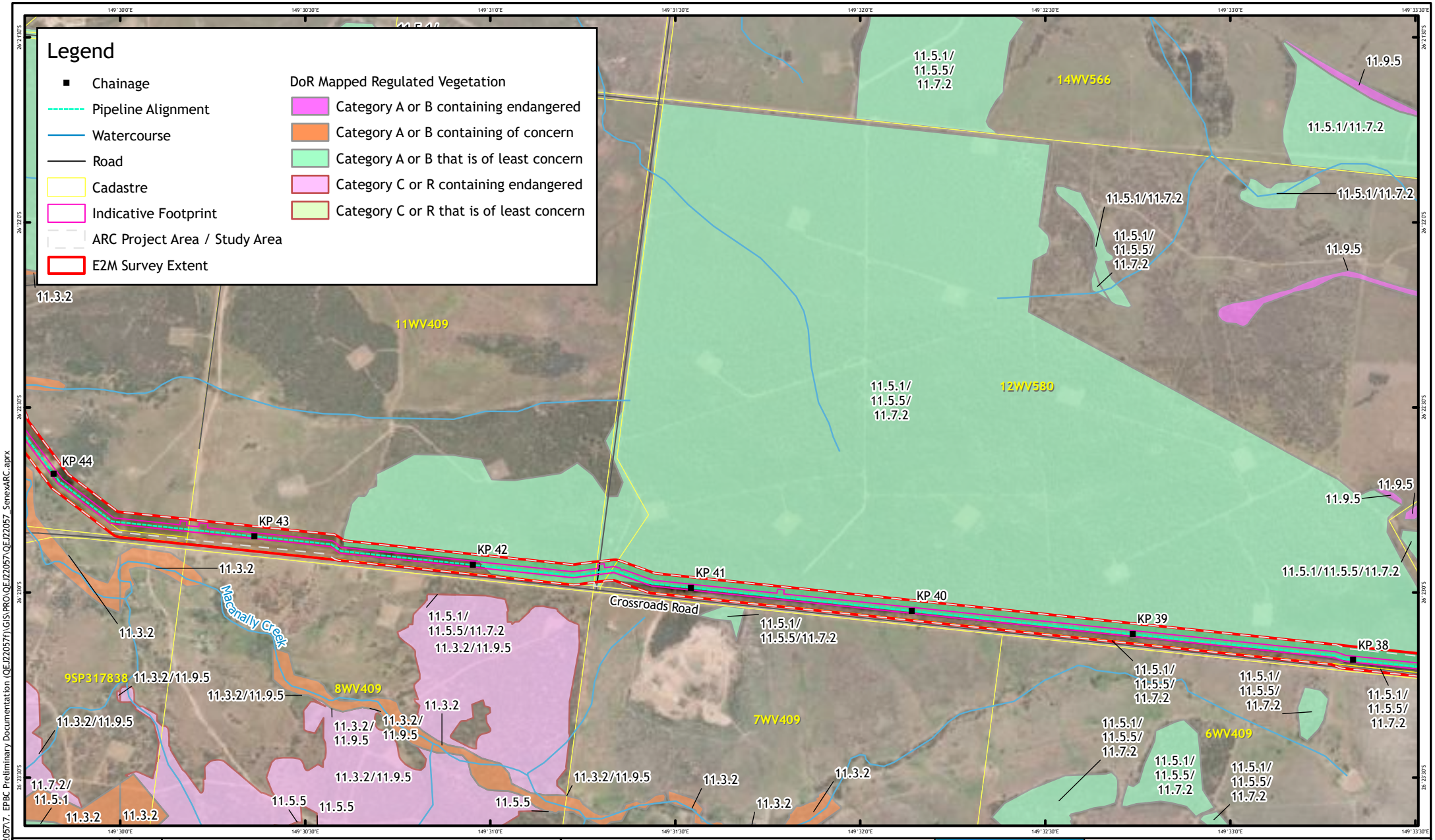
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Wandoan
Guluguba
Yuleba
Blythdale
Dulacca
Jackson
Miles
Condamine

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Scale 1:25,000 (A4)

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Kilometres

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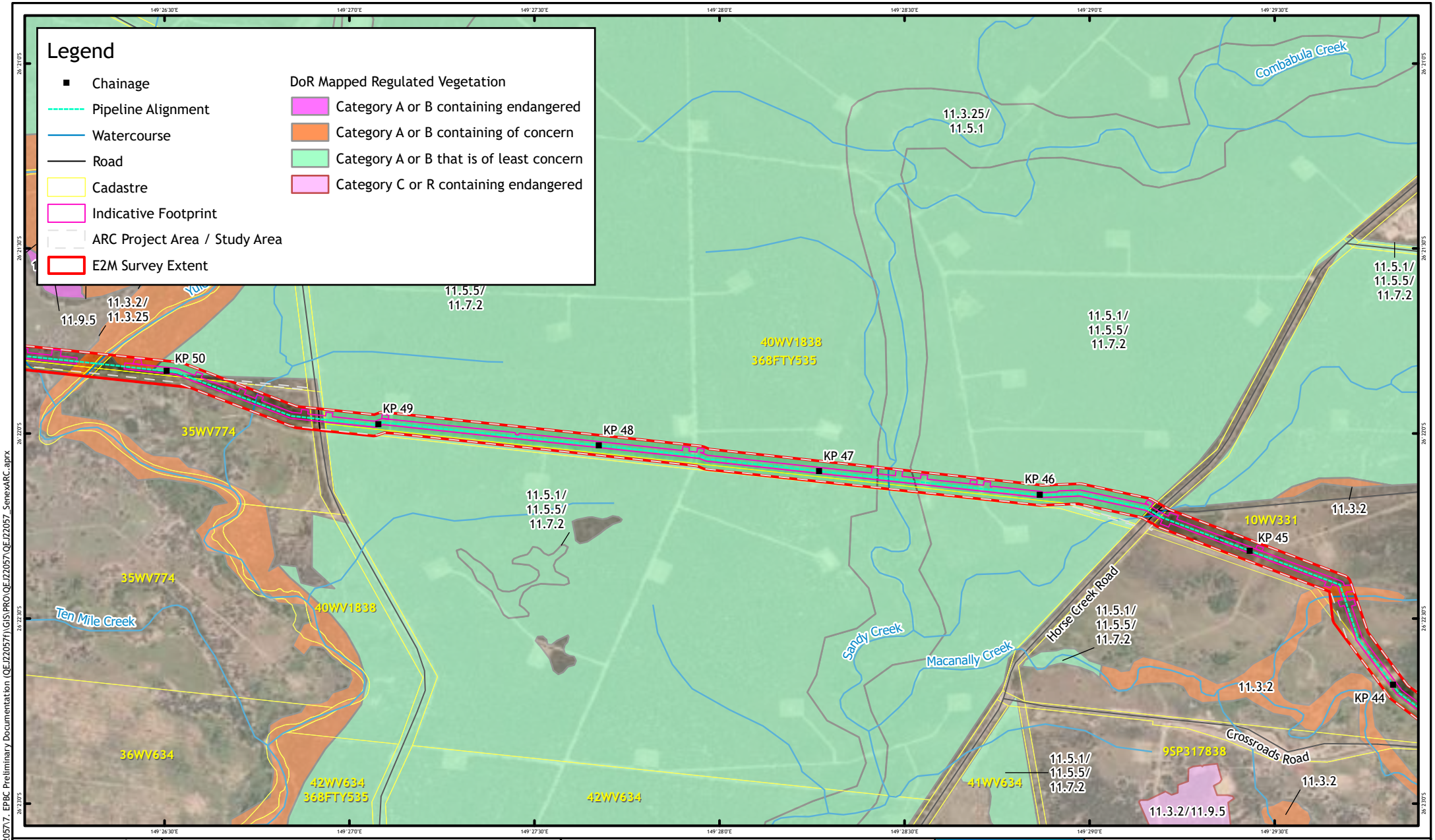
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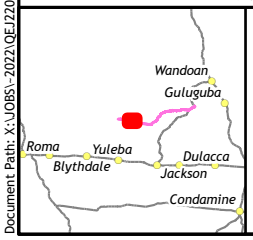
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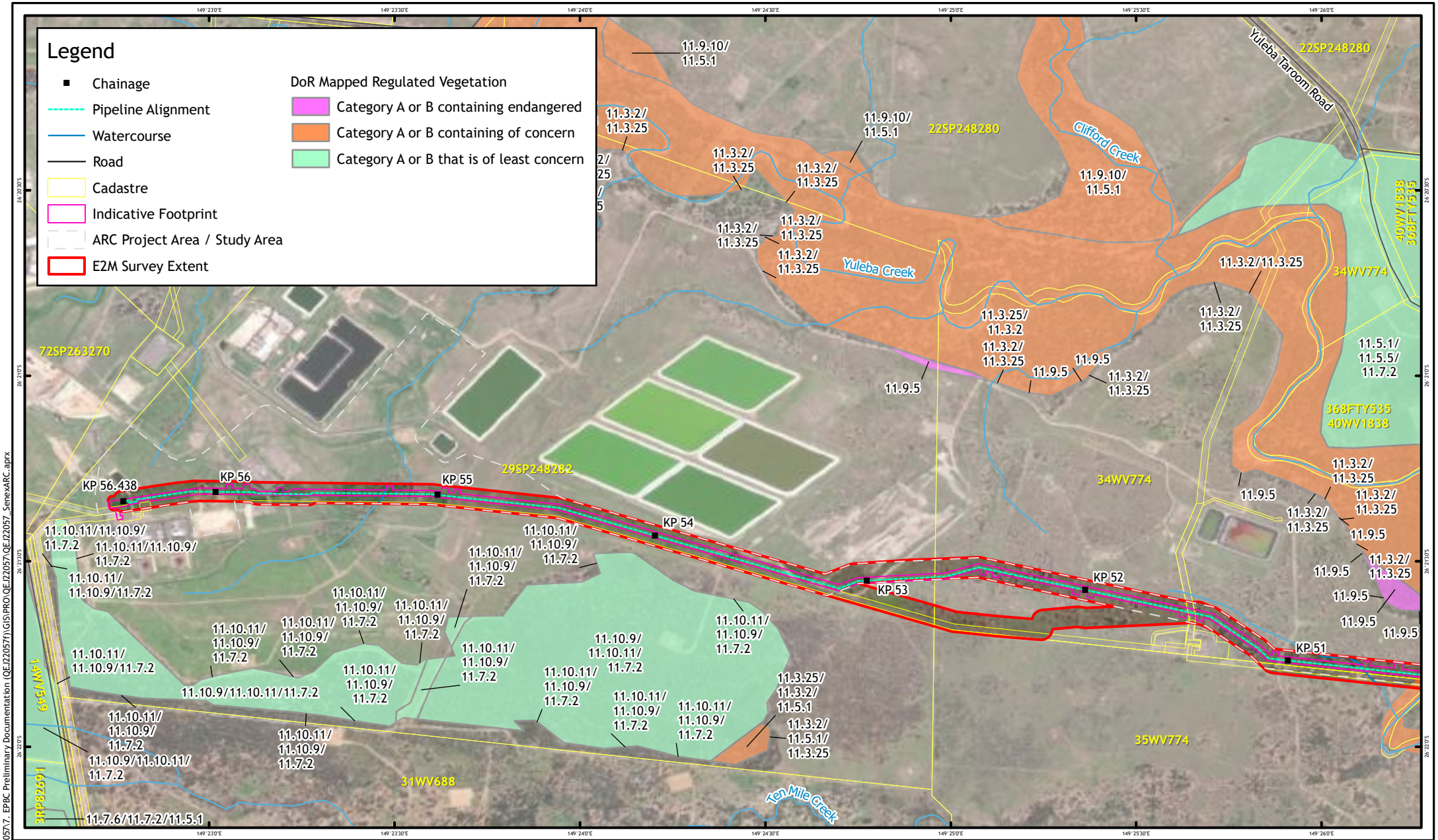
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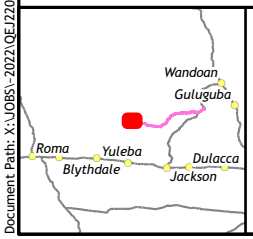
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Appendix D Likelihood of Occurrence Assessments

D.1 Likelihood of occurrence assessment

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
PMST/ WO	***Acacia curranii*** curly-bark wattle	Vulnerable	This species most often occurs on the rocky outcrops of isolated hills and ranges, as well as in widely scattered thickets in patches of diverse heath scrub with emergent trees. In Queensland, it occurs in patches in species-rich heathy scrub on deeply weathered sandstone forming red sandy soils (DAWE, 2022).	**Unlikely to occur** Although the species has been recorded within the desktop search extent, the Indicative Footprint and Study Area do not contain suitable habitat for the species.
PMST	***Arthraxon hispidus*** hairy-joint grass	Vulnerable	This species is found within or on the edges of rainforest and in wet eucalypt forest, near creeks and swamps, woodlands, around freshwater springs on coastal foreshore dunes, shaded gullies, creek banks and on alluvium in creek beds in open forest (DEWHA, 2008).	**Unlikely to occur** The species has not been recorded within the desktop search extent and the Indicative Footprint and Study Area contain little suitable habitat for the species. The species was also not detected during surveys.
PMST/WO/ ALA	***Cadellia pentastylis*** ooline	Vulnerable	This species grows in semi-evergreen vine thickets and sclerophyll vegetation on undulating terrain of various geology, including sandstone, conglomerate and claystone. Soils generally have low to medium nutrient content and are normally associated with upper and mid-slopes in the landscape. The altitude is generally 300-460 metres above sea-level. The species forms a closed or open canopy, as a dominant or commonly with *Eucalyptus albens* and *Callitris glaucophylla*, with an open understorey and leaf litter dominating the forest floor (DAWE, 2022).	**Unlikely to occur** Whilst the species has previously been recorded within the desktop search extent, the Indicative Footprint and Study Area contain little suitable habitat and the species was not recorded during targeted surveys.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
PMST/WO	***Calytrix gurulmundensis***	Vulnerable	This species is found in open shrubland with sparse, stunted *Eucalyptus*, *Casuarina* and *Acacia* spp. and in *Triodia* hummock grassland with scattered shrubs (DAWE, 2022).	**Unlikely to occur** The species has been recorded within the desktop search extent; however, suitable habitat does not occur within the Indicative Footprint or Study Area and the species was not recorded during surveys.
PMST	***Dichanthium setosum*** bluegrass	Vulnerable	This species is associated with heavy basaltic black soils and red-brown loams with clay subsoil. Associated species include White Box (*Eucalyptus albens*), Silver-leaved Ironbark (*Eucalyptus melanophloia*), Yellow Box (*Eucalyptus melliodora*), Manna Gum (*Eucalyptus viminalis*), Amulla (*Myoporum debile*), Purple Wire-grass (*Aristida ramosa*), Kangaroo Grass (*Themeda triandra*), Fine-leaved Tussock-grass (*Poa sieberiana*), Red-leg Grass (*Bothriochloa ambigua*), Pitted Blue-grass (*Bothriochloa decipiens*), *Macrozamia stenotera*, Small Woolly Burr-medic (*Medicago minima*), Scaly Buttons (*Leptorhynchos squamatus*), *Lomandra* aff. *longifolia*, Australian Bugle (*Ajuga australis*), Bogan-flea (*Calotis hispidula)* and *Austrodanthonia spp., Dichopogon spp., Brach yscome sp.,Vittadinia spp., Wahlenbergia spp.* an d *Psoralea spp.* This species is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. It is often collected from disturbed open grassy woodlands on the northern tablelands, where the habitat has been variously	**Unlikely to occur** The species has not been recorded within the desktop search extent, and neither the species nor associated species were observed within the Indicative Footprint or Study Area during surveys.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
			grazed, nutrient-enriched, and water-enriched (DEWHA, 2008).	
PMST/WO/ ALA	***Homopholis belsonii*** Belson's panic	Vulnerable	This species is known to occur in dry woodland habitats on poor soils, such as those derived from basalt. It occurs on rocky hills supporting *Eucalyptus albens* and in *Geijera parviflora* woodland; flat to gently undulating alluvial areas supporting *Casuarina cristata* forest; and soils and plant communities of *Eucalyptus populnea* woodlands. It may also be associated with shadier areas of *Acacia harpophylla, Acacia melvillei* and *Acacia pendula* communities; in *Eucalyptus orgadophila* communities; and on roadsides. It is generally found among fallen timber at the base of trees or shrubs, among branches and leaves of trees hanging to ground level or along the bottom of netting fences. It occurs at elevations ranging from 200 m to 520 metres above sea level (DAWE, 2022).	**Unlikely to occur** The species has been recorded once within the desktop search extent and the Indicative Footprint and Study Area contain suitable habitat for the species; however, the species was not detected during surveys.
PMST	***Lepidium monoplocoides*** Winged Pepper-cress	Endangered	Occurs on seasonally moist to waterlogged sites on heavy fertile soils. Surrounding vegetation generally consists of open woodland dominated by *Allocasuarina luehmannii* (Bulloak) and/or eucalypts, particularly *Eucalyptus largiflorens* (Black Box) or Eucalyptus populnea (Poplar Box). The ground layer of the surrounding woodland is dominated by tussock grasses (Office of Environment and Heritage, 2019).	**Unlikely to occur** There are no previous records within desktop search extent and the Study Area lies outside the known distribution of the species.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
PMST	***Thesium austral*** Austral Toadflax	Vulnerable	The species is semi-parasitic on roots of a range of grass species, particularly *Themeda triandra*. It occurs in subtropical, temperate and subalpine climates over a wide range of altitudes. It occurs on soils derived from sedimentary, igneous and metamorphic geology on a range of soils including black clay loams to yellow podzolics and peaty loams (sprat page). The austral toadflax occurs in New South Wales, the Australian Capital Territory, Queensland and Victoria. Its current distribution is sporadic but widespread occurring between the Bunya Mountains in south-east Queensland to northeast Victoria and as far inland as the southern, central and northern tablelands in New South Wales and the Toowoomba region (sprat page).	**Unlikely to occur** The species has not previously been recorded within the desktop search extent and the Study Area lies outside the species' known distribution.
PMST	***Tylophora linearis*** *(*synonym of *Vincetoxicum forsteri)*	Endangered	*Vincetoxicum forsteri* grows in dry scrub, open forest and woodlands, low-altitude sedimentary, flats associated with *Melaleuca uncinata, Eucalyptus fibrosa, E. sideroxylon, E. albens, Callitris endlicheri, C. glaucophylla, Allocasuarina luehmannii, Acacia hakeoides, A. lineata, Myoporum* spp., and *Casuarina* spp. (DECC, 2005a; Forster et al., 2004).	**Unlikely to occur** The Study Area is outside of the species known distribution and there are no records from within the desktop search extent.
PMST	***Xerothamnella herbacea***	Endangered	*Xerothamnella herbacea* occurs in brigalow (*Acacia harpophylla*) dominated communities in shaded situations, often in leaf litter and is associated with gilgai (shallow ground	**Unlikely to occur** Suitable habitat occurs within the Study Area; however there are no records within the desktop search extent and the species was not detected during surveys.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
			depressions). Soils are heavy, grey to dark brown clays (DEWHA, 2008).	
PMST	**Australian painted snipe** *Rostratula australis*	Endangered; Marine	This species generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. The species has been recorded to utilise areas lined with trees, or that have some scattered fallen or washed-up timber. Breeding occurs in shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby, typically from or near small islands in freshwater wetlands (DotE 2015).	**Unlikely to occur** The Indicative Footprint and Study Area contain little suitable habitat for the species and there are no records within the desktop search extent.
PMST	**Brown treecreeper (south-eastern)** *Climacteris picumnus victoriae*	Vulnerable	This species is known to occur within dry open eucalypt forests and woodlands (Bounds 2019; Ford et al. 2021), usually dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. They are usually not found in woodlands with a dense shrub layer, and it is absent from heavily degraded woodlands and steep rocky hills (DCCEEW, 2023b).	**Unlikely to occur** The Study Area lies outside the subspecies' current known distribution, with the northernmost Queensland records from east of Inglewood.
PMST	**common sandpiper** *Actitis hypoleucos*	Migratory	The species has been recorded from a wide range of wetland habitats, of varying levels of salinity (DotE 2015). The species typically forages in	**Unlikely to occur** The Indicative Footprint and Study Area contains little or no suitable habitat for the species and

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
			shallow water and on bare soft mud at the edges of wetlands (DotE 2015).	there are no records of this species within the desktop search extent.
PMST	**Diamond firetail** *Stagonopleura guttata*	Vulnerable	Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees (DCCEEW, 2023a)	**Unlikely to occur** Suitable habitat occurs within the Study Area; however, the species has not been recorded within the desktop search extent and there are few records within the wider landscape. Suitable habitat within the Study Area is likely isolated from areas of known/occupied habitat (with the nearest contemporary record 19 km away away).
PMST	**curlew sandpiper** *Calidris ferruginea*	Critically Endangered; Migratory	This species usually forages and roosts in intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms (DotE 2015). Curlew Sandpipers commonly occur around the Australian coastline. Queensland records indicate that this species is more widespread in coastal areas south of Cairns. In Queensland, scattered records occur in the Gulf of Carpentaria also. There are sparsely scattered records inland.	**Unlikely to occur** The species has not been recorded within the desktop search extent and the Study Area does not contain suitable habitat for the species.
PMST	**fork-tailed swift** *Apus pacificus*	Migratory	The species is predominantly aerial and occurs over inland areas and occasionally above the foothills in coastal areas with dry and open habitat. The species can also occur over low scrub, heathland, saltmarsh and riparian woodlands and are associated with low pressure	**Unlikely to occur** The species has been recorded within the desktop search extent. However, being strictly arboreal, is unlikely to utilise habitat within or immediately adjacent the Disturbance Footprint.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
			systems that favour the occurrence of insect prey (DoE, 2022).	
PMST/ WO/ ALA	**glossy black-cockatoo** *Calyptorhynchus lathami*	Vulnerable	Unless required movement, species is found in habitats dominated with Allocasuarina or *Casuarina* (she-oak) trees as it is their primary food source (Glossy Black Conservancy 2010). Habitats used include intact habitats of woodlands and open sclerophyll forest, isolated she-oaks and tall gums and areas suited for hollow nesting (DotE 2015).	**Likely to occur** The Study Area and Indicative Footprint contains suitable habitat, and the species has been recorded within the desktop search extent. Though not recorded during surveys, the species may utilise habitat within and adjacent the Indicative Footprint on a seasonal or intermittent basis.
PMST	**grey falcon** *Falco hypoleucos*	Vulnerable	Habitat for the species is generally timbered lowland plains that are crossed by tree-lined watercourses, and adjacent to treeless areas, grasslands and open woodlands that are used for foraging (Garnett et al. 2011). Key habitat is identified as Acacia shrublands that are crossed by tree-lined watercourses (Garnett et al. 2011).	**Unlikely to occur** Suitable habitat occurs within the Study Area; however, the species is seldom recorded within the Southern Brigalow Belt and there are no records within the desktop search extent.
PMST	**Latham's snipe** *Gallinago hardwickii*	Migratory	The species typically occurs in permanent and ephemeral wetlands up to 2000 m above sea-level (DotE 2015). The species usually inhabits open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) (DotE 2015). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (DotE 2015). Various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or	**Unlikely to occur** The Indicative Footprint and Study Area contain little if any suitable habitat, and there are no records of this species within the desktop search extent.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
			river margins, river pools and floodplains (DotE 2015).	
PMST	**Oriental cuckoo** *Cuculus optatus*	Migratory	The species is a regular nonbreeding migrant to coastal northern and eastern Australia (Pizzey & Knight 2007). It occurs in monsoonal rainforest, vine thickets, wet sclerophyll forest or open *Casuarina*, *Acacia* or *Eucalyptus* woodlands; frequently at edges or ecotones between habitat types (DotE, 2015).	**Unlikely to occur** The species is rarely recorded west of the Great Dividing Range and there are no records of this species within the desktop search extent or wider landscape. The species was also not detected within the Study Area during surveys.
PMST	**painted honeyeater** *Grantiella picta*	Vulnerable	The species forages on mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, *Acacia*-dominated woodlands, *Melaleuca*, *Casuarina*, *Callitris*, and trees on farmland or gardens (DotE 2015). The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes (DotE 2015).	**Unlikely to occur** Potentially suitable habitat occurs within the Study Area; however, the species has not been recorded within the desktop search extent and there are very few records within the wider landscape. Suitable habitat within the Study Area is likely isolated from known/occupied habitat within the broader landscape (with the nearest known record 27 km away).
PMST	**Pectoral sandpiper** *Calidris melanotus*	Migratory	Typical habitat for the species comprises shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands (DotE 2015). The species is usually found in coastal or near coastal habitat but occasionally further inland (DotE 2015). Also recorded in swamp overgrown with lignum (DotE 2015).	**Unlikely to occur** The Study Area contains little or no suitable habitat for the species and there are no records of this species with then desktop search extent.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
PMST	**red goshawk** *Erythrotriorchis radiatus*	Endangered	The species prefers landscapes containing a mosaic of habitats including coastal and sub-coastal tall open forest, woodland and rainforest edges (DotE 2015). Forests of intermediate density are particularly favoured, as are ecotones between variably dense habitats (DotE 2015). Habitat utilisation is influenced by the location of large populations of birds (primary prey) (DotE 2015). It is rarely encountered over agricultural land as it avoids open habitats (DotE 2015). Nesting occurs in tall trees within one kilometre of permanent water, generally in open, biologically rich forest or woodland (DotE 2015). The species is sparsely dispersed across 15% of coastal and sub-coastal Australia (DotE 2015).	**Unlikely to occur** There are no records from within the desktop search extent and no contemporary (post-2000) records from the broader surrounding landscape. Recent research (MacColl et la., 2023) indicates that the species is likely absent from the southern Brigalow Belt.
PMST	**rufous fantail** *Rhipidura rufifrons*	Migratory	In east and south-east Australia, the species usually inhabits wet sclerophyll forests usually with a dense shrubby understorey often including ferns. It can also be found in subtropical and temperate rainforests, and occasionally in drier sclerophyll forests during migration. In the north, it occurs in tropical rainforest and monsoon rainforests, including semi-evergreen mesophyll vine forests, semi-deciduous vine thickets or thickets of Paperbarks (Melaleuca spp.). It occasionally occurs in secondary regrowth, following logging or disturbance in forests or rainforests (DotE 2015).	**Unlikely to occur** The Study Area contains little or no suitable habitat for the species and there are no records of this species within the desktop search extent, and very few within the broader landscape. The species was also not detected within the Study Area during surveys.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
PMST	**satin flycatcher** *Myiagra cyanoleuca*	Migratory	The species mainly inhabit eucalypt forests, often near wetlands or watercourses (DotE 2015). They generally occur in moister, taller forests than the leaden flycatcher, often occurring in gullies (DotE 2015). They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest (DotE 2015).	**Unlikely to occur** The Study Area contains potential habitat for the species; however, there are no records of this species within the desktop search extent and very few from the broader surrounding landscape, and the specie was not detected during surveys.
PMST	**sharp-tailed sandpiper** *Calidris acuminata*	Migratory	The sharp-tailed Sandpiper prefers the grassy edges of shallow inland freshwater wetlands. It is also found around sewage farms, flooded fields, mudflats, mangroves, rocky shores and beaches (Adams, 2016).	**Unlikely to occur** The Study Area contains little or no suitable habitat for the species and there are no records of this species within the desktop search extent.
PMST	**southern whiteface** *Aphelocephala leucopsis*	Vulnerable	Known to inhabit a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains (DCCEEW, 2023c).	**Unlikely to occur** The Study Area and Indicative Footprint may contain habitat for the species; however, there are no records within the desktop extent and very few records within the broader landscape. Potential suitable habitat within the Study Area is also likely isolated from areas of known/occupied habitat (with the nearest known record 30 km from the Study Area).
PMST/WO/ ALA	**squatter pigeon (southern subspecies)** *Geophaps scripta scripta*	Vulnerable	The species is locally abundant within the northern part of its range (i.e. Brigalow Belt (North) and Desert Uplands Bioregions) (DotE 2015). It is common in grazing country north of the Tropic of Capricorn (DotE 2015). The species occurs in a wide range of habitats wherever there is a grassy understorey in open eucalypt woodland	**Likely to occur** Suitable habitat occurs within the Study Area and Indicative Footprint and the species has been recorded from the desktop search extent. Though not recorded during surveys, the species may utilise habitat within the Indicative Footprint

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
			(and less often savannas) (DotE 2015). It is often found within close proximity to water bodies (DotE 2015).	and/or Study Area on a seasonal and/or intermittent basis.
PMST	**Swift Parrot** *Lathamus discolor*	Critically Endangered	This species occurs in a variety of habitats that contain preferred mature foraging habitat trees. In south-east Queensland, preferred tree species include Eucalyptus microcarpa, E. melliodora, E. robusta and E. tereticornis (Saunders and Tzaros 2011).	**Unlikely to occur** The Study Area contains little or no suitable habitat for the species and there are no records of this species within the desktop search extent or within the broader landscape surrounding the Study Area (~100km).
PMST	**yellow-tailed wagtail** *Motavilla flava*	Migratory	The species typically inhabits short grass and bare ground; swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land and town lawns (Pizzey & Knight 2007). The species is regularly recorded as a summer migrant to coastal northern Australia (Pizzey & Knight 2007).	**Unlikely to occur** There are very few records of this species from Queensland and none from west of the Great Dividing Range or southern Queensland, with most records from coastal mesic environs north of the tropic of Capricorn.
PMST/WO/ ALA	**white-throated needletail** *Hirundapus caudacutus*	Vulnerable; Marine; Migratory	Conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species (DotE 2015). Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland (DotE 2015). They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps (DotE 2015). When flying above farmland, they are more often recorded	**Likely to occur** Suitable roosting and foraging habitat occur within the Study Area and Indicative Footprint and the species has been recorded within the desktop search extent. Though not recorded during surveys, the species may utilise habitat within/above the Indicative Footprint and Study Area on an intermittent basis.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
			above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (DotE 2015). In coastal areas, they are sometimes seen flying over sandy beaches or mudflats, and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes (DotE 2015).	
PMST	**ghost bat** *Macroderma gigas*	Vulnerable	The species occurs across a range of habitats, from arid Pilbara to tropical savanna woodlands and rainforests (DotE 2015). During the daytime they roost in caves, rock crevices and old mines (DotE 2015). Roost sites used permanently are generally deep natural caves or disused mines with a relatively stable temperature of 23°–28°C and a moderate to high relative humidity of 50–100 percent (DotE 2015). The average foraging distance is approximately 2 km from the daytime roost (DotE 2015).	**Unlikely to occur** The Study Area and Indicative Footprint contains little or no suitable habitat, and the species has not been recorded within the desktop search extent or the broader landscape.
PMST/WO/ ALA	**greater glider (central and southern)** *Petauroides volans*	Endangered	The species is generally restricted to eucalypt forests and woodlands, particularly favouring forest with a diversity of eucalypt species (SPRAT). During the day the species shelters in tree hollows, with a particular selection for large hollows in large, old trees. Modelling suggests that they require native forest patches of at least 160 km^2 to maintain viable populations (Eyre 2002).	**Likely to occur** Suitable habitat occurs within the Study Area and the species has previously been recorded within the desktop search extent. Scratches potentially attributable to the species were observed during surveys.
PMST/WO/ ALA	**koala (combined populations of Qld, NSW and**	Endangered	Koalas occur in a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by their diet; Eucalyptus	**Likely to occur** Suitable habitat occurs within the Study Area and the species has been recorded within the desktop

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
	the ACT) *Phascolarctos cinereus*		species (preference varying regionally) (DotE 2015). Diet is thought to be a major determinant of habitat selection, with the use small remnants of original vegetation where suitable habitat is present (DotE 2015). Koalas are also known to occur in modified or regenerating native vegetation communities, as well as urban and rural landscapes where food trees or shelter trees may be highly scattered (DotE 2015).	search extent. Though not recorded during surveys, the species may utilise habitat within and/or adjacent the Indicative Footprint on an intermittent or occasional basis.
PMST	**large-eared pied bat** *Chalinolobus dwyeri*	Vulnerable	Habitat preferences include fertile woodland valleys or rainforest and moist eucalypt forests within proximity to sandstone cliffs stretching from Blackdown Tableland in central eastern Qld, to Wollongong in NSW (DotE 2015). Roosting sites have also been observed within disused mineshafts, caves, overhangs and tree hollows (where suited) (DotE 2015).	**Unlikely to occur** The Study Area and surrounds contain little suitable habitat for the species and there are no records of this species from the desktop search extent or wider landscape.
PMST	**northern quoll** *Dasyurus hallucatus*	Endangered	The species diverse range of rocky habitats includes Eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert (DotE 2015). The species is also known to occupy non rocky lowland habitats such as beach scrub communities in central Queensland (DotE 2015). Rocky areas provide prime habitat for northern quolls (DotE 2015).	**Unlikely to occur** The Study Area contains little suitable shelter habitat for the species and there are no records of the species within the desktop search extent or wider landscape.
WO	**south-eastern long-eared bat**	Vulnerable	The species is found in a wide range of inland woodland vegetation types, these include box/ironbark/cypress pine woodlands, buloke	**Unlikely to occur** Suitable habitat occurs within the Indicative Footprint and Study Area; however, there are no

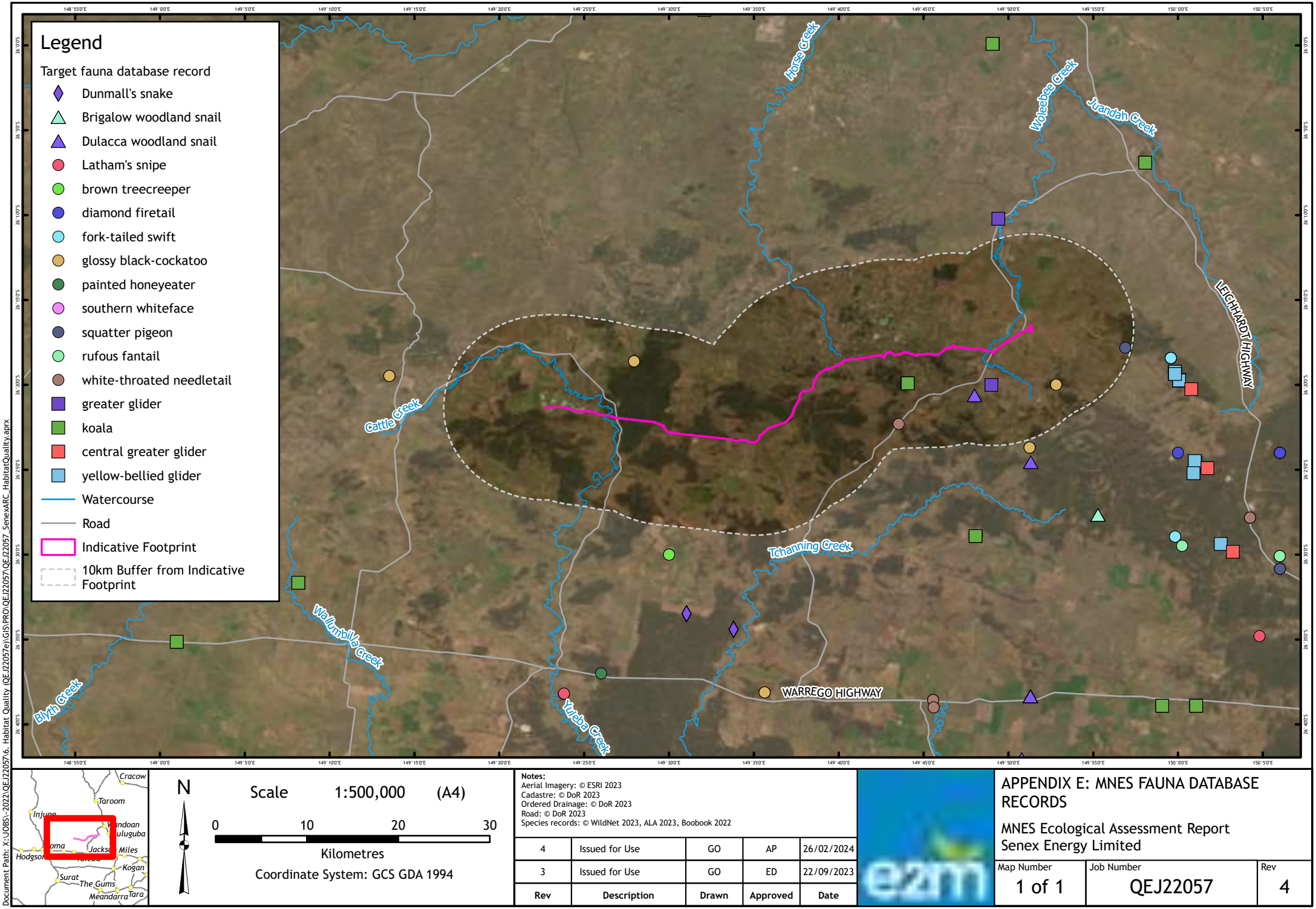
Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
	Nyctophilus corbeni		woodlands, Brigalow woodland, Belah woodland, smooth-barked apple woodland, river red gum forest, black box woodland, and various types of tree mallee (DotE 2015). The species is more abundant in extensive stands of vegetation in comparison to smaller woodland patches (DotE 2015).	records within the desktop search extent and very few records from the wider surrounds. Habitat within the Study Area is also likely isolated from areas of known/occupied habitat (with nearest records 32 km from the Study Area).
PMST	**yellow-bellied glider** *Petaurus australis*	Vulnerable	The yellow-bellied glider (south-eastern) occurs in eucalypt-dominated woodlands and forests including both wet and dry sclerophyll forests, with the subspecies showing a preference for large patches of mature old growth forest that provide suitable trees for foraging and shelter with a high proportion of winter-flowering and smooth-barked eucalypts (DAWE, 2023). The species relies upon a diversity of tree species and is unlikely to persist in forests dominated by only one or two tree species (DAWE, 2023),	**Unlikely to occur** Suitable habitat is present within and adjacent the Indicative Footprint; however, there no records from the desktop search extent and the species was not detected during surveys. Habitat within the Study Area is also likely isolated from areas of known/occupied habitat within the wider landscape.
PMST	**collared delma** *Delma torquata*	Vulnerable	The species normally inhabits dry eucalypt dominated woodlands and open-forests on stony soils or rocky ridges with an understorey of grasses and *Lantana montevidensis* (DotE 2015). This also includes alluvial river and creek flats, undulating country on fine-grained sedimentary rocks and sandstone ranges (DotE 2015). The species lives in permanent deep tunnel-like burrows and deep soil cracks, using fallen logs and timber as sheltering sites on the surface (DotE 2015).	**Unlikely to occur** The Indicative Footprint and Study Area contain limited suitable habitat and the species has not been recorded within the desktop search extent and there are no records within the wider landscape.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
PMST	**Dunmall's snake** *Furina dunmall*i	Vulnerable	The species range of habitats includes forests and woodlands on black alluvial cracking clay and clay loams dominated by *Acacia harpophylla* (brigalow), other wattles (*A. burowii, A. deanii, A. leiocalyx), Callitris spp.* or *Allocasuarina luehmannii;* and *Corymbia citriodora, Eucalyptus crebra, E. melanophloia, Callitris glaucophylla* and bulloak open forest and woodland associations on sandstone derived soils (DotE 2015).	**Unlikely to occur** Suitable habitat occurs within the Study Area; however, the species has not been recorded within the desktop search extent and the species was not recorded during surveys. Though recorded within the wider landscape, habitat within the Study Area is likely isolated from areas of known/occupied habitat (with the nearest record 19 km away).
PMST	**Fitzroy River Turtle** *Rheodytes leukops*	Vulnerable	*Rheodytes leukops* occurs in flowing rivers with large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles. Preferred areas have high water clarity and are often associated with Ribbonweed (*Vallisneria sp.)* beds. Common riparian vegetation includes Blue Gums (*Eucalyptus tereticornis*), River Oaks (*Casuarina cunninghamiana*), Weeping Bottlebrushes (*Callistemon viminalis*) and paperbarks (*Melaleuca linariifolia*) (DEWHA, 2008).	**Unlikely to occur** The species has not previously been recorded within the desktop search extent and the Study Area does not contain suitable habitat for the species.
PMST	**five-clawed worm-skink, long-legged worm-skink** *Anomalopus mackayi*	Vulnerable	The Five-clawed Worm-skink occurs on the lower slopes of slight rises in grassy White Box woodland, open woodland and River Red Gum-Coolibah-Bimble Box woodland. This type of woodland is generally supported by red-black to black clay-loam soils (Shea et al., 1987). The Five-clawed Worm-skink lives in permanent deep tunnel-like burrows and deep soil cracks, using fallen logs and timber as sheltering sites on the surface (DEWHA, 2008).	**Unlikely to occur** There is limited suitable habitat for the species within the Indicative Footprint, no records within the desktop search extent or the wider landscape, and the Study Area lies outside the species' current known distribution.

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
PMST	**grey snake** *Hemiaspis damelii*	Endangered	The grey snake favours woodlands (typically brigalow *Acacia harpophylla* and belah *Casuarina cristata*), usually on heavier, cracking clay soils, particularly in association with water bodies or in areas with small gullies and ditches. It shelters under rocks, logs and other debris as well as in soil cracks (Department of Climate Change, Energy, the Environment and Water, 2022).The Grey Snake distribution extends from central inland New South Wales, north to several isolated populations near Rockhampton in Queensland.	**Unlikely to occur** The Study Area contains suitable habitat for the species; however, the species has not been recorded from the desktop search extent and there are no records from the wider surrounds.
PMST	**white-throated snapping turtle** *Elseya albagula*	Critically Endangered	The white-throated snapping turtle is recognised as a habitat specialist. Within the river system the white-throated snapping turtle prefers clear, flowing, well-oxygenated waters. This preference appears to be associated with their physiological adaption to extract oxygen from water via cloacal respiration. White-throated snapping turtles do occur in non-flowing waters, but typically at much reduced densities (DoE, 2014). Found only in Queensland in the Fitzroy, Mary and Burnett Rivers and associated smaller drainages in south-eastern Queensland. The Fitzroy catchment population has been separated from the Mary and Burnett catchments for an extended period.	**Unlikely to occur** The species has not previously been recorded within the Indicative Footprint and the Study Area does not contain suitable waterways for the species. The species is restricted to The Fitzroy, Mary and Burnett Rivers and associated smaller drainages in SEQ.
PMST	**yakka skink** *Egernia rugosa*	Vulnerable	The species is known to occur in open dry sclerophyll forest, woodland and scrub, including on Land Zones 3, 4, 5, 7, 9 and 10 (DotE 2015). Common woodland and open forest types include	**Unlikely to occur** Potentially suitable habitat occurs within the Study Area; however, the species has not been recorded within the desktop search extent and there are

Source	Species	EPBC Act Status	Habitat	Likelihood of occurrence within and/or adjacent the Indicative Footprint
			Acacia harpophylla, A. aneura, A. catenulata, A. shirleyi, Casuarina cristata, Eucalyptus populnea, Eucalyptus spp. and *Callitris glaucophylla* (DotE 2015). This species will often take refuge among dense ground vegetation, large hollow logs, cavities in soil-bound root systems of fallen trees and beneath rocks (DotE 2015).	very few records within the broader landscape. Habitat within the Study Area is also likely isolated from known/occupied habitat within the wider landscape.
PMST/WO	**Brigalow woodland snail** *Adclarkia cameroni*	Endangered	It is known to occur under logs and leaf litter, where it likely feeds on fungi, lichen, algae and other detritus/biofilm growing on forest debris, thereby recycling nutrients into the soil (DotE 2015). The species needs both canopy and on-ground timber cover for survival and egg-laying (DotE 2015).	**Unlikely to occur** The species has been recorded from the desktop search extent; however, the Study Area lies outside the species' known and modelled distributions.
PMST/WO/ ALA	**Dulacca woodland snail** *Adclarkia dulacca*	Endangered	The species inhabits a variety of remnant and scattered habitats; vine thicket and *Acacia harpophylla* woodland patches on rocky outcrops with clay to loam soils, Eucalyptus (ironbark) species and *Acacia shirleyi* woodlands on ridges (with and without rock), and *Eucalyptus woollsiana* woodland (DotE 2015).	**Likely to occur** The species has previously been recorded within the desktop search extent and the Study Area contains suitable habitat for the species. Though not recorded during surveys, conditions during survey were suboptimal for detection of the species and, as such, the species is still considered 'likely to occur'.

Appendix E Threatened Fauna Species Database Records



N

Scale 1:500,000 (A4)

0 10 20 30

Kilometres

Coordinate System: GCS GDA 1994

Notes:
Aerial Imagery: © ESRI 2023
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Ordered Drainage: © DoR 2023
Road: © DoR 2023
Species records: © WildNet 2023, ALA 2023, Boobook 2022

Rev	Description	Drawn	Approved	Date
4	Issued for Use	GO	AP	26/02/2024
3	Issued for Use	GO	ED	22/09/2023

APPENDIX E: MNES FAUNA DATABASE RECORDS

MNES Ecological Assessment Report
Senex Energy Limited

Map Number	Job Number	Rev
1 of 1	QEJ22057	4

Document Path: X:\JOBS\~2022\QEJ22057\6. Habitat Quality (QEJ22057e)\GIS\PRO\QEJ22057\QEJ22057_SenexARC_HabitatQuality.aprx

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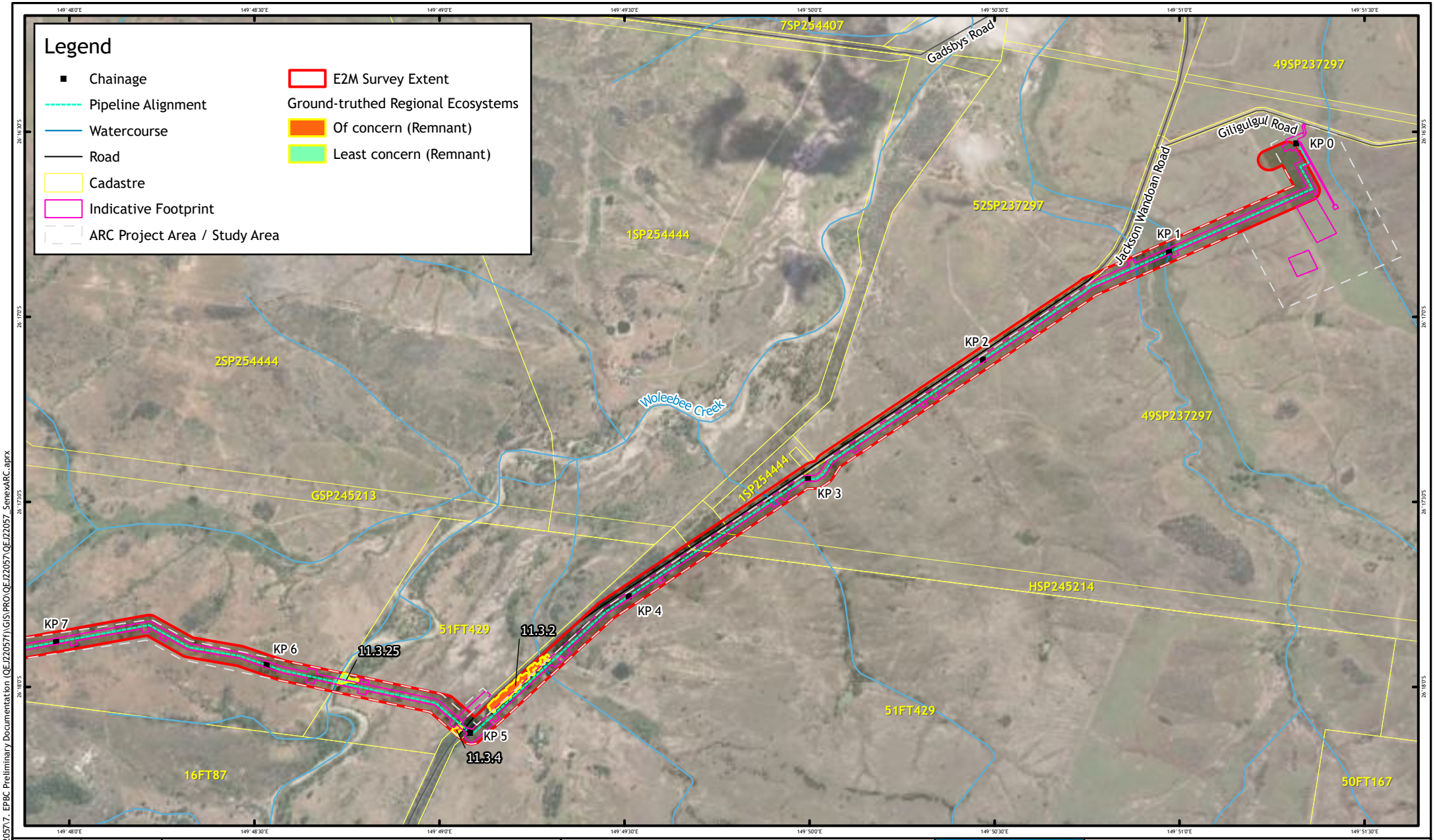
E.1 Threatened Fauna Species Database Records within 10 km of the Indicative Footprint

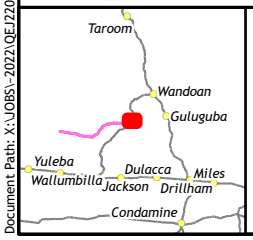
Common name	Scientific name	NC Act status[1]	EPBC Act status[2]	Year	Source	Distance from Indicative Footprint (km)	Latitude	Longitude
Dulacca Woodland Snail	*Adclarkia dulacca*	E	E	2009	ALA	5	-26.342778	149.8
Glossy black-cockatoo (eastern)	*Calyptorhynchus lathami lathami*	V	V	2009	WO	6	-26.33316	149.88027
Glossy black-cockatoo (eastern)	*Calyptorhynchus lathami lathami*	V	V	2009	WO	6	-26.31013	149.46569
Greater Glider	*Petauroides volans*	E	E	1989	ALA	3	-26.333333	149.816667
Koala	*Phascolarctos cinereus*	E	E	1984	ALA	3	-26.331758	149.734444
Squatter pigeon (southern subspecies)	*Geophaps scripta scripta*	V	V	2016	WO	9	-26.29683	149.9482
White-throated Needletail	*Hirundapus caudacutus*	V	V	2017	ALA	7	-26.37167	149.72556

1 CE = Critically Endangered; E = Endangered; V = Vulnerable; NT = Near Threatened; SLC = Special Least Concern; NA = Not Applicable.

2 CE = Critically Endangered; E = Endangered; V = Vulnerable; M = Migratory; NA = Not Applicable

Appendix F GTRE Mapping





N

Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
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3	Issued for Use	GO	LW	18/08/2023

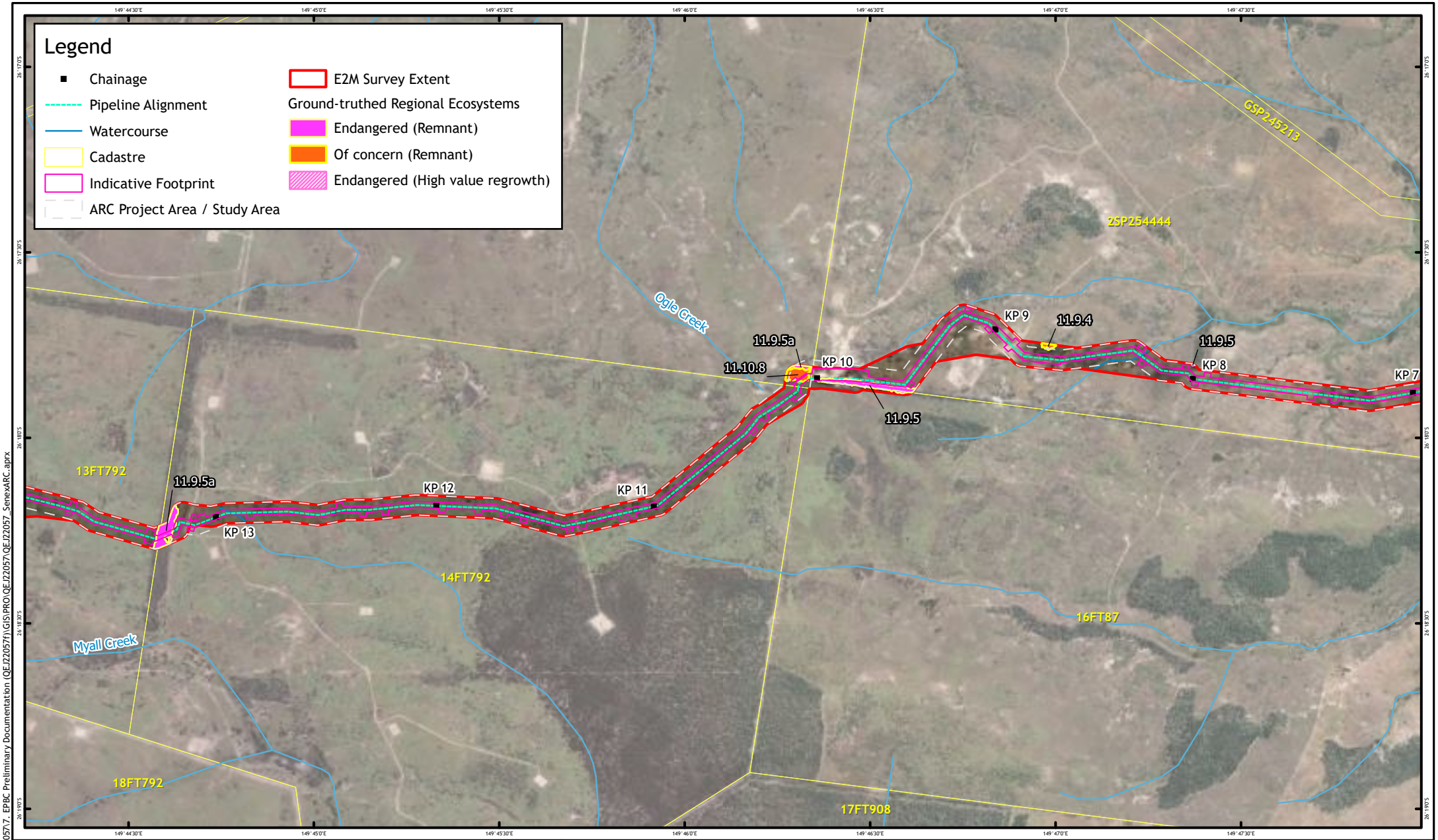
APPENDIX F: GROUND-TRUTHED REGIONAL ECOSYSTEM MAPPING

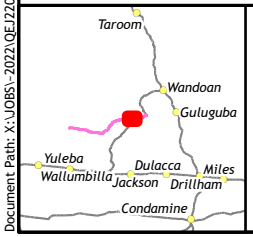
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Map Number	Job Number	Rev
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Kilometres

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3	Issued for Use	GO	LW	18/08/2023

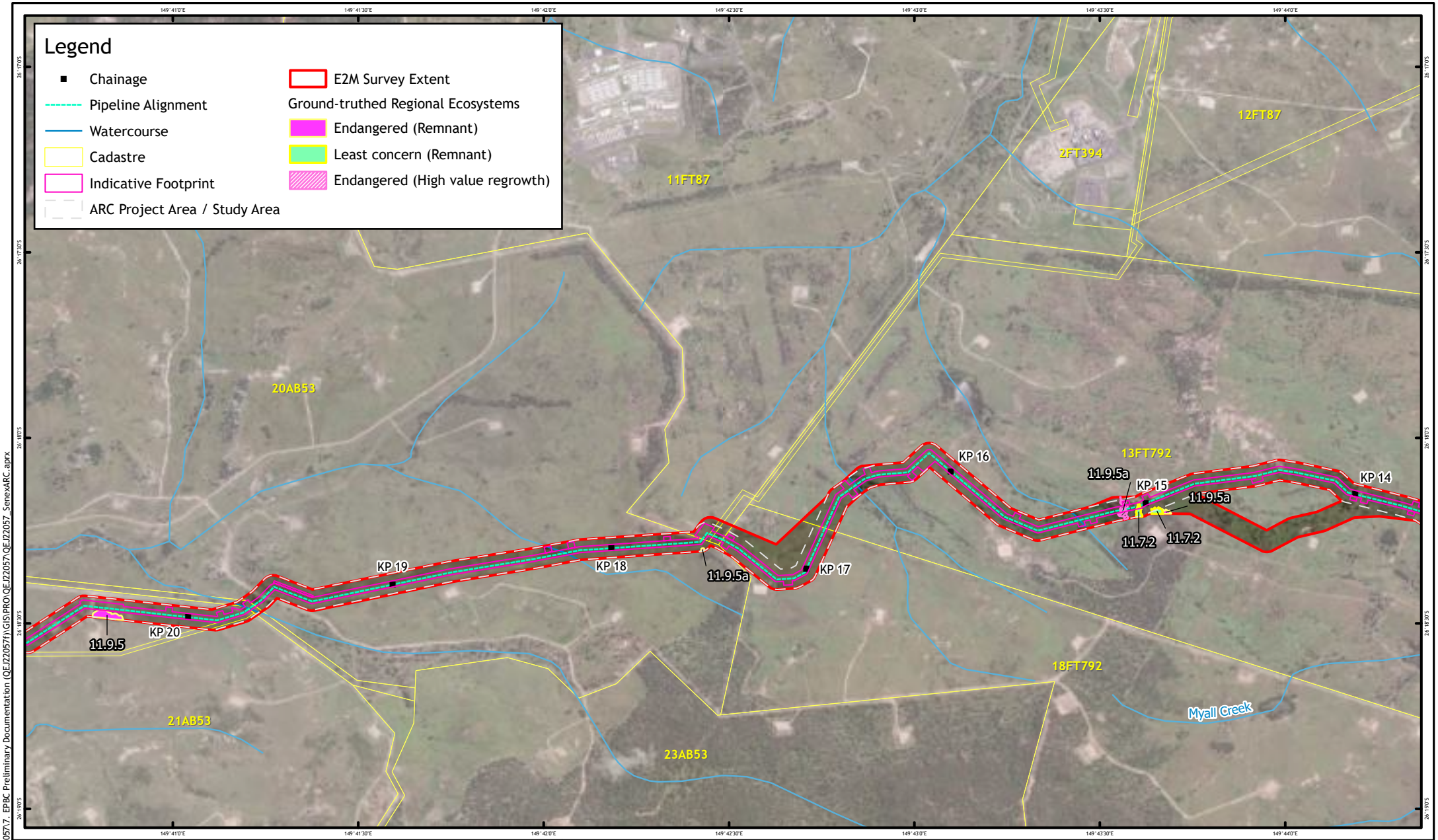
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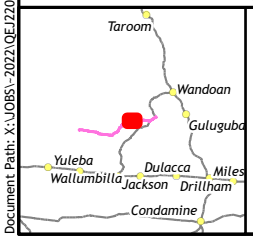
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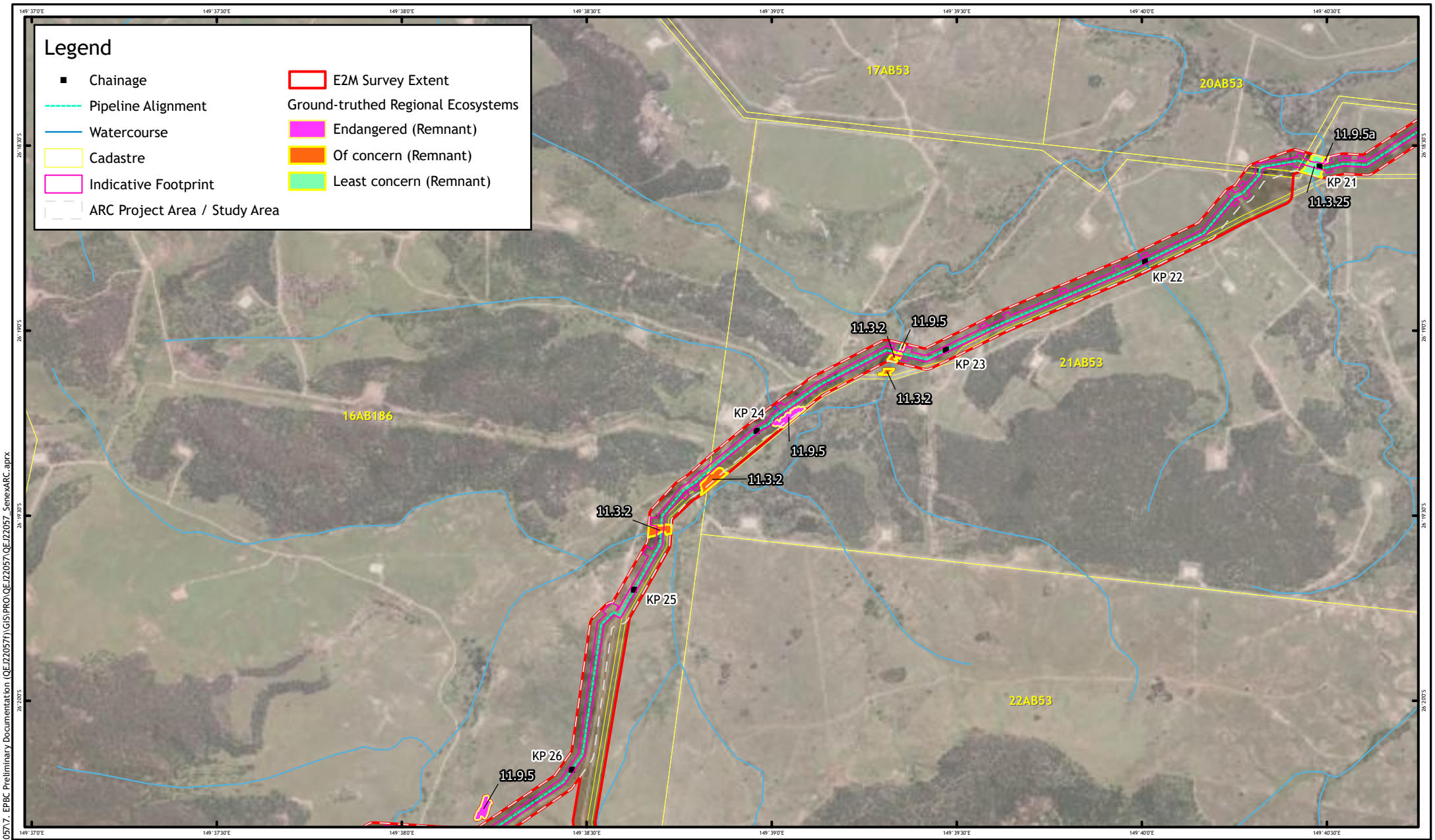
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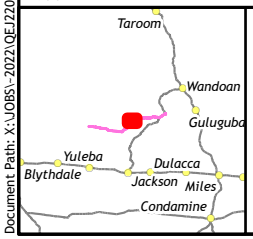
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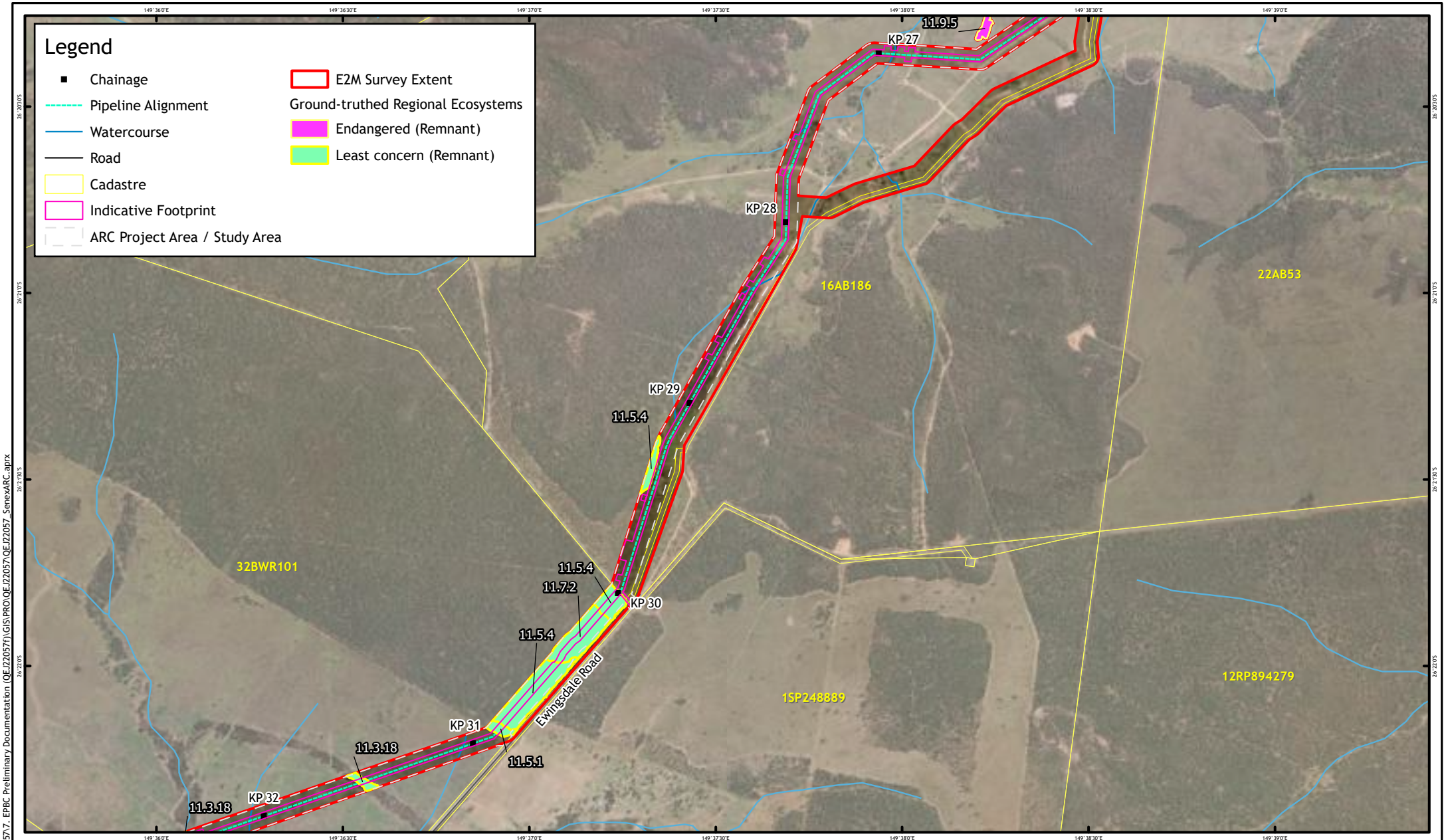
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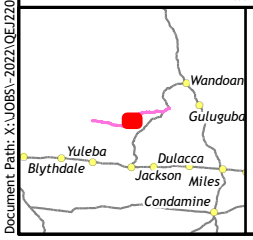
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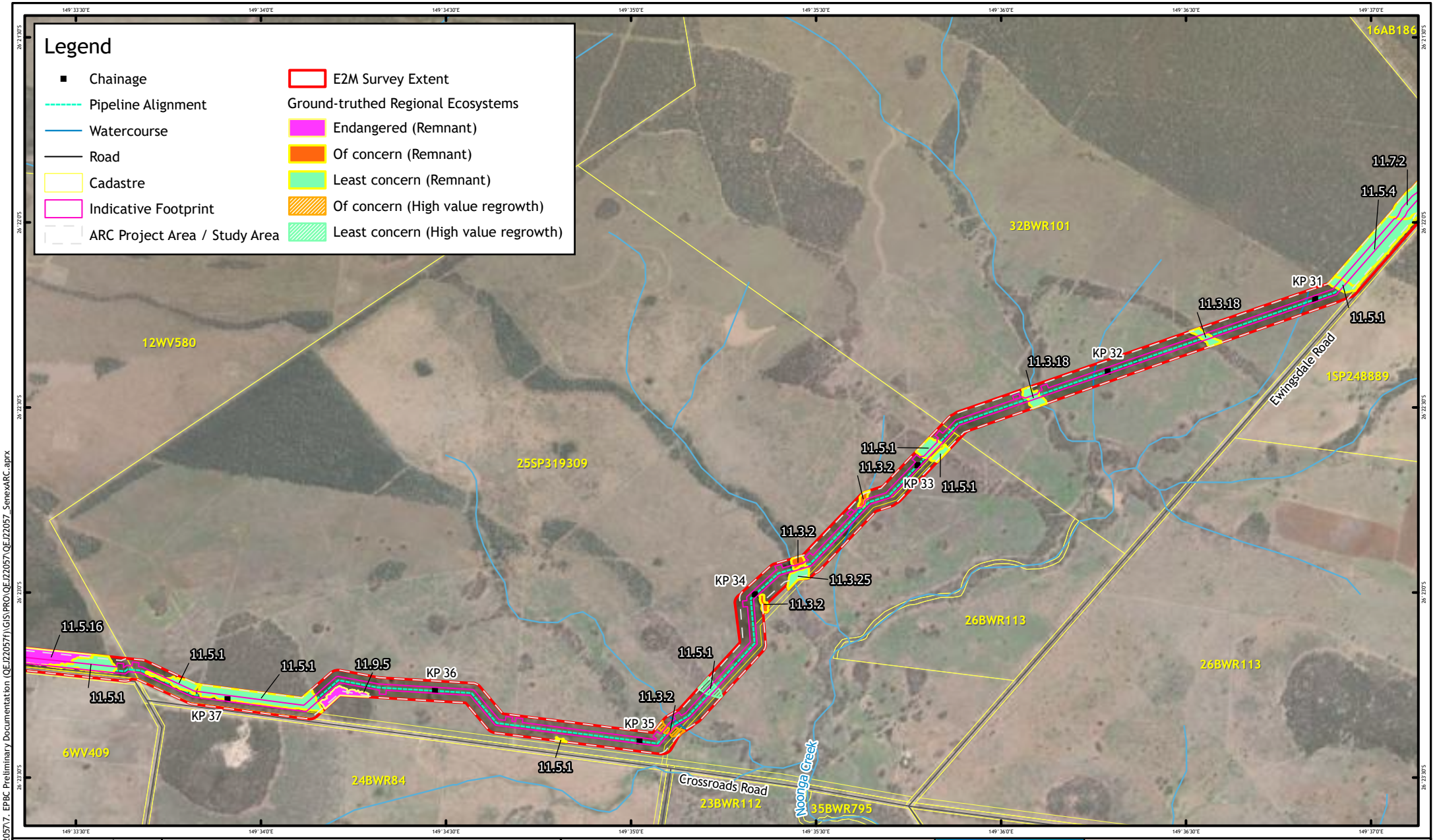
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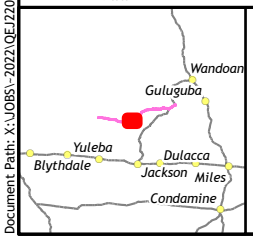
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Kilometres

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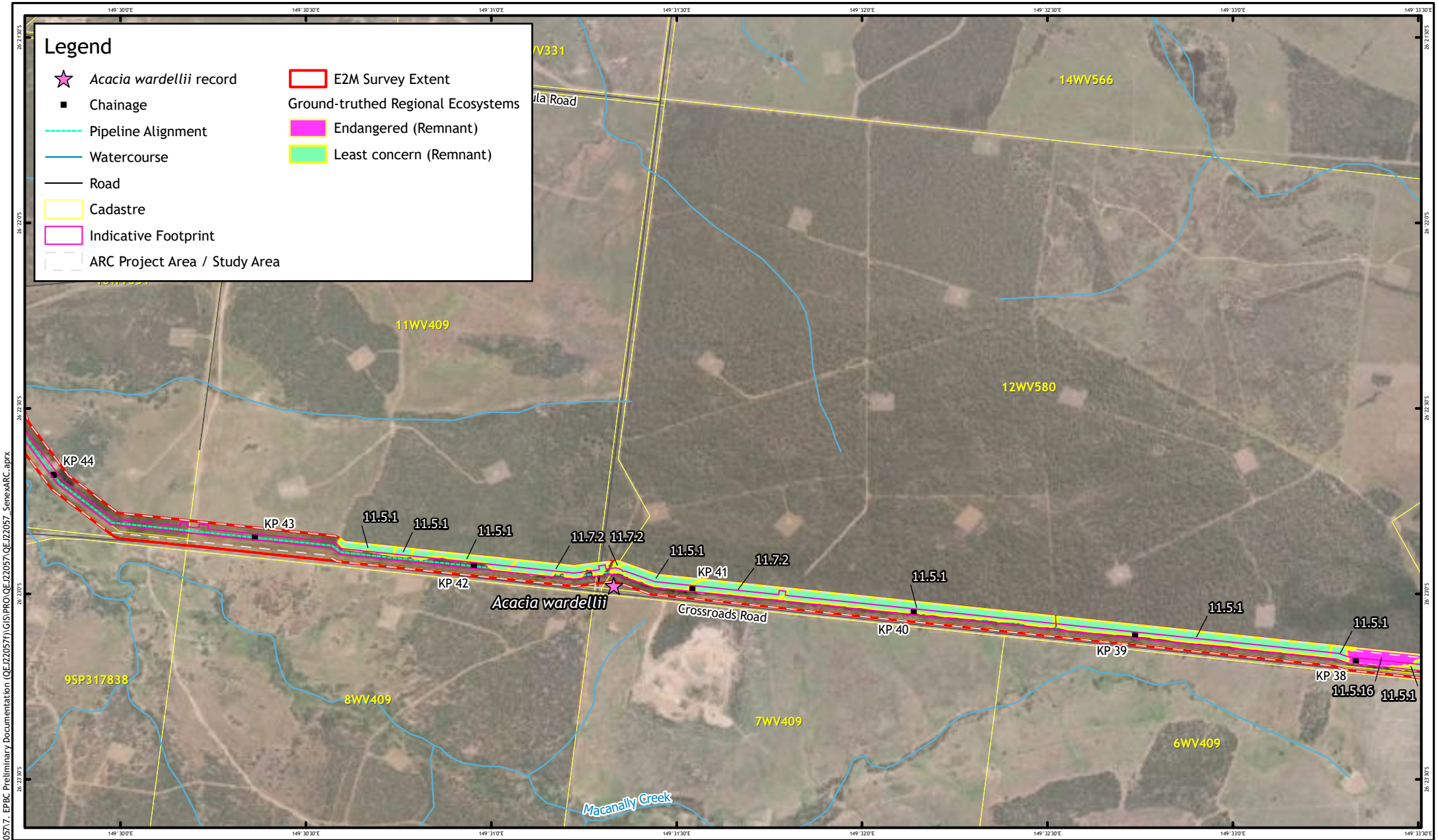
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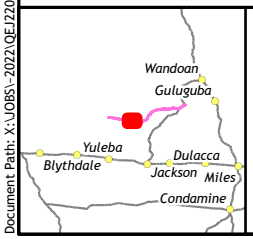
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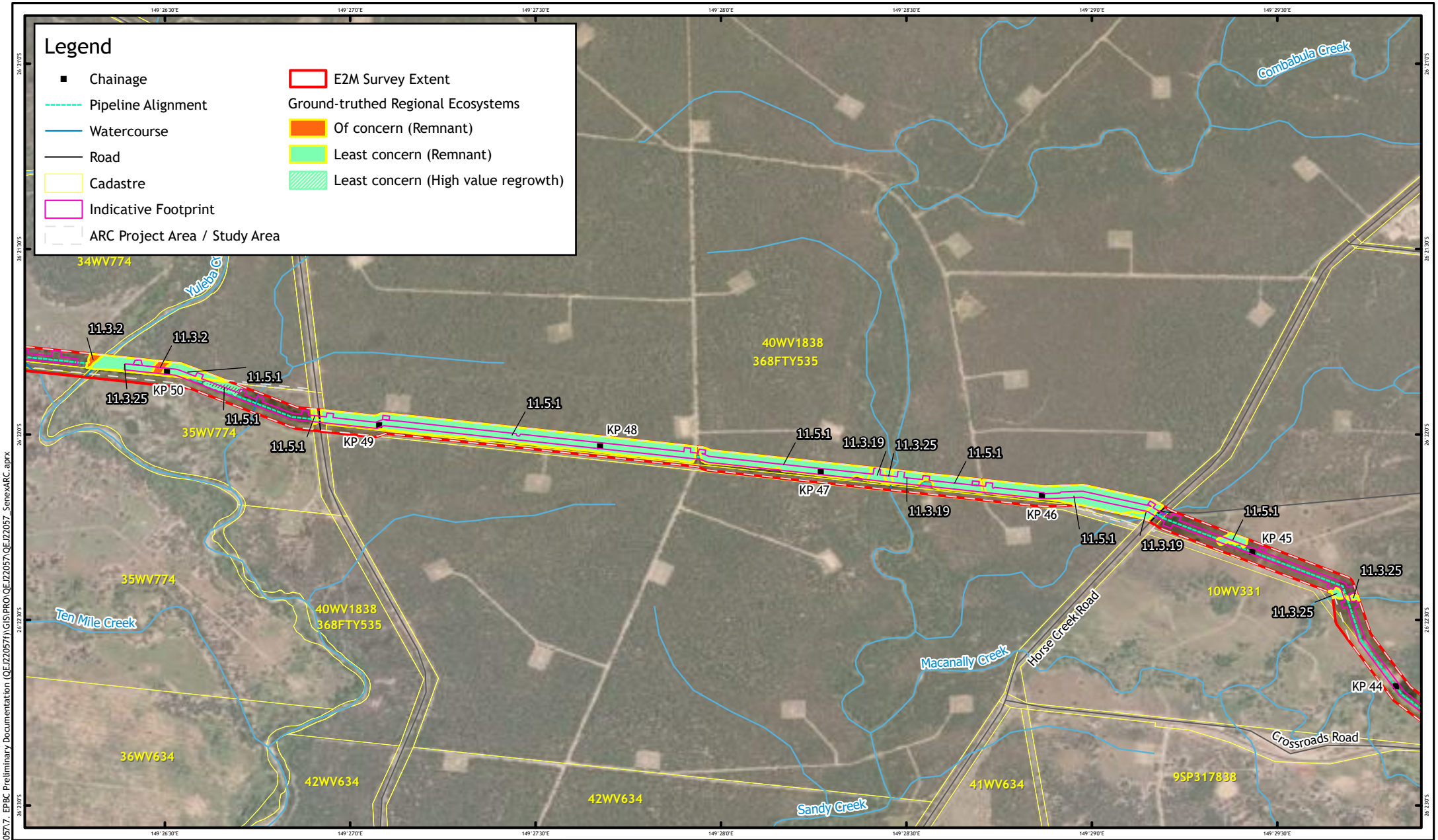
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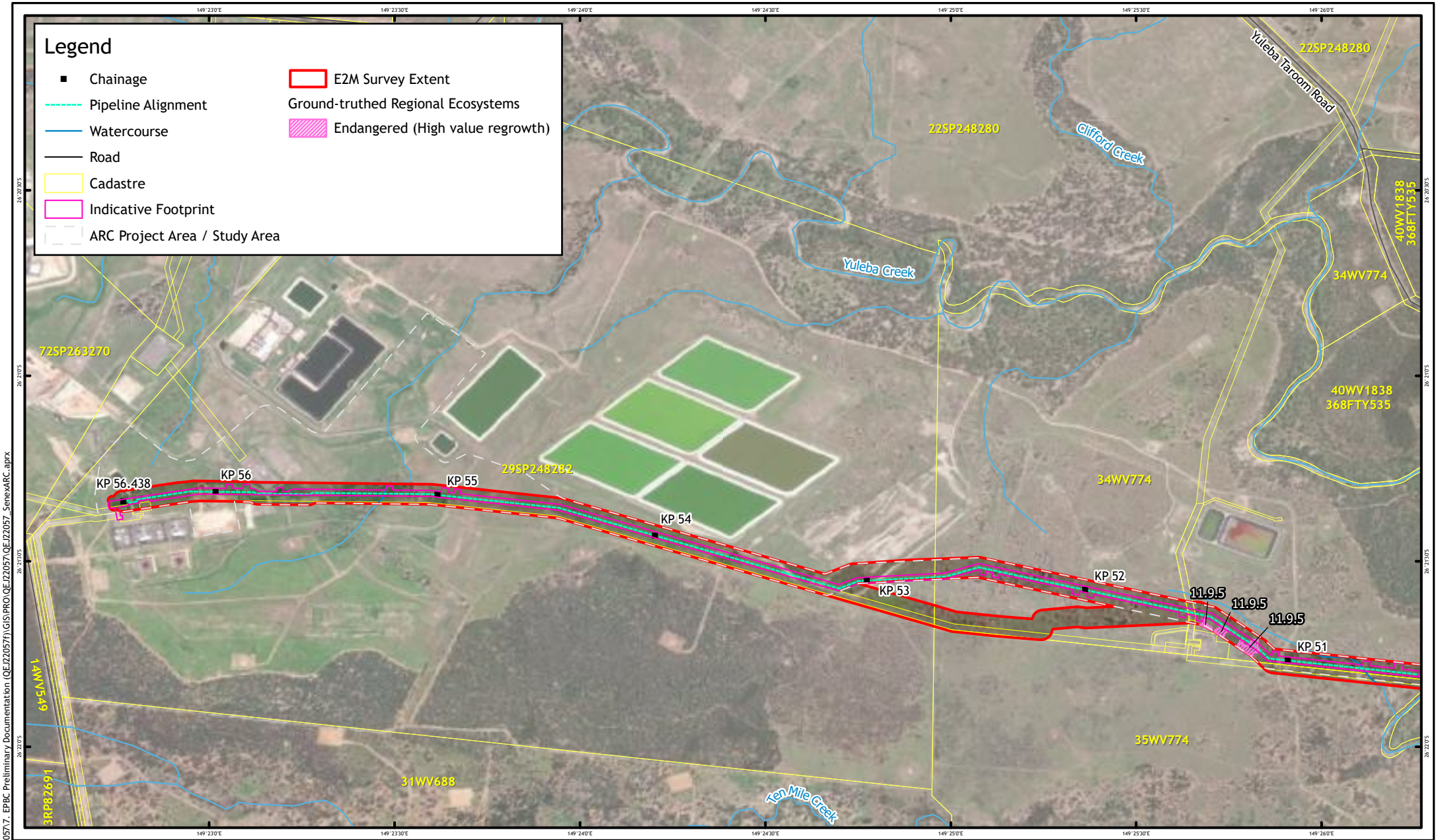
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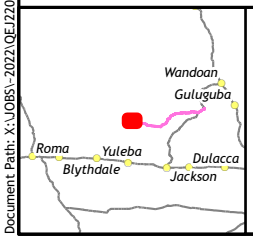
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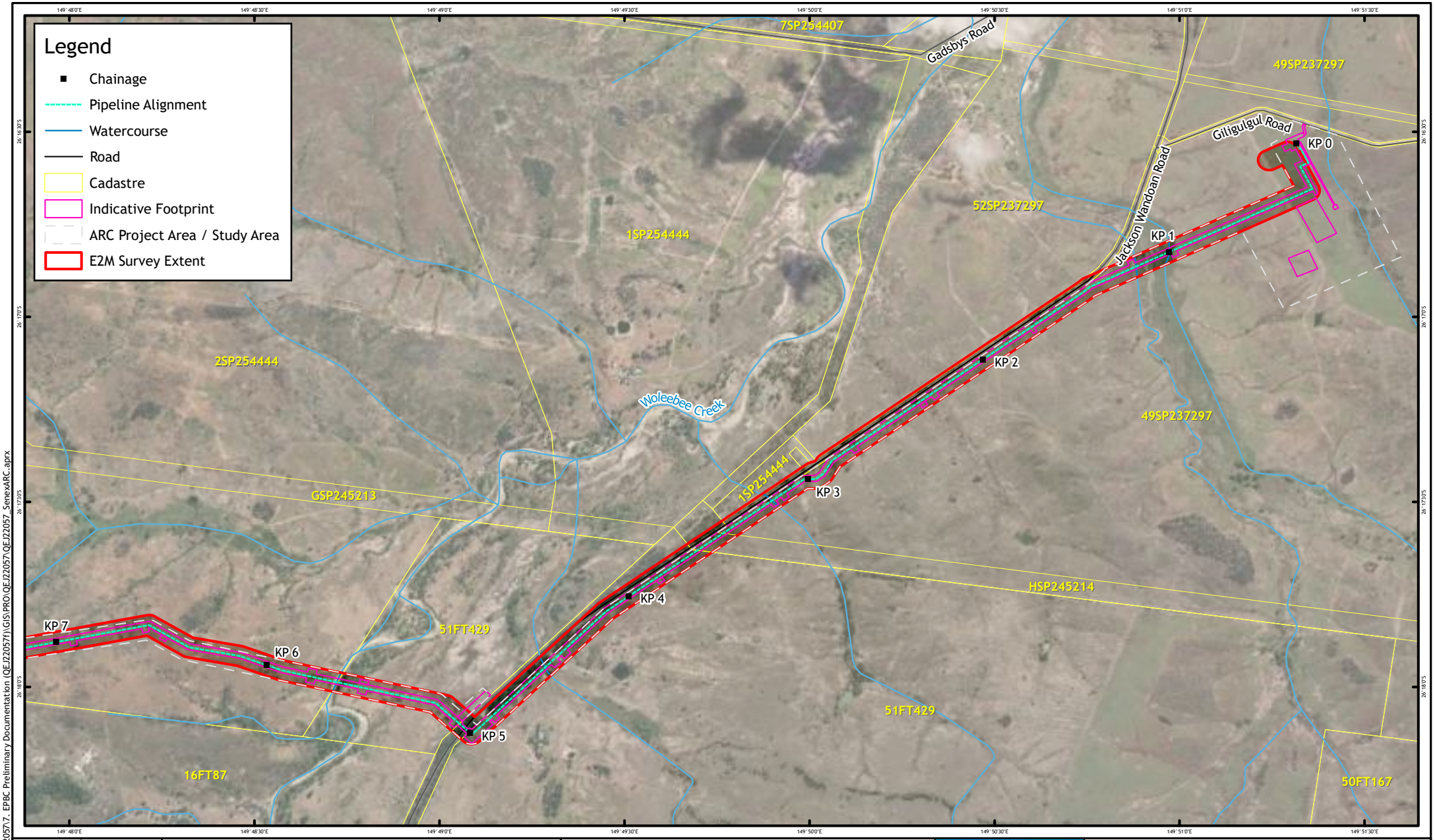
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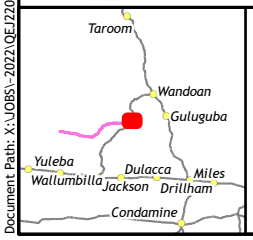
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Appendix G TEC Mapping





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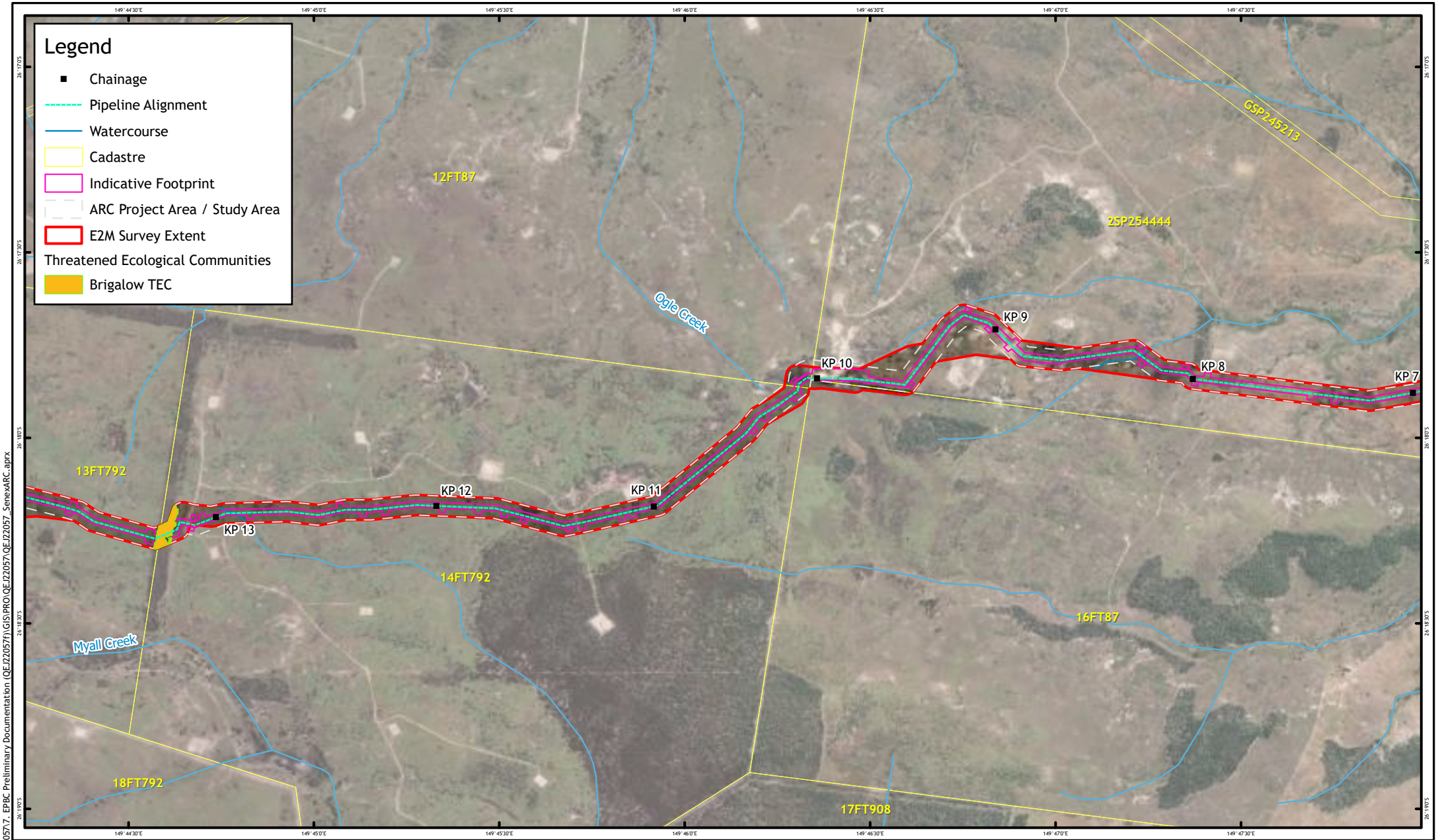
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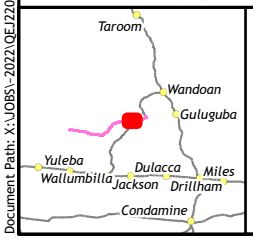
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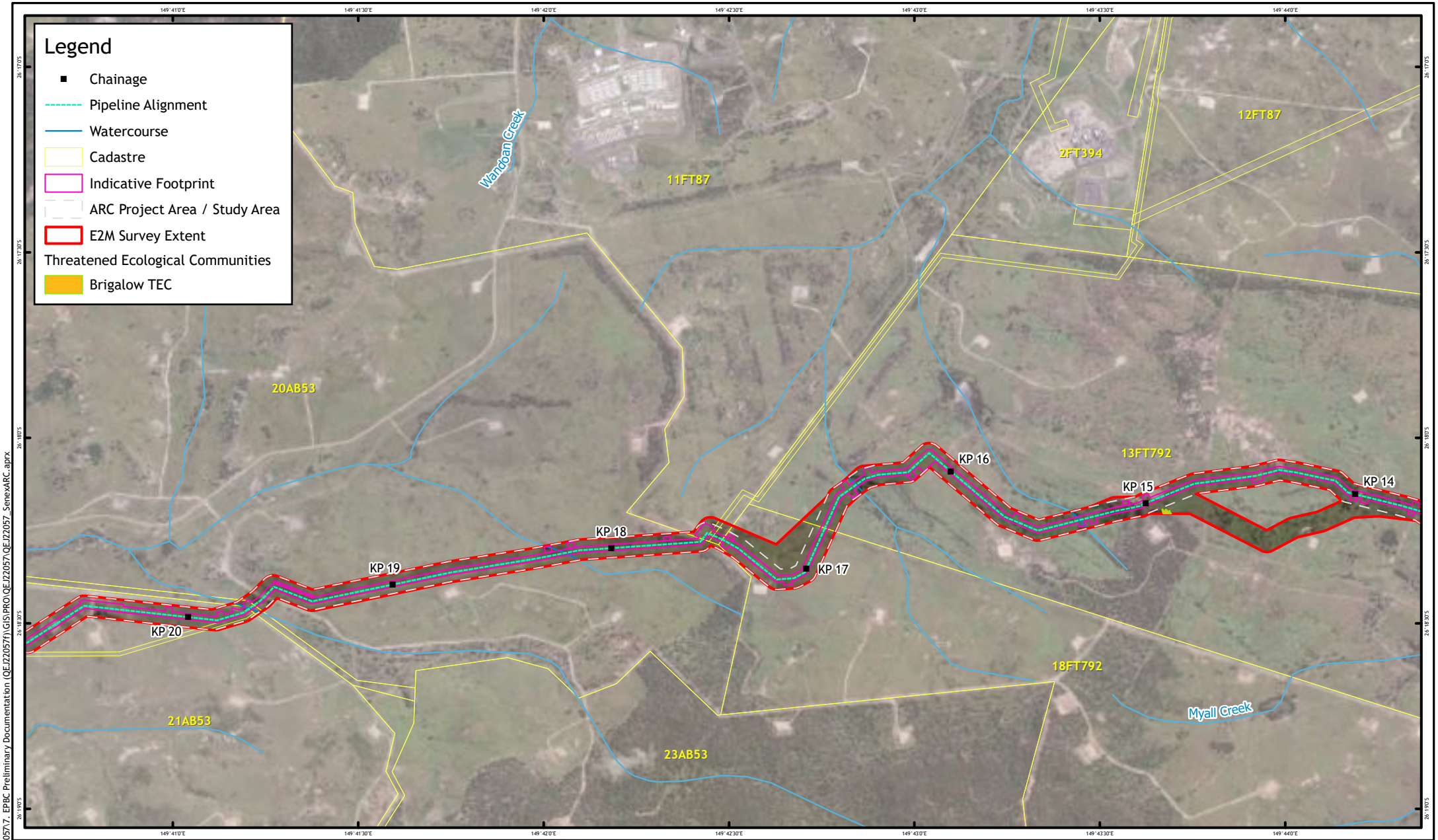
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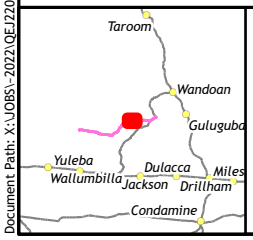
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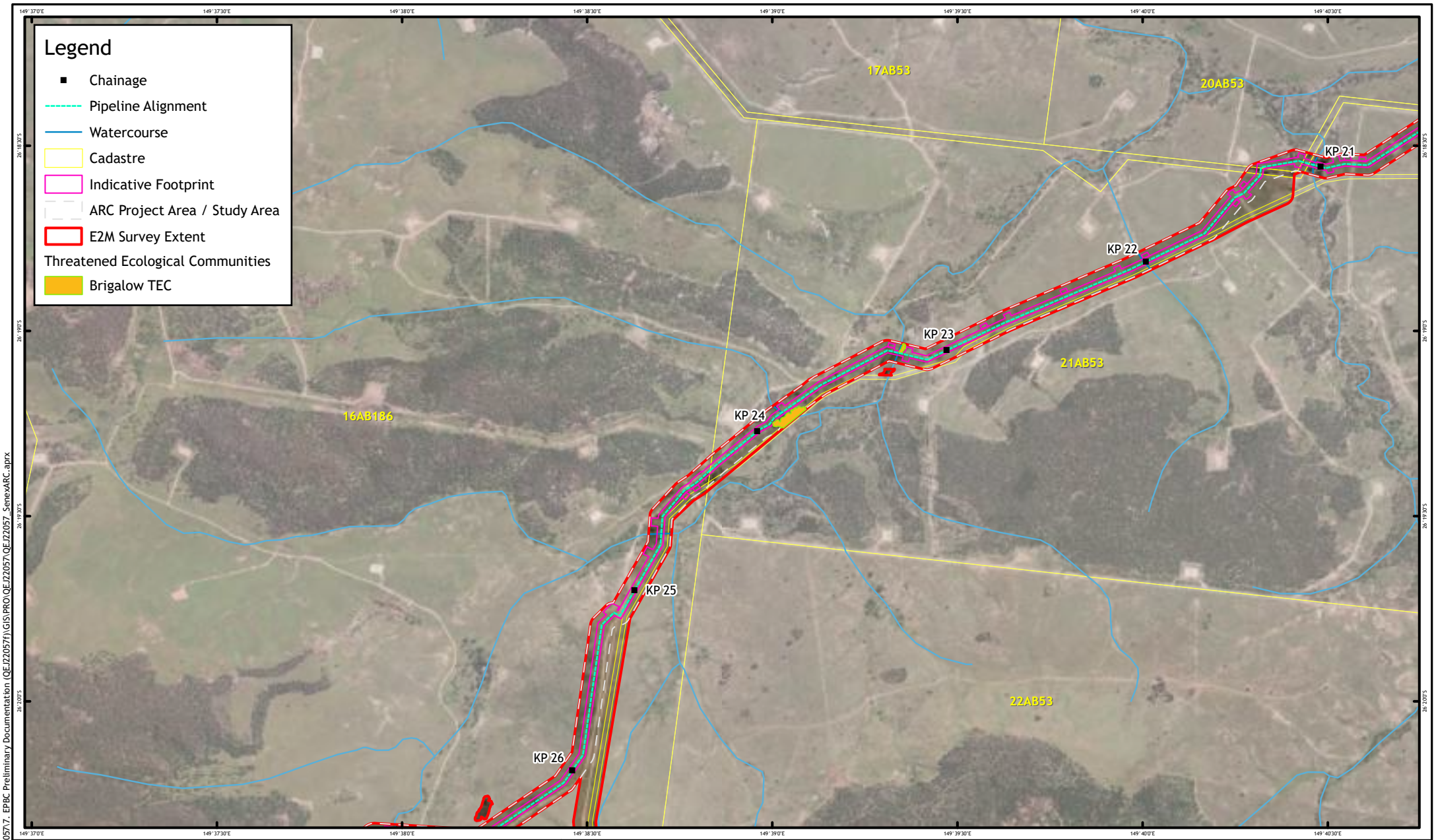
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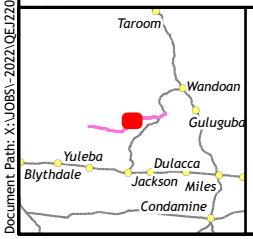
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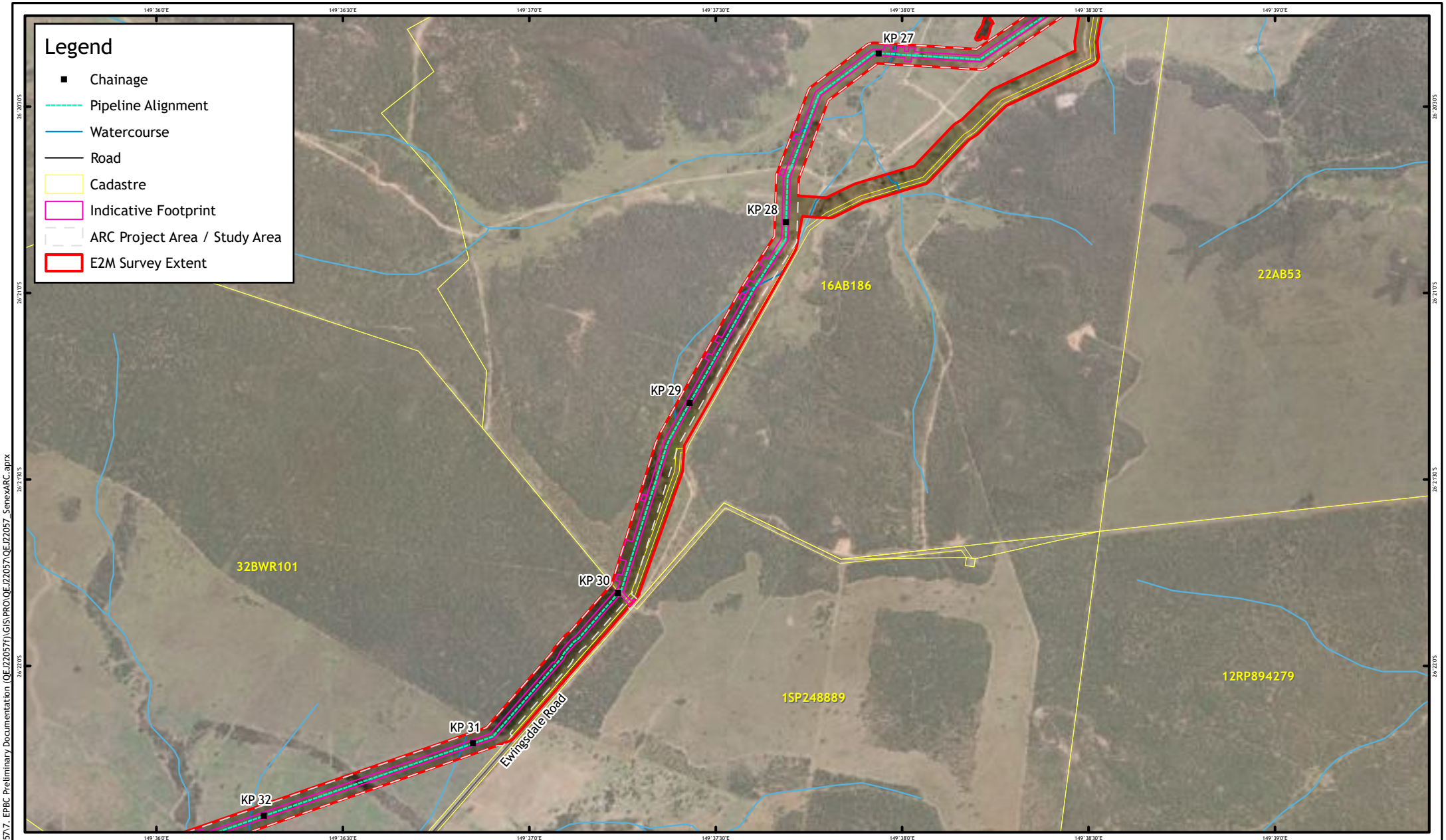
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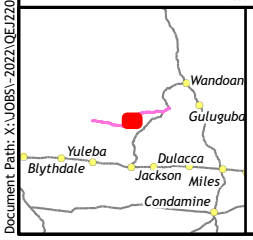
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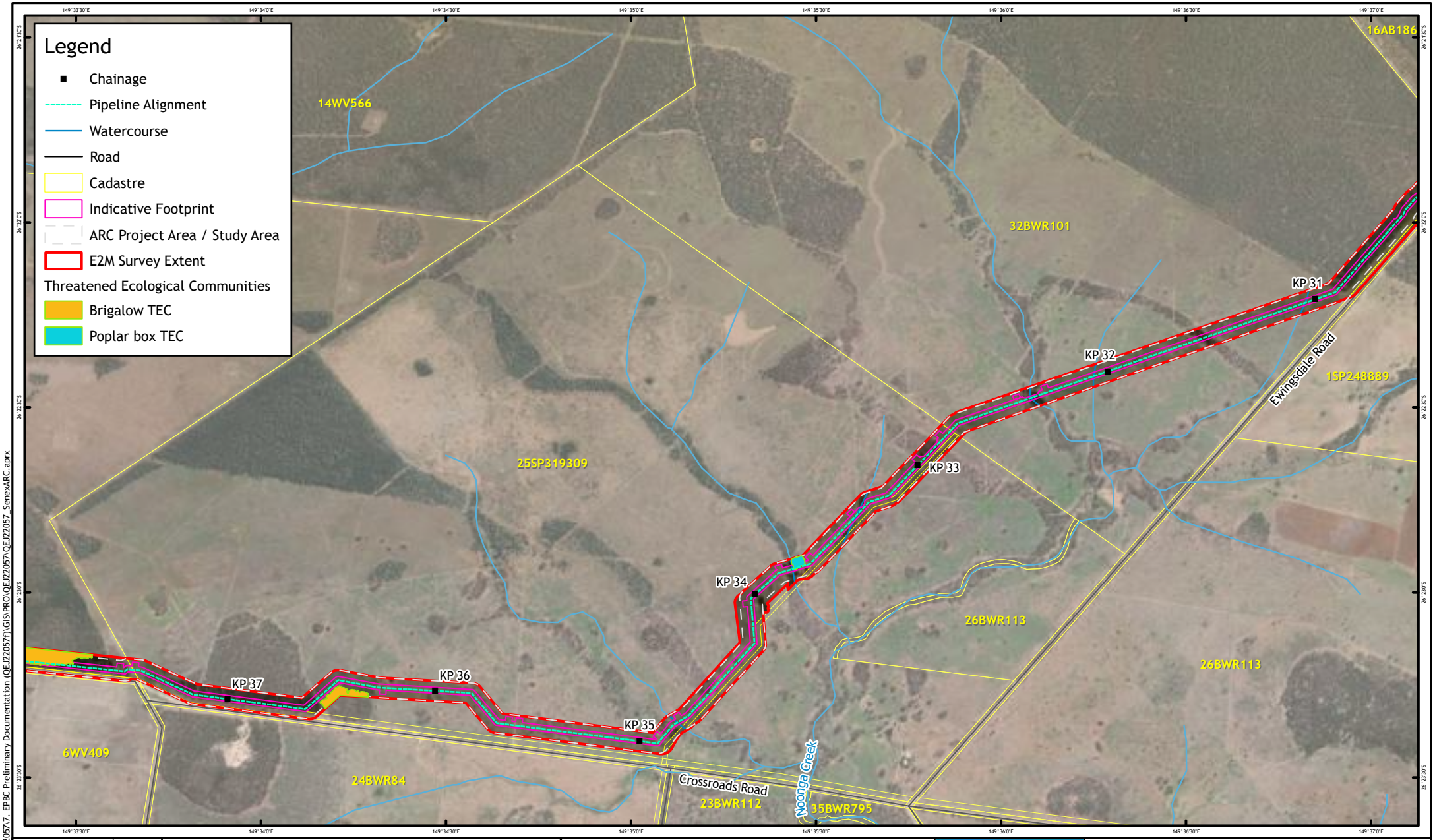
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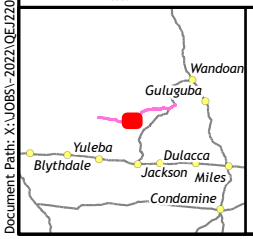
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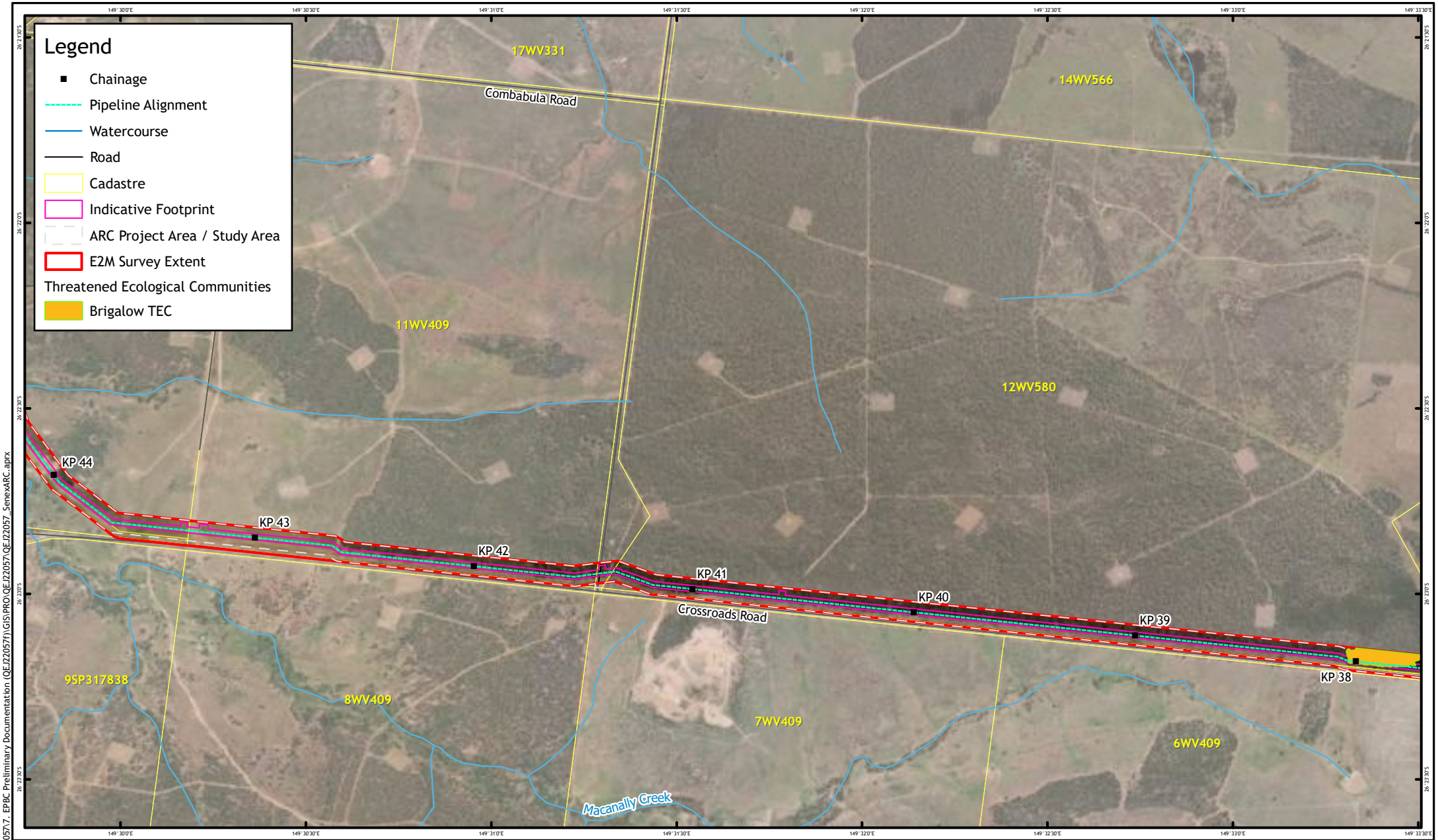
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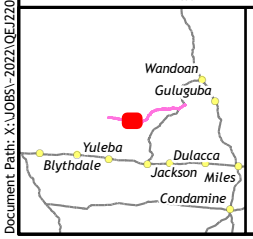
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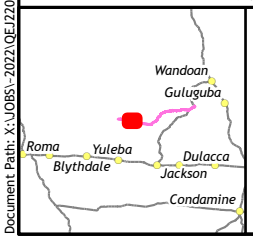
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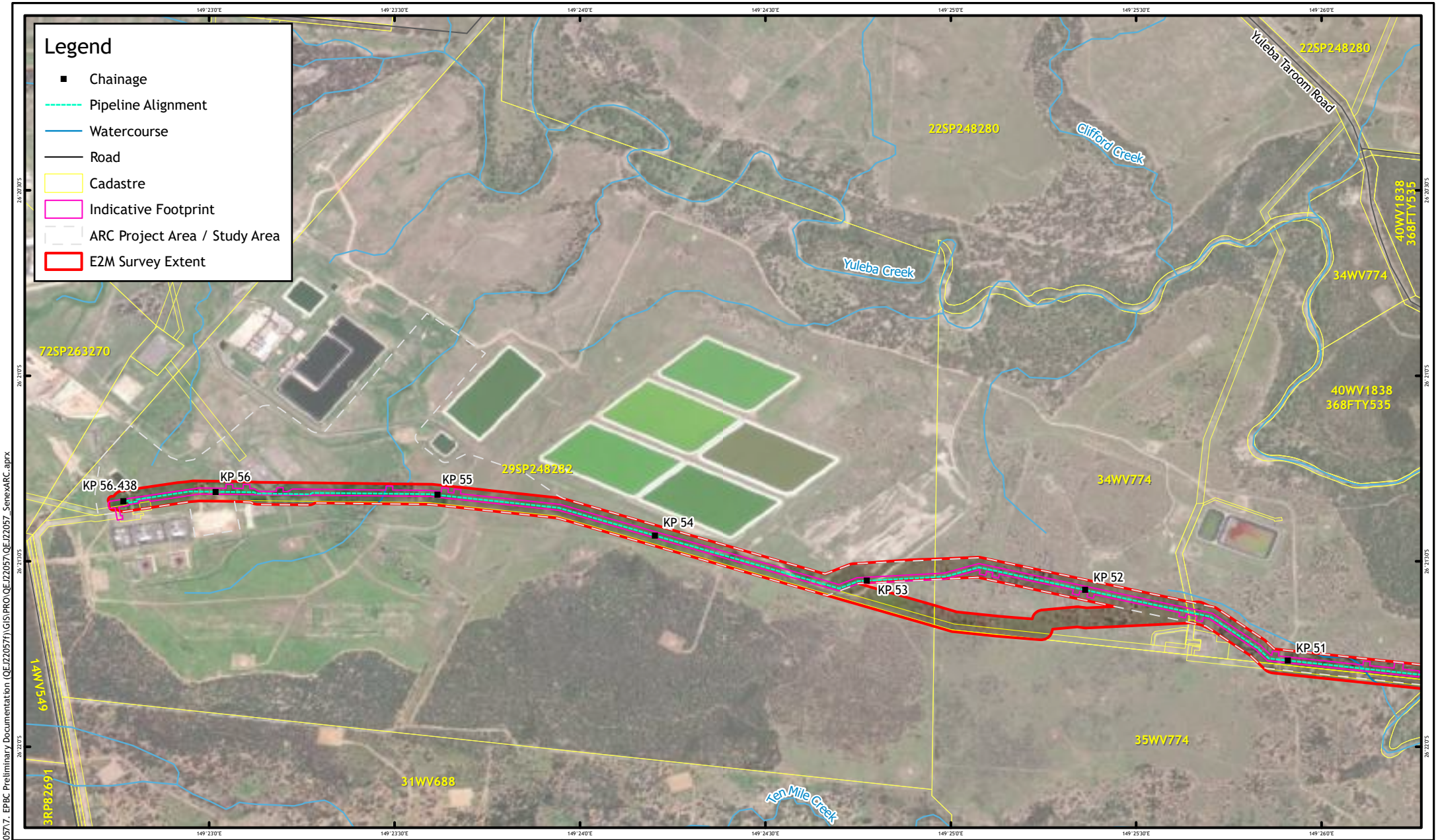
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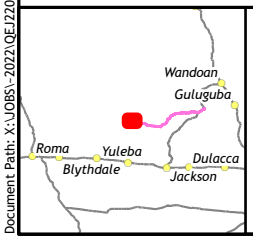
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Appendix H Species Lists and Habitat Features

H.1 Fauna Species List

Scientific name	Common name	NC Act Status[1]	EPBC Act[1]
Birds			
Anthus novaeseelandiae	Australasian pipit	LC	-
Aprosmictus erythropterus	red-winged parrot	LC	-
Aquila audax	wedge-tailed eagle	LC	-
Cacatua galerita	sulphur-crested cockatoo	LC	-
Centropus phasianinus	pheasant coucal	LC	-
Cisticola exilis	golden-headed cisticola	LC	-
Coracina novaehollandiae	black-faced cuckoo-shrike	LC	-
Corcorax melanorhamphos	white-winged chough	LC	-
Corvus orru	Torresian crow	LC	-
Cracticus nigrogularis	pied butcherbird	LC	-
Cracticus torquatus	grey butcherbird	LC	-
Dacelo novaeguineae	laughing kookaburra	LC	-
Dromaius novaehollandiae	emu	LC	-
Egretta novaehollandiae	white-faced heron	LC	-
Elanus axillaris	black-shouldered kite	LC	-
Eolophus roseicapilla	galah	LC	-

Scientific name	Common name	NC Act Status[1]	EPBC Act[1]
Eudynamys orientalis	eastern koel	LC	-
Falco cenchroides	nankeen kestrel	LC	-
Geopelia humeralis	bar-shouldered dove	LC	-
Gerygone olivacea	white-throated gerygone	LC	-
Grallina cyanoleuca	magpie-lark	LC	-
Gymnorhina tibicen	Australian magpie	LC	-
Malurus lamberti	variegated fairy-wren	LC	-
Malurus melanocephalus	red back fairy wren	LC	-
Manorina melanocephala	noisy miner	LC	-
Merops ornatus	rainbow bee-eater	LC	-
Pachycephala rufiventris	rufous whistler	LC	-
Pardalotus punctatus	spotted pardalote	LC	-
Pardalotus striatus	striated pardalote	LC	-
Platycercus adscitus	pale-headed rosella	LC	-
Podargus strigoides	tawny frogmouth	LC	-
Pomatostomus temporalis	grey-crowned babbler	LC	-
Rhipidura albiscapa	grey fantail	LC	-
Rhipidura leucophrys	willie wagtail	LC	-
Smicrornis brevirostris	weebill	LC	-

Scientific name	Common name	NC Act Status[1]	EPBC Act[1]
Stizoptera bichenovii	double-barred finch	LC	-
Strepera graculina	pied currawong	LC	-
Struthidea cinerea	apostlebird	LC	-
Synoicus ypsilophorus	brown quail	LC	-
Tyto alba	barn owl	LC	-
Mammals			
Aepyprymnus rufescens	rufous bettong	LC	-
Macropus giganteus	eastern grey kangaroo	LC	-
Notamacropus rufogriseus	red-necked wallaby	LC	-
Perameles nasuta	long-nosed bandicoot	LC	-
Petaurus breviceps	sugar glider	LC	-
Trichosurus vulpecula	common brushtail possum	LC	-
Wallabia bicolor	swamp wallaby	LC	-
*Sus scrofa**	feral pig*	-	-
*Oryctolagus cuniculus**	rabbit*	-	-
Reptiles			
Cryptoblepharus pulcher	elegant snake-eyed skink	LC	-
Heteronotia binoei	Bynoe's gecko	LC	-
Paradelma orientalis	brigalow scaly-foot	LC	-

Scientific name	Common name	NC Act Status[1]	EPBC Act[1]
Amphibians			
Litoria caerulea	Australian green tree frog	LC	-
*Rhinella marina**	cane toad*	-	-

[1] EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*; NC Act = *Nature Conservation Act 1992*. EW – Extinct in the Wild; CR – Critically Endangered; E-Endangered; V-Vulnerable; NT-Near Threatened, LC= Least Concern, SLC= Special Least Concern

H.2 Flora Species List

Family	Scientific name	Common name	EPBC Act Status	WoNS
Aizoaceae	*Tetragonia tetragonoides*	New Zealand spinach	-	
Amaranthaceae	*Gomphrena celosioides**	gomphrena weed	-	
Apiaceae	*Feoniculum vulgara**	fennel	-	
Apocynaceae	*Alstonia constricta*	bitterbark	-	
	Carissa ovata	currantbush	-	
Apocynaceae	*Gomphocarpus physocarpus**	balloon cottonbush	-	
	Marsdenia viridiflora	bush banana	-	
Asteraceae	*Ageratum houstonianum**	blue billygoat weed	-	
	*Bidens pilosa**	-	-	
	Brachyscome dentata	-	-	
	Brachyscome microcarpa	Brisbane daisy	-	
	Calotis sp.	-	-	
	Chrysocephalum apiculatum	yellow buttons	-	
	*Cirsium vulgare**	spear thistle	-	
	*Erigeron bonariensis**	-	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	*Euchiton sphaericus**	-	-	
	Ozothamnus diotophyllus	heath everlasting	-	
	Pterocaulon sphacelatum	applebush	-	
	Rhodanthe polyphylla	-	-	
	Rutidosis murchisonii	button wrinklewort	-	
	Senecio brigalowensis	brigalow daisy	-	
	Sigesbeckia orientalis	Indian weed	-	
	*Tagetes minuta**	stinking roger	-	
	*Verbesina encelioides**	crownbeard	-	
	*Xanthium occidentale**	-	-	
	*Xanthium spinosum**	Bathurst burr	-	
	Xerochrysum bracteatum	golden everlasting daisy	-	
	*Zinnia peruviana**	wild zinnia	-	
	Gamochaeta sp.	-	-	
Bignoniaceae	*Pandorea pandorana*	wonga vine	-	
Brassicaceae	*Brassica x juncea**	Indian mustard	-	
	*Lepidium peregrinum**	-	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	*Sisymbrium officinale**	hedge mustard	-	
	*Lepidium sp.**	-	-	
Cactaceae	*Harrisia martinii**	-	-	
	*Opuntia stricta**	-	-	Yes
	*Opuntia tomentosa**	velvety tree pear	-	Yes
Caesalpiniaceae	*Chamaecrista rotundifolia**	-	-	
	Senna artemisioides	silver cassia	-	
Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell	-	
Capparaceae	*Capparis canescens*	corky barked wild orange	-	
	Capparis lasiantha	nipan	-	
	Capparis loranthifolia	narrow-leaf bumble	-	
	Capparis mitchellii	wild orange	-	
Casuarinaceae	*Allocasuarina luehmannii*	bull oak	-	
	Allocasuarina torulosa	forest she oak	-	
	Casuarina cristata	belah	-	
Celastraceae	*Denhamia oleaster*	stiff-leafed denhamia	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	Maytenus cunninghamii	Yellowberry bush	-	
Chenopodiaceae	*Chenopodium sp.*	-	-	
	Enchylaena tomentosa	ruby saltbush	-	
	Maireana microphylla	small-leaf bluebush	-	
	Salsola australis	-	-	
	Sclerolaena birchii	galvanised burr	-	
	Sclerolaena muricata	black roly-poly	-	
	Einadia trigonos	fishweed	-	
Compositae	*Conyza bilbaoana**	-	-	
Cupressaceae	*Callitris glaucophylla*	white cypress pine	-	
Cyperaceae	*Eleocharis cylindrostachys*	drooping spike-rush	-	
	Eleocharis plana	ribbed spikerush	-	
	Gahnia aspera	saw sedge	-	
Droseraceae	*Drosera peltata*	pale sundew	-	
Euphorbiaceae	*Acalypha eremorum*	soft acalypha	-	
	Croton phebalioides	narrow-leaved croton	-	
Fabaceae	*Glycine clandestina*	-	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
Fabaceae	*Hardenbergia violacea*	native sarsaparilla	-	
	Hovea longipes	brush hovea	-	
	Hovea lorata	-	-	
	Indigofera australis	austral indigo	-	
	*Macroptilium atropurpureum**	siratro	-	
	*Stylosanthes scabra**	Stylo	-	
	Tephrosia sp.	-		
Goodeniaceae	*Goodenia glabra*	smooth goodenia	-	
	Goodenia rotundifolia	round-leaf goodenia	-	
	Goodenia sp.	-	-	
	Scaevola spinescens	prickly fan flower	-	
Hemerocallidaceae	*Dianella caerulea*	blue flax lily	-	
	Dianella longifolia	long-leaf flax lily	-	
	Dianella revoluta	spreading flax lily	-	
	Dianella sp.	-	-	
Juncaceae	*Juncus subsecundus*	-	-	
Laxmanniaceae	*Lomandra filiformis*	wattle mat-rush	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	Lomandra glauca	pale matrush	-	
	Lomandra leucocephala	woolly-headed mat-rush	-	
	Lomandra longifolia	spiny-headed mat-rush	-	
	Lomandra multiflora	many-flowered mat-rush	-	
	Lomandra sp.	-	-	
Loranthaceae	*Amyema congener*	-	-	
Malvaceae	*Hibiscus sturtii*	-	-	
	*Malvastrum americanum**	-	-	
	*Sida atherophora**	-	-	
	*Sida cordifolia**	-	-	
	Sida hackettiana	-	-	
	*Sida rhombifolia**	-	-	
Meliaceae	*Owenia acidula*	emu apple	-	
Mimosaceae	*Acacia burrowii*	currawong	-	
	Acacia concurrens	curracabah	-	
	Acacia conferta	crowded-leaf wattle	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	Acacia decora	pretty wattle	-	
	Acacia excelsa	ironwood	-	
	Acacia harpophylla	brigalow	-	
	Acacia leiocalyx	early-flowering black wattle	-	
	Acacia macradenia	zig-zag wattle	-	
	Acacia oswaldii	miljee	-	
	Acacia salicina	doolan	-	
	Acacia shirleyi	lancewood	-	
	Acacia spectabilis	pilliga wattle	-	
	Acacia wardellii	Wardell's wattle	-	
	*Leucaena leucocephala**	Leucaena	-	
	*Vachellia farnesiana**	-	-	
Myrtaceae	*Angophora leiocarpa*	rusty gum	-	
	Corymbia clarksoniana	Clarkson's bloodwood	-	
	Corymbia tessellaris	Moreton Bay ash	-	
	Corymbia torelliana	cadaghi	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	Eucalyptus crebra	narrow-leaved red ironbark	-	
	Eucalyptus fibrosa	broad-leaved ironbark	-	
	Eucalyptus orgadophila	mountain coolibah	-	
	Eucalyptus populnea	poplar box	-	
Oleaceae	*Jasminum didymum*	desert jasmine	-	
	Jasminum simplicifolium	native jasmine	-	
	Notelaea longifolia	long-leaved olive	-	
	Notelaea microcarpa	native olive	-	
Orchidaceae	*Cymbidium canaliculatum*	channelled boat-lip orchid	-	
Papaveraceae	*Argemone ochroleuca**	-	-	
Passifloraceae	*Passiflora aurantia*	native passionfruit	-	
Phyllanthaceae	*Breynia oblongifolia*	coffee bush	-	
Picrodendraceae	*Petalostigma pubescens*	quinine tree	-	
Pittosporaceae	*Bursaria incana*	prickly pine	-	
	Pittosporum revolutum	yellow pittosporum	-	
	Pittosporum spinescens	orange thorn	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
Poaceae	*Aristida calycina*	white spear grass	-	
	Aristida caput-medusae	many-headed wire grass	-	
	Aristida jerichoensis	Jericho wiregrass	-	
	Aristida ramosa	purple wiregrass	-	
	Arundinella nepalensis	reed grass	-	
	Austrostipa verticillata	slender bamboo grass	-	
	Bothriochloa bladhii	forest blue grass	-	
	*Bothriochloa pertusa**	-	-	
	*Cenchrus ciliaris**	-	-	
	*Chloris gayana**	Rhodes grass	-	
	*Chloris virgata**	feathertop Rhodes grass	-	
	Chrysopogon fallax	golden beard grass	-	
	Dichanthium sericeum	Queensland blue grass	-	
	Digitaria brownii	cotton panic grass	-	
	Enteropogon acicularis	curly windmill grass	-	
	Enteropogon ramosus	curly windmill grass	-	
	*Eragrostis curvula**	African lovegrass	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	Eragrostis parviflora	weeping lovegrass	-	
	Eragrostis setifolia	bristly lovegrass	-	
	Eragrostis sororia	woodland lovegrass	-	
	*Eragrostis tenuifolia**	elastic grass	-	
	*Eragrostis trichophora**	-	-	
	Heteropogon contortus	black speargrass	-	
	Imperata cylindrica	blady grass	-	
	Leptochloa digitata	umbrella canegrass	-	
	*Megathyrsus maximus**	-	-	
	*Melinis repens**	red natal grass	-	
	Panicum effusum	hairy panic	-	
	Paspalidium distans	shotgrass	-	
	Paspalum distichum	water couch	-	
	*Sorghum halepense**	Johnson grass	-	
	Sporobolus caroli	fairy grass	-	
	Themeda avenacea	oat grass	-	
	Themeda triandra	kangaroo grass	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	Tragus australianus	small burr grass	-	
	*Urochloa mosambicensis**	sabi grass	-	
	Imperata cylindrica	Blady grass	-	
	Leptochlia decipiens	Australian sprangletop	-	
Polygonaceae	*Duma florulenta*	-	-	
Proteaceae	*Grevillea striata*	beefwood	-	
	Hakea lorea	corkwood	-	
	Hakea purpurea	crimson hakea	-	
	Xylomelum cunninghamianum	woody pear	-	
Pteridaceae	*Cheilanthes distans*	bristly cloak fern	-	
	Cheilanthes sieberi	mulga fern	-	
Rhamnaceae	*Alphitonia excelsa*	soap tree	-	
	Ventilago viminalis	supplejack	-	
Rubiaceae	*Psydrax odorata*	shiny-leafed canthium	-	
	Psydrax sp.	-	-	
Rutaceae	*Citrus glauca*	lime bush	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	Flindersia collina	broad-leaved leopard tree	-	
	Geijera parviflora	wilga	-	
Santalaceae	*Santalum lanceolatum*	sandalwood	-	
	Alectryon diversifolius	scrub boonaree	-	
	Atalaya hemiglauca	whitewood	-	
	Dodonaea boroniifolia	fern-leaf hopbush	-	
	Dodonaea tenuifolia	-	-	
	Dodonaea viscosa	sticky hopbush	-	
	Dodonaea tribulopis angustifolialaris	-	-	
	Dodonea filifolia	-	-	
Scrophulariaceae	*Eremophila debilis*	winter apple	-	
	Eremophila longifolia	berrigan	-	
	Eremophila mitchellii	false sandalwood	-	
	*Verbascum virgatum**	twiggy mullein	-	
Solanaceae	*Solanum coracinum*	-	-	

Family	Scientific name	Common name	EPBC Act Status	WoNS
	Solanum ellipticum	potato bush	-	
	Solanum esuriale	quena	-	
	*Solanum nigrum**	-	-	
	Nicotiana megalosiphon	-	-	
	Nicotiana sp.	-	-	
Sterculiaceae	*Brachychiton australis*	broad-leaved bottle tree	-	
	Brachychiton populneus	kurrajong	-	
	Brachychiton rupestris	narrow-leaved bottle tree	-	
Thymelaeaceae	*Pimelea elongata*	-	-	
Verbenaceae	*Glandularia aristigera**	-	-	
	*Verbena bonariensis**	purpletop	-	
	*Verbena litoralis**	verbena	-	

H.3 Habitat Features

Feature ID	Habitat Feature	Usage	Number of Features	Comment	Latitude (GDA 94)	Longitude (GDA 94)
Hollow Limb		Unknown		*Eucalyptus melanophloia*	149.8530266	-26.27564309
Hollow Limb		Unknown	1	hollow in the tree limb split	149.852993	-26.27588939
Hollow Limb					149.8372067	-26.28801611
Hollow Limb		Unknown		Multiple hollows, decorticating bark.	149.8276264	-26.29424656
Hollow Limb		Unknown		Multiple hollow limbs, hollows greater than 20cm diameter	149.8262465	-26.29518943
Hollow Limb		Unknown	5	Multiple hollow limbs	149.8224621	-26.29866978
Waterbody/Dam				Dammed watercourse with riparian vegetation.	149.8215417	-26.2992222
Hollow Limb		Active/in-use		Significant habitat tree with hollow limbs, stick nest and recent scratches on trunk	149.8136716	-26.30004522
Hollow Limb		Unknown	2	Large *Eucalyptus tereticornis* with multiple hollows.	149.8129949	-26.29969811
Hollow Limb		Unknown	3	Large *Eucalyptus tereticornis* with multiple hollows.	149.8129742	-26.2996705
Hollow Limb		Unknown	3	Large *Eucalyptus tereticornis* with multiple hollows.	149.8128467	-26.29966198
Hollow Limb		Unknown	3	Large *Eucalyptus tereticornis* with multiple hollows.	149.8127141	-26.29974646
Hollow Limb		Unknown	3	Large *Eucalyptus tereticornis* with multiple hollows.	149.8125941	-26.29963304

Feature ID	Habitat Feature	Usage	Number of Features	Comment	Latitude (GDA 94)	Longitude (GDA 94)
Hollow Limb				*Eucalyptus tereticornis*	149.8271824	-26.29529111
Hollow Limb					149.8243082	-26.29635817
Hollow Limb					149.8230461	-26.2981178
Hollow Limb					149.8227865	-26.29849594
Hollow Limb					149.8184236	-26.30161759
Hollow Limb				*Angophora floribunda* multiple hollows and stick nest	149.8128864	-26.30041591
Hollow Log				Stag will hollows and fissures	149.8128728	-26.30043876
Hollow Limb				Multiple small hollows in Angophora floribunda.	149.8126053	-26.30007763
Mistletoe				Mistletoe in *Geijera parviflora*	149.8111963	-26.29911767
Hollow Limb				Significant habitat tree with multiple hollows.	149.771295	-26.29700298
Hollow Limb				Significant habitat tree with multiple hollows and decorticating bark.	149.7664179	-26.30227639
Hollow Limb		Unknown		Significant habitat stag with multiple hollows	149.7276101	-26.30299148
Decorticating Bark					149.743364	-26.30417031
Decorticating Bark				Hollow bearing stag	149.7431763	-26.30440189
Hollow Limb					149.7431383	-26.30447756
Decorticating Bark				Hollow bearing stag	149.743225	-26.30453305
Hollow Limb					149.7432202	-26.30459817

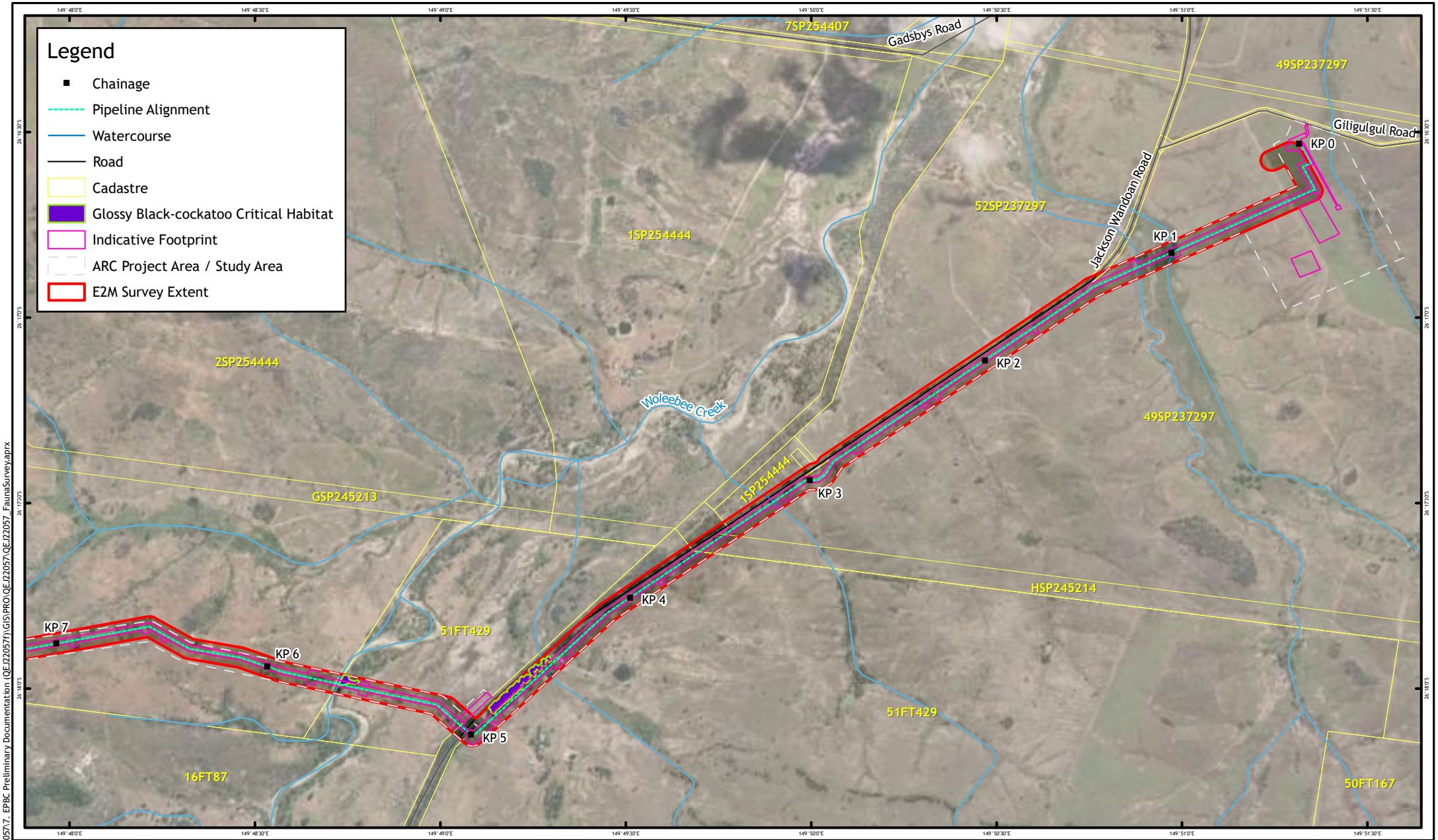
Feature ID	Habitat Feature	Usage	Number of Features	Comment	Latitude (GDA 94)	Longitude (GDA 94)
Hollow Limb				Hollow limb in *Eucalyptus orgadophila*	149.74345	-26.30440368
Decorticating Bark				Stag	149.715007	-26.30197563
Hollow Limb				*Eucalyptus crebra*	149.7142629	-26.30212678
Hollow Limb				Significant habitat stag tree with multiple hollows.	149.7434045	-26.30409618
Hollow Limb				Significant habitat stag tree with multiple hollows.	149.7430686	-26.3042807
Hollow Limb				Significant habitat stag tree with multiple hollows.	149.7430364	-26.30437518
Hollow Limb		Unknown	3	Stag tree with fissures and multiple hollows	149.743076	-26.30442259
Hollow Limb		Unknown	3	Stag tree with fissures and multiple hollows	149.7430886	-26.3044998
Hollow Limb		Unknown		Large significant habitat tree with multiple hollows.	149.7143656	-26.30226624
Hollow Limb		Unknown		Large significant habitat tree with multiple hollows.	149.7143086	-26.30233181
Hollow Limb		Unknown			149.6865076	-26.30760981
Hollow Limb		Unknown			149.6864194	-26.3076257
Hollow Limb		Unknown			149.6803407	-26.30778904
Decorticating Bark		Unknown			149.6802213	-26.30790313
Decorticating Bark		Unknown			149.6796423	-26.30794743

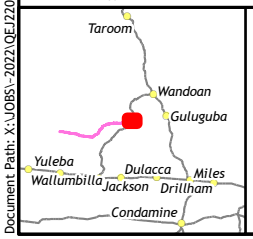
Feature ID	Habitat Feature	Usage	Number of Features	Comment	Latitude (GDA 94)	Longitude (GDA 94)
Hollow Limb		Unknown			149.6745916	-26.30898304
Hollow Limb		Unknown			149.6744561	-26.30896078
Hollow Limb		Unknown			149.6744186	-26.30899657
Hollow Limb		Unknown			149.6743493	-26.30913298
Hollow Limb		Unknown			149.6742665	-26.3092393
Hollow Limb		Unknown			149.6742772	-26.30933483
Hollow Limb		Unknown			149.6741004	-26.3093905
Hollow Limb		Unknown			149.6732365	-26.30957343
Hollow Limb		Unknown			149.6730591	-26.3095367
Hollow Limb		Unknown			149.6721756	-26.30945794
Hollow Limb		Unknown			149.6722014	-26.30948956
Gilgai		Active/in-use	5	Gilgai containing water	149.6712455	-26.31008141
Hollow Limb		Unknown		Stag tree with multiple hollows and decorticating bark	149.6877825	-26.307435
Hollow Limb		Unknown	3	Hollow bearing *Eucalyptus populnea* with approximately 3 hollows.	149.6746465	-26.30917772
Hollow Limb		Unknown	3	Hollow bearing *Eucalyptus populnea* with approximately 3 hollows.	149.6747003	-26.30921615

Feature ID	Habitat Feature	Usage	Number of Features	Comment	Latitude (GDA 94)	Longitude (GDA 94)
Hollow Limb		Unknown	3	Hollow bearing *Eucalyptus populnea* with approximately 3 hollows.	149.6747064	-26.30924672
Hollow Limb		Unknown	3	Hollow bearing *Eucalyptus populnea* with approximately 3 hollows.	149.674751	-26.30943513
Hollow Limb		Unknown	2	Hollow bearing *Eucalyptus populnea* with approximately 2 hollows.	149.674615	-26.30937881
Hollow Limb		Unknown	3	Hollow bearing *Eucalyptus populnea* with approximately 3 hollows.	149.672653	-26.30951196
Gilgai		Active/in-use	1	Gilgai containing water	149.6715644	-26.31034278
Gilgai		Active/in-use	1	Gilgai containing water	149.654174	-26.31824583
Gilgai		Unknown	1	Gilgai containing water	149.6472865	-26.32301698
Other		Unknown			149.633287	-26.34456087
Gilgai		Unknown		Gilgai containing water	149.649463	-26.32088161
Gilgai		Unknown		Gilgai containing water	149.6482404	-26.32200117
Gilgai		Unknown		Gilgai containing water	149.6421085	-26.33456972
Waterbody/Dam		Unknown			149.6333164	-26.34449583
Burrow		Active/in-use			149.6413132	-26.3326923
Habitat tree		Unknown	2	dead standing stag with 2 hollows	149.6272948	-26.34925096

Feature ID	Habitat Feature	Usage	Number of Features	Comment	Latitude (GDA 94)	Longitude (GDA 94)
Habitat tree		N/A		large Eucalyptus crebra, retain if possible	149.6273729	-26.3490928
Gilgai		Unknown		Large Eucalyptus crebra, retain if possible	149.6419335	-26.33264461
Habitat tree		Unknown		Retain if possible	149.6393063	-26.33797567
Habitat tree		Unknown		*Eucalyptus tereticornis*, retain if possible	149.6331711	-26.33886161

Appendix I Glossy Black-Cockatoo Habitat Mapping





N

Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
Aerial Imagery: © ESRI 2022
Cadastre: © DoR 2022
Road: © DoR 2022
Hydrographic features: © DoR 2023

Rev	Description	Drawn	Approved	Date
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0	Issued for Use	GO	ED	12/10/2023

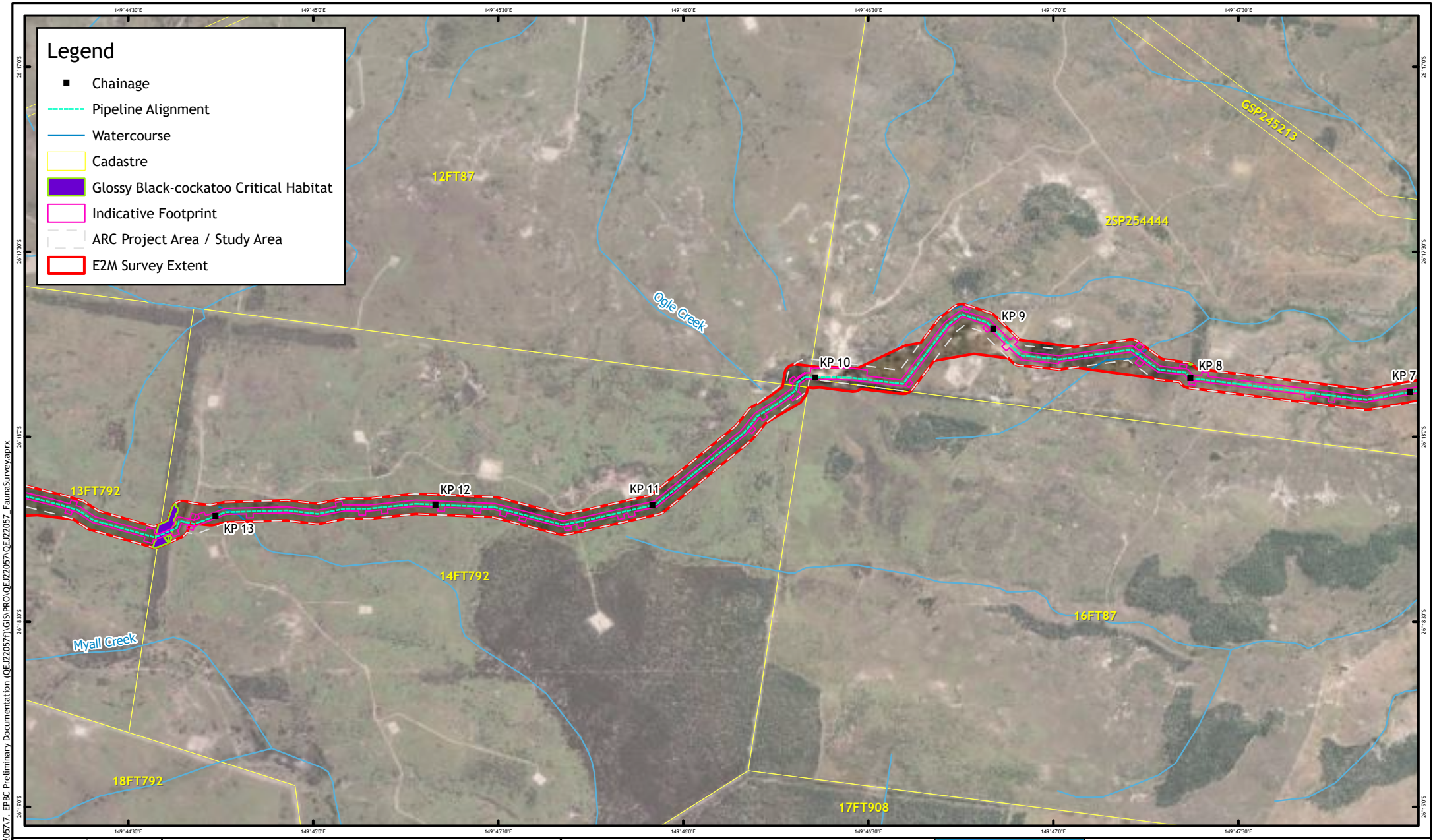
APPENDIX I: GLOSSY BLACK-COCKATOO HABITAT MAPPING

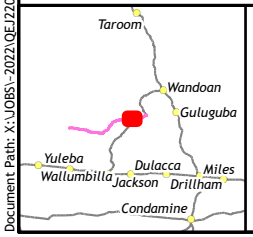
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N

Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
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Road: © DoR 2022
Hydrographic features: © DoR 2023

Rev	Description	Drawn	Approved	Date
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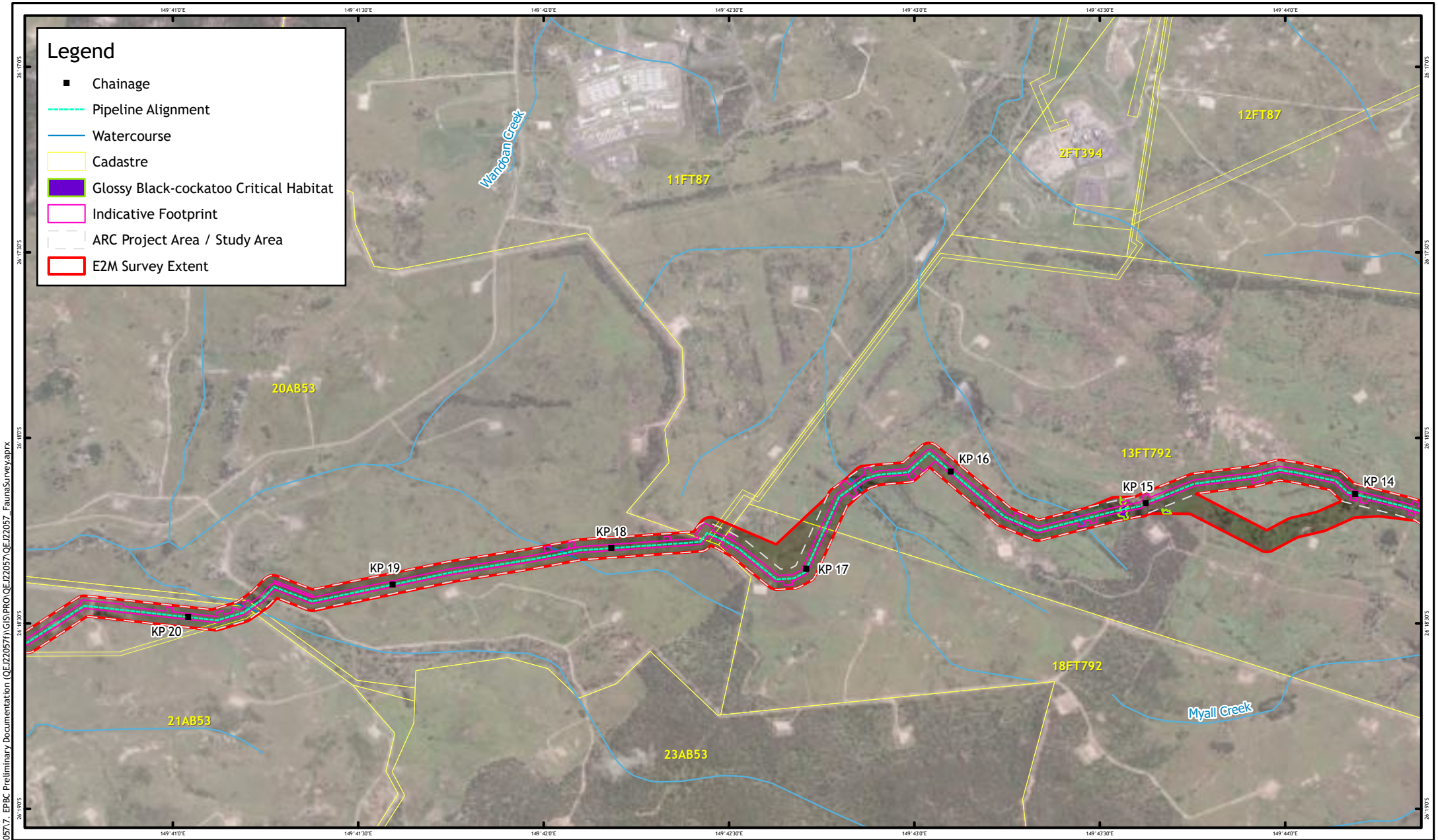
APPENDIX I: GLOSSY BLACK-COCKATOO HABITAT MAPPING

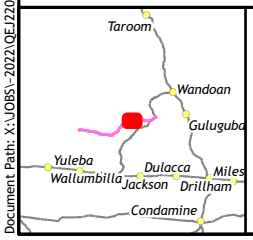
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Map Number	Job Number	Rev
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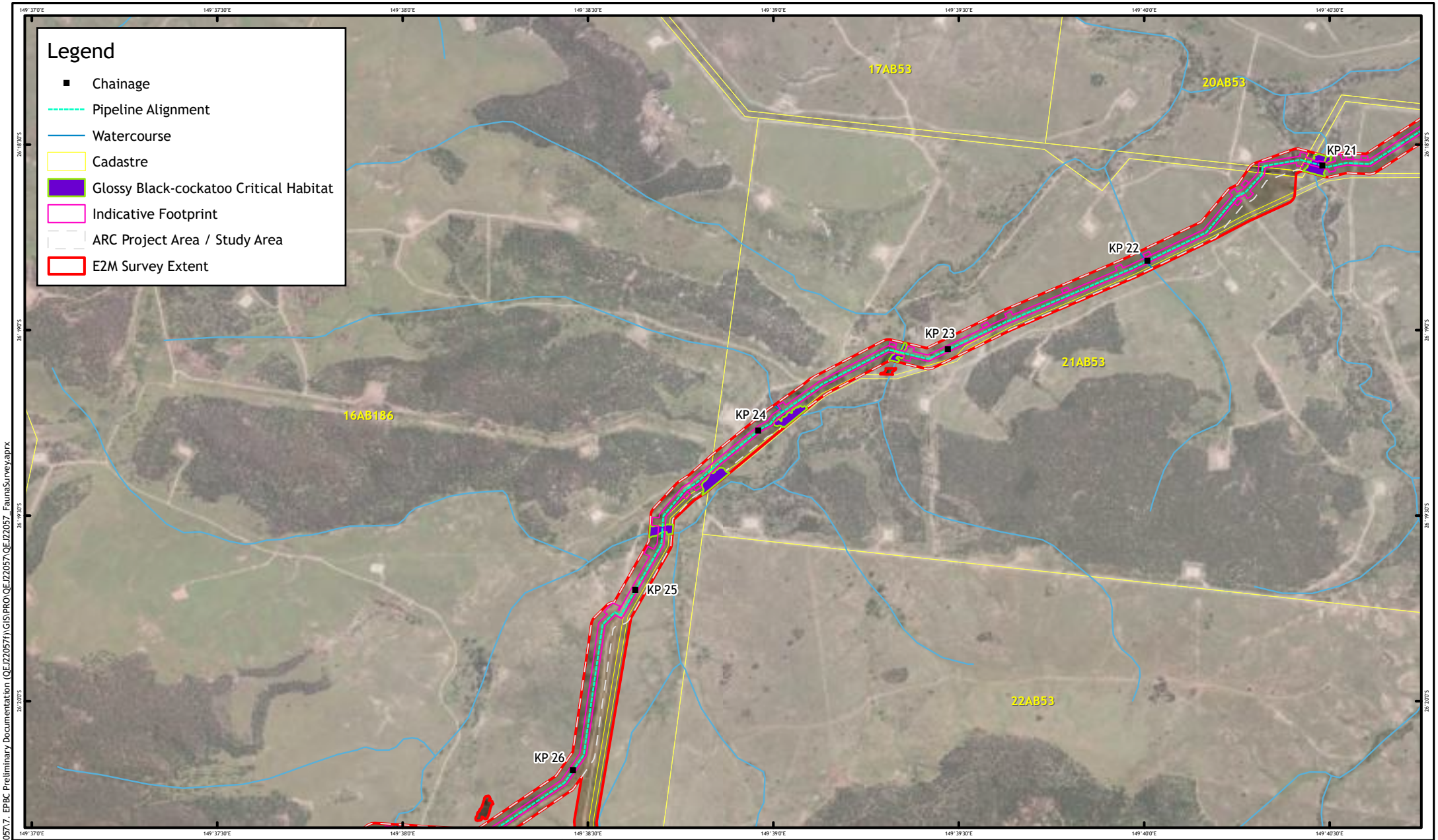
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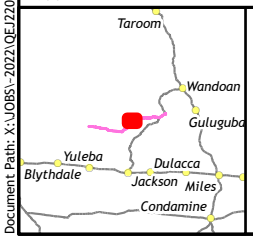
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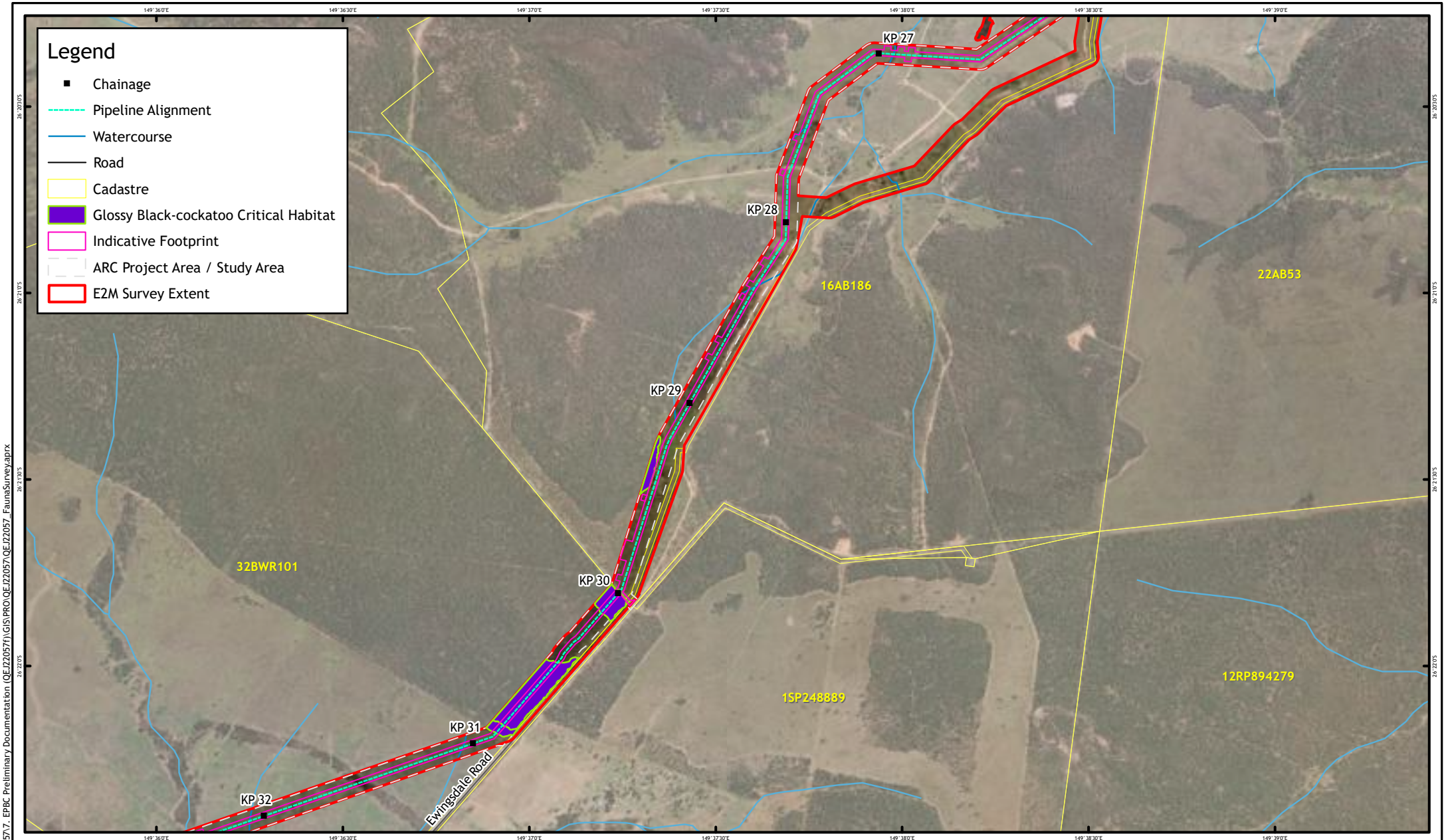
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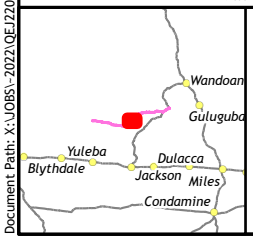
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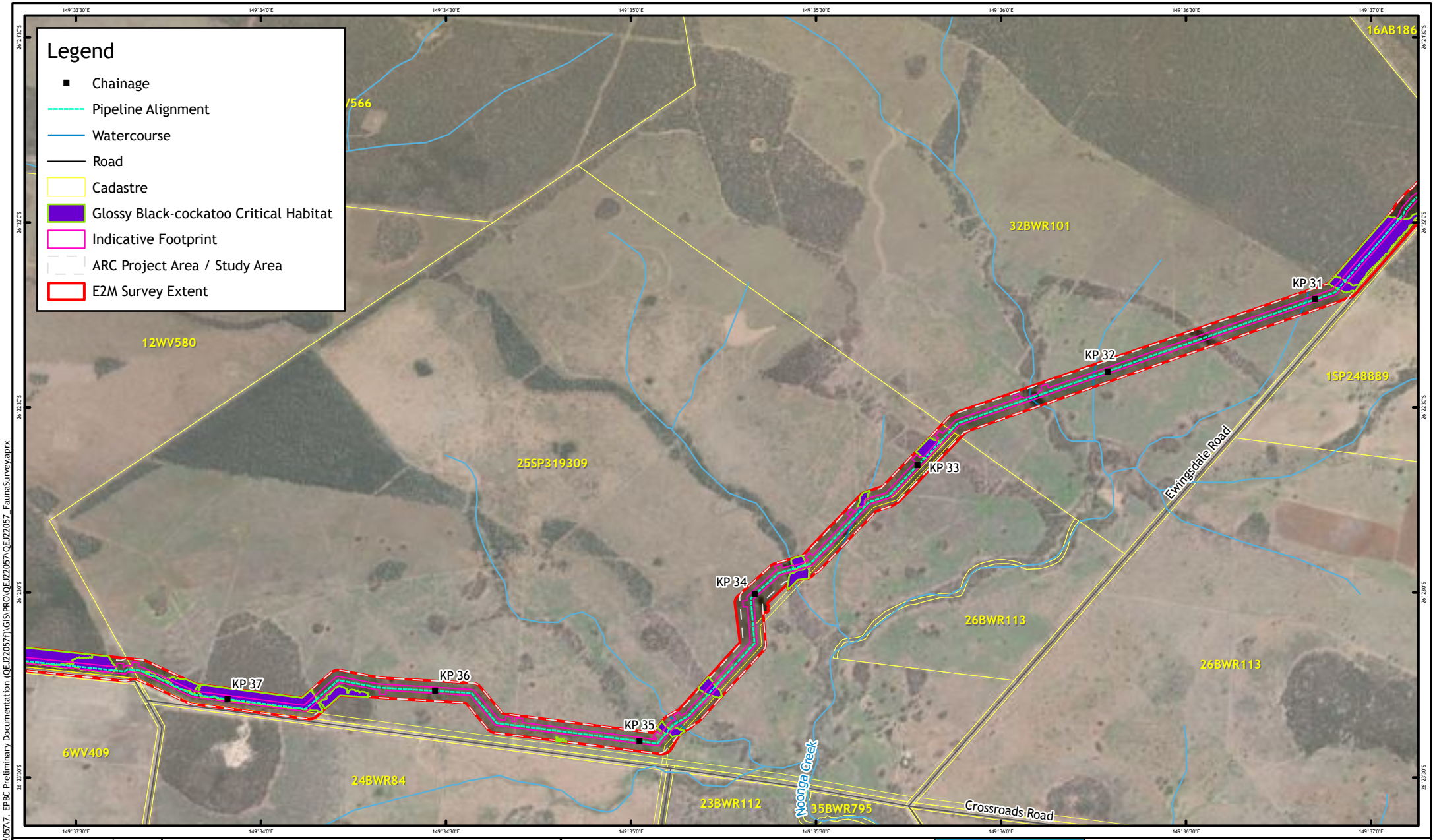
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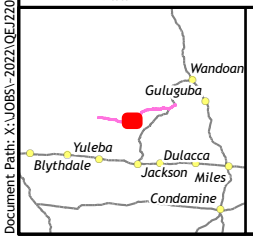
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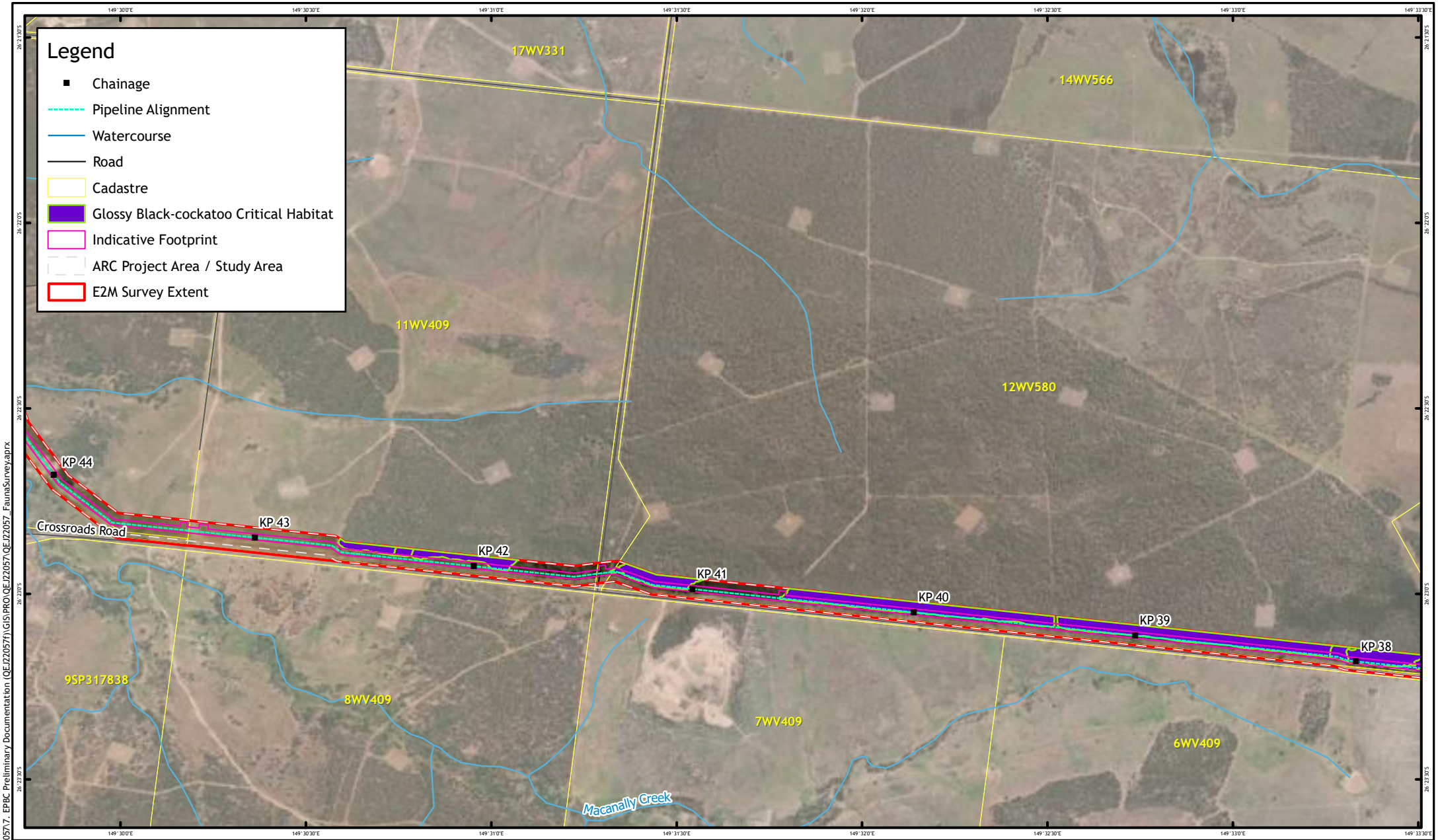
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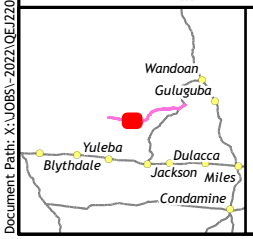
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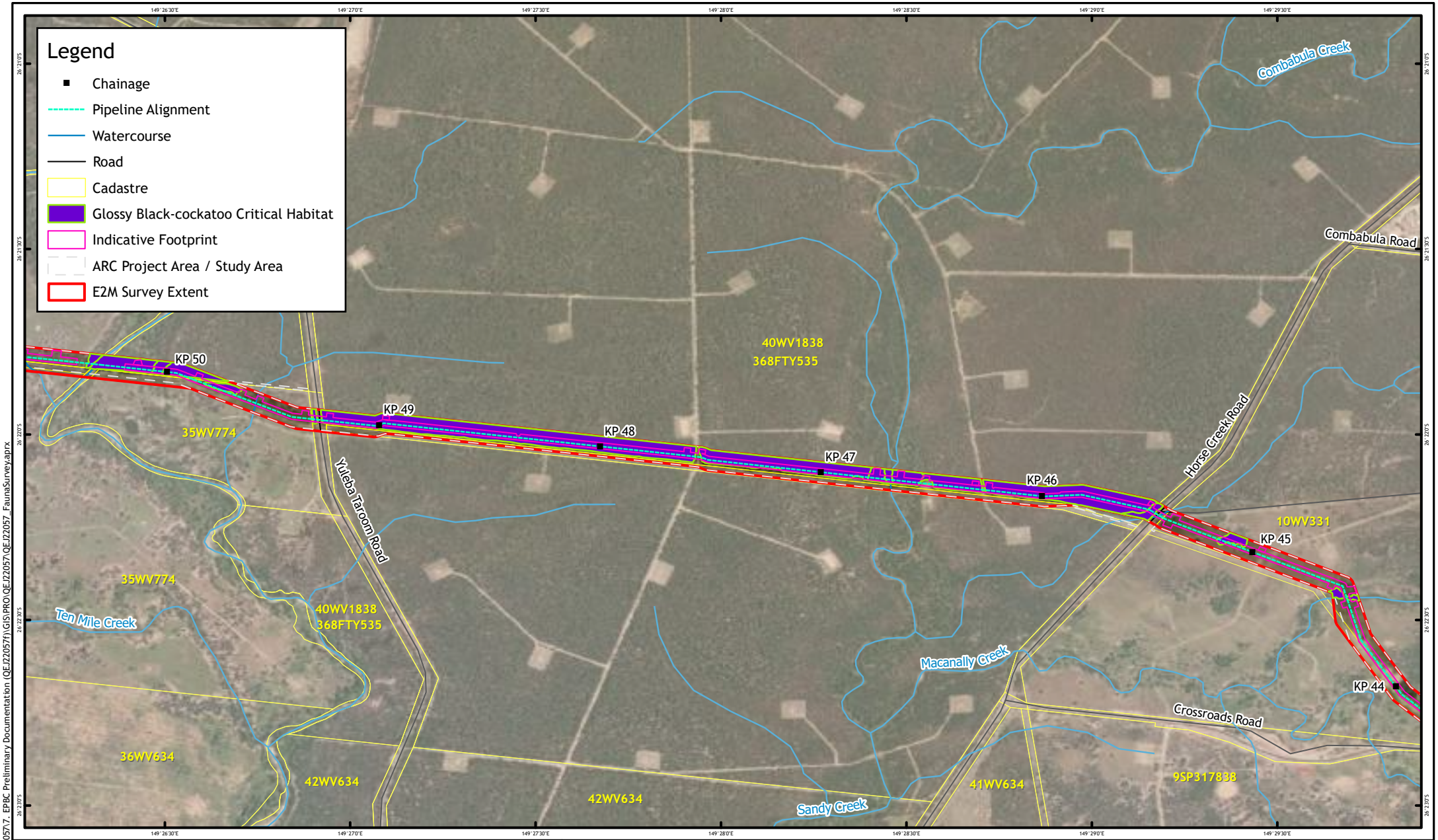
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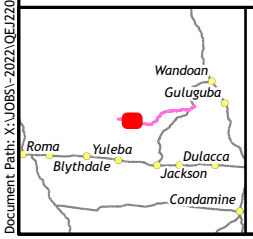
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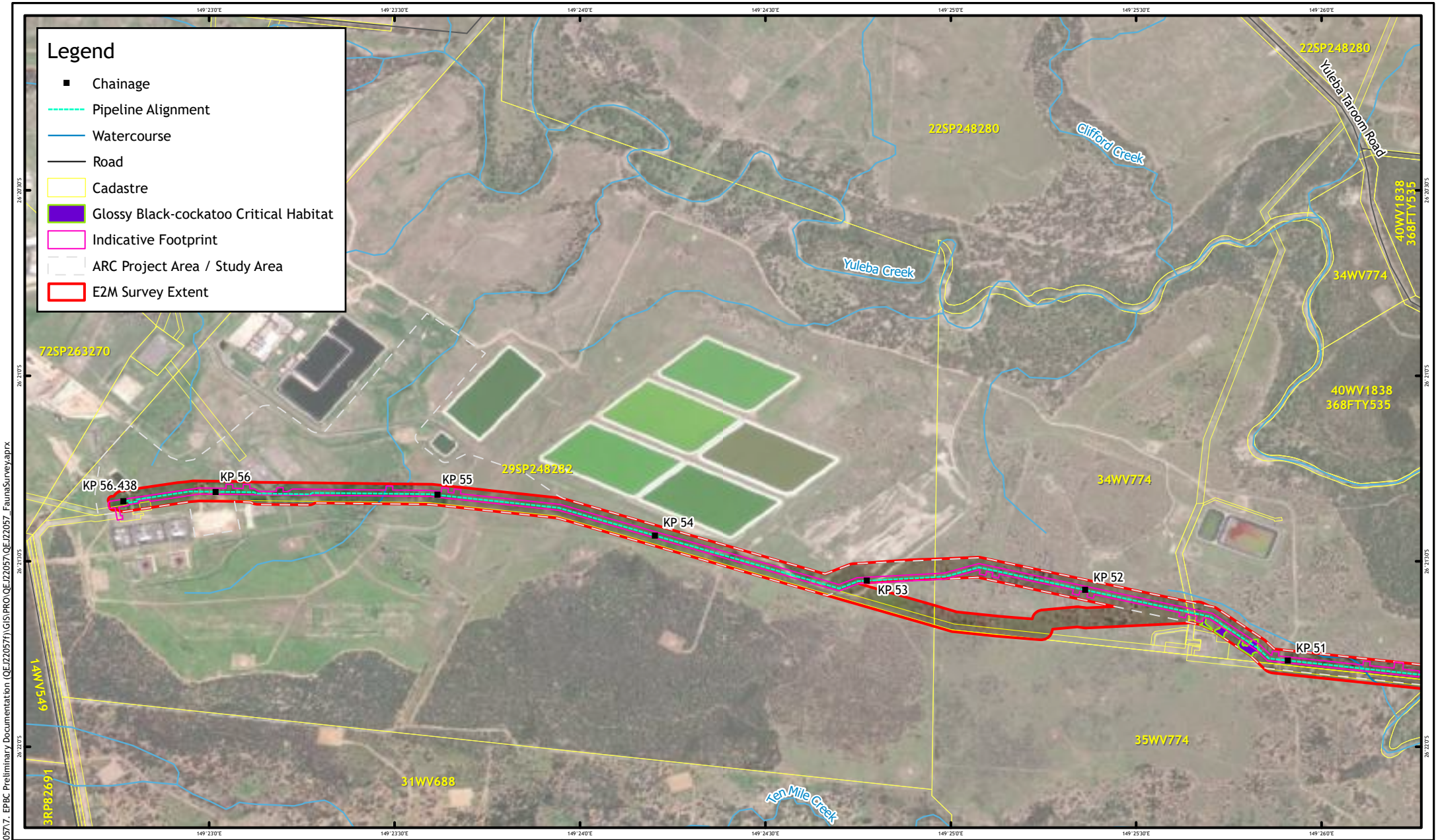
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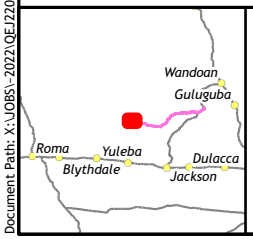
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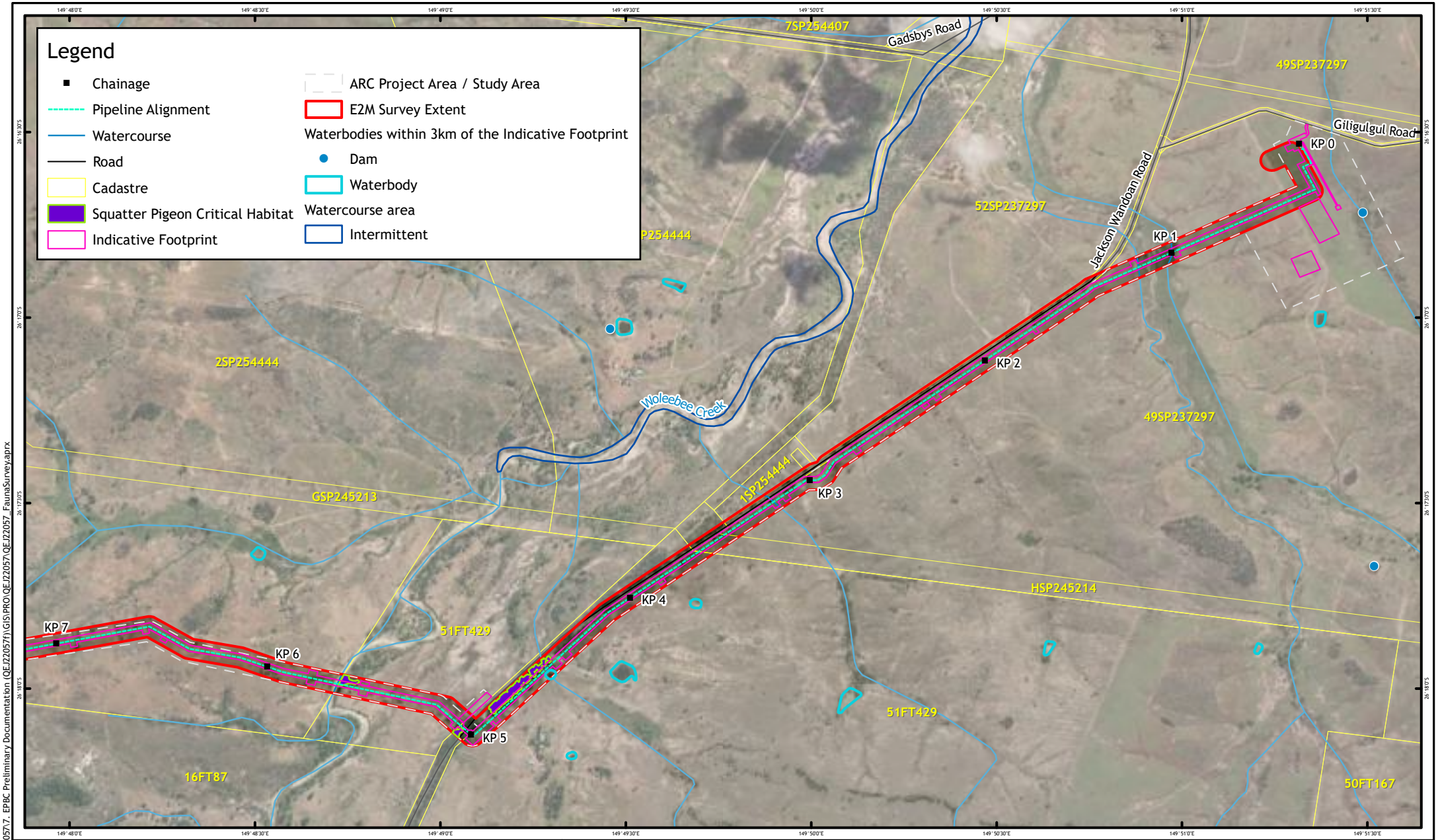
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Appendix J Squatter Pigeon Habitat Mapping



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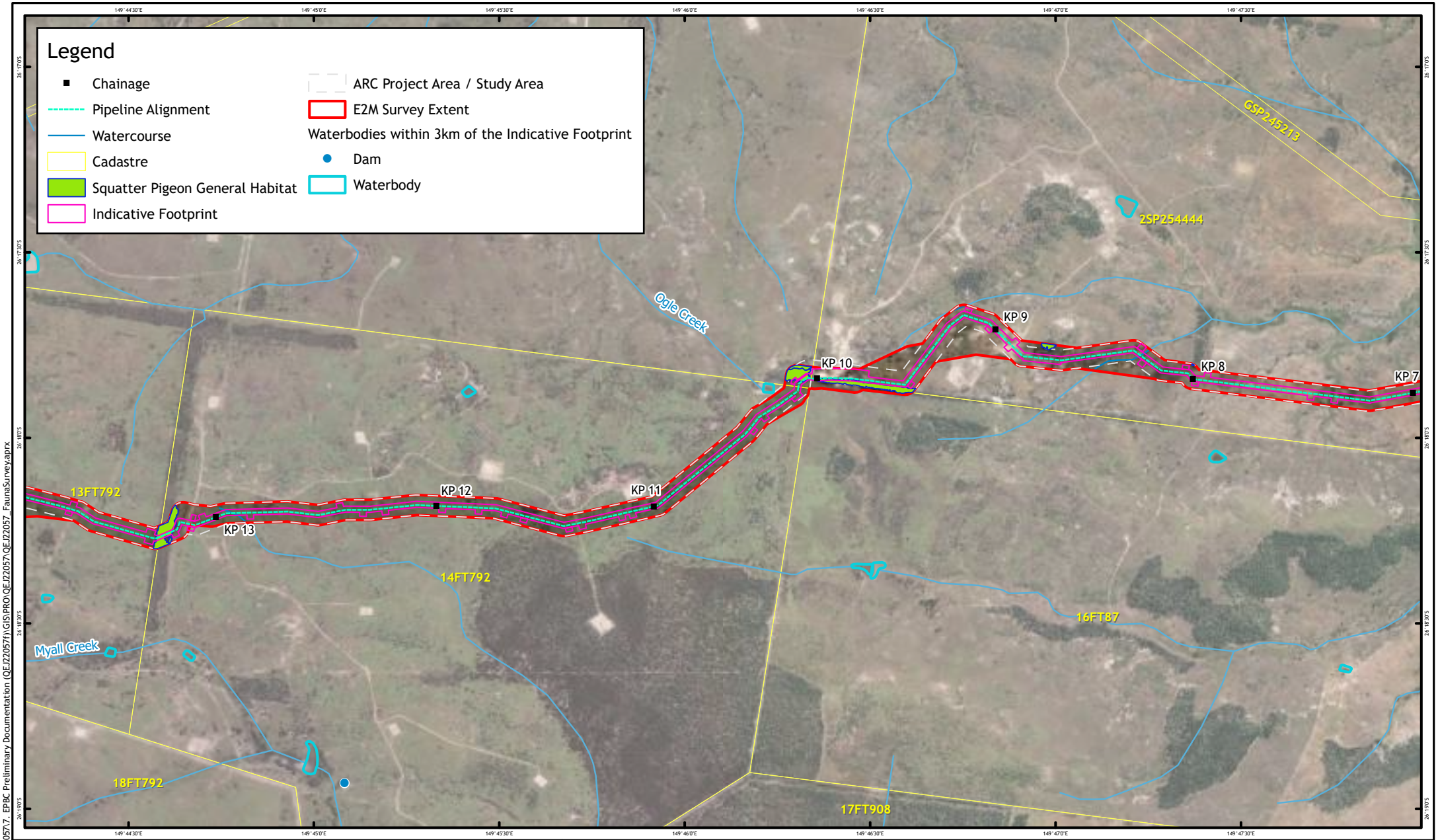
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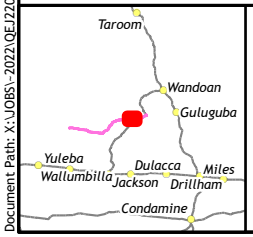
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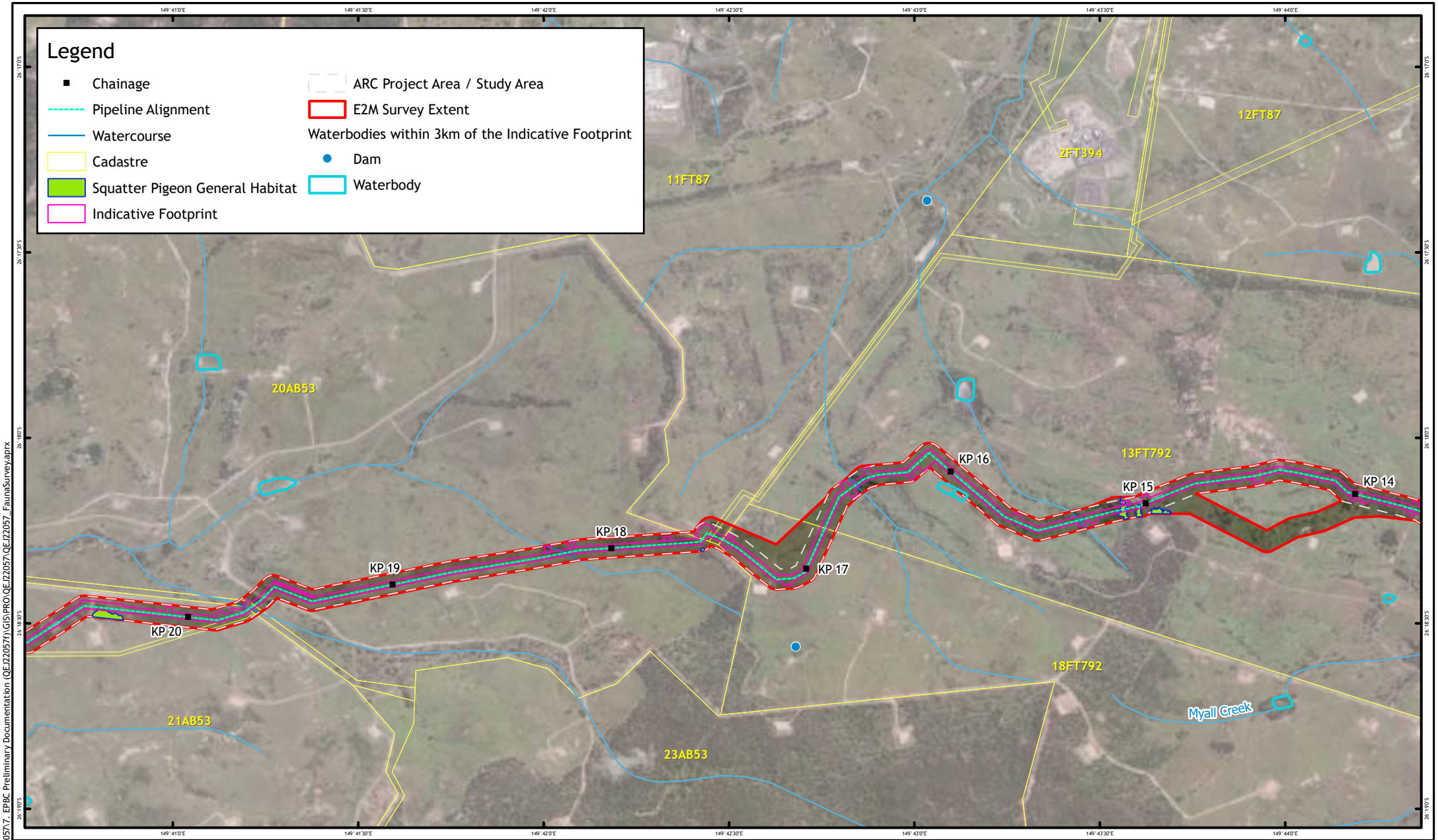
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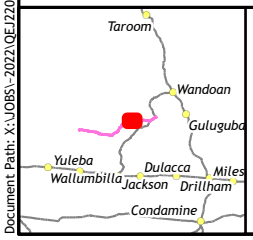
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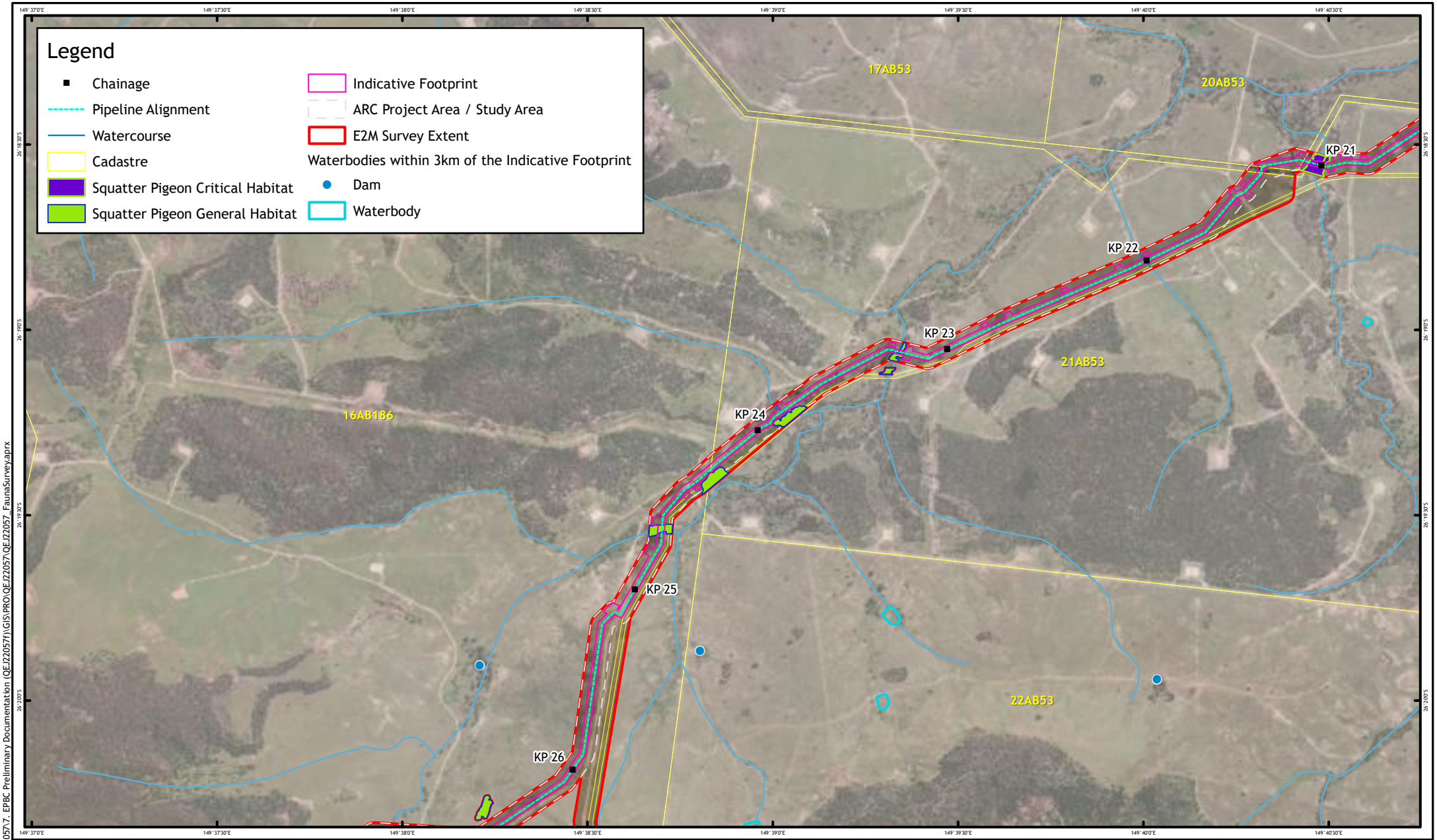
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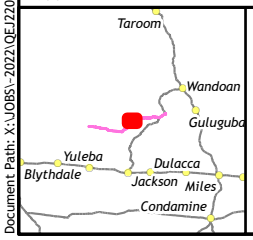
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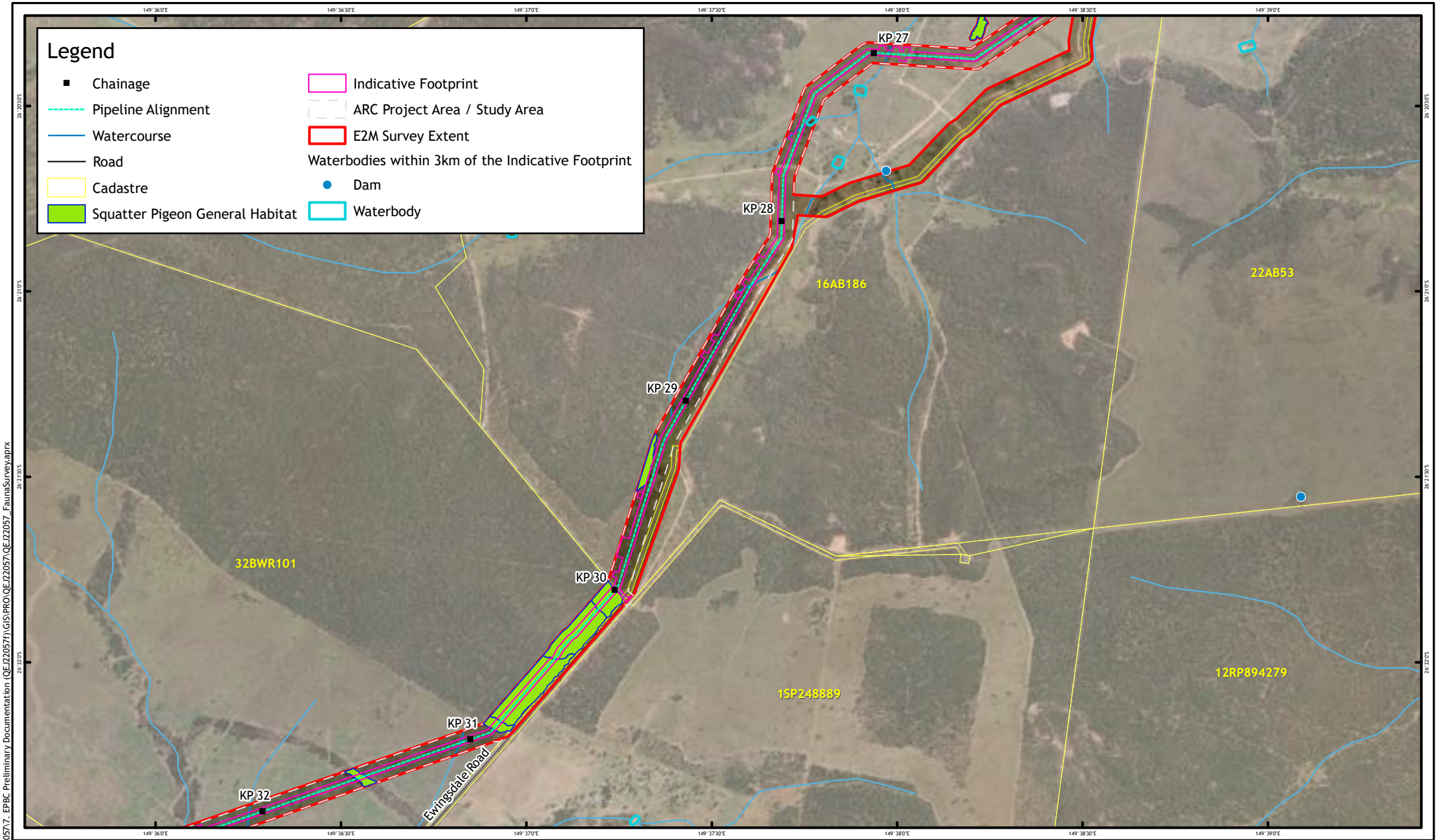
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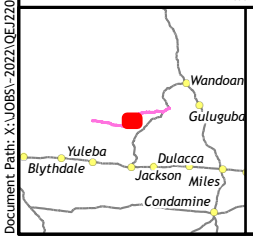
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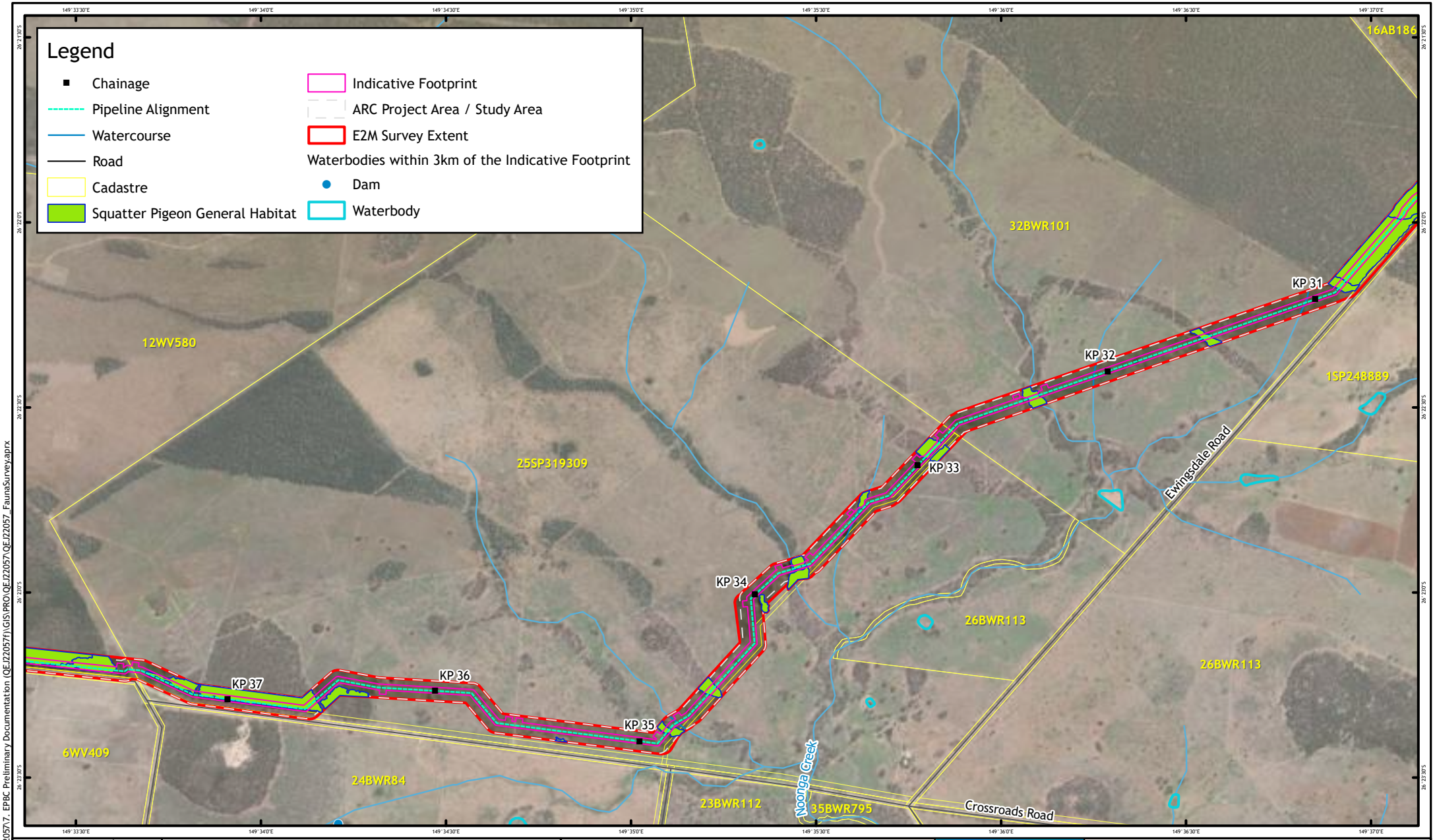
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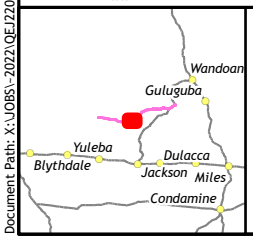
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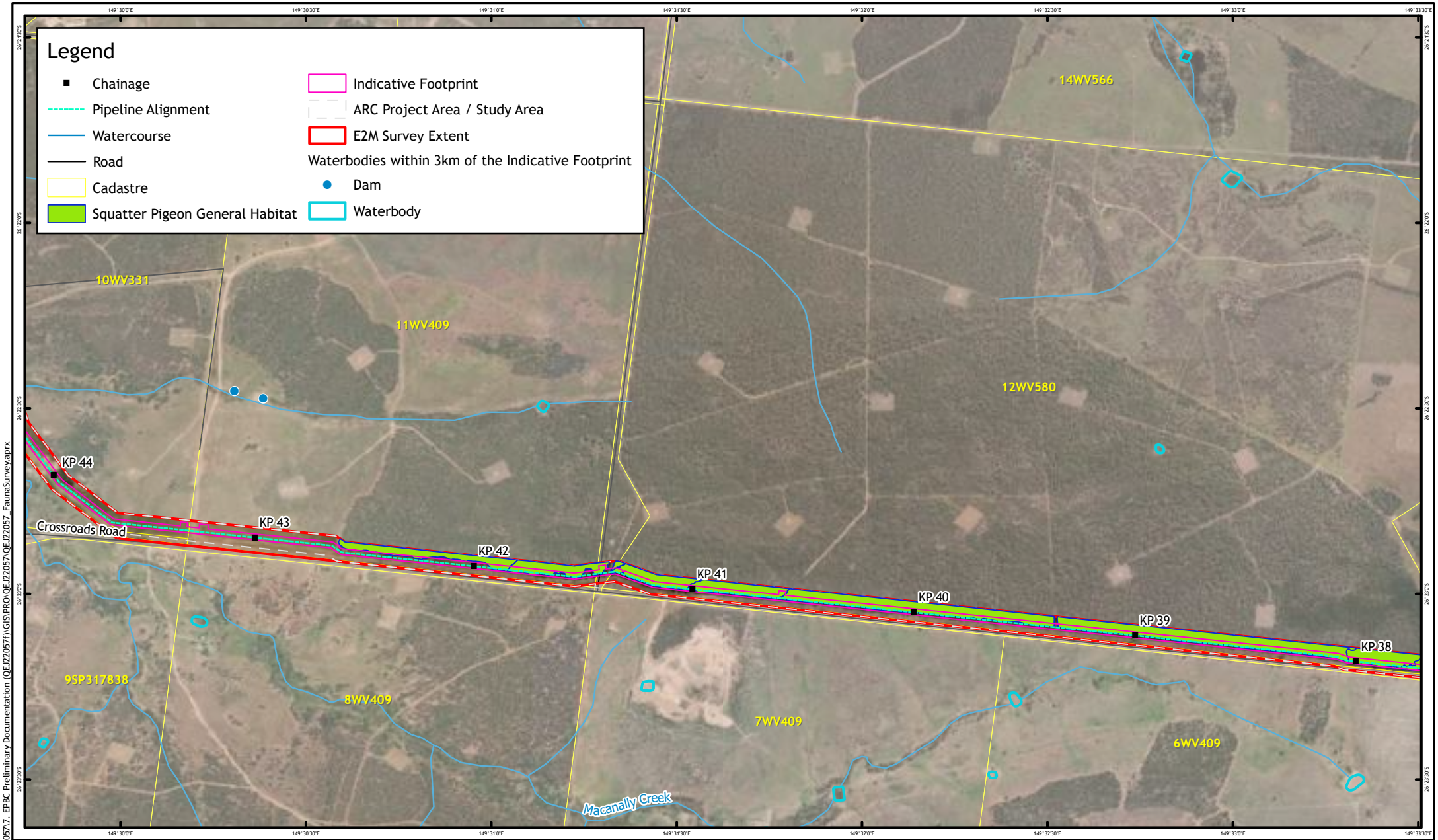
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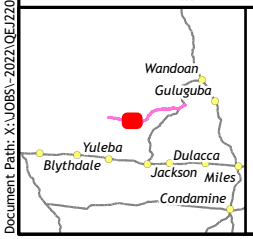
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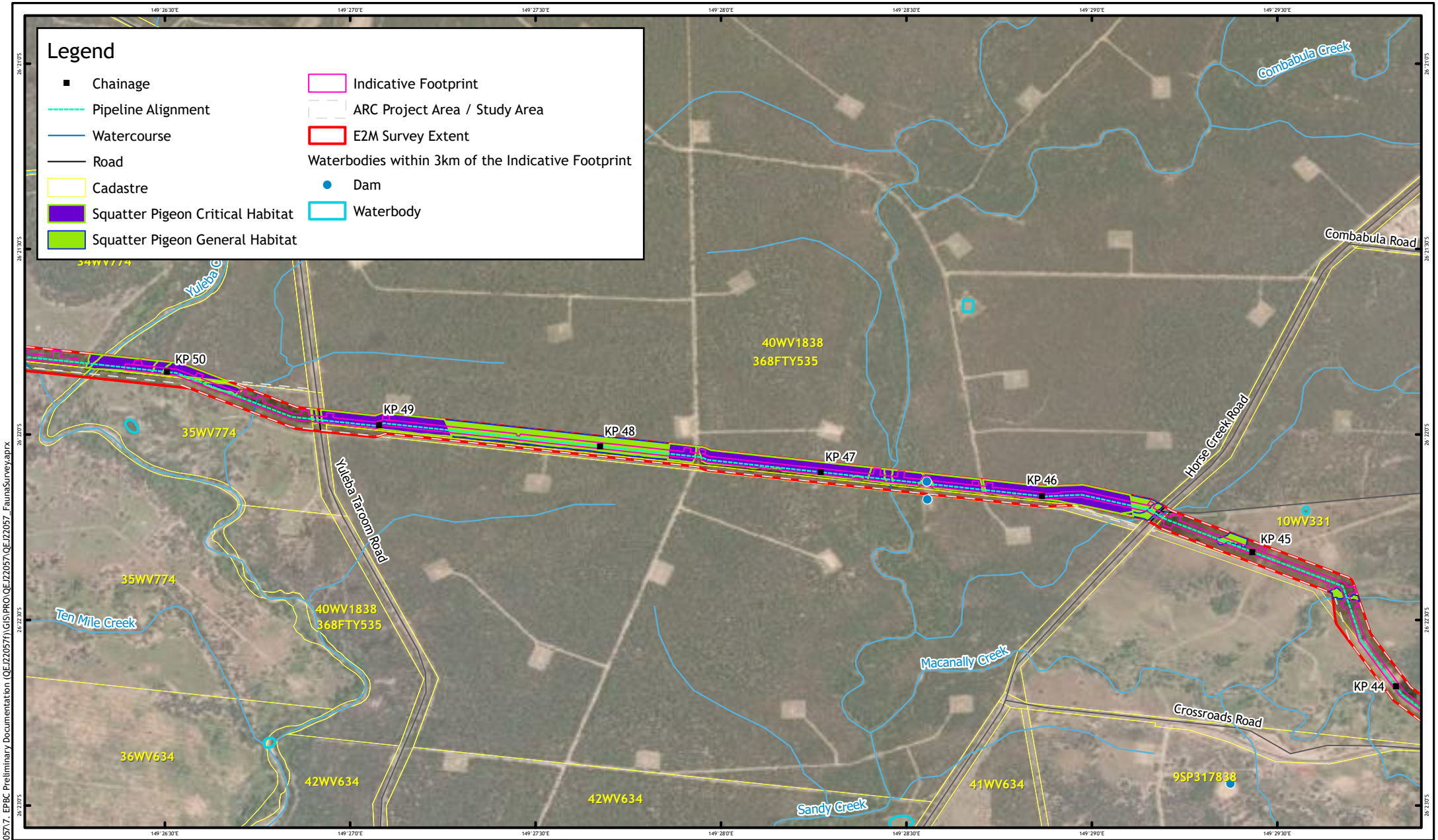
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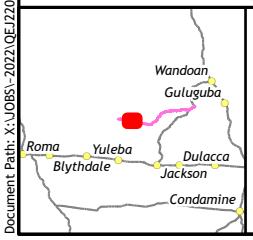
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Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

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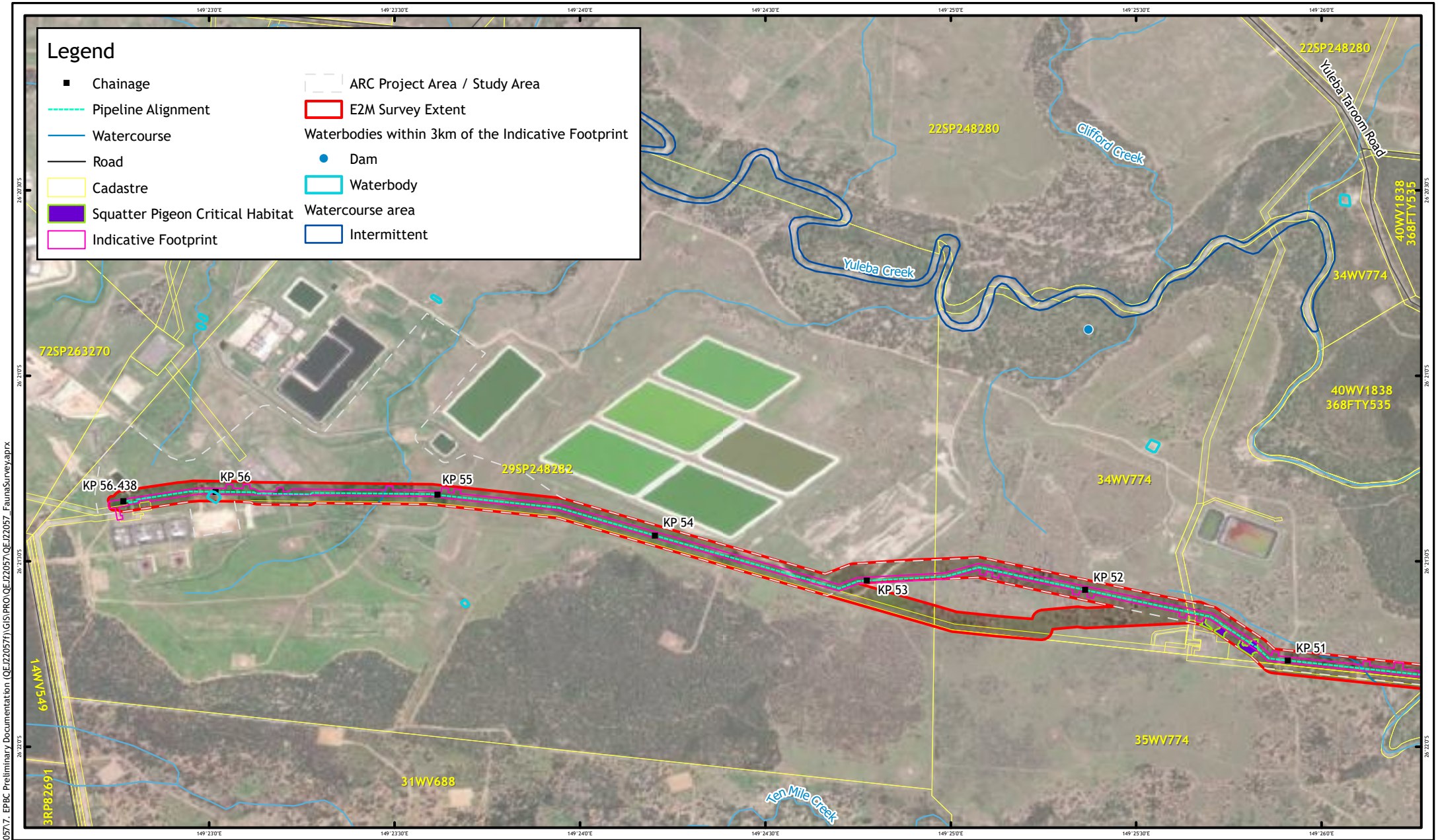
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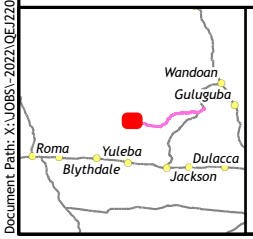
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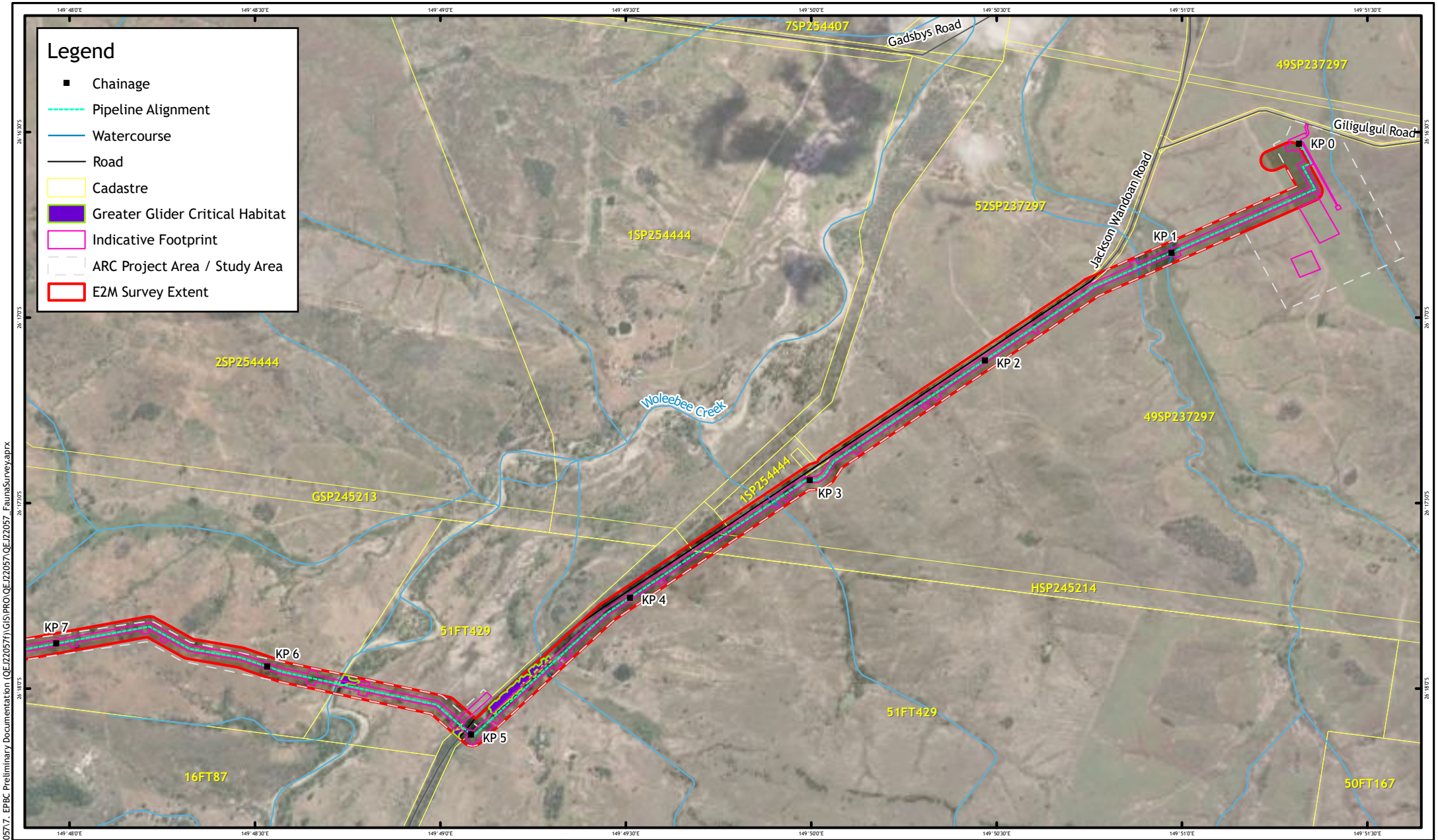
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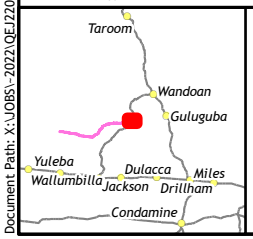
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Appendix K Greater Glider Habitat Mapping





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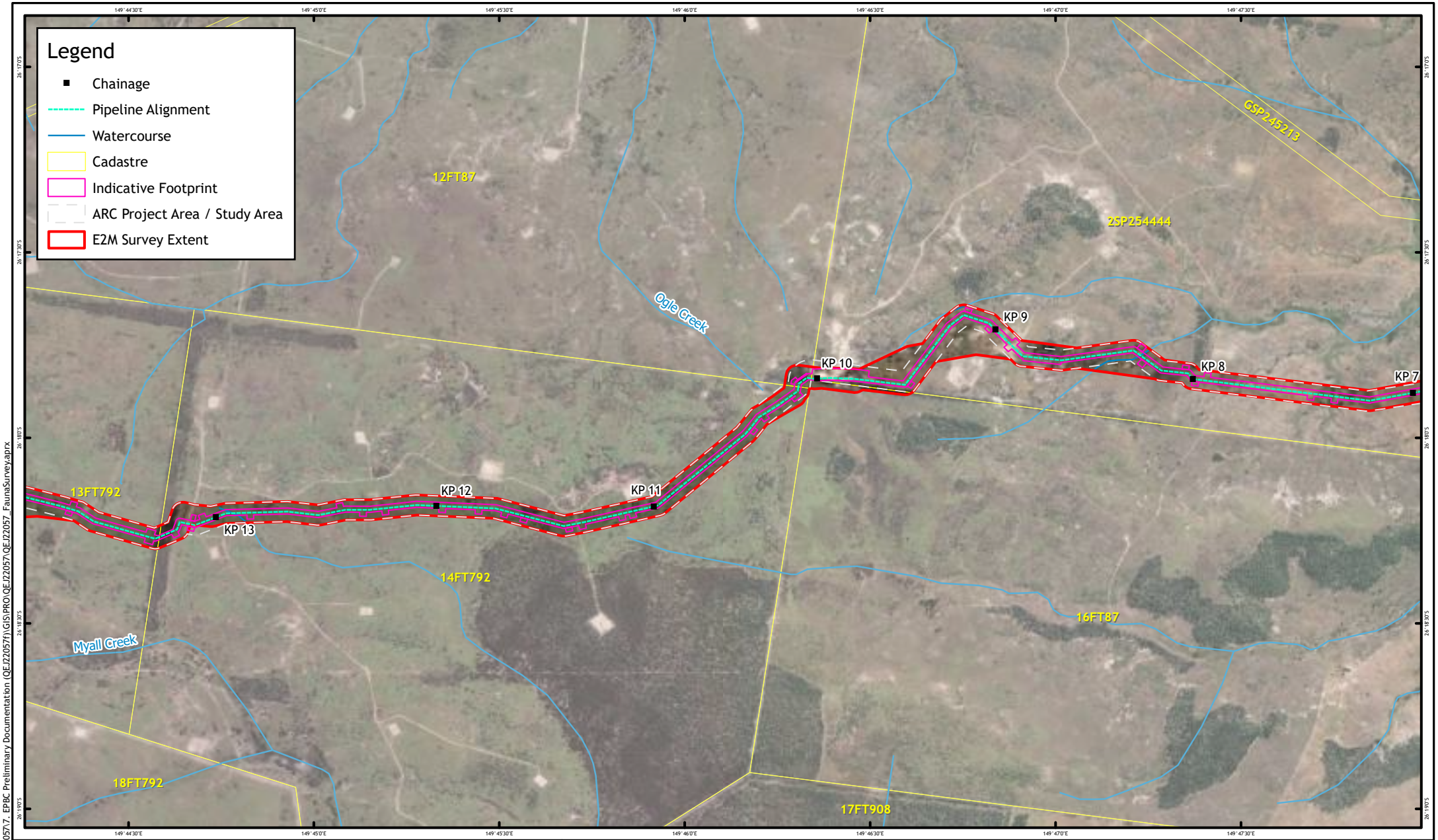
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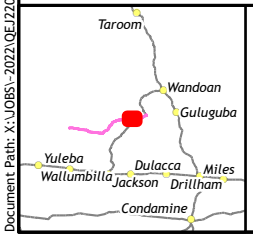
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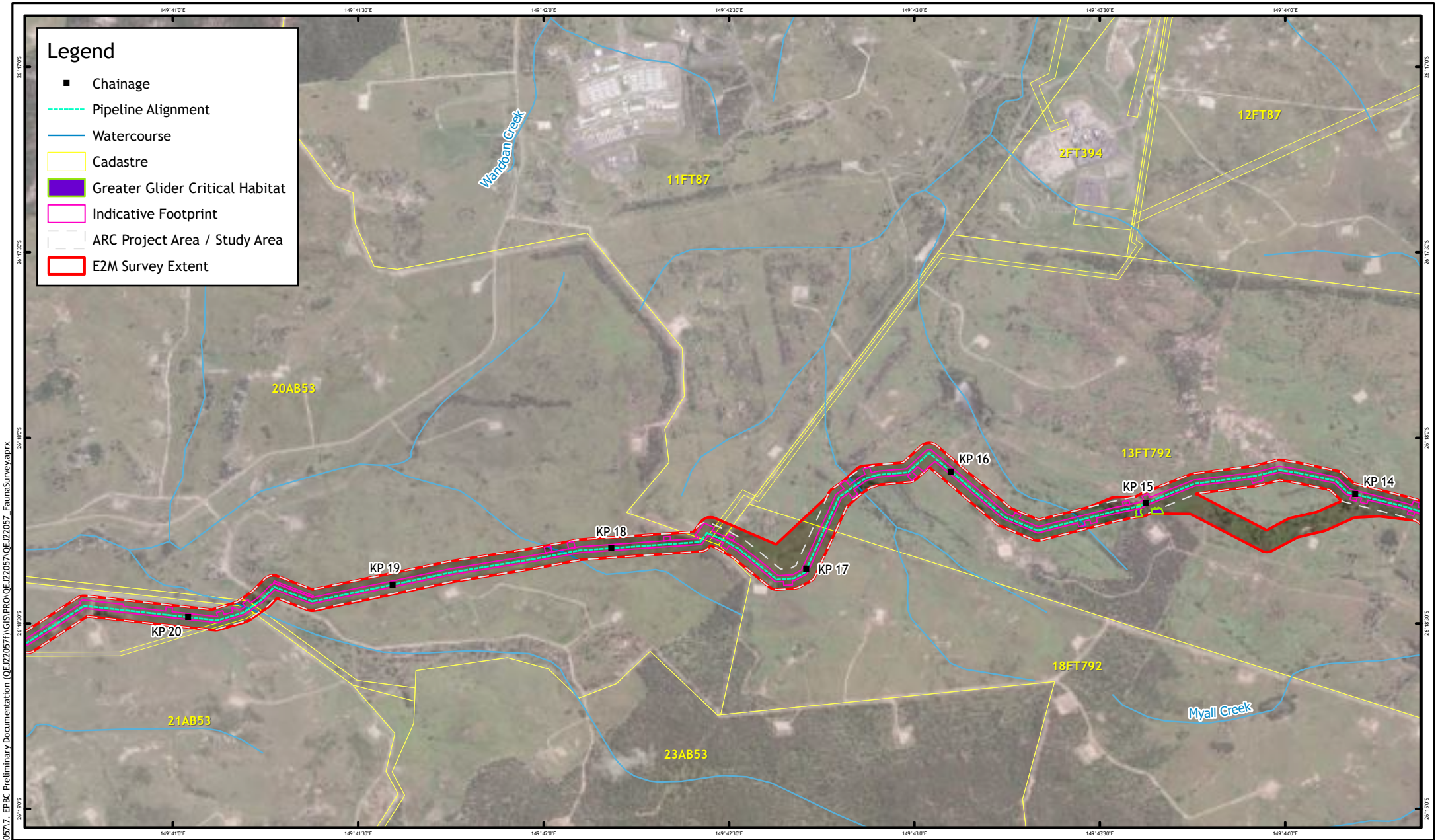
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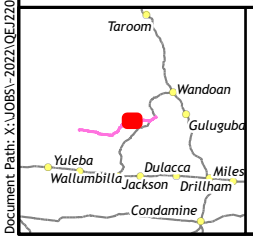
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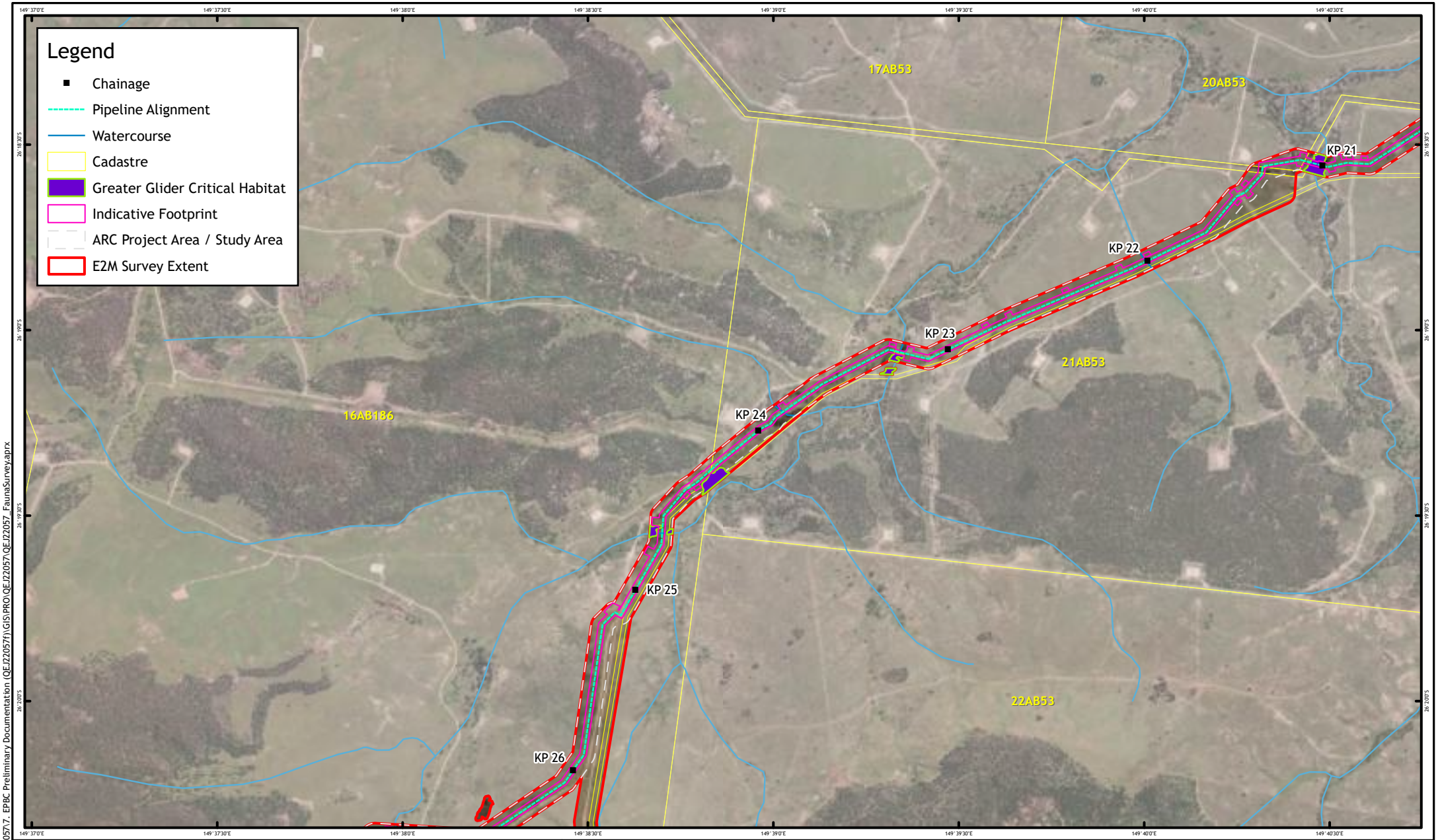
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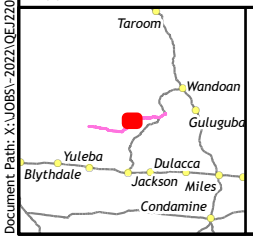
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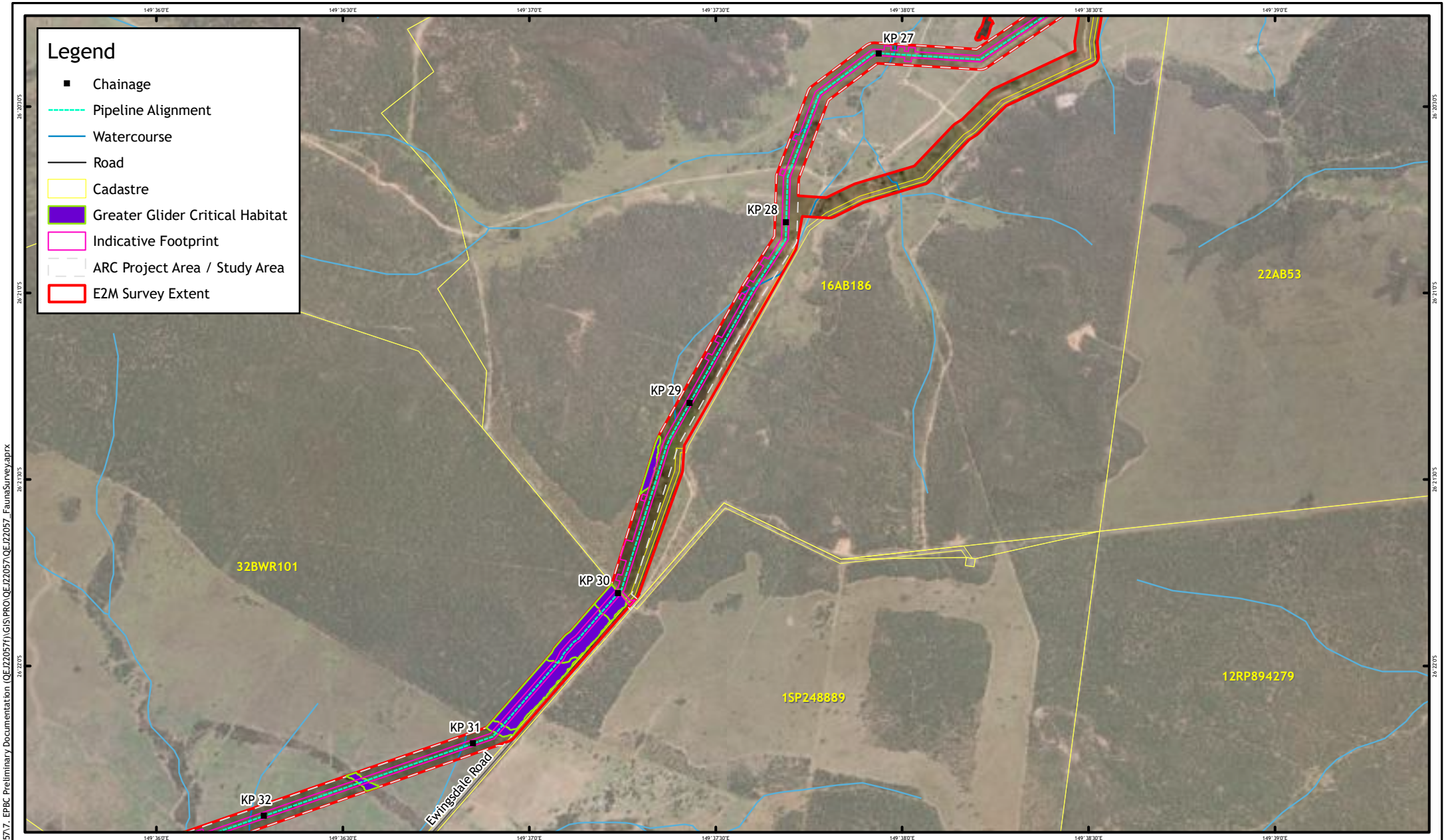
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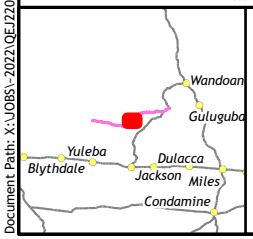
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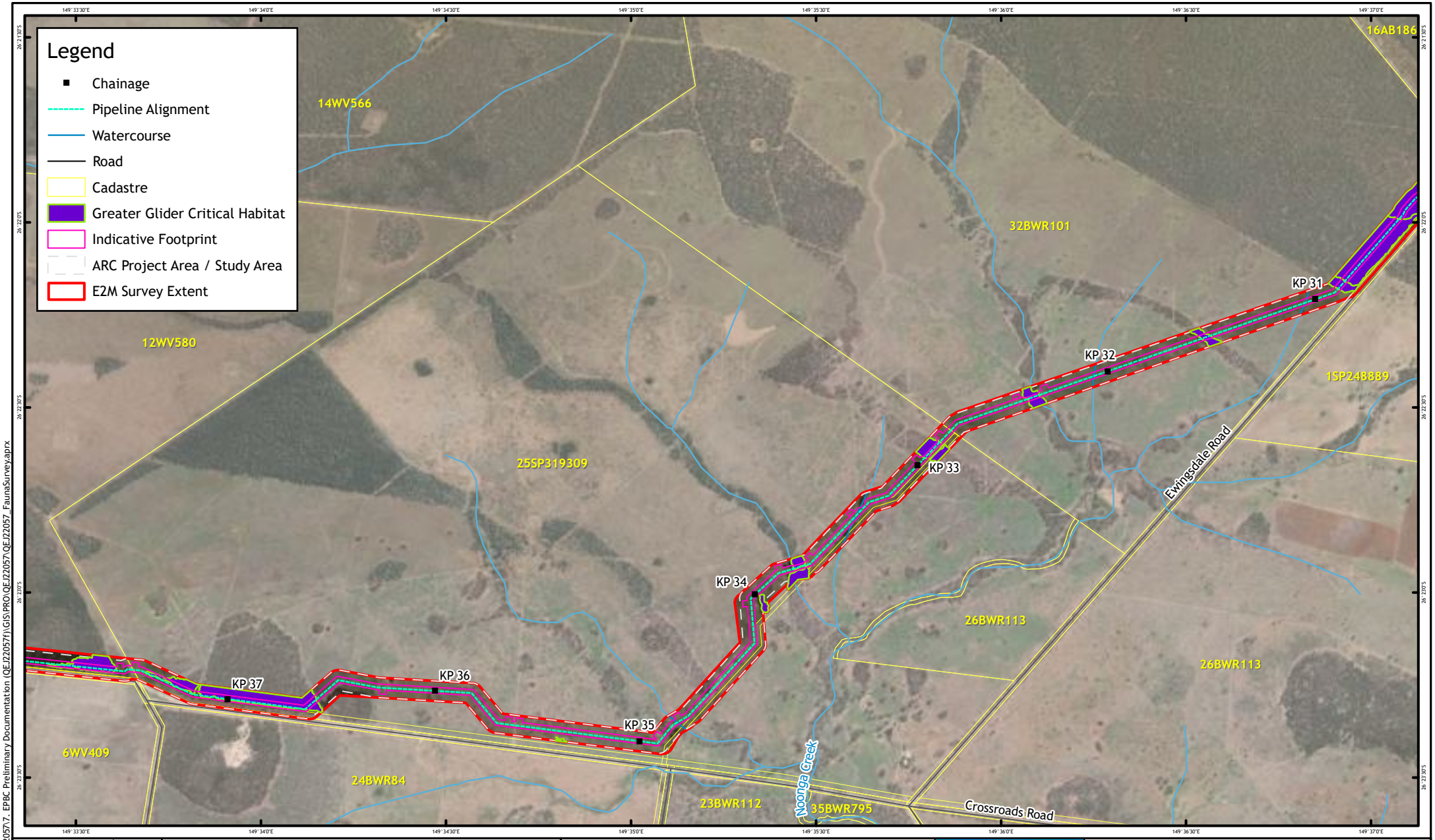
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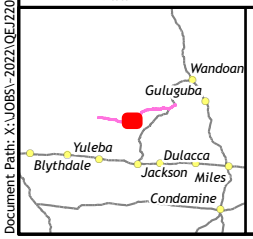
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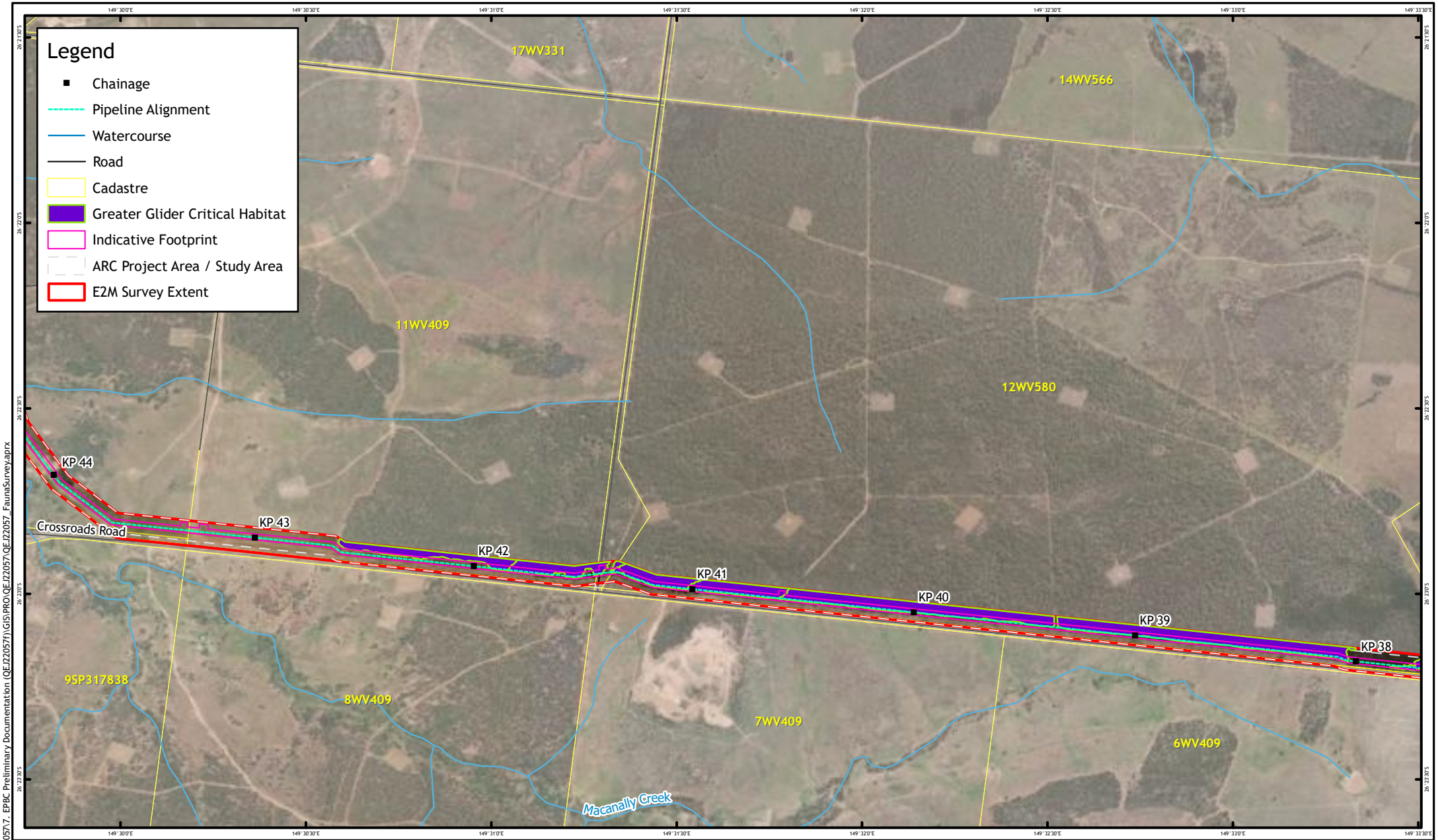
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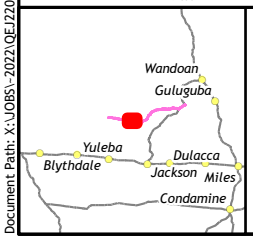
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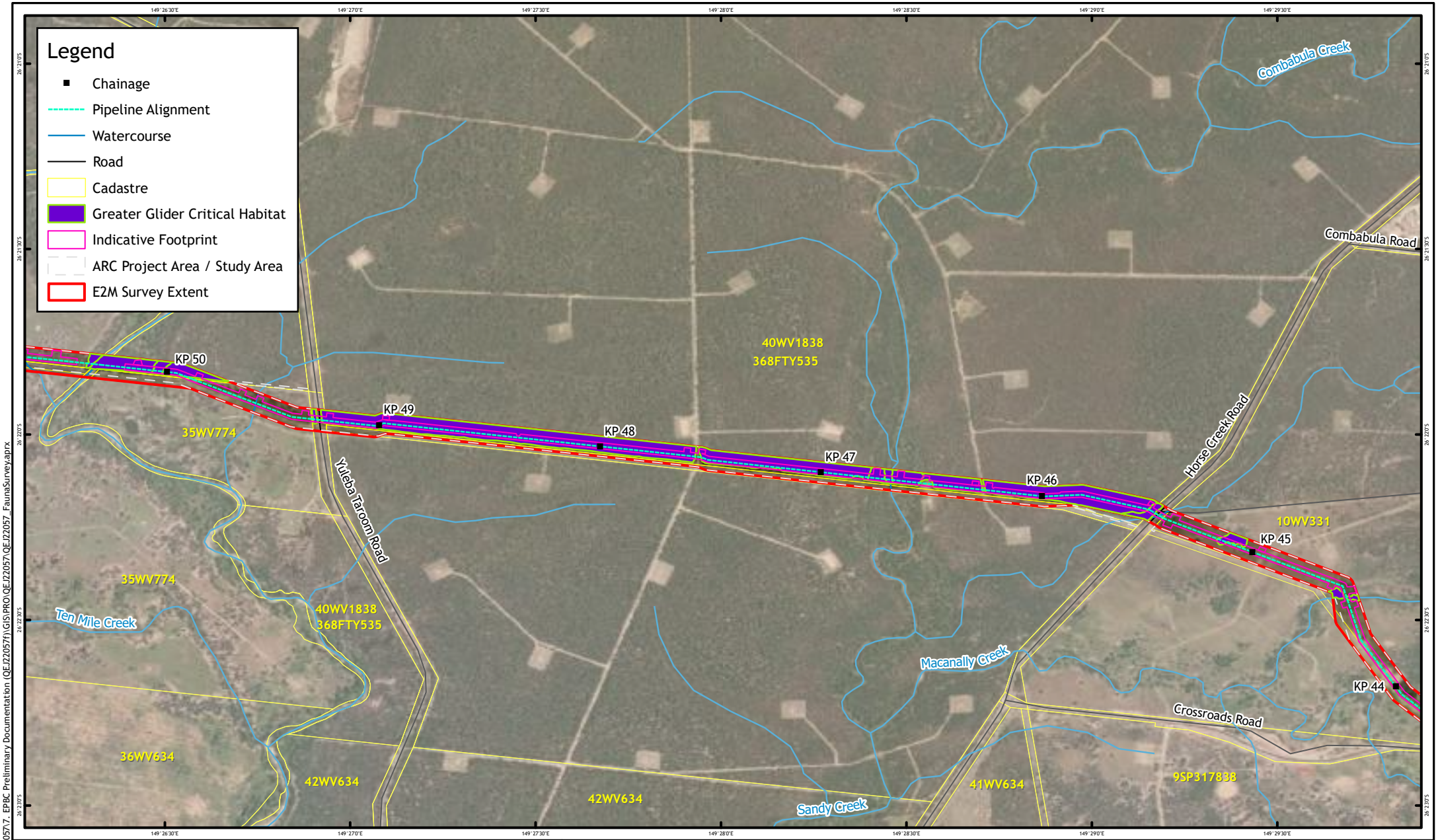
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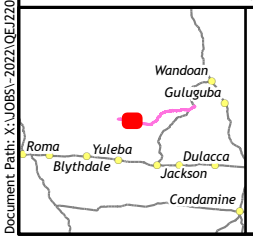
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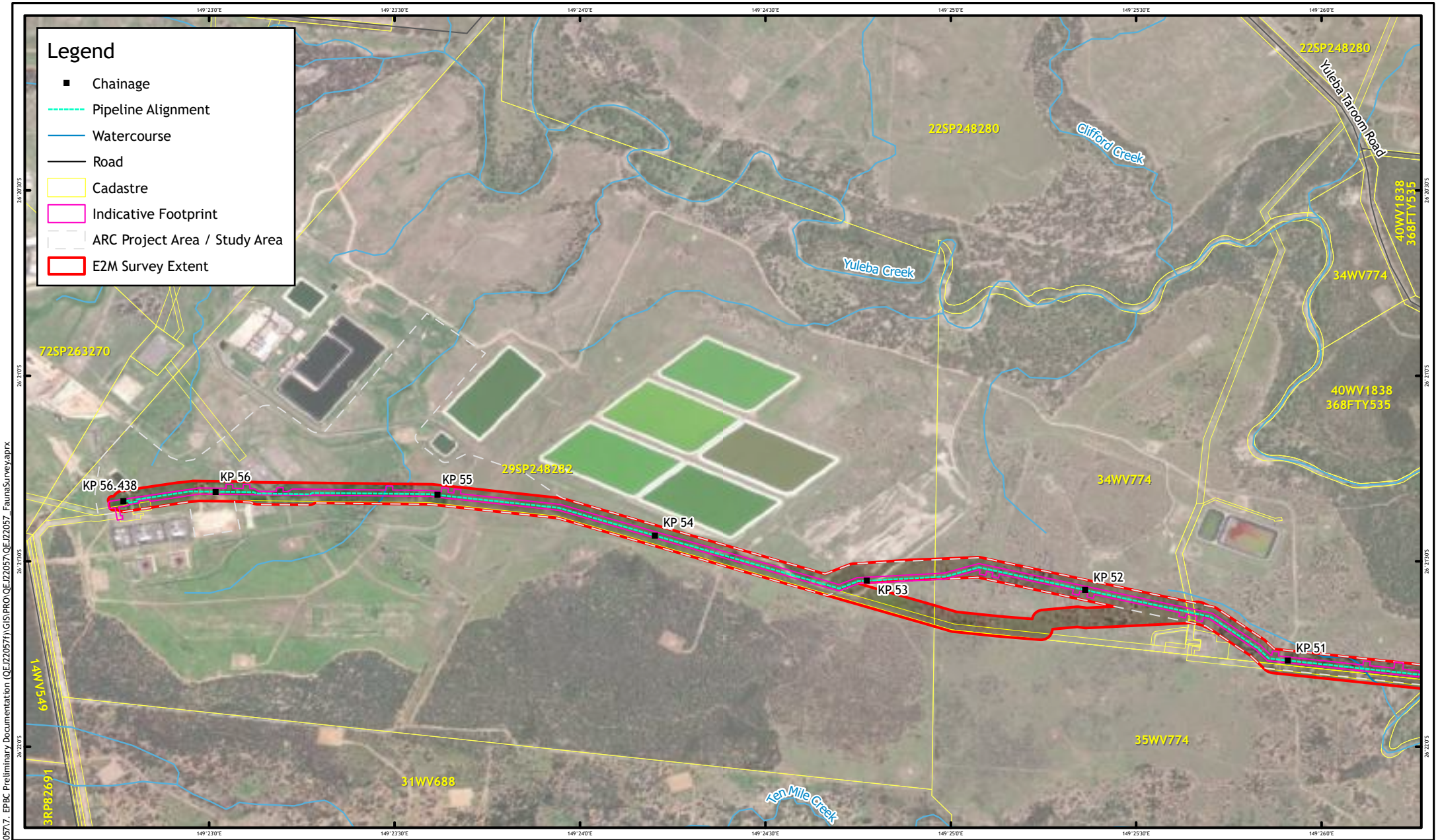
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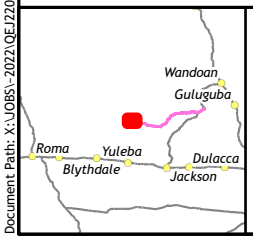
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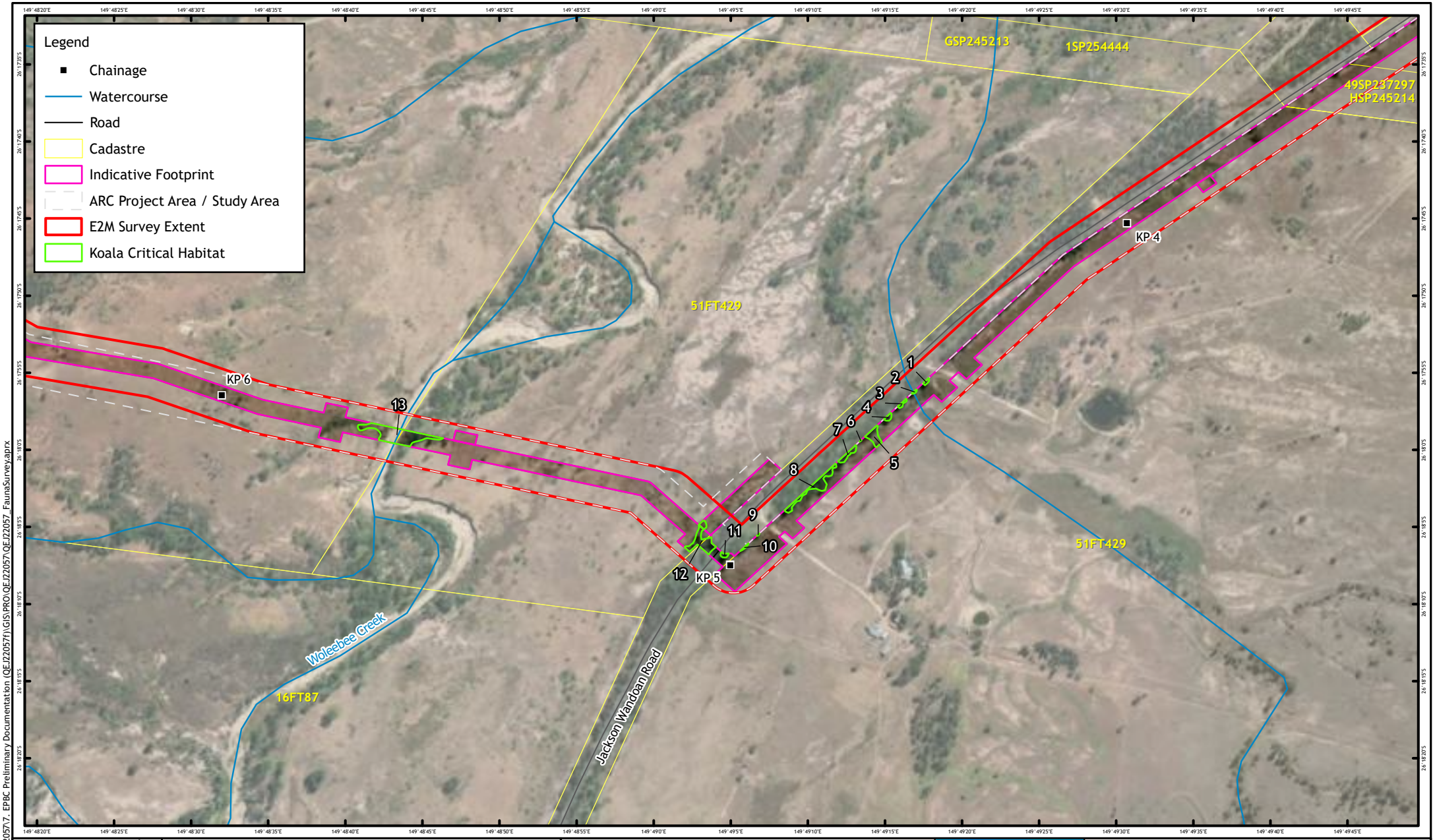
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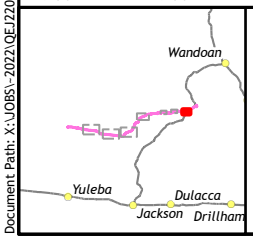
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Appendix L Koala Habitat Mapping and Habitat Patch Analysis





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Scale 1:10,000 (A4)

0 250 500

Meters

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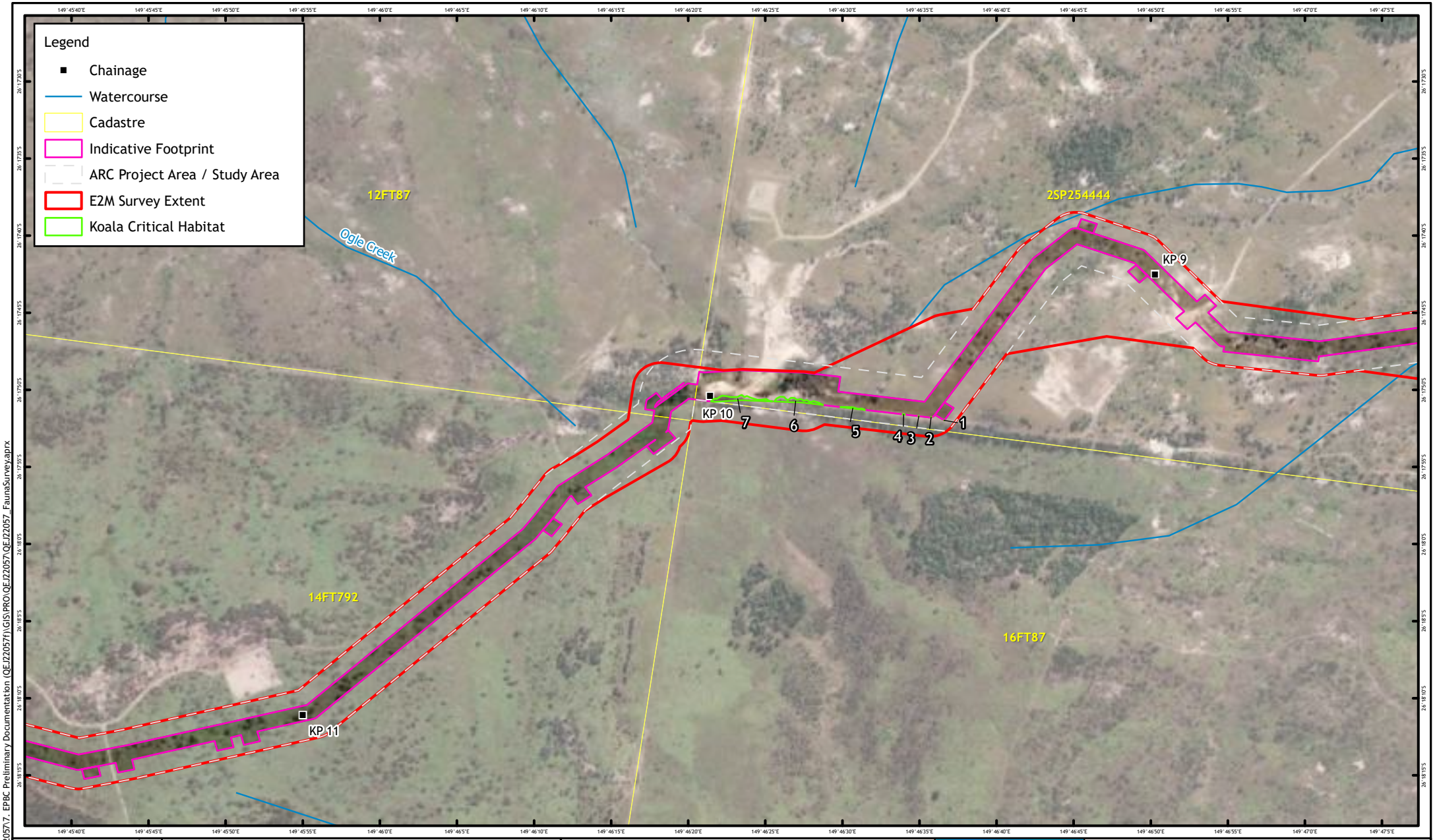
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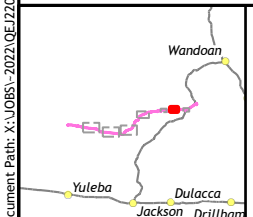
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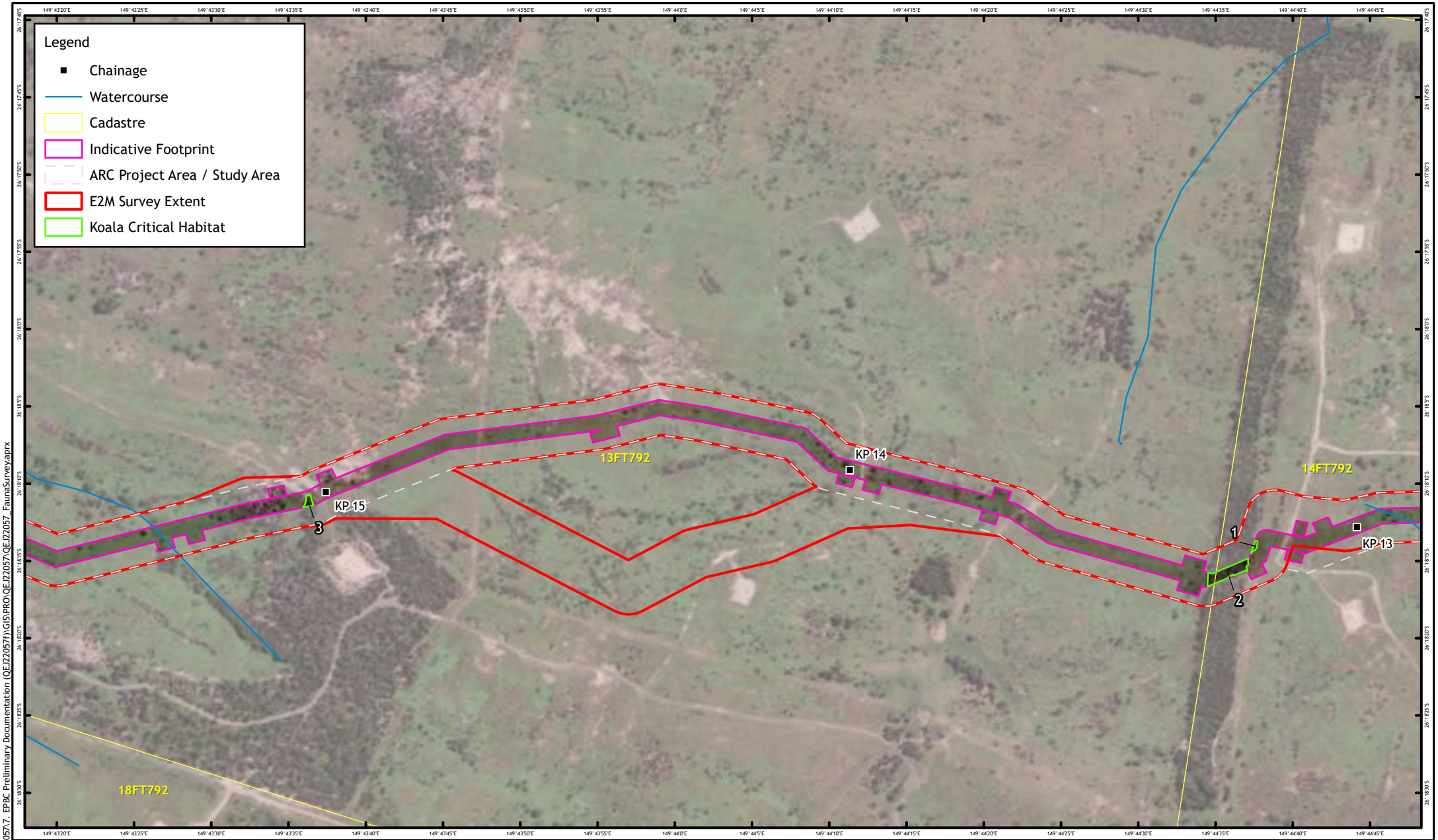
APPENDIX L: KOALA HABITAT MAPPING AND HABITAT PATCH ANALYSIS

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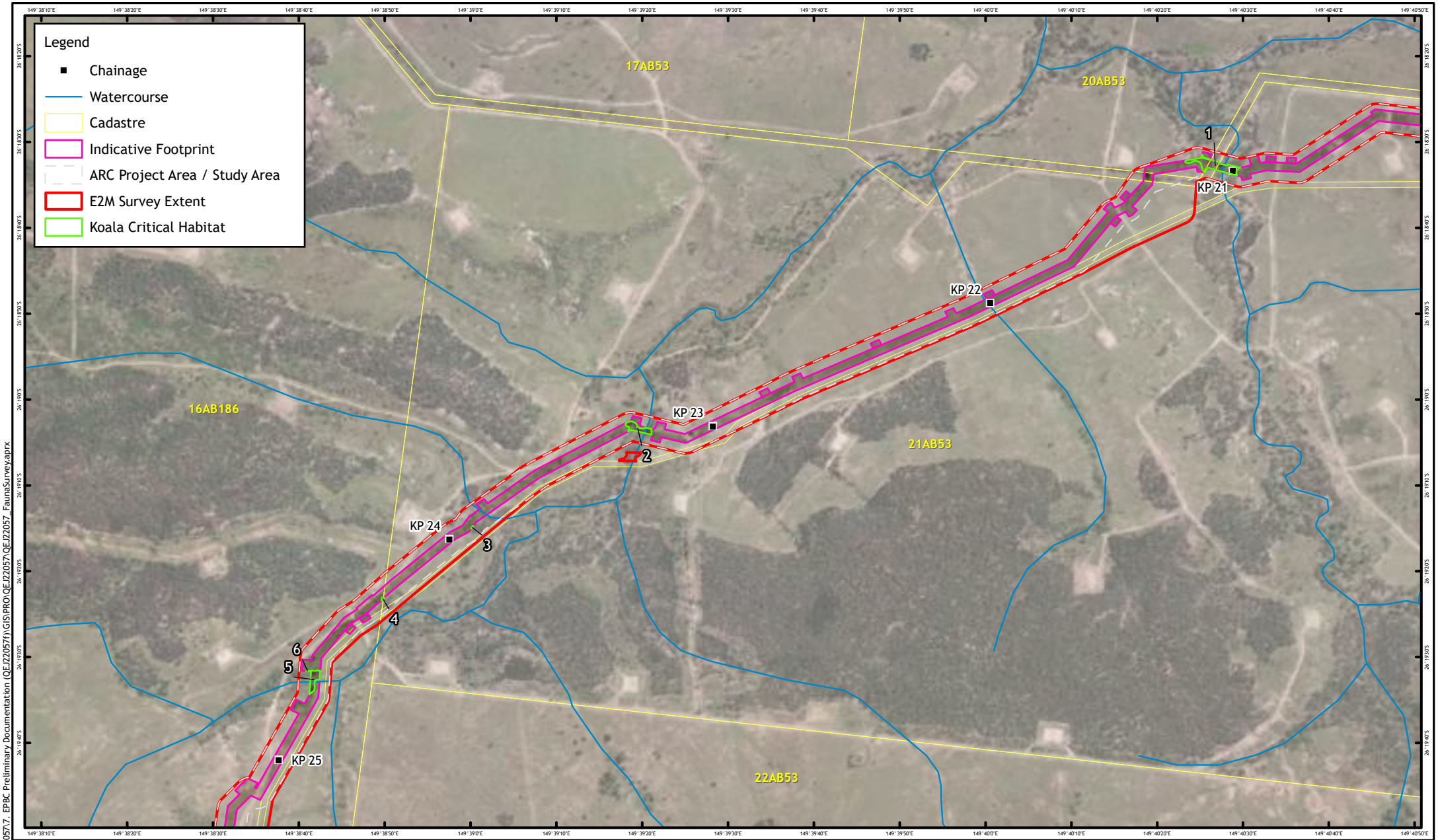
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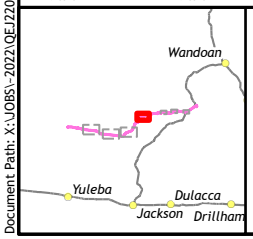
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N

Scale 1:18,000 (A4)

0 250 500 750

Meters

Coordinate System: GCS GDA 1994

Notes:
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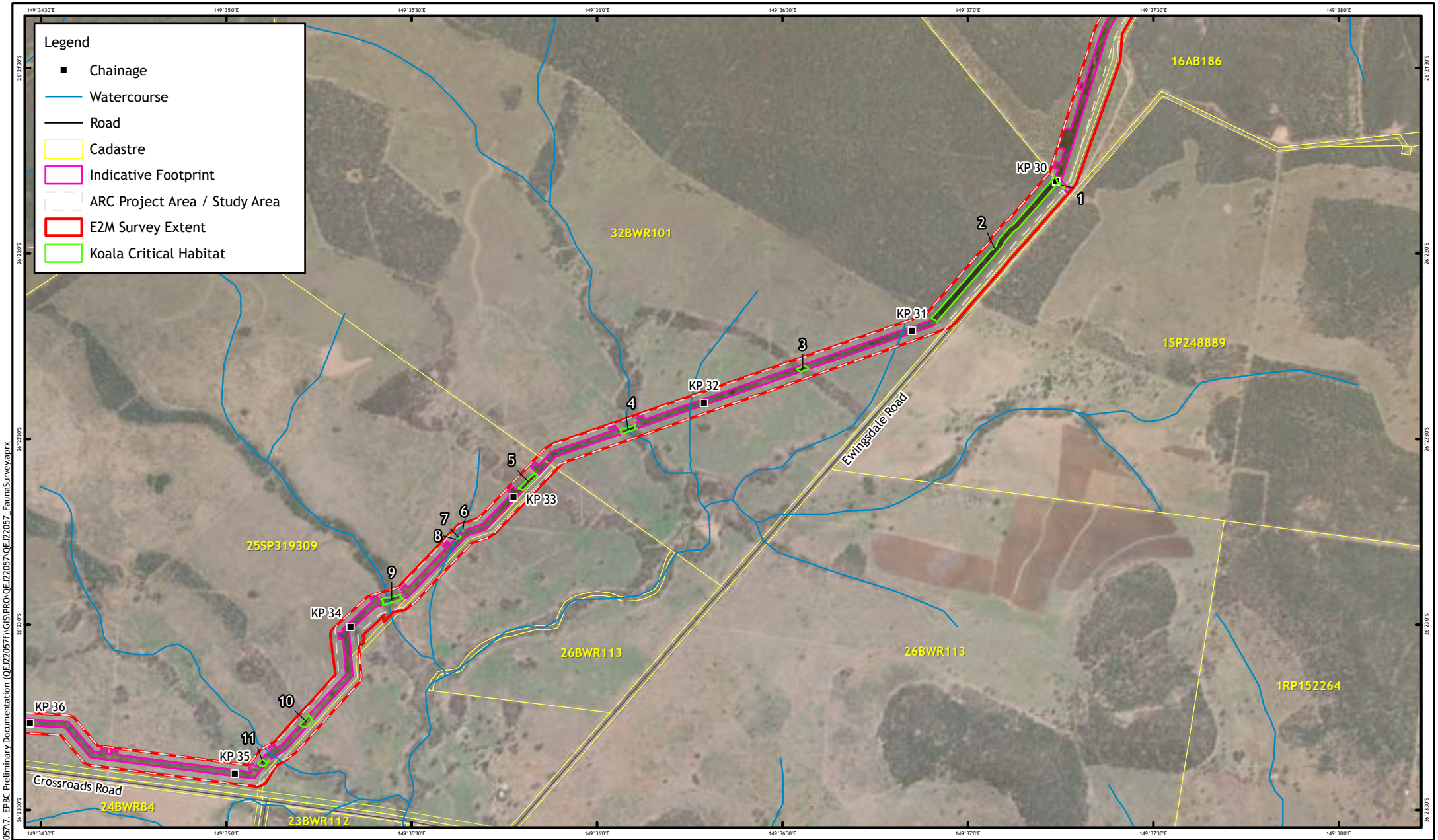
APPENDIX L: KOALA HABITAT MAPPING AND HABITAT PATCH ANALYSIS

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Meters

Coordinate System: GCS GDA 1994

Notes:
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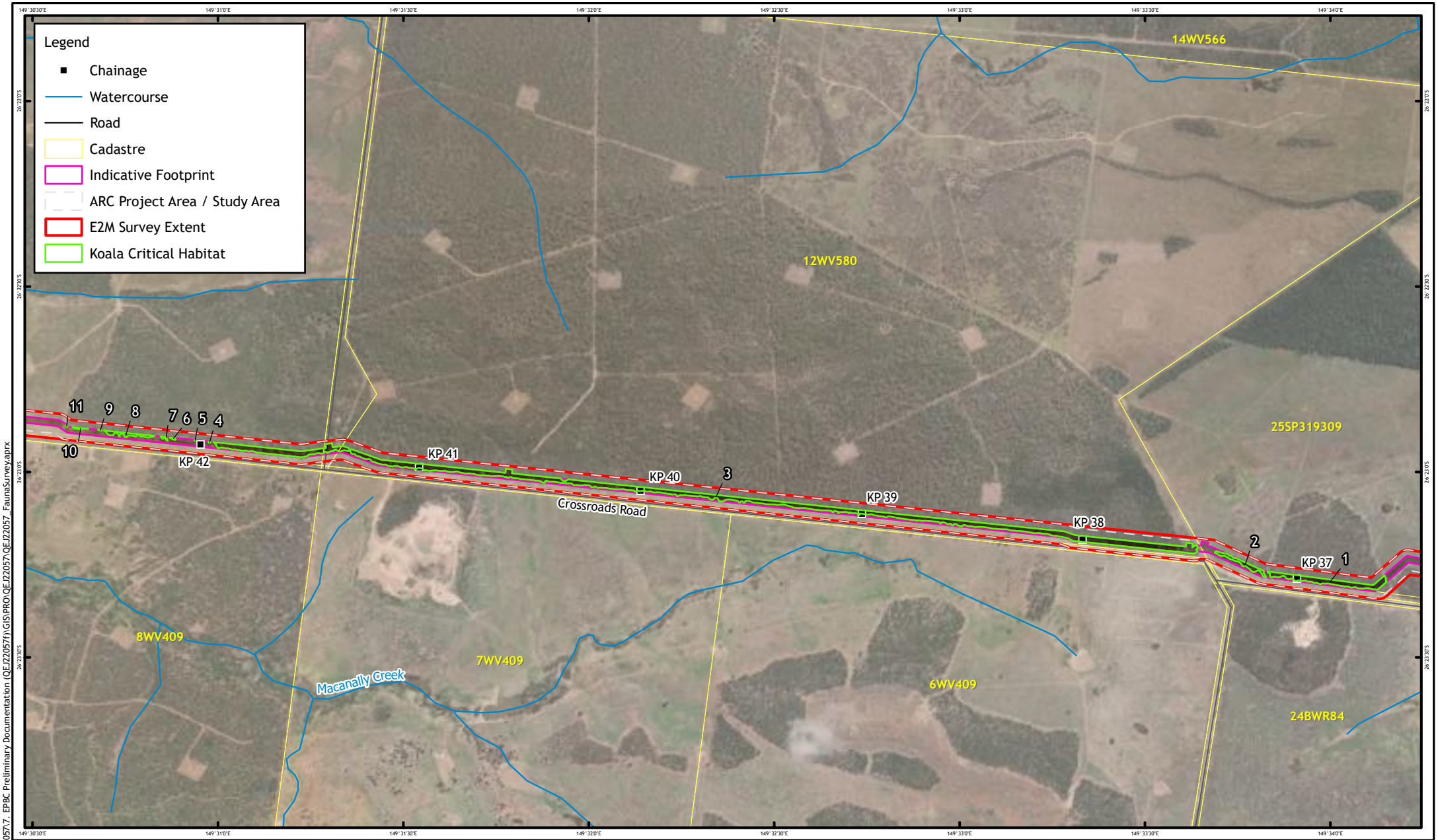
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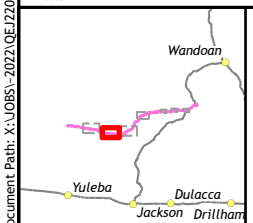
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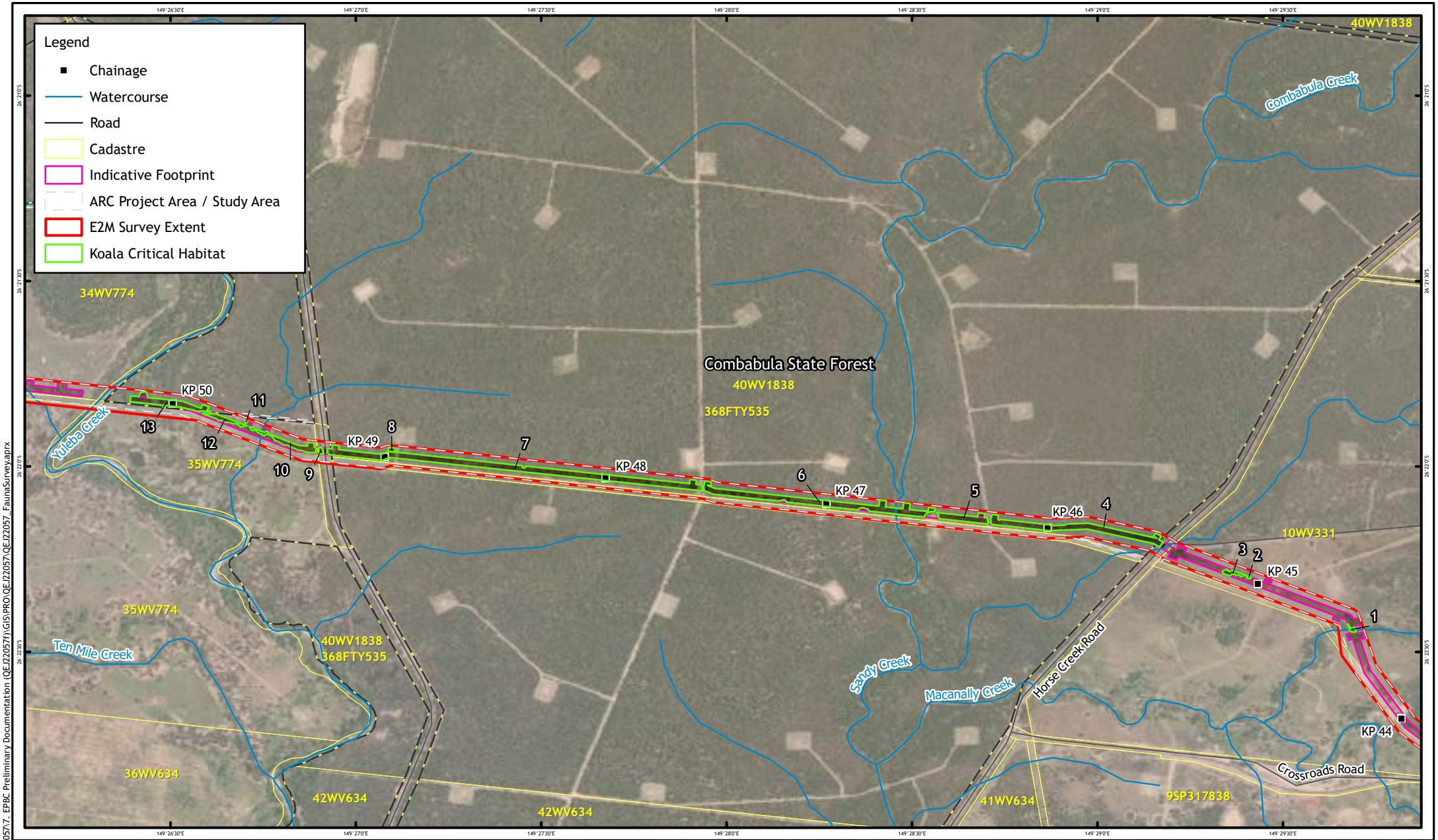
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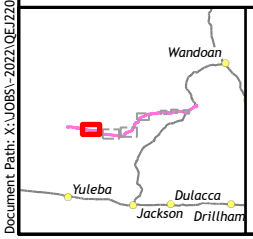
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Meters

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L.2 Koala habitat patches within the Indicative Footprint

Map No.	Patch No.	RE	Type	Values and potential for impact	Area
Map 1	1	11.3.2	Remnant	Indicative Footprint is on periphery of linear patch of roadside vegetation and unlikely to impact upon koala movement or result in further fragmentation.	0.006891
Map 1	2	11.3.2	Remnant		0.003395
Map 1	3	11.3.2	Remnant		0.009482
Map 1	4	11.3.2	Remnant		0.011876
Map 1	5	11.3.2	Remnant		0.014736
Map 1	5	Non-remnant	-		0.043029
Map 1	6	11.3.2	Remnant		0.000306
Map 1	7	11.3.2	Remnant		0.031119
Map 1	8	11.3.2	Remnant		0.075624
Map 1	8	Non-remnant	-		0.030370
Map 1	9	Non-remnant	-		0.000719
Map 1	10	Non-remnant	-		0.003478
Map 1	11	Non-remnant	-	Indicative Footprint is on the periphery of a patch of vegetation that is intersected by a road and unlikely to impact upon koala movement or result in further fragmentation.	0.010545
Map 1	**12**	11.3.4	Remnant		0.008951
Map 1	**12**	Non-remnant	-		0.115686
Map 1	**13**	11.3.25	Remnant		0.086575
Map 1	**13**	Non-remnant	-		0.184941

Map No.	Patch No.	RE	Type	Values and potential for impact	Area
Map 2	1	11.9.5	Remnant	Indicative Footprint intersects a narrow strip of riparian vegetation associated with Woleebee Creek. The Indicative Footprint has been located to maximise existing cleared areas and limit impacts to LIKT. Further, HDD is likely to be utilised to avoid vegetation removal. Koala movement is unlikely to be impacted.	0.000002
Map 2	2	11.9.5	Remnant	Indicative Footprint intersects a narrow strip of riparian vegetation associated with a creek. The Indicative Footprint has been located to maximise existing cleared areas and limit impacts to LIKT. Koala movement is unlikely to be impacted.	0.000027
Map 2	3	11.9.5	Remnant		0.000012
Map 2	4	11.9.5	Remnant		0.000093
Map 2	5	11.9.5	Remnant		0.006235
Map 2	6	11.9.5	Remnant	Indicative Footprint intersects a fragmented riparian vegetation associated with a creek. The Indicative Footprint has been located to maximise existing cleared areas and limit impacts to LIKT. Koala movement is unlikely to be impacted.	0.050981
Map 2	7	11.9.5	Remnant		0.068892
Map 3	1	11.9.5a	Remnant		0.011917
Map 3	2	11.9.5a	Remnant		0.159627
Map 3	3	11.7.2	Remnant	Indicative Footprint is located on the periphery of riparian vegetation within a fragmented landscape. Koala movement is unlikely to be impacted.	0.025955
Map 4	1	11.3.25	Remnant	Indicative Footprint intersects a fragmented riparian vegetation associated with a creek. The Indicative Footprint has been located to maximise existing cleared areas and limit impacts to LIKT. Koala movement is unlikely to be impacted.	0.186021
Map 4	1	11.9.5a	Remnant		0.005018
Map 4	1	Non-remnant			0.239311

Map No.	Patch No.	RE	Type	Values and potential for impact	Area
Map 4	2	11.3.2	Remnant	Indicative Footprint is located on the periphery of a remnant tract of vegetation. Clearing is unlikely to result in additional fragmentation or impact upon movement opportunities.	0.029286
Map 4	2	11.9.5	Remnant		0.012065
Map 4	2	Non-remnant			0.138407
Map 4	3	11.9.5	Remnant		0.002175
Map 4	4	11.3.2	Remnant	Indicative Footprint is located on the periphery of a remnant tract of vegetation that has been fragmented by Ewingsdale Road. Clearing is unlikely to result in additional fragmentation or impact upon movement opportunities.	0.004064
Map 4	5	11.3.2	Remnant		0.112472
Map 4	5	Non-remnant			0.055341
Map 4	6	11.3.2	Remnant		0.000749
Map 5	1	11.5.4	Remnant		0.008472
Map 5	2	11.5.1	Remnant	Indicative Footprint is located within fragmented vegetation within cleared paddock, adjacent to existing pipeline. The Indicative Footprint is unlikely to result in barriers to movement.	0.150423
Map 5	2	11.5.4	Remnant		1.561329
Map 5	2	11.7.2	Remnant	Indicative Footprint is located within fragmented riparian vegetation along a disturbed watercourse, adjacent to an existing pipeline. Koala movement is unlikely to be impacted.	0.936036
Map 5	3	11.3.18	Remnant		0.091601
Map 5	4	11.3.18	Remnant	Indicative Footprint intersects a fragmented riparian vegetation associated with a creek. The Indicative Footprint has been located to maximise existing cleared areas and limit impacts to LIKT. Koala movement is unlikely to be impacted.	0.111813
Map 5	4	Non-remnant			0.031774
Map 5	5	11.5.1	Remnant		0.195347

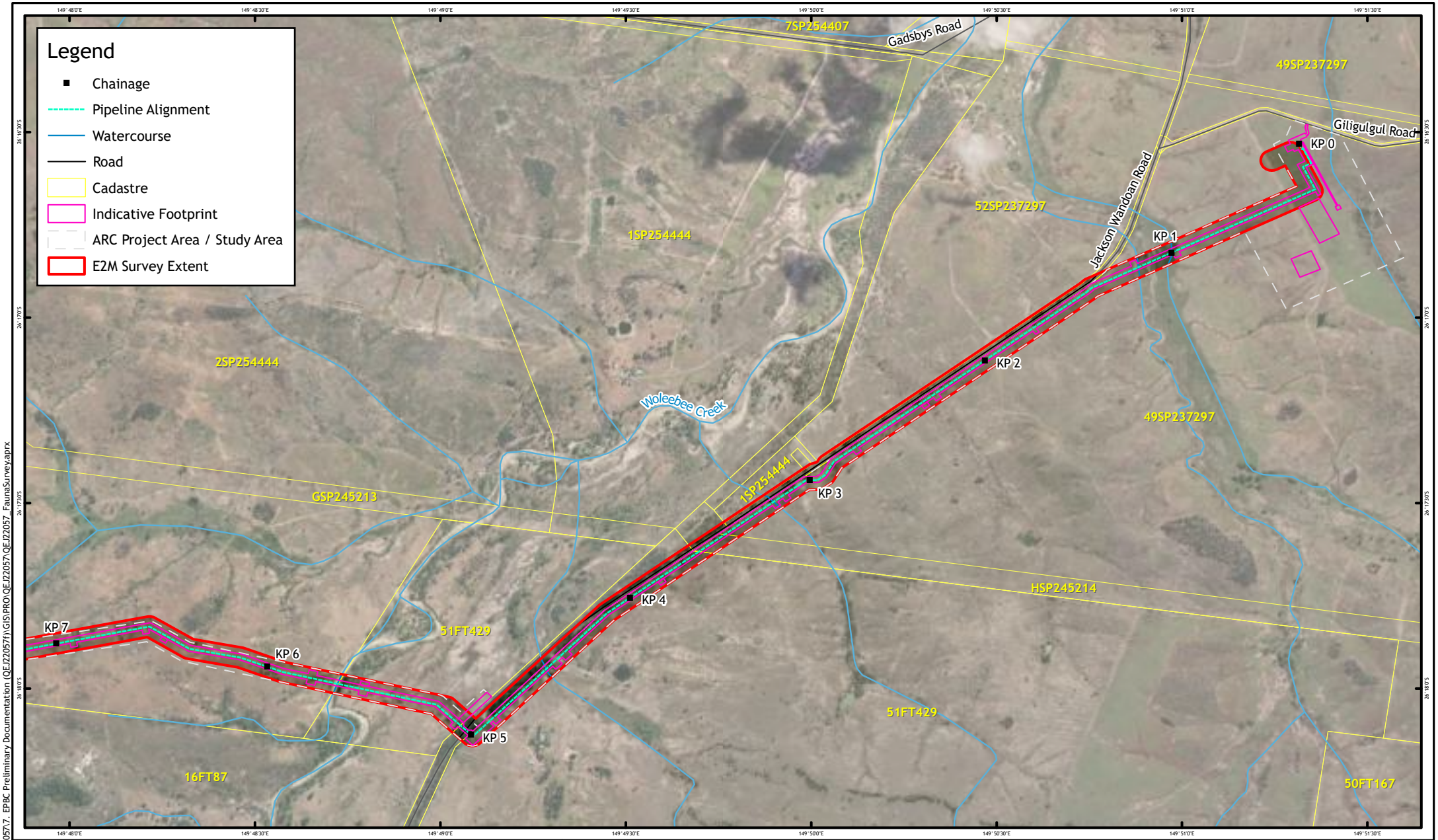
Map No.	Patch No.	RE	Type	Values and potential for impact	Area
Map 5	5	Non-remnant		Linear patch of fragmented vegetation within cleared paddock, adjacent to existing pipeline. The Indicative Footprint is unlikely to result in barriers to movement.	0.012053
Map 5	6	11.3.2	Remnant	Indicative Footprint is located within fragmented riparian vegetation along a disturbed watercourse, adjacent to an existing pipeline. Koala movement is unlikely to be impacted.	0.000229
Map 5	7	11.3.2	Remnant	Indicative Footprint is located on the periphery of a remnant tract of vegetation that has been fragmented by Crossroads Road and an existing pipeline. Clearing is unlikely to result in additional fragmentation or impact upon movement opportunities.	0.002641
Map 5	8	11.3.2	Remnant	Indicative Footprint is located within scattered trees. Clearing is unlikely to result in additional fragmentation or impact upon movement opportunities.	0.000000
Map 5	9	11.3.2	Remnant		0.078516
Map 5	9	11.3.25	Remnant		0.005607
Map 5	9	Non-remnant			0.152396
Map 5	10	11.5.1	High value regrowth	Indicative Footprint is located within an area of scattered trees adjacent to a road. Clearing is unlikely to result in additional fragmentation or impact upon movement opportunities.	0.166245
Map 5	11	11.3.2	High value regrowth		0.084607
Map 6	1	11.5.1	Remnant		1.304009
Map 6	2	11.5.1	Remnant		0.338761

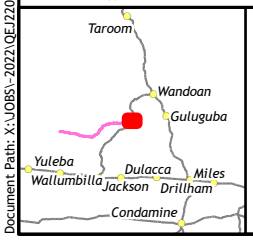
Map No.	Patch No.	RE	Type	Values and potential for impact	Area
Map 6	2	Non-remnant	-	Indicative Footprint is located on the periphery of a remnant tract of vegetation that has been fragmented by Crossroads Road and an existing pipeline. Clearing is unlikely to result in additional fragmentation or impact upon movement opportunities.	0.050665
Map 6	3	11.5.1	Remnant		6.811583
Map 6	3	11.5.16	Remnant		0.733204
Map 6	3	11.7.2	Remnant		1.996850
Map 6	3	Non-remnant	-		0.988753
Map 6	4	Non-remnant	-		0.004181
Map 6	5	Non-remnant	-		0.000486
Map 6	6	Non-remnant	-		0.015619
Map 6	7	Non-remnant	-		0.020385
Map 6	8	11.5.1	Remnant		0.132986
Map 6	8	Non-remnant	-		0.116826
Map 6	9	11.5.1	Remnant		0.001770
Map 6	10	11.5.1	Remnant		0.004063
Map	10	Non-remnant	Remnant		0.022242
Map 6	11`	11.5.1	High value regrowth		0.002253
Map 7	1	11.3.25	Remnant		0.026363
Map 7	1	Non-remnant	-		0.036068
Map 7	2	11.5.1	Remnant		0.016948

Map No.	Patch No.	RE	Type	Values and potential for impact	Area
Map 7	3	11.5.1	Remnant	Indicative Footprint is located on the periphery of a remnant tract of vegetation that has been fragmented by Crossroads Road and an existing pipeline. Clearing is unlikely to result in additional fragmentation or impact upon movement opportunities.	0.162379
Map 7	4	11.3.19	Remnant		0.127682
Map 7	4	11.5.1	Remnant		2.296803
Map 7	5	11.5.1	Remnant		0.733332
Map 7	6	11.3.19	Remnant		0.786578
Map 7	6	11.3.25	Remnant		0.095149
Map 7	6	11.5.1	Remnant		2.317346
Map 7	6	Non-remnant			0.037521
Map 7	7	11.5.1	Remnant		5.175801
Map 7	7	Non-remnant			0.017391
Map 7	8	11.5.1	Remnant		0.060000
Map 7	9	11.5.1	Remnant		0.056010
Map 7	10	Non-remnant			0.653267
Map 7	11	11.5.1	High value regrowth		0.007721
Map 7	12	11.5.1	High value regrowth		0.260697
Map 7	12	Non-remnant	-		0.049759
Map 7	13	11.3.2	Remnant		0.139040
Map 7	13	11.3.25	Remnant		0.468858

Map No.	Patch No.	RE	Type	Values and potential for impact	Area
Map 7	13	11.5.1	Remnant		0.422449
Map 7	13	Non-remnant			0.068061

Appendix M Dulacca Woodland Snail Habitat Mapping





N

Scale 1:25,000 (A4)

0 0.5 1

Kilometres

Coordinate System: GCS GDA 1994

Notes:
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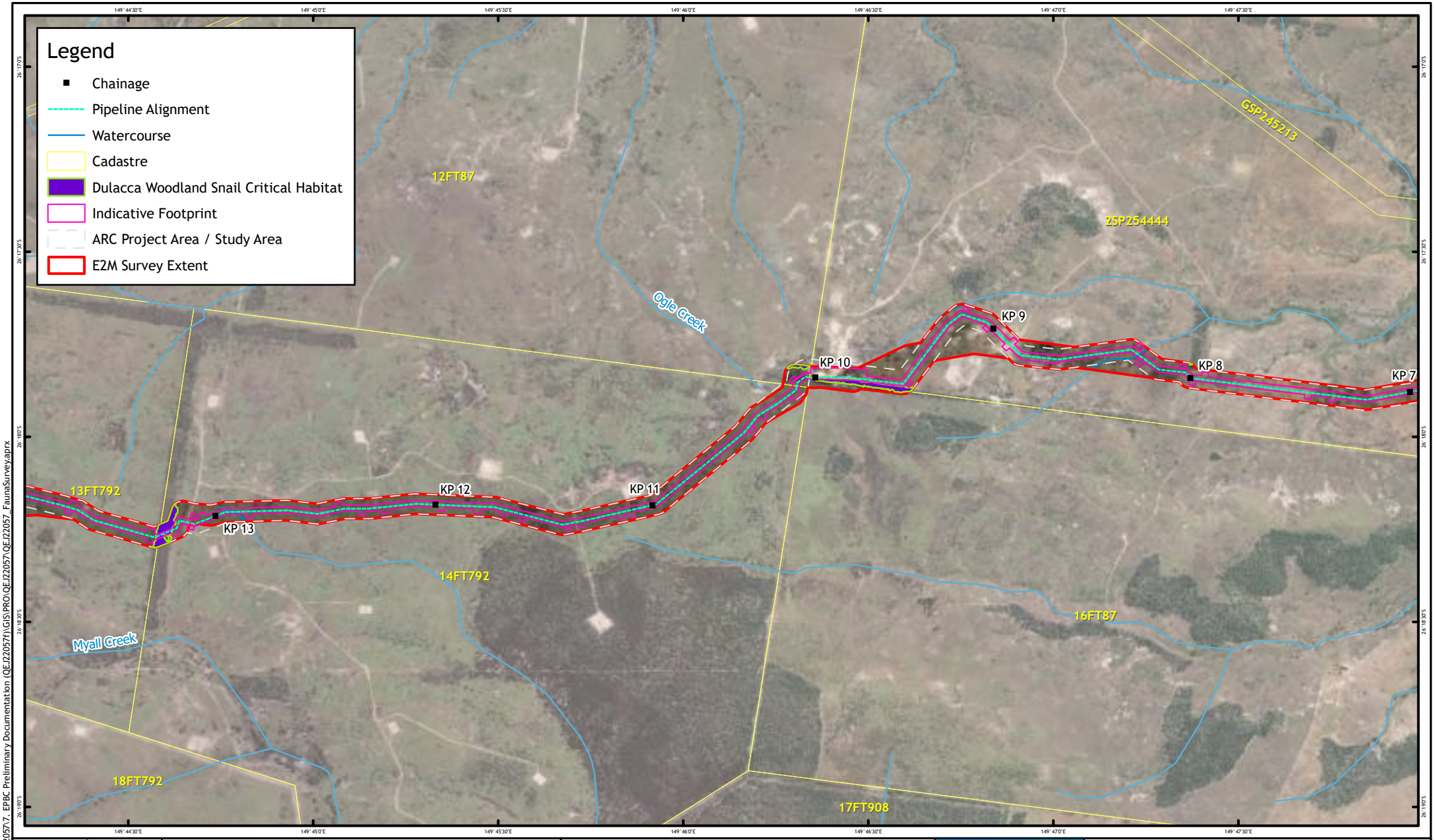
APPENDIX M: DULACCA WOODLAND SNAIL HABITAT MAPPING

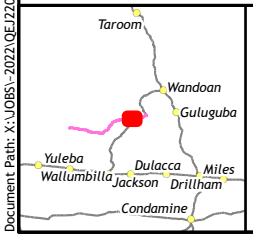
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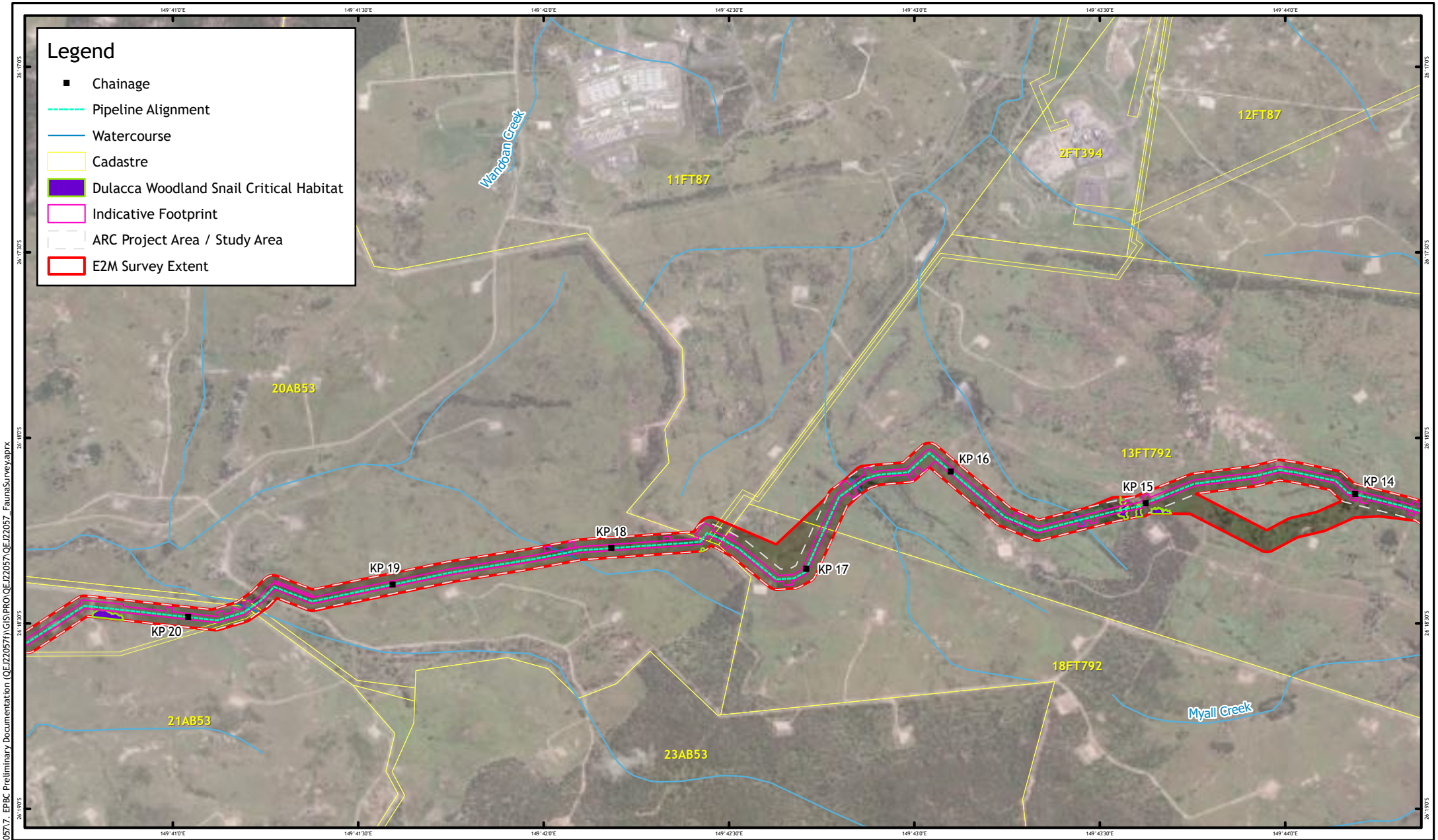
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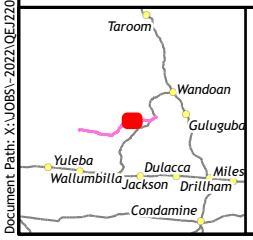
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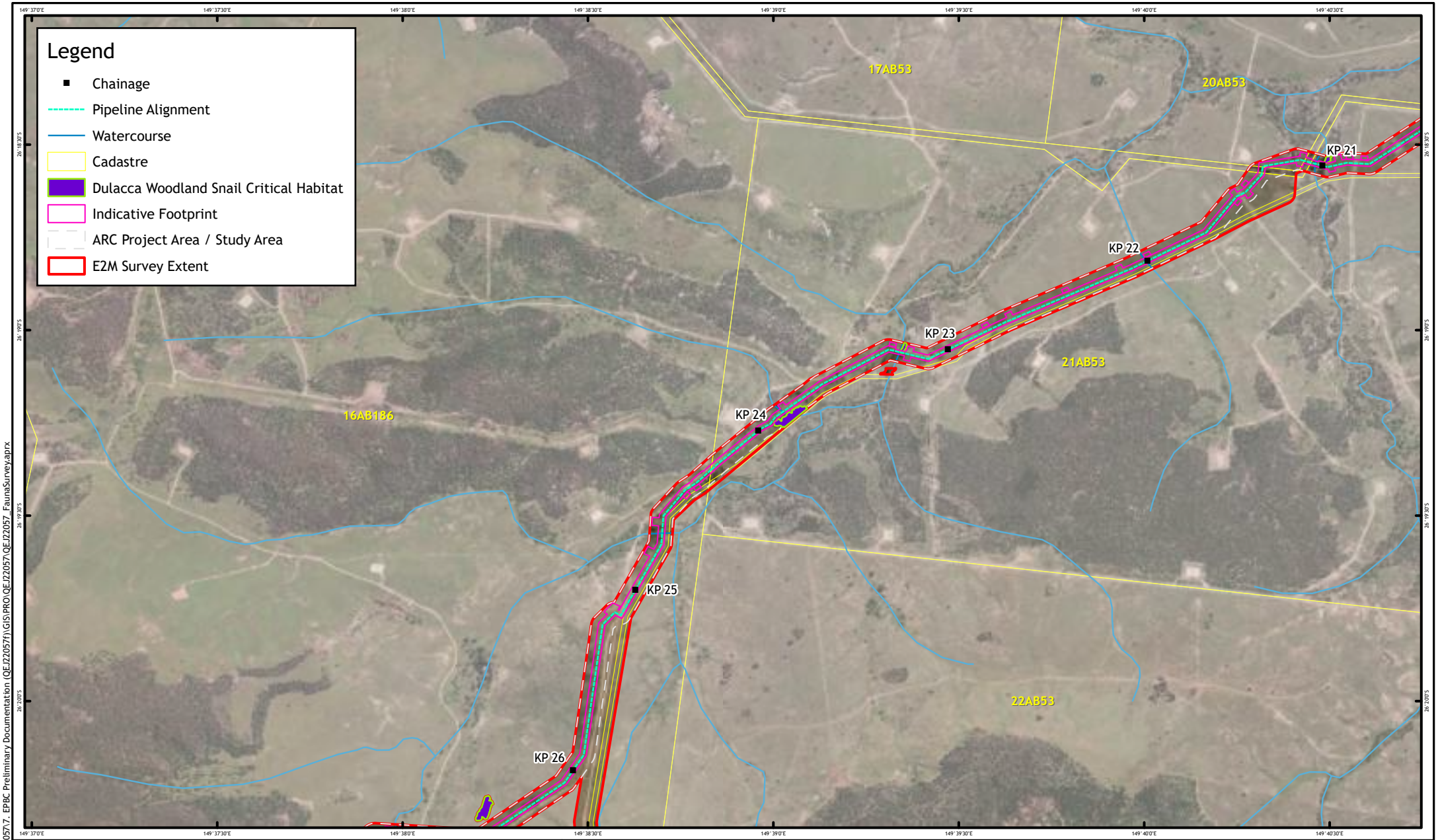
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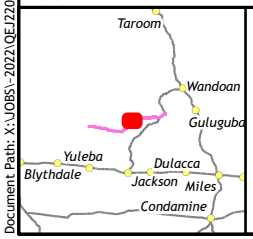
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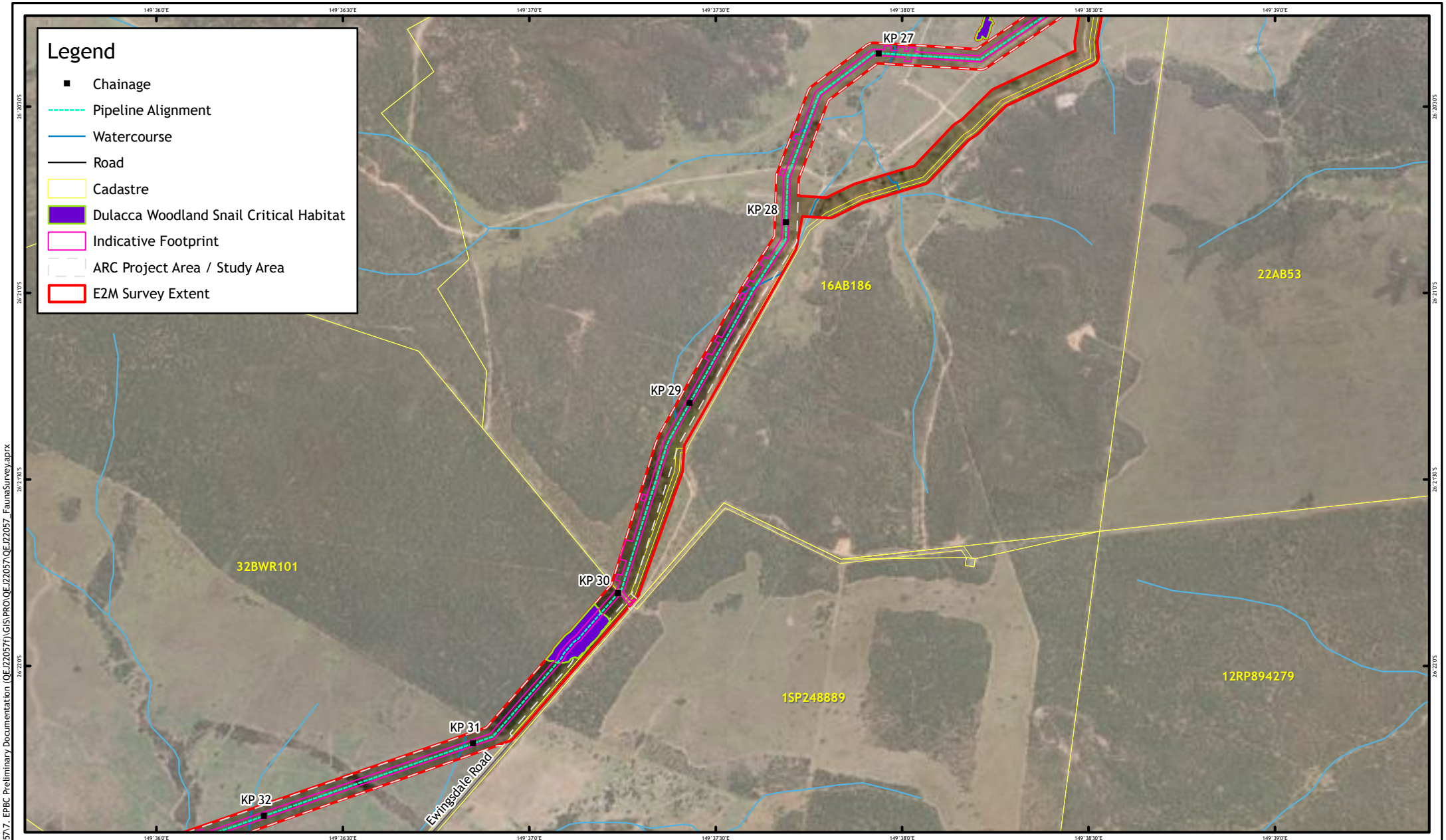
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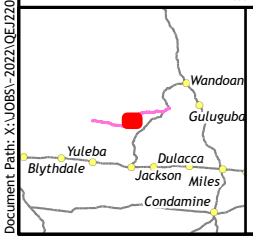
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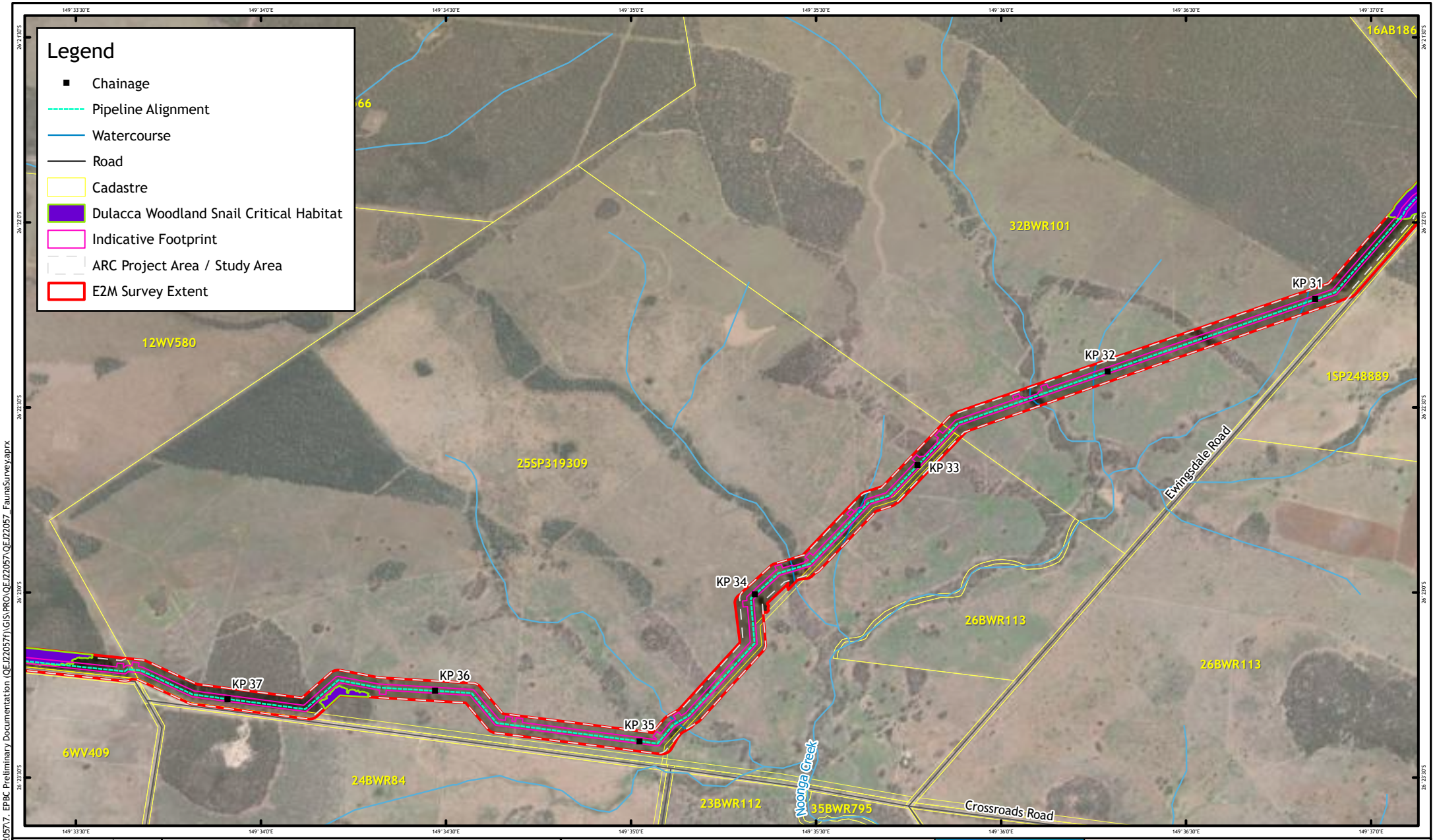
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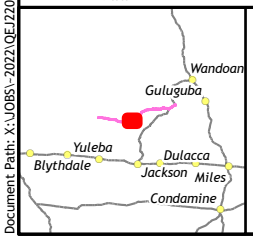
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Kilometres

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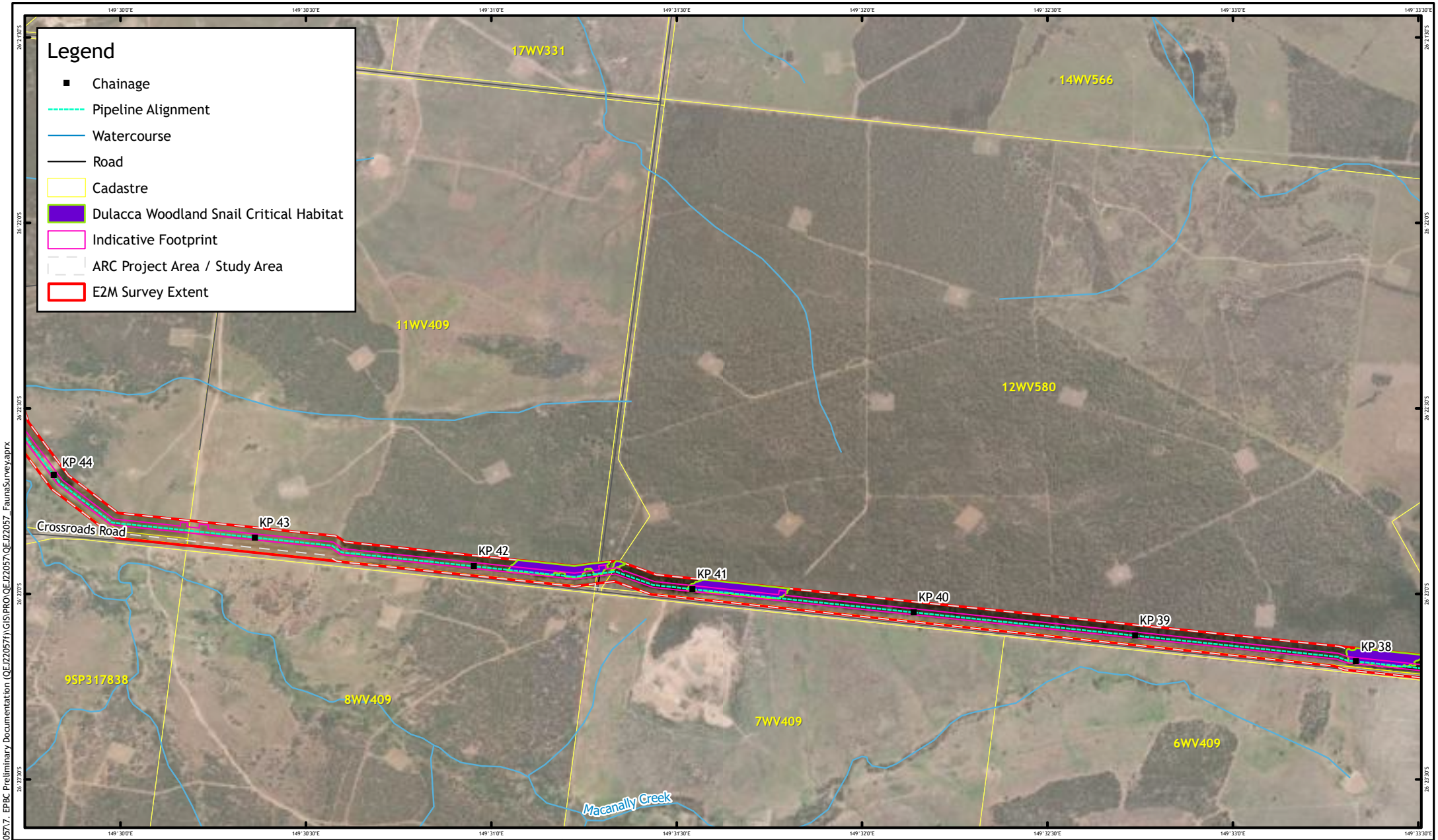
APPENDIX M: DULACCA WOODLAND SNAIL HABITAT MAPPING

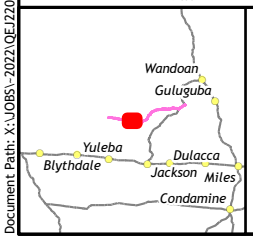
MNES Ecological Assessment Report
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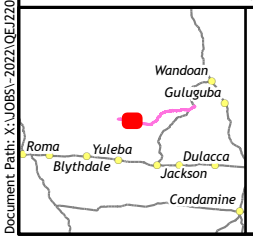
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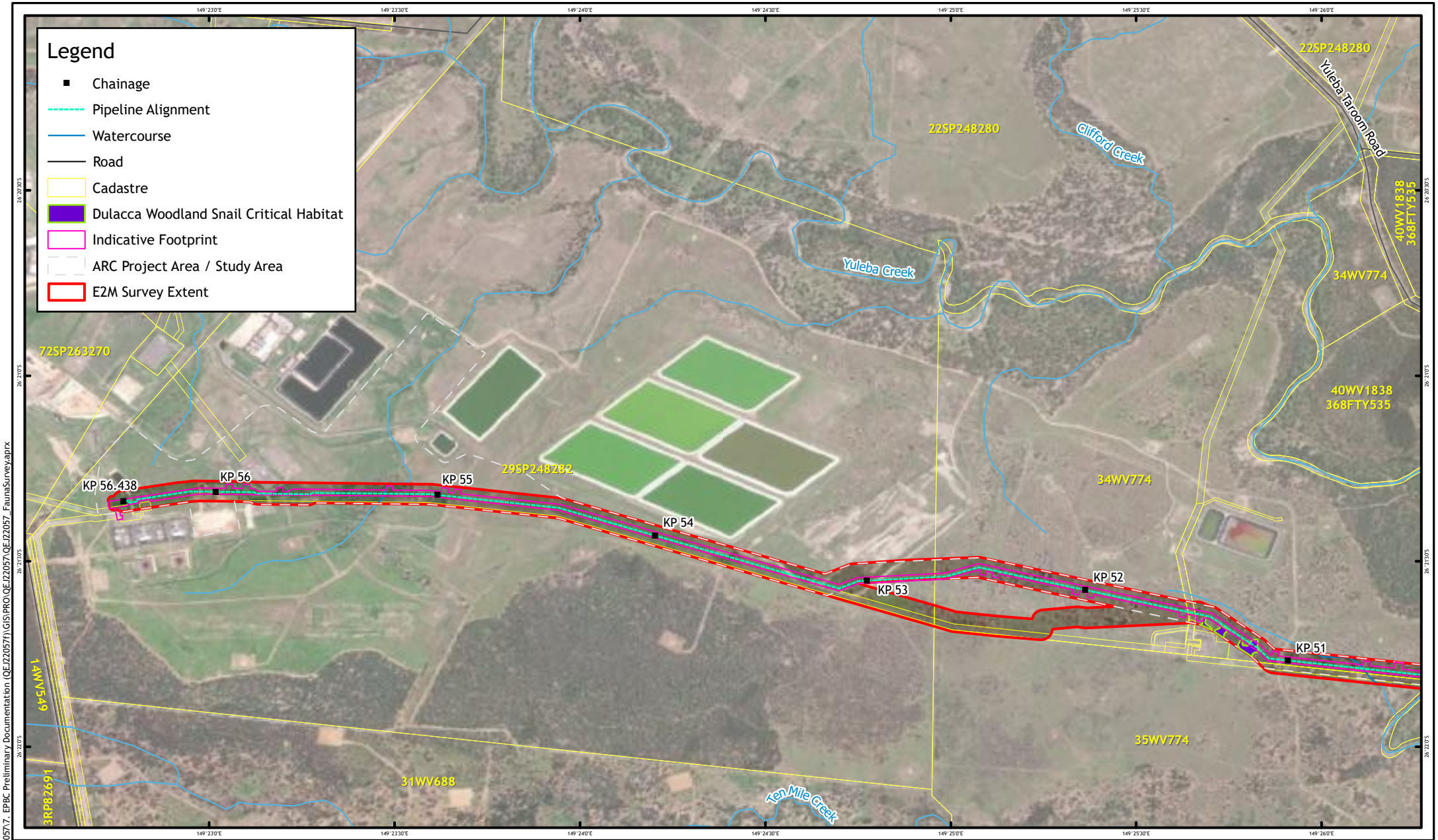
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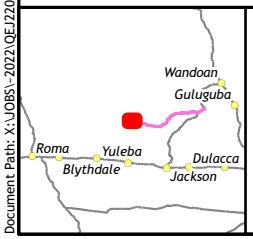
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Appendix N Habitat Quality Assessment Results

N.1 Species habitat Index

Species habitat attributes indicate the ability of the area of matter to support a fauna species based on their specific habitat requirements. Habitat attribute scores are used to calculate the area weighted matter area habitat score for each species as per the Guide to Determining Terrestrial Habitat Quality (version 1.3) (DES, 2020).

Species	Habitat attribute	Indicators	Unweighted average score (/25)
Squatter pigeon (southern subspecies) *Geophaps scripta scripta*	Quality and availability of food and habitat required for foraging	Abundance of seed-producing native grasses and forbs (%)	15.2
		Ground cover (%)	
		Ground cover height (m)	
		Distance to 'suitable' water source (including dams, troughs, seasonal wetlands, and pools along watercourses) (km)	
	Quality and availability of habitat required for shelter and breeding	Abundance of low trees (<15 m height) suitable for roosting	22.6
		Distance to 'suitable' water source (including dams, troughs, seasonal wetlands, and pools along watercourses) (km)	
	Quality and availability of habitat required for mobility	Habitat connectivity	17.4
	Absence of threats	Clearing / fragmentation	8.3
		Grazing	

Species	Habitat attribute	Indicators	Unweighted average score (/25)
Koala *Phascolarctos cinereus*	Quality and availability of food and habitat required for foraging	Abundance of Locally Important Koala Trees Leaf moisture content/availability of soil water to feed trees	14.0
	Quality and availability of habitat required for shelter and breeding	Abundance of suitable Koala shelter trees (LIKT, Ancillary habitat tree, or other suitable shade tree species) ≥10 cm DBH	18.0
	Quality and availability of habitat required for mobility	Patch size of suitable habitat (remnant or regrowth vegetation with LIKTs ≥ 10 cm DBH) (ha) Connectivity of suitable habitat in the landscape	12.0

Species	Habitat attribute	Indicators	Unweighted average score (/25)
	Absence of threats	Presence of predators (feral dogs, dingoes)	11.5
		Density of dense weedy ground cover (e.g., thickets of lantana) impeding movement of koalas/limiting access to feed trees	
		Man-made barriers preventing movement between suitable habitat patches e.g. fences, large multi-lane highways, and high density housing	
		Vehicular collision	
Greater glider *Petauroides minor*	Quality and availability of food and habitat required for foraging	Diversity of preferred food trees (Corymbia and Eucalyptus species) of >30 cm DBH	9.6
		Abundance of preferred food trees (Corymbia and Eucalyptus species) of >30 cm DBH (%)	
	Quality and availability of habitat required for shelter and breeding	Abundance of large-hollow bearing trees and stags (trees stags bearing hollows with an aperture >10 cm)	6.4

Species	Habitat attribute	Indicators	Unweighted average score (/25)
	Quality and availability of habitat required for mobility	Patch size of suitable habitat (ha)	9.2
		Connectivity of suitable habitat in the landscape	
		Presence of man-made fragmentation features	
	Absence of threats	Barbed wire entanglement	7.6
		Fragmentation of habitat	
		Inappropriate fire regimes	
South-eastern glossy black-cockatoo *Calyptorhynchus lathami*	Quality and availability of food and habitat required for foraging	Known feed tree species (*Allocasuarina spp.* or *Casuarina spp.*) presence	12.3
		Abundance of mature female (cone-bearing) trees	
	Quality and availability of habitat required for shelter and breeding	Abundance of suitable hollow bearing trees and/or stags	12.0
		Distance to 'suitable' water source (including dams, troughs, seasonal wetlands, and pools along watercourses) (km)	

Species	Habitat attribute	Indicators	Unweighted average score (/25)
	Quality and availability of habitat required for mobility	Assign score of 25 as species is able to disperse long distances over a wide range of habitats, including highly modified areas	25
	Absence of threats	Habitat clearing resulting in the loss of foraging habitat and/or nest trees in the surrounding landscape Inappropriate fire regime: infrequent fire resulting in senescence of feed trees; high frequency fires suppressing recruitment of feed trees; and/or high intensity fires resulting in death of feed trees and/or loss of suitable nest trees/stags	8.8
Dulacca woodland snail *Adclarkia dulacca*	Quality and availability of food and habitat required for foraging	Overstory (shrub/tree) cover required to maintain sufficient humidity (%) Foraging substrate: organic litter and/or bare ground/substrate (%)	13.8

Species	Habitat attribute	Indicators	Unweighted average score (/25)
	Quality and availability of habitat required for shelter and breeding	Overstory (shrub/tree) cover required to maintain sufficient humidity (%)	20.0
		Coarse woody debris (m)	
		Loose or embedded rocks >20 cm across	
	Quality and availability of habitat required for mobility	Overstory (shrub/tree) cover required to maintain sufficient humidity (%)	18.5
		Coarse woody debris (m)	
		Loose or embedded rocks >20 cm across	
		Distribution of cover (coarse woody debris and/or rock)	
	Absence of threats	Clearing/removal or stacking of microhabitat features, or removal or leaf litter/ground cover	4.0
		Introduced predators (rats, mice, pigs, cattle)	
		High intensity fire, Evidence of fire removing ground cover/key microhabitat features, or high fuel loads (e.g., buffel grass)	

Species	Habitat attribute	Indicators	Unweighted average score (/25)
White-throated needletail *Hirundapus caudacutus*	Quality and availability of food and habitat required for foraging	Extent of native vegetation cover within Study Area	12.5
	Quality and availability of habitat required for shelter and breeding	Presence of suitable roost trees (canopy trees with hollows and/or mid-dense to dense canopy cover, with clear air space allowing birds ready access)	14.3
	Quality and availability of habitat required for mobility	Assign score of 25 as species is able to disperse long distances over a wide range of habitats, including highly modified areas	25
	Absence of threats	Presence of wind turbines, power lines, or other aerial threats or obstructions	25.0

IMPACT - Squatter Pigeon (southern) (Geophaps scripta scripta)

Assessment Unit - Regional Ecosystem	Max score	AU 2 (Remnant 11.3.18)						AU 3 (Remnant 11.3.19)					
Site Reference	V1.2	Benchmark	HQ2a			Average %		Benchmark	HQ3a			Average %	
		11.3.18	Raw Data	% Benchmark	Score	benchmark	Average Score	11.3.19	Raw Data	% Benchmark	Score	benchmark	Average Score
Recruitment of woody perennial species in EDL	5	**100**	25	25%	3	25%	3	**100**	0	0%	0	0%	0
Native plant species richness - trees	5	**4**	4	100%	5	100%	5	**7**	2	29%	2.5	29%	2.5
Native plant species richness - shrubs	5	**7**	3	43%	2.5	43%	2.5	**4**	2	50%	2.5	50%	2.5
Native plant species richness - grasses	5	**11**	12	109%	5	109%	5	**16**	18	113%	5	113%	5
Native plant species richness - forbes	5	**21**	7	33%	2.5	33%	2.5	**19**	11	58%	2.5	58%	2.5
Tree emergent height		**NA**	NA	NA				**NA**	NA	NA			
Tree canopy height	5	**18**	17	94%	5	NA	5	**15**	13	87%	2.5	NA	2.5
Tree sub-canopy height		**9**	11	122%				**7**	0	0%			
Tree emergent cover		**NA**	NA	NA				**NA**	NA	NA			
Tree canopy cover	5	**43**	46.8	109%	5	NA	5	**20**	23.8	119%	2.5	NA	2.5
Tree sub-canopy cover		**26**	25.8	99%				**7**	0	0%			
Shrub canopy cover	5	**5**	0.6	12%	3	12%	3	**17**	0	0%	0	0%	0
Native grass cover	5	**16**	34	213%	5	213%	5	**24**	20.4	85%	3	85%	3
Organic litter	5	**35**	9	26%	3	26%	3	**27**	8.4	31%	3	31%	3
Large trees (euc plus non-euc)	15	**24**	6	25%	5	25%	5	**26**	14	54%	10	54%	10
Coarse woody debris	5	**273**	170	62%	5	62%	5	**431**	130	30%	2	30%	2
Non-native plant cover	10	**0**	45	45%	2	45%	2	**0**	5	5%	5	5%	5
Quality and availability of food and foraging habitat	10	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	7.8	NA	7.8
Quality and availability of shelter	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10
Site Condition Score					*66*		66				*58.3*		58.3
MAX Site Condition Score	100				100		*100*				100		*100*
Site Condition Score - out of 3							**1.98**						**1.75**
Site Context													
Size of patch	10	**NA**	0	NA	0	NA	0	**NA**	10	NA	10	NA	10
Connectedness	5	**NA**	0	NA	0	NA	0	**NA**	4	NA	4	NA	4
Context	5	**NA**	0	NA	0	NA	0	**NA**	5	NA	5	NA	5
Ecological Corridors	6	**NA**	0	NA	0	NA	0	**NA**	6	NA	6	NA	6
Role of site location to species overall population in the state	5	**NA**	0	NA	0	NA	0	**NA**	0	NA	0	NA	0
Threats to the species	15	**NA**	6.3	NA	6.3	NA	6.3	**NA**	12.3	NA	12.3	NA	12.3
Species mobility capacity	10	**NA**	10	NA	10	NA	10	**NA**	10	NA	10	NA	10
Site Context Score					16.3		16.3				47.3		47.3
MAX Site Context Score	56				*56*		*56*				*56*		*56*
Site Context Score - out of 3							**0.87**						**2.53**
Species Stocking Rate (SSR)													
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0
Species usage of the site (habitat type & evidenced usage)	15	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15
Approximate density (per ha)	30	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
Role/importance of species population on site*	15	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0
SSR Score					25		25				25		25
Max SSR Score	70				70		*70*				70		*70*
SRR Score (out of 4)							**1.43**						**1.43**

Final habitat quality score (weighted)	AU 2 (Remnant 11.3.18)	AU 3 (Remnant 11.3.19)	AU 4 (Remnant 11.3.2)	AU 5 (Non-Remnant HVR	AU 6 (Remnant 11.3.2 Poplar	AU 7 (Remnant 11.3.25)	AU 8 (Remnant 11.3.4)	AU 9 (Remnant 11.5.1)	AU 10 (HVR 11.5.1)	AU 11 (11.5.16 Brigalow TEC)	AU 12 (Remnant 11.5.4)	AU 13 (Remnant 11.7.2)	AU 15 (Remnant 11.9.5)
Site Condition score (out of 3)	1.98	1.75	2.12	1.93	2.08	1.92	1.82	1.92	2.11	2.12	2.21	2.46	2.07
Site Context Score (out of 3)	0.87	2.53	0.48	1.06	0.59	1.73	0.56	1.85	1.61	1.64	1.85	1.63	0.66
Species Stocking Rate Score (out of 4)	1.43	1.43	1.43	1.43	1.43	1.33	1.43	1.43	1.43	1.43	1.14	1.43	1.43
Habitat Quality score (out of 10)	4	6	4	4	4	5	4	5	5	5	5	6	4
Assessment Unit area (ha) in disturbance footprint	0.20	0.91	0.44	0.08	0.08	0.87	0.01	20.18	0.43	0.73	1.57	2.96	0.13
Assessment Unit area (ha) in disturbance footprint + 10% buffer	0.22	1.01	0.49	0.09	0.09	0.96	0.01	22.20	0.48	0.81	1.73	3.25	0.14
Total impact area (ha) for this MNES (including 10% buffer)	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1
Size Weighting	0.007	0.031	0.015	0.003	0.003	0.030	0.000	0.692	0.015	0.025	0.054	0.101	0.004
Weighted Habitat Quality Score	***0.030***	***0.179***	***0.061***	***0.013***	***0.011***	***0.148***	***0.001***	***3.595***	***0.077***	***0.130***	***0.280***	***0.560***	***0.018***

AU 4 (Remnant 11.3.2)						AU 5 (Non-Remnant HVR 11.3.2)						AU 6 (Remnant 11.3.2 Poplar Box TEC)				
Benchmark 11.3.2	HQ4a			Average % benchmark	Average Score	**Benchmark 11.3.2**	HQ5a			Average % benchmark	Average Score	**Benchmark 11.3.2**	HQ6a			Average % benchmark
	Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	
100	100	100%	5	100%	5	**100**	100	100%	5	100%	5	**100**	75	75%	3	75%
2	7	350%	5	350%	5	**2**	3	150%	5	150%	5	**2**	5	250%	5	250%
2	3	150%	5	150%	5	**2**	5	250%	5	250%	5	**2**	2	100%	5	100%
9	5	56%	2.5	56%	2.5	**9**	15	167%	5	167%	5	**9**	7	78%	2.5	78%
17	2	12%	0	12%	0	**17**	4	24%	0	24%	0	**17**	6	35%	2.5	35%
NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA		
18	18	100%	5	NA	5	**18**	12	67%	4	NA	4	**18**	16	89%	5	NA
NA	NA	NA				**NA**	0	NA				**NA**	NA	NA		
NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA		
40	38.5	96%	4	NA	4	**40**	21.8	55%	4	NA	4	**40**	41	103%	4	NA
NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA		
2	2.2	110%	5	110%	5	**2**	3.5	175%	5	175%	5	**2**	1	50%	5	50%
35	30	86%	3	86%	3	**35**	47	134%	5	134%	5	**35**	56	160%	5	160%
30	28	93%	5	93%	5	**30**	6	20%	3	20%	3	**30**	10	33%	3	33%
22	14	64%	10	64%	10	**22**	0	0%	0	0%	0	**22**	6	27%	5	27%
307	250	81%	5	81%	5	**307**	110	36%	2	36%	2	**307**	180	59%	5	59%
0	70	70%	0	70%	0	**0**	5	5%	5	5%	5	**0**	35	35%	3	35%
NA	NA	NA	6.3	NA	6.3	**NA**	NA	NA	6.3	NA	6.3	**NA**	NA	NA	6.3	NA
NA	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA
			70.8		70.8				*64.3*		64.3				*69.3*	
			100		*100*				100		*100*				100	
					2.12						**1.93**					
NA	0	NA	0	NA	0	**NA**	10	NA	10	NA	10	**NA**	0	NA	0	NA
NA	0	NA	0	NA	0	**NA**	0	NA	0	NA	0	**NA**	0	NA	0	NA
NA	0	NA	0	NA	0	**NA**	0	NA	0	NA	0	**NA**	0	NA	0	NA
NA	0	NA	0	NA	0	**NA**	0	NA	0	NA	0	**NA**	0	NA	0	NA
NA	0	NA	0	NA	0	**NA**	0	NA	0	NA	0	**NA**	0	NA	0	NA
NA	3.9	NA	3.9	NA	3.9	**NA**	4.8	NA	4.8	NA	4.8	**NA**	6	NA	6	NA
NA	5	NA	5	NA	5	**NA**	5	NA	5	NA	5	**NA**	5	NA	5	NA
			8.9		8.9				19.8		19.8				11	
			56		*56*				*56*		*56*				*56*	
					0.48						**1.06**					
NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA
NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA
NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA
NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA
			25		25				25		25				25	
			70		*70*				70		*70*				70	
					1.43						**1.43**					

AU 16 (11.9.5 Brigalow TEC)	AU 17 (HVR 11.9.5)	AU 18 (Remnant 11.9.5a)	AU 19 (Remnant 11.9.5a Brigalow	AU 20 (HVR 11.9.5a)	Average/Final
2.07	1.29	1.73	2.45	1.26	1.96
1.18	1.04	0.57	0.59	1.39	1.21
1.43	1.43	1.14	1.43	1.43	1.39
5	4	3	4	4	5
0.01	0.14	0.01	0.17	0.10	29.04
0.02	0.16	0.01	0.19	0.11	31.94
32.1	32.1	32.1	32.1	32.1	32.1
0.000	0.005	0.000	0.006	0.004	0.996
0.002	***0.018***	***0.001***	***0.026***	***0.015***	***5***

	AU 7 (Remnant 11.3.25)												
	Benchmark	HQ7a			HQ7b			HQ7c			Average %		**Benchmark**
Average Score	**11.3.25**	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score	**11.3.4**
3	**100**	25	25%	3	0	0%	0	0	0%	0	8%	1	**100**
5	**4**	9	225%	5	3	75%	2.5	5	125%	5	142%	4.166666667	**4**
5	**4**	8	200%	5	1	25%	2.5	3	75%	2.5	100%	3.333333333	**2**
2.5	**8**	11	138%	5	9	113%	5	15	188%	5	146%	5	**7**
2.5	**13**	2	15%	0	7	54%	2.5	4	31%	2.5	33%	1.666666667	**10**
	NA	NA	NA		NA	NA		NA	NA				**NA**
5	**23**	21	91%	5	22	96%	5	23	100%	2.5	NA	4.166666667	**22**
	11	12	109%		14	127%		0	0%				**12**
	NA	NA	NA		NA	NA		NA	NA				**NA**
4	**34**	37.3	110%	5	66.4	195%	2.5	73.1	215%	3	NA	3.5	**17**
	12	16.1	134%		0	0%		36.7	306%				**5**
5	**7**	4.6	66%	5	5.6	80%	5	1.7	24%	3	57%	4.333333333	**1**
5	**35**	0	0%	0	12	34%	1	70.8	202%	5	79%	2	**43**
3	**21**	12	57%	5	16	76%	5	21.8	104%	5	79%	5	**20**
5	**32**	28	88%	10	28	88%	10	68	213%	15	129%	11.66666667	**35**
5	**473**	250	53%	5	90	19%	2	110	23%	2	32%	3	**384**
3	**0**	70	70%	0	20	20%	5	60	60%	0	50%	1.666666667	**0**
6.3	**NA**	NA	NA	3.8	NA	NA	6.5	NA	NA	5	NA	5.1	**NA**
10	**NA**	NA	NA	5	NA	NA	10	NA	NA	10	NA	8.333333333	**NA**
69.3				*61.8*			*64.5*			*65.5*		63.93333333	
100				100			100			100		*100*	
2.08												**1.92**	
0	**NA**	0	NA	0	10	NA	10	10	NA	10	NA	6.666666667	**NA**
0	**NA**	0	NA	0	5	NA	5	4	NA	4	NA	3	**NA**
0	**NA**	0	NA	0	5	NA	5	4	NA	4	NA	3	**NA**
0	**NA**	0	NA	0	6	NA	6	6	NA	6	NA	4	**NA**
0	**NA**	0	NA	0	0	NA	0	0	NA	0	NA	0	**NA**
6	**NA**	3.9	NA	3.9	10.8	NA	10.8	12.3	NA	12.3	NA	9	**NA**
5	**NA**	5	NA	5	10	NA	10	5	NA	5	NA	6.666666667	**NA**
11				8.9			46.8			41.3		32.33333333	
56				*56*			*56*			*56*		*56*	
0.59												**1.73**	
0	NA	NA	NA	0	NA	NA	0	NA	NA	0	NA	0	NA
15	NA	NA	NA	10	NA	NA	15	NA	NA	15	NA	13.33333333	NA
10	NA	NA	NA	10	NA	NA	10	NA	NA	10	NA	10	NA
0	NA	NA	NA	0	NA	NA	0	NA	NA	0	NA	0	NA
25				20			25			25		23.33333333	
70				70			70			70		*70*	
1.43												**1.33**	

AU 8 (Remnant 11.3.4)					AU 9 (Remnant 11.5.1)										
HQ8a			Average % benchmark	Average Score	Benchmark 11.5.1	HQ9a			HQ9b			Average % benchmark	Average Score	Benchmark 11.5.1	
Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score				Raw Data
0	0%	0	0%	0	**100**	0	0%	0	50	50%	3	25%	1.5	**100**	0
7	175%	5	175%	5	**5**	5	100%	5	6	120%	5	110%	5	**5**	7
7	350%	5	350%	5	**5**	5	100%	5	3	60%	2.5	80%	3.75	**5**	7
17	243%	5	243%	5	**8**	4	50%	2.5	16	200%	5	125%	3.75	**8**	17
5	50%	2.5	50%	2.5	**10**	4	40%	2.5	6	60%	2.5	50%	2.5	**10**	5
NA	NA				**NA**	NA	NA		NA	NA				**NA**	NA
11	50%	1.5	NA	1.5	**20**	17	85%	5	19	95%	2.5	NA	3.75	**20**	11
0	0%				**9**	10	111%		0	0%				**9**	0
NA	NA				**NA**	NA	NA		NA	NA				**NA**	NA
45.8	269%	1.5	NA	1.5	**25**	50.2	201%	4	30.5	122%	5	NA	4.5	**25**	45.8
0	0%				**20**	29.1	146%		26.4	132%				**20**	0
8.2	820%	3	820%	3	**6**	12.4	207%	3	3.6	60%	5	133%	4	**6**	8.2
23	53%	3	53%	3	**23**	10	43%	1	8	35%	1	39%	1	**23**	23
22	110%	5	110%	5	**45**	10	22%	3	35	78%	5	50%	4	**45**	22
16	46%	5	46%	5	**17**	18	106%	15	4	24%	5	65%	10	**17**	16
270	70%	5	70%	5	**135**	560	415%	2	380	281%	2	348%	2	**135**	270
25	25%	3	25%	3	**0**	5	5%	5	60	60%	0	33%	2.5	**0**	25
NA	NA	6.3	NA	6.3	**NA**	NA	NA	7.5	NA	NA	3.8	NA	5.65	**NA**	NA
NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10	**NA**	NA
		60.8		60.8				*70.5*			*57.3*		63.9		
		100		*100*				100			100		*100*		
				1.82									**1.92**		
0	NA	0	NA	0	**NA**	10	NA	10	10	NA	10	NA	10	**NA**	10
0	NA	0	NA	0	**NA**	2	NA	2	2	NA	2	NA	2	**NA**	0
0	NA	0	NA	0	**NA**	4	NA	4	5	NA	5	NA	4.5	**NA**	4
0	NA	0	NA	0	**NA**	0	NA	0	0	NA	0	NA	0	**NA**	0
0	NA	0	NA	0	**NA**	0	NA	0	0	NA	0	NA	0	**NA**	0
5.4	NA	5.4	NA	5.4	**NA**	8.7	NA	8.7	12.3	NA	12.3	NA	10.5	**NA**	11.1
5	NA	5	NA	5	**NA**	5	NA	5	10	NA	10	NA	7.5	**NA**	5
		10.4		10.4				29.7			39.3		34.5		
		56		*56*				*56*			*56*		*56*		
				0.56									**1.85**		
NA	NA	0	NA	0	NA	NA	NA	0	NA	NA	0	NA	0	NA	NA
NA	NA	15	NA	15	NA	NA	NA	15	NA	NA	15	NA	15	NA	NA
NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10	NA	NA
NA	NA	0	NA	0	NA	NA	NA	0	NA	NA	0	NA	0	NA	NA
		25		25				25			25		25		
		70		*70*				70			70		*70*		
				1.43									**1.43**		

AU 10 (HVR 11.5.1)				AU 11 (11.5.16 Brigalow TEC)						AU 12 (Remnant 11.5.4)					
HQ10a		Average % benchmark	Average Score	Benchmark 11.5.16	HQ11a			Average % benchmark	Average Score	Benchmark 11.5.4	HQ12a			HQ12b	
% Benchmark	Score				Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	Raw Data	% Benchmark
0%	0	0%	0	**100**	100	100%	5	100%	5	**100**	0	0%	0	33	33%
140%	5	140%	5	**3**	4	133%	5	133%	5	**4**	9	225%	5	8	200%
140%	5	140%	5	**9**	5	56%	2.5	56%	2.5	**3**	7	233%	5	4	133%
213%	5	213%	5	**5**	1	20%	0	20%	0	**13**	12	92%	5	11	85%
50%	2.5	50%	2.5	**12**	4	33%	2.5	33%	2.5	**18**	3	17%	0	10	56%
NA				**NA**	NA	NA				**NA**	NA	NA		NA	NA
55%	1.5	NA	1.5	**13**	14	108%	5	NA	5	**21**	20	95%	5	22	105%
0%				**7**	8	114%				**10**	10	100%		13	130%
NA				**NA**	NA	NA				**NA**	NA	NA		NA	NA
183%	2.5	NA	2.5	**52**	76	146%	3.5	NA	3.5	**30**	60.5	202%	4	48.9	163%
0%				**26**	9.3	36%				**24**	24.7	103%		25.6	107%
137%	5	137%	5	**24**	9.2	38%	3	38%	3	**7**	7.7	110%	5	3.5	50%
100%	5	100%	5	**10**	27	270%	5	270%	5	**30**	38	127%	5	52	173%
49%	3	49%	3	**47**	22	47%	3	47%	3	**58**	39	67%	5	15.8	27%
94%	10	94%	10	**58**	12	21%	5	21%	5	**17**	60	353%	15	10	59%
200%	5	200%	5	**1812**	750	41%	2	41%	2	**204**	320	157%	5	320	157%
25%	3	25%	3	**0**	3	3%	10	3%	10	**0**	15	15%	5	3	3%
NA	7.8	NA	7.8	**NA**	NA	NA	9	NA	9	**NA**	NA	NA	3.8	NA	NA
NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	5	NA	NA
	70.3		70.3				*70.5*		70.5				*72.8*		
	100		*100*				100		*100*				100		
			2.11						**2.12**						
NA	10	NA	10	**NA**	10	NA	10	NA	10	**NA**	10	NA	10	10	NA
NA	0	NA	0	**NA**	5	NA	5	NA	5	**NA**	2	NA	2	4	NA
NA	4	NA	4	**NA**	4	NA	4	NA	4	**NA**	4	NA	4	4	NA
NA	0	NA	0	**NA**	0	NA	0	NA	0	**NA**	0	NA	0	0	NA
NA	0	NA	0	**NA**	0	NA	0	NA	0	**NA**	0	NA	0	0	NA
NA	11.1	NA	11.1	**NA**	6.6	NA	6.6	NA	6.6	**NA**	7.5	NA	7.5	7.5	NA
NA	5	NA	5	**NA**	5	NA	5	NA	5	**NA**	10	NA	10	10	NA
	30.1		30.1				30.6		30.6				33.5		
	56		*56*				*56*		*56*				*56*		
			1.61						**1.64**						
NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	NA
NA	15	NA	15	NA	NA	NA	15	NA	15	NA	NA	NA	10	NA	NA
NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA
NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	NA
	25		25				25		25				20		
	70		*70*				70		*70*				70		
			1.43						**1.43**						

			AU 13 (Remnant 11.7.2)									AU 15 (Remnant 11.9.5)			
	Average %		Benchmark	HQ13a			HQ13b			Average %		Benchmark	HQ15a		
Score	benchmark	Average Score	11.7.2	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score
3	17%	1.5	**100**	100	100%	5	100	100%	5	100%	5	**100**	33	33%	3
5	213%	5	**3**	3	100%	5	3	100%	5	100%	5	**4**	13	325%	5
5	183%	5	**4**	3	75%	2.5	3	75%	2.5	75%	2.5	**5**	3	60%	2.5
2.5	88%	3.75	**5**	10	200%	5	10	200%	5	200%	5	**7**	4	57%	2.5
2.5	36%	1.25	**5**	7	140%	5	15	300%	5	220%	5	**13**	6	46%	2.5
			NA	NA	NA		NA	NA				**NA**	NA	NA	
5	NA	5	**15**	18	120%	5	20	133%	5	NA	5	**14**	17	121%	5
			5	9	180%		13	260%				**7**	13	186%	
			NA	NA	NA		NA	NA				**NA**	NA	NA	
5	NA	4.5	**40**	65	163%	4	43.4	109%	4	NA	4	**37**	60.3	163%	5
			4	9	225%		17.4	435%				**20**	33.9	170%	
5	80%	5	**4**	1.6	40%	3	10.8	270%	3	155%	3	**15**	10	67%	5
5	150%	5	**15**	67	447%	5	52	347%	5	397%	5	**27**	3	11%	1
3	47%	4	**20**	19	95%	5	5	25%	3	60%	4	**31**	25	81%	5
10	206%	12.5	**36**	38	106%	15	28	78%	10	92%	12.5	**16**	10	63%	10
5	157%	5	**1214**	380	31%	2	430	35%	2	33%	2	**827**	510	62%	5
10	9%	7.5	**0**	1	1%	10	20	20%	5	11%	7.5	**0**	55	55%	0
3.8	NA	3.8	**NA**	NA	NA	6.8	NA	NA	6.3	NA	6.55	**NA**	NA	NA	7.5
5	NA	5	**NA**	NA	NA	10	NA	NA	10	NA	10	**NA**	NA	NA	10
74.8		73.8				*88.3*			*75.8*		82.05				*69*
100		*100*				100			100		*100*				100
		2.21									**2.46**				
10	NA	10	**NA**	10	NA	10	10	NA	10	NA	10	**NA**	0	NA	0
4	NA	3	**NA**	4	NA	4	2	NA	2	NA	3	**NA**	0	NA	0
4	NA	4	**NA**	4	NA	4	4	NA	4	NA	4	**NA**	0	NA	0
0	NA	0	**NA**	0	NA	0	0	NA	0	NA	0	**NA**	0	NA	0
0	NA	0	**NA**	0	NA	0	0	NA	0	NA	0	**NA**	0	NA	0
7.5	NA	7.5	**NA**	8.4	NA	8.4	8.4	NA	8.4	NA	8.4	**NA**	2.4	NA	2.4
10	NA	10	**NA**	5	NA	5	5	NA	5	NA	5	**NA**	10	NA	10
35.5		34.5				31.4			29.4		30.4				12.4
56		*56*				*56*			*56*		*56*				*56*
		1.85									**1.63**				
0	NA	0	NA	NA	NA	0	NA	NA	0	NA	0	NA	NA	NA	0
10	NA	10	NA	NA	NA	15	NA	NA	15	NA	15	NA	NA	NA	15
10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10
0	NA	0	NA	NA	NA	0	NA	NA	0	NA	0	NA	NA	NA	0
20		20				25			25		25				25
70		*70*				70			70		*70*				70
		1.14									**1.43**				

		AU 16 (11.9.5 Brigalow TEC)						AU 17 (HVR 11.9.5)							
Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**	HQ16a Raw Data	HQ16a % Benchmark	HQ16a Score	Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**	HQ17a Raw Data	HQ17a % Benchmark	HQ17a Score	Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**	Raw Data
33%	3	**100**	100	100%	5	100%	5	**100**	100	100%	5	100%	5	**100**	100
325%	5	**4**	5	125%	5	125%	5	**4**	3	75%	2.5	75%	2.5	**4**	6
60%	2.5	**5**	4	80%	2.5	80%	2.5	**5**	2	40%	2.5	40%	2.5	**5**	10
57%	2.5	**7**	10	143%	5	143%	5	**7**	6	86%	2.5	86%	2.5	**7**	6
46%	2.5	**13**	12	92%	5	92%	5	**13**	12	92%	5	92%	5	**13**	7
		NA	NA	NA				**NA**	NA	NA				**NA**	NA
NA	5	**14**	8	57%	1.5	NA	1.5	**14**	7	50%	1.5	NA	1.5	**14**	12
		7	0	0%				**7**	0	0%				**7**	0
		NA	NA	NA				**NA**	NA	NA				**NA**	NA
NA	5	**37**	59.5	161%	2.5	NA	2.5	**37**	23.9	65%	2.5	NA	2.5	**37**	50.1
		20	0	0%				**20**	0	0%				**20**	0
67%	5	**15**	12	80%	5	80%	5	**15**	4.7	31%	3	31%	3	**15**	0
11%	1	**27**	73	270%	5	270%	5	**27**	0	0%	0	0%	0	**27**	9
81%	5	**31**	9	29%	3	29%	3	**31**	13.4	43%	3	43%	3	**31**	22
63%	10	**16**	2	13%	5	13%	5	**16**	0	0%	0	0%	0	**16**	8
62%	5	**827**	160	19%	2	19%	2	**827**	30	4%	0	4%	0	**827**	370
55%	0	**0**	5	5%	5	5%	5	**0**	65	65%	0	65%	0	**0**	50
NA	7.5	**NA**	NA	NA	7.5	NA	7.5	**NA**	NA	NA	5.5	NA	5.5	**NA**	NA
NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA
	69				*69*		69				*43*		43		
	100				100		*100*				100		*100*		
	2.07						**2.07**						**1.29**		
NA	0	**NA**	2	NA	2	NA	2	**NA**	10	NA	10	NA	10	**NA**	0
NA	0	**NA**	2	NA	2	NA	2	**NA**	0	NA	0	NA	0	**NA**	2
NA	0	**NA**	2	NA	2	NA	2	**NA**	2	NA	2	NA	2	**NA**	0
NA	0	**NA**	0	NA	0	NA	0	**NA**	0	NA	0	NA	0	**NA**	0
NA	0	**NA**	0	NA	0	NA	0	**NA**	0	NA	0	NA	0	**NA**	0
NA	2.4	**NA**	6	NA	6	NA	6	**NA**	2.4	NA	2.4	NA	2.4	**NA**	3.6
NA	10	**NA**	10	NA	10	NA	10	**NA**	5	NA	5	NA	5	**NA**	5
	12.4				22		22				19.4		19.4		
	56				*56*		*56*				*56*		*56*		
	0.66						**1.18**						**1.04**		
NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA
NA	15	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA	NA
NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA
NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA
	25				25		25				25		25		
	70				70		*70*				70		*70*		
	1.43						**1.43**						**1.43**		

AU 18 (Remnant 11.9.5a)				AU 19 (Remnant 11.9.5a Brigalow TEC)						AU 20 (HVR 11.9.5a)					
HQ18a		Average % benchmark	Average Score	Benchmark 11.9.5 (Western)	HQ19a			Average % benchmark	Average Score	Benchmark 11.9.5 (Western)	HQ20a			Average % benchmark	Average Score
% Benchmark	Score				Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score		
100%	5	100%	5	**100**	50	50%	3	50%	3	**100**	100	100%	5	100%	5
150%	5	150%	5	**4**	12	300%	5	300%	5	**4**	3	75%	2.5	75%	2.5
200%	5	200%	5	**5**	4	80%	2.5	80%	2.5	**5**	6	120%	5	120%	5
86%	2.5	86%	2.5	**7**	5	71%	2.5	71%	2.5	**7**	3	43%	2.5	43%	2.5
54%	2.5	54%	2.5	**13**	7	54%	2.5	54%	2.5	**13**	3	23%	0	23%	0
NA				**NA**	NA	NA				**NA**	NA	NA			
86%	2.5	NA	2.5	**14**	19	136%	5	NA	5	**14**	5	36%	1.5	NA	1.5
0%				**7**	8	114%				**7**	0	0%			
NA				**NA**	NA	NA				**NA**	NA	NA			
135%	2.5	NA	2.5	**37**	65.4	177%	5	NA	5	**37**	32.2	87%	2.5	NA	2.5
0%				**20**	33.5	168%				**20**	0	0%			
0%	0	0%	0	**15**	16.9	113%	5	113%	5	**15**	0.6	4%	0	4%	0
33%	1	33%	1	**27**	15	56%	3	56%	3	**27**	3	11%	1	11%	1
71%	5	71%	5	**31**	14	45%	3	45%	3	**31**	12	39%	3	39%	3
50%	10	50%	10	**16**	28	175%	15	175%	15	**16**	0	0%	0	0%	0
45%	2	45%	2	**827**	550	67%	5	67%	5	**827**	30	4%	0	4%	0
50%	3	50%	3	**0**	3	3%	10	3%	10	**0**	15	15%	5	15%	5
NA	6.5	NA	6.5	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	6.5	NA	6.5
NA	5	NA	5	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	7.5	NA	7.5
	57.5		57.5				*81.5*		81.5				*42*		42
	100		*100*				100		*100*				100		*100*
			1.73						**2.45**						**1.26**
NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	10	NA	10
NA	2	NA	2	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	2
NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	3.6	NA	3.6	**NA**	NA	NA	6	NA	6	**NA**	NA	NA	3.9	NA	3.9
NA	5	NA	5	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	10	NA	10
	10.6		10.6				11		11				25.9		25.9
	56		*56*				*56*		*56*				*56*		*56*
			0.57						**0.59**						**1.39**
NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0
NA	10	NA	10	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15
NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0
	20		20				25		25				25		25
	70		*70*				70		*70*				70		*70*
			1.14						**1.43**						**1.43**

IMPACT - Greater glider (Petauroides volans)

Assessment Unit - Regional Ecosystem	Max score	AU 2 (Remnant 11.3.18)						AU 3 (Remnant 11.3.19)						
Site Reference	V1.2	Benchmark 11.3.18	HQ2a Raw Data	HQ2a % Benchmark	HQ2a Score	Average % benchmark	Average Score	Benchmark 11.3.19	HQ3a Raw Data	HQ3a % Benchmark	HQ3a Score	Average % benchmark	Average Score	Benchmark 11.3.2
Recruitment of woody perennial species in EDL	5	**100**	25	25%	3	25%	3	**100**	0	0%	0	0%	0	**100**
Native plant species richness - trees	5	**4**	4	100%	5	100%	5	**7**	2	29%	2.5	29%	2.5	**2**
Native plant species richness - shrubs	5	**7**	3	43%	2.5	43%	2.5	**4**	2	50%	2.5	50%	2.5	**2**
Native plant species richness - grasses	5	**11**	12	109%	5	109%	5	**16**	18	113%	5	113%	5	**9**
Native plant species richness - forbes	5	**21**	7	33%	2.5	33%	2.5	**19**	11	58%	2.5	58%	2.5	**17**
Tree emergent height		**na**	na	na				**NA**	NA	NA				**NA**
Tree canopy height	5	**18**	17	94%	5	NA	5	**15**	13	87%	2.5	NA	2.5	**18**
Tree sub-canopy height		**9**	11	122%				**7**	0	0%				**NA**
Tree emergent cover		**na**	na	na				**NA**	NA	NA				**NA**
Tree canopy cover	5	**43**	46.8	109%	5	NA	5	**20**	23.8	119%	2.5	NA	2.5	**40**
Tree sub-canopy cover		**26**	25.8	99%				**7**	0	0%				**NA**
Shrub canopy cover	5	**5**	0.6	12%	3	12%	3	**17**	0	0%	0	0%	0	**2**
Native grass cover	5	**16**	34	213%	5	213%	5	**24**	20.4	85%	3	85%	3	**35**
Organic litter	5	**35**	9	26%	3	26%	3	**27**	8.4	31%	3	31%	3	**30**
Large trees (euc plus non-euc)	15	**24**	6	25%	5	25%	5	**26**	14	54%	10	54%	10	**22**
Coarse woody debris	5	**273**	170	62%	5	62%	5	**431**	130	30%	2	30%	2	**307**
Non-native plant cover	10	**0**	45	45%	2	45%	2	**0**	5	5%	5	5%	5	**0**
Quality and availability of food and foraging habitat	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	2	**NA**
Quality and availability of shelter	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
Site Condition Score					*51*		51				*42.5*		42.5	
MAX Site Condition Score	100				100		*100*				100		*100*	
Site Condition Score - out of 3							**1.53**						**1.28**	
Site Context														
Size of patch	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	10	NA	10	**NA**
Connectedness	5	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	4	NA	4	**NA**
Context	5	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	5	NA	5	**NA**
Ecological Corridors	6	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	6	NA	6	**NA**
Role of site location to species overall population in the state	5	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**
Threats to the species	15	**NA**	NA	NA	10.8	NA	10.8	**NA**	NA	NA	12.4	NA	12.4	**NA**
Species mobility capacity	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	3.25	NA	3.25	**NA**
Site Context Score					12.5		12.5				42.35		42.35	
MAX Site Context Score	56				*56*		*56*				*56*		*56*	
Site Context Score - out of 3							**0.67**						**2.27**	
Species Stocking Rate (SSR)														
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA
Species usage of the site (habitat type & evidenced usage)	15	NA	NA	NA	0	NA	0	NA	NA	NA	15	NA	15	NA
Approximate density (per ha)	30	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
Role/importance of species population on site*	15	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA
SSR Score					15		15				30		30	
Max SSR Score	70				70		*70*				70		*70*	
SRR Score (out of 4)							**0.86**						**1.71**	

Final habitat quality score (weighted)	AU 2 (Remnant 11.3.18)	AU 3 (Remnant 11.3.19)	AU 4 (Remnant 11.3.2)	AU 6 (Remnant 11.3.2 Poplar Box TEC)	AU 7 (Remnant 11.3.25)	AU 8 (Remnant 11.3.4)	AU 9 (Remnant 11.5.1)	AU 12 (Remnant 11.5.4)	AU 13 (Remnant 11.7.2)	Average/Final
Site Condition score (out of 3)	1.53	1.28	1.79	1.65	1.86	1.55	1.66	2.27	2.04	1.73
Site Context Score (out of 3)	0.67	2.27	0.46	0.82	1.75	0.51	1.96	1.64	1.78	1.32
Species Stocking Rate Score (out of 4)	0.86	1.71	1.71	1.71	1.71	1.43	1.71	1.71	1.71	1.59
Habitat Quality score (out of 10)	3.06	5.26	3.96	4.18	5.32	3.48	5.33	5.62	5.53	4.64
Assessment Unit area (ha) in disturbance footprint	0.20	0.91	0.35	0.08	0.87	0.01	20.18	1.57	2.96	27.1
Assessment Unit area (ha) in disturbance footprint + 10% buffer	0.22	1.01	0.38	0.09	0.96	0.01	22.20	1.73	3.25	29.8
Total impact area (ha) for this MNES (including 10% buffer)	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9	29.9
Size Weighting	0.01	0.03	0.01	0.00	0.03	0.00	0.74	0.06	0.11	1.00
Weighted Habitat Quality Score	***0.023***	***0.177***	***0.051***	***0.012***	***0.170***	***0.001***	***3.952***	***0.324***	***0.601***	***5***

AU 4 (Remnant 11.3.2)					AU 6 (Remnant 11.3.2 Poplar Box TEC)									
HQ4a			Average % benchmark	Average Score	Benchmark 11.3.2	HQ6a			Average % benchmark	Average Score	Benchmark 11.3.25	HQ7a		
Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score
100	100%	5	100%	5	**100**	75	75%	3	75%	3	**100**	25	25%	3
7	350%	5	350%	5	**2**	5	250%	5	250%	5	**4**	9	225%	5
3	150%	5	150%	5	**2**	2	100%	5	100%	5	**4**	8	200%	5
5	56%	2.5	56%	2.5	**9**	7	78%	2.5	78%	2.5	**8**	11	138%	5
2	12%	0	12%	0	**17**	6	35%	2.5	35%	2.5	**13**	2	15%	0
NA	NA				**NA**	NA	NA				**NA**	NA	NA	
18	100%	5	NA	5	**18**	16	89%	5	NA	5	**23**	21	91%	5
NA	NA				**NA**	NA	NA				**11**	12	109%	
NA	NA				**NA**	NA	NA				**NA**	NA	NA	
38.5	96%	4	NA	4	**40**	41	103%	4	NA	4	**34**	37.3	110%	5
NA	NA				**NA**	NA	NA				**12**	16.1	134%	
2.2	110%	5	110%	5	**2**	1	50%	5	50%	5	**7**	4.6	66%	5
30	86%	3	86%	3	**35**	56	160%	5	160%	5	**35**	0	0%	0
28	93%	5	93%	5	**30**	10	33%	3	33%	3	**21**	12	57%	5
14	64%	10	64%	10	**22**	6	27%	5	27%	5	**32**	28	88%	10
250	81%	5	81%	5	**307**	180	59%	5	59%	5	**473**	250	53%	5
70	70%	0	70%	0	**0**	35	35%	3	35%	3	**0**	70	70%	0
NA	NA	3	NA	3	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	6
NA	NA	2	NA	2	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	6
		59.5		59.5				*55*		55				*65*
		100		*100*				100		*100*				100
				1.79						**1.65**				
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7
NA	NA	6.2	NA	6.2	**NA**	NA	NA	8.6	NA	8.6	**NA**	NA	NA	9.8
NA	NA	0.7	NA	0.7	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	0.7
		8.6		8.6				15.3		15.3				12.2
		56		*56*				*56*		*56*				*56*
				0.46						**0.82**				
NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA	NA	NA	5
NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA	NA	NA	15
NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10
NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0
		30		30				30		30				30
		70		*70*				70		*70*				70
				1.71						**1.71**				

AU 7 (Remnant 11.3.25)								AU 8 (Remnant 11.3.4)						
HQ7b			HQ7c			Average % benchmark	Average Score	Benchmark 11.3.4	HQ8a			Average % benchmark	Average Score	Benchmark 11.5.1
Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score			
0	0%	0	0	0%	0	8%	1	**100**	0	0%	0	0%	0	**100**
3	75%	2.5	5	125%	5	142%	4.166666667	**4**	7	175%	5	175%	5	**5**
1	25%	2.5	3	75%	2.5	100%	3.333333333	**2**	7	350%	5	350%	5	**5**
9	113%	5	15	188%	5	146%	5	**7**	17	243%	5	243%	5	**8**
7	54%	2.5	4	31%	2.5	33%	1.666666667	**10**	5	50%	2.5	50%	2.5	**10**
NA	NA		NA	NA				**NA**	NA	NA				**NA**
22	96%	5	23	100%	2.5	NA	4.166666667	**22**	11	50%	1.5	NA	1.5	**20**
14	127%		0	0%				**12**	0	0%				**9**
NA	NA		NA	NA				**NA**	NA	NA				**NA**
66.4	195%	2.5	73.1	215%	3	NA	3.5	**17**	45.8	269%	1.5	NA	1.5	**25**
0	0%		36.7	306%				**5**	0	0%				**20**
5.6	80%	5	1.7	24%	3	57%	4.333333333	**1**	8.2	820%	3	820%	3	**6**
12	34%	1	70.8	202%	5	79%	2	**43**	23	53%	3	53%	3	**23**
16	76%	5	21.8	104%	5	79%	5	**20**	22	110%	5	110%	5	**45**
28	88%	10	68	213%	15	129%	11.66666667	**35**	16	46%	5	46%	5	**17**
90	19%	2	110	23%	2	32%	3	**384**	270	70%	5	70%	5	**135**
20	20%	5	60	60%	0	50%	1.666666667	**0**	25	25%	3	25%	3	**0**
NA	NA	6	NA	NA	10	NA	7.333333333	**NA**	NA	NA	7	NA	7	**NA**
NA	NA	0	NA	NA	6	NA	4	**NA**	NA	NA	0	NA	0	**NA**
		54			*66.5*		61.83333333				*51.5*		51.5	
		100			100		*100*				100		*100*	
							1.86						**1.55**	
NA	NA	10	NA	NA	10	NA	6.666666667	**NA**	NA	NA	0	NA	0	**NA**
NA	NA	5	NA	NA	4	NA	3	**NA**	NA	NA	0	NA	0	**NA**
NA	NA	5	NA	NA	4	NA	3	**NA**	NA	NA	0	NA	0	**NA**
NA	NA	6	NA	NA	6	NA	4	**NA**	NA	NA	0	NA	0	**NA**
NA	NA	1.7	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**
NA	NA	11.8	NA	NA	11.8	NA	11.13333333	**NA**	NA	NA	7.8	NA	7.8	**NA**
NA	NA	6.4	NA	NA	2.2	NA	3.1	**NA**	NA	NA	0	NA	0	**NA**
		45.9			39.7		32.6				9.5		9.5	
		56			*56*		*56*				*56*		*56*	
							1.75						**0.51**	
NA	NA	5	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA
NA	NA	15	NA	NA	15	NA	15	NA	NA	NA	10	NA	10	NA
NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
NA	NA	0	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA
		30			30		30				25		25	
		70			70		*70*				70		*70*	
							1.71						**1.43**	

AU 9 (Remnant 11.5.1)								AU 12 (Remnant 11.5.4)								
HQ9a			HQ9b			Average % benchmark	Average Score	Benchmark 11.5.4	HQ12a			HQ12b			Average % benchmark	Average Score
Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score		
0	0%	0	50	50%	3	25%	1.5	**100**	0	0%	0	33	33%	3	17%	1.5
5	100%	5	6	120%	5	110%	5	**4**	9	225%	5	8	200%	5	213%	5
5	100%	5	3	60%	2.5	80%	3.75	**3**	7	233%	5	4	133%	5	183%	5
4	50%	2.5	16	200%	5	125%	3.75	**13**	12	92%	5	11	85%	2.5	88%	3.75
4	40%	2.5	6	60%	2.5	50%	2.5	**18**	3	17%	0	10	56%	2.5	36%	1.25
NA	NA		NA	NA				**NA**	NA	NA		NA	NA			
17	85%	5	19	95%	2.5	NA	3.75	**21**	20	95%	5	22	105%	5	NA	5
10	111%		0	0%				**10**	10	100%		13	130%			
NA	NA		NA	NA				**NA**	NA	NA		NA	NA			
50.2	201%	4	30.5	122%	5	NA	4.5	**30**	60.5	202%	4	48.9	163%	5	NA	4.5
29.1	146%		26.4	132%				**24**	24.7	103%		25.6	107%			
12.4	207%	3	3.6	60%	5	133%	4	**7**	7.7	110%	5	3.5	50%	5	80%	5
10	43%	1	8	35%	1	39%	1	**30**	38	127%	5	52	173%	5	150%	5
10	22%	3	35	78%	5	50%	4	**58**	39	67%	5	15.8	27%	3	47%	4
18	106%	15	4	24%	5	65%	10	**17**	60	353%	15	10	59%	10	206%	12.5
560	415%	2	380	281%	2	348%	2	**204**	320	157%	5	320	157%	5	157%	5
5	5%	5	60	60%	0	33%	2.5	**0**	15	15%	5	3	3%	10	9%	7.5
NA	NA	0	NA	NA	6	NA	3	**NA**	NA	NA	6	NA	NA	5	NA	5.5
NA	NA	2	NA	NA	6	NA	4	**NA**	NA	NA	10	NA	NA	0	NA	5
		55			*55.5*		55.25				*80*			*71*		75.5
		100			100		*100*				100			100		*100*
							1.66									**2.27**
NA	NA	10	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10
NA	NA	2	NA	NA	2	NA	2	**NA**	NA	NA	2	NA	NA	4	NA	3
NA	NA	4	NA	NA	5	NA	4.5	**NA**	NA	NA	4	NA	NA	4	NA	4
NA	NA	0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	0	NA	0
NA	NA	1.7	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	NA	1.7	NA	1.7
NA	NA	11.8	NA	NA	13.2	NA	12.5	**NA**	NA	NA	7	NA	NA	8.2	NA	7.6
NA	NA	3.95	NA	NA	7.8	NA	5.875	**NA**	NA	NA	3.95	NA	NA	4.65	NA	4.3
		33.45			39.7		36.575				28.65			32.55		30.6
		56			*56*		*56*				*56*			*56*		*56*
							1.96									**1.64**
NA	NA	5	NA	NA	5	NA	5	NA	NA	NA	5	NA	NA	5	NA	5
NA	NA	15	NA	NA	15	NA	15	NA	NA	NA	15	NA	NA	15	NA	15
NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10
NA	NA	0	NA	NA	0	NA	0	NA	NA	NA	0	NA	NA	0	NA	0
		30			30		30				30			30		30
		70			70		*70*				70			70		*70*
							1.71									**1.71**

AU 13 (Remnant 11.7.2)								
Benchmark	HQ13a			HQ13b			Average %	
11.7.2	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score
100	100	100%	5	100	100%	5	100%	5
3	3	100%	5	3	100%	5	100%	5
4	3	75%	2.5	3	75%	2.5	75%	2.5
5	10	200%	5	10	200%	5	200%	5
5	7	140%	5	15	300%	5	220%	5
NA	NA	NA		NA	NA			
15	18	120%	5	20	133%	5	NA	5
5	9	180%		13	260%			
NA	NA	NA		NA	NA			
40	65	163%	4	43.4	109%	4	NA	4
4	9	225%		17.4	435%			
4	1.6	40%	3	10.8	270%	3	155%	3
15	67	447%	5	52	347%	5	397%	5
20	19	95%	5	5	25%	3	60%	4
36	38	106%	15	28	78%	10	92%	12.5
1214	380	31%	2	430	35%	2	33%	2
0	1	1%	10	20	20%	5	11%	7.5
NA	NA	NA	3	NA	NA	0	NA	1.5
NA	NA	NA	2	NA	NA	0	NA	1
			76.5			*59.5*		68
			100			100		*100*
								2.04
NA	NA	NA	10	NA	NA	10	NA	10
NA	NA	NA	4	NA	NA	2	NA	3
NA	NA	NA	4	NA	NA	4	NA	4
NA	NA	NA	0	NA	NA	0	NA	0
NA	NA	NA	1.7	NA	NA	1.7	NA	1.7
NA	NA	NA	7.2	NA	NA	9	NA	8.1
NA	NA	NA	6.4	NA	NA	6.4	NA	6.4
			33.3			33.1		33.2
			56			*56*		*56*
								1.78
NA	NA	NA	5	NA	NA	5	NA	5
NA	NA	NA	15	NA	NA	15	NA	15
NA	NA	NA	10	NA	NA	10	NA	10
NA	NA	NA	0	NA	NA	0	NA	0
			30			30		30
			70			70		*70*
								1.71

IMPACT - South-eastern Glossy Black-Cockatoo (Calyptorhynchus lathami lathami)

Assessment Unit - Regional Ecosystem	Max score	AU 3 (Remnant 11.3.19)						AU 4 (Remnant 11.3.2)				
Site Reference	V1.2	Benchmark	HQ3a			Average % benchmark	Average Score	Benchmark	HQ4a			Average % benchmark
		11.3.19	Raw Data	% Benchmark	Score			11.3.2	Raw Data	% Benchmark	Score	
Recruitment of woody perennial species in EDL	5	**100**	0	0%	0	0%	0	**100**	100	100%	5	100%
Native plant species richness - trees	5	**7**	2	29%	2.5	29%	2.5	**2**	7	350%	5	350%
Native plant species richness - shrubs	5	**4**	2	50%	2.5	50%	2.5	**2**	3	150%	5	150%
Native plant species richness - grasses	5	**16**	18	113%	5	113%	5	**9**	5	56%	2.5	56%
Native plant species richness - forbes	5	**19**	11	58%	2.5	58%	2.5	**17**	2	12%	0	12%
Tree emergent height		**NA**	NA	NA				**NA**	NA	NA		
Tree canopy height	5	**15**	13	87%	2.5	NA	2.5	**18**	18	100%	5	NA
Tree sub-canopy height		**7**	0	0%				**NA**	NA	NA		
Tree emergent cover		**NA**	NA	NA				**NA**	NA	NA		
Tree canopy cover	5	**20**	23.8	119%	2.5	NA	2.5	**40**	38.5	96%	4	NA
Tree sub-canopy cover		**7**	0	0%				**NA**	NA	NA		
Shrub canopy cover	5	**17**	0	0%	0	0%	0	**2**	2.2	110%	5	110%
Native grass cover	5	**24**	20.4	85%	3	85%	3	**35**	30	86%	3	86%
Organic litter	5	**27**	8.4	31%	3	31%	3	**30**	28	93%	5	93%
Large trees (euc plus non-euc)	15	**26**	14	54%	10	54%	10	**22**	14	64%	10	64%
Coarse woody debris	5	**431**	130	30%	2	30%	2	**307**	250	81%	5	81%
Non-native plant cover	10	**0**	5	5%	5	5%	5	**0**	70	70%	0	70%
Quality and availability of food and foraging habitat	10	**NA**	NA	NA	2.5	NA	2.5	**NA**	NA	NA	2.5	NA
Quality and availability of shelter	10	**NA**	NA	NA	1.5	NA	1.5	**NA**	NA	NA	6.3	NA
Site Condition Score					*44.5*		44.5				*63.3*	
MAX Site Condition Score	100				100		*100*				100	
Site Condition Score - out of 3							**1.34**					
Site Context												
Size of patch	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	0	NA
Connectedness	5	**NA**	NA	NA	4	NA	4	**NA**	NA	NA	0	NA
Context	5	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	0	NA
Ecological Corridors	6	**NA**	NA	NA	6	NA	6	**NA**	NA	NA	0	NA
Role of site location to species overall population in the state	5	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA
Threats to the species	15	**NA**	NA	NA	12.3	NA	12.3	**NA**	NA	NA	5.4	NA
Species mobility capacity	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA
Site Context Score					49		49				17.1	
MAX Site Context Score	56				*56*		*56*				*56*	
Site Context Score - out of 3							**2.63**					
Species Stocking Rate (SSR)												
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA
Species usage of the site (habitat type & evidenced usage)	15	NA	NA	NA	10	NA	10	NA	NA	NA	15	NA
Approximate density (per ha)	30	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA
Role/importance of species population on site*	15	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA
SSR Score					35		35				40	
Max SSR Score	70				70		*70*				70	
SRR Score (out of 4)							**2.00**					

Final habitat quality score (weighted)	**AU 3 (Remnant 11.3.19)**	**AU 4 (Remnant 11.3.2)**	**AU 5 (Non-Remnant HVR 11.3.2)**	**AU 6 (Remnant 11.3.2 Poplar Box TEC)**	**AU 7 (Remnant 11.3.25)**	**AU 9 (Remnant 11.5.1)**	**AU 10 (HVR 11.5.1)**	**AU 11 (11.5.16 Brigalow TEC)**	**AU 12 (Remnant 11.5.4)**	**AU 16 (11.9.5 Brigalow TEC)**	**AU 17 (HVR 11.9.5)**	**AU 18 (Remnant 11.9.5a)**
Site Condition score (out of 3)	1.34	1.90	1.56	1.82	1.85	1.92	1.76	2.03	2.18	1.86	1.08	1.78
Site Context Score (out of 3)	2.63	0.92	1.66	1.13	2.11	1.90	1.83	1.98	1.79	1.27	1.59	1.06
Species Stocking Rate Score (out of 4)	2.00	2.29	2.00	2.29	2.29	2.29	2.00	2.29	2.14	2.00	2.00	2.29
Habitat Quality score (out of 10)	5.96	5.10	5.22	5.23	6.24	6.11	5.58	6.30	6.12	5.13	4.67	5.12
Assessment Unit area (ha) in disturbance footprint	0.91	0.44	0.08	0.08	0.87	20.18	0.43	0.73	1.57	0.01	0.14	0.01
Assessment Unit area (ha) in disturbance footprint + 10% buffer	1.01	0.49	0.09	0.09	0.96	22.20	0.48	0.81	1.73	0.02	0.16	0.01
Total impact area (ha) for this MNES (including 10% buffer)	28.32	28.32	28.32	28.32	28.32	28.32	28.32	28.32	28.32	28.32	28.32	28.32
Size Weighting	0.04	0.02	0.00	0.00	0.03	0.78	0.02	0.03	0.06	0.00	0.01	0.00
Weighted Habitat Quality Score	***0.212***	***0.088***	***0.017***	***0.016***	***0.211***	***4.790***	***0.094***	***0.179***	***0.373***	***0.003***	***0.026***	***0.001***

	AU 5 (Non-Remnant HVR 11.3.2)						AU 6 (Remnant 11.3.2 Poplar Box TEC)									
	Benchmark	HQ5a			Average %		Benchmark	HQ6a			Average %		Benchmark	HQ7a		
Average Score	11.3.2	Raw Data	% Benchmark	Score	benchmark	Average Score	11.3.2	Raw Data	% Benchmark	Score	benchmark	Average Score	11.3.25	Raw Data	% Benchmark	Score
5	**100**	100	100%	5	100%	5	**100**	75	75%	3	75%	3	**100**	25	25%	3
5	**2**	3	150%	5	150%	5	**2**	5	250%	5	250%	5	**4**	9	225%	5
5	**2**	5	250%	5	250%	5	**2**	2	100%	5	100%	5	**4**	8	200%	5
2.5	**9**	15	167%	5	167%	5	**9**	7	78%	2.5	78%	2.5	**8**	11	138%	5
0	**17**	4	24%	0	24%	0	**17**	6	35%	2.5	35%	2.5	**13**	2	15%	0
	NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA	
5	**18**	12	67%	4	NA	4	**18**	16	89%	5	NA	5	**23**	21	91%	5
	NA	0	NA				**NA**	NA	NA				**11**	12	109%	
	NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA	
4	**40**	21.8	55%	4	NA	4	**40**	41	103%	4	NA	4	**34**	37.3	110%	5
	NA	NA	NA				**NA**	NA	NA				**12**	16.1	134%	
5	**2**	3.5	175%	5	175%	5	**2**	1	50%	5	50%	5	**7**	4.6	66%	5
3	**35**	47	134%	5	134%	5	**35**	56	160%	5	160%	5	**35**	0	0%	0
5	**30**	6	20%	3	20%	3	**30**	10	33%	3	33%	3	**21**	12	57%	5
10	**22**	0	0%	0	0%	0	**22**	6	27%	5	27%	5	**32**	28	88%	10
5	**307**	110	36%	2	36%	2	**307**	180	59%	5	59%	5	**473**	250	53%	5
0	**0**	5	5%	5	5%	5	**0**	35	35%	3	35%	3	**0**	70	70%	0
2.5	**NA**	NA	NA	2.5	NA	2.5	**NA**	NA	NA	2.5	NA	2.5	**NA**	NA	NA	5
6.3	**NA**	NA	NA	1.5	NA	1.5	**NA**	NA	NA	5.3	NA	5.3	**NA**	NA	NA	8
63.3				*52*		52				*60.8*		60.8				*66*
100				100		*100*				100		*100*				100
1.90						**1.56**						**1.82**				
0	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7
5.4	**NA**	NA	NA	9.3	NA	9.3	**NA**	NA	NA	9.3	NA	9.3	**NA**	NA	NA	10
10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10
17.1				31		31				21		21				21.7
56				*56*		*56*				*56*		*56*				*56*
0.92						**1.66**						**1.13**				
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10
15	NA	NA	NA	10	NA	10	NA	NA	NA	15	NA	15	NA	NA	NA	15
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10
5	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA	NA	NA	5
40				35		35				40		40				40
70				70		*70*				70		*70*				70
2.29						**2.00**						**2.29**				

AU 19 (Remnant 11.9.5a Brigalow TEC)	AU 20 (HVR 11.9.5a)	Average/Final
2.34	0.96	1.75
0.92	1.67	1.47
2.00	2.00	2.10
5.26	4.63	5.32
0.17	0.10	25.7
0.19	0.11	28.3
28.32	28.32	28.32
0.01	0.00	1.00
0.035	***0.019***	***6***

AU 7 (Remnant 11.3.25)								AU 9 (Remnant 11.5.1)								
HQ7b			HQ7c			Average % benchmark	Average Score	Benchmark 11.5.1	HQ9a			HQ9b			Average % benchmark	Average Score
Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score		
0	0%	0	0	0%	0	8%	1	**100**	0	0%	0	50	50%	3	25%	1.5
3	75%	2.5	5	125%	5	142%	4.166666667	**5**	5	100%	5	6	120%	5	110%	5
1	25%	2.5	3	75%	2.5	100%	3.333333333	**5**	5	100%	5	3	60%	2.5	80%	3.75
9	113%	5	15	188%	5	146%	5	**8**	4	50%	2.5	16	200%	5	125%	3.75
7	54%	2.5	4	31%	2.5	33%	1.666666667	**10**	4	40%	2.5	6	60%	2.5	50%	2.5
NA	NA		NA	NA				**NA**	NA	NA		NA	NA			
22	96%	5	23	100%	2.5	NA	4.166666667	**20**	17	85%	5	19	95%	2.5	NA	3.75
14	127%		0	0%				**9**	10	111%		0	0%			
NA	NA		NA	NA				**NA**	NA	NA		NA	NA			
66.4	195%	2.5	73.1	215%	3	NA	3.5	**25**	50.2	201%	4	30.5	122%	5	NA	4.5
0	0%		36.7	306%				**20**	29.1	146%		26.4	132%			
5.6	80%	5	1.7	24%	3	57%	4.333333333	**6**	12.4	207%	3	3.6	60%	5	133%	4
12	34%	1	70.8	202%	5	79%	2	**23**	10	43%	1	8	35%	1	39%	1
16	76%	5	21.8	104%	5	79%	5	**45**	10	22%	3	35	78%	5	50%	4
28	88%	10	68	213%	15	129%	11.66666667	**17**	18	106%	15	4	24%	5	65%	10
90	19%	2	110	23%	2	32%	3	**135**	560	415%	2	380	281%	2	348%	2
20	20%	5	60	60%	0	50%	1.666666667	**0**	5	5%	5	60	60%	0	33%	2.5
NA	NA	2.5	NA	NA	2.5	NA	3.333333333	**NA**	NA	NA	10	NA	NA	2.5	NA	6.25
NA	NA	5.3	NA	NA	10	NA	7.766666667	**NA**	NA	NA	10	NA	NA	9	NA	9.5
		55.8			*63*		61.6				*73*			*55*		64
		100			100		*100*				100			100		*100*
							1.85									**1.92**
NA	NA	10	NA	NA	10	NA	6.666666667	**NA**	NA	NA	10	NA	NA	10	NA	10
NA	NA	5	NA	NA	4	NA	3	**NA**	NA	NA	2	NA	NA	2	NA	2
NA	NA	5	NA	NA	4	NA	3	**NA**	NA	NA	4	NA	NA	5	NA	4.5
NA	NA	6	NA	NA	6	NA	4	**NA**	NA	NA	0	NA	NA	0	NA	0
NA	NA	1.7	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	NA	1.7	NA	1.7
NA	NA	12.3	NA	NA	10.8	NA	11.03333333	**NA**	NA	NA	5.1	NA	NA	9.6	NA	7.35
NA	NA	10	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10
		50			46.5		39.4				32.8			38.3		35.55
		56			*56*		*56*				*56*			*56*		*56*
							2.11									**1.90**
NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10
NA	NA	15	NA	NA	15	NA	15	NA	NA	NA	15	NA	NA	15	NA	15
NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10
NA	NA	5	NA	NA	5	NA	5	NA	NA	NA	5	NA	NA	5	NA	5
		40			40		40				40			40		40
		70			70		*70*				70			70		*70*
							2.29									**2.29**

AU 10 (HVR 11.5.1)						AU 11 (11.5.16 Brigalow TEC)								
Benchmark	HQ10a			Average %		**Benchmark**	HQ11a			Average %		**Benchmark**	HQ12a	
11.5.1	Raw Data	% Benchmark	Score	benchmark	Average Score	**11.5.16**	Raw Data	% Benchmark	Score	benchmark	Average Score	**11.5.4**	Raw Data	% Benchmark
100	0	0%	0	0%	0	**100**	100	100%	5	100%	5	**100**	0	0%
5	7	140%	5	140%	5	**3**	4	133%	5	133%	5	**4**	9	225%
5	7	140%	5	140%	5	**9**	5	56%	2.5	56%	2.5	**3**	7	233%
8	17	213%	5	213%	5	**5**	1	20%	0	20%	0	**13**	12	92%
10	5	50%	2.5	50%	2.5	**12**	4	33%	2.5	33%	2.5	**18**	3	17%
NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA
20	11	55%	1.5	NA	1.5	**13**	14	108%	5	NA	5	**21**	20	95%
9	0	0%				**7**	8	114%				**10**	10	100%
NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA
25	45.8	183%	2.5	NA	2.5	**52**	76	146%	3.5	NA	3.5	**30**	60.5	202%
20	0	0%				**26**	9.3	36%				**24**	24.7	103%
6	8.2	137%	5	137%	5	**24**	9.2	38%	3	38%	3	**7**	7.7	110%
23	23	100%	5	100%	5	**10**	27	270%	5	270%	5	**30**	38	127%
45	22	49%	3	49%	3	**47**	22	47%	3	47%	3	**58**	39	67%
17	16	94%	10	94%	10	**58**	12	21%	5	21%	5	**17**	60	353%
135	270	200%	5	200%	5	**1812**	750	41%	2	41%	2	**204**	320	157%
0	25	25%	3	25%	3	**0**	3	3%	10	3%	10	**0**	15	15%
NA	NA	NA	3.5	NA	3.5	**NA**	NA	NA	10	NA	10	**NA**	NA	NA
NA	NA	NA	2.5	NA	2.5	**NA**	NA	NA	6.3	NA	6.3	**NA**	NA	NA
			58.5		58.5				*67.8*		67.8			
			100		*100*				100		*100*			
					1.76						**2.03**			
NA	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA
NA	NA	NA	0	NA	0	**NA**	NA	NA	5	NA	5	**NA**	NA	NA
NA	NA	NA	4	NA	4	**NA**	NA	NA	4	NA	4	**NA**	NA	NA
NA	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA
NA	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA
NA	NA	NA	8.4	NA	8.4	**NA**	NA	NA	6.3	NA	6.3	**NA**	NA	NA
NA	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA
			34.1		34.1				37		37			
			56		*56*				*56*		*56*			
					1.83						**1.98**			
NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA
NA	NA	NA	10	NA	10	NA	NA	NA	15	NA	15	NA	NA	NA
NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA
NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA	NA	NA
			35		35				40		40			
			70		*70*				70		*70*			
					2.00						**2.29**			

AU 12 (Remnant 11.5.4)						AU 16 (11.9.5 Brigalow TEC)						AU 17 (HVR 11.9.5)			
	HQ12b			Average %		Benchmark	HQ16a			Average %		Benchmark	HQ17a		
Score	Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score
0	33	33%	3	17%	1.5	**100**	100	100%	5	100%	5	**100**	100	100%	5
5	8	200%	5	213%	5	**4**	5	125%	5	125%	5	**4**	3	75%	2.5
5	4	133%	5	183%	5	**5**	4	80%	2.5	80%	2.5	**5**	2	40%	2.5
5	11	85%	2.5	88%	3.75	**7**	10	143%	5	143%	5	**7**	6	86%	2.5
0	10	56%	2.5	36%	1.25	**13**	12	92%	5	92%	5	**13**	12	92%	5
	NA	NA				**NA**	NA	NA				**NA**	NA	NA	
5	22	105%	5	NA	5	**14**	8	57%	1.5	NA	1.5	**14**	7	50%	1.5
	13	130%				**7**	0	0%				**7**	0	0%	
	NA	NA				**NA**	NA	NA				**NA**	NA	NA	
4	48.9	163%	5	NA	4.5	**37**	59.5	161%	2.5	NA	2.5	**37**	23.9	65%	2.5
	25.6	107%				**20**	0	0%				**20**	0	0%	
5	3.5	50%	5	80%	5	**15**	12	80%	5	80%	5	**15**	4.7	31%	3
5	52	173%	5	150%	5	**27**	73	270%	5	270%	5	**27**	0	0%	0
5	15.8	27%	3	47%	4	**31**	9	29%	3	29%	3	**31**	13.4	43%	3
15	10	59%	10	206%	12.5	**16**	2	13%	5	13%	5	**16**	0	0%	0
5	320	157%	5	157%	5	**827**	160	19%	2	19%	2	**827**	30	4%	0
5	3	3%	10	9%	7.5	**0**	5	5%	5	5%	5	**0**	65	65%	0
4.5	NA	NA	2.5	NA	3.5	**NA**	NA	NA	9	NA	9	**NA**	NA	NA	6
8	NA	NA	0.5	NA	4.25	**NA**	NA	NA	1.5	NA	1.5	**NA**	NA	NA	2.5
76.5			*69*		72.75				*62*		62				*36*
100			100		*100*				100		*100*				100
					2.18						**1.86**				
10	NA	NA	10	NA	10	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	10
2	NA	NA	4	NA	3	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	0
4	NA	NA	4	NA	4	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	2
0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
1.7	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7
4.8	NA	NA	6.3	NA	4.8	**NA**	NA	NA	6	NA	6	**NA**	NA	NA	6
10	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10
32.5			36		33.5				23.7		23.7				29.7
56			*56*		*56*				*56*		*56*				*56*
					1.79						**1.27**				
10	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10
15	NA	NA	10	NA	12.5	NA	NA	NA	10	NA	10	NA	NA	NA	10
10	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10
5	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA	NA	NA	5
40			35		37.5				35		35				35
70			70		*70*				70		*70*				70
					2.14						**2.00**				

		AU 18 (Remnant 11.9.5a)						AU 19 (Remnant 11.9.5a Brigalow TEC)						
Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**	HQ18a Raw Data	HQ18a % Benchmark	HQ18a Score	Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**	HQ19a Raw Data	HQ19a % Benchmark	HQ19a Score	Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**
100%	5	**100**	100	100%	5	100%	5	**100**	50	50%	3	50%	3	**100**
75%	2.5	**4**	6	150%	5	150%	5	**4**	12	300%	5	300%	5	**4**
40%	2.5	**5**	10	200%	5	200%	5	**5**	4	80%	2.5	80%	2.5	**5**
86%	2.5	**7**	6	86%	2.5	86%	2.5	**7**	5	71%	2.5	71%	2.5	**7**
92%	5	**13**	7	54%	2.5	54%	2.5	**13**	7	54%	2.5	54%	2.5	**13**
		NA	NA	NA				**NA**	NA	NA				**NA**
NA	1.5	**14**	12	86%	2.5	NA	2.5	**14**	19	136%	5	NA	5	**14**
		7	0	0%				**7**	8	114%				**7**
		NA	NA	NA				**NA**	NA	NA				**NA**
NA	2.5	**37**	50.1	135%	2.5	NA	2.5	**37**	65.4	177%	5	NA	5	**37**
		20	0	0%				**20**	33.5	168%				**20**
31%	3	**15**	0	0%	0	0%	0	**15**	16.9	113%	5	113%	5	**15**
0%	0	**27**	9	33%	1	33%	1	**27**	15	56%	3	56%	3	**27**
43%	3	**31**	22	71%	5	71%	5	**31**	14	45%	3	45%	3	**31**
0%	0	**16**	8	50%	10	50%	10	**16**	28	175%	15	175%	15	**16**
4%	0	**827**	370	45%	2	45%	2	**827**	550	67%	5	67%	5	**827**
65%	0	**0**	50	50%	3	50%	3	**0**	3	3%	10	3%	10	**0**
NA	6	**NA**	NA	NA	9	NA	9	**NA**	NA	NA	9	NA	9	**NA**
NA	2.5	**NA**	NA	NA	4.3	NA	4.3	**NA**	NA	NA	2.5	NA	2.5	**NA**
	36				*59.3*		59.3				*78*		78	
	100				100		*100*				100		*100*	
	1.08						**1.78**						**2.34**	
NA	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
NA	0	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0	**NA**
NA	2	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**
NA	6	**NA**	NA	NA	6	NA	6	**NA**	NA	NA	5.4	NA	5.4	**NA**
NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**
	29.7				19.7		19.7				17.1		17.1	
	56				*56*		*56*				*56*		*56*	
	1.59						**1.06**						**0.92**	
NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
NA	10	NA	NA	NA	15	NA	15	NA	NA	NA	10	NA	10	NA
NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
NA	5	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA
	35				40		40				35		35	
	70				70		*70*				70		*70*	
	2.00						**2.29**						**2.00**	

AU 20 (HVR 11.9.5a)				
HQ20a			Average % benchmark	Average Score
Raw Data	% Benchmark	Score		
100	100%	5	100%	5
3	75%	2.5	75%	2.5
6	120%	5	120%	5
3	43%	2.5	43%	2.5
3	23%	0	23%	0
NA	NA			
5	36%	1.5	NA	1.5
0	0%			
NA	NA			
32.2	87%	2.5	NA	2.5
0	0%			
0.6	4%	0	4%	0
3	11%	1	11%	1
12	39%	3	39%	3
0	0%	0	0%	0
30	4%	0	4%	0
15	15%	5	15%	5
NA	NA	2.5	NA	2.5
NA	NA	1.5	NA	1.5
		32		32
		100		*100*
				0.96
NA	NA	10	NA	10
NA	NA	0	NA	0
NA	NA	2	NA	2
NA	NA	0	NA	0
NA	NA	1.7	NA	1.7
NA	NA	7.5	NA	7.5
NA	NA	10	NA	10
		31.2		31.2
		56		*56*
				1.67
NA	NA	10	NA	10
NA	NA	10	NA	10
NA	NA	10	NA	10
NA	NA	5	NA	5
		35		35
		70		*70*
				2.00

IMPACT - Koala (Phascolarctos cinereus)

Assessment Unit - Regional Ecosystem	Max score	AU 2 (Remnant 11.3.18)						AU 3 (Remnant 11.3.19)						
Site Reference	V1.2	Benchmark	HQ2a			Average %		Benchmark	HQ3a			Average %		Benchmark
		11.3.18	Raw Data	% Benchmark	Score	benchmark	Average Score	11.3.19	Raw Data	% Benchmark	Score	benchmark	Average Score	11.3.2
Recruitment of woody perennial species in EDL	5	**100**	25	25%	3	25%	3	**100**	0	0%	0	0%	0	**100**
Native plant species richness - trees	5	**4**	4	100%	5	100%	5	**7**	2	29%	2.5	29%	2.5	**2**
Native plant species richness - shrubs	5	**7**	3	43%	2.5	43%	2.5	**4**	2	50%	2.5	50%	2.5	**2**
Native plant species richness - grasses	5	**11**	12	109%	5	109%	5	**16**	18	113%	5	113%	5	**9**
Native plant species richness - forbes	5	**21**	7	33%	2.5	33%	2.5	**19**	11	58%	2.5	58%	2.5	**17**
Tree emergent height		**na**	na	na				**NA**	NA	NA				**NA**
Tree canopy height	5	**18**	17	94%	5	NA	5	**15**	13	87%	2.5	NA	2.5	**18**
Tree sub-canopy height		**9**	11	122%				**7**	0	0%				**NA**
Tree emergent cover		**na**	na	na				**NA**	NA	NA				**NA**
Tree canopy cover	5	**43**	46.8	109%	5	NA	5	**20**	23.8	119%	2.5	NA	2.5	**40**
Tree sub-canopy cover		**26**	25.8	99%				**7**	0	0%				**NA**
Shrub canopy cover	5	**5**	0.6	12%	3	12%	3	**17**	0	0%	0	0%	0	**2**
Native grass cover	5	**16**	34	213%	5	213%	5	**24**	20.4	85%	3	85%	3	**35**
Organic litter	5	**35**	9	26%	3	26%	3	**27**	8.4	31%	3	31%	3	**30**
Large trees (euc plus non-euc)	15	**24**	6	25%	5	25%	5	**26**	14	54%	10	54%	10	**22**
Coarse woody debris	5	**273**	170	62%	5	62%	5	**431**	130	30%	2	30%	2	**307**
Non-native plant cover	10	**0**	45	45%	2	45%	2	**0**	5	5%	5	5%	5	**0**
Quality and availability of food and foraging habitat	10	**NA**	NA	NA	9.5	NA	9.5	**NA**	NA	NA	5.9	NA	5.9	**NA**
Quality and availability of shelter	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	6	NA	6	**NA**
Site Condition Score					*70.5*		70.5				*52.4*		52.4	
MAX Site Condition Score	100				100		*100*				100		*100*	
Site Condition Score - out of 3							**2.12**						**1.57**	
Site Context														
Size of patch	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	10	NA	10	**NA**
Connectedness	5	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	4	NA	4	**NA**
Context	5	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	5	NA	5	**NA**
Ecological Corridors	6	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	6	NA	6	**NA**
Role of site location to species overall population in the state	5	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
Threats to the species	15	**NA**	NA	NA	9.7	NA	9.7	**NA**	NA	NA	10.9	NA	10.9	**NA**
Species mobility capacity	10	**NA**	NA	NA	3.6	NA	3.6	**NA**	NA	NA	6	NA	6	**NA**
Site Context Score					13.3		13.3				41.9		41.9	
MAX Site Context Score	56				*56*		*56*				*56*		*56*	
Site Context Score - out of 3							**0.71**						**2.24**	
Species Stocking Rate (SSR)														
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
Species usage of the site (habitat type & evidenced usage)	15	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA
Approximate density (per ha)	30	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
Role/importance of species population on site*	15	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA
SSR Score					35		35				35		35	
Max SSR Score	70				70		*70*				70		*70*	
SRR Score (out of 4)							**2.00**						**2.00**	

Final habitat quality score (weighted)	**AU 2 (Remnant 11.3.18)**	**AU 3 (Remnant 11.3.19)**	**AU 4 (Remnant 11.3.2)**	**AU 5 (Non-Remnant HVR 11.3.2)**	**AU 6 (Remnant 11.3.2 Poplar Box TEC)**	**AU 7 (Remnant 11.3.25)**	**AU 8 (Remnant 11.3.4)**	**AU 9 (Remnant 11.5.1)**	**AU 10 (HVR 11.5.1)**	**AU 11 (11.5.16 Brigalow TEC)**	**AU 12 (Remnant 11.5.4)**	**AU 13 (Remnant 11.7.2)**	**AU 15 (Remnant 11.9.5)**	**AU 16 (11.9.5 Brigalow TEC)**
Site Condition score (out of 3)	2.12	1.57	2.22	2.03	2.18	2.02	1.92	1.88	2.15	1.85	2.12	2.14	2.02	1.97
Site Context Score (out of 3)	0.71	2.24	0.62	1.23	0.78	1.76	0.73	1.76	1.54	1.82	1.82	1.71	0.74	1.13
Species Stocking Rate Score (out of 4)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Habitat Quality score (out of 10)	4.83	5.82	4.84	5.26	4.95	5.78	4.65	5.64	5.68	5.67	5.94	5.85	4.76	5.10
Assessment Unit area (ha) in disturbance footprint	0.20	0.91	0.44	0.08	0.08	0.87	0.01	20.18	0.43	0.73	1.57	2.96	0.13	0.01
Assessment Unit area (ha) in disturbance footprint + 10% buffer	0.22	1.01	0.49	0.09	0.09	0.96	0.01	22.20	0.48	0.81	1.73	3.25	0.14	0.02
Total impact area (ha) for this MNES (including 10% buffer)	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1
Size Weighting	0.01	0.03	0.01	0.00	0.00	0.03	0.00	0.63	0.01	0.02	0.05	0.09	0.00	0.00
Weighted Habitat Quality Score	***0.031***	***0.167***	***0.067***	***0.014***	***0.012***	***0.157***	***0.001***	***3.568***	***0.077***	***0.130***	***0.292***	***0.543***	***0.019***	***0.002***

AU 4 (Remnant 11.3.2)					AU 5 (Non-Remnant HVR 11.3.2)						AU 6 (Remnant 11.3.2 Poplar Box TEC)					
HQ4a			Average % benchmark	Average Score	Benchmark 11.3.2	HQ5a			Average % benchmark	Average Score	Benchmark 11.3.2	HQ6a			Average % benchmark	Average Score
Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score		
100	100%	5	100%	5	**100**	100	100%	5	100%	5	**100**	75	75%	3	75%	3
7	350%	5	350%	5	**2**	3	150%	5	150%	5	**2**	5	250%	5	250%	5
3	150%	5	150%	5	**2**	5	250%	5	250%	5	**2**	2	100%	5	100%	5
5	56%	2.5	56%	2.5	**9**	15	167%	5	167%	5	**9**	7	78%	2.5	78%	2.5
2	12%	0	12%	0	**17**	4	24%	0	24%	0	**17**	6	35%	2.5	35%	2.5
NA	NA				**NA**	NA	NA				**NA**	NA	NA			
18	100%	5	NA	5	**18**	12	67%	4	NA	4	**18**	16	89%	5	NA	5
NA	NA				**NA**	0	NA				**NA**	NA	NA			
NA	NA				**NA**	NA	NA				**NA**	NA	NA			
38.5	96%	4	NA	4	**40**	21.8	55%	4	NA	4	**40**	41	103%	4	NA	4
NA	NA				**NA**	NA	NA				**NA**	NA	NA			
2.2	110%	5	110%	5	**2**	3.5	175%	5	175%	5	**2**	1	50%	5	50%	5
30	86%	3	86%	3	**35**	47	134%	5	134%	5	**35**	56	160%	5	160%	5
28	93%	5	93%	5	**30**	6	20%	3	20%	3	**30**	10	33%	3	33%	3
14	64%	10	64%	10	**22**	0	0%	0	0%	0	**22**	6	27%	5	27%	5
250	81%	5	81%	5	**307**	110	36%	2	36%	2	**307**	180	59%	5	59%	5
70	70%	0	70%	0	**0**	5	5%	5	5%	5	**0**	35	35%	3	35%	3
NA	NA	9.5	NA	9.5	**NA**	NA	NA	9.5	NA	9.5	**NA**	NA	NA	9.5	NA	9.5
NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10
		74		74				*67.5*		67.5				*72.5*		72.5
		100		*100*				100		*100*				100		*100*
				2.22						**2.03**						**2.18**
NA	NA	0	NA	0	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	0	NA	0
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	NA	7.9	NA	7.9	**NA**	NA	NA	9.4	NA	9.4	**NA**	NA	NA	9.7	NA	9.7
NA	NA	3.6	NA	3.6	**NA**	NA	NA	3.6	NA	3.6	**NA**	NA	NA	4.8	NA	4.8
		11.5		11.5				23		23				14.5		14.5
		56		*56*				*56*		*56*				*56*		*56*
				0.62						**1.23**						**0.78**
NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15
NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0
		35		35				35		35				35		35
		70		*70*				70		*70*				70		*70*
				2.00						**2.00**						**2.00**

AU 18 (Remnant 11.9.5a)	AU 19 (Remnant 11.9.5a Brigalow TEC)	AU 21 (Non remnant 11.9.5 (Western)	AU 21 (Non-remnant 11.5.1)	Average/Final
1.70	2.53	0.53	1.16	1.82
0.88	1.30	0.62	1.47	1.35
2.00	2.00	2.00	2.00	2.00
4.58	5.83	3.15	4.63	5.17
0.01	0.17	1.55	1.55	31.9
0.01	0.19	1.71	1.71	35.1
35.1	35.1	35.1	35.1	35.1
0.00	0.01	0.049	0.049	1.00
0.001	***0.031***	***0.153***	***0.225***	***5***

AU 7 (Remnant 11.3.25)												AU 8 (Remnant 11.3.4)				
Benchmark	HQ7a			HQ7b			HQ7c			Average %		Benchmark	HQ8a			Average %
11.3.25	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score	11.3.4	Raw Data	% Benchmark	Score	benchmark
100	25	25%	3	0	0%	0	0	0%	0	8%	1	**100**	0	0%	0	0%
4	9	225%	5	3	75%	2.5	5	125%	5	142%	4.166666667	**4**	7	175%	5	175%
4	8	200%	5	1	25%	2.5	3	75%	2.5	100%	3.333333333	**2**	7	350%	5	350%
8	11	138%	5	9	113%	5	15	188%	5	146%	5	**7**	17	243%	5	243%
13	2	15%	0	7	54%	2.5	4	31%	2.5	33%	1.666666667	**10**	5	50%	2.5	50%
NA	NA	NA		NA	NA		NA	NA				**NA**	NA	NA		
23	21	91%	5	22	96%	5	23	100%	2.5	NA	4.166666667	**22**	11	50%	1.5	NA
11	12	109%		14	127%		0	0%				**12**	0	0%		
NA	NA	NA		NA	NA		NA	NA				**NA**	NA	NA		
34	37.3	110%	5	66.4	195%	2.5	73.1	215%	3	NA	3.5	**17**	45.8	269%	1.5	NA
12	16.1	134%		0	0%		36.7	306%				**5**	0	0%		
7	4.6	66%	5	5.6	80%	5	1.7	24%	3	57%	4.333333333	**1**	8.2	820%	3	820%
35	0	0%	0	12	34%	1	70.8	202%	5	79%	2	**43**	23	53%	3	53%
21	12	57%	5	16	76%	5	21.8	104%	5	79%	5	**20**	22	110%	5	110%
32	28	88%	10	28	88%	10	68	213%	15	129%	11.66666667	**35**	16	46%	5	46%
473	250	53%	5	90	19%	2	110	23%	2	32%	3	**384**	270	70%	5	70%
0	70	70%	0	20	20%	5	60	60%	0	50%	1.666666667	**0**	25	25%	3	25%
NA	NA	NA	9.5	NA	NA	9.5	NA	NA	5.9	NA	8.3	**NA**	NA	NA	9.5	NA
NA	NA	NA	10	NA	NA	10	NA	NA	6	NA	8.666666667	**NA**	NA	NA	10	NA
			72.5			*67.5*			*62.4*		67.46666667				*64*	
			100			100			100		*100*				100	
											2.02					
NA	NA	NA	0	NA	NA	10	NA	NA	10	NA	6.666666667	**NA**	NA	NA	0	NA
NA	NA	NA	0	NA	NA	5	NA	NA	4	NA	3	**NA**	NA	NA	0	NA
NA	NA	NA	0	NA	NA	5	NA	NA	4	NA	3	**NA**	NA	NA	0	NA
NA	NA	NA	0	NA	NA	6	NA	NA	6	NA	4	**NA**	NA	NA	0	NA
NA	NA	NA	0	NA	NA	0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA
NA	NA	NA	10.9	NA	NA	10.9	NA	NA	11.7	NA	11.16666667	**NA**	NA	NA	10	NA
NA	NA	NA	3.2	NA	NA	6.8	NA	NA	4.8	NA	4.933333333	**NA**	NA	NA	3.6	NA
			14.1			43.7			40.5		32.76666667				13.6	
			56			*56*			*56*		*56*				*56*	
											1.76					
NA	NA	NA	10	NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA
NA	NA	NA	15	NA	NA	15	NA	NA	15	NA	15	NA	NA	NA	15	NA
NA	NA	NA	10	NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA
NA	NA	NA	0	NA	NA	0	NA	NA	0	NA	0	NA	NA	NA	0	NA
			35			35			35		35				35	
			70			70			70		*70*				70	
											2.00					

	AU 9 (Remnant 11.5.1)									AU 10 (HVR 11.5.1)						
	Benchmark	HQ9a			HQ9b			Average %		Benchmark	HQ10a			Average %		Benchmark
Average Score	11.5.1	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score	11.5.1	Raw Data	% Benchmark	Score	benchmark	Average Score	11.5.16
0	**100**	0	0%	0	50	50%	3	25%	1.5	**100**	0	0%	0	0%	0	**100**
5	**5**	5	100%	5	6	120%	5	110%	5	**5**	7	140%	5	140%	5	**3**
5	**5**	5	100%	5	3	60%	2.5	80%	3.75	**5**	7	140%	5	140%	5	**9**
5	**8**	4	50%	2.5	16	200%	5	125%	3.75	**8**	17	213%	5	213%	5	**5**
2.5	**10**	4	40%	2.5	6	60%	2.5	50%	2.5	**10**	5	50%	2.5	50%	2.5	**12**
	NA	NA	NA		NA	NA				**NA**	NA	NA				**NA**
1.5	**20**	17	85%	5	19	95%	2.5	NA	3.75	**20**	11	55%	1.5	NA	1.5	**13**
	9	10	111%		0	0%				**9**	0	0%				**7**
	NA	NA	NA		NA	NA				**NA**	NA	NA				**NA**
1.5	**25**	50.2	201%	4	30.5	122%	5	NA	4.5	**25**	45.8	183%	2.5	NA	2.5	**52**
	20	29.1	146%		26.4	132%				**20**	0	0%				**26**
3	**6**	12.4	207%	3	3.6	60%	5	133%	4	**6**	8.2	137%	5	137%	5	**24**
3	**23**	10	43%	1	8	35%	1	39%	1	**23**	23	100%	5	100%	5	**10**
5	**45**	10	22%	3	35	78%	5	50%	4	**45**	22	49%	3	49%	3	**47**
5	**17**	18	106%	15	4	24%	5	65%	10	**17**	16	94%	10	94%	10	**58**
5	**135**	560	415%	2	380	281%	2	348%	2	**135**	270	200%	5	200%	5	**1812**
3	**0**	5	5%	5	60	60%	0	33%	2.5	**0**	25	25%	3	25%	3	**0**
9.5	**NA**	NA	NA	9	NA	NA	3.6	NA	6.3	**NA**	NA	NA	9	NA	9	**NA**
10	**NA**	NA	NA	10	NA	NA	6	NA	8	**NA**	NA	NA	10	NA	10	**NA**
64				*72*			*53.1*		62.55				*71.5*		71.5	
100				100			100		*100*				100		*100*	
1.92									**1.88**						**2.15**	
0	**NA**	NA	NA	10	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**
0	**NA**	NA	NA	2	NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0	**NA**
0	**NA**	NA	NA	4	NA	NA	5	NA	4.5	**NA**	NA	NA	4	NA	4	**NA**
0	**NA**	NA	NA	0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
0	**NA**	NA	NA	0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
10	**NA**	NA	NA	9.9	NA	NA	10.9	NA	10.4	**NA**	NA	NA	9.9	NA	9.9	**NA**
3.6	**NA**	NA	NA	5.6	NA	NA	6.4	NA	6	**NA**	NA	NA	4.8	NA	4.8	**NA**
13.6				31.5			34.3		32.9				28.7		28.7	
56				*56*			*56*		*56*				*56*		*56*	
0.73									**1.76**						**1.54**	
10	NA	NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
15	NA	NA	NA	15	NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA
10	NA	NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
0	NA	NA	NA	0	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA
35				35			35		35				35		35	
70				70			70		*70*				70		*70*	
2.00									**2.00**						**2.00**	

AU 11 (11.5.16 Brigalow TEC)					AU 12 (Remnant 11.5.4)									HQ13a	
HQ11a			Average %		Benchmark	HQ12a			HQ12b			Average %		Benchmark	
Raw Data	% Benchmark	Score	benchmark	Average Score	11.5.4	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score	11.7.2	Raw Data	% Benchmark
100	100%	5	100%	5	**100**	0	0%	0	33	33%	3	17%	1.5	**100**	100	100%
4	133%	5	133%	5	**4**	9	225%	5	8	200%	5	213%	5	**3**	3	100%
5	56%	2.5	56%	2.5	**3**	7	233%	5	4	133%	5	183%	5	**4**	3	75%
1	20%	0	20%	0	**13**	12	92%	5	11	85%	2.5	88%	3.75	**5**	10	200%
4	33%	2.5	33%	2.5	**18**	3	17%	0	10	56%	2.5	36%	1.25	**5**	7	140%
NA	NA				**NA**	NA	NA		NA	NA				**NA**	NA	NA
14	108%	5	NA	5	**21**	20	95%	5	22	105%	5	NA	5	**15**	18	120%
8	114%				**10**	10	100%		13	130%				**5**	9	180%
NA	NA				**NA**	NA	NA		NA	NA				**NA**	NA	NA
76	146%	3.5	NA	3.5	**30**	60.5	202%	4	48.9	163%	5	NA	4.5	**40**	65	163%
9.3	36%				**24**	24.7	103%		25.6	107%				**4**	9	225%
9.2	38%	3	38%	3	**7**	7.7	110%	5	3.5	50%	5	80%	5	**4**	1.6	40%
27	270%	5	270%	5	**30**	38	127%	5	52	173%	5	150%	5	**15**	67	447%
22	47%	3	47%	3	**58**	39	67%	5	15.8	27%	3	47%	4	**20**	19	95%
12	21%	5	21%	5	**17**	60	353%	15	10	59%	10	206%	12.5	**36**	38	106%
750	41%	2	41%	2	**204**	320	157%	5	320	157%	5	157%	5	**1214**	380	31%
3	3%	10	3%	10	**0**	15	15%	5	3	3%	10	9%	7.5	**0**	1	1%
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	5.4	NA	2.7	**NA**	NA	NA
NA	NA	10	NA	10	**NA**	NA	NA	0	NA	NA	6	NA	3	**NA**	NA	NA
		61.5		61.5				*64*			*77.4*		70.7			
		100		*100*				100			100		*100*			
				1.85									**2.12**			
NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10	**NA**	NA	NA
NA	NA	5	NA	5	**NA**	NA	NA	2	NA	NA	4	NA	3	**NA**	NA	NA
NA	NA	4	NA	4	**NA**	NA	NA	4	NA	NA	4	NA	4	**NA**	NA	NA
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	0	NA	0	**NA**	NA	NA
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	0	NA	0	**NA**	NA	NA
NA	NA	8.2	NA	8.2	**NA**	NA	NA	10.9	NA	NA	10.9	NA	10.9	**NA**	NA	NA
NA	NA	6.8	NA	6.8	**NA**	NA	NA	6	NA	NA	6.8	NA	6	**NA**	NA	NA
		34		34				32.9			35.7		33.9			
		56		*56*				*56*			*56*		*56*			
				1.82									**1.82**			
NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10	NA	NA	NA
NA	NA	15	NA	15	NA	NA	NA	15	NA	NA	15	NA	15	NA	NA	NA
NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10	NA	NA	NA
NA	NA	0	NA	0	NA	NA	NA	0	NA	NA	0	NA	0	NA	NA	NA
		35		35				35			35		35			
		70		*70*				70			70		*70*			
				2.00									**2.00**			

AU 13 (Remnant 11.7.2)						AU 15 (Remnant 11.9.5)						AU 16 (11.9.5 Brigalow TEC)				
	HQ13b			Average %		Benchmark	HQ15a			Average %		Benchmark	HQ16a			Average %
Score	Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score	benchmark
5	100	100%	5	100%	5	**100**	33	33%	3	33%	3	**100**	100	100%	5	100%
5	3	100%	5	100%	5	**4**	13	325%	5	325%	5	**4**	5	125%	5	125%
2.5	3	75%	2.5	75%	2.5	**5**	3	60%	2.5	60%	2.5	**5**	4	80%	2.5	80%
5	10	200%	5	200%	5	**7**	4	57%	2.5	57%	2.5	**7**	10	143%	5	143%
5	15	300%	5	220%	5	**13**	6	46%	2.5	46%	2.5	**13**	12	92%	5	92%
	NA	NA				**NA**	NA	NA				**NA**	NA	NA		
5	20	133%	5	NA	5	**14**	17	121%	5	NA	5	**14**	8	57%	1.5	NA
	13	260%				**7**	13	186%				**7**	0	0%		
	NA	NA				**NA**	NA	NA				**NA**	NA	NA		
4	43.4	109%	4	NA	4	**37**	60.3	163%	5	NA	5	**37**	59.5	161%	2.5	NA
	17.4	435%				**20**	33.9	170%				**20**	0	0%		
3	10.8	270%	3	155%	3	**15**	10	67%	5	67%	5	**15**	12	80%	5	80%
5	52	347%	5	397%	5	**27**	3	11%	1	11%	1	**27**	73	270%	5	270%
5	5	25%	3	60%	4	**31**	25	81%	5	81%	5	**31**	9	29%	3	29%
15	28	78%	10	92%	12.5	**16**	10	63%	10	63%	10	**16**	2	13%	5	13%
2	430	35%	2	33%	2	**827**	510	62%	5	62%	5	**827**	160	19%	2	19%
10	20	20%	5	11%	7.5	**0**	55	55%	0	55%	0	**0**	5	5%	5	5%
5.4	NA	NA	0	NA	2.7	**NA**	NA	NA	5.9	NA	5.9	**NA**	NA	NA	4.1	NA
6	NA	NA	0	NA	3	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA
82.9			*59.5*		71.2				*67.4*		67.4				*65.6*	
100			100		*100*				100		*100*				100	
					2.14						**2.02**					
10	NA	NA	10	NA	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	2	NA
4	NA	NA	2	NA	3	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	2	NA
4	NA	NA	4	NA	4	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	2	NA
0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA
0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA
8.2	NA	NA	9.3	NA	8.2	**NA**	NA	NA	9	NA	9	**NA**	NA	NA	10.3	NA
6.8	NA	NA	6.8	NA	6.8	**NA**	NA	NA	4.8	NA	4.8	**NA**	NA	NA	4.8	NA
33			32.1		32				13.8		13.8				21.1	
56			*56*		*56*				*56*		*56*				*56*	
					1.71						**0.74**					
10	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA
15	NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA
10	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA
0	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA
35			35		35				35		35				35	
70			70		*70*				70		*70*				70	
					2.00						**2.00**					

	AU 18 (Remnant 11.9.5a)						AU 19 (Remnant 11.9.5a Brigalow TEC)								
	Benchmark	HQ18a			Average %		Benchmark	HQ19a			Average %		Benchmark	HQ21a	
Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark
5	**100**	100	100%	5	100%	5	**100**	50	50%	3	50%	3	**100**	100	100%
5	**4**	6	150%	5	150%	5	**4**	12	300%	5	300%	5	**4**	4	100%
2.5	**5**	10	200%	5	200%	5	**5**	4	80%	2.5	80%	2.5	**5**	3	60%
5	**7**	6	86%	2.5	86%	2.5	**7**	5	71%	2.5	71%	2.5	**7**	3	43%
5	**13**	7	54%	2.5	54%	2.5	**13**	7	54%	2.5	54%	2.5	**13**	7	54%
	NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA
1.5	**14**	12	86%	2.5	NA	2.5	**14**	19	136%	5	NA	5	**14**	3	21%
	7	0	0%				**7**	8	114%				**7**	0	0%
	NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA
2.5	**37**	50.1	135%	2.5	NA	2.5	**37**	65.4	177%	5	NA	5	**37**	1.8	5%
	20	0	0%				**20**	33.5	168%				**20**	0	0%
5	**15**	0	0%	0	0%	0	**15**	16.9	113%	5	113%	5	**15**	0.8	5%
5	**27**	9	33%	1	33%	1	**27**	15	56%	3	56%	3	**27**	12	44%
3	**31**	22	71%	5	71%	5	**31**	14	45%	3	45%	3	**31**	7.5	24%
5	**16**	8	50%	10	50%	10	**16**	28	175%	15	175%	15	**16**	0	0%
2	**827**	370	45%	2	45%	2	**827**	550	67%	5	67%	5	**827**	100	12%
5	**0**	50	50%	3	50%	3	**0**	3	3%	10	3%	10	**0**	60	60%
4.1	**NA**	NA	NA	0.5	NA	0.5	**NA**	NA	NA	7.7	NA	7.7	**NA**	NA	NA
10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA
65.6				*56.5*		56.5				*84.2*		84.2			
100				100		*100*				100		*100*			
1.97						**1.70**						**2.53**			
2	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA
2	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0	**NA**	NA	NA
2	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA
0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA
0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA
10.3	**NA**	NA	NA	10.9	NA	10.9	**NA**	NA	NA	10.3	NA	10.3	**NA**	NA	NA
4.8	**NA**	NA	NA	3.6	NA	3.6	**NA**	NA	NA	1.2	NA	1.2	**NA**	NA	NA
21.1				16.5		16.5				11.5		11.5			
56				*56*		*56*				*56*		*56*			
1.13						**0.88**						**0.62**			
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA
15	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA	NA	NA
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA
0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA
35				35		35				35		35			
70				70		*70*				70		*70*			
2.00						**2.00**						**2.00**			

AU 21 (Non-remnant)						AU 21 (Non-remnant)								
	HQ21b			Average %		Benchmark	HQ21c			HQ21d			Average %	
Score	Raw Data	% Benchmark	Score	benchmark	Average Score	11.5.1	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score
5	0	0%	0	50%	2.5	**100**	10	10%	0	20	20%	3	15%	1.5
5	2	50%	2.5	75%	3.75	**5**	5	100%	5	5	100%	5	100%	5
2.5	4	80%	2.5	70%	2.5	**5**	2	40%	2.5	3	60%	2.5	50%	2.5
2.5	5	71%	2.5	57%	2.5	**8**	6	75%	2.5	7	88%	2.5	81%	2.5
2.5	11	85%	2.5	69%	2.5	**10**	14	140%	5	9	90%	2.5	115%	3.75
	NA	NA				**NA**	NA	NA		NA	NA			
0	1	7%	0	NA	0	**20**	3	15%	0	7	35%	1.5	NA	0.75
	0	0%				**9**	0	0%		0	0%			
	NA	NA				**NA**	NA	NA		NA	NA			
0	0.5	1%	0	NA	0	**25**	0.8	3%	0	9.8	39%	1	NA	0.5
	0	0%				**20**	0	0%		0	0%			
0	0	0%	0	3%	0	**6**	0	0%	0	5	83%	5	42%	2.5
1	11	41%	1	43%	1	**23**	31	135%	5	17	74%	3	104%	4
3	0	0%	0	12%	1.5	**45**	0	0%	0	10	22%	3	11%	1.5
0	0	0%	0	0%	0	**17**	0	0%	0	0	0%	0	0%	0
2	5	1%	0	6%	1	**135**	0	0%	0	240	178%	5	89%	2.5
0	80	80%	0	70%	0	**0**	30	30%	3	80	80%	0	55%	1.5
0.52	NA	NA	0.52	NA	0.52	**NA**	NA	NA	0.52	NA	NA	9.52	NA	5.02
0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	10	NA	5
24.02			*11.52*		17.77				*23.52*			*53.52*		38.52
100			100		*100*				100			100		*100*
					0.53									**1.16**
10	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10
0	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	NA	2	NA	2
0	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	NA	4	NA	3
0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	0	NA	0
1.7	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	NA	1.7	NA	1.7
9.6	NA	NA	7.2	NA	8.4	**NA**	NA	NA	7.2	NA	NA	7.2	NA	7.2
4.8	NA	NA	3.6	NA	4.2	**NA**	NA	NA	3.6	NA	NA	3.6	NA	3.6
26.1			22.5		24.3				26.5			28.5		27.5
56			*56*		*56*				*56*			*56*		*56*
					1.30									**1.47**
10	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10
10	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10
10	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10
5	NA	NA	5	NA	5	NA	NA	NA	5	NA	NA	5	NA	5
35			35		35				35			35		35
70			70		*70*				70			70		*70*
					2.00									**2.00**

IMPACT - Dulacca Woodland Snail (Adclarkia dulacca)

Assessment Unit - Regional Ecosystem	Max score	AU 1 (Remnant 11.10.8)						AU 11 (11.5.16 Brigalow TEC)					
Site Reference	V1.2	Benchmark	HQ1a			Average % benchmark	Average Score	Benchmark	HQ11a			Average % benchmark	Average Score
		11.9.4a	Raw Data	% Benchmark	Score			11.5.16	Raw Data	% Benchmark	Score		
Recruitment of woody perennial species in EDL	5	**100**	33	33%	3	33%	3	**100**	100	100%	5	100%	5
Native plant species richness - trees	5	**19**	18	95%	5	95%	5	**3**	4	133%	5	133%	5
Native plant species richness - shrubs	5	**17**	7	41%	2.5	41%	2.5	**9**	5	56%	2.5	56%	2.5
Native plant species richness - grasses	5	**3**	5	167%	5	167%	5	**5**	1	20%	0	20%	0
Native plant species richness - forbes	5	**13**	1	8%	0	8%	0	**12**	4	33%	2.5	33%	2.5
Tree emergent height		**18**	0	0%				**NA**	NA	NA			
Tree canopy height	5	**13**	8	62%	1.5	NA	2	**13**	14	108%	5	NA	5
Tree sub-canopy height		**7**	0	0%				**7**	8	114%			
Tree emergent cover		**5**	14.1	282%				**NA**	NA	NA			
Tree canopy cover	5	**30**	42.3	141%	2.5	NA	2.625	**52**	76	146%	3.5	NA	3.5
Tree sub-canopy cover		**33**	0	0%				**26**	9.3	36%			
Shrub canopy cover	5	**24**	20.5	85%	5	85%	5	**24**	9.2	38%	3	38%	3
Native grass cover	5	**3**	0	0%	0	0%	0	**10**	27	270%	5	270%	5
Organic litter	5	**60**	19	32%	3	32%	3	**47**	22	47%	3	47%	3
Large trees (euc plus non-euc)	15	**146**	34	23%	5	23%	5	**58**	12	21%	5	21%	5
Coarse woody debris	5	**1035**	950	92%	5	92%	5	**1812**	750	41%	2	41%	2
Non-native plant cover	10	**0**	40	40%	2	40%	2	**0**	3	3%	10	3%	10
Quality and availability of food and foraging habitat	10	**NA**	NA	NA	8	NA	8	**NA**	NA	NA	7	NA	7
Quality and availability of shelter	10	**NA**	NA	NA	8	NA	8	**NA**	NA	NA	10	NA	10
Site Condition Score					*55.5*		56.125				*68.5*		68.5
MAX Site Condition Score	100				100		*100*				100		*100*
Site Condition Score - out of 3							**1.68**						**2.06**
Site Context													
Size of patch	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	10	NA	10
Connectedness	5	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	5	NA	5
Context	5	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	4	NA	4
Ecological Corridors	6	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
Role of site location to species overall population in the state	5	**NA**	NA	NA	3.3	NA	3.3	**NA**	NA	NA	3.3	NA	3.3
Threats to the species	15	**NA**	NA	NA	6.4	NA	6.4	**NA**	NA	NA	5.2	NA	5.2
Species mobility capacity	10	**NA**	NA	NA	7	NA	7	**NA**	NA	NA	10	NA	10
Site Context Score					18.7		18.7				37.5		37.5
MAX Site Context Score	56				*56*		*56*				*56*		*56*
Site Context Score - out of 3							**1.00**						**2.01**
Species Stocking Rate (SSR)													
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0
Species usage of the site (habitat type & evidenced usage)	15	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15
Approximate density (per ha)	30	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
Role/importance of species population on site*	15	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
SSR Score					35		35				35		35
Max SSR Score	70				70		*70*				70		*70*
SRR Score (out of 4)							**2.00**						**2.00**

Final habitat quality score (weighted)	AU 1 (Remnant 11.10.8)	AU 11 (11.5.16 Brigalow TEC)	AU 13 (Remnant 11.7.2)	AU 15 (Remnant 11.9.5)	AU 16 (11.9.5 Brigalow TEC)	AU 17 (HVR 11.9.5)	AU 18 (Remnant 11.9.5a)	AU 19 (Remnant 11.9.5a Brigalow TEC)	AU 20 (HVR 11.9.5a)	Average/Final
Site Condition score (out of 3)	1.68	2.06	2.40	1.97	1.88	1.04	1.80	2.51	1.14	1.85
Site Context Score (out of 3)	1.00	2.01	1.86	0.91	1.23	1.33	0.94	0.86	1.36	1.31
Species Stocking Rate Score (out of 4)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Habitat Quality score (out of 10)	4.69	6.06	6.26	4.87	5.11	4.36	4.74	5.37	4.50	5.16
Assessment Unit area (ha) in disturbance footprint	0.11	0.73	2.96	0.13	0.01	0.14	0.01	0.17	0.10	4.4
Assessment Unit area (ha) in disturbance footprint + 10% buffer	0.13	0.81	3.25	0.14	0.02	0.16	0.01	0.19	0.11	4.81
Total impact area (ha) for this MNES (including 10% buffer)	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Size Weighting	0.03	0.17	0.70	0.03	0.00	0.03	0.00	0.04	0.02	1.03
Weighted Habitat Quality Score	***0.126***	***1.045***	***4.353***	***0.145***	***0.017***	***0.145***	***0.006***	***0.216***	***0.110***	***6***

AU 13 (Remnant 11.7.2)									AU 15 (Remnant 11.9.5)						
Benchmark 11.7.2	HQ13a			HQ13b			Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**	HQ15a			Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**
	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score			
100	100	100%	5	100	100%	5	100%	5	**100**	33	33%	3	33%	3	**100**
3	3	100%	5	3	100%	5	100%	5	**4**	13	325%	5	325%	5	**4**
4	3	75%	2.5	3	75%	2.5	75%	2.5	**5**	3	60%	2.5	60%	2.5	**5**
5	10	200%	5	10	200%	5	200%	5	**7**	4	57%	2.5	57%	2.5	**7**
5	7	140%	5	15	300%	5	220%	5	**13**	6	46%	2.5	46%	2.5	**13**
NA	NA	NA		NA	NA				**NA**	NA	NA				**NA**
15	18	120%	5	20	133%	5	NA	5	**14**	17	121%	5	NA	5	**14**
5	9	180%		13	260%				**7**	13	186%				**7**
NA	NA	NA		NA	NA				**NA**	NA	NA				**NA**
40	65	163%	4	43.4	109%	4	NA	4	**37**	60.3	163%	5	NA	5	**37**
4	9	225%		17.4	435%				**20**	33.9	170%				**20**
4	1.6	40%	3	10.8	270%	3	155%	3	**15**	10	67%	5	67%	5	**15**
15	67	447%	5	52	347%	5	397%	5	**27**	3	11%	1	11%	1	**27**
20	19	95%	5	5	25%	3	60%	4	**31**	25	81%	5	81%	5	**31**
36	38	106%	15	28	78%	10	92%	12.5	**16**	10	63%	10	63%	10	**16**
1214	380	31%	2	430	35%	2	33%	2	**827**	510	62%	5	62%	5	**827**
0	1	1%	10	20	20%	5	11%	7.5	**0**	55	55%	0	55%	0	**0**
NA	NA	NA	5	NA	NA	7	NA	6	**NA**	NA	NA	5	NA	5	**NA**
NA	NA	NA	9	NA	NA	8	NA	8.5	**NA**	NA	NA	9	NA	9	**NA**
			85.5			*74.5*		80				*65.5*		65.5	
			100			100		*100*				100		*100*	
								2.40						**1.97**	
NA	NA	NA	10	NA	NA	10	NA	10	**NA**	NA	NA	0	NA	0	**NA**
NA	NA	NA	4	NA	NA	2	NA	3	**NA**	NA	NA	0	NA	0	**NA**
NA	NA	NA	4	NA	NA	4	NA	4	**NA**	NA	NA	0	NA	0	**NA**
NA	NA	NA	0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
NA	NA	NA	3.3	NA	NA	3.3	NA	3.3	**NA**	NA	NA	3.3	NA	3.3	**NA**
NA	NA	NA	5.4	NA	NA	6.6	NA	5.4	**NA**	NA	NA	5.6	NA	5.6	**NA**
NA	NA	NA	9	NA	NA	7	NA	9	**NA**	NA	NA	8	NA	8	**NA**
			35.7			32.9		34.7				16.9		16.9	
			56			*56*		*56*				*56*		*56*	
								1.86						**0.91**	
NA	NA	NA	0	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA
NA	NA	NA	15	NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA
NA	NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
NA	NA	NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
			35			35		35				35		35	
			70			70		*70*				70		*70*	
								2.00						**2.00**	

AU 16 (11.9.5 Brigalow TEC)					AU 17 (HVR 11.9.5)						AU 18 (Remnant 11.9.5a)					
HQ16a			Average % benchmark	Average Score	Benchmark 11.9.5 (Western)	HQ17a			Average % benchmark	Average Score	Benchmark 11.9.5 (Western)	HQ18a			Average % benchmark	Average Score
Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score		
100	100%	5	100%	5	**100**	100	100%	5	100%	5	**100**	100	100%	5	100%	5
5	125%	5	125%	5	**4**	3	75%	2.5	75%	2.5	**4**	6	150%	5	150%	5
4	80%	2.5	80%	2.5	**5**	2	40%	2.5	40%	2.5	**5**	10	200%	5	200%	5
10	143%	5	143%	5	**7**	6	86%	2.5	86%	2.5	**7**	6	86%	2.5	86%	2.5
12	92%	5	92%	5	**13**	12	92%	5	92%	5	**13**	7	54%	2.5	54%	2.5
NA	NA				**NA**	NA	NA				**NA**	NA	NA			
8	57%	1.5	NA	1.5	**14**	7	50%	1.5	NA	1.5	**14**	12	86%	2.5	NA	2.5
0	0%				**7**	0	0%				**7**	0	0%			
NA	NA				**NA**	NA	NA				**NA**	NA	NA			
59.5	161%	2.5	NA	2.5	**37**	23.9	65%	2.5	NA	2.5	**37**	50.1	135%	2.5	NA	2.5
0	0%				**20**	0	0%				**20**	0	0%			
12	80%	5	80%	5	**15**	4.7	31%	3	31%	3	**15**	0	0%	0	0%	0
73	270%	5	270%	5	**27**	0	0%	0	0%	0	**27**	9	33%	1	33%	1
9	29%	3	29%	3	**31**	13.4	43%	3	43%	3	**31**	22	71%	5	71%	5
2	13%	5	13%	5	**16**	0	0%	0	0%	0	**16**	8	50%	10	50%	10
160	19%	2	19%	2	**827**	30	4%	0	4%	0	**827**	370	45%	2	45%	2
5	5%	5	5%	5	**0**	65	65%	0	65%	0	**0**	50	50%	3	50%	3
NA	NA	4	NA	4	**NA**	NA	NA	3	NA	3	**NA**	NA	NA	5	NA	5
NA	NA	7	NA	7	**NA**	NA	NA	4	NA	4	**NA**	NA	NA	9	NA	9
		62.5		62.5				*34.5*		34.5				*60*		60
		100		*100*				100		*100*				100		*100*
				1.88						**1.04**						**1.80**
NA	NA	2	NA	2	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	0	NA	0
NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	2
NA	NA	2	NA	2	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	NA	3.3	NA	3.3	**NA**	NA	NA	3.3	NA	3.3	**NA**	NA	NA	3.3	NA	3.3
NA	NA	7.2	NA	7.2	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	4.2	NA	4.2
NA	NA	6.5	NA	6.5	**NA**	NA	NA	4.5	NA	4.5	**NA**	NA	NA	8	NA	8
		23		23				24.8		24.8				17.5		17.5
		56		*56*				*56*		*56*				*56*		*56*
				1.23						**1.33**						**0.94**
NA	NA	0	NA	0	NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0
NA	NA	15	NA	15	NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15
NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
		35		35				35		35				35		35
		70		*70*				70		*70*				70		*70*
				2.00						**2.00**						**2.00**

AU 19 (Remnant 11.9.5a Brigalow TEC)						AU 20 (HVR 11.9.5a)					
Benchmark	HQ19a			Average %		**Benchmark**	HQ20a			Average %	
11.9.5 (Western)	Raw Data	% Benchmark	Score	benchmark	Average Score	**11.9.5 (Western)**	Raw Data	% Benchmark	Score	benchmark	Average Score
100	50	50%	3	50%	3	**100**	100	100%	5	100%	5
4	12	300%	5	300%	5	**4**	3	75%	2.5	75%	2.5
5	4	80%	2.5	80%	2.5	**5**	6	120%	5	120%	5
7	5	71%	2.5	71%	2.5	**7**	3	43%	2.5	43%	2.5
13	7	54%	2.5	54%	2.5	**13**	3	23%	0	23%	0
NA	NA	NA				**NA**	NA	NA			
14	19	136%	5	NA	5	**14**	5	36%	1.5	NA	1.5
7	8	114%				**7**	0	0%			
NA	NA	NA				**NA**	NA	NA			
37	65.4	177%	5	NA	5	**37**	32.2	87%	2.5	NA	2.5
20	33.5	168%				**20**	0	0%			
15	16.9	113%	5	113%	5	**15**	0.6	4%	0	4%	0
27	15	56%	3	56%	3	**27**	3	11%	1	11%	1
31	14	45%	3	45%	3	**31**	12	39%	3	39%	3
16	28	175%	15	175%	15	**16**	0	0%	0	0%	0
827	550	67%	5	67%	5	**827**	30	4%	0	4%	0
0	3	3%	10	3%	10	**0**	15	15%	5	15%	5
NA	NA	NA	8	NA	8	**NA**	NA	NA	3	NA	3
NA	NA	NA	9	NA	9	**NA**	NA	NA	7	NA	7
			83.5		83.5				*38*		38
			100		*100*				100		*100*
					2.51						**1.14**
NA	NA	NA	0	NA	0	**NA**	NA	NA	10	NA	10
NA	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	2
NA	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	NA	NA	3.3	NA	3.3	**NA**	NA	NA	3.3	NA	3.3
NA	NA	NA	4.8	NA	4.8	**NA**	NA	NA	4	NA	4
NA	NA	NA	8	NA	8	**NA**	NA	NA	6	NA	6
			16.1		16.1				25.3		25.3
			56		*56*				*56*		*56*
					0.86						**1.36**
NA	NA	NA	0	NA	0	NA	NA	NA	0	NA	0
NA	NA	NA	15	NA	15	NA	NA	NA	15	NA	15
NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10
			35		35				35		35
			70		*70*				70		*70*
					2.00						**2.00**

IMPACT - White-throated Needletail (Hirundapus caudacutus)

Assessment Unit - Regional Ecosystem	Max score	AU 1 (Remnant 11.10.8)						AU 2 (Remnant 11.3.18)						
Site Reference	V1.2	Benchmark	HQ1a			Average % benchmark	Average Score	Benchmark	HQ2a			Average % benchmark	Average Score	Benchmark
		11.9.4a	Raw Data	% Benchmark	Score			11.3.18	Raw Data	% Benchmark	Score			11.3.19
Recruitment of woody perennial species in EDL	5	**100**	33	33%	3	33%	3	**100**	25	25%	3	25%	3	**100**
Native plant species richness - trees	5	**19**	18	95%	5	95%	5	**4**	4	100%	5	100%	5	**7**
Native plant species richness - shrubs	5	**17**	7	41%	2.5	41%	2.5	**7**	3	43%	2.5	43%	2.5	**4**
Native plant species richness - grasses	5	**3**	5	167%	5	167%	5	**11**	12	109%	5	109%	5	**16**
Native plant species richness - forbes	5	**13**	1	8%	0	8%	0	**21**	7	33%	2.5	33%	2.5	**19**
Tree emergent height		**18**	0	0%				**na**	na	na				**NA**
Tree canopy height	5	**13**	8	62%	1.5	NA	2	**18**	17	94%	5	NA	5	**15**
Tree sub-canopy height		**7**	0	0%				**9**	11	122%				**7**
Tree emergent cover		**5**	14.1	282%				**na**	na	na				**NA**
Tree canopy cover	5	**30**	42.3	141%	2.5	NA	2.625	**43**	46.8	109%	5	NA	5	**20**
Tree sub-canopy cover		**33**	0	0%				**26**	25.8	99%				**7**
Shrub canopy cover	5	**24**	20.5	85%	5	85%	5	**5**	0.6	12%	3	12%	3	**17**
Native grass cover	5	**3**	0	0%	0	0%	0	**16**	34	213%	5	213%	5	**24**
Organic litter	5	**60**	19	32%	3	32%	3	**35**	9	26%	3	26%	3	**27**
Large trees (euc plus non-euc)	15	**146**	34	23%	5	23%	5	**24**	6	25%	5	25%	5	**26**
Coarse woody debris	5	**1035**	950	92%	5	92%	5	**273**	170	62%	5	62%	5	**431**
Non-native plant cover	10	**0**	40	40%	2	40%	2	**0**	45	45%	2	45%	2	**0**
Quality and availability of food and foraging habitat	10	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	5	NA	5	**NA**
Quality and availability of shelter	10	**NA**	NA	NA	6	NA	6	**NA**	NA	NA	6	NA	6	**NA**
Site Condition Score					*50.5*		51.125				*62*		62	
MAX Site Condition Score	100				100		*100*				100		*100*	
Site Condition Score - out of 3							**1.53**						**1.86**	
Site Context														
Size of patch	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
Connectedness	5	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0	**NA**
Context	5	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
Ecological Corridors	6	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
Role of site location to species overall population in the state	5	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**
Threats to the species	15	**NA**	NA	NA	15	NA	15	**NA**	NA	NA	15	NA	15	**NA**
Species mobility capacity	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**
Site Context Score					28.7		28.7				26.7		26.7	
MAX Site Context Score	56				*56*		*56*				*56*		*56*	
Site Context Score - out of 3							**1.54**						**1.43**	
Species Stocking Rate (SSR)														
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
Species usage of the site (habitat type & evidenced usage)	15	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
Approximate density (per ha)	30	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
Role/importance of species population on site*	15	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA
SSR Score					35		35				35		35	
Max SSR Score	70				70		*70*				70		*70*	
SRR Score (out of 4)							**2.00**						**2.00**	

Final habitat quality score (weighted)	**AU 1 (Remnant 11.10.8)**	**AU 2 (Remnant 11.3.18)**	**AU 3 (Remnant 11.3.19)**	**AU 4 (Remnant 11.3.2)**	**AU 5 (Non-Remnant HVR 11.3.2)**	**AU 6 (Remnant 11.3.2 Poplar Box TEC)**	**AU 7 (Remnant 11.3.25)**	**AU 8 (Remnant 11.3.4)**	**AU 9 (Remnant 11.5.1)**	**AU 10 (HVR 11.5.1)**	**AU 11 (11.5.16 Brigalow TEC)**	**AU 12 (Remnant 11.5.4)**	**AU 13 (Remnant 11.7.2)**	**AU 15 (Remnant 11.9.5)**
Site Condition score (out of 3)	1.53	1.86	1.67	1.97	1.65	1.80	1.93	1.79	1.84	1.91	2.00	2.40	2.42	1.76
Site Context Score (out of 3)	1.54	1.43	2.77	1.43	1.97	1.43	2.32	1.43	2.31	2.18	2.45	2.34	2.34	1.43
Species Stocking Rate Score (out of 4)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Habitat Quality score (out of 10)	5.07	5.29	6.43	5.40	5.62	5.23	6.25	5.22	6.15	6.09	6.44	6.74	6.76	5.19
Assessment Unit area (ha) in disturbance footprint	0.11	0.20	0.91	0.44	0.08	0.08	0.87	0.01	20.18	0.43	0.73	1.57	2.96	0.13
Assessment Unit area (ha) in disturbance footprint + 10% buffer	0.1	0.2	1.0	0.5	0.1	0.1	1.0	0.0	22.2	0.5	0.8	1.7	3.3	0.1
Total impact area (ha) for this MNES (including 10% buffer)	209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2
Size Weighting	0.001	0.001	0.005	0.002	0.000	0.000	0.005	0.000	0.106	0.002	0.004	0.008	0.016	0.001
Weighted Habitat Quality Score	***0.003***	***0.006***	***0.031***	***0.013***	***0.002***	***0.002***	***0.029***	***0.000***	***0.653***	***0.014***	***0.025***	***0.056***	***0.105***	***0.003***

AU 3 (Remnant 11.3.19)					AU 4 (Remnant 11.3.2)						AU 5 (Non-Remnant HVR 11.3.2)				
HQ3a			Average % benchmark	Average Score	Benchmark 11.3.2	HQ4a			Average % benchmark	Average Score	Benchmark 11.3.2	HQ5a			Average % benchmark
Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	
0	0%	0	0%	0	**100**	100	100%	5	100%	5	**100**	100	100%	5	100%
2	29%	2.5	29%	2.5	**2**	7	350%	5	350%	5	**2**	3	150%	5	150%
2	50%	2.5	50%	2.5	**2**	3	150%	5	150%	5	**2**	5	250%	5	250%
18	113%	5	113%	5	**9**	5	56%	2.5	56%	2.5	**9**	15	167%	5	167%
11	58%	2.5	58%	2.5	**17**	2	12%	0	12%	0	**17**	4	24%	0	24%
NA	NA				**NA**	NA	NA				**NA**	NA	NA		
13	87%	2.5	NA	2.5	**18**	18	100%	5	NA	5	**18**	12	67%	4	NA
0	0%				**NA**	NA	NA				**NA**	0	NA		
NA	NA				**NA**	NA	NA				**NA**	NA	NA		
23.8	119%	2.5	NA	2.5	**40**	38.5	96%	4	NA	4	**40**	21.8	55%	4	NA
0	0%				**NA**	NA	NA				**NA**	NA	NA		
0	0%	0	0%	0	**2**	2.2	110%	5	110%	5	**2**	3.5	175%	5	175%
20.4	85%	3	85%	3	**35**	30	86%	3	86%	3	**35**	47	134%	5	134%
8.4	31%	3	31%	3	**30**	28	93%	5	93%	5	**30**	6	20%	3	20%
14	54%	10	54%	10	**22**	14	64%	10	64%	10	**22**	0	0%	0	0%
130	30%	2	30%	2	**307**	250	81%	5	81%	5	**307**	110	36%	2	36%
5	5%	5	5%	5	**0**	70	70%	0	70%	0	**0**	5	5%	5	5%
NA	NA	5	NA	5	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	5	NA
NA	NA	10	NA	10	**NA**	NA	NA	6	NA	6	**NA**	NA	NA	2	NA
		55.5		55.5				*65.5*		65.5				*55*	
		100		*100*				100		*100*				100	
				1.67						**1.97**					
NA	NA	10	NA	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	10	NA
NA	NA	4	NA	4	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA
NA	NA	5	NA	5	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA
NA	NA	6	NA	6	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA
NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA
NA	NA	15	NA	15	**NA**	NA	NA	15	NA	15	**NA**	NA	NA	15	NA
NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA
		51.7		51.7				26.7		26.7				36.7	
		56		*56*				*56*		*56*				*56*	
				2.77						**1.43**					
NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA
NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA
NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA
NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA
		35		35				35		35				35	
		70		*70*				70		*70*				70	
				2.00						**2.00**					

AU 16 (11.9.5 Brigalow TEC)	AU 17 (HVR 11.9.5)	AU 18 (Remnant 11.9.5a)	AU 19 (Remnant 11.9.5a Brigalow TEC)	AU 20 (HVR 11.9.5a)	AU 21 (Non remnant 11.9.5 (Western)	AU 21 (Non-remnant 11.5.1)	Average/Final
1.76	1.04	1.71	2.33	1.05	0.67	1.01	1.68
1.75	2.07	1.54	1.43	2.07	1.97	2.23	1.88
2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
5.51	5.11	5.25	5.76	5.12	4.63	5.24	5.56
0.01	0.14	0.01	0.17	0.10	76.28	76.28	181.7
0.0	0.2	0.0	0.2	0.1	87.4	87.4	206.8
209.2	209.2	209.2	209.2	209.2	209.2	209.2	209.2
0.000	0.001	0.000	0.001	0.001	0.418	0.418	0.988
0.000	***0.004***	***0.000***	***0.005***	***0.003***	***1.935***	***2.187***	***5***

	AU 6 (Remnant 11.3.2 Poplar Box TEC)						AU 7 (Remnant 11.3.25)									
	Benchmark	HQ6a			Average %		Benchmark	HQ7a			HQ7b			HQ7c		
Average Score	11.3.2	Raw Data	% Benchmark	Score	benchmark	Average Score	11.3.25	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score
5	**100**	75	75%	3	75%	3	**100**	25	25%	3	0	0%	0	0	0%	0
5	**2**	5	250%	5	250%	5	**4**	9	225%	5	3	75%	2.5	5	125%	5
5	**2**	2	100%	5	100%	5	**4**	8	200%	5	1	25%	2.5	3	75%	2.5
5	**9**	7	78%	2.5	78%	2.5	**8**	11	138%	5	9	113%	5	15	188%	5
0	**17**	6	35%	2.5	35%	2.5	**13**	2	15%	0	7	54%	2.5	4	31%	2.5
	NA	NA	NA				**NA**	NA	NA		NA	NA		NA	NA	
4	**18**	16	89%	5	NA	5	**23**	21	91%	5	22	96%	5	23	100%	2.5
	NA	NA	NA				**11**	12	109%		14	127%		0	0%	
	NA	NA	NA				**NA**	NA	NA		NA	NA		NA	NA	
4	**40**	41	103%	4	NA	4	**34**	37.3	110%	5	66.4	195%	2.5	73.1	215%	3
	NA	NA	NA				**12**	16.1	134%		0	0%		36.7	306%	
5	**2**	1	50%	5	50%	5	**7**	4.6	66%	5	5.6	80%	5	1.7	24%	3
5	**35**	56	160%	5	160%	5	**35**	0	0%	0	12	34%	1	70.8	202%	5
3	**30**	10	33%	3	33%	3	**21**	12	57%	5	16	76%	5	21.8	104%	5
0	**22**	6	27%	5	27%	5	**32**	28	88%	10	28	88%	10	68	213%	15
2	**307**	180	59%	5	59%	5	**473**	250	53%	5	90	19%	2	110	23%	2
5	**0**	35	35%	3	35%	3	**0**	70	70%	0	20	20%	5	60	60%	0
5	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	5	NA	NA	5	NA	NA	5
2	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	6	NA	NA	10	NA	NA	10
55				*60*		60				*64*			*63*			*65.5*
100				100		*100*				100			100			100
1.65						**1.80**										
10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	10	NA	NA	10
0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	5	NA	NA	4
0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	5	NA	NA	4
0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	6	NA	NA	6
1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	NA	1.7	NA	NA	1.7
15	**NA**	NA	NA	15	NA	15	**NA**	NA	NA	15	NA	NA	15	NA	NA	15
10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	NA	10
36.7				26.7		26.7				26.7			52.7			50.7
56				*56*		*56*				*56*			*56*			*56*
1.97						**1.43**										
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	NA	10
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	NA	10
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	NA	10
5	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	NA	5	NA	NA	5
35				35		35				35			35			35
70				70		*70*				70			70			70
2.00						**2.00**										

		AU 8 (Remnant 11.3.4)						AU 9 (Remnant 11.5.1)							
Average % benchmark	Average Score	**Benchmark 11.3.4**	HQ8a Raw Data	HQ8a % Benchmark	HQ8a Score	Average % benchmark	Average Score	**Benchmark 11.5.1**	HQ9a Raw Data	HQ9a % Benchmark	HQ9a Score	HQ9b Raw Data	HQ9b % Benchmark	HQ9b Score	Average % benchmark
8%	1	**100**	0	0%	0	0%	0	**100**	0	0%	0	50	50%	3	25%
142%	4.166666667	**4**	7	175%	5	175%	5	**5**	5	100%	5	6	120%	5	110%
100%	3.333333333	**2**	7	350%	5	350%	5	**5**	5	100%	5	3	60%	2.5	80%
146%	5	**7**	17	243%	5	243%	5	**8**	4	50%	2.5	16	200%	5	125%
33%	1.666666667	**10**	5	50%	2.5	50%	2.5	**10**	4	40%	2.5	6	60%	2.5	50%
		NA	NA	NA				**NA**	NA	NA		NA	NA		
NA	4.166666667	**22**	11	50%	1.5	NA	1.5	**20**	17	85%	5	19	95%	2.5	NA
		12	0	0%				**9**	10	111%		0	0%		
		NA	NA	NA				**NA**	NA	NA		NA	NA		
NA	3.5	**17**	45.8	269%	1.5	NA	1.5	**25**	50.2	201%	4	30.5	122%	5	NA
		5	0	0%				**20**	29.1	146%		26.4	132%		
57%	4.333333333	**1**	8.2	820%	3	820%	3	**6**	12.4	207%	3	3.6	60%	5	133%
79%	2	**43**	23	53%	3	53%	3	**23**	10	43%	1	8	35%	1	39%
79%	5	**20**	22	110%	5	110%	5	**45**	10	22%	3	35	78%	5	50%
129%	11.66666667	**35**	16	46%	5	46%	5	**17**	18	106%	15	4	24%	5	65%
32%	3	**384**	270	70%	5	70%	5	**135**	560	415%	2	380	281%	2	348%
50%	1.666666667	**0**	25	25%	3	25%	3	**0**	5	5%	5	60	60%	0	33%
NA	5	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	5	NA	NA	5	NA
NA	8.666666667	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	6	NA	NA	10	NA
	64.16666667				*59.5*		59.5				*64*			*58.5*	
	100				100		*100*				100			100	
	1.93						**1.79**								
NA	6.666666667	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	10	NA	NA	10	NA
NA	3	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	NA	2	NA
NA	3	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	4	NA	NA	5	NA
NA	4	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	0	NA
NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	NA	1.7	NA
NA	15	**NA**	NA	NA	15	NA	15	**NA**	NA	NA	15	NA	NA	15	NA
NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA
	43.36666667				26.7		26.7				42.7			43.7	
	56				*56*		*56*				*56*			*56*	
	2.32						**1.43**								
NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA
NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA
NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA
NA	5	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	NA	5	NA
	35				35		35				35			35	
	70				70		*70*				70			70	
	2.00						**2.00**								

	AU 10 (HVR 11.5.1)						AU 11 (11.5.16 Brigalow TEC)							
	Benchmark	HQ10a			Average %		Benchmark	HQ11a			Average %		Benchmark	
Average Score	11.5.1	Raw Data	% Benchmark	Score	benchmark	Average Score	11.5.16	Raw Data	% Benchmark	Score	benchmark	Average Score	11.5.4	Raw Data
1.5	**100**	0	0%	0	0%	0	**100**	100	100%	5	100%	5	**100**	0
5	**5**	7	140%	5	140%	5	**3**	4	133%	5	133%	5	**4**	9
3.75	**5**	7	140%	5	140%	5	**9**	5	56%	2.5	56%	2.5	**3**	7
3.75	**8**	17	213%	5	213%	5	**5**	1	20%	0	20%	0	**13**	12
2.5	**10**	5	50%	2.5	50%	2.5	**12**	4	33%	2.5	33%	2.5	**18**	3
	NA	NA	NA				**NA**	NA	NA				**NA**	NA
3.75	**20**	11	55%	1.5	NA	1.5	**13**	14	108%	5	NA	5	**21**	20
	9	0	0%				**7**	8	114%				**10**	10
	NA	NA	NA				**NA**	NA	NA				**NA**	NA
4.5	**25**	45.8	183%	2.5	NA	2.5	**52**	76	146%	3.5	NA	3.5	**30**	60.5
	20	0	0%				**26**	9.3	36%				**24**	24.7
4	**6**	8.2	137%	5	137%	5	**24**	9.2	38%	3	38%	3	**7**	7.7
1	**23**	23	100%	5	100%	5	**10**	27	270%	5	270%	5	**30**	38
4	**45**	22	49%	3	49%	3	**47**	22	47%	3	47%	3	**58**	39
10	**17**	16	94%	10	94%	10	**58**	12	21%	5	21%	5	**17**	60
2	**135**	270	200%	5	200%	5	**1812**	750	41%	2	41%	2	**204**	320
2.5	**0**	25	25%	3	25%	3	**0**	3	3%	10	3%	10	**0**	15
5	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	5	NA	5	**NA**	NA
8	**NA**	NA	NA	6	NA	6	**NA**	NA	NA	10	NA	10	**NA**	NA
61.25				*63.5*		63.5				*66.5*		66.5		
100				100		*100*				100		*100*		
1.84						**1.91**						**2.00**		
10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA
2	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	5	NA	5	**NA**	NA
4.5	**NA**	NA	NA	4	NA	4	**NA**	NA	NA	4	NA	4	**NA**	NA
0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA
1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA
15	**NA**	NA	NA	15	NA	15	**NA**	NA	NA	15	NA	15	**NA**	NA
10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA
43.2				40.7		40.7				45.7		45.7		
56				*56*		*56*				*56*		*56*		
2.31						**2.18**						**2.45**		
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA
10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA
5	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA	NA
35				35		35				35		35		
70				70		*70*				70		*70*		
2.00						**2.00**						**2.00**		

AU 12 (Remnant 11.5.4)							AU 13 (Remnant 11.7.2)								
HQ12a		HQ12b			Average %		Benchmark	HQ13a			HQ13b			Average %	
% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score	11.7.2	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score
0%	0	33	33%	3	17%	1.5	**100**	100	100%	5	100	100%	5	100%	5
225%	5	8	200%	5	213%	5	**3**	3	100%	5	3	100%	5	100%	5
233%	5	4	133%	5	183%	5	**4**	3	75%	2.5	3	75%	2.5	75%	2.5
92%	5	11	85%	2.5	88%	3.75	**5**	10	200%	5	10	200%	5	200%	5
17%	0	10	56%	2.5	36%	1.25	**5**	7	140%	5	15	300%	5	220%	5
NA		NA	NA				**NA**	NA	NA		NA	NA			
95%	5	22	105%	5	NA	5	**15**	18	120%	5	20	133%	5	NA	5
100%		13	130%				**5**	9	180%		13	260%			
NA		NA	NA				**NA**	NA	NA		NA	NA			
202%	4	48.9	163%	5	NA	4.5	**40**	65	163%	4	43.4	109%	4	NA	4
103%		25.6	107%				**4**	9	225%		17.4	435%			
110%	5	3.5	50%	5	80%	5	**4**	1.6	40%	3	10.8	270%	3	155%	3
127%	5	52	173%	5	150%	5	**15**	67	447%	5	52	347%	5	397%	5
67%	5	15.8	27%	3	47%	4	**20**	19	95%	5	5	25%	3	60%	4
353%	15	10	59%	10	206%	12.5	**36**	38	106%	15	28	78%	10	92%	12.5
157%	5	320	157%	5	157%	5	**1214**	380	31%	2	430	35%	2	33%	2
15%	5	3	3%	10	9%	7.5	**0**	1	1%	10	20	20%	5	11%	7.5
NA	5	NA	NA	5	NA	5	**NA**	NA	NA	5	NA	NA	5	NA	5
NA	10	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10
	79			*81*		80				*86.5*			*74.5*		80.5
	100			100		*100*				100			100		*100*
						2.40									**2.42**
NA	10	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10
NA	2	NA	NA	4	NA	3	**NA**	NA	NA	4	NA	NA	2	NA	3
NA	4	NA	NA	4	NA	4	**NA**	NA	NA	4	NA	NA	4	NA	4
NA	0	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	0	NA	0
NA	1.7	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	NA	1.7	NA	1.7
NA	15	NA	NA	15	NA	15	**NA**	NA	NA	15	NA	NA	15	NA	15
NA	10	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10
	42.7			44.7		43.7				44.7			42.7		43.7
	56			*56*		*56*				*56*			*56*		*56*
						2.34									**2.34**
NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10
NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10
NA	10	NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10
NA	5	NA	NA	5	NA	5	NA	NA	NA	5	NA	NA	5	NA	5
	35			35		35				35			35		35
	70			70		*70*				70			70		*70*
						2.00									**2.00**

AU 15 (Remnant 11.9.5)						AU 16 (11.9.5 Brigalow TEC)						AU 17 (HVR 11.9.5)			
Benchmark	HQ15a			Average %		Benchmark	HQ16a			Average %		Benchmark	HQ17a		
11.9.5 (Western)	Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score
100	33	33%	3	33%	3	**100**	100	100%	5	100%	5	**100**	100	100%	5
4	13	325%	5	325%	5	**4**	5	125%	5	125%	5	**4**	3	75%	2.5
5	3	60%	2.5	60%	2.5	**5**	4	80%	2.5	80%	2.5	**5**	2	40%	2.5
7	4	57%	2.5	57%	2.5	**7**	10	143%	5	143%	5	**7**	6	86%	2.5
13	6	46%	2.5	46%	2.5	**13**	12	92%	5	92%	5	**13**	12	92%	5
NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA	
14	17	121%	5	NA	5	**14**	8	57%	1.5	NA	1.5	**14**	7	50%	1.5
7	13	186%				**7**	0	0%				**7**	0	0%	
NA	NA	NA				**NA**	NA	NA				**NA**	NA	NA	
37	60.3	163%	5	NA	5	**37**	59.5	161%	2.5	NA	2.5	**37**	23.9	65%	2.5
20	33.9	170%				**20**	0	0%				**20**	0	0%	
15	10	67%	5	67%	5	**15**	12	80%	5	80%	5	**15**	4.7	31%	3
27	3	11%	1	11%	1	**27**	73	270%	5	270%	5	**27**	0	0%	0
31	25	81%	5	81%	5	**31**	9	29%	3	29%	3	**31**	13.4	43%	3
16	10	63%	10	63%	10	**16**	2	13%	5	13%	5	**16**	0	0%	0
827	510	62%	5	62%	5	**827**	160	19%	2	19%	2	**827**	30	4%	0
0	55	55%	0	55%	0	**0**	5	5%	5	5%	5	**0**	65	65%	0
NA	NA	NA	5	NA	5	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	5
NA	NA	NA	2	NA	2	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	2
			58.5		58.5				*58.5*		58.5				*34.5*
			100		*100*				100		*100*				100
					1.76						**1.76**				
NA	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	10
NA	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	0
NA	NA	NA	0	NA	0	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	2
NA	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0
NA	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7
NA	NA	NA	15	NA	15	**NA**	NA	NA	15	NA	15	**NA**	NA	NA	15
NA	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10
			26.7		26.7				32.7		32.7				38.7
			56		*56*				*56*		*56*				*56*
					1.43						**1.75**				
NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10
NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10
NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10
NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA	NA	NA	5
			35		35				35		35				35
			70		*70*				70		*70*				70
					2.00						**2.00**				

		AU 18 (Remnant 11.9.5a)						AU 19 (Remnant 11.9.5a Brigalow TEC)						
Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**	HQ18a Raw Data	HQ18a % Benchmark	HQ18a Score	Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**	HQ19a Raw Data	HQ19a % Benchmark	HQ19a Score	Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**
100%	5	**100**	100	100%	5	100%	5	**100**	50	50%	3	50%	3	**100**
75%	2.5	**4**	6	150%	5	150%	5	**4**	12	300%	5	300%	5	**4**
40%	2.5	**5**	10	200%	5	200%	5	**5**	4	80%	2.5	80%	2.5	**5**
86%	2.5	**7**	6	86%	2.5	86%	2.5	**7**	5	71%	2.5	71%	2.5	**7**
92%	5	**13**	7	54%	2.5	54%	2.5	**13**	7	54%	2.5	54%	2.5	**13**
		NA	NA	NA				**NA**	NA	NA				**NA**
NA	1.5	**14**	12	86%	2.5	NA	2.5	**14**	19	136%	5	NA	5	**14**
		7	0	0%				**7**	8	114%				**7**
		NA	NA	NA				**NA**	NA	NA				**NA**
NA	2.5	**37**	50.1	135%	2.5	NA	2.5	**37**	65.4	177%	5	NA	5	**37**
		20	0	0%				**20**	33.5	168%				**20**
31%	3	**15**	0	0%	0	0%	0	**15**	16.9	113%	5	113%	5	**15**
0%	0	**27**	9	33%	1	33%	1	**27**	15	56%	3	56%	3	**27**
43%	3	**31**	22	71%	5	71%	5	**31**	14	45%	3	45%	3	**31**
0%	0	**16**	8	50%	10	50%	10	**16**	28	175%	15	175%	15	**16**
4%	0	**827**	370	45%	2	45%	2	**827**	550	67%	5	67%	5	**827**
65%	0	**0**	50	50%	3	50%	3	**0**	3	3%	10	3%	10	**0**
NA	5	**NA**	NA	NA	5	NA	5	**NA**	NA	NA	5	NA	5	**NA**
NA	2	**NA**	NA	NA	6	NA	6	**NA**	NA	NA	6	NA	6	**NA**
	34.5				*57*		57				*77.5*		77.5	
	100				100		*100*				100		*100*	
	1.04						**1.71**						**2.33**	
NA	10	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
NA	0	**NA**	NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0	**NA**
NA	2	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
NA	0	**NA**	NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0	**NA**
NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	1.7	**NA**
NA	15	**NA**	NA	NA	15	NA	15	**NA**	NA	NA	15	NA	15	**NA**
NA	10	**NA**	NA	NA	10	NA	10	**NA**	NA	NA	10	NA	10	**NA**
	38.7				28.7		28.7				26.7		26.7	
	56				*56*		*56*				*56*		*56*	
	2.07						**1.54**						**1.43**	
NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
NA	10	NA	NA	NA	10	NA	10	NA	NA	NA	10	NA	10	NA
NA	5	NA	NA	NA	5	NA	5	NA	NA	NA	5	NA	5	NA
	35				35		35				35		35	
	70				70		*70*				70		*70*	
	2.00						**2.00**						**2.00**	

AU 20 (HVR 11.9.5a)					AU 21 (Non-remnant)									
HQ20a			Average % benchmark	Average Score	**Benchmark 11.9.5 (Western)**	HQ21a			HQ21b			Average % benchmark	Average Score	**Benchmark 11.5.1**
Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score			
100	100%	5	100%	5	**100**	100	100%	5	0	0%	0	50%	2.5	**100**
3	75%	2.5	75%	2.5	**4**	4	100%	5	2	50%	2.5	75%	3.75	**5**
6	120%	5	120%	5	**5**	3	60%	2.5	4	80%	2.5	70%	2.5	**5**
3	43%	2.5	43%	2.5	**7**	3	43%	2.5	5	71%	2.5	57%	2.5	**8**
3	23%	0	23%	0	**13**	7	54%	2.5	11	85%	2.5	69%	2.5	**10**
NA	NA				**NA**	NA	NA		NA	NA				**NA**
5	36%	1.5	NA	1.5	**14**	3	21%	0	1	7%	0	NA	0	**20**
0	0%				**7**	0	0%		0	0%				**9**
NA	NA				**NA**	NA	NA		NA	NA				**NA**
32.2	87%	2.5	NA	2.5	**37**	1.8	5%	0	0.5	1%	0	NA	0	**25**
0	0%				**20**	0	0%		0	0%				**20**
0.6	4%	0	4%	0	**15**	0.8	5%	0	0	0%	0	3%	0	**6**
3	11%	1	11%	1	**27**	12	44%	1	11	41%	1	43%	1	**23**
12	39%	3	39%	3	**31**	7.5	24%	3	0	0%	0	12%	1.5	**45**
0	0%	0	0%	0	**16**	0	0%	0	0	0%	0	0%	0	**17**
30	4%	0	4%	0	**827**	100	12%	2	5	1%	0	6%	1	**135**
15	15%	5	15%	5	**0**	60	60%	0	80	80%	0	70%	0	**0**
NA	NA	5	NA	5	**NA**	NA	NA	5	NA	NA	5	NA	5	**NA**
NA	NA	2	NA	2	**NA**	NA	NA	0	NA	NA	0	NA	0	**NA**
		35		35				*28.5*			*16*		22.25	
		100		*100*				100			100		*100*	
				1.05									**0.67**	
NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10	**NA**
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	0	NA	0	**NA**
NA	NA	2	NA	2	**NA**	NA	NA	0	NA	NA	0	NA	0	**NA**
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	NA	0	NA	0	**NA**
NA	NA	1.7	NA	1.7	**NA**	NA	NA	1.7	NA	NA	1.7	NA	1.7	**NA**
NA	NA	15	NA	15	**NA**	NA	NA	15	NA	NA	15	NA	15	**NA**
NA	NA	10	NA	10	**NA**	NA	NA	10	NA	NA	10	NA	10	**NA**
		38.7		38.7				36.7			36.7		36.7	
		56		*56*				*56*			*56*		*56*	
				2.07									**1.97**	
NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10	NA
NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10	NA
NA	NA	10	NA	10	NA	NA	NA	10	NA	NA	10	NA	10	NA
NA	NA	5	NA	5	NA	NA	NA	5	NA	NA	5	NA	5	NA
		35		35				35			35		35	
		70		*70*				70			70		*70*	
				2.00									**2.00**	

AU 21 (Non-remnant)							
HQ21c			HQ21d			Average %	
Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	benchmark	Average Score
10	10%	0	20	20%	3	15%	1.5
5	100%	5	5	100%	5	100%	5
2	40%	2.5	3	60%	2.5	50%	2.5
6	75%	2.5	7	88%	2.5	81%	2.5
14	140%	5	9	90%	2.5	115%	3.75
NA	NA		NA	NA			
3	15%	0	7	35%	1.5	NA	0.75
0	0%		0	0%			
NA	NA		NA	NA			
0.8	3%	0	9.8	39%	1	NA	0.5
0	0%		0	0%			
0	0%	0	5	83%	5	42%	2.5
31	135%	5	17	74%	3	104%	4
0	0%	0	10	22%	3	11%	1.5
0	0%	0	0	0%	0	0%	0
0	0%	0	240	178%	5	89%	2.5
30	30%	3	80	80%	0	55%	1.5
NA	NA	5	NA	NA	5	NA	5
NA	NA	0	NA	NA	0	NA	0
		28			*39*		33.5
		100			100		*100*
							1.01
NA	NA	10	NA	NA	10	NA	10
NA	NA	2	NA	NA	2	NA	2
NA	NA	2	NA	NA	4	NA	3
NA	NA	0	NA	NA	0	NA	0
NA	NA	1.7	NA	NA	1.7	NA	1.7
NA	NA	15	NA	NA	15	NA	15
NA	NA	10	NA	NA	10	NA	10
		40.7			42.7		41.7
		56			*56*		*56*
							2.23
NA	NA	10	NA	NA	10	NA	10
NA	NA	10	NA	NA	10	NA	10
NA	NA	10	NA	NA	10	NA	10
NA	NA	5	NA	NA	5	NA	5
		35			35		35
		70			70		*70*
							2.00

IMPACT - TEC Poplar Box

Assessment Unit - Regional Ecosystem	Max score	AU 6 (Remnant 11.3.2 Poplar Box TEC)						
Site Reference	V1.2	**Benchmark**	HQ6a			Average %		
		11.3.2	Raw Data	% Benchmark	Score	benchmark	Average Score	
Recruitment of woody perennial species in EDL	5	**100**	75	75%	3	75%	3	
Native plant species richness - trees	5	**2**	5	250%	5	250%	5	
Native plant species richness - shrubs	5	**2**	2	100%	5	100%	5	
Native plant species richness - grasses	5	**9**	7	78%	2.5	78%	2.5	
Native plant species richness - forbes	5	**17**	6	35%	2.5	35%	2.5	
Tree emergent height		**NA**	NA	NA				
Tree canopy height	5	**18**	16	89%	5	NA	5	
Tree sub-canopy height		**NA**	NA	NA				
Tree emergent cover		**NA**	NA	NA				
Tree canopy cover	5	**40**	41	103%	4	NA	4	
Tree sub-canopy cover		**NA**	NA	NA				
Shrub canopy cover	5	**2**	1	50%	5	50%	5	
Native grass cover	5	**35**	56	160%	5	160%	5	
Organic litter	5	**30**	10	33%	3	33%	3	
Large trees (euc plus non-euc)	15	**22**	6	27%	5	27%	5	
Coarse woody debris	5	**307**	180	59%	5	59%	5	
Non-native plant cover	10	**0**	35	35%	3	35%	3	
Site Condition Score					*53*		53	
MAX Site Condition Score	80				80		*80*	
Site Condition Score - out of 7							**4.64**	
Site Context								
Size of patch	10	**NA**	NA	NA	0	NA	0	
Connectedness	5	**NA**	NA	NA	0	NA	0	
Context	5	**NA**	NA	NA	0	NA	0	
Ecological Corridors	6	**NA**	NA	NA	0	NA	0	
Role of site location to TEC	5	**NA**	NA	NA	1	NA	1	
Threats to the TEC	15	**NA**	NA	NA	6.9	NA	6.9	
Site Context Score					7.9		7.9	
MAX Site Context Score	46				*46*		*46*	
Site Context Score - out of 3							**0.52**	

Final habitat quality score (weighted)	**AU 6 (Remnant 11.3.2 Poplar Box TEC)**	**Average/Final**
Site Condition score (out of 7)	4.64	4.64
Site Context Score (out of 3)	0.52	0.52
Habitat Quality score (out of 10)	5.15	5.15
Assessment Unit area (ha) in disturbance footprint	0.08	0.08
Assessment Unit area (ha) in disturbance footprint + 10% buffer	0.09	0.09
Total impact area (ha) for this MNES (including 10% buffer)	0.09	0.09
Size Weighting	1.000	1.000
Weighted Habitat Quality Score	***5.153***	***5***

IMPACT - TEC Brigalow

Assessment Unit - Regional Ecosystem	Max score	AU 11 (11.5.16 Brigalow TEC)						
Site Reference	V1.2	**Benchmark**	HQ11a			Average % benchmark	Average Score	**Benchmark**
		11.5.16	Raw Data	% Benchmark	Score			**11.9.5 (Western)**
Recruitment of woody perennial species in EDL	5	**100**	100	100%	5	100%	5	**100**
Native plant species richness - trees	5	**3**	4	133%	5	133%	5	**4**
Native plant species richness - shrubs	5	**9**	5	56%	2.5	56%	2.5	**5**
Native plant species richness - grasses	5	**5**	1	20%	0	20%	0	**7**
Native plant species richness - forbes	5	**12**	4	33%	2.5	33%	2.5	**13**
Tree emergent height		**NA**	NA	NA				**NA**
Tree canopy height	5	**13**	14	108%	5	NA	5	**14**
Tree sub-canopy height		**7**	8	114%				**7**
Tree emergent cover		**NA**	NA	NA				**NA**
Tree canopy cover	5	**52**	76	146%	3.5	NA	3.5	**37**
Tree sub-canopy cover		**26**	9.3	36%				**20**
Shrub canopy cover	5	**24**	9.2	38%	3	38%	3	**15**
Native grass cover	5	**10**	27	270%	5	270%	5	**27**
Organic litter	5	**47**	22	47%	3	47%	3	**31**
Large trees (euc plus non-euc)	15	**58**	12	21%	5	21%	5	**16**
Coarse woody debris	5	**1812**	750	41%	2	41%	2	**827**
Non-native plant cover	10	**0**	3	3%	10	3%	10	**0**
Site Condition Score					*51.5*		51.5	
MAX Site Condition Score	80				80		*80*	
Site Condition Score - out of 7							**4.51**	
Site Context								
Size of patch	10	**NA**	NA	NA	10	NA	10	**NA**
Connectedness	5	**NA**	NA	NA	5	NA	5	**NA**
Context	5	**NA**	NA	NA	4	NA	4	**NA**
Ecological Corridors	6	**NA**	NA	NA	0	NA	0	**NA**
Role of site location to TEC	5	**NA**	NA	NA	1	NA	1	**NA**
Threats to TEC	15	**NA**	NA	NA	11.1	NA	11.1	**NA**
Site Context Score					31.1		31.1	
MAX Site Context Score	46				*46*		*46*	
Site Context Score - out of 3							**2.03**	

Final habitat quality score (weighted)	**AU 11 (11.5.16 Brigalow TEC)**	**AU 16 (11.9.5 Brigalow TEC)**	**AU 19 (Remnant 11.9.5a Brigalow TEC)**	**Average/Final**
Site Condition score (out of 7)	4.51	4.51	5.82	5.16
Site Context Score (out of 3)	2.03	1.18	0.55	0.87
Habitat Quality score (out of 10)	6.53	5.69	6.37	6.03
Assessment Unit area (ha) in disturbance footprint	0.73	0.01	0.17	0.9
Assessment Unit area (ha) in disturbance footprint + 10% buffer	0.81	0.02	0.19	1.0
Total impact area (ha) for this MNES (including 10% buffer)	1.0	1.0	1.0	1.0
Size Weighting	0.798	0.015	0.187	1.0
Weighted Habitat Quality Score	***5.213***	***0.088***	***1.190***	***6***

AU 16 (11.9.5 Brigalow TEC)					AU 19 (Remnant 11.9.5a Brigalow TEC)					
HQ16a			Average %		Benchmark	HQ19a			Average %	
Raw Data	% Benchmark	Score	benchmark	Average Score	11.9.5 (Western)	Raw Data	% Benchmark	Score	benchmark	Average Score
100	100%	5	100%	5	**100**	50	50%	3	50%	3
5	125%	5	125%	5	**4**	12	300%	5	300%	5
4	80%	2.5	80%	2.5	**5**	4	80%	2.5	80%	2.5
10	143%	5	143%	5	**7**	5	71%	2.5	71%	2.5
12	92%	5	92%	5	**13**	7	54%	2.5	54%	2.5
NA	NA				**NA**	NA	NA			
8	57%	1.5	NA	1.5	**14**	19	136%	5	NA	5
0	0%				**7**	8	114%			
NA	NA				**NA**	NA	NA			
59.5	161%	2.5	NA	2.5	**37**	65.4	177%	5	NA	5
0	0%				**20**	33.5	168%			
12	80%	5	80%	5	**15**	16.9	113%	5	113%	5
73	270%	5	270%	5	**27**	15	56%	3	56%	3
9	29%	3	29%	3	**31**	14	45%	3	45%	3
2	13%	5	13%	5	**16**	28	175%	15	175%	15
160	19%	2	19%	2	**827**	550	67%	5	67%	5
5	5%	5	5%	5	**0**	3	3%	10	3%	10
		51.5		51.5				*66.5*		66.5
		80		*80*				80		*80*
				4.51						**5.82**
NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0
NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0
NA	NA	2	NA	2	**NA**	NA	NA	0	NA	0
NA	NA	0	NA	0	**NA**	NA	NA	0	NA	0
NA	NA	1	NA	1	**NA**	NA	NA	1	NA	1
NA	NA	9.9	NA	11.1	**NA**	NA	NA	7.5	NA	7.5
		16.9		18.1				8.5		8.5
		46		*46*				*46*		*46*
				1.18						**0.55**

Appendix O Modified Queensland Habitat Quality Guideline

Information request:

1. Habitat quality assessment

A methodology that is suitable for each listed threatened species or threatened ecological community (i.e., endorsed by the department or supported by literature) where there is a residual significant impact must be used to assess habitat quality, noting the same scoring mechanism must be used at both impact and offset sites.

The department encourages proponents to consult and seek endorsement from the department on a proposed method prior to undertaking any habitat quality assessment at both impact and offset site(s).

The department currently prefers habitat quality scoring methods for each prescribed matters to be consistent with the Modified Habitat Quality Assessment (MHQA) method. The MHQA tool derives habitat quality scores using an adaptation of the Queensland Government's 'Guide to determining terrestrial habitat quality version 1.2 (DEHP Guide).

The MHQA aligns, as far as possible, the DEHP Guide with the requirements of the EPBC Act Environmental Offsets Policy for determining habitat quality scores. In aligning with this policy, all habitat quality scoring methods are required to generate future scores for 'with' and without' offset scenarios. Forecast gains or loss in habitat quality score must be substantiated by scientific information and via the endorsed MHQA (or alternative) method.

To support the habitat quality assessment, a link to the DEHP Guide, a MHQA scoring guide, and a MHQA scoring spreadsheet template (.xlsx) are provided herein. When calculating offsets, please refer to the department's published guidance: How to use the Offsets Assessment Guide.

A precautionary approach to forecasting scores should be applied, with all limitations and uncertainties considered, documented and integrated within the 'Confidence in Result % (Quality)' value applied in the Offset Assessment Guide (offset calculator). Please also note the following:

- If you propose a habitat quality gain of more than 2 points, or an achieved future habitat quality score 'with offset' of 9 or 10, it becomes less certain that the conservation outcome can be achieved. The justification of effectiveness of your proposed management measures and associated habitat quality score improvements and (reflected in the confidence in result) must be supported by substantial evidence.
- Higher habitat quality gains will generally be associated with lower 'confidence in result' scores in the Offset Assessments Guide to reflect the difficulty associated with achieving the conservation outcomes. In these cases, it is likely that outcomes-based commitments will be required in the associated management plan for the site, including specifying binding metrics to be met to demonstrate quality improvement. For further information, please contact the department to discuss the metrics that will be used to demonstrate achievement of quality standards.

If you intend to propose an alternative methodology for assessing and scoring habitat quality for any/all of the prescribed matters likely to experience significant residual impacts as a result of the proposed action, the alternative methodology must:

- directly relate to habitat requirements of the species and factors associated with the viability

of the prescribed matter, and align with information contained in the SPRAT database and relevant statutory/departmental documents, and

- be substantiated with appropriate field surveys in accordance with the relevant survey guidelines or using a scientifically robust and repeatable methodology.

Where there are any inconsistencies between the habitat assessment approach and information contained in the SPRAT database, the inconsistencies must be discussed with the department prior to the submission of the assessment documentation and must be supported by scientific evidence including published research, independent expert advice and information derived from field surveys.

Guidance on the use of the Modified Habitat Quality Assessment method

The Modified Habitat Quality Assessment (MHQA) method is a best-practice approach to derive Habitat Quality Scores (HQS) for input to the EPBC Offset Assessment Guide (offset calculator). The offset calculator is a component of the EPBC Environmental Offset Policy that is applied to environmental assessments under parts 7 – 9 of the EPBC Act. The MHQA method is accompanied by an Excel spreadsheet for entering measured attribute data, benchmark values and recording the associated attribute score. It is recommended that this document is used in conjunction with the worksheet.

The *How to use the Offsets Assessment Guide*[1] provides overarching guidance on the development and application of Habitat Quality Scoring methods. These methods are intended to generate a HQS that represents key habitat values provided by a site (*Site Condition*) and values of its surrounding landscape (*Site Context*). When applied to threatened species, HQS also quantifies the value of both the site and the species population (*Species Stocking Rate*).

The term 'modified' arises from the MHQA's origin in the Queensland State government offset policy framework, and further modification by the department to meet the requirements of the EPBC Environmental Offset Policy (see. EPBC Act environmental offsets policy). Given this origin, the MHQA draws heavily from the Queensland Guide to Determining Terrestrial Habitat Quality Version 1.2 (DEHP 2017) and Regional Ecosystem descriptions and benchmark values associated with the BioCondition Assessment Manual Version 2.2 (2015).

For these reasons, only suitably qualified practitioners with extensive experience using the BioCondition Assessment Manual should attempt to apply the MHQA.

Consistent with the Queensland State government offset policy framework, the EPBC Environmental Offset Policy also applies HQS that:

- represent the quality of a defined area of threatened flora or species habitat using indicators that measure and combine relevant habitat attributes which influence the viability of the species..
- Are rounded to the nearest whole number (scores between 0 to 10).

[1] DCCEEW. 2020. How to use the Offsets assessment guide (dcceew.gov.au)

Under the EPBC Environmental Offset Policy framework, HQS at both impact and land-based offset site(s) are applied in the offset calculation, using HQS values which represent:

- the quality of the **impact site** – representing the impact site HQS at the time of the EPBC Assessment.
- the **start quality** of the offset site – representing the offset site HQS at the time of the EPBC Assessment (or commencement date in the case of Advanced Offsets)
- projected **future quality (without offset)** at the offset site – representing the continuation of current land management practices (e.g., the status quo) at ***time until ecological benefit*** (a maximum of 20 years or less).
- projected **future quality (with offset)** at the offset site – representing the HQS associated with the management of the offset site and resulting conservation benefits at the ***time until ecological benefit*** (a maximum of 20 years)

To maximise alignment between Commonwealth and State government HQS methods, the MHQA:

- **applies** all 13 x site-based DEHP 2017 attributes and corresponding assessment methods, scoring matrices and associated biodiversity and spatial information (noting the 4x *DEHP corrections* detailed below).
- **applies** the DEHP 2017 methods and scoring the approaches for 2 x landscape-scale attributes (*Size of Patch* and *Ecological Corridors*)
- **applies** DEHP 2017 methods and scoring the approaches for developing species-specific HQS methods (not all are relevant to plants or TECs) using the Species Habitat Index approaches:
    - *Quality and Availability of Food and Foraging Habitat* and *Quality and Availability of Shelter* attributes are included within the MHQA's Site Condition component
    - *Threats*, *Role of the Site Location for the Population in the State* and *Species Mobility Capacity* attributes are included within the MHQA's Site Context component
- **modifies** DEHP 2017 methods and scoring approaches for:
    - *Connectedness* and *Context* landscape-scale attributes (Note: these attributes and 'size of patch' are replaced by a single 'distance from water' attribute in 'intact' regions). The modifications involve:
        - the replacement of 'remnant' vegetation with alternative spatial datasets which represent species-specific habitat (only when available and relevant)
        - The replacement of a 1 km distance from the site perimeter with alternative distances that better reflect the species mobility and utility of adjacent habitat
- **adds** new attributes to derive a Species Stocking Rate component score, including:
    - Presence detected on or adjacent to site (neighbouring property with connecting habitat)
    - Species usage of the site (habitat type & evidenced usage) (not relevant for Flora TS).
    - Approximate density (per ha)
    - Role/importance of species population on site:

- Key source population
- Necessary for maintaining genetic diversity
- Near limit of species range
- Key source population for breeding (Fauna only)

- **modifies** the scale at which attribute assessments are undertaken, with MHQA using the following scale of assessment:
  - Assessment Unit scale - all Site Condition attributes
  - Matter area scale – generally all Site Context and SSR component attributes are assessed at the matter area scale, which differs from both BioCondition and DEHP v1.2. Exceptions do apply, which are assessed on a case-by-case basis.
- **modifies** the weighting of individual attribute scores and each components contribution to the final HQS. The MHQA adopts default weightings for the MHQA, which are:
  - TEC's – Site Condition (70%) + Site Context (30%)
  - Flora & Fauna – Site Condition (30%) + Site Context (30%) + SSR (40%)

In addition, all MHQA attributes must be projected for 2 x Future scenarios, including:

- *Future Quality with offset,* and
- *Future Quality without offset*.

Note: MNES specific guidance should always be the primary driver of attribute and component weightings in any HQS method, including the MHQA. Weightings should reflect how well a site supports the protected matter and contributes to its ongoing viability.

For example, where HQS are being derived for impacts to Grey-headed Flying-Fox foraging habitat, their high mobility and feeding preferences for flowering eucalypts should be integrated. This may increase the scoring focus on winter-spring flowering resources (e.g., Quality and Availability of Food and Foraging habitat attribute) and redistribute attribute weightings towards tree-focused attributes and away from ground cover.

Similarly, the high species mobility and often large distance to nearby roosts can be reflected in a redistribution of the components score weightings to focus scores on the condition of foraging resources and away from the site's role in breeding and density etc. (40% / 30% / 30%).

DEHP Corrections

Please note for condition scoring there are errors in Table 2 of the Queensland Guidelines for attributes 2, 3, 4 and 5, and correct score values are found in the Qld Bio condition Guidelines as highlighted in the table below.

Table 1: BioCondition Guideline (page 22).

Attribute	***Guide to Determining Terrestrial Habitat***	***BioCondition Assessment Manual***
Native plant species – trees	<25% benchmark = 2.5 ≥25% to 90% of benchmark = 3	<25% benchmark = 0 ≥25% to 90% of benchmark = 2.5

	≥90% of benchmark = 5	≥90% of benchmark = 5
Native plant species – shrubs	<25% benchmark = 2.5 ≥25% to 90% of benchmark = 3 ≥90% of benchmark = 5	<25% benchmark = 0 ≥25% to 90% of benchmark = 2.5 ≥90% of benchmark = 5
Native plant species – grasses	<25% benchmark = 2.5 ≥25% to 90% of benchmark = 3 ≥90% of benchmark = 5	<25% benchmark = 0 ≥25% to 90% of benchmark = 2.5 ≥90% of benchmark = 5
Native plant species – forbs	<25% benchmark = 2.5 ≥25% to 90% of benchmark = 3 ≥90% of benchmark = 5	<25% benchmark = 0 ≥25% to 90% of benchmark = 2.5 ≥90% of benchmark = 5

Species stocking rate guidance

The MHQA's Species stocking rate component is applied to threatened species HQS and contributes up to 40% of the overall habitat quality score.

Please note that comprehensive best-practice targeted surveys are required to inform and calculate species stocking rate. Also, evidence of the species' presence includes indirect observations such as scats, tracks, scratches, etc.

Targeted surveys to determine stocking rates should be undertaken using best-practice methods aimed at maximising detectability. This includes appropriate survey timing and search effort, preferentially over numerous monitoring periods. If surveys were not undertaken in accordance with best-practice methods (eg. koala transects in an area likely to support low density population) then the Department would assume conservative values calculating the proposed offset.

Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		10	
		No		Yes	
Species usage of the site (habitat type)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)	Score	0	10	20	30
		0%			
Role/importance of species population on site*	Score	0	5	10	15
	(Total from supplementary table below)	0	5 - 15	20 - 35	40 - 45

* The score for Role/importance of species population on site is calculated using the table below

For a species, an important population is one that is necessary for a species' long-term survival and recovery (DoEE Significant Impact Guidelines). This may include populations identified as such in recovery plans, and/or that are:

- Key source populations for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity, and/or
- Populations that are near the limit of the species range.

The following supplementary scoring matrix will require species distribution mapping, such as available on Wylie (internal use only), Atlas of Living Australia and/or WildNet.

Key source population for breeding	Score	0	10
		No	Yes
Key source population for dispersal	Score	0	5
		No	Yes
Necessary for maintaining genetic diversity	Score	0	15
		No	Yes
Near the limit of the species range	Score	0	15
		No	Yes

Appendix P Species Habitat Index Scoring Guide

Species Habitat Index Scoring Guide

The below tables detail the E2M methodology for scoring Species Habitat Index. It should be noted that the scores detailed in the tables are converted to be out of the maximum scores detailed in Table 1.

Table 1: Attribute Maximum Score

Attribute	Max score
Threats to species	15
Quality and availability of food and foraging habitat	10
Quality and availability of shelter	10
Species mobility capacity	10

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Table 2: Greater glider habitat attribute scoring

Indicators	Scoring data source	Scoring system	Weighting
Quality and availability of food and habitat required for foraging			
Diversity of preferred food trees (*Corymbia* and *Eucalyptus* species) of >30 cm DBH	Assessment site: *fauna habitat assessment site* Data field: *GG food tree diversity* Assessment area: *100 x 50 m plot*	0 = Preferred food trees are absent 1 = 1-2 species of preferred food tree are present 3 = 3 – 4 species of preferred food tree are present 5 = ≥ 5 species of preferred food tree are present	0.25
Abundance of preferred food trees (*Corymbia* and *Eucalyptus* species) of >30 cm DBH	Assessment site: *fauna habitat assessment site* Data field: *GG food tree abundance* Assessment area: *100 x 50 m plot*	0 = Preferred food trees are absent 1 = Preferred food trees are in very low density in the canopy (<20% of canopy species) 3 = Preferred food trees are moderately abundant in the canopy (comprise 30-50 % of canopy species) 5 = Preferred food trees are dominant in the canopy (comprise over 50% of canopy species)	0.75
Quality and availability of habitat required for shelter and breeding			
Abundance of large-hollow bearing trees and stags (trees stags bearing hollows with an aperture >10 cm)	Assessment site: *fauna habitat assessment site* Data field: *GG HBTs* Assessment area: *100 x 50 m plot*	0 = Large hollow bearing trees or stags are absent (>10 cm) 1 = 1-2 large hollow bearing trees or stags (>10 cm) 3 = 3-4 large hollow bearing trees or stags (>10 cm) 5 = >4 large hollow bearing trees or stags (>10 cm)	1
Quality and availability of habitat required for mobility			
Patch size of suitable habitat	GIS assessment Data field: *GG patch size*	0 = Suitable habitat patch is <1 ha 1 = Suitable habitat patch is 1 – 3 ha 2 = Suitable habitat patch is >3 – 5 ha 3 = Suitable habitat patch is >5 – 10 ha 4 = Suitable habitat patch is >10 – 20 ha 5 = Suitable habitat patch is > 20 ha	0.35

Indicators	Scoring data source	Scoring system	Weighting
Connectivity of suitable habitat in the landscape	GIS assessment Data field: *GG connectivity*	0 = The suitable habitat patch is separated from other suitable habitat by: • ≥50m of non-remnant or regrowth vegetation; or • ≥200m of non-suitable remnant vegetation. 2.5 = The suitable habitat patch is separated from other suitable habitat by: • ≥30m to 50m of non-remnant or regrowth vegetation; or • ≥100m to 200m of non-suitable remnant vegetation. 5 = The suitable habitat patch is separated from other suitable habitat by: • <30m of non-remnant or regrowth vegetation; or • <100m of non-suitable remnant vegetation.	0.35
Presence of man-made fragmentation features	GIS assessment Data field: *GG fragmentation*	0 = Main roads or large cleared areas are present to prevent connectivity with other suitable habitat 2.5 = Moderately significant man-made fragmentation features are present within the landscape, e.g. power lines, fence lines 5 = No man-made fragmentation features are present within the landscape	0.3
Absence of threats			
Barbed wire entanglement	Assessment site: *fauna habitat assessment site* Data fields: *GG wire threat scope*, *GG wire threat severity* Assessment area: *100 x 50 m plot*	For each threat, score 1-5 for: Scope: 1 = >80% of AU patch impacted or potentially impacted by the threat 2 = 40-80% of AU patch impacted or potentially impacted by the threat 3 = 20-40 % of AU patch impacted or potentially impacted by the threat 4 = up to 20% of AU patch impacted or potentially impacted by the threat 5 = AU patch not impacted or unlikely to be impacted by the threat Severity: 1 = intensity/severity of threat high 2 = intensity/severity of threat moderate	Average of threat scores used.
Fragmentation of habitat	Assessment site: *fauna habitat assessment site* Data fields: *GG fragmentation threat scope*, *GG fragmentation threat severity* Assessment area: *GIS Assessment*		

Indicators	Scoring data source	Scoring system	Weighting
Inappropriate fire regimes	Assessment site: *fauna habitat assessment site* Data fields: *GG fire threat scope*, *GG fire threat severity* Assessment area: *100 x 50 m plot*	3 = intensity/severity of threat low 4 = intensity/severity of threat within AU patch very low 5 = threat absent	

Table 3: Koala habitat attribute scoring

Indicators	Scoring data source	Scoring system	Weighting
Quality and availability of food and habitat required for foraging			
Abundance of Locally Important Koala Trees (LIKTs)[1]	Assessment site: *fauna habitat assessment site* Data field: *Koala LIKTs abundance (≥10cm DBH)* Assessment area: *100 x 50 m plot*	0 = No LIKTs present 1 = LIKTs present only as juvenile trees (<10 cm DBH) 2 = LIKTs ≥10cm DBH present as: • associated canopy species, • scattered emergent trees, and/or • as subdominant subcanopy species (at sites where the density of subcanopy trees exceeds 10 per 100 x 50 m plot) 3 = LIKTs ≥10cm DBH present as: • subdominant canopy species, and/or • co-dominant subcanopy species at sites where the density of subcanopy trees exceeds 10 per 100 x 50 m plot. 4 = LIKTs ≥10cm DBH present as: • co-dominant canopy species and/or • dominant subcanopy species at sites where the density of subcanopy trees exceeds 10 per 100 x 50 m plot. 5 = LIKTs ≥10cm DBH present as dominant canopy species	0.9

[1] See Youngentob et al. (2021) for list of LIKT species for each Bioregion.

Indicators	Scoring data source	Scoring system	Weighting
Leaf moisture content/availability of soil water to feed trees	GIS assessment and field observations Data field: *Koala foliar and soil water* Assessment Area: assessment site, immediate surrounds and climatic zone/region.	0 = leaf moisture content / availability of soil water typically low due to: • very low annual and seasonal rainfall • general absence of flooding • very quick-draining soils, and/or • low ground water table. 2.5 = leaf moisture content / availability of soil water moderately high-to-high for part (less than half) of year due to: • substantive, though highly seasonal rainfall, or • regular but infrequent flooding, or • less quick-draining soils, and • seasonally high water table. 5 = leaf moisture content moderately high-to-high for half or more of year due to: • high annual or regular rainfall across multiple seasons, or • frequent flooding, or • slow-draining soil, and • water table high for much of year.	0.1
Quality and availability of habitat required for shelter and breeding			
Abundance of suitable Koala shelter trees (LIKT, Ancillary habitat tree, or other suitable shade tree species) ≥10 cm DBH	Assessment site: *fauna habitat assessment site* Data field: *Koala shelter (LIKTs & Ancillary)[2] tree abundance* Assessment area: *100 x 50 m plot*	0 = no suitable koala shelter trees present 1 = single suitable koala shelter tree present 3 = suitable koala shelter trees present at low-to-moderate abundance (2-5 per 100 x 50 m plot) 5 = suitable koala shelter trees present at moderate-to-high abundance (>5 per 100 x 50 m plot)	1
Quality and availability of habitat required for mobility			
Patch size of suitable habitat (remnant or regrowth vegetation with LIKTs ≥ 10 cm DBH)	GIS assessment Data field: *GG patch size*	0 = Patch <2 ha 1 = Patch is 2 – 10 ha 2 = Patch is 11 – 50 ha 3 = Patch is 50 – 250 ha 4 = Patch is 251 – 500 ha 5 = Patch is > 500 ha	0.4

[2] See Youngentob et al. (2021) for list of LIKT and Ancillary habitat trees

Indicators	Scoring data source	Scoring system	Weighting
Connectivity of suitable habitat in the landscape	GIS assessment Data field: *Koala connectivity*	0 = The suitable habitat patch is separated from other suitable habitat by: • Man-made or natural barriers to dispersal (e.g., fencing, dense/impenetrable weedy ground cover, permanent watercourses >30 m wide); or • >1 km of cleared/developed land with no suitable habitat trees; or 1 = The suitable habitat patch is separated from other suitable habitat by: • >1 km of mostly cleared/developed land with scattered habitat trees • Numerous busy roads or a single multi-lane highway 2 = The suitable habitat patch is separated from other suitable habitat by: • <1 km and >500 m of mostly cleared/developed land with scattered habitat trees • >1 km of remnant or regrowth woodland/open forest without any LIKTs or Ancillary habitat trees, and/or • Multiple roadways carrying low volume of traffic. 3 = The suitable habitat patch is separated from other suitable habitat by: • <500 m and >100 m of mostly cleared/developed land with scattered habitat trees, and/or • <1 km and >500 m of remnant or regrowth woodland/open forest without any LIKTs or Ancillary habitat trees 4 = The suitable habitat patch is separated from other suitable habitat by: • No more than 100 m of mostly cleared/developed land with scattered habitat trees and/or • <500 and >100 m of remnant or regrowth woodland/open forest without any LIKTs or Ancillary habitat trees 5 = Suitable habitat more or less contiguous or separated from other areas of suitable habitat by: • no more than 100 m of remnant or regrowth woodland/open forest without any LIKTs or Ancillary habitat trees	0.6

Indicators	Scoring data source	Scoring system	Weighting
Absence of threats			
Presence of predators (feral dogs, dingoes)	Assessment site: *fauna habitat assessment site* Data fields: *Koala predators threat scope*, *Koala predators threat severity* Assessment area: *Within a 20 km radius of the site*	For each threat, score 1-5 for: Scope: 1 = >80% of AU patch impacted or potentially impacted by the threat 2 = 40-80% of AU patch impacted or potentially impacted by the threat 3 = 20-40 % of AU patch impacted or potentially impacted by the threat 4 = up to 20% of AU patch impacted or potentially impacted by the threat 5 = AU patch not impacted or unlikely to be impacted by the threat Severity: 1 = intensity/severity of threat high 2 = intensity/severity of threat moderate 3 = intensity/severity of threat low 4 = intensity/severity of threat within AU patch very low 5 = threat absent	Average of threat scores used.
Density of dense weedy ground cover (e.g., thickets of lantana) impeding movement of koalas/limiting access to feed trees	Assessment site: *fauna habitat assessment site* Data fields: *Koala weed GC threat scope*, *Koala weed GC threat severity* Assessment area: *Within a 20 km radius of the site*		
Man-made barriers preventing movement between suitable habitat patches e.g. fences, large multi-lane highways, and high density housing	Assessment site: *fauna habitat assessment site* Data fields: *Koala barriers threat scope*, *Koala barriers threat severity* Assessment area: *Within a 20 km radius of the site*		
Vehicular collision	Assessment site: *fauna habitat assessment site* Data fields: *Koala collision threat scope*, *Koala collision threat severity* Assessment area: *Within a 20 km radius of the site*		

Table 4: Squatter pigeon (southern) habitat attribute scoring

Indicators	Data source	Scoring system	Weighting
Quality and availability of food and habitat required for foraging			
Abundance of seed-producing native grasses and forbs	Assessment site: *fauna habitat assessment site* Data field: *SP native grasses and forbs* Assessment area: *100 x 50 m plot*	0 = Seed-producing native grasses and forbs absent or extremely limited (<30% of ground cover) 2.5 = Seed-producing native grasses and forbs comprising 30% to 50% of ground stratum 5 = Ground layer dominated by seed-producing native grasses and forbs (comprising >50% of ground stratum)	0.25
Ground cover	Assessment site: *fauna habitat assessment site* Data field: *SP ground cover* Assessment area: *100 x 50 m plot*	0 = Ground layer absent (<1%) OR very dense (>70%) 1 = Ground layer very sparse (1-5%) OR moderately dense (61-70%) 3 = Ground layer patchy (5-10%) or mid-dense (30-60%) 5 = Ground layer sparse to mid-dense (10-30%)	0.25
Ground cover height	Assessment site: *fauna habitat assessment site* Data field: *SP ground cover height* Assessment area: *100 x 50 m plot*	0 = Ground layer median height >0.7 m 2.5 = Ground layer median height 0.4-0.7 m 5 = Ground layer low median height < 0.4 m	0.25
Distance to 'suitable' water source (including dams, troughs, seasonal wetlands, and pools along watercourses).	GIS assessment Data field: *SP distance to water* Assessment area: radius *from the habitat assessment site*	0 = Site >2 km from a suitable water source 2.5 = Site 1-2 km from a suitable water source 5 = Site <1 km from a suitable water source	0.25
Quality and availability of habitat required for shelter and breeding			
Abundance of low trees (<15 m height) suitable for roosting	Assessment site: *fauna habitat assessment site* Data field: *SP roost trees* Assessment area: *100 x 50 m plot*	0 = Overstory does not include low trees suitable for roosting 2.5 = Very few low trees suitable for roosting in overstory (1-2 per plot) 5 = Overstory includes a reasonable number of low trees suitable for roosting (>3 per plot)	0.5
Distance to 'suitable' water source (including dams, troughs, seasonal wetlands, and pools along watercourses).	GIS assessment Data field: *SP distance to water* Assessment area: *radius from the habitat assessment site*	0 = Site >2 km from a suitable water source 2.5 = Site 1-2 km from a suitable water source 5 = Site <1 km from a suitable water source	0.5

Indicators	Data source	Scoring system	Weighting
Quality and availability of habitat required for mobility			
Habitat connectivity	Assessment site: *fauna habitat assessment site* Data field: *SP connectivity* Assessment area: *Habitat patch*	Habitat within which the site is located has: 0 = Poor connectivity: There is little or no opportunity for movement/dispersal of animals between areas of suitable habitat 2.5 = Reasonable connectivity: movement between habitat areas possible but limited or somewhat constrained 5 = Good connectivity: movement between habitat areas subject to few, if any, constraints	1
Absence of threats			
Clearing / fragmentation	Assessment site: *fauna habitat assessment site* Data fields: *SP clearing threat scope*, *SP clearing threat severity* Assessment area: *Habitat cleared within 3 km radius from the site*	For each threat, score 1-5 for: Scope: 1 = >80% of AU patch impacted or potentially impacted by the threat 2 = 40-80% of AU patch impacted or potentially impacted by the threat 3 = 20-40 % of AU patch impacted or potentially impacted by the threat 4 = up to 20% of AU patch impacted or potentially impacted by the threat 5 = AU patch not impacted or unlikely to be impacted by the threat Severity: 1 = intensity/severity of threat high 2 = intensity/severity of threat moderate 3 = intensity/severity of threat low 4 = intensity/severity of threat within AU patch very low 5 = threat absent	Average of threat scores used.
Grazing	Assessment site: *fauna habitat assessment site* Data fields: *SP grazing threat scope*, *SP grazing threat severity* Assessment area: *100 x 50 m plot*		

Table 5: Glossy black cockatoo habitat attribute scoring

Indicators	Scoring data source	Scoring system	Weighting
Quality and availability of food and habitat required for foraging			
Known feed tree species (*Allocasuarina spp.* or *Casuarina spp.*) presence	Assessment site: *fauna habitat assessment site* Data field: *GBC feed tree species* Assessment area: *100 x 50 m plot*	0 = no known feed trees present 2.5 = less-preferred feed tree species (*Casuarina cunninghami*, *C. equisetifolia*, *C. glauca*, and/or *C. inophloia*) present only 5 = preferred feed tree species (*Allocasuarina torulosa, A. littoralis A. luehmannii and/or C. cristata*) present	0.5
Abundance of mature female (cone-bearing) trees	Assessment site: *fauna habitat assessment site* Data field: *GBC feed tree abundance* Assessment area: *100 x 50 m plot*	0 = none present 1 = <3 trees/plot 2 = 3-5 trees/plot 4 = 6-10 trees/plot 5 = >10 trees/plot	0.5
Quality and availability of habitat required for shelter and breeding			
Abundance of suitable* hollow bearing trees and/or stags	Assessment site: *fauna habitat assessment site* Data field: *GBC HBTs* Assessment area: *100 x 50 m plot*	0 = no trees or stags containing suitable hollows present 2.5 = single tree/stag containing suitable hollow(s) present 5 = two or more trees/stags containing suitable hollow(s) present	0.75
Distance to 'suitable' water source (including dams, troughs, seasonal wetlands, and pools along watercourses).	GIS assessment Data field: GBC *distance to water* Assessment area: *radius from habitat assessment site*	0 = Site >3 km from a suitable water source 1 = Site 3-1.5 km from suitable water source 3 = Site 1.5 km – 500 m from a suitable water source 5 = Site <500 m from a suitable water source	0.25
Quality and availability of habitat required for mobility			
Maximum score of 5 assigned due to the species' mobility and ability to traverse/overfly highly modified lansdscapes, unless site located in proximity to transmission lines and/or wind turbines (in which case mobility is assigned a score of 1).			
Absence of threats			
Habitat clearing resulting in the loss of foraging habitat and/or nest trees in the surrounding landscape	Assessment site: *fauna habitat assessment site* Data fields: *GBC clearing threat scope*, *GBC clearing threat severity* Assessment area: *Habitat cleared within 5 km radius of site*	For each threat, score 1-5 for: Scope: 1 = >80% of AU patch impacted or potentially impacted by the threat 2 = 40-80% of AU patch impacted or potentially impacted by the threat 3 = 20-40 % of AU patch impacted or potentially impacted by the threat 4 = up to 20% of AU patch impacted or potentially impacted by the threat	Average of threat scores used.

Indicators	Scoring data source	Scoring system	Weighting
Inappropriate fire regime: infrequent fire resulting in senescence of feed trees; high frequency fires suppressing recruitment of feed trees; and/or high intensity fires resulting in death of feed trees and/or loss of suitable nest trees/stags	Assessment site: *fauna habitat assessment site* Data fields: *GBC fire threat scope*, *GBC fire threat severity* Assessment area: *100 x 50 m plot*	5 = AU patch not impacted or unlikely to be impacted by the threat Severity: 1 = intensity/severity of threat high 2 = intensity/severity of threat moderate 3 = intensity/severity of threat low 4 = intensity/severity of threat within AU patch very low 5 = threat absent	

*Suitable hollow bearing trees are those which meet the criteria outlined in section 12.1.2.

Table 6: Woodland snails habitat attribute scoring

Indicators	Scoring data source	Scoring system	Weighting
Quality and availability of food and habitat required for foraging			
Overstory (shrub/tree) cover (%) required to maintain sufficient humidity	Assessment site: *fauna habitat assessment site* Data field: *WS overstory cover* Assessment area: *100m transect (within Condition plot)*	0 = Cover is absent 1 = >0-20% cover - very little overstory cover, only a small number of scattered shrubs/trees present. 2 = 21-40% cover – less than half of the transect with overstory cover. Scattered shrubs/trees present. 3 = 41-60% - approximately half of the transect has overstory cover. Fairly consistent cover of shrubs/trees throughout the transect. 4 = 61-80% cover – majority of the transect with overstory cover. Continuous presence of shrubs/trees with few gaps in the overstory. 5 = 81-100% cover – the transect can be characterised as having continuous overstory cover by shrubs/trees with very few to no gaps in the overstory.	0.5
Foraging substrate: % organic litter and/or bare ground/substrate	Assessment site: *fauna habitat assessment site* Data field: *WS deep litter > 5 cm* Assessment area: 1 m quadrats in *50 x 20 m plot*	0 = Litter and bare ground is absent in the quadrats 1 = mean litter and bare ground cover <10% 2 = mean litter and bare ground cover >10-20% 3 = mean litter and bare ground cover >20-30 % 4 = mean litter and bare ground cover >30-50 % 5 = litter and bare ground cover >50 %	0.5

Indicators	Scoring data source	Scoring system	Weighting
Quality and availability of habitat required for shelter and breeding			
Overstory (shrub/tree) cover (%) required to maintain sufficient humidity	Assessment site: *fauna habitat assessment site* Data field: *WS overstory cover* Assessment area: *100m transect (within Condition plot)*	0 = Cover is absent 1 = >0-20% cover - very little overstory cover, only a small number of scattered shrubs/trees present. 2 = 21-40% cover – less than half of the transect with overstory cover. Scattered shrubs/trees present. 3 = 41-60% - approximately half of the transect has overstory cover. Fairly consistent cover of shrubs/trees throughout the transect. 4 = 61-80% cover – majority of the transect with overstory cover. Continuous presence of shrubs/trees with few gaps in the overstory. 5 = 81-100% cover – the transect can be characterised as having continuous overstory cover by shrubs/trees with very few to no gaps in the overstory.	0.5
Coarse woody debris	Assessment site: *fauna habitat assessment site* Data field: *WS coarse woody debris* Assessment area: *50 x 20 m plot*	0 = CWD is absent 1 = >0 - <2 m 2 = 2-5 m 3 = >5-10 m 4 = >10-20 m 5 = >20 m	0.5 for highest scoring attribute (i.e., coarse woody debris or rock cover)
Loose or embedded rocks >20 cm across	Assessment site: *fauna habitat assessment site* Data field: *WS rock >20 cm* Assessment area: *50 x 20 m plot*	0 = Rocks > 20 cm across are absent 1 = 1-2 rocks > 20 cm across 2= >2-5 rocks > 20 cm across 3 = >5-10 rocks > 20 cm across 4 = >10-15 rocks >20 cm across 5 = >15 rocks > 20 cm across	

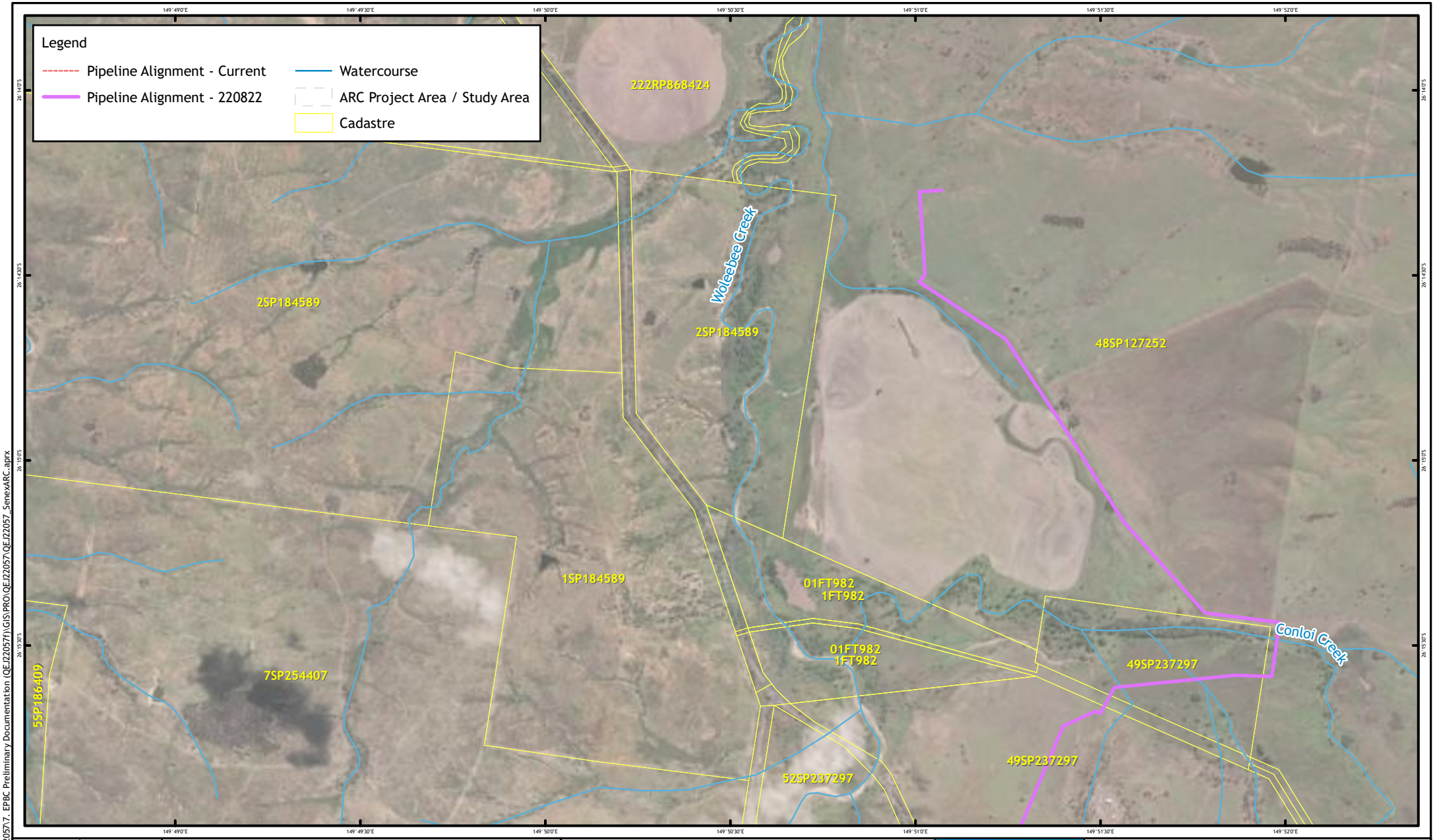
Indicators	Scoring data source	Scoring system	Weighting
Quality and availability of habitat required for mobility			
Overstory (shrub/tree) cover (%) required to maintain sufficient humidity	Assessment site: *fauna habitat assessment site* Data field: *WS overstory cover* Assessment area: *100m transect (within Condition plot)*	0 = Cover is absent 1 = >0-20% cover - very little overstory cover, only a small number of scattered shrubs/trees present. 2 = 21-40% cover – less than half of the transect with overstory cover. Scattered shrubs/trees present. 3 = 41-60% - approximately half of the transect has overstory cover. Fairly consistent cover of shrubs/trees throughout the transect. 4 = 61-80% cover – majority of the transect with overstory cover. Continuous presence of shrubs/trees with few gaps in the overstory. 5 = 81-100% cover – the transect can be characterised as having continuous overstory cover by shrubs/trees with very few to no gaps in the overstory.	0.5
Coarse woody debris	Assessment site: *fauna habitat assessment site* Data field: *WS coarse woody debris* Assessment area: *50 x 20 m plot*	0 = CWD is absent 1 = >0 - <2 m 2 = 2-5 m 3 = >5-10 m 4 = >10-20 m 5 = >20 m	0.25 for highest scoring attribute (i.e., coarse woody debris or rock cover)
Loose or embedded rocks >20 cm across	Assessment site: *fauna habitat assessment site* Data field: *WS rock >20 cm* Assessment area: *50 x 20 m plot*	0 = Rocks > 20 cm across are absent 1 = 1-2 rocks > 20 cm across 2= >2-5 rocks > 20 cm across 3 = >5-10 rocks > 20 cm across 4 = >10-15 rocks >20 cm across 5 = >15 rocks > 20 cm across	
Distribution of cover (coarse woody debris and/or rock)	*Assessment site: fauna habitat assessment site* *Data field: WS microhabitat density* *Assessment area: 50 x 20 m plot*	0 – cover is absent 1 = cover not at all widely distributed within plot 3 = cover moderately widely distributed within plot 5 = cover scattered throughout most of plot	0.25

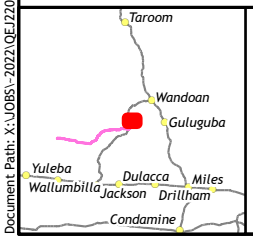
Indicators	Scoring data source	Scoring system	Weighting
Absence of threats			
Clearing/removal or stacking of microhabitat features, or removal or leaf litter/ground cover.	Assessment site: *fauna habitat assessment site* Data fields: *WS clearing threat scope*, *WS clearing threat severity* Assessment area: *100 x 50 m plot*	For each threat, score 1-5 for: Scope: 1 = >80% of AU patch impacted or potentially impacted by the threat 2 = 40-80% of AU patch impacted or potentially impacted by the threat 3 = 20-40 % of AU patch impacted or potentially impacted by the threat 4 = up to 20% of AU patch impacted or potentially impacted by the threat 5 = AU patch not impacted or unlikely to be impacted by the threat Severity: 1 = intensity/severity of threat high 2 = intensity/severity of threat moderate 3 = intensity/severity of threat low 4 = intensity/severity of threat within AU patch very low 5 = threat absent	Average of threat scores used.
Introduced predators (rats, mice, pigs, cattle)	Assessment site: *fauna habitat assessment site* Data fields: *WS invasive species threat scope*, *WS invasive species threat severity* Assessment area: *Habitat/assessment unit patch*		
High intensity fire, Evidence of fire removing ground cover/key microhabitat features, or high fuel loads (e.g., buffel grass)	Assessment site: *fauna habitat assessment site* Data fields: *WS fire threat scope*, *WS fire threat severity* Assessment area: *Habitat/ assessment unit patch*		

Table 7: White-throated Needletail habitat attribute scoring

Indicators	Scoring data source	Scoring system	Weighting
Quality and availability of food and habitat required for foraging			
Extent of native vegetation cover within Study Area	Assessment site: *fauna habitat assessment site* Data field: *WTNT vegetation cover* Assessment area: *Study Area*	0 = Built area / with little or no native vegetation present 2.5 = Fragmented landscape with patchy native vegetation cover 5 = Mostly / all native vegetation cover	1
Quality and availability of habitat required for shelter			
Presence of suitable roost trees (canopy trees with hollows and/or mid-dense to dense canopy cover, with clear air space allowing birds ready access)	Assessment site: *fauna habitat assessment site* Data field: *WTNT roosting* Assessment area: 50 x *100m plot*	0 = Suitable roost trees are absent 1 = 1-3 suitable roost trees 3 = 4-8 suitable roost trees 5 = >8 suitable roost trees	1
Quality and availability of habitat required for mobility			
Maximum score of 5 assigned due to the species' mobility, unless site located in proximity to transmission lines and/or wind turbines (in which case mobility is assigned a score of 1).			
Absence of threats			
Presence of wind turbines, power lines, or other aerial threats or obstructions	Assessment site: *fauna habitat assessment site* Data field: *WTNT aerial threat scope*, *WTNT aerial threat severity* Assessment area: *Within 1km of site*	Scope: 1 = Aerial threat present 5 = Aerial threat absent Severity: 1 = intensity/severity of threat high (i.e., wind turbines) 3 = intensity/severity of threat low (i.e., power lines or other threats) 5 = threat absent	Average of threat scores used.

Appendix Q Impact Avoidance and Route Re-alignment





N

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0 0.5 1

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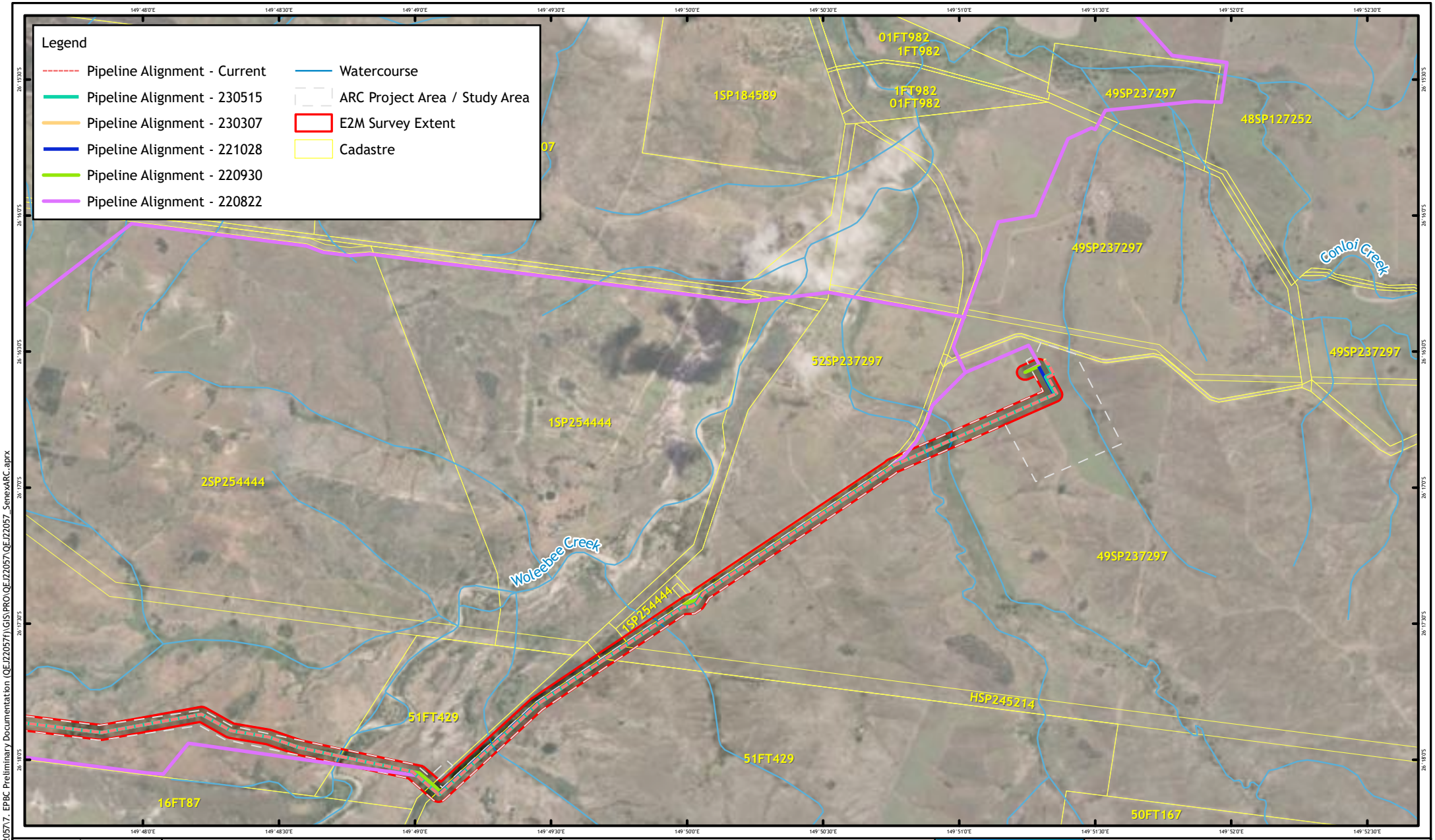
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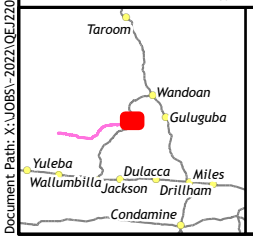
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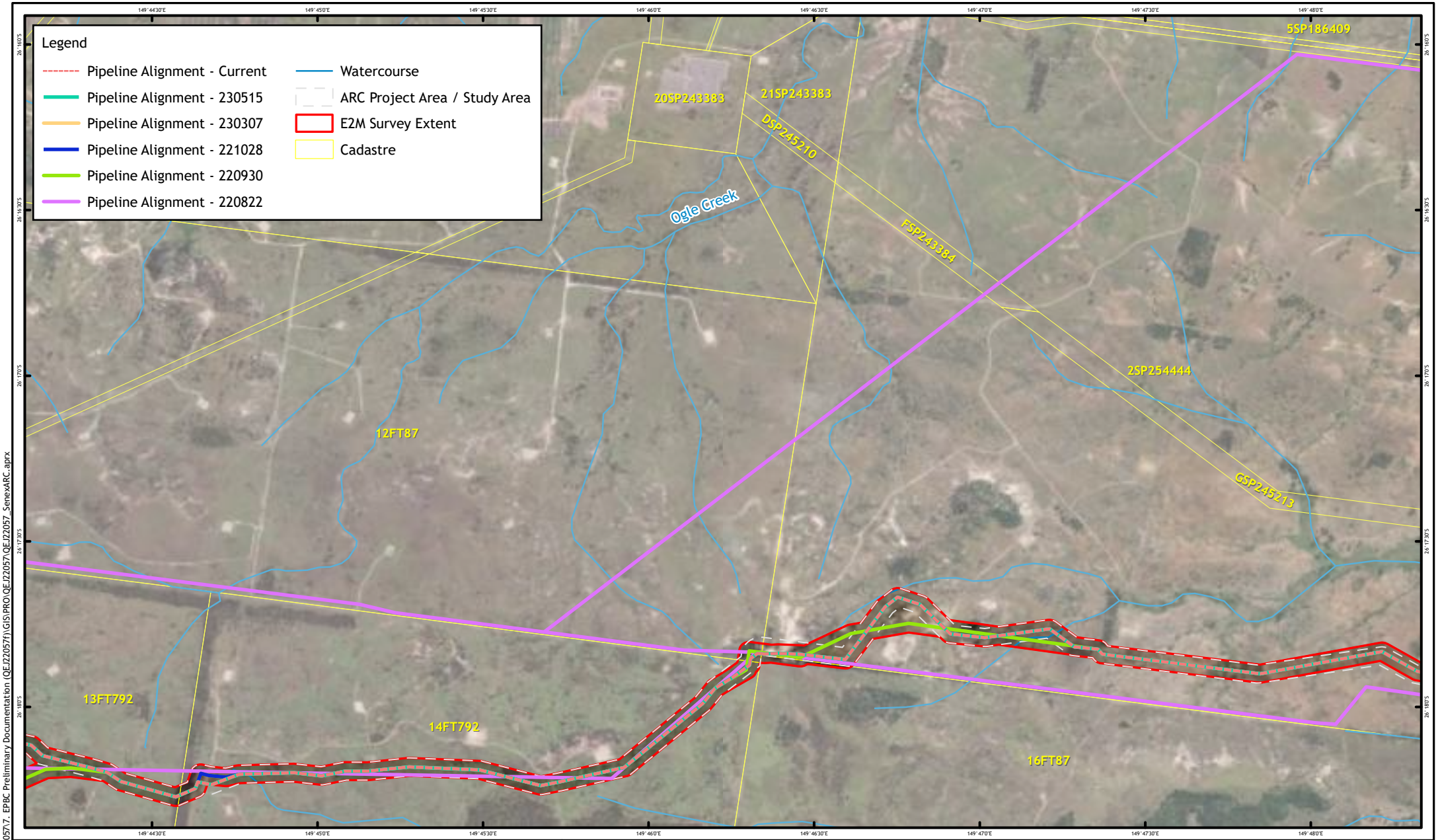
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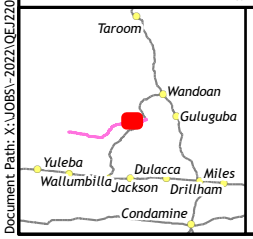
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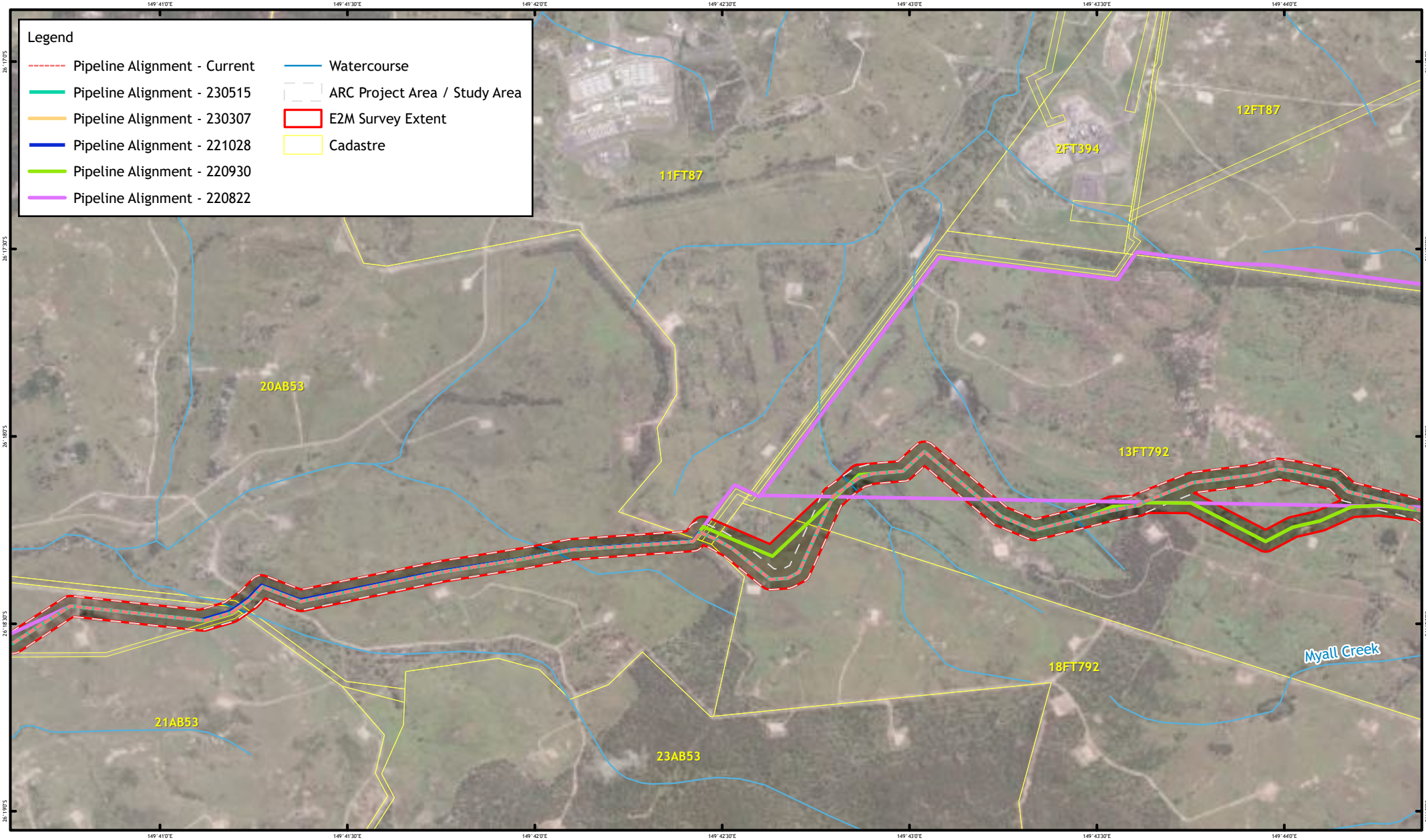
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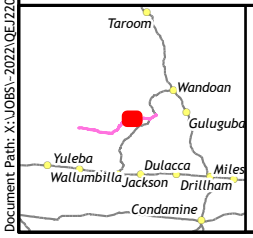
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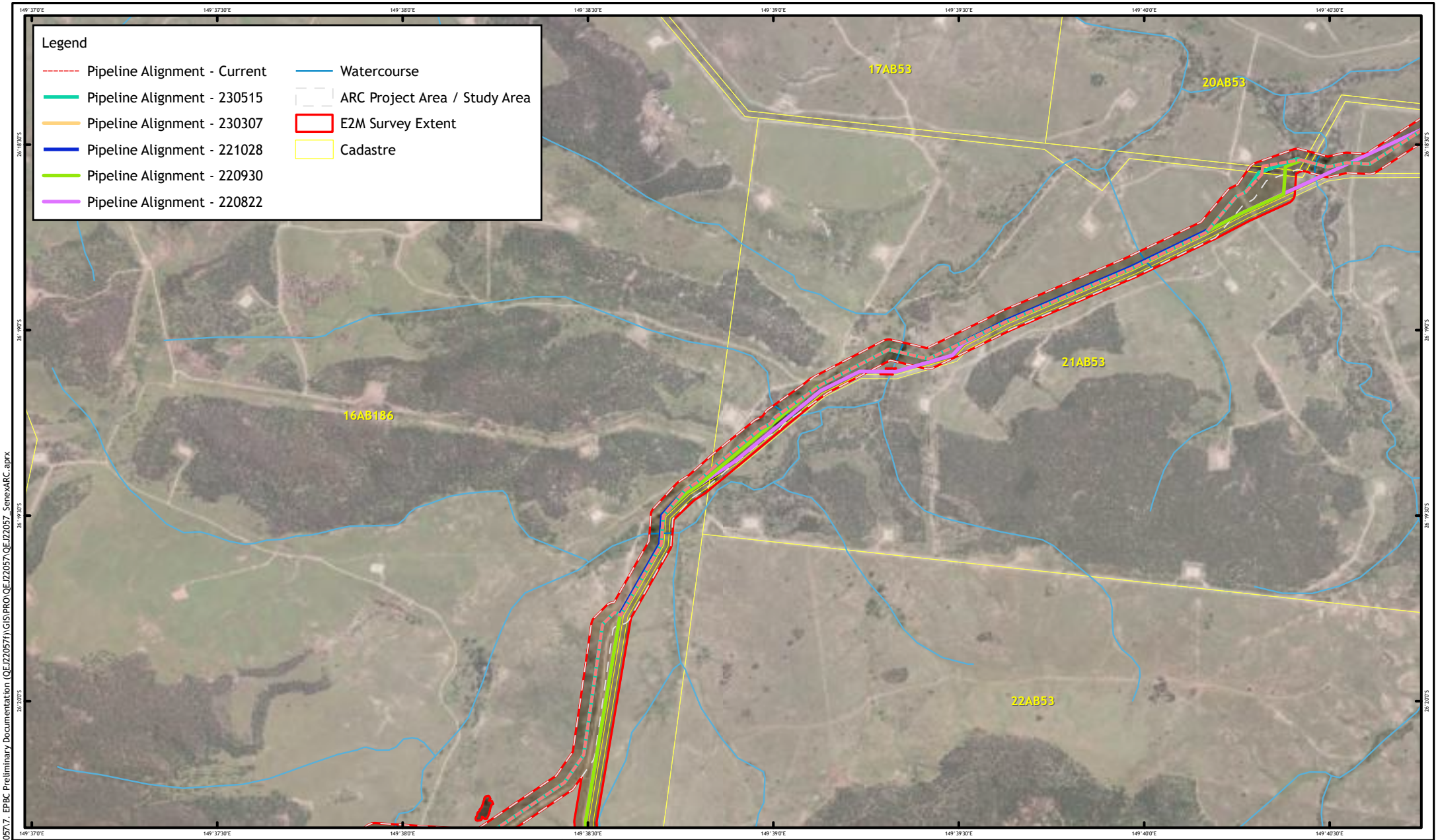
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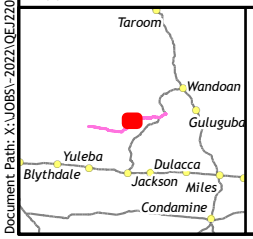
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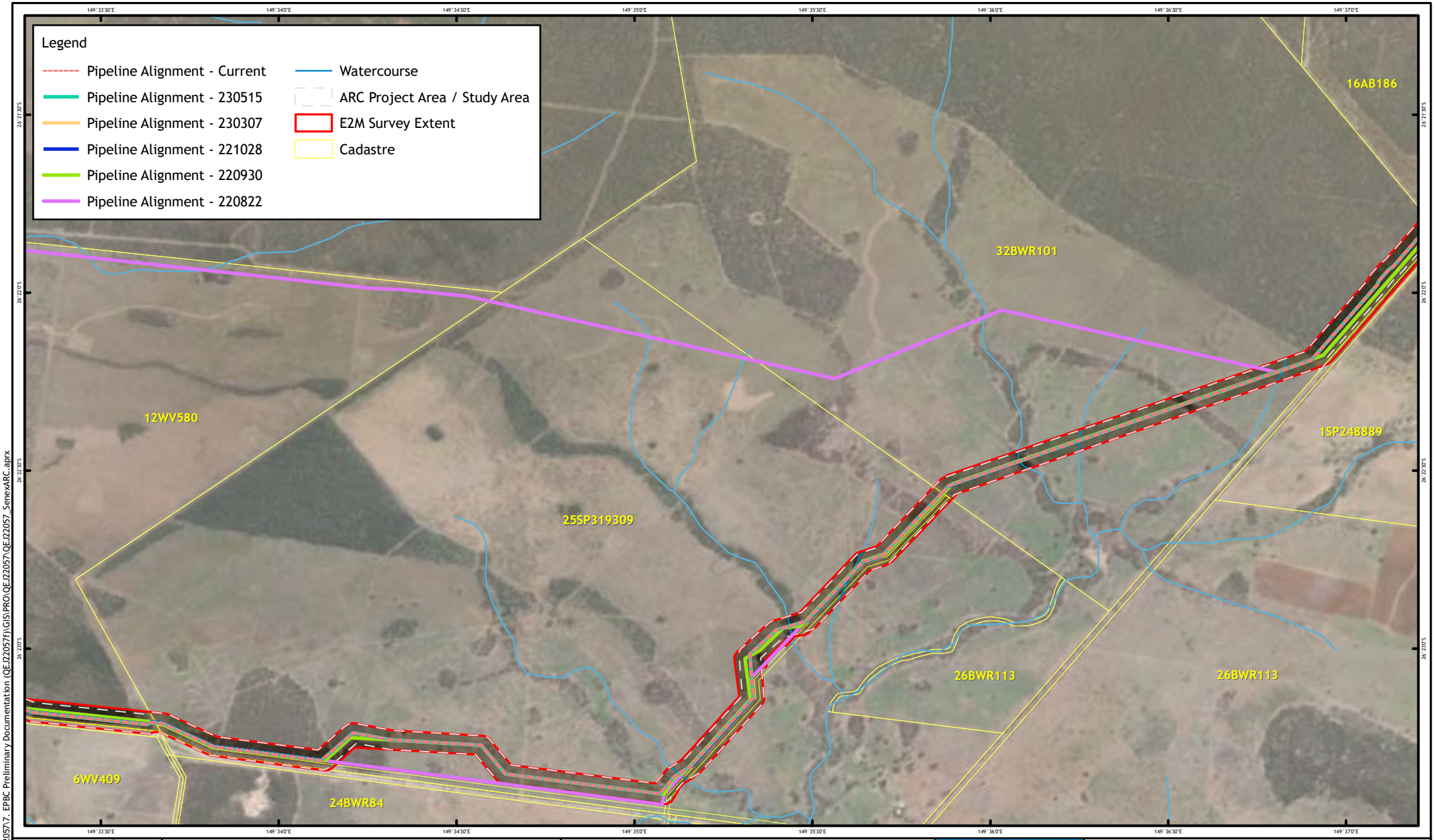
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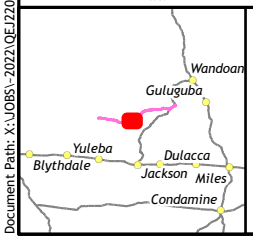
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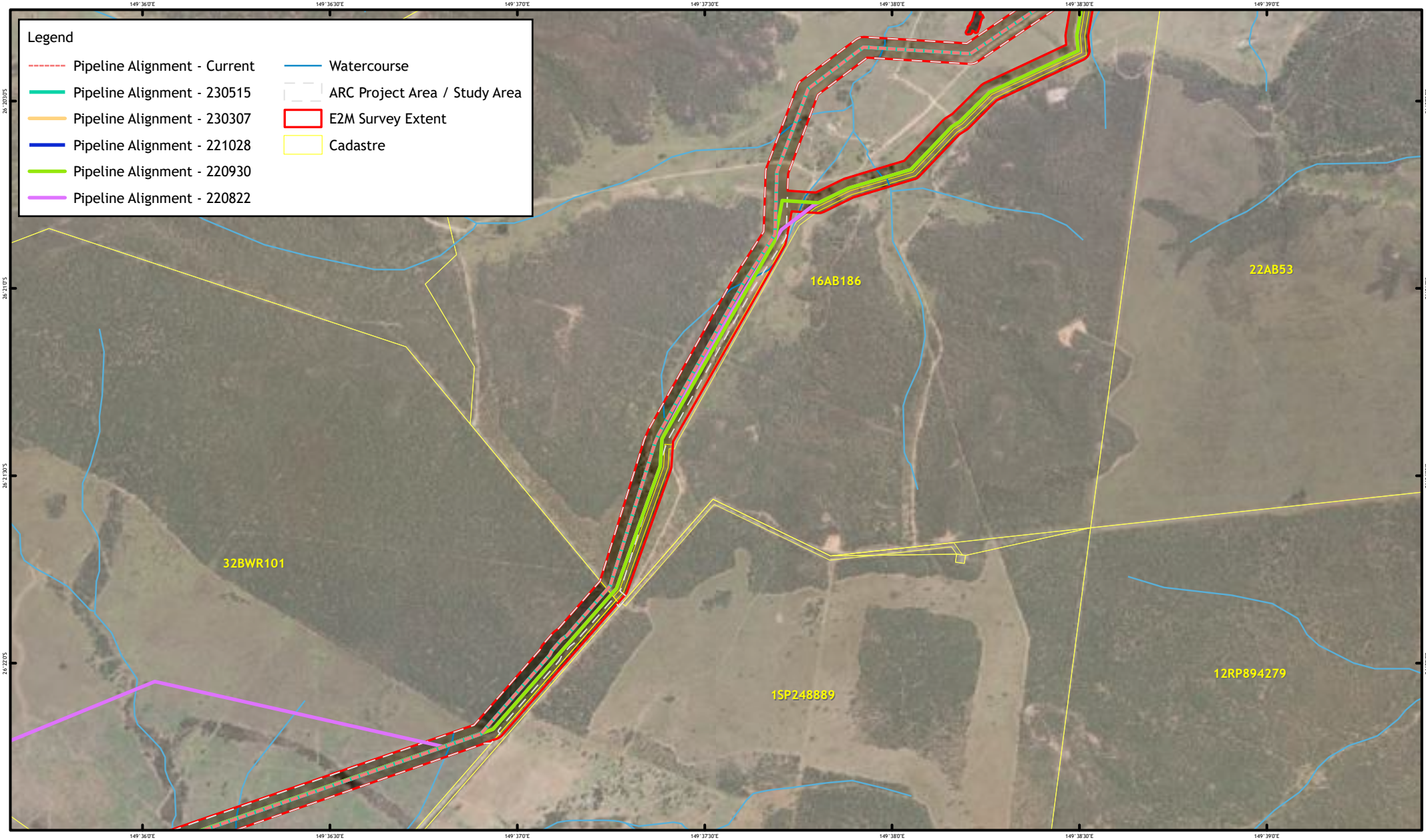
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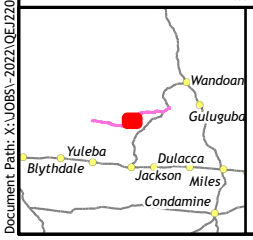
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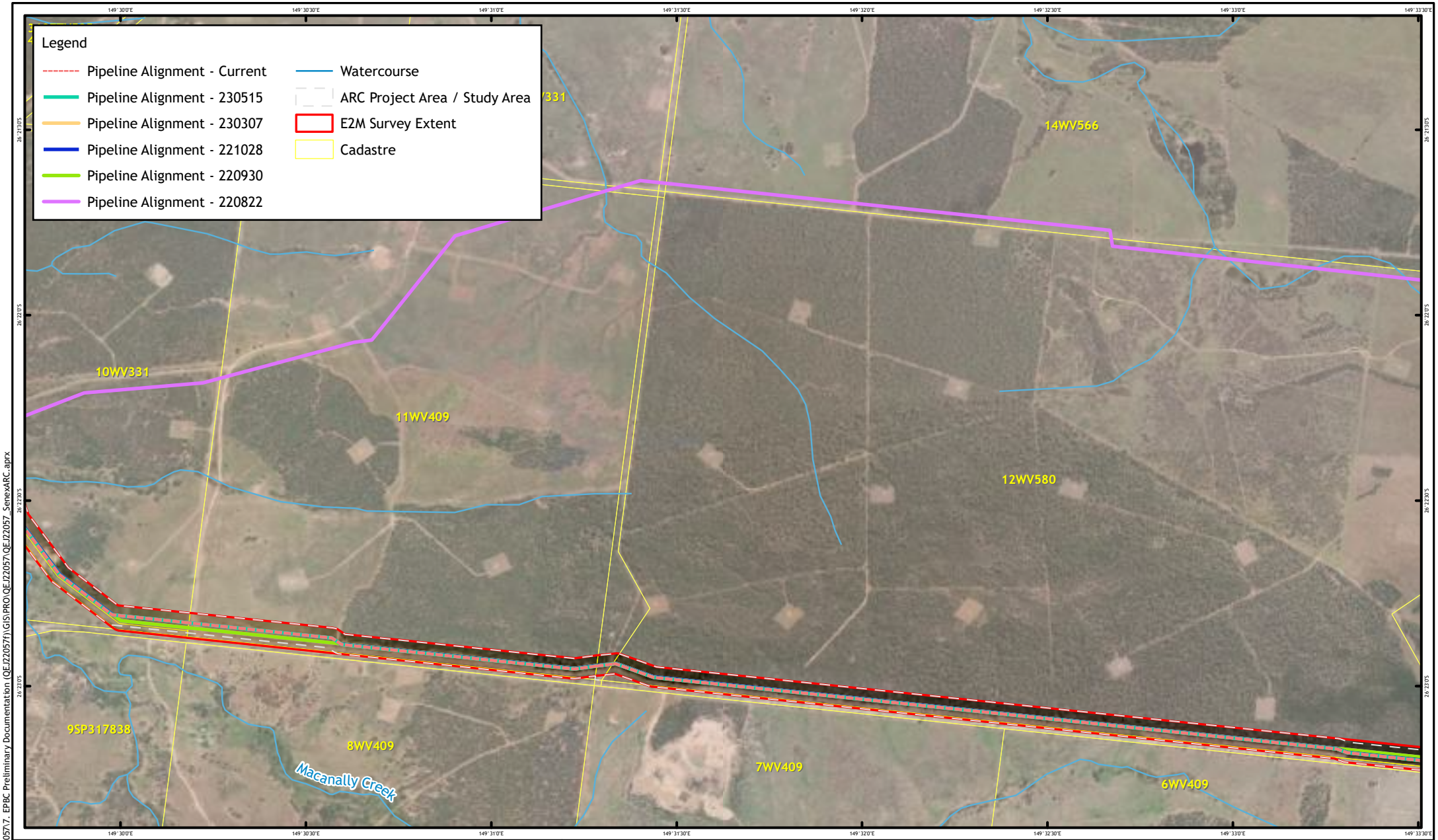
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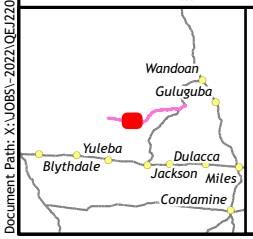
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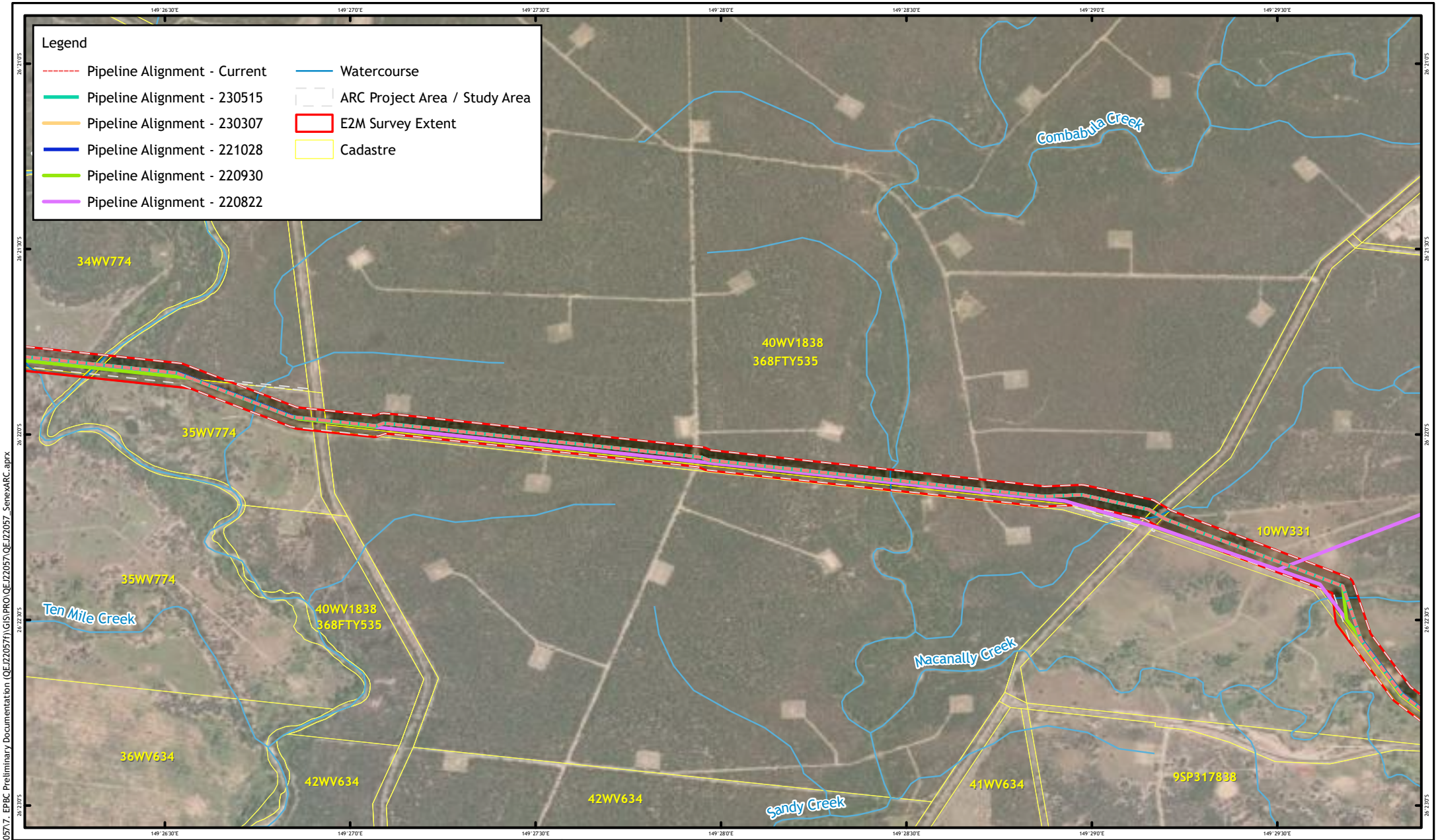
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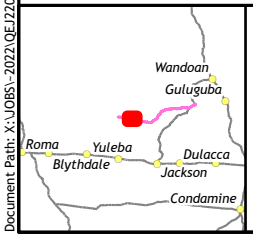
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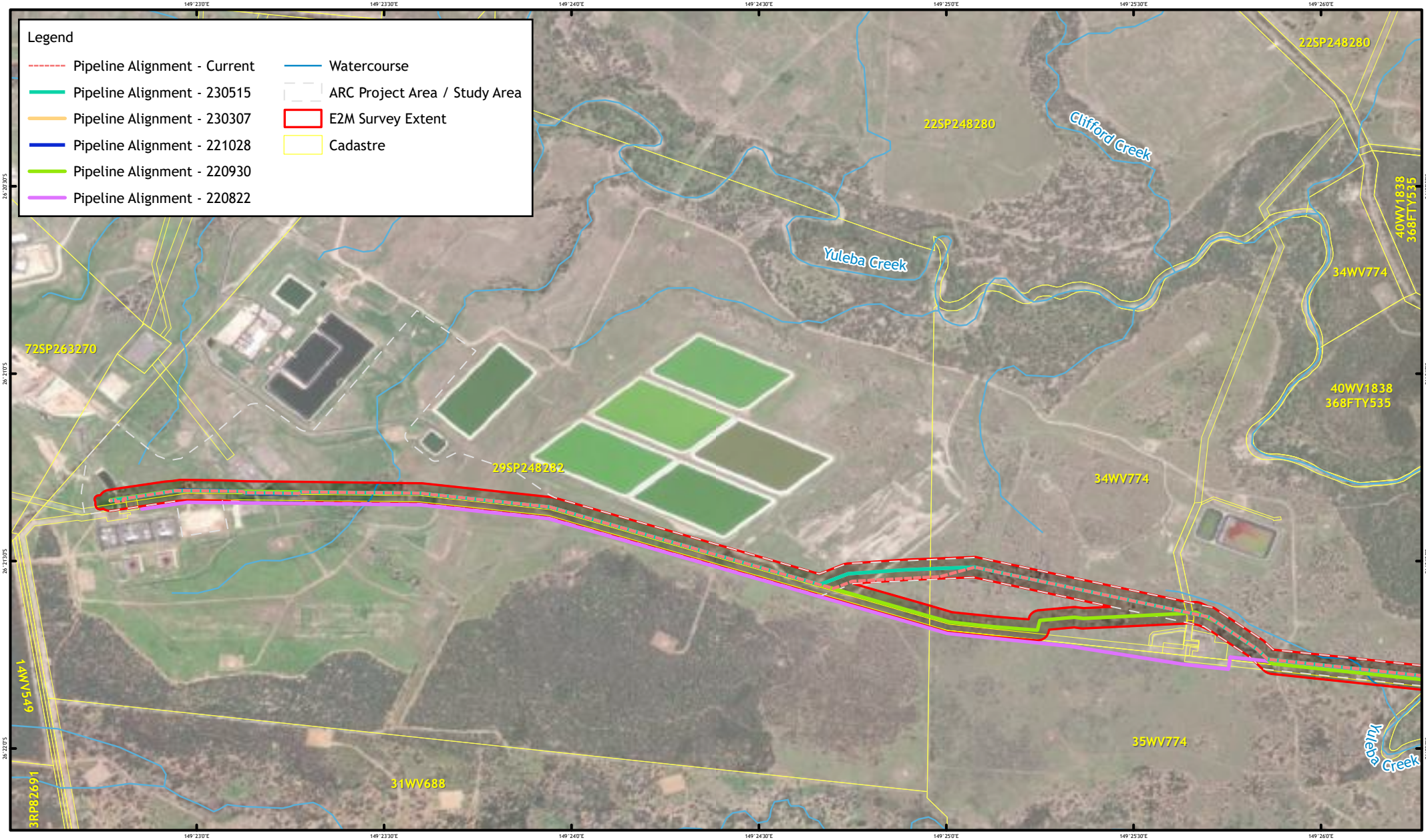
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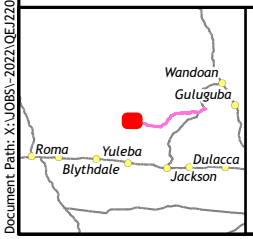
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Scale 1:25,000 (A4)

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Kilometres

Coordinate System: GCS GDA 1994

Notes:
Aerial Imagery: © ESRI 2022
Cadastre: © DoR 2022
Ordered Drainage: © DoR 2022
Road: © DoR 2022

Rev	Description	Drawn	Approved	Date
4	Issued for Use	GO	AP	26/02/2024
3	Issued for Use	GO	LW	18/08/2023

APPENDIX Q: IMPACT AVOIDANCE – ROUTE REALIGNMENTS

MNES Ecological Assessment Report
Senex Energy Limited

Map Number	Job Number	Rev
10 of 10	QEJ22057	4

Document Path: X:\JOBS\~2022\QEJ22057\7. EPBC Preliminary Documentation (QEJ22057f)\GIS\PRO\QEJ22057\QEJ22057_SenexARC.aprx

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Appendix R MNES Significant Impact Assessments (SIA)

R.1 MNES SIA – Brigalow TEC

Assessments identified that the Project is likely to result in the removal of a maximum of up to of 1.01 ha of Brigalow TEC (including 10% buffer) as discussed in Section 4.1.4.1 and depicted in Appendix C. As outlined in Section 5, impacts to Brigalow TEC were avoided by route realignment where possible. Mitigation measures will also be implemented as per Section 5 to minimise impacts to adjacent Brigalow TEC to be retained.

To determine if the Project is likely to have a significant impact on the Brigalow TEC, an assessment in accordance with the Guidelines was conducted (below), which determined that a significant impact is unlikely.

Assessment criteria	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p. 2)	
Reduce the extent of an ecological community	The Brigalow TEC community is widespread throughout Queensland and New South Wales, largely in association with the Brigalow Belt Bioregion (SPRAT). The Project, situated within the southern Brigalow Belt bioregion, is not located near the edge of the known distribution of this ecological community. The extent of occurrence for Brigalow TEC within the local landscape is likely to remain largely unchanged as a result of the Project given the minor removal of TEC proposed. The Project has refined alignments in order to minimise impacts to Brigalow TEC. This included a realignment that resulted in avoidance to several patches of remnant TEC. The Project will therefore not reduce the extent of the ecological community.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	The location of the Project has been refined to minimise fragmentation of the TEC by abutting roads or existing pipelines in most instances. While the Project will require the clearing of up to 1.01 ha of Brigalow TEC, it is unlikely to increase fragmentation of the TEC.
Adversely affect habitat critical to the survival of an ecological community (Critical Habitat)	As per the listing advice for the Brigalow Ecological Community (Butler, 2007), the areas considered critical to the survival of the Brigalow TEC includes all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community. The Project will result in the removal of 1.01 ha of Brigalow TEC, however, when considering the context and intensity of the impact, this is not likely to adversely impact the survival of the TEC. The Project will also not result in the removal of any entire patches of Brigalow TEC. Indirect impacts on the Brigalow TEC area to be retained adjacent to the Project and surrounds are considered to be minimal. Implementation of mitigation measures (refer to Section 5), such as weed hygiene and erosion and sediment controls, will minimise any potential indirect impacts on ecological function and composition within the retained adjacent TEC areas.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's	Indirect impacts on the Brigalow TEC area to be retained adjacent to the Project are considered to be minimal. The Brigalow TEC to be retained within the Study Area are not located along a watercourse and largely dependent on overland flows. It is unlikely that the

Assessment criteria	Response
survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	Project will modify abiotic factors of Brigalow TEC communities to be retained adjacent to the Project or surrounds.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.	The removal of a maximum of 1.01 ha of TEC is unlikely to result in substantial change in species composition or occurrence. Clearing will be generally limited to the removal of edges of patches, rather than entire patches of Brigalow. The Project is unlikely to result in the changes to existing fire regimes or harvesting of native species. Indirect impacts on the Brigalow TEC areas to be retained are considered to be minimal. Implementation of mitigation measures (refer to Section 5), such as weed hygiene and erosion and sediment controls, will minimise and potential indirect impacts on ecological function and composition within the retained TEC areas.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • assisting invasive species, which are harmful to the listed ecological community, to become established, or • causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	Indirect impacts on the Brigalow TEC areas to be retained are considered to be minimal. Implementation of mitigation measures (refer to Section 5), such as weed hygiene and erosion and sediment controls, will minimise any potential indirect impacts on ecological function and composition within the retained TEC area.
Interfere with the recovery of an ecological community	A draft national recovery plan has been developed for the Brigalow TEC (refer to Recovery plan for the *"Brigalow (Acacia harpophylla dominant and co-dominant" endangered ecological community* (Butler, 2007)). Key objectives of the national recovery plan include: • increasing the area of the Brigalow ecological community and its representation in conservation reserves • improving knowledge of the Brigalow ecological community and its condition as habitat for native species; and • mitigating key threats to the Brigalow ecological community by controlling fire, weeds and animal pests. The Project has refined the alignment in order to minimise impacts to Brigalow TEC. While the Project will unavoidably impact up to 1.01 ha of Brigalow TEC, it will not result in fragmentation to patches. The removal of a maximum of 1.01 ha is not considered important, notable or of consequence to the recovery of this TEC.
Conclusion	**Overall, the Project is unlikely to result in a significant impact on Brigalow TEC.**

R.2 MNES SIA – Poplar box TEC

Assessments identified that the Project is likely to result in the removal of a maximum of 0.088 ha of Poplar Box (including a 10% buffer) as discussed in Section 4.1.4.2 and depicted in Appendix G. As outlined in Section 5, impacts to Poplar Box TEC were avoided by route realignment where possible. Mitigation measures outlined in section 5 of this report will also be implemented to minimise impacts on retained Poplar Box TEC adjacent the Indicative Footprint.

To determine if the Project is likely to have a significant impact on the Poplar Box TEC, an assessment in accordance with the Guidelines was conducted (below), which determined that a significant impact is unlikely.

Assessment criteria	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p. 2)	
Reduce the extent of an ecological community	The Project will require the removal of a maximum of 0.088 ha of one occurrence of Poplar Box TEC. The current extent of potential Poplar Box in Southern Downs subregion is 125,339 ha based on (Accad *et al.*, 2019). The Project would not significantly reduce the extent on the Poplar Box TEC as the Project impact on potential TEC within the Southern Down subregion would be <0.0001%. The Project is not near the edge of the known distribution of this ecological community and therefore the Project would not reduce the overall extent of occurrence of this community.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	The Project would require the removal of a maximum of 0.088 ha of Class C Poplar Box TEC. Historical vegetation clearing and land development for agricultural practices have resulted in substantial fragmentation and degradation of Poplar Box TEC within the Study Area. The removal of a maximum of 0.088 ha of TEC will not significantly increase fragmentation of this TEC.
Adversely affect habitat critical to the survival of an ecological community (Critical Habitat)	The Poplar Box TEC Conservation Advice (DEE, 2019a) describes that the areas most critical to the survival of the ecological community are the "Best Quality" (Class A), most intact patches of the ecological community. The areas of Poplar Box TEC within the Project area are "Moderate Quality" (Class C). The removal of a maximum of 0.088 ha of Class C Poplar Box TEC is considered unlikely to adversely affect habitat critical to the survival of the ecological community.

Assessment criteria	Response
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	The Project will result in the direct removal of 0.088 ha of Class C Poplar Box TEC. Indirect impacts on the Poplar Box TEC area to be retained adjacent to the Project are considered to be minimal. It is considered unlikely that the Project will modify abiotic factors of the Poplar Box TEC communities to be retained adjacent to the Project or surrounds.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.	The Project will result in the direct removal of 0.088 ha of Class C Poplar Box TEC. Indirect impacts on the Poplar Box TEC areas to be retained adjacent to the Project and surrounds are considered to be minimal. Implementation of mitigation measures (refer to Section 5, such as weed hygiene and erosion and sediment controls, will minimise any potential indirect impacts on ecological function and floristic composition/structure within retained TEC areas adjacent the Project. The Project is unlikely to result in the changes to existing fire regimes or harvesting of native species.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • assisting invasive species, that are harmful to the listed ecological community, to become established, or • causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	The clearing of areas of Poplar Box TEC would lead to an increase in potential edge effects which has the potential to impact species composition. However, given the mitigation measures proposed in this assessment will be implemented it is considered unlikely the Project would substantially change the species composition of retained areas of the TEC (refer to Section 5).

Assessment criteria	Response
Interfere with the recovery of an ecological community	While the Project would require clearing of 0.088 ha of Poplar Box TEC, the identified community is isolated and located within a largely modified and disturbed landscape with limited connectivity with surrounding remnant vegetation or conservation areas. Furthermore, indirect impacts on the Poplar Box TEC area to be retained adjacent to the Project will be minimised through the implementation of mitigation measures, such as weed hygiene and erosion and sediment controls. As such, it is unlikely that the Project will significantly interfere with the recovery actions identified within the national recovery plan.
Conclusion	**Overall, the Project is unlikely to result in a significant impact on Poplar Box TEC.**

R.3 MNES SIA – Dulacca Woodland Snail

As outlined in Section 4.2.3.6 and depicted in Appendix M, the Indicative Footprint and adjoining Study Area contain potential foraging and breeding habitat for the Dulacca woodland snail considered Critical Habitat for the species (comprising remnant vegetation mapped as REs 11.7.2, 11.5.16 and 11.10.8). This includes up to 4.80 ha of suitable habitat within the Indicative Footprint (with 10% buffer included to account for final adjustments to the RoW and associated infrastructure).

As outlined in Section 5.3, a range of mitigation measures have been identified for implementation to minimise residual impacts to Dulacca woodland snail, including (but not limited to):

- Relocating individuals identified during pre-clearing surveys to areas of nearby suitable habitat (as detailed in the Dulacca woodland snail translocation strategy in Appendix U), and
- Placing coarse woody debris/fallen timber left over from clearing works along the RoW to facilitate movement of animals between areas of retained habitat adjacent the RoW (if/where any individuals are identified during pre-clearance surveys).

To determine if the Project is likely to have a significant impact on Dulacca woodland snail, an assessment in accordance with the Guidelines was conducted, which determined that a significant impact is unlikely (see below).

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	

The action is likely to lead to a long-term decrease in the size of a population	The Project is unlikely to lead to long-term decrease in a population of the Dulacca woodland snail, given the following:
	• The proposed alignment will avoid most areas of likely suitable habitat present within the Study Area, with the clearing/disturbance of remnant REs 11.9.5, 11.5.16, 11.10.8, and 11.7.2 limited to 4.80 ha (representing ~0.17% of likely suitable habitat available within the Study Area and wider surrounds). This is unlikely to lead to a significant population decline, given:
	  • the extent of habitat adjacent and surrounding the Indicative Footprint, and noting that much of the clearing/loss of is occurring at the edges of larger blocks of contiguous woodland habitat; and
	  • the implementation of proposed impact mitigation measures detailed in Section 5.3, including (but not limited to):
	  • repositioning/redistribution of fallen/felled timber to provide shelter for animals in areas subject to clearing if/where any individuals are identified during pre-clearance surveys; noting that the species is known to occur in cleared areas where suitable cover(i.e., rocks and fallen timber) remains (TSSC, 2016), and
	  • the capture and translocation of animals located within the Indicative Footprint during pre-clearance surveys to suitable habitat nearby (as detailed in the Dulacca woodland snail translocation strategy in Appendix U).

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
Reduce the area of occupancy of the species	The current known area of occupancy for this species is 112km^2 and encompasses records to the near south of the Indicative Footprint (to the north-west and west of Gurulmundi SF, within approximately 8 km of the pipeline) and further south to the east and south-east of Yuleba State Forest. As outlined in the Conservation Advice for this species (DEE, 2016), this species is known to occur on private property adjoining Barakula State Forest and Condamine State Forest. While no individuals were detected during fauna surveys, suitable habitat is present within the Indicative Footprint. Based on a desktop assessment of habitat availability within 10 km of the Study Area, less than 0.2% of available habitat within the surrounding landscape will be impacted by the Project. As such, the loss of habitat within the Indicative Footprint, is unlikely to reduce the current known area of occupancy of the species.
Fragment an existing population into two or more populations	The Project will fragment mapped Critical Habitat for Dulacca woodland snail between KP13 and KP14 . As such, the Project could potentially fragment an existing population into two or more populations. To mitigate this risk, coarse woody debris/fallen timber left over from clearing works will be redistributed along the RoW to facilitate movement of animals between areas of retained habitat either side of the clearing footprint if/where any individuals are identified during pre-clearance surveys; noting that the species is known to occur in cleared paddocks where suitable cover (i.e., rocks and fallen timber) remains) (TSSC, 2016). It is therefore unlikely that the Project will fragment an existing population into two or more populations.
Adversely affect habitat critical to the survival of the species (Critical Habitat)	Tree cover and ground debris (timber, rocks, and deep litter) are critical to the survival of native Australian land snails, providing breeding habitat and shelter for adult and juvenile snails (Stanisic, 2011, cited in TSSC, 2016). Clearing for the Project may therefore result in the disturbance of Critical Habitat for the species. The disturbance of critical habitat, however, is unlikely to significantly impact the species, given: • The proposed alignment will avoid most areas of likely suitable habitat present within the Study Area, with the loss of remnant 11.9.5, 11.5.16, 11.10.8, and 11.7.2 limited to 4.80 ha (representing <0.2% of potentially suitable habitat available within the Study Area and wider surrounds) • Connectivity between areas of occupied habitat either side of the RoW will be maintained by reinstating coarse woody debris removed from the RoW during clearing works, noting that the species is known to occur in cleared areas where suitable cover (i.e., rocks and fallen timber) remains (TSSC, 2016).
Disrupt the breeding cycle of a population	Currently, the timing of reproduction in the Dulacca woodland snail is unknown. As such, clearing works have the potential to disrupt the species' breeding cycle. However, given (1) the limited extent of habitat clearance/disturbance and (2) the extent of likely/potentially suitable

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	habitat adjacent to and surrounding the Indicative Footprint, it is unlikely the Project would disrupt the breeding cycle of an entire population.

Modify, destroy, remove or isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project is unlikely to destroy, remove or isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline, given:
	• The proposed alignment will avoid most areas of likely suitable habitat present within the Indicative Footprint, with the loss of remnant 11.9.5, 11.5.16, 11.10.8, and 11.7.2 limited to 4.37 ha (representing a small percentage of suitable habitat available within the Project Study Area and wider surrounds, as outlined in Table 16 of this report).
	• The implementation of proposed impact mitigation measures detailed Section 5.3, including (but not limited to):
	  • repositioning/redistribution of fallen/felled timber to provide shelter for animals in areas subject to clearing if/where any individuals are identified during pre-clearance surveys; noting that the species is known to occur in cleared areas where suitable cover (i.e., rocks and fallen timber) remains (TSSC, 2016), and
	  • the capture and translocation of animals located within the Indicative Footprint during pre-clearance surveys to suitable habitat nearby (as detailed in Appendix U).

Result in invasive species that are harmful to an Endangered species becoming established in the species habitat	The implementation of weed management and pest control measures identified in Section 5.3 will assist in reducing any potential introduction or spread of exotic species in retained habitat adjacent to and surrounding the Indicative Footprint. Rehabilitation of disturbed areas will not utilise exotic species (e.g., buffel grass or other exotic species that can lead to more intense fires) that are harmful to the Dulacca woodland snail, where these exotic species do not already occur. As such, The Project is unlikely to increase the abundance of invasive species above their current levels or result in the introduction of new invasive species.
Introduce disease that may cause the species to decline	The proposed disturbance is unlikely to introduce or facilitate the spread of diseases or pathogens that may cause the species to decline.
Interfere substantially with the recovery of the species	While resulting in the loss of up to 4.80 ha of potential shelter and/or foraging habitat for the Dulacca woodland snail, the Project is unlikely to substantially interfere with recovery of the species, given: • The Project is unlikely to result in any further decline in abundance or reduction in the species' area of occupancy or extent of occurrence (for the reasons outlined above).

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	• The Project is unlikely to substantially interfere with conservation actions identified in the conservation advice notice for the species (TSSC, 2016).
Conclusion	**Overall, the Project is unlikely to result in a significant impact on Dulacca woodland snail**

R.4 MNES SIA – Glossy Black-Cockatoo (south-eastern)

As detailed in Section 4.3.3.1 and Appendix I, the Indicative Footprint and adjoining Study Area contain potential breeding and foraging habitat for the glossy black-cockatoo (south-eastern) (henceforth referred to as the 'glossy black-cockatoo') considered Critical Habitat for the species (see Section 4.2.3.1 and in Appendix I for details). This includes up to 28.31 ha of Critical Habitat within the Indicative Footprint (with 10% buffer included to account for final adjustments to the RoW and siting of associated infrastructure)

As outlined in Section 5.3, a range of mitigation measures have been identified to minimise Project impacts on glossy black-cockatoo, including (but not limited to):

- avoidance of hollow-bearing trees along the periphery of the Indicative Footprint (where possible),
- development and implementation of SMPs to address Project impacts on animal breeding places (including active glossy black-cockatoo nests) identified during pre-clearing surveys, and
- and installation of salvaged hollows and/or nest boxes to replace the loss of suitable (large volume) nest hollows due to clearing along the RoW.

To determine if the Project is likely to have a significant impact on glossy black-cockatoo, an assessment in accordance with the Guidelines was conducted, which determined that a significant impact is unlikely. For the purposes of this assessment, birds occurring within the Study Area and surrounds are considered part of an important population (as per the Guidelines) (see below for further details).

MNES Significant Impact Guideline Criteria for Vulnerable Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
Lead to a long-term decrease in the size of an important population of a species.	No important populations are detailed within the conservation listing advice for glossy black-cockatoo (southern) (DCCEEW, 2016); however, research by Pavey et al. (2016) suggests habitat within and surrounding Combabula State Forest (including woodland/open forest within the Indicative Footprint) may support an important population of the species. Clearing within the Indicative Footprint will result in the loss of up to 28.31 ha of Critical Habitat supporting this important population. Notwithstanding this, the Project is unlikely to result in a long-term decrease in an important population of the species given: • the area of habitat being cleared represents a small percentage (~0.1%) of potentially suitable breeding and/or foraging habitat available within the Study Area and wider surrounding landscape (including extensive areas of Critical Habitat elsewhere within Combabula State Forest) (see Table 16 in body of report), • the Project is unlikely to have a significant adverse impact on areas of Critical Habitat adjoining the Indicative Footprint (due to the implementation of measures minimising and/or mitigating impacts such as weed spread, clearing or disturbance of habitat outside of the Indicative Footprint, and disruption of breeding activity), and

MNES Significant Impact Guideline Criteria for Vulnerable Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	• no evidence of the species was detected during the field surveys.
Reduce the area of occupancy of an important population.	While the Project will result in the loss of up to 28.31 ha of Critical Habitat supporting an important population of the glossy black-cockatoo (southern), the Project is unlikely to result in a significant reduction in area of occupancy, given: • no evidence of the species was detected within the Study Area during field surveys, • the area of habitat being cleared represents a small percentage (~0.1%) of potentially suitable breeding and foraging habitat available within the Study Area and wider surrounding landscape (including extensive areas of Critical Habitat elsewhere within Combabula State Forest) (as outlined in Table 16 of this report). • the Project is unlikely to have a significant adverse impact on areas of Critical Habitat adjoining the Project due to the implementation of measures minimising and/or mitigating impacts such as weed spread, clearing or disturbance of habitat outside of the Indicative Footprint, and disruption of breeding activity (see Section 5.3 of this report).
Fragment an existing important population into two or more potential populations.	While the Project will result in the loss of up to 28.31 ha of breeding and foraging habitat for an important population of the glossy black-cockatoo, the Project is unlikely to fragment this population into two, given: • no evidence of the species was detected during field surveys, • the Project is unlikely to impede or constrain movement of glossy black-cockatoos across the broader landscape given how mobile the species is, and • clearing within the Indicative Footprint is unlikely to significantly fragment areas of Critical Habitat supporting an important population of this species.
Adversely affect habitat critical to the survival of a species (Critical Habitat)	Critical Habitat is detailed within the Conservation Advice for *Calyptorhynchus lathami lathami* (South-eastern glossy black-cockatoo) (DCCEW, 2022) and includes areas that are necessary: • For activities such as foraging, breeding, roosting, or dispersal • For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • To maintain genetic diversity and long-term evolutionary development; or • For the reintroduction of populations or recovery of the species or ecological community.

MNES Significant Impact Guideline Criteria for Vulnerable Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	While resulting in the loss of up to 28.31 ha of Critical Habitat for the species. The Project is unlikely to have a significant impact on the species having regard to the context and intensity of potential impacts, given: • Project impacts on the species are highly localised within the context of the species' current known distribution • the area of habitat being cleared represents a small percentage (~0.1%) of suitable habitat available within the surrounding landscape (including extensive areas of Critical Habitat elsewhere within Combabula State Forest) • Project impacts (including the removal of critical habitat) are unlikely to affect movement and gene flow within or between important populations; and • the Project is unlikely to have a significant adverse impact on areas of Critical Habitat within the Study Area and wider surrounds due to the implementation of measures minimising and/or mitigating impacts such as weed spread, clearing or disturbance of habitat outside of disturbed areas, and disruption of breeding activity (as detailed in Section 5.3 of this report).
Disrupt the breeding cycle of an important population.	Though resulting in the loss of 28.31 ha of potential breeding and foraging habitat, the Project is unlikely to significantly disrupt the breeding cycle of an important population, given: • the extent of suitable breeding habitat nearby (including similarly suitable breeding habitat elsewhere within Combabula State Forest), • avoidance of hollow-bearing trees along the periphery of the Indicative Footprint (where possible), • development and implementation of SMPs to address Project impacts on animal breeding places (including active glossy black-cockatoo nests) identified during pre-clearing surveys, and • installation of salvaged hollows and/or nest boxes to replace the loss of active hollows identified during pre-clearance surveys.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, given: • Project impacts on the species are highly localised within the context of the species' current known distribution, • the area of habitat being cleared represents a small percentage (~0.1%) of suitable habitat available within the surrounding landscape (including extensive areas of Critical Habitat elsewhere within Combabula State Forest),

MNES Significant Impact Guideline Criteria for Vulnerable Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	• Project impacts (including the removal of critical habitat) are unlikely to affect movement and gene flow within or between important populations, and • the Project is unlikely to have a significant adverse impact on areas of Critical Habitat adjoining the Indicative Footprint due to the implementation of mitigation measures detailed in Section 5.3.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The Project is considered unlikely to result in the introduction or spread of invasive species that may be harmful to the glossy black-cockatoo. Weed management and mitigation measures identified in section 5 will furthermore assist in preventing the introduction and dispersal of pest flora material from vehicles prior to entering the Project area. Invasive weeds, moreover, are only cited as a minor threat to the glossy black-cockatoo (DCCEEW, 2016).
Introduce disease that may cause the species to decline	The threat of disease (i.e. Psittacine Beak and Feather Disease) is relatively low compared to other threats to the species (DotE, 2015) and the Project is unlikely to result in increased transmission/spread of this disease or any other known bird diseases. As such, the Project is unlikely to result in the introduction of a disease that may cause the species to decline.
Interfere substantially with the recovery of the species	The Project is unlikely to result in any further decline in abundance or reduction in the species' area of occupancy. Nor is the Project likely to significantly impact efforts to recover the species. As such, the Project is unlikely to interfere with the recovery of the species as a whole.
Conclusion	**Overall, the Project is unlikely to result in a significant impact on the glossy-black cockatoo (south-eastern).**

R.5 MNES SIA – Squatter pigeon

As documented in section 4.2.3.2 and Appendix J, the Indicative Footprint and adjacent Study Area contain potential foraging and breeding habitat for the squatter pigeon considered Critical Habitat for the species, as well as potential foraging and dispersal habitat considered General Habitat for the species.

As detailed in section 4.2.3.2, the Project is likely to result in the removal of up to 11.18 ha of Critical Habitat and up to 20.76 ha of General Habitat for the squatter pigeon (with a 10% buffer applied to account for final adjustments to the RoW and associated infrastructure). As outlined in Section 5.3, a range of mitigation measures have been identified for implementation to minimise impacts on the species/species' habitat, including (but not limited to): minimising clearing extents where possible and ensuring retained vegetation is protected.

To determine if the Project is likely to have a significant impact on squatter pigeon, a significant impact assessment was conducted in accordance with the Guidelines (see below). For the purposes of this assessment, birds present within the Study Area and surrounds are considered part of an 'important population' (as per the Guidelines)[12].

MNES Significant Impact Guideline Criteria for Vulnerable Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
Lead to a long-term decrease in the size of an important population of a species.	The species was not observed within the Study Area during field surveys and there are very few records from the surrounding landscape, with the nearest contemporary (post-2000) record from Cherwondah State Forest (where the species was recorded in 2016). If present, the species may occur at low densities within the local area. Historical vegetation clearing and land development for agricultural practices have increasingly fragmented and degraded squatter pigeon (southern) habitat within the Study Area and surrounding landscape. Whilst the Project will result in the removal of a maximum of 11.18 ha of breeding habitat and up to 20.76 ha of foraging / dispersal habitat, this is a small percentage of potentially suitable habitat available (less than 0.25%) of habitat available within a 10km radius of the Study Area. Further, the lack of records of the species within the Study Area means it is unlikely that the Project would lead to a long-term decrease in the size of an important population of the species (if present).
Reduce the area of occupancy of an important population.	The Project is unlikely to result in a reduction in the area of occupancy of an important population, as less than 0.25 % of available habitat within a 10km radius of the Study Area will be impacted (see Table 16).

[12] All of the relatively small, isolated and sparsely distributed sub-populations occurring south of the Carnarvon Ranges in Central Queensland are considered to be important sub-populations of the subspecies. As a result, birds occurring within the Indicative Footprint and the broader Wandoan region may be considered to be part of an 'important population' or an important subpopulation as per the Guidelines (SPRAT database [DCCEEW, 2022]).

MNES Significant Impact Guideline Criteria for Vulnerable Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
Fragment an existing important population into two or more populations.	Historical vegetation clearing and land development for agricultural practices have increasingly fragmented and degraded squatter pigeon (southern subspecies) habitat within the Study Area and surrounding landscape. Due to the existing fragmentation within the landscape and the mobile nature of the species, it is unlikely that the Project would result in the fragmentation of an important population (if present) into two or more populations.
Adversely affect habitat critical to the survival of a species.	The Project will result in the removal of up to 11.18 ha of potential breeding/foraging habitat and up to 20.76 ha of foraging/dispersal habitat. Historical vegetation clearing and land development for agricultural practices have increasingly fragmented and degraded squatter pigeon (southern subspecies) habitat within the Study Area and surrounding landscape. The habitat to be removed is not considered to be critical to the survival of the species, given the availability of similarly suitable habitat within and adjacent to the broader Study Area.
Disrupt the breeding cycle of an important population.	The Project is unlikely to disrupt the breeding cycle of an important population due to the lack of records within the Study Area and therefore apparent low usage of the area. Further, the Project will impact less than 0.3% of available habitat within a 10km radius of the Project Area. Disturbance of breeding birds, moreover, will require development of an approved Species Management Program to mitigate Project impacts on birds found breeding within or immediately adjacent the Indicative Footprint.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project will result in the likely removal of up to 11.18 ha of potential breeding/foraging habitat and 20.76 ha of foraging/dispersal habitat, which is unlikely to lead to a long-term decline in the species population given the extent of likely suitable habitat for this species within the Study Area and wider surrounds.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The Project is unlikely to increase the abundance of invasive species (i.e., feral dogs, cats and foxes) above their current levels or result in the introduction of new invasive species. The implementation of mitigation measures (refer to Section 5.3) including weed management, pest control and weed hygiene protocols, will assist in reducing any potential reintroduction or spread of exotic species in retained habitat within adjoining habitat.
Introduce disease that may cause the species to decline	The Project is unlikely to introduce a disease that may cause the species to decline, given the nature of the proposed activities and the fact there are no known diseases that impact the species (TSSC, 2015d).
Interfere substantially with the recovery of the species	Although there is currently no national recovery plan developed for the species, key threat abatement and recovery objectives are provided within the approved listing advice (TSSC, 2015d) and include:

MNES Significant Impact Guideline Criteria for Vulnerable Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	• Determining the population size and distribution of the Squatter Pigeon (southern) in southern Queensland and New South Wales and assess the pigeon's conservation status and requirements. • Undertaking studies in North and Central Queensland to determine the relationship between pigeon abundance, tree density and stocking rates. • Establish sites for sub-population monitoring. If possible, these sites should be established with the cooperation of local land-owners and/or conservation organisations. • Develop and implement public education programs and community based tree planting schemes to revegetate favoured habitat types. • Establish control measures for predators (especially cats and foxes) at important sites. • Establish conservation measures to protect grassy woodlands and forests. The Project will result in the likely removal of 11.18 ha of breeding habitat and 20.76 ha of foraging / dispersal habitat, the surrounding landscape is largely fragmented and subject to ongoing agricultural development with limited connectivity with surrounding remnant vegetation or conservation areas. Furthermore, potential indirect impacts on suitable habitat to be retained in the adjoining areas will be minimised through the implementation of mitigation measures (refer to Section 5.3) such as weed and pest control and erosion and sediment controls. As such, it is unlikely that the Project would significantly interfere with the recovery actions identified for the species.
Conclusion	**Overall, the Project is unlikely to result in a significant impact on the squatter pigeon (southern)**

R.6 MNES SIA – White-throated needletail

As outlined in Section 4.2.3.3, the entire airspace above the Study Area provides suitable foraging habitat for the species, however as the species does not breed within Australia, no suitable breeding habitat occurs.

To determine if the Project is likely to have a significant impact on white-throated needletail, an assessment in accordance with the Guidelines was conducted (below), which determined that a significant impact is unlikely.

MNES Significant Impact Guideline Criteria for Vulnerable Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
Lead to a long-term decrease in the size of an important population of a species.	In Australia, the species is a wide-ranging nomadic species that is almost exclusively aerial (Threatened Species Scientific Committee, 2019). Clearing of vegetation is considered largely inconsequential to the species, as the species is almost exclusively aerial and is known to occur over a wide range of habitats, including cleared habitats (Threatened Species Scientific Committee, 2019). As such, the Project is unlikely to lead to a long-term decrease in the size of an important population of a species.
Reduce the area of occupancy of an important population.	The species is a wide-ranging nomadic species that is almost exclusively aerial in Australia (Threatened Species Scientific Committee, 2019). As such, the Project is unlikely to reduce the area of occupancy of the species.
Fragment an existing important population into two or more populations.	The species is a wide-ranging nomadic species that is almost exclusively aerial in Australia (Threatened Species Scientific Committee, 2019). As such, the Project is unlikely to fragment an important population of the species.
Adversely affect habitat critical to the survival of a species.	As the species is known to occur aerially over a wide range of habitats, including cleared habitats (Threatened Species Scientific Committee, 2019) the Indicative Footprint is unlikely to provide Critical Habitat.
Disrupt the breeding cycle of an important population.	The species breeds in the northern hemisphere (Threatened Species Scientific Committee, 2019). As such, disruption to the species breeding cycle is unlikely.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The species is a wide-ranging nomadic species that is almost exclusively aerial in Australia (Threatened Species Scientific Committee, 2019). As the species is known to occur over a wide range of habitats, including cleared habitats, disturbance of vegetation within the Indicative Footprint is unlikely to modify, destroy, remove or isolate or decrease the availability of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No invasive species are considered harmful to this species.

MNES Significant Impact Guideline Criteria for Vulnerable Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
Introduce disease that may cause the species to decline	No diseases are currently identified as a threat to the species (Threatened Species Scientific Committee, 2019). The Project is unlikely to result in the introduction or spread of a disease that may cause the species to decline.
Interfere substantially with the recovery of the species	The Project is unlikely to interfere with the recovery of the species. As the species is known to occur over a wide range of habitats, including cleared habitats, clearing of vegetation within the Indicative Footprint is unlikely to reduce the area of occupancy, impact habitat connectivity or movement of the species.
Conclusion	**Overall, the Project is unlikely to result in a significant impact on the white-throated needletail.**

R.7 MNES SIA - Koala

The Indicative Footprint and Study Area contains likely foraging and shelter/breeding habitat for the koala, including up to 35.08 ha of suitable habitat across 64 discrete patches within the indicative Footprint (with 10% buffer applied to account for final adjustments to the RoW and siting of associated infrastructure). A patch-by-patch analysis of values and potential for impact was conducted and is included in Appendix L. This assessment determined that impacts upon koala movement, fragmentation or habitat availability are unlikely, due to:

- The linear, narrow (30m) nature of clearing and lack of permanent barriers to movement resulting from the Project, and
- The small amount of clearing required from each patch of vegetation (with average amount to be removed from each patch is less than 0.3 ha).

Measures to avoid, minimise and mitigate potential Project impacts on koala are detailed in Section 5.3 of this report.

To determine if the Project is likely to have a significant impact on koala, an assessment in accordance with the EPBC Act *Significant Impact Guidelines 1.1 Matters of National Environmental Significance* (MNES Referral Guidelines) is required.

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
The action is likely to lead to a long-term decrease in the size of a population	While resulting in the removal of up to 35.08 ha of likely suitable koala habitat, the Project is unlikely to lead to a long-term decrease in the size of a koala population because: • habitat usage within the Indicative Footprint and adjacent Study Area is appears limited (based on the findings of the fauna survey and paucity of koala records from the Study Area surrounds), • habitat within the Indicative Footprint represents a small percentage (~0.14%) of the habitat available to koalas within the surrounding landscape (as outlined in Table 16): • movement opportunities for koala will not be significantly impacted by the Project, and • foraging, shelter and breeding resources sustaining the local koala population remain plentiful outside of the Indicative Footprint.
Reduce the area of occupancy of the species	The species area of occupancy is estimated at 19,400 km^2 (based on a 2 km square grid) (DAWE,2022). The Project will result in the removal of a maximum of up to 35.08 ha of likely suitable koala habitat. The loss of koala habitat trees will occur at scattered locations along the RoW and will not result in the loss of entire patches or large contiguous areas of suitable koala habitat, or substantially fragment koala habitat along the RoW, noting that the majority of clearing will occur along the edges of habitat patches. The results of field and desktop investigations, moreover, suggest koala usage of habitat within the Indicative Footprint and adjoining habitat areas is

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	extremely limited (and likely confined to vegetation fringing watercourses). Furthermore, the Project will impact less than 0.15% of potential habitat available within a 10 km radius of the Study Area as outlined in Table 16 in this report. As such, it is unlikely that the Project will substantially reduce the area of occupancy of the species at a local or regional level or reduce the species current estimated area of occupancy.
Fragment an existing important population into two or more populations	While movement through cleared areas makes koalas more susceptible to predation or vehicle strike, a 30 m wide corridor is unlikely to fragment or isolate koala habitat/populations or create a barrier to dispersal or movement, given: • clearing along the RoW is unlikely to constrain koala movement across the wider landscape (noting that dispersing animals will readily travel tens, even hundreds of metres on the ground in order to access foraging and/or shelter trees (Youngentob et. al., 2021; Ramsay 1999, Marsh et al. 2014b)), • careful avoidance of isolated shelter trees important for facilitating koala movement/dispersal between more widely-separated areas of suitable koala foraging habitat (e.g., isolated trees in large clearings/paddocks), • retention of riparian vegetation facilitating dispersal of koala and other arboreal species across the wider landscape, along Woloobee and Yuleba Creeks, • narrowing of the RoW where the Indicative Footprint intersects vegetated corridors likely to facilitate movement/dispersal of koala and other arboreal fauna across the wider landscape, and • potential use of glider poles as refuge poles by koala moving/dispersing along vegetated corridors. Given the above, the Project will not fragment an existing koala population into two or more separate populations.
Adversely affect Critical Habitat	The National Recovery Plan for the Koala (DCCEEW, 2022) describe koala Critical Habitat as the area that the species relies on to halt decline and promote recovery, including any potential foraging, shelter and dispersal habitat supporting a population of the species. Given evidence of likely koala presence within the Indicative Footprint, it is therefore possible that Project could adversely affect Critical Habitat for the species. The resulting impact on koalas, however, is not considered important, notable or of consequence for the species given: • the field surveys identified potential koala scratches in one location, with no further evidence of presence identified. Limited records also exist within 10 km of the Study Area, suggesting limited usage of habitat within the Project footprint (with habitat usage potentially limited to vegetation fringing watercourses). • habitat within the Indicative Footprint represents a small percentage (~0.14%) of the habitat available to koalas within the surrounding landscape (see Table 16 of main report).

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	• the loss of habitat within the Indicative Footprint is unlikely to limit access to critical foraging, shelter and breeding resources, and • the Project is unlikely to adversely affect habitat values for koala outside of the Indicative Footprint (given measures to avoid and minimise disturbance of habitat adjacent the RoW).
Disrupt the breeding cycle of a population	The Project is unlikely to disrupt the breeding cycle of a local koala population given: • limited or intermittent usage of habitat by koalas within the Study Area • habitat within the Indicative Footprint represents a small percentage of the habitat available to breeding koalas within the surrounding landscape • the loss of habitat within the Indicative Footprint is unlikely to limit access to critical foraging and shelter resources for breeding animals within the broader (surrounding) landscape • the Project is unlikely to adversely affect habitat for breeding koalas outside of the Indicative Footprint (given measures to avoid and minimise disturbance of habitat adjacent the RoW), and • the implementation of avoidance and mitigation measures to minimise disruption to breeding animals during clearing and construction works (including the avoidance of tree clearing at night between August and December when breeding behaviour is most likely to occur).
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project is unlikely to destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, given: • there is evidence of limited usage of habitat within the Study Area • habitat within the Study Area represents a small percentage of the habitat available to koalas within the surrounding landscape • the loss of habitat within the Study Area is unlikely to limit access to critical foraging, shelter and breeding resources within the surrounding landscape, and • the Project is unlikely to adversely affect habitat values for koala outside of the Indicative Footprint (given measures to avoid and minimise disturbance of habitat adjacent the RoW).
Result in invasive species that are harmful to an Endangered species becoming	The Project is unlikely to increase the abundance of invasive species above their current levels or result in the introduction of new invasive species. The implementation of mitigation measures outlined in section 5.3 of this report, including weed management, pest control and weed hygiene protocols, will

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
established in the species habitat	assist in reducing any potential reintroduction or spread of exotic species in retained habitat within adjoining areas.
Introduce disease that may cause the species to decline	The proposed disturbance is unlikely to introduce or facilitate the spread of disease or pathogens for the species (i.e. Koala retrovirus or Chlamydia).
Interfere substantially with the recovery of the species	According to the National Koala Recovery Plan (DAWE, 2022), recovery of the koala requires that: • 'the area of occupancy and estimated size of populations that are declining, suspected to be declining, or predicted to decline are instead stabilised then increased, • the area of occupancy and estimated size of populations that are suspected and predicted to be stable are maintained or increased, and • metapopulation processes are maintained or improved'. The Project will necessitate clearing a total of 35.08 ha of suitable koala habitat at scattered locations within the Indicative Footprint. Given the diffuse nature and scale of clearing, apparent paucity of koalas, and extent of suitable koala habitat available elsewhere within the surrounding landscape, it is unlikely that clearing would significantly reduce the species' area of occupancy, affect the size of the local koala population, or interfere with metapopulation processes important for the survival and recovery of the species. It is therefore unlikely that the Project would substantially interfere with recovery of the species.
Conclusion	**Overall, the Project is unlikely to result in a significant impact on koala**

R.8 MNES SIA – Greater Glider (central and southern)

As outlined in Section 4.2.3.4 and shown in Appendix K, both the Indicative Footprint and Study Area contain potential foraging, denning and associated dispersal habitat for the greater glider (southern and central) considered Critical Habitat for the species. The Project will require the removal of up to 29.84 ha of greater gilder habitat from the Indicative Footprint (with 10% buffer applied to account for final adjustments to the RoW and associated infrastructure).

Measures to help mitigate Project impacts on greater glider detailed in Section 5.3 of this report, include:

- avoidance of hollow-bearing trees along the periphery of the Indicative Footprint wherever possible
- capture and translocation of animals during pre-clearance surveys,
- selective retention of mature trees to facilitate movement of greater gliders in areas of known (occupied) habitat identified during pre-clearance surveys,
- use of horizontal directional drilling to avoid clearing/disturbance of riparian vegetation along important dispersal corridors (i.e., Woloobee and Yuleba Creeks)
- installation of 13-20 m tall glider poles to facilitate glider movement along vegetated riparian corridors intersected by the RoW.

To determine if the Project is likely to have a significant impact on greater glider, an assessment in accordance with the Guidelines was conducted (below), which determined that a significant impact is unlikely (see below).

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
The action is likely to lead to a long-term decrease in the size of a population	Though the Project will result in the removal of a maximum of 29.84 ha of greater glider habitat, including areas that may be used for breeding purposes, this is unlikely to lead to a long-term decrease in the size of a greater glider population, given: • limited evidence of greater glider presence within the Indicative Footprint and immediate surrounds during surveys (indicating, at best, limited or intermittent use if habitat within the Indicative Footprint), • habitat within the Indicative Footprint represents a small percentage (~0.12%) of likely suitable habitat within the surrounding landscape (as outlined in Table 16 of this report), • the Project is unlikely to adversely affect habitat values for greater glider outside of the Indicative Footprint (given measures to avoid and minimise disturbance of habitat in adjacent areas), • foraging, shelter and breeding resources sustaining the local greater glider population will remain plentiful outside of the Indicative Footprint,

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	• clearing will not be concentrated in any one area but will occur along a 30-meter-wide, linear strip that will largely result in the removal of edges of tracts of vegetation, • the loss of active denning trees will be offset by the installation of nest boxes suitable for greater glider; and • any individuals found during pre-clearance surveys (if any) within the Indicative Footprint will be captured and relocated to suitable habitat nearby, prior to clearing.
Reduce the area of occupancy of the species	While resulting in the clearance of up to 29.84 ha of greater glider habitat along a narrow linear strip, the Project is unlikely to reduce the area of occupancy of the species given: • the limited extent of habitat loss/disturbance when compared with the extent of likely suitable habitat within the Study Area and wider surrounds (as outlined in Table 16); and • the implementation of mitigation measures including relocation of any individuals found during pre-clearance surveys (if any) within the Indicative Footprint.
Fragment an existing population into two or more populations	While potentially impacting local movement/dispersal of greater glider across parts of the Indicative Footprint, the project is unlikely to fragment an existing population of the species into two or more populations given: • existing fragmentation of habitat along sections of the proposed RoW (i.e., existing roads and clearing for other linear infrastructure such as the Jemena gas pipeline and Australia-Pacific LNG pipeline construction corridor), • narrowing of the RoW and selective retention of taller canopy trees, so as to facilitate movement of greater gliders along vegetated riparian corridors intersected by the Indicative Footprint, • use of horizontal directional drilling to avoid clearing/disturbance of riparian vegetation along important dispersal corridors (i.e., Woloobee and Yuleba Creeks), and • installation of 13-20 m tall glider poles to facilitate glider movement along vegetated riparian corridors intersected by the RoW.
Adversely affect Critical Habitat	Habitat critical to the survival of the greater gilder is broadly defined as any habitat meeting one or more of the criteria below, irrespective of the current abundance or density of greater gliders (DCCEEW, 2022):

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	• large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species' preferred food species in a particular region; and • smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonization; and • a cool microclimate forest/woodland area (e.g. protected gullies, sheltered high elevation areas, coastal lowland areas, southern slopes); and • areas identified as refuges under future climate changes scenarios; and • short-term or long-term post-fire refuges (i.e. unburnt habitat within or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas. While the Project will result in the loss of 'Critical Habitat', the resulting impact on greater glider is not considered important, notable or of consequence, given: • habitat within the Indicative Footprint represents a small percentage (~0.12%) of likely suitable habitat within the surrounding landscape, • movement opportunities between tracts of Critical Habitat will not be lost as a result of the project (as detailed above); and • the Project is unlikely to adversely affect habitat values for greater glider outside of the Indicative Footprint (given measure to avoid and minimise disturbance of habitat adjacent the Indicative Footprint).
Disrupt the breeding cycle of a population	The Project is unlikely to disrupt the breeding cycle of a local greater glider population given: • development and implementation of an approved Species Management Program to mitigate Project impacts on breeding animals encountered within the Indicative Footprint during pre-clearing surveys, and • the loss of active glider denning sites identified during pre-clearance surveys will be offset by the installation of artificial nest boxes in habitat adjoining the Indicative Footprint.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project is unlikely to destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, given:

MNES Significant Impact Guideline Criteria for Endangered Species	Response
A significant impact is determined with regard to whether an impact is 'important, notable or of consequence, having regard to its context or intensity' (DotE, 2013, p.2)	
	• habitat within the Indicative Footprint represents a small percentage (~0.12%) of likely suitable habitat available to greater glider within Study Area and wider surrounds, • suitable habitat to support greater glider remains plentiful outside of the Indicative Footprint, • the loss of habitat within the Indicative Footprint is unlikely to limit access to Critical Habitat within the surrounding landscape, and • the Project is unlikely to adversely affect habitat values for greater glider outside of the Indicative Footprint (given measure to avoid and minimise disturbance of habitat adjacent the RoW detailed in Section 5.3 of this report).
Result in invasive species that are harmful to an Endangered species becoming established in the species habitat	The implementation of weed management and pest control measures outlined in this document will assist in reducing any potential introduction or spread of exotic species in areas of retained habitat adjoining the Indicative Footprint. The Project is therefore unlikely to increase the abundance of invasive species above their current levels or result in the introduction of new invasive species
Introduce disease that may cause the species to decline	The proposed Project is unlikely to introduce or facilitate the spread of disease or pathogens harmful to the species.
Interfere substantially with the recovery of the species	While the Project will result in the removal of up to 29.84 ha of suitable habitat for this species, the Project is unlikely to result in any further decline in abundance or reduction in the species' area of occupancy or extent of occurrence. Nor is the Project likely to significantly impact efforts to recover the species. As such, the Project is unlikely to interfere substantially with the recovery of the species.
Conclusion	**Overall, the Project is unlikely to result in a significant impact on greater glider**

Appendix S Scoring Criteria for Species Density

S.1 Scoring criteria for species density

Scoring criteria for species density: Koala

Density	General criteria	Score (whole of Indicative Footprint)	Criteria
Zero	Species not observed/detected on site despite reasonable survey effort and site coverage	0 if survey comprehensive; higher (conservative) score if inadequate	No direct or indirect evidence of koala presence during survey
Low	Species observed/detected at low abundance and/or infrequently with reasonable survey effort and site coverage	10 if survey comprehensive; higher (conservative) score if inadequate	Scats and/or scratches attributable koala detected at no more than 1 out of 30 koala habitat (LIKT or AH) trees surveyed and/or where present, no more than 1 koala detected for every person hour of survey effort
Moderate	Species observed/detected at moderate abundance and/or moderately frequently with reasonable survey effort and site coverage	20 if survey comprehensive; higher (conservative) score if inadequate	Scats and/or scratches attributable koala detected at >1 but no more than 3 out of 30 koala habitat trees surveyed and/or >1 but no more than 2 koalas detected for every person hour of survey effort
High	Species observed/detected at high abundance and/or frequently	30 if survey comprehensive; higher (conservative) score if inadequate	Scats and/or scratches attributable to koala detected at >3 out of 30 koala habitat trees surveyed and/or 2 or more koalas detected for every person hour of survey effort

Scoring criteria for species density: Greater glider (central and southern)

Density	General criteria	Score (whole of Indicative Footprint)	Criteria
Zero	Species not observed/detected on site despite reasonable survey effort and site coverage	0 if survey comprehensive; higher (conservative) score if inadequate	No direct or indirect evidence of greater glider presence during survey

Low	Species observed/detected at low abundance and/or infrequently with reasonable survey effort and site coverage	10 if survey comprehensive; higher (conservative) score if inadequate	Where present, no more than 1 greater glider detected for every person hour of survey effort
Moderate	Species observed/detected at moderate abundance and/or moderately frequently with reasonable survey effort and site coverage	20 if survey comprehensive; higher (conservative) score if inadequate	>1 but no more than 3 greater gliders detected for every person hour of survey effort
High	Species observed/detected at high abundance and/or frequently	30 if survey comprehensive; higher (conservative) score if inadequate	3 or more greater gliders detected for every person hour of survey effort

Scoring criteria for species density: Glossy black-cockatoo (south-eastern)

Density	General criteria	Score (whole of Indicative Footprint)	Criteria
Zero	Species not observed/detected on site despite reasonable survey effort and site coverage	0 if survey comprehensive; higher (conservative) score if inadequate	No direct or indirect evidence of glossy black-cockatoo presence during surveys
Low	Species observed/detected at low abundance and/or infrequently with reasonable survey effort and site coverage	10 if survey comprehensive; higher (conservative) score if inadequate	Orts observed around 1-3 feed trees and/or single bird observed during survey

Moderate	Species observed/detected at moderate abundance and/or moderately frequently with reasonable survey effort and site coverage	20 if survey comprehensive; higher (conservative) score if inadequate	Orts observed around >3 and up to 6 feed trees and/or or 2-3 birds observed during survey
High	Species observed/detected at high abundance and/or frequently	30 if survey comprehensive; higher (conservative) score if inadequate	Orts observed around >6 feed trees and/or or >3 birds observed during survey

Scoring criteria for species density: Squatter pigeon (southern)

Density	General criteria	Score (whole of Indicative Footprint)	Criteria
Zero	Species not observed/detected on site despite reasonable survey effort and site coverage	0 if survey comprehensive; higher (conservative) score if inadequate	No evidence of squatter pigeon presence during survey
Low	Species observed/detected at low abundance and/or infrequently with reasonable survey effort and site coverage	10 if survey comprehensive; higher (conservative) score if inadequate	Where present, species detected in low numbers (singly or in pairs)
Moderate	Species observed/detected at moderate abundance and/or moderately frequently with reasonable survey effort and site coverage	20 if survey comprehensive; higher (conservative) score if inadequate	Where present, species generally encountered in groups of 3-5

High	Species observed/detected at high abundance and/or frequently	30 if survey comprehensive; higher (conservative) score if inadequate	Where present, species generally encountered in groups of 3-5

Scoring criteria for species density: Dulacca woodland snail

Density	General criteria	Score (whole of Indicative Footprint)	Criteria
Zero	Species not observed/detected on site despite reasonable survey effort and site coverage	0 if survey comprehensive; higher (conservative) score if inadequate	No evidence of snail presence during survey
Low	Species observed/detected at low abundance and/or infrequently with reasonable survey effort and site coverage	10 if survey comprehensive; higher (conservative) score if inadequate	Where present, no more than 5 snails detected for every person hour of survey effort
Moderate	Species observed/detected at moderate abundance and/or moderately frequently with reasonable survey effort and site coverage	20 if survey comprehensive; higher (conservative) score if inadequate	Where present, >5 and <20 snails detected for every person hour of survey effort
High	Species observed/detected at high abundance and/or frequently	30 if survey comprehensive; higher (conservative) score if inadequate	Where present, no more than 20 snails detected for every person hour of survey effort

Scoring criteria for species density: White-throated needletail

Density	General criteria	Score (whole of Indicative Footprint)	Criteria
Zero	Species not observed/detected on site despite reasonable survey effort and site coverage	0 if survey comprehensive; higher (conservative) score if inadequate	No evidence of species presence during survey
Low	Species observed/detected at low abundance and/or infrequently with reasonable survey effort and site coverage	10 if survey comprehensive; higher (conservative) score if inadequate	Where present, species detected in low numbers (i.e., 1-5 birds)
Moderate	Species observed/detected at moderate abundance and/or moderately frequently with reasonable survey effort and site coverage	20 if survey comprehensive; higher (conservative) score if inadequate	Where present, species generally encountered in groups of 5-10
High	Species observed/detected at high abundance and/or frequently	30 if survey comprehensive; higher (conservative) score if inadequate	Where present, species generally encountered in flocks of 10 or more

Appendix T Habitat Connectivity Report

Characterisation of Habitat Connectivity Pre- and Post-Development

Atlas to Reedy Creek Pipeline

Date:	18 March 2024
Document:	OPS-ARCP-EN-REP-002
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Document Status

Revision History

Revision	Release Date	Document Status	Revision Comments	Author
A	4/02/2024	Draft - Issued for Internal Review		S Fox
0	27/02/2024	Final – Issued for Use		S Fox
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Document Approval

Approved by	Jacob Cumpstay Environment Manager	**Signed**	Date

Abbreviations

The abbreviations provided below are used throughout this document.

Abbreviation	Description
ARCP	Atlas to Reedy Creek Pipeline
ARCP P/L	ARC Pipeline Pty Ltd
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, Environment and Water
DES	Department of Environment and Science
EA	Environmental Authority
EMP	Environmental Management Plan
EP Regulation	*Environmental Protection Regulation 2008 (Qld)*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ES	Ecological (Ground-truthing) Survey
HSEMS	Health, Safety and Environment Management System
MNES	Matter of National Environmental Significance
PDA	Preliminary Desktop Assessment
PPL	Petroleum Pipeline License
QLD	Queensland
RE	Regional Ecosystem
Senex	Senex Energy Pty Ltd
SEVT	Semi-evergreen vine thickets
SIG 1.1	Significant Impact Guidelines 1.1 – Matters of National Environmental Significance
Significant Species	Species or communities considered to be MNES under the EPBC Act that are known, or have a likely or potential to occur within the Project Area
SPRAT	Species Profile And Threats Database
SSMP	Significant Species Management Plan
TEC	Threatened Ecological Community

1 Introduction

1.1 Project Background

ARC Pipeline Pty Ltd (ARCP P/L), a wholly owned subsidiary of Senex Energy Pty Ltd (Senex), is planning to construct and operate the Atlas to Reedy Creek Pipeline (ARCP), a buried steel pipeline for supply of natural gas in the Surat Basin near Wandoan, Queensland (EPBC 2023/09585).

1.2 Project Description

The ARCP will be a buried high-pressure gas transmission pipeline constructed and operated under Petroleum Pipeline License (PPL) 2075. The ARCP will transport natural gas produced from Surat Basin gas tenements southwest of Wandoan to the Reedy Creek to Wallumbilla Pipeline (RCWP) north of Yuleba (which is owned and operated by a third party).

The ARCP is approximately 57 km long and will be constructed within a 30 m wide right of way (ROW). It is noted that the actual 30 m RoW and workspace Indicative Footprints may in some cases vary from the Indicative Footprint as an outcome of further consultation with landholders or the discovery of cultural heritage items or other localised constraints identified during construction or preclearing surveys. To account for this uncertainty, a 10% buffer has been applied to area calculations used to assess/quantify Project impacts on MNES known or likely to occur within the Indicative Footprint.

The ARCP consists of:

- a ROW with a disturbance area of up to 184.9 ha
- up to 18.4 ha of additional workspaces
- 2 ha of laydown area
- 0.1 ha inlet access track; and
- up to 1.5 ha of cathodic protection beds (including their access tracks).

The total indicative disturbance footprint for the ARCP (as detailed above) is 206.9 ha.

Specific locations have been defined for 186.2 ha of the maximum disturbance area of 206.9 ha. These known and proposed locations are referred to as the ‘Indicative Footprint’ which is illustrated in the Figure 2-1 series of the Preliminary Documentation (AECOM, 2024). The Project may also require up to 3 ha of additional clearing within remnant vegetation/ mature regrowth to allow for potential future ROW refinements (e.g. cultural heritage monitors/surveys, landholder liaison/preferences and the construction contractor’s final constructability review). These potential future ROW refinements have been included within the 206.9 ha maximum disturbance limit.

Workspaces will be used for construction activities, including placement of soil stockpiles and equipment at watercourses, pipeline and sealed road crossings. These workspaces allow for rehabilitation of crossings and safe operations.

All potential disturbance areas have been considered when completing the significant impact assessment for the action. Further, ARCP P/L has committed to maximum habitat disturbance limits for all known and likely Matters of National Environmental Significance (MNES) communities and species. Where any deviations from the Indicative Footprint are required, the Environmental Protocol for Field Development and Constraints Analysis [SENEX-QLDS-EN-PRC-019] will be used to ensure these will only be adopted where the overall maximum disturbance limit and the maximum disturbance limit for each MNES is not exceeded.

All other disturbance in the indicative footprint (comprising known and proposed locations) is included in the ARC Pipeline EPBC Act MNES Assessment Report (E2M, March 2024) as unavoidable disturbance/removal. Figure 1 shows the location of the ARCP.

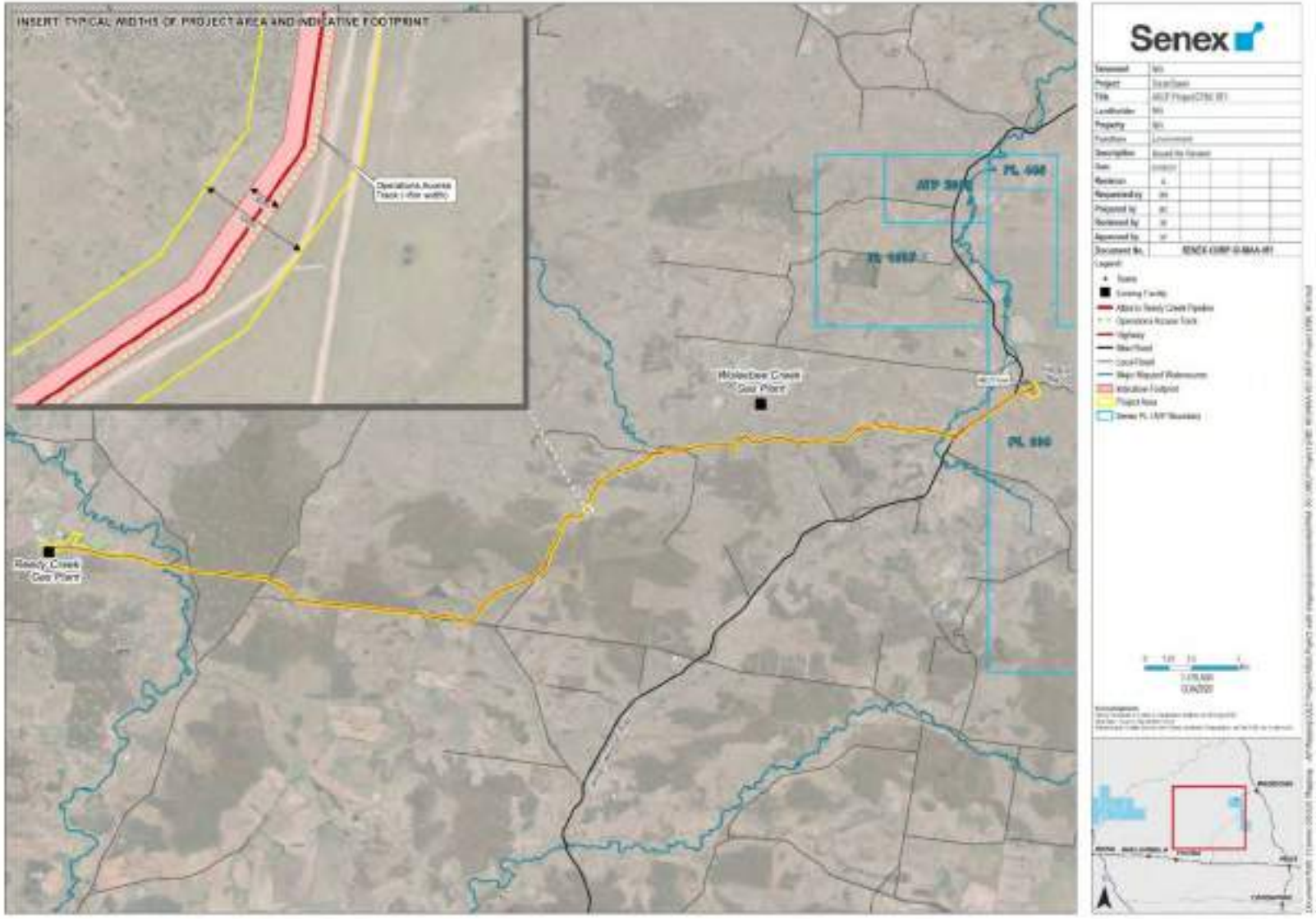


Figure 1 Location of ARC Pipeline Alignment

1.3 Purpose and Scope

ARCP P/L has prepared this Characterisation of Habitat Connectivity to demonstrate how the mitigation hierarchy has been applied in the design of the ARCP and confirm which habitat areas and trees are able to be retained (including with particular reference to areas that have been identified as Threatened Ecological Communities (TECs) under the *Environment Protection and Biodiversity Conservation Act 1999* and potential habitat for Greater Glider (*Petauroides volans*) and Dulacca Woodland Snail (*Adclarkia dulacca*), which are both MNES species for which the Department of Energy, Environment, Climate Change and Water have requested additional information.

This information will then be utilised by specialist ecologists to further their consideration and assessment of the likely impacts on these species (refer to ARC Pipeline EPBC Act MNES Ecological Assessment Report (E2M, 2024)) including specifically the degree to which ARCP will affect the pre-existing landscape connectivity for Greater Glider (on the assumption that they are present).

2 Mitigation Hierarchy

The mitigation hierarchy is an approach to project design and planning that is used to limit the amount of impact a proposed development will have on the environment. The mitigation hierarchy requires the application of three steps, which must be followed in order and to the greatest extent possible before moving on to the next. The three steps are:

Step 1: Avoid impacts

Avoid developing areas where there are protected matters wherever possible (e.g. use land which is already cleared, site new infrastructure closer together, minimise and adjust footprints to avoid impacts and minimise impacts that are unavoidable).

Step 2: Mitigate impacts

Once impacts have been avoided impacts as far as possible through changes to the project design, consideration needs to be given to what other things can be done to reduce the impacts that cannot be avoided.

Mitigation is what can be done to reduce the likelihood or seriousness of the unavoidable impacts. Both direct and indirect impacts need to be considered. Depending on the impact there may be relevant guidelines or standards which will assist in identifying suitable mitigation methods.

Step 3: Offset residual significant impacts

Offsetting is the final step in the mitigation hierarchy and is only to be applied once impacts have been avoided and mitigated. A proposed development may still be considered likely to have a significant impact on a protected matter after every attempt to avoid or mitigate an impact has been made. This is called having a residual significant impact. If the proposed development is considered to be acceptable and is approved, a condition of that approval may be to have an offset to compensate for these residual significant impacts.

An offset will then be required that evenly balances out these impacts so that overall the development results in ‘no net loss’. This means that, although a development affects a protected matter in one area, it is also responsible to ensure it is improved in another. Offsets are required to be in accordance with the Environmental Offsets Policy to be considered acceptable under the the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act).

3 ARCP P/L Avoidance Approach, Achievements and Limitations

An Ecological Ground- truthing Survey has been completed of the entire disturbance area and a buffer by suitably qualified ecologists as detailed in E2M (2024).

In relation to the EPBC Act listed TECs and all likely and potential threatened species (including

Greater Glider and Dulacca Woodland Snail), ARCP P/L has selected the ROW alignment to utilise existing cleared areas to the greatest possible extent. Several realignments were assessed to avoid and minimise impacts to MNES values as they were identified by the ecological field surveys including:

- Avoidance of a large remnant patch of Brigalow TEC near KP 36, along with smaller patches along the alignment
- Avoidance of Poplar Box TEC (realignments were identified to utilise existing disturbance within Poplar Box TEC)
- Avoiding and minimising disturbances to remnant and high value regrowth by slight realignments, particularly within areas of scattered vegetation. This included locations at:
    - KP 8.5 – KP 10
    - KP 23.75
    - KP 34; and
    - KP 37.5.
- Minimising impacts to koala habitat by realigning to retain scattered stands of LIKTs
- Avoiding impacts to watercourses by utilising existing disturbances within riparian vegetation. Impacts on riparian habitat were further minimised by siting crossings to avoid the Project running parallel to watercourses (through direct crossing), resulting in less vegetation clearing and reducing the risk of erosion and sedimentation issues post-construction. Minor realignments to minimise impacts to watercourses and watercourse vegetation occurred at:
    - KP 21
    - KP 23.25
    - KP 33.75
    - KP 35; and
    - KP 44.75.
- Within open grazed areas, isolated habitat trees were avoided where possible by realigning the Project disturbance footprint.

All ARCP infrastructure has been micro-sited to utilise existing clearance areas where possible and avoid patch isolation. Where native vegetation is unavoidable disturbed areas and areas of lower ecological value have been preferentially selected and disturbance of TECs and EPBC Act listed species habitat and habitat connectivity has been minimised.

Clearance footprints have been minimised in all areas. Installation of a buried high pressure gas pipeline through unavoidable wide stands of vegetation require construction of a 30 m wide ROW that is cleared of all woody vegetation. This width of corridor is required because the felled timber needs to be safely stockpiled along one side of the ROW. Appendix AA provides a schematic which illustrates the construction components and activities that require the combined total ROW width of 30 m.

In particular, the following widths are required to ensure that construction is undertaken in a safe and environmentally responsible manner (from LHS in direction of construction):

- Buffer between retained vegetation and topsoil stockpile (min. 500 mm)
- Topsoil stockpile (varies – 2000 mm)
- Buffer between topsoil and subsoil stockpiles to prevent mixing (min. 1000 mm)
- Subsoil stockpile (varies – 2000 mm)
- Buffer between subsoil stockpile and trench (min. 2000 mm)
- Trench (approx. 400 mm in clay soils but may batter back to >2000 mm in sandy soils, etc)
- Space for feeding pipe sections across and into trench (3000 mm)
- Pipe stand (1000 mm)
- Room for dozers to move along alignment feeding pipe into trench (6000 mm)

- Vehicle and emergency access (with room for vehicles to pass) (5000 mm)
- Topsoil stockpile (varies – 2000 mm)
- Room to stockpile cleared vegetation (5000 mm).

Although it is not possible to narrow the construction corridor to less than 30 m width through longer sections of vegetation it is sometimes possible to narrow the construction corridor through shorter sections by pushing timber out of each end of the cleared corridor and windrowing in the adjacent already cleared areas. It is not feasible to do this on long sections as there is too much timber to push out. It is also sometimes possible to narrow in short sections on the RHS of the construction corridor to create 'pinch points' by having short sections where timber is moved a bit further and piled up a bit higher in each direction and/or the width of the vehicle/emergency access is narrowed to one lane for a short section (only where adequate emergency access is not excessively compromised).

Due to the minimum construction and safety requirements, it is not possible to narrow the ROW to less than 20 m width. Construction contractors will seek to reduce their construction disturbance widths where conditions allow as this helps reduce construction costs, however, some opportunities to reduce the width are not able to be confirmed until construction is underway at a particular location. A number of these situations are specifically identified and discussed in Appendix BB. A key variable is the trench's angle of repose that will not be known until it has been dug and this affects how much the ROW can be narrowed.

ARCP P/L has recorded all large habitat trees inside the edges of the ROW and in addition to the trees identified for retention the construction contractor will also retain additional larger trees close to the edges of the ROW where this can be safely achieved. The risk of branch and tree fall are important considerations than can only be fully assessed as clearing operations progress in each location (and branch and root structure, tree integrity and soil conditions become more fully apparent).

Appendix BB of this report sets out the locations where the ROW is able to be narrowed (along its RHS edge). In January 2024 a further round of ecological survey was completed which mapped all larger habitat and potential Greater Glider connectivity ('launch') trees which are present on each side of the existing cleared corridors and those that will be retained post-development of the ARCP.

The locations of narrowing presented in Appendix BB have specifically targeted preservation of habitat and tall eucalypt trees wherever possible.

Micro-siting, minimising clearance widths and incorporation of pinch points for the ROW disturbance footprint has utilised existing clearance areas and avoided patch isolation wherever possible.

As detailed in Appendix BB, existing easements have been utilised to reduce the necessary clearance width in a number of locations. As utilisation of existing easements requires certain circumstances to be manageable from a safety perspective and due to the presence of other infrastructure and environmental values, this has not been possible for the many parts of the ARCP (e.g. fibre optic cables, reserved infrastructure corridors, vegetation patches of habitat, as detailed in Appendix BB).

Appendix BB refers to 'narrowing of the ROW', however the ROW refers to land over which an easement will be applied and this will in fact extend for the full 30 m width. However, disturbance exclusion areas have been identified that will ensure these parts of the ROW are not cleared or otherwise disturbed.

HDD reduces environmental impacts at the drilled section but requires additional disturbance at the entry and exit points, and a linear cleared area in which to position the pipeline 'string' prior to installation. Therefore, the environmental benefits of HDD are often outweighed by the disturbance to adjoining areas where forested areas adjoin the HDD site.

Horizontal directional drilling (HDD) is proposed at Woleebee Creek and Yuleba Creek. Woleebee Creek is the largest watercourse traversed by the pipeline and is recognised as a regional riparian corridor and wildlife corridor in an otherwise highly cleared landscape.

Further investigations have been completed since the submission of the Draft Preliminary

Documentation in November 2023 and in direct response to comments from DCCEEW regarding connectivity and habitat fragmentation ARCP P/L have now also committed to utilising HDD for the crossing of Yuleba Creek in order to enable all riparian vegetation and associated potential habitat for Greater Glider associated with this watercourse (which adjoins already cleared land on one side) to be retained.

There are no State of local government requirements for HDD to be installed in either of these locations. The feasibility of HDD is also dependent on a number of other additional factors, including geology and adjoining infrastructure and/or environmental values. HDD has been considered in response to DCCEEW comments but is not well suited for other parts of the alignment, such as other parts of the Combabula State Forest, due to these constraints.

4 Greater Glider Connectivity Assessment Methodology

To help assess potential impacts of clearing on greater glider habitat connectivity, the potential movement of greater gliders (southern) between areas of suitable habitat either side of the RoW has been subject to more detailed analysis. The analysis of glider movement undertaken to assess Project impacts on habitat connectivity takes into account:

- information on tree height collected by ecologists along the RoW
- existing impediments to glider movement/dispersal within and/or adjacent the ROW (including roadways, fencing, the Jemena gas pipeline RoW and APLNG construction corridor) identified in the field and/or satellite imagery, and
- current knowledge of the species movement/dispersal behaviour, as summarised below.

Greater gliders typically move through woodland and forest habitat by gliding from tree-to-tree without coming to ground and moves awkwardly when on the ground (where it is also highly susceptible to predation). Available evidence suggests greater gliders are unlikely to cross clearings >50 m except in taller forest/woodland habitat where tall trees (>30 m height) may allow the species to glide further (Taylor and Goldingay, 2009; T. Eyre. pers. comm). In areas of lower forest/open woodland, where canopy trees typically measure <20 m, this distance is likely to be less (due to a reduction in launch tree height and glide distance) (T. Eyre, pers. comm.).

Appendix BB characterise the trees and native vegetation that is currently present within the vicinity of the proposed ROW as well as that which will be retained after the ARCP pipeline has been installed.

Ecology surveys have previously been completed along the entire alignment which have confirmed all areas that contain TECs or potential habitat for Greater Glider and Dulacca Woodland Snail. Appendix BB describes the entire alignment based on sections that have been divided based upon their particular environmental characteristics. For each section that is potential habitat for Greater Glider the width of any existing adjacent cleared corridors and the height of the tallest existing adjoining trees is identified.

To assess the potential for Project impacts on habitat connectivity along the ROW, maximum horizontal glide distances across the ROW have been calculated based on tree height and the distance between launch trees either side of the ROW, assuming a maximum glide angle of between 31 to 40 degrees from horizontal (see Taylor and Goldingay, 2009 and Wake et al., 1970). In calculating safe glide distances across the RoW, launch tree height has been adjusted to account for uncertainty regarding: (1) the height at which gliders will attempt to launch themselves from a tree, noting that gliders may not launch from the highest point in the tree canopy; and (2) safe landing height (given the potential for entanglement in dense shrub cover and/or fencing upon landing). For this reason, the estimated launch height of gliders has been calculated as follows: launch height = tree canopy height in meters, less 2 metres.

Given the above, it is likely that gliders would come to ground when attempting to cross (1) sections of the RoW measuring 30 m across where the height of canopy trees either side of the ROW is less 20 m or less, and (2) areas where the combined width of the RoW and abutting cleared infrastructure

corridors (i.e., combined area of contiguous clearing) exceeds 40 m. This includes mapped habitat at the following locations:

- between chainages 20980-21300 (i.e. between KP 20 and KP 22)
- between chainages 23200-23300 (i.e., between KP 23 and KP 24)
- between chainages 24600-24760 (i.e., between KP 24 and KP 25)
- between chainages 30000-30900 (I.e., between KP 30 and KP 31)
- between chainages 31500-31550 (i.e., between KP 31 and KP 32)
- between chainages 32830-32950 (i.e., between KP 32 and KP 33)
- between chainages 33700-33800 (i.e., between KP 33 and KP 34)
- between chainages 36580-37450 (i.e., between KP 36 and KP 38)
- between chainages 40700-42600 (i.e., between KP 40 and KP 43)
- between chainages 44480-44520 (i.e., between KP 44 and KP 45)
- between chainages 45460-45800 (i.e., between KP 45 and KP 46)
- between chainages 45800-46530 (i.e., between KP 46 and KP 47)
- between chainages 46800-47570 (i.e., between KP 46 and KP 48), and
- between chainages 49650-50180 (i.e., between KP 49 and KP 51).

In considering potential Project impacts on glider habitat connectivity, it is noted that movement of gliders within the Project Study Area and surrounds is already compromised by clearing associated with roadways, the Jemena pipeline RoW and the 40 m-wide APLNG construction corridor situated south of the Project RoW (between KP 45 and KP 50), with barbed wire fencing posing an additional risk in some areas.

Appendix BB details what the circumstances will be post-development of the ARCP pipeline, including the heights of retained adjoining trees and the gap between tall 'launch' trees and the nearest vegetation across the ROW.

This information has been considered by specialist ecologists in their assessment (E2M 2024) of the degree to which ARCP will affect the pre-existing landscape connectivity for Greater Glider (on the assumption that they are present or may be present at some future time) and mitigation measures for these potential connectivity impacts are presented in the following section.

5 Connectivity Mitigation Based on Assessment

The conductivity assessment described above identifies specific locations where RoW narrowing, and tall tree retention can be achieved along the proposed RoW alignment at the following locations:

- Chainage 5000 – 5100
- Chainage 9700 – 10050
- Chainage 13200 – 13300
- Chainage 20980 – 21300
- Chainage 23200 – 23300
- Chainage 30000 – 30900
- Chainage 31500 – 31550
- Chainage 32320 – 32380
- Chainage 32830 – 32950
- Chainage 32950 – 33700
- Chainage 33700 – 33800
- Chainage 37450 – 40700
- Chainage 40700 – 42600
- Chainage 44480 – 44520
- Chainage 45030 – 45160
- Chainage 45800 – 46530
- Chainage 47570 – 49300.

Refer to Appendix BB for further details of the assessment at these locations. In addition to the RoW narrowing and tree retention the vegetation at Yuleba Creek was identified as important connectivity

habitat and HDD will be undertaken to avoid impacting this vegetation and Greater Glider habitat connectivity.

For patches of greater glider habitat where the Project potentially impacts on connectivity that is not able to be avoided by through HDD, RoW narrowing or tree retention (described above) glider refuge poles will be installed to facilitate movement across the disturbance area. Glider poles will be installed at the following locations as shown in the maps in Appendix CC:

- Chainages 20980-21300: 2 x 15m tall poles
- Chainages 23200-23300: 2 x 15m tall poles
- Chainages 31500-31550: 1 x 20m tall pole
- Chainages 32320-32380: 1 x 20m tall pole
- Chainages 32830-32950: 1 x 20m tall pole
- Chainages 33700-33800: 2 x 15m tall poles
- Chainages 44480-44520: 2 x 15m tall poles

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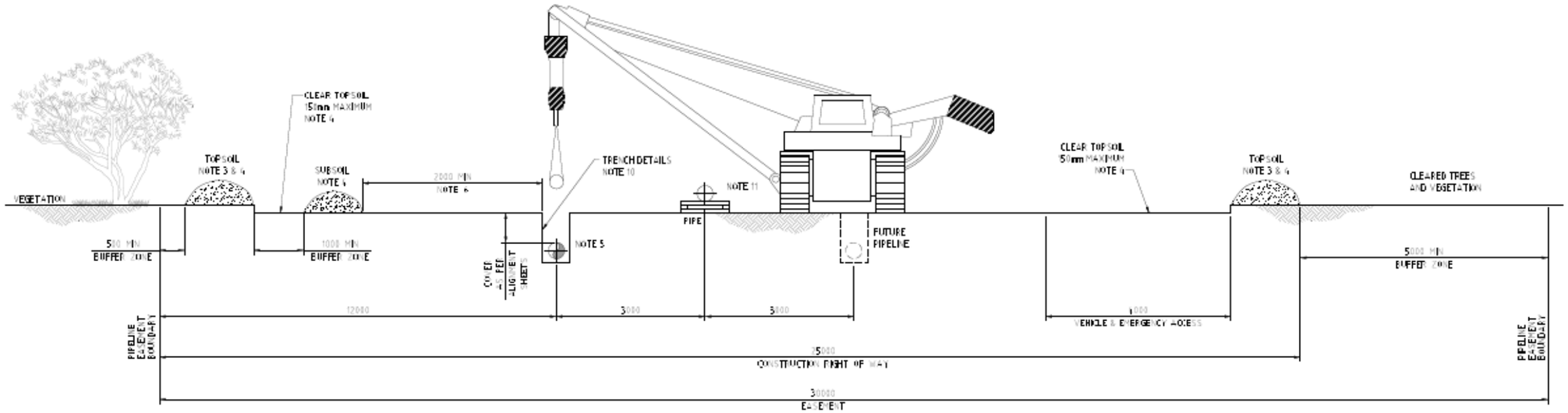
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Appendix AA – Typical Pipeline Construction Right of Way Standard Drawing



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND ARE NOMINAL.
2. THIS DRAWING SHOWS THE TYPICAL LAYOUT FOR THE PIPELINE RIGHT OF WAY AND EASEMENT. THE CONTRACTOR SHALL PLAN ALL WORKS BASED ON THE CONTRACTORS WORK METHODOLOGY.
3. TOP SOIL TO BE STOCKPILED IN ACCORDANCE WITH ENVIRONMENTAL REQUIREMENTS. STOCKPILE HEIGHT SHALL NOT EXCEED 1.5m.
4. TOPSOIL SHALL BE STRIPPED FROM RIGHT OF WAY AND STOCKPILED SEPARATELY FROM TRENCH SUBSOIL. TRENCH SUBSOIL SHALL NOT BE CONTAMINATED WITH MATERIAL THAT COULD DAMAGE THE PIPE. TOPSOIL SHALL NOT BE STOCKPILED IN DRAINAGE TRENCHES OR AGAINST FENCES AND SHALL BE FREE OF DEBRIS.
5. THE TRENCH SHALL BE ADEQUATELY SUPPORTED AT ALL TIMES BY SHORING OR BATTERING TECHNIQUES IF PERSONNEL ENTRY IS NECESSARY.
6. EXCAVATED MATERIAL SHALL BE STORED AT A DISTANCE SUCH THAT TRENCH COLLAPSE DUE TO SOIL STORAGE OVERBURDEN IS AVOIDED.
7. ALL CLEARING PREPARATION, STOCKPILING DISPOSAL, PADDING, BEDDING AND BACKFILLING SHALL BE IN ACCORDANCE WITH PIPELINE CONSTRUCTION SPECIFICATION, OPS-ARCP-CN-SPE-001.
8. WHEN ANY EXISTING PIPELINE IS LOCATED THE CONTRACTOR SHALL CLEARLY INDICATE ITS ROUTE AND DEPTH OF COVER BY PEGS AND WARNING SIGNS IN ACCORDANCE WITH THE PIPELINE CONSTRUCTION SPECIFICATION OPS-ARCP-CN-SPE-001. THE CONTRACTOR SHALL PROTECT THE EXISTING PIPELINE FROM VEHICLE BY SUITABLE BARRIERS OR THE PLACEMENT OF PROTECTIVE SLABS.
9. THE CONTRACTOR SHALL PERFORM ALL NECESSARY GRADING TO PERMIT THE PASSAGE CONSTRUCTION EQUIPMENT.
10. TRENCH DETAIL SHALL BE IN ACCORDANCE WITH DRAWING NUMBER OPS-OLDS-PL-DWG-005.
11. PIPE COATING SHALL BE PROTECTED BY PLACING SAND BAG (OR EQUIVALENT) ON TIMBER SKIDS.

SCALE 1:40 (DEPICTION)

ISSUED FOR DESIGN
NOT FOR CONSTRUCTION

No	DATE	DRN	CHK	ENG	Q.A.	PROJECT	DESCRIPTION
B	27/01/23	FLC	BAC	PK	WW		ISSUED FOR DESIGN
A	20/12/22	BAC	ISS	PK	WW		ISSUED FOR REVIEW

REVISION

NUMBER | TITLE

REFERENCE DRAWINGS

LogiCamms a verbinetz company

Senex Energy Limited
Level 31, 141 Ann Street
Brisbane QLD 4000
GPO Box 2233
Brisbane QLD 4001

SENEX ENERGY LIMITED
HIGH PRESSURE GAS PIPELINE
TYPICAL PIPELINE CONSTRUCTION RIGHT OF WAY
STANDARD DRAWING

DATE	DRAWN	CHK	ENG	Q.A.	SCALE
					NTS

PROJ No | DRG No: OPS-OLDS-PL-DWG-024 | REV: B

AUTOCAD A1SHEET

Appendix BB – Patch by Patch Analysis

1 Chainage 0 - 1400

This section traverses cleared grazing land from the ARCP inlet to join the Jackson-Wandoan Road at Chainage 1400.

Pre-existing

There are several isolated shrubs and no trees present in the vicinity of the ROW at this location. Ecology field surveys have confirmed that the ROW in this section does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

Several scattered and isolated shrubs will be unavoidably removed.



Chainage 0 - 1400

2 Chainage 1400 - 5000 (Parallelling Jackson - Wandoan Road)

This section traverses cleared grazing land as it parallels the Jackson-Wandoan Road between Chainage 1400 - 5000.

Pre-existing

The ROW is immediately adjacent to a variable (patchy) strip of remnant vegetation including mature trees (and some areas of ground-truthed TEC) running along the inside of the Jackson-Wandoan Road Reserve. There are a small number of isolated trees and shrubs within the cleared grazing paddock. Ecology field surveys have confirmed that the ROW in this section does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

All native vegetation and trees within the Jackson-Wandoan Road Reserve (including all areas of ground-truthed TEC) has been avoided. Almost all of the isolated trees and shrubs within the cleared grazing paddock are retained. A large stag and small number of small trees and shrubs are unavoidable due to their scattered distribution across the paddocks and in keeping with the landholders preference that the pipeline be as close as possible to his boundary.

(Note on following images: The tree branches and tree shadows that appear in the following images to extend from the greyed-out road reserve into the ROW have all be avoided and will be retained).



Chainage 1400 – 2800



Chainage 2600 - 3800



Chainage 3800 - 5000

Chainage 5000 - 5100 (Crossing of Jackson-Wandoan Road)

This section traverses a narrow corridor of native vegetation and trees located within the Jackson-Wandoan Road Reserve.

Pre-existing

The ROW transects a variable (patchy) strip of remnant vegetation including mature trees running along the inside of the Jackson-Wandoan Road Reserve. There are a small number of isolated trees and shrubs within the cleared grazing paddock immediately to the northwest. Ecology field surveys have confirmed that the ROW in this section does not contain any TECs or potential habitat for Dulacca Woodland Snail. The ecology field surveys identified an area of potential habitat for the Greater Glider extends to within the southern edge of the ROW.

Post-development

This location has been selected to minimise the number of trees and shrubs that need to be removed, whilst also crossing perpendicular to the Jackson-Wandoan Road and the nearby landholder's residence access track and lining up with a suitable location for a perpendicular crossing of Woleebee Creek. **The ROW has been narrowed to 20 m** in this section. The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared. The 20 m wide ROW will retain a 19 m tall tree on the northern edge of the ROW (43.5^{o} glide angle north to south) and an 18 m tall tree on the southern side of the 30 m wide ROW section (42.0^{o} glide angle south to north).



Chainage 5000 – 5100 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)

4 Chainage 5100 - 5550 (Cleared grazing paddock east of Wooleebee Creek)

This section traverses cleared grazing land.

Pre-existing

There are several isolated shrubs and regrowth trees present in the vicinity of the ROW at this location. The vicinity is not mapped as containing any TECs or species habitats. Ecology field surveys have confirmed that the ROW in this section does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

Several scattered and isolated shrubs will be unavoidably removed.



Chainage 5100 - 5550

5 Chainage 5550 - 5800 (HDD of Woleebee Creek)

This section traverses Woleebee Creek, recognized as containing riparian vegetation with wildlife habitat and corridor values.

Pre-existing

Woleebee Creek is an ephemeral watercourse which has a sandy bed that only has surface water during and immediately after rainfall events. The riparian vegetation along Woleebee Creek includes mature trees and intact remnant vegetation. There is no TEC or potential habitat for Greater Glider or Dulacca Woodland Snail within the proposed disturbance footprint.

Post-development

ARCP P/L will utilise HDD for the crossing of Woleebee Creek. Therefore, all trees, remnant vegetation and riparian vegetation have been avoided and will be retained. Several scattered and isolated shrubs within the cleared area away from the watercourse and riparian vegetation will be unavoidably removed at the HDD entry and exit points to enable the HDD to be completed.



Chainage 5550 - 5800

Chainage 5800 – 9700

This section traverses cleared grazing land with scattered and isolated shrubs.

Pre-existing

There are numerous scattered and isolated shrubs and several small patches of remnant vegetation including TECs are present in the vicinity of the ROW in this section. Ecology field surveys have confirmed that the ROW does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

No patches of remnant vegetation, TECs or potential habitat for Greater Glider or Dulacca Woodland Snail are affected. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 5800 - 8000



Chainage 8000 - 9700

7 Chainage 9700 - 10050 (Skirting existing quarry)

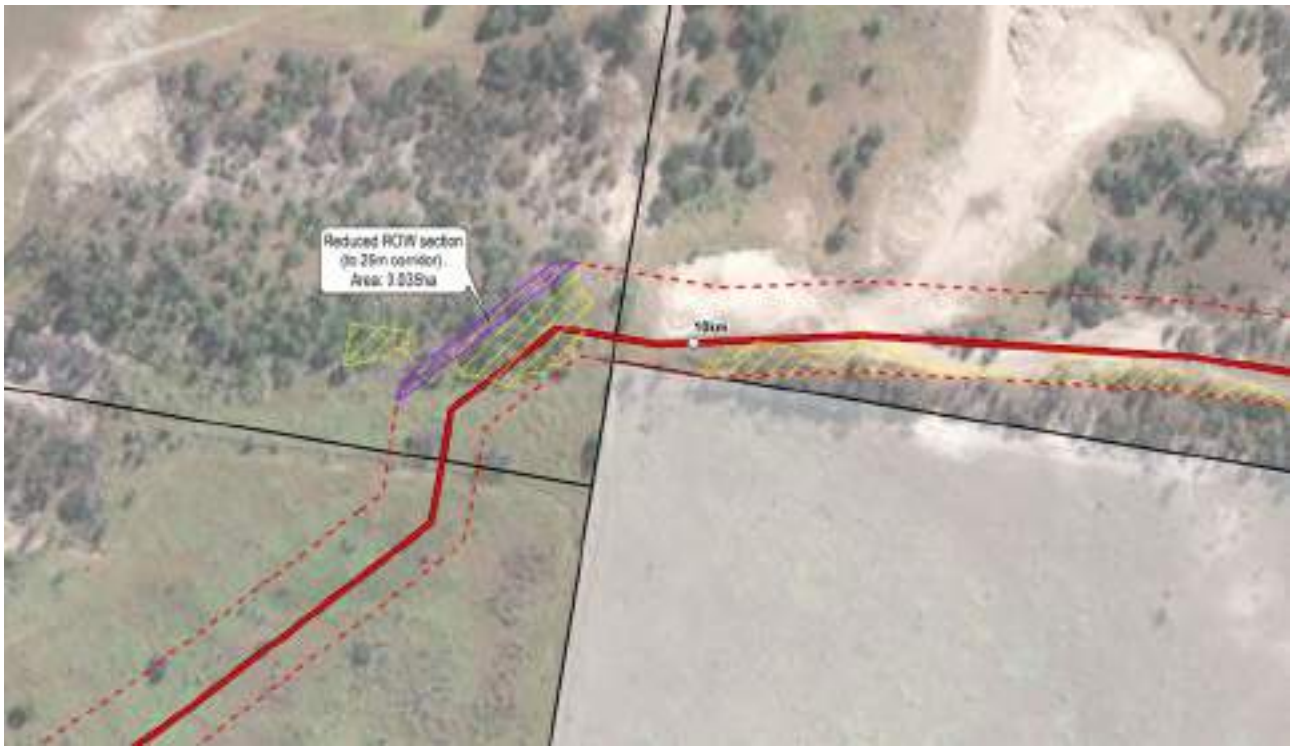
This section skirts between an existing quarry, and the intersection of four property boundaries. The topography is also restrictive (with the alignment joining and following a crest around Chainage 10000).

Pre-existing

The ROW is immediately adjacent to small patches and strips of Brigalow TEC, Semi-evergreen vine thicket (not TEC), and potential habitat for Dulacca Woodland Snail (Plate 1). The groundlayer contains mid-dense to dense exotic grass (Buffel Grass). There are also some scattered shrubs outside of these patches within pre-existing disturbance areas. There is no habitat identified as suitable for the Greater Glider in the vicinity.

Post-development

The area of Brigalow TEC and potential habitat for Dulacca Woodland Snail (Plate 1) shown as yellow hatching in the figure below will be unavoidably cleared due to the constraints associated with the existing quarry, property boundary intersections and topography. The majority of the TEC and habitat has been avoided and impacts have been minimised where possible given the constraints present. In particular, the **ROW has been narrowed to 25 m** avoid two habitat trees (*Eucalyptus woollsiana*) (Plates 2 and 3) on the northern edge of the indicative footprint.



Chainage 9700 – 10050 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate 1 Vegetation to be unavoidably removed at Chainage 10020 (to left of person)



Plate 2 – Large Eucalyptus woollsiana habitat tree retained through ROW narrowing



Plate 3 – 2nd large Eucalyptus woollsiana habitat tree retained through ROW narrowing

Chainage 10050 - 13200 (Cleared grazing paddocks on black soils)

This section is cleared grazing land in close proximity to developed gas fields (wells and gathering).

Pre-existing

There are numerous scattered and isolated shrubs and several small patches of remnant vegetation including TECs are present in the vicinity of the ROW in this section. Ecology field surveys have confirmed that the ROW does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

No patches of remnant vegetation, TECs or potential habitats for Greater Glider or Dulacca Woodland Snail are affected. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 10050 - 11500



Chainage 11500 - 13200

Chainage 13200 - 13300 (Strip of Brigalow along a fenceline)

This section traverses strip of Brigalow vegetation retained along a fenceline through otherwise cleared grazing land.

Pre-existing

The ROW transects a 70 m wide strip of remnant Brigalow vegetation including mature trees to 15 m tall through an otherwise cleared landscape. The groundlayer has mid-dense exotic grasses (Buffel Grass and Green Panic). This area is Brigalow TEC and potential habitat for Dulacca Woodland Snail. There is no habitat identified as suitable for Greater Glider in the vicinity.

Post-development

The area of Brigalow TEC and potential habitat for Dulacca Woodland Snail (Plate 4) shown as yellow hatching in the figure below will be unavoidably cleared due to the strip being unavoidable (the strip extends to other environmental constraints in each direction) and the necessity to cross existing gas gathering lines at a perpendicular angle. HDD is not supported at this location due to the topography (and existing infrastructure locations). Additional bends have been incorporated into the pipeline design so that the alignment can be placed within less dense vegetation and immediately parallel to an existing (narrow) cleared corridor. The **ROW width has also been reduced to 20 m width** to minimise the extent of clearing required. (As the strip of vegetation is relatively narrow felled timber can be windrowed in existing cleared areas on each side allowing safe construction within this reduced ROW).



Chainage 13200 – 13300 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate 4 Vegetation to be unavoidably removed at Chainage 13200 (right side of person)

10 Chainage 13300 - 14900 (Cleared grazing paddocks on black soils)

This section is cleared grazing land in close proximity to developed gas fields (wells and gathering).

Pre-existing

There are numerous scattered and isolated shrubs and several small patches of remnant vegetation including TECs are present in the vicinity of the ROW in this section. Ecology field surveys have confirmed that the ROW does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

All patches of remnant vegetation, TECs and species habitats have been avoided. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 13000 - 14900

11 Chainage 14900 - 15120 (Skirting existing erosion area)

This section crosses a rise while also skirting between an existing erosion area and a patch of Brigalow TEC.

Pre-existing

The ROW is immediately north of a small patch of Brigalow TEC (this was transected by the original alignment which was further south of the existing erosion area prior to being relocated to avoid the TEC). A patch of potential habitat for Dulacca Woodland Snail occurs south of the ROW and two relatively small patches extend into the ROW itself. The ROW contains a high density of exotic grasses (Buffel Grass and Rhodes Grass). There is no habitat identified as suitable for Greater Glider in the vicinity.

Post-development

Two small Narrow-leaved Ironbark regrowth trees and several small regrowth Brigalow trees (shrubs) will be unavoidably removed. The area of Brigalow TEC has been avoided through realignment of the ROW. The potential habitat for Dulacca Woodland Snail shown as yellow hatching in the figure below will be unavoidably cleared due to the constraints associated with the existing erosion area, topography and nearby TEC. The alignment crosses an existing access track at the high point (at KP 15). The majority of potential habitat has been avoided and impacts have also been reduced wherever the constraints present have allowed. The habitat which is unavoidable is relatively degraded (Plate 5) and less suitable than that retained in the Brigalow TEC on the southern side of the ROW.



Chainage 14900 - 15120



Plate 5 Vegetation to be unavoidably removed at Chainage 15020 (to right of person)

12 Chainage 15120 - 20980 (Cleared grazing paddocks)

This section is cleared grazing land in close proximity to developed gas fields (wells and gathering). The ROW joins and is immediately adjacent to the existing Jemena Gas Pipeline ROW from Chainage 17600-19870 and then diverges between Chainage 18970-20980 to avoid an existing well pad and small patch of remnant vegetation.

Pre-existing

There are numerous scattered and isolated shrubs and several patches for Brigalow TEC and potential habitat Dulacca Woodland Snail present in the vicinity of the ROW in this section. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

The alignment has been designed to carefully avoid large habitat trees and patches of regrowth and remnant vegetation. All TECs and potential habitat for Dulacca Woodland Snail have been avoided. Several scattered and isolated shrubs and smaller trees will be unavoidably removed due to their scattered and widespread nature.



Chainage 15120 – 17000



Chainage 17000 - 19000



Chainage 19000 - 20980

13 Chainage 20980 - 21300 (Crossing of watercourse with riparian vegetation)

This section traverses a narrow strip of Brigalow (not TEC) and wider band of Eucalypt woodland following an ephemeral watercourse.

Pre-existing

The ROW transects a 75 m wide section of this watercourse which contains a band of intact remnant vegetation through an otherwise cleared landscape. A narrow strip of Brigalow vegetation (ground-truthed as not TEC) follows the eastern edge of this corridor including some mature trees. This thin strip is also potential habitat for Dulacca Woodland Snail. The riparian vegetation along this watercourse has been ground-truthed as potential habitat for Greater Glider. The existing Jemena ROW is 20 m wide through the watercourse and has approximately 15 m tall trees on each side (**36.9º** glide angle).

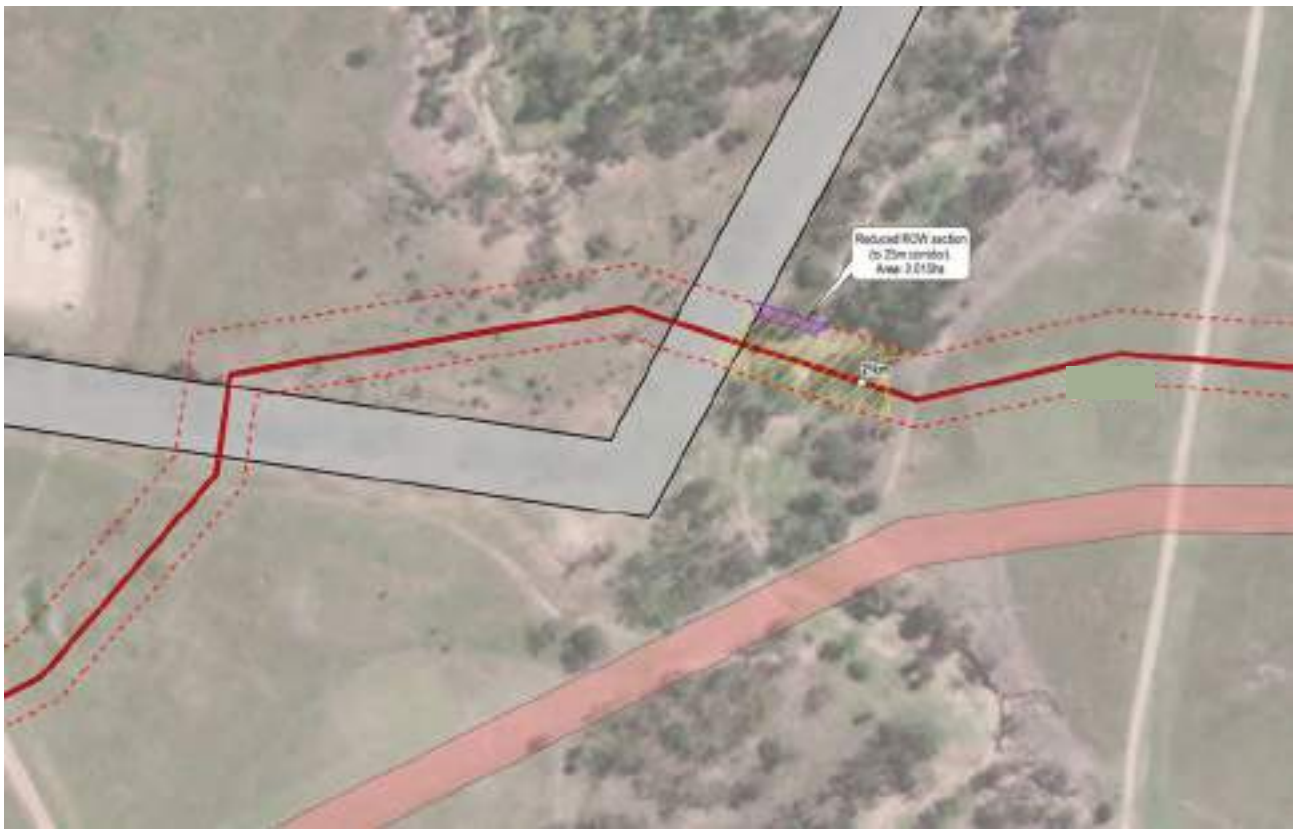
Post-development

The ROW has been sited in this location (and somewhat removed from the existing Jemena ROW) in order to minimise vegetation clearing requirements. The ROW has been designed so that the alignment crosses a narrower area of vegetation and less dense vegetation. There are several constraints that limit the locations for the crossing including the existing pipeline and the paper road (which needs to be crossed at a perpendicular angle). The **ROW has been narrowed to 25 m from Chainage** 21020 – 21050 in order to avoid two large 28 m tall habitat trees (Plate 6).

The ROW may also be able to be narrowed in other sections, however, due to the proximity and nature of the watercourse, this will not be able to be confirmed until construction is underway (the width of the trench could need to be wider if sandy materials are encountered requiring the full 30 m width). For the purposes of the impact assessment and this Greater Glider connectivity assessment it has been assumed that the full 30 m width will be required to be cleared. A 6m x 6m area of potential habitat for Dulacca Woodland Snail could need to be unavoidably cleared within this 30m wide ROW. This habitat is noted to be poor quality habitat due to flooding and there being regular stock camping at the location (Plate 7). The riparian vegetation (and potential habitat for Greater Glider) shown as yellow hatching in the figure below, including 2-3 mature habitat trees may be unavoidable.

The 25 m wide ROW will retain two 28 m tall trees on the northern edge of the ROW (**48.2º** glide angle north to south) and a 15 m tall tree on the southern side of the 30 m wide ROW section (**26.6º** glide angle south to north).

The ROW has been positioned to minimise the extent of clearing required at the crossing of the paper road at Chainage 21300 (which the ecology field survey confirmed does not contain TEC or potential habitat for Greater Glider or Dulacca Woodland Snail). A small number of trees and shrubs will be unavoidably removed at the crossing of the paper road. The crossing of the paper road has been selected to avoid larger trees and affect as little vegetation as possible within the limitations of safe pipeline construction.



Chainage 20980 – 21300 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate 6 28 m tall habitat trees retained on northern edge of ROW through narrowing to 25 m at Chainage 21020 - 21050



Plate 7 Thin strip of Brigalow (and poor Dulacca Woodland Snail habitat) affect by stock camp at Chainage 21000

14 Chainage 21300 - 23200 (Cleared grazing paddocks on black soils)

This section is cleared grazing land in close proximity to developed gas fields (wells and gathering).

Pre-existing

There are a few scattered and isolated shrubs and several small patches of remnant vegetation including TECs are present in the vicinity of the ROW in this section. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

No patches of remnant vegetation, TECs or potential habitat for the Greater Glider or Dulacca Woodland Snail will be affected. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 21300 - 23200

15 Chainage 23200 - 23300 (Small watercourse crossing)

This section traverses a minor ephemeral drainage line with a narrow (approximately 40m wide) strip of vegetation.

Pre-existing

The ROW transects a 40 m wide section of this drainage line which contains a narrow band of degraded mixed Poplar Box and Brigalow vegetation (mapped as TEC) through an otherwise patchily vegetated landscape. Although relatively sparse, the vegetation includes potential habitat for both Dulacca Woodland Snail and Greater Glider. The existing Jemena ROW is approximately 100 m further south and is 30 m wide but narrows to approximately 20 m at the watercourse crossing. A 18 m tall tree is retained on the northern edge (**42.0º** glide angle north to south). Shorter trees occur on the southern side (height estimated from aerial images at no more than 10 m) with an approximate south to north glide angle of **29.1º**. North of the ARCP ROW the vegetated corridor is fragmented with gaps up to 25 m and few eucalypt trees.

Post-development

The ROW has been located in this location to align with an existing fenceline where the landholder crosses the drainage line (4WD track) and is somewhat removed from the existing Jemena ROW in order to affect the least amount of vegetation possible. The ROW avoids a steep area to the south. **The ROW width has also been reduced to 20 m width** across the drainage line to minimise the extent of clearing required.

The area of mixed Poplar Box and Brigalow vegetation and potential habitat for Dulacca Woodland Snail (north of the centerline) and Greater Glider (south of the centerline) (Plate 8) shown as yellow hatching in the figure below will be unavoidably cleared. This will introduce a new 20 m wide gap into this already fragmented patch. Trees on each side up to 12 m tall will introduce a **31º** glide angle in each direction.



Chainage 23200 - 23300 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate 8 Vegetation that will be unavoidably cleared for 20 m wide ROW at Chainage 23250

16 Chainage 23300 - 24600 (Cleared grazing paddocks on black soils)

This section is cleared grazing land in close proximity to developed gas fields (wells and gathering).

Pre-existing

There are numerous scattered and isolated shrubs and several small patches of remnant vegetation including TECs and potential habitat for Dulacca Woodland Snail that are present in the vicinity of the ROW in this section. There is no habitat identified as suitable for Greater Glider in the vicinity.

Post-development

The ROW will require the unavoidable clearing of the edge of two patches mapped as containing potential habitat for Dulacca Woodland Snail at Chainage 23900 (100 m^2) and 24300 (80 m^2) (of which the one at Chainage 23900 is also Brigalow TEC). These are shown as yellow hatching in the figure below and are approximately 0.01 ha and 0.008 ha respectively. The vegetation at Chainage 23900 is unavoidable due to the ROW needing to work around a livestock watering tank and trough immediately to the west. The vegetation at Chainage 24300 is unavoidable due to the proximity of the public road and the watercourse crossing at Chainage 24250. All other patches of remnant vegetation, TECs and species habitat been avoided. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 23300 - 24600

17 Chainage 24600 - 24720 (Small watercourse crossing with patchy vegetation)

This section traverses a minor ephemeral drainage line with scattered Poplar Box trees and acacia regrowth and shrubs.

Pre-existing

The ROW transects a small drainage line within a patchily vegetated landscape. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Dulacca Woodland Snail. Although relatively sparse and with relatively large gaps, the vegetation along the watercourse includes poor quality but potential habitat for Greater Glider (Plate 9). Although the existing Jemena ROW is 30 m wide the distance between vegetation across the existing area is 40 m. There are a few trees on the western side up to 13 m tall (**18.0º** glide angle from west to east) and the closest vegetation on the eastern side is 10 m tall (**14.0º** glide angle from east to west).

Post-development

The ROW has been located in this location to align with a previously cleared corridor to affect the least amount of vegetation possible. The ROW avoids all mature Poplar Box trees. The ROW may be able to be narrowed, however, due to the proximity and nature of the watercourse, this will not be able to be confirmed until construction is underway (the width of the trench could be forced wider if sandy materials encountered requiring the full 30 m width). Therefore patchy potential Greater Glider habitat (including Poplar Box saplings and acacia regrowth and shrubs, Plate 9) shown as yellow hatching in the figure below may be unavoidably cleared. Post-development, the existing 40 m wide gap between trees will become 50 m. Trees to 13 m tall will be retained on the western side up (**14.6º** glide angle from west to east) and the closest vegetation on the eastern side is 10 m tall (**11.3º** glide angle from east to west).



Chainage 24600 - 24700



Plate 9 Vegetation that will be unavoidably cleared for ROW at Chainage 24650

18 Chainage 24700 - 28300 (Cleared grazing paddocks)

This section is cleared grazing land.

Pre-existing

There are numerous scattered and isolated shrubs and several small patches of remnant vegetation including TECs are present in the vicinity of the ROW in this section. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

All patches of remnant vegetation, TECs and species habitats have been avoided. Several scattered and isolated shrubs and regrowth trees will be unavoidably removed.



Chainage 24700 - 26400



Chainage 26400 - 28300

19 Chainage 28300 - 30000 (Cleared grazing land)

This section is cleared grazing land (all trees and large shrubs shown in the proposed ARCP ROW in the image below are no longer present due to recent clearing by third parties). The ARCP ROW is adjacent to another linear corridor which has been reserved for future infrastructure through this section.

Pre-existing

There are no trees within the ROW in this section and it does not contain any MNES TECs or potential habitat for Greater Glider or Dulacca Woodland Snail. Plates 10 and 11 show only smaller shrubs have been retained after the recent clearing. Potential habitat for Greater Glider occurs to the west of the ROW and further to the east.

Post-development

No trees or large shrubs, TECs or potential habitat for Greater Glider or Dulacca Woodland Snail is required to be cleared to facilitate construction of the ROW in this section. Scattered shrubs will be unavoidably removed.



Chainage 28300 - 29040



Chainage 29040 – 30000



Plate 10 Proposed ARCP ROW at Chainage 29400 looking northwards taken (Photo taken January 2024)



Plate 11 Proposed ARCP ROW at Chainage 29400 looking southwards taken (Photo taken January 2024)

20 Chainage 30000 - 30900 (Forested patch)

This section passes through the eastern edge of a relatively large forested patch. The ROW is adjacent to another linear corridor (20m wide) which has been reserved for future infrastructure through this section. The existing 30m wide Jemena Gas Pipeline ROW, Ewingdale Road and a cleared fenceline and/or firebreak run parallel on the other side of the reserved linear corridor.

Pre-existing

This is the eastern extent of a large forested area containing intact remnant vegetation (not TEC). Although relatively shrubby and dry and dominated by Cypress Pine, the vegetation includes potential habitat for both Greater Glider and, between Chainage 30100 – 30500, Dulacca Woodland Snail. The existing Jemena Gas Pipeline ROW, Ewingdale Road and fenceline/firebreak lie between the existing forest patch and a smaller forested area to the east.

The existing Jemena corridor is 30 m wide from Chainage 30000 – 30540 and 40 m wide (as it combines with the road) from Chainage 30540 - 30900. It has a 23 m tall tree on its north-western edge at Chainage 30800 (40 m wide gap (**29.9º** glide angle from north to south) and 15-18 m tall trees on its north-western edge in the 30 m wide section (**26.6 – 31.0º** glide angle from NW to SE). On the south-eastern side of the Jemena ROW there is a 19 m tall tree in the 30 m wide section (**32.4º** glide angle from SE to NW). Glide angles across the Ewingdale Road and fenceline/firebreaks would generally be 40º or higher with occasional trees up to 19 m tall present on each side of these 10 m wide barriers.

Post-development

The ARCP ROW transects a 900 m wide section of forest which contains intact remnant vegetation. The ROW has been located in this location so as to affect the narrowest cross-section of vegetation and to minimise impacts further into the forested area. Therefore, the ROW has been placed immediately adjacent to the linear corridor that has been reserved for future development. The **ROW will be narrowed to 25 m at Chainage 30430** to avoid a 16 m tall habitat tree (Plate 12). The ROW may also be able to be narrowed to avoid a habitat tree at Chainage 30460, however, due to the location of the tree this will not be able to be confirmed until construction is underway (the width of the trench could need to be wider if sandy materials are encountered requiring the full 30 m width). For the purposes of the impact assessment and this Greater Glider connectivity assessment it is assumed that the full 30 m width will be required in all parts of this section except at Chainage 30430 which will be narrowed to 25 m width. Other than this narrowing all areas of mapped potential habitat for Greater Glider and Dulacca Woodland Snail will be unavoidably cleared.

The 16 m tall tree on the north-western boundary of the 25 m wide section results in a **32.6º** glide angle from NW to SE). There are other trees up to 19 m tall which will be retained along the northwestern edge of the 30 m wide section of the ROW (**32.4º** glide angle from NW to SE). A 23 m tall tree and others of up to 18 m tall will be retained along the south-eastern boundary of the ARCP ROW (**31.0 – 37.5º** glide angle from SE to NW).



Chainage 30000 – 30900



Narrowing of ROW at Chainage 30430 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate12 Habitat tree to be retained through ROW narrowing at Chainage 30430

21 Chainage 30900 - 31500 (Cleared grazing paddock)

This section is cleared grazing land.

Pre-existing

There are numerous scattered and isolated shrubs present in the vicinity of the ROW in this section. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

All patches of remnant vegetation, TECs and species habitats have been avoided. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 30900 - 31500

22 Chainage 31500 - 31550 (Retained timber belt)

This section of the ROW passes through a 35 m wide retained timber belt / shade line in an otherwise cleared grazing paddock. The ROW is immediately adjacent to the existing 30 m wide Jemena Pipeline ROW.

Pre-existing

The ROW transects a 35 m wide strip of remnant vegetation including eucalypt trees to 19 m tall through an otherwise cleared landscape. The strip is already transected by a number of fencelines and the 30 m wide Jemena ROW (Plate 13). Ecology field surveys have confirmed that the ROW does not contain any TECs or potential habitat for Dulacca Woodland Snail. This strip has been identified as being potential habitat for Greater Glider. The existing corridor is 30 m wide in this location. It has a 19 m tall tree on its southern edge (**32.4º** glide angle from south to north) and 15 m tall trees on its northern edge (**26.6º** glide angle from north to south).

Post-development

The ROW has been positioned adjacent to the existing Jemena ROW to consolidate the impacts to the timber belt/shade line and minimise edge effects. The **ROW corridor has been reduced to 20 m width** through this section to minimise the extent of clearing required. (As the strip of vegetation is relatively narrow felled timber can be windrowed in existing cleared areas on each side allowing safe construction within this reduced ROW). The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared due to the vegetation corridor extending for a considerable distance in each direction. The existing 30 m gap from the existing Jemena ROW will become a combined gap of 50 m. The new combined gap will retain the 19 m tall tree on its southern edge (**20.8º** glide angle from south to north) and will have a 13 m tall tree on its northern edge (**14.6º** glide angle from north to south).



Chainage 31500 - 31550 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate 13 Photo looking east through retained timber belt at Chainage 31500 - 31550 showing vegetation to be removed and existing 30 m wide Jemena Pipeline ROW

23 Chainage 31550 - 32320 (Cleared grazing paddock)

This section is cleared grazing land.

Pre-existing

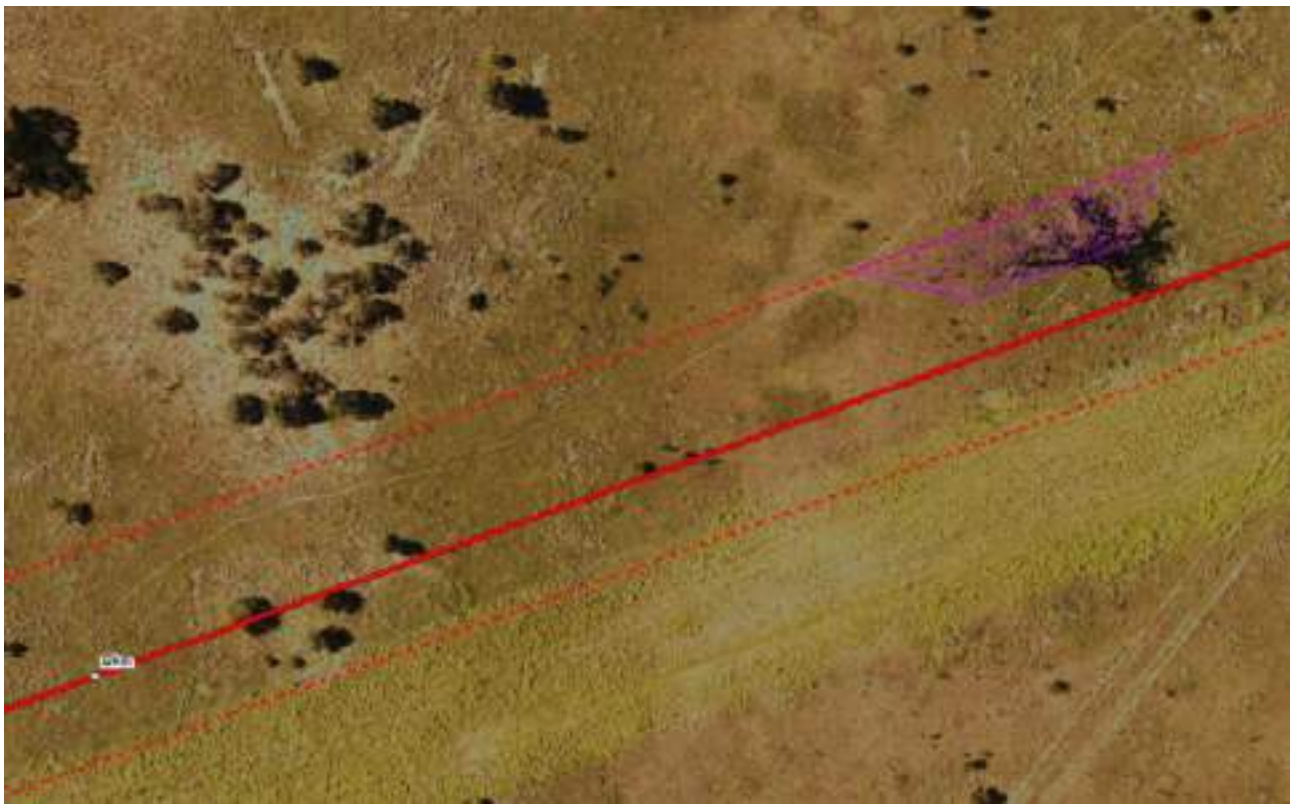
There are numerous scattered and isolated shrubs present in the vicinity of the ROW in this section. There is one isolated large ironbark at Chainage 31850. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

All patches of remnant vegetation, TECs and species habitats have been avoided. Several scattered and isolated shrubs will be unavoidably removed. The **ROW corridor has been reduced to 20 m width** through this section to minimise the extent of clearing required. The isolated ironbark at Chainage 31850 will be retained as an important tree (Plate 14) in koala dispersal habitat.



Chainage 31550 - 32320



Narrowing of ROW at Chainage 31850 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate 14 Photo of the large isolated ironbark to be retained through narrowing of the ROW

24 Chainage 32320 - 32380 (Retained timber belt along watercourse)

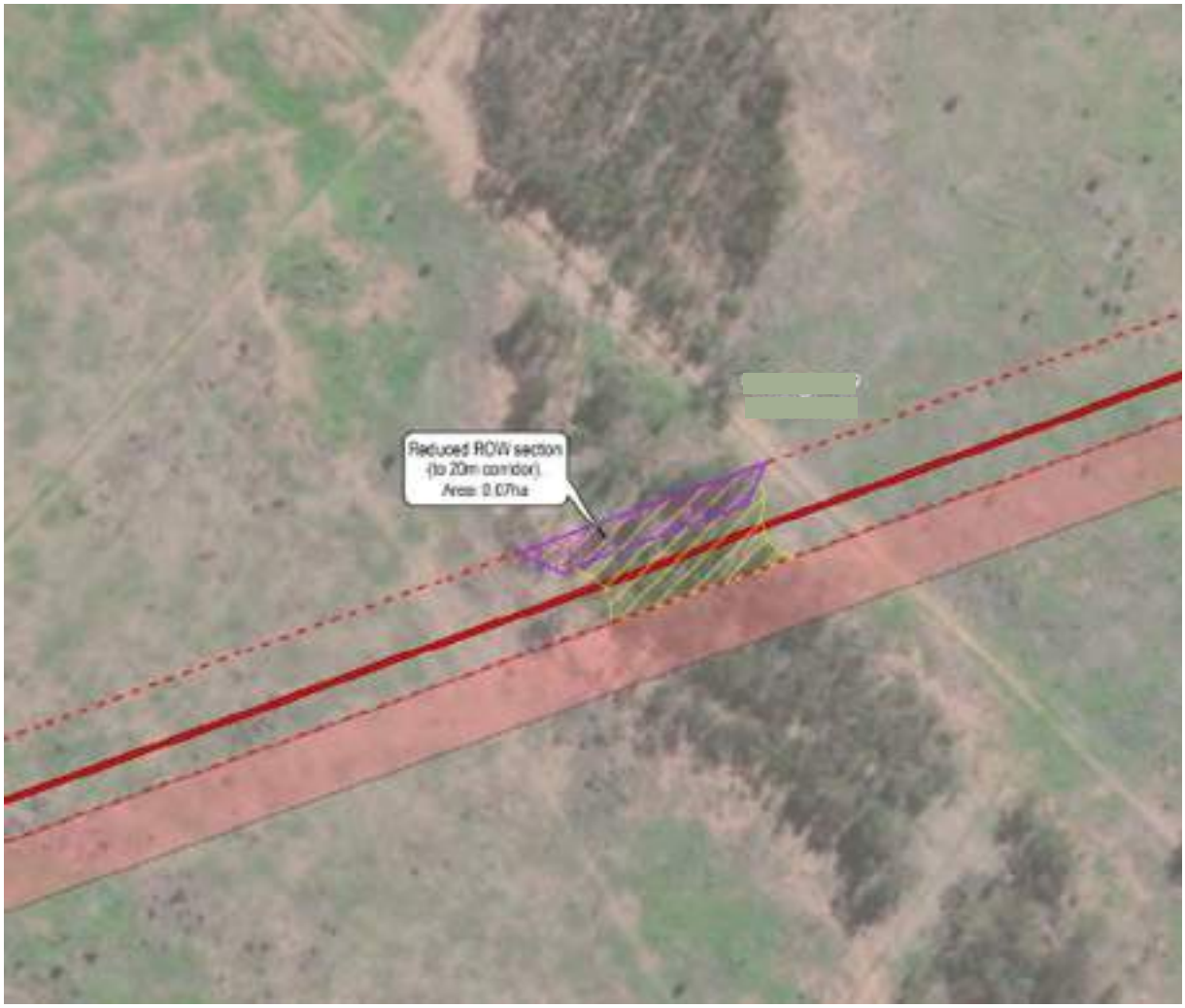
This section of the ROW passes through a 50 m wide retained timber belt in an otherwise cleared grazing paddock. The ROW is immediately adjacent to the existing 30 m wide Jemena Pipeline ROW.

Pre-existing

The ROW transects a 50 m wide strip of remnant vegetation including eucalypt trees to 19 m tall along a watercourse through an otherwise cleared landscape. The strip is already transected by a number of fencelines and the 30 m wide Jemena ROW. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Dulacca Woodland Snail. This strip has been identifies as being potential habitat for Greater Glider. The existing corridor is narrowed to 20 m wide in this location. It has an 18 m tall tree on its southern edge (**42.0º** glide angle from south to north) and a 15 m tall tree on its northern edge (**36.9º** glide angle from north to south).

Post-development

The ROW has been positioned adjacent to the existing Jemena ROW to consolidate the impacts to the watercourse vegetation and minimise edge effects. The **ROW corridor has been reduced to 20 m width** through this section to minimise the extent of clearing required. The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared due to the vegetation corridor extending for a considerable distance in each direction. The existing 20 m gap from the existing Jemena ROW will become a combined gap of 40 m. The new combined gap will retain the 18 m tall tree on its southern edge (**24.2º** glide angle from south to north) and will have a 15.5 m tall tree on its northern edge (**21.2º** glide angle from north to south).



Chainage 32320 – 32380 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)

25 Chainage 32380 - 32830 (Cleared grazing paddock)

This section is cleared grazing land.

Pre-existing

There are numerous scattered and isolated shrubs present in the vicinity of the ROW in this section. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

All patches of remnant vegetation, TECs and species habitats have been avoided. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 32380 - 32830

26 Chainage 32830 - 32950 (Retained timber belt)

This section of the ROW passes through a 100 m wide retained timber belt in an otherwise cleared grazing paddock. The ROW is immediately adjacent to the existing 30 m wide Jemena Pipeline ROW.

Pre-existing

The ROW transects a 100 m wide strip of remnant vegetation including eucalypt trees to 19 m tall through an otherwise cleared landscape. The vegetated corridor is already transected by a number of fencelines and the 30 m wide Jemena ROW. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Dulacca Woodland Snail. This corridor is identified as being potential habitat for Greater Glider. The existing 30 m wide corridor is flanked on the south-eastern side by small trees up to 8 m (**14.9º** glide angle in SE to NW direction) and a 19 m tall tree occurs 30 m outside the NW edge of the alignment (**17.6º** glide angle in NW to SE direction).

Post-development

The ROW has be positioned adjacent to the existing Jemena ROW to consolidate the impacts to the timber belt/shade line and minimise edge effects. The **ROW corridor has been reduced to 20 m width** through this section to minimise the extent of clearing required. The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared due to the strip extending for a considerable distance in each direction). The existing 30 m gap from the existing Jemena ROW will become a combined gap of 50 m. The 19 m tall tree 10 m outside the new northwestern boundary of the corridor is retained so that glide angle will remain unchanged at **17.6º** in the NW-SE direction but the glide angle in the SE-NW direction will be reduced from 14.9º to **9.1º**.



Chainage 32830 - 32950 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)

27 Chainage 32950 - 33700 (Cleared grazing paddock)

This section is cleared grazing land.

Pre-existing

There are numerous scattered and isolated shrubs present in the vicinity of the ROW with a narrow band of trees to the north of Chainage 33300 being mapped as potential habitat for Greater Glider. Ecology field surveys have confirmed that the ROW itself does not contain any TECs or potential habitat for Dulacca Woodland Snail.

Post-development

The ROW has been placed as close as possible to the existing Jemena ROW. The **ROW corridor has been reduced to 20 m width** at Chainage 33300 to avoid all vegetation mapped as potential habitat for Greater Glider. Similarly, no remnant vegetation, TECs or potential habitat for Dulacca Woodland Snail will be disturbed. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 32950 - 33700 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)

28 Chainage 33700 - 33800 (Retained timber belt along watercourse)

This section of the ROW passes through a 80 m wide retained timber belt in an otherwise cleared grazing paddock. The ROW is approximately 50 m from the existing 30 m wide Jemena Pipeline ROW.

Pre-existing

The ROW transects a 80 m wide strip of remnant vegetation including eucalypt trees to 22 m tall along a watercourse through an otherwise cleared landscape. The vegetation corridor is already transected by a number of fencelines and the 30 m wide Jemena ROW. This vegetation is Poplar Box TEC and is mapped as potential habitat for Greater Glider. Ecologist field surveys confirmed the site is not potential habitat for Dulacca Woodland Snail. A 21.6 m tall tree is on the southern edge (requiring a **35.8º** glide angle from south to north) and a 20 m tall tree is on the northern edge (requiring a **33.7º** glide angle from north to south).

Post-development

The ROW has been positioned away from the existing corridor to follow an existing access track, minimise impacts to the watercourse vegetation and avoid a patch of vegetation next to Chainage 34000. The area of TEC and potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared due to the vegetation corridor extending for a considerable distance in each direction. The **ROW corridor has been reduced to 25 m width** through this section to minimise the extent of clearing required. The ROW may be further reduced but this will depend on how things proceed during construction.

Post-development the ARCP 25 m corridor will be left with a 15 m tall tree 5 m back from the southern edge (requiring a **26.6º** glide angle from south to north) and a 16 m tall tree is on the northern edge (requiring a **32.6º** glide angle from north to south).



Chainage 33700 - 33800 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)

29 Chainage 33800 - 36580 (Cleared grazing paddock)

This section is cleared grazing land.

Pre-existing

There are numerous scattered and isolated shrubs and two degraded vegetation lines present in the vicinity of the ROW in this section. This section is not mapped as containing any TECs and there is no habitat identified as suitable for Greater Glider or Dulacca Woodland Snail in the vicinity.

Post-development

The ROW follows existing disturbed areas past the two degraded vegetation lines. All patches of remnant vegetation, TECs and potential habitat for Greater Glider or Dulacca Woodland Snail have been avoided. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 33800 - 36580

30 Chainage 36580 - 37450 (Retained timber patch)

This section of the ROW passes through an area of retained timber. The ARCP ROW joins the APLNG Pipeline ROW where it starts to overlap (by 10m) the 40 m wide clearing corridor used during the 2013 construction of the APLNG Pipeline (Plate 14).

Pre-existing

The timbered area to the east of Chainage 36580 is Brigalow TEC and potential habitat for Dulacca Woodland Snail. The timbered area between Chainage 36580 – 37390 is not TEC but is mapped as potential habitat for Greater Glider. There is already a 40 m wide cleared corridor between the timbered area in this section and thin strips of roadside trees and fenceline/firebreak before an area of potential habitat on the southern side of Crossroads Road. There is currently trees up to 23 m tall on the northern side of the existing 40 m wide APLNG construction corridor, approximately 7 m tall on the southern side and approximately 7 m tall trees on the southern side of the 12 m wide road. Moving from north to south, Greater Glider would currently be required to undertake glides of **29.9º or less** (across the APLNG corridor) and then 30.3º or less (across the road) when moving from north to south 30.3º or less (across the road) and then **9.9º or less** (across the APLNG corridor).

Post-development

The 30 m wide ARCP ROW has been located to utilise (overlap) the northernmost 10 m of the corridor that was cleared to facilitate the construction of the APLNG Pipeline. Therefore, the area to be cleared will be 20 m wide through this section. The ROW may also be able to be narrowed to avoid some habitat trees in the northern 10 m of the ROW, however, this will not be able to be confirmed until construction is underway (and trenching materials and tree/root conditions are better understood). For the purposes of the impact assessment and this Greater Glider connectivity assessment it is assumed that the full 20 m width of timber will be required to be cleared. The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared. The existing 40 m gap to the roadside fringe of trees due to the existing APLNG Pipeline construction corridor (Plate 15) will become a combined gap of 60 m. The corresponding glide angles across the combined gap would become approximately **21.0º** from north to south and **6.7º** from south to north.



Chainage 36580 - 37450



Plate 15 Photo looking east at Chainage 37000 show vegetation to be cleared (LHS) adjoining the existing 40 m wide APLNG Pipeline construction corridor

31 Chainage 37450 – 40700 (Large timber area)

This section of the ROW passes through a large area of retained timber that contains operational gas wells and gathering. The ARCP ROW adjoins the APLNG Pipeline where for most of this section it overlaps (by 10 m) the 40 m wide clearing corridor used during the 2013 construction of the APLNG Pipeline.

Pre-existing

The timbered area between Chainage 37700 - 38000 is Brigalow TEC and potential habitat for Dulacca Woodland Snail. The rest of the timbered area is not TEC but is mapped as potential habitat for Greater Glider. One hollow bearing tree was recorded in the northern 10 m of the proposed ROW at Chainage 40340 (Plate 15). There is already a 40m wide cleared corridor between timbered area in this section and thin strips of roadside trees. Areas to the south of Crossroads Road are cleared for cattle grazing and there are no existing linkages to areas of potential habitat for Greater Glider on the southern side of Crossroads Road.

Post-development

Between Chainage 38030 - 40700, the 30 m wide ARCP ROW has been located to utilise (overlap) the northernmost 10 m of the corridor that was cleared to facilitate the construction of the APLNG Pipeline. Therefore, the area to be cleared will be 20 m wide through this section. Between Chainage 37550 – 38030, the APLNG Pipeline did not use a 40 m wide clearing corridor so there is no 10 m corridor outside the APLNG ROW at can be utilised. The **ROW will be narrowed to 20 m at Chainage 40340** (so that only 10m of clearing is required) in order to enable the large habitat tree (Plate 16) to be retained.

The areas of Brigalow TEC and potential habitat for Dulacca Woodland Snail (Chainage 37700 - 38000) and potential habitat for Greater Glider (all other sections), shown as yellow hatching in the figure below will be unavoidably cleared.



Chainage 37450 - 40700



Narrowing of ROW at Chainage 40340 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate 16 Hollow bearing habitat tree which will be retained through narrowing the clearing width to 10 m at Chainage 40340

32 Chainage 40700 - 42600 (Large timber area)

This section of the ROW passes through a large area of retained timber that contains operational gas wells and gathering. The ARCP ROW adjoins the APLNG Pipeline where for most of this section it overlaps (by 10m) the 40 m wide clearing corridor used during the 2013 construction of the APLNG Pipeline.

Pre-existing

The timbered area is not TEC but is mapped as potential habitat for Greater Glider. Potential habitat for Dulacca Woodland Snail is mapped between Chainages 40600 - 41000 and 41400 – 41900. Two larger trees were recorded in the northern 10 m of the proposed ROW at Chainages 41300 and 41920. There is already a 40 m wide cleared corridor between timbered area in this section and thin strips of roadside trees. Areas to the south of Crossroads Road include areas of potential habitat for Greater Glider. There are currently trees up to 20 m tall on the northern side of the existing 40 m wide APLNG construction corridor, 17 - 19 m tall on the southern side and one tree at 28 m tall on the southern side of the road (50 m away, with other lower vegetation as close as 30 m away). Moving from north to south, Greater Glider would be required to undertake glides of **26.6º or less** (across the APLNG corridor) and then 32.4º or less (across the road) when moving from north to south 29.25º or less (across the road) and then **25.4º or less** (across the APLNG corridor).

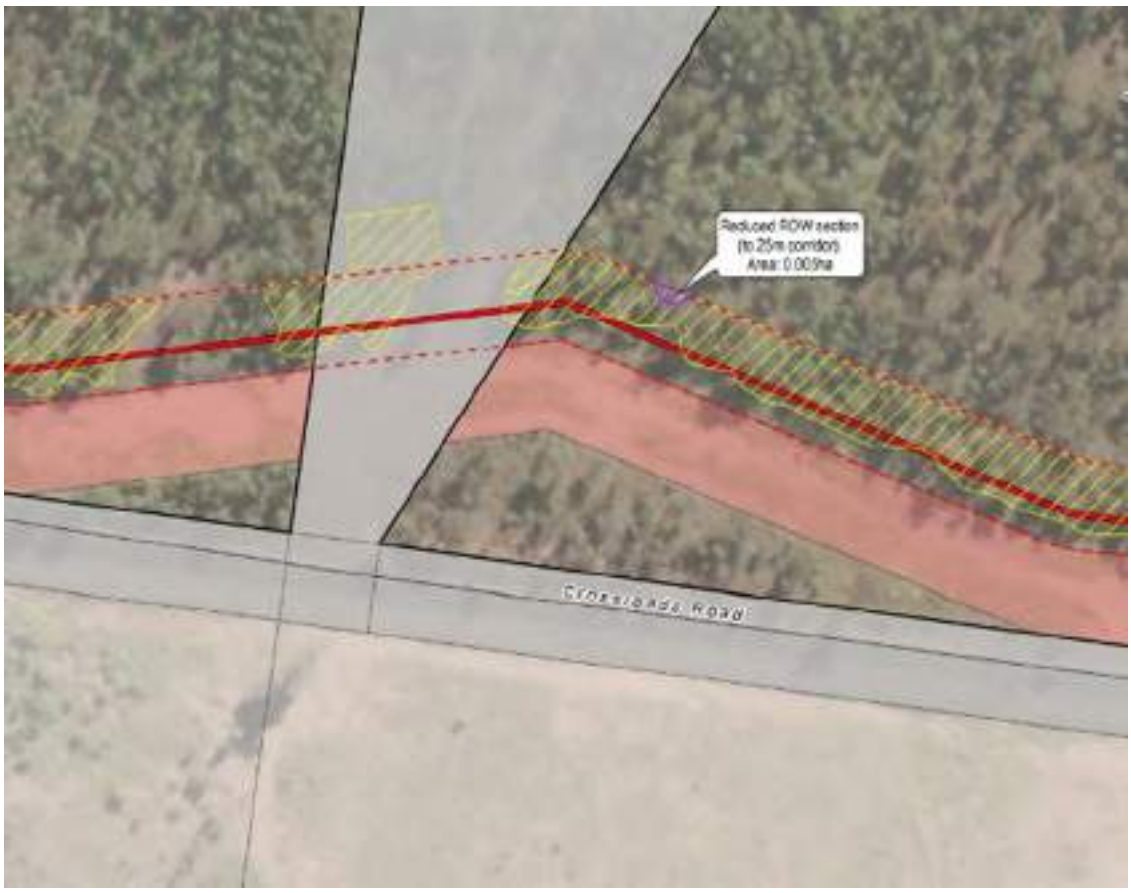
Post-development

For most of this section, the 30 m wide ARCP ROW has been located to utilise (overlap) the northernmost 10 m of the corridor that was cleared to facilitate the construction of the APLNG Pipeline. Therefore, the area to be cleared will be 20 m wide through most of this section. The **ROW will be narrowed to 25 m at Chainages 41300 and 41920** (so that only 15 m of clearing is required) in order to enable the 20 m and 25 m tall trees to be retained.

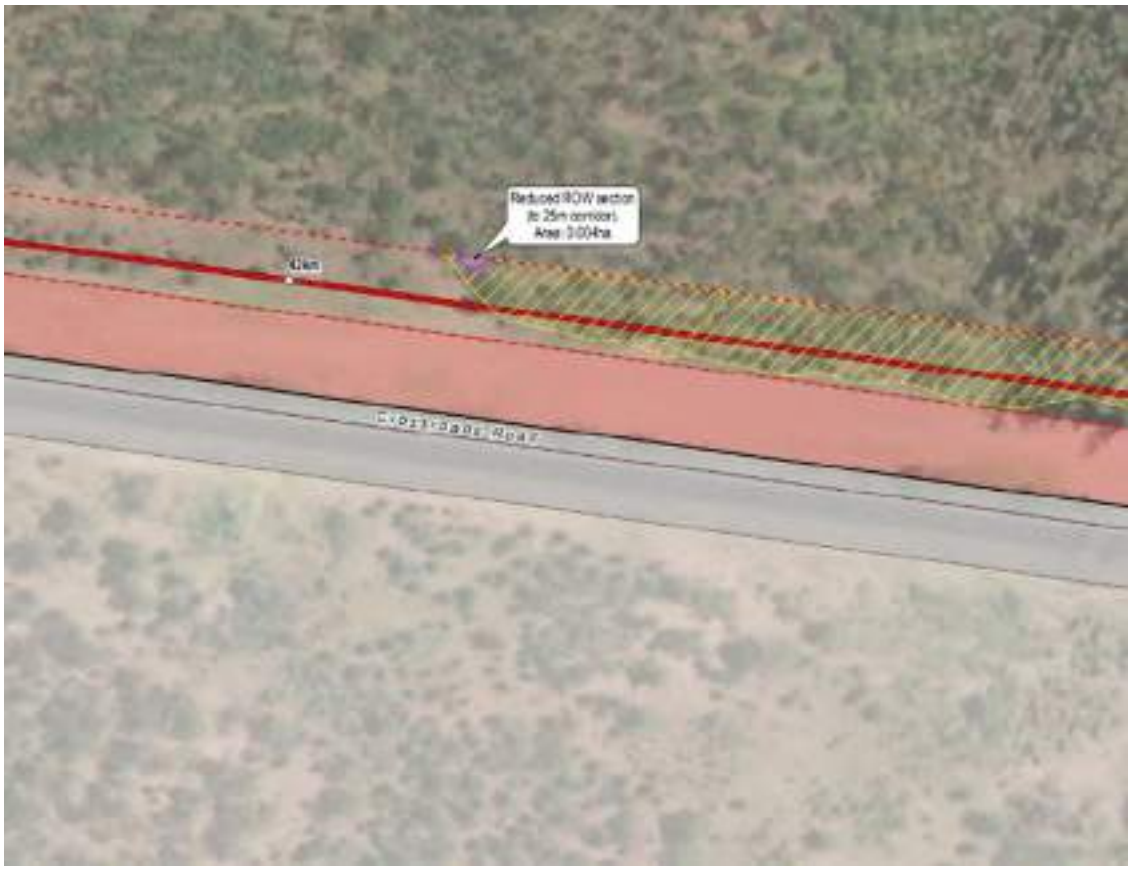
The areas of potential habitat for Greater Glider, shown as yellow hatching in the figure below, will be unavoidably cleared. The existing 40 m wide clearing corridor for the APLNG Pipeline construction will become a combined gap of 55 m at Chainages 41300 and 41920. The glide angles for crossing the combined ARCP and APLNG ROWs will be reduced to **24.4º**.



Chainage 40700 – 42600



Narrowing of ROW at Chainage 41300 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Narrowing of ROW at Chainage 41920 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)

33 Chainage 42600 - 44480 (Cleared grazing land)

This section is cleared grazing land that contains operational gas wells and gathering.

Pre-existing

There are numerous scattered and isolated shrubs present in the vicinity of the ROW in this section. The ROW is not mapped as containing any MNES TECs or species habitats. There is no habitat identified as suitable for the Greater Glider or Dulacca Woodland Snail in the vicinity.

Post-development

All patches of remnant vegetation, TECs and potential Greater Glider or Dulacca Woodland Snail habitats have been avoided. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 42600 - 44480

34 Chainage 44480 - 44520 (Retained trees along watercourse)

This section of the ROW passes through a 20-30 m wide vegetation corridor which follows a minor watercourse in an otherwise cleared grazing paddock with patchy regrowth that contains operational gas wells and gathering. The ROW parallels an existing fence and clearing.

Pre-existing

The ROW transects a strip of eucalypt trees to 24 m tall along a small watercourse. The vegetated corridor is already transected by an existing fenceline (20 m wide) and the nearby APLNG ROW (which is 20 m wide at this watercourse). This strip is mapped as potential habitat for Greater Glider. 20 m tall trees are present on each side of the existing 20 m wide clearings (creating **45º** glide angles in both directions).

Post-development

The tall trees on each side of the existing APLNG corridor are not affected by ARCP.

The ARCP ROW has been positioned to leave the existing APLNG ROW at this watercourse so that it can collocate with an existing fence and clearing and minimise impacts to the watercourse vegetation. The **ROW will be narrowed to 25 m at Chainage 44500**. The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared due to the vegetation corridor extending for a considerable distance in each direction. The existing 20 m wide gap will become a combined gap of 36 m. The 20 m tall trees will be retained on the western edge of the new 36 m wide gap (creating a **29.1º** glide angle from west to east) and a 23.7 m tall eucalypt tree will be retained at the eastern edge (creating a **33.4º** glide angle from east to west).



Chainage 44480 - 44520 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)

35 Chainage 44520 - 45030 (Cleared grazing land)

This section is cleared grazing land that contains operational gas wells and gathering.

Pre-existing

There are numerous scattered and isolated shrubs present in the vicinity of the ROW in this section. The ROW is not mapped as containing any MNES TECs or species habitats. There is no habitat identified as suitable for the Greater Glider or Dulacca Woodland Snail in the vicinity.

Post-development

All patches of remnant vegetation, TECs and potential Greater Glider or Dulacca Woodland Snail habitats have been avoided. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 44520 - 45030

36 Chainage 45030 - 45160 (Patch of trees)

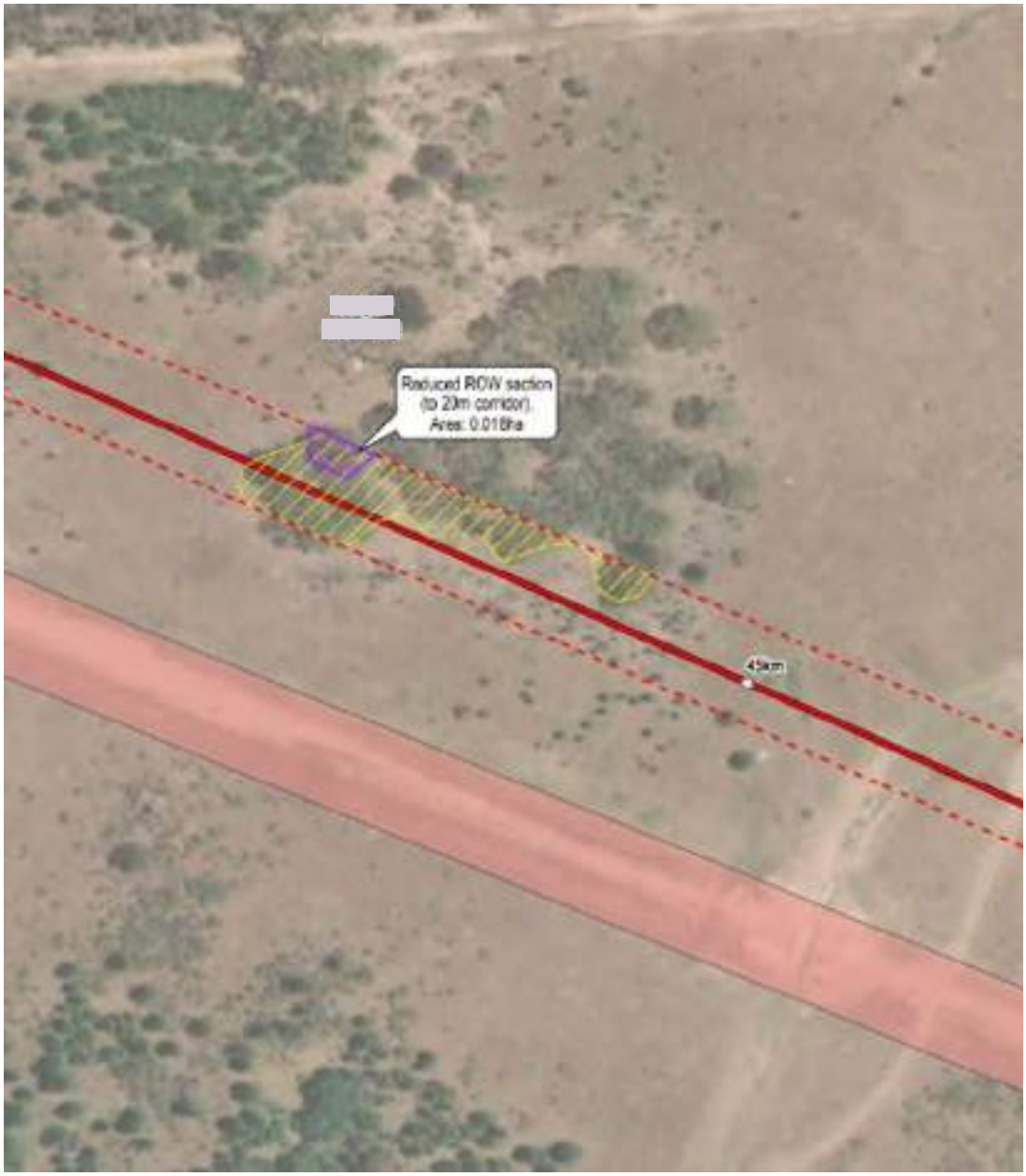
This section of the ROW passes through a 120 m wide patch of vegetation in an otherwise cleared grazing paddock with patchy regrowth proximate to operational gas wells and gathering. The ROW parallels an existing fence and clearing.

Pre-existing

This patch is not TEC or potential habitat for Dulacca Woodland Snail but is mapped as potential habitat for Greater Glider. It is not connected to any vegetation or habitat to the south. One larger habitat tree occurs in this patch (17.6m tall Queensland Bluegum at Chainage 45140).

Post-development

The ROW has been positioned to leave the existing APLNG ROW at this point so that it does not follow the unnamed watercourse immediately adjacent to the APLNG ROW at Chainage 45500 – 45700 and to be perpendicular to the road crossing at Chainage 45450. The **ROW corridor has been reduced to 20 m width at Chainage 45140** to retain the larger habitat tree (Plate 17). The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared.



Chainage 45030 - 45160 *(purple polygon is the part of the ROW that is excluded from disturbance and is retained)*



Plate 17 Vegetation to be unavoidably removed at Chainage 45030 - 45160 (Larger habitat tree on left hand side to be retained through narrowing of ROW to 20 m)

37 Chainage 45160 - 45460 (Cleared grazing land)

This section is cleared grazing land that contains operational gas wells and gathering.

Pre-existing

There are numerous scattered and isolated shrubs present in the vicinity of the ROW in this section. Ecology field surveys have confirmed that the ROW in this section does not contain any TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

All patches of remnant vegetation, TECs and potential Greater Glider or Dulacca Woodland Snail habitats have been avoided. Several scattered and isolated shrubs will be unavoidably removed.



Chainage 45160 - 45460

38 Chainage 45460 - 45800 (Unnamed watercourse at eastern edge of Combabula State Forest)

This section of the ROW passes through an ephemeral watercourse within Combabula State Forest in proximity to operational gas wells and gathering. The ARCP ROW is offset from the existing APLNG ROW (and State Forest access track) by approximately 50 m.

Pre-existing

The vegetation is not TEC or potential habitat for Dulacca Woodland Snail. It is mapped as potential habitat for Greater Glider. The existing APLNG Pipeline construction corridor (and State Forestry access road) is 40 m wide and has 23 m tall trees on each side (**29.9º** glide angle).

Post-development

The taller trees on each side of the existing APLNG Pipeline construction corridor have been retained.

The ROW has been positioned to leave the existing APLNG ROW at this point so that it does not follow the unnamed watercourse immediately adjacent to the APLNG ROW at Chainage 45500 – 45700 and to be perpendicular to the road crossing at Chainage 45450.

The ROW is generally unable to be narrowed in this section due to the volume of timber which needs to be windrowed in the ROW. Trees up to 12.6 m are retained on the southern side (**22.8º** glide angle) and trees up to 8.8 m tall are retained on the northern side **16.3º** glide angles). The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared.



Chainage 45460 - 4580

39 Chainage 45800 - 46530 (Combabula State Forest)

This section of the ROW passes through Combabula State Forest in proximity to operational gas wells and gathering. The ARCP ROW is offset from the existing APLNG Pipeline construction corridor (and State Forest access track) by approximately 5 m.

Pre-existing

The vegetation is not TEC or potential habitat for Dulacca Woodland Snail. It is mapped as potential habitat for Greater Glider. The existing APLNG Pipeline construction corridor (and State Forestry access road) is 40 m wide (Plate 18) and has trees up to 25 m tall on the northern side of the existing cleared corridor at Chainage 45970 (**32.0º** glide angle north to south) and 15 m tall trees on the southern side each side (**20.6º** glide angle south to north).

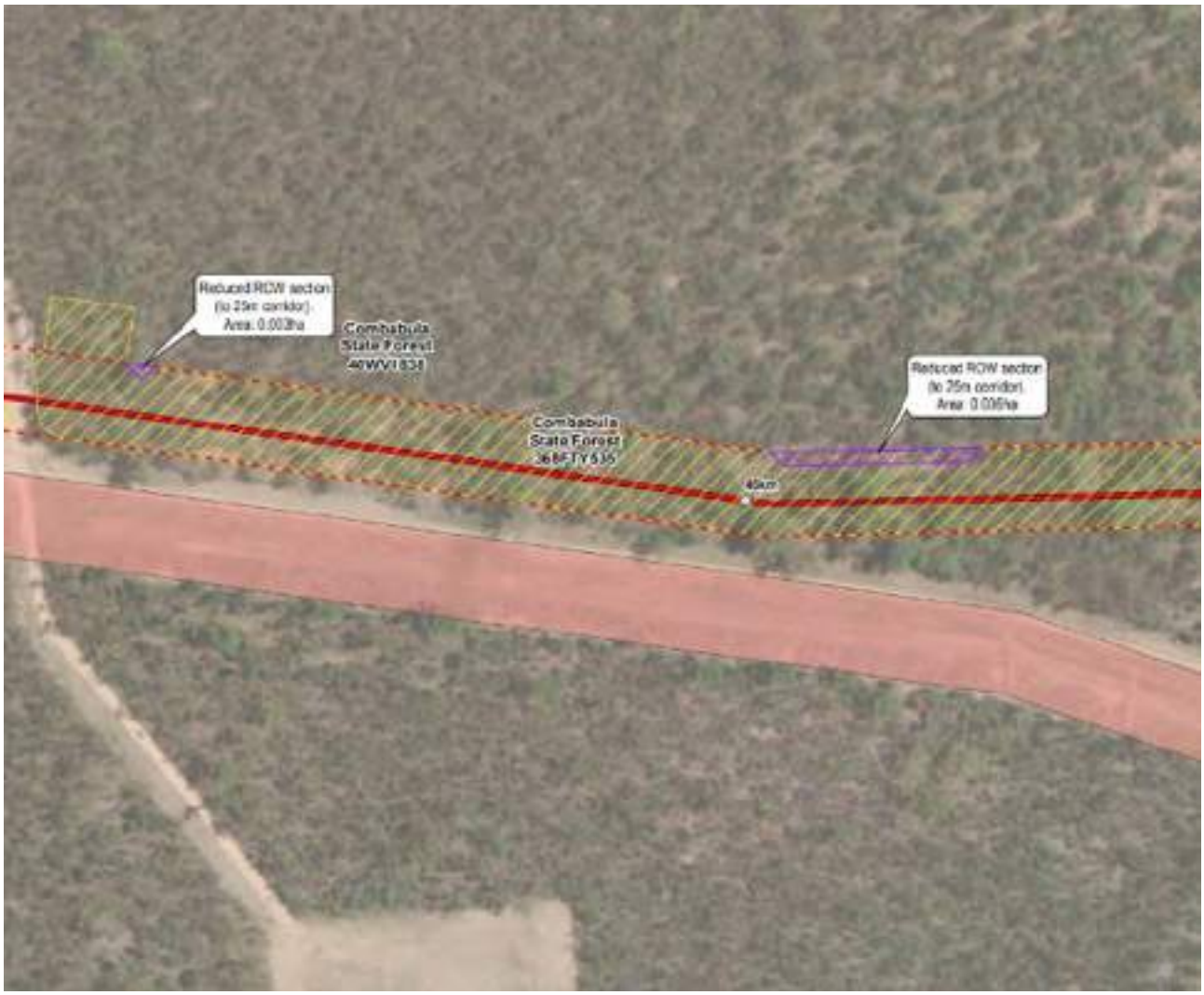
Post-development

The taller trees on each side of the existing APLNG Pipeline construction corridor have been retained.

The ROW has been positioned as close as possible to the APLNG Pipeline construction corridor in order to minimise edge effects and intrusion into the State Forest. The ROW is offset from the ARCP Pipeline construction corridor by 5 m in this section due to the presence of a fibre optic cable which parallels the existing infrastructure. The ROW is generally unable to be narrowed in this section due to the volume of timber which needs to be windrowed in the ROW. However, the **ROW corridor has been reduced to 25 m width at Chainage 45900 – 45980** to provide a narrower south to north glide gap and **at Chainage 46210** to retain a 18.2 m tall Smooth-barked Apple. These narrower sections have been provided to retain taller and habitat trees on each side of the ROW (with the aim of maintaining achievable glide distances for Greater Glider). The ARCP ROW will be 25 m wide at the narrowed sections (pinch points) resulting in a **45º** glide angle from south to north at the 25 m tall tree on the southern side (Plate 19) and a **34.2 – 36.1º** glide angle from north to south at the 17-18.2 m tall trees on the northern side. The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared.



Chainage 45800 – 46530



ROW reduced to 25 m at Chainages 45900 – 45980 and 46210 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate 18 Existing 40 m wide cleared corridor through the Combabula State Forest for APLNG Pipeline construction corridor and State Forest access track



Plate 19 Nearest large tree (25 m tall) will be retained between ARCP ROW and existing APLNG Pipeline construction corridor (further large tree is unavoidable)

40 Chainage 46530 - 46800 (Sandy Creek, Combabula State Forest)

This section of the ROW passes through an ephemeral watercourse within Combabula State Forest in proximity to operational gas wells and gathering. The ARCP ROW is offset from the existing APLNG ROW (and State Forest access track) by approximately 10 m.

Pre-existing

The vegetation is not TEC or potential habitat for Dulacca Woodland Snail. It is mapped as potential habitat for Greater Glider. The existing APLNG Pipeline construction corridor (and State Forestry access road) is 30 m wide and has a 26.7 m tall tree on the northern side (**41.7º** glide angle from north to south) and a 19 m tall tree on the southern side **32.4º** glide angle from south to north).

Post-development

Tall trees on each side of the existing APLNG Pipeline construction corridor have been retained.

The ROW has been positioned as close as possible to the APLNG Pipeline construction corridor in order to minimise edge effects and intrusion into the State Forest. The ROW is offset from the ARCP Pipeline construction corridor by 10 m in this section due to the presence of a fibre optic cable which parallels the existing infrastructure. The ROW will be narrowed as much as possible through this crossing but the sandy soils are likely to be a limiting factor (sandy soils requiring a wider trench). Therefore it is assumed that the ARCP ROW will be 30 m wide. The glide angles will be **41.6º** for north to south glides and **41.7º** south to north). The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared.



Chainage 46530 - 46800

41 Chainage 46800 - 47570 (Combabula State Forest)

This section of the ROW passes through Combabula State Forest in proximity to operational gas wells and gathering. The ARCP ROW is offset from the existing APLNG Pipeline construction corridor (and State Forest access track) by approximately 5 m.

Pre-existing

The vegetation is not TEC or potential habitat for Dulacca Woodland Snail. It is mapped as potential habitat for Greater Glider. The existing APLNG Pipeline construction corridor (and State Forestry access road) is 40 m wide and has a number of 21-31.5 m tall trees on the northern side of the existing cleared corridor (**27.7 – 38.2º** glide angle north to south) and 21.6-26.8 m tall trees on the southern side (**21.6 – 33.8º** glide angle south to north).

Post-development

Although a thin band of vegetation (approximately 12 m tall) will be retained between the ARCP ROW and the existing APLNG Pipeline construction corridor, none of the taller trees are certain to be retained (although it is possible that some may be able to be retained subject to further survey and construction safety assessments). The north south glide angle will therefore be reduced from a maximum of 38.2º to just 16.7º in this section of the State Forest.

The ROW has been positioned as close as possible to the APLNG Pipeline construction corridor in order to minimise edge effects and intrusion into the State Forest. The ROW is offset from the ARCP Pipeline construction corridor by 5 m in this section due to the presence of a fibre optic cable which parallels the existing infrastructure. The ROW will be 30 m wide and is unable to be narrowed through this section due to the volume of timber which needs to be windrowed in the ROW. For the approximately 12 m tall vegetation on the southern side (**21.8º** glide angle south to north) and a number of 17 m tall trees along the northern side (**29.5º** glide angle north to south).

The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared.



Chainage 46800 - 47570

42 Chainage 47570 - 49300 (Combabula State Forest)

This section of the ROW passes through Combabula State Forest in proximity to operational gas wells and gathering. The ARCP ROW is offset from the existing APLNG Pipeline construction corridor (and State Forest access track) by approximately 10 m (5 m between Chainage 49000 – 49300).

Pre-existing

The vegetation is not TEC or potential habitat for Dulacca Woodland Snail. It is mapped as potential habitat for Greater Glider. The existing APLNG Pipeline construction corridor (and State Forestry access road) is 40 m wide and has a number of tall trees up to 28.9 m tall trees on the northern side of the existing cleared corridor (**35.9º** glide angle north to south) and a number of 25-27.1 m tall trees on the southern side (**32.0 - 34º** glide angle south to north).

Post-development

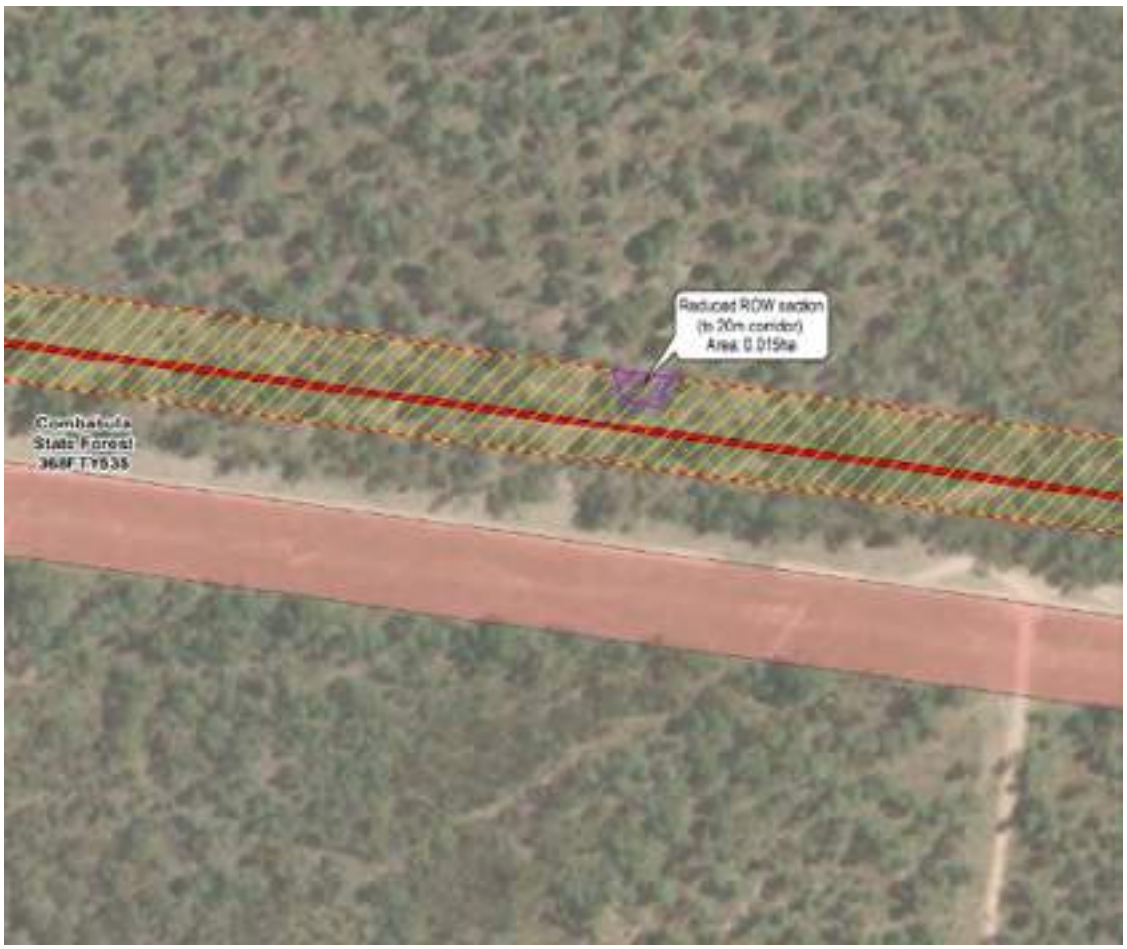
The tallest (28.9 m) tree near the northern edge of the existing cleared corridor may be unavoidable for the ARCP pipeline construction whilst several trees up to 25.2 m tall are able to be retained. This would reduce the north south glide angle from **35.9º to 32.2º**.

The ROW has been positioned as close as possible to the APLNG Pipeline construction corridor in order to minimise edge effects and intrusion into the State Forest. The ROW is offset from the ARCP Pipeline construction corridor by 10 m in this section due to the presence of fibre optic cables which parallel the existing infrastructure. The ROW is unable to be narrowed through most of this section due to the volume of timber which needs to be windrowed in the ROW. However, the **ROW corridor has been reduced to 20 m at Chainage 48370** to retain a 20.2 m tall habitat tree. At least two other habitat trees (19.6 and 26.7m tall) occurring just outside the ROW will also be retained. At Chainage 48370 there is a 19.1 m tall tree on the southern side. This means there will be a **41.7º** glide angle for south to north glides and a **45.3º** glide angle for north to south glides at this location

Several habitat trees (up to 24.5 – 25.2 m) are retained within the strip between the ARCP ROW and the existing cleared corridor. The ARCP ROW will be 30 m wide in this section (except at the narrowed section (pinch point) at Chainage 48370). The 24.5 – 25.2 m tall trees on the southern side result in a **39.2 – 40.0º** glide angle south to north) and the 19.6 and 26.7m tall trees on the northern side result in a **33.2 – 41.7º** glide angle north to south. The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared.



Chainage 47570 – 49300



ROW reduced to 20 m at Chainage 48370 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)

43 Chainage 49300 – 49650 (Cleared grazing paddocks)

This section is previously cleared grazing land with scattered regrowth.

Pre-existing

There are several trees (up to 18.7 m tall) and numerous scattered and isolated shrubs in the vicinity of the ROW in this section. The ROW is not mapped as containing any MNES TECs or potential habitat for Greater Glider or Dulacca Woodland Snail.

Post-development

All patches of remnant vegetation, TECs and potential habitat for Greater Glider or Dulacca Woodland Snail have been avoided. Several scattered trees and numerous scattered shrubs will be unavoidably removed.



Chainage 49300 – 49650

44 Chainage 49650 - 50180 (Combabula State Forest)

This section of the ROW passes through the southern edge of Combabula State Forest where it adjoins a grazing property. The ARCP ROW is offset from the existing APLNG Pipeline construction corridor (and an access track) by approximately 10 m (no offset between Chainage 49650 – 49950).

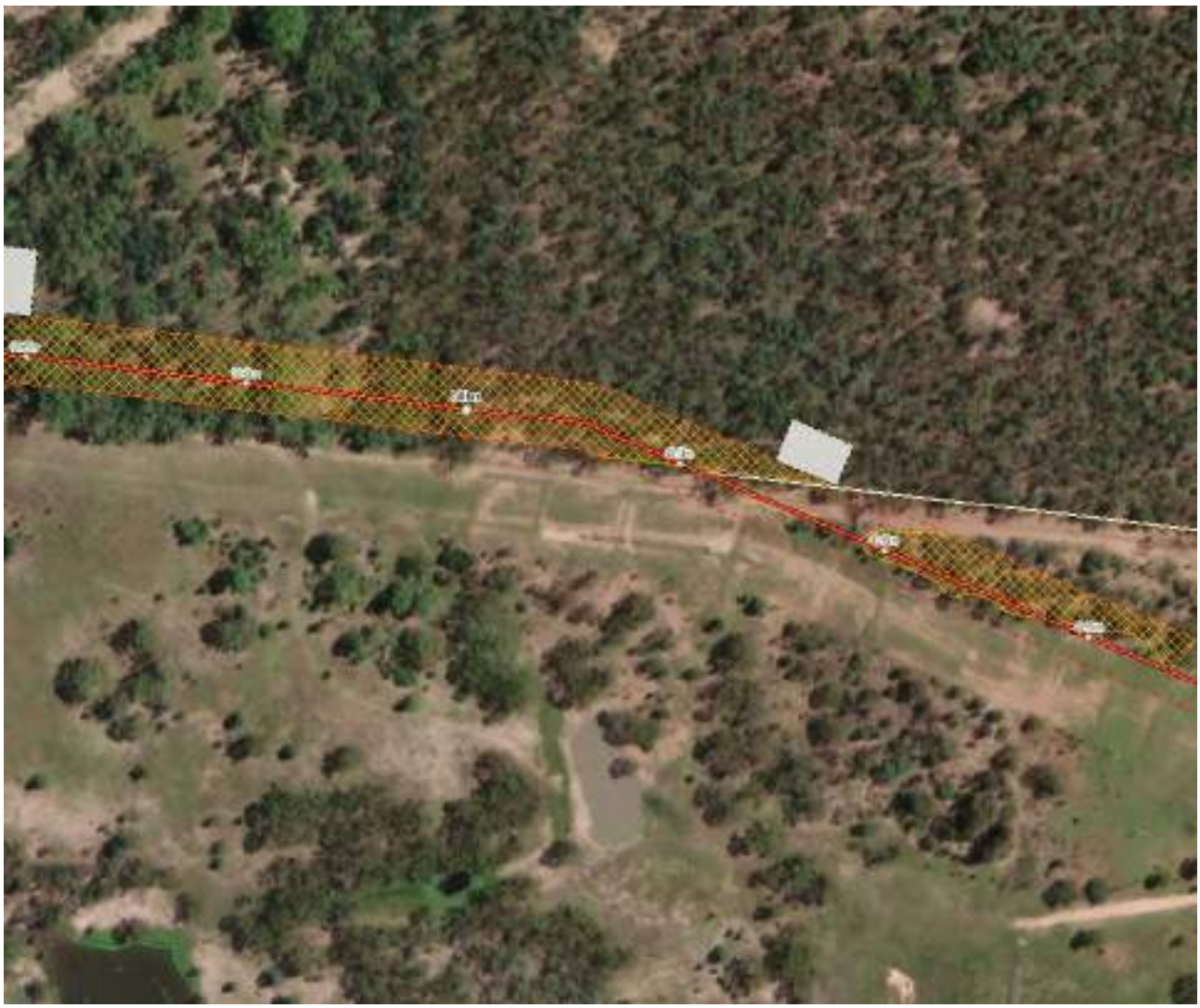
Pre-existing

The vegetation is not TEC or potential habitat for Dulacca Woodland Snail. It is mapped as potential habitat for Greater Glider. The existing APLNG Pipeline construction corridor (and State Forestry access road) is 40 m wide and has a number of trees up to 17 m tall trees on the northern side of the existing cleared corridor (**23º** glide angle north to south) and a 19 m tall tree on the southern side (**25.4º** glide angle south to north).

Post-development

The tallest trees on each side of the existing APLNG Pipeline construction corridor have been retained.

The ROW has been positioned as close as possible to the APLNG Pipeline construction corridor in order to minimise edge effects and intrusion into the State Forest. The ROW is offset from the ARCP Pipeline construction corridor by 10 m in this section due to the presence of fibre optic cables which parallel the existing infrastructure. The ROW is unable to be narrowed through most of this section due to the volume of timber which needs to be windrowed in the ROW. However, the ROW corridor has been positioned to retain habitat trees the ROW and the existing cleared corridor between Chainages 49950 - 50180. The ARCP ROW is unlikely to be able to be narrowed to less than 30 m width in this section as it will be used to launch the HDD crossing of Yuleba Creek (at approximately Chainage 50180, no clearing will occur between Chainage 50180 - 50350). There the up to 27.7 m tall trees on the southern side will require a minimum **42.7º** glide angle south to north and the up to 20 m tall trees on the northern side a minimum **33.7º** glide angle north to south). The area of potential habitat for Greater Glider shown as yellow hatching in the figure below will be unavoidably cleared.



Chainage 49650 - 50180

45 Chainage 50180 - 50350 (Yuleba Creek , Combabula State Forest)

This section of the ROW crosses Yuleba Creek at the southern edge of Combabula State Forest where it adjoins a grazing property. The ARCP ROW is offset from the existing APLNG Pipeline construction corridor (and an access track) by approximately 10 m.

Pre-existing

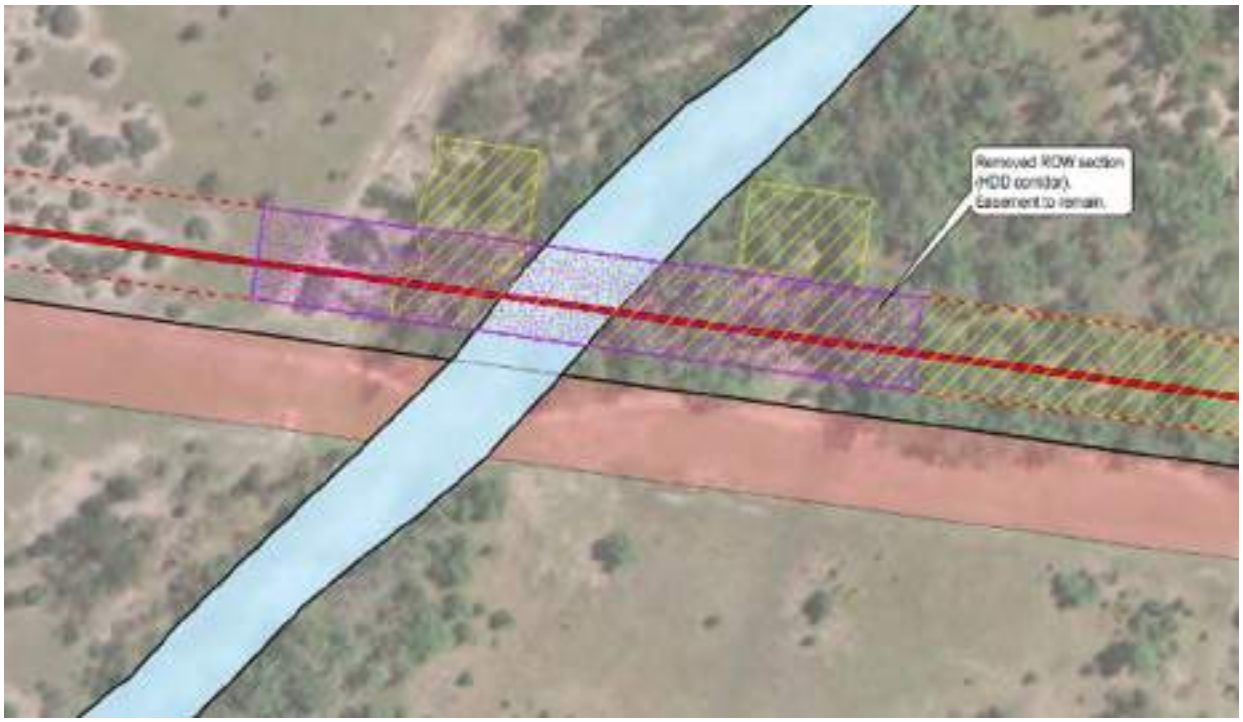
The vegetation is not TEC or potential habitat for Dulacca Woodland Snail. It is mapped as potential habitat for Greater Glider. The existing APLNG Pipeline construction corridor (and State Forestry access road) is 30 m wide and has two 30 m tall trees on the northern side of the existing cleared corridor (**45º** glide angle north to south) and a 19.5 m tall tree on the southern side (**33º** glide angle south to north).

Post-development

HDD has been adopted in order to preserve all potential habitat for Greater Glider and all remaining connectivity for Greater Glider along this riparian corridor. A typical habitat tree in this area is shown in Plate 20.

The tallest trees on each side of the existing APLNG Pipeline construction corridor remain unchanged.

(Note that the two yellow hatched additional workspaces shown below will both be moved back from the riparian vegetation to past the HDD entry and exit points).



Chainage 50180 - 50350 (purple polygon is the part of the ROW that is excluded from disturbance and is retained)



Plate 20 One of several large habitat trees to be retained within the riparian corridor along Yuleba Creek through adoption of HDD for the crossing

46 Chainage 50350 - 51150 (Cleared grazing paddocks with regrowth)

This section is cleared grazing land with scattered regrowth Brigalow and Belah.

Pre-existing

There are numerous scattered and isolated shrubs and isolated young regrowth present in the vicinity of the ROW in this section. The ROW is not mapped as containing any MNES TECs or species habitats. There is no habitat identified as suitable for the Greater Glider or Dulacca Woodland Snail in the vicinity.

Post-development

No patches of remnant vegetation, TECs and species habitats are affected. Several scattered and isolated shrubs and young regrowth will be unavoidably removed.



Chainage 50370 - 51150

47 Chainage 51150 - 51430 (Cleared grazing paddocks with regrowth in approach to Reedy Creek Gas Processing Facility)

This section is cleared grazing land with scattered regrowth Brigalow and Belah.

Pre-existing

There are numerous scattered and isolated shrubs and isolated young regrowth present in the vicinity of the ROW in this section. The ROW is not mapped as containing any MNES TECs or potential habitat for Greater Glider. It is mapped as containing potential habitat for Dulacca Woodland Snail.

Post-development

The ROW has been located in this location to avoid existing infrastructure and allow for potential future infrastructure within a highly constrained approach to the Reedy Creek Gas Processing Facility. No patches of remnant vegetation or TECs are affected. The potential habitat for Dulacca Woodland Snail is limited to several isolated regrowth trees (Plate 21). The area of potential habitat for Dulacca Woodland Snail shown as yellow hatching in the figure below will be unavoidably cleared.



Chainage 51150 - 51430



Plate 21 Young regrowth Brigalow (left) and Belah (right and centre), mapped as potential habitat for Dulacca Woodland Snail which will be unavoidably cleared near Chainage 51170

48 Chainage 51430 - 56400 (Cleared grazing paddocks with some patches of regrowth in approach to Reedy Creek Gas Processing Facility)

This section Gas Processing Facility infrastructure and cleared grazing land and with scattered regrowth Brigalow and Belah.

Pre-existing

There are numerous scattered and isolated shrubs and isolated young regrowth present in the vicinity of the ROW in this section. The ROW is not mapped as containing any MNES TECs or potential habitat Greater Glider or Dulacca Woodland Snail.

Post-development

No patches of remnant vegetation, TECs or potential habitat the Greater Glider or Dulacca Woodland Snail are affected. Several scattered and isolated shrubs and young regrowth will be unavoidably removed.



Chainage 51430 - 53100



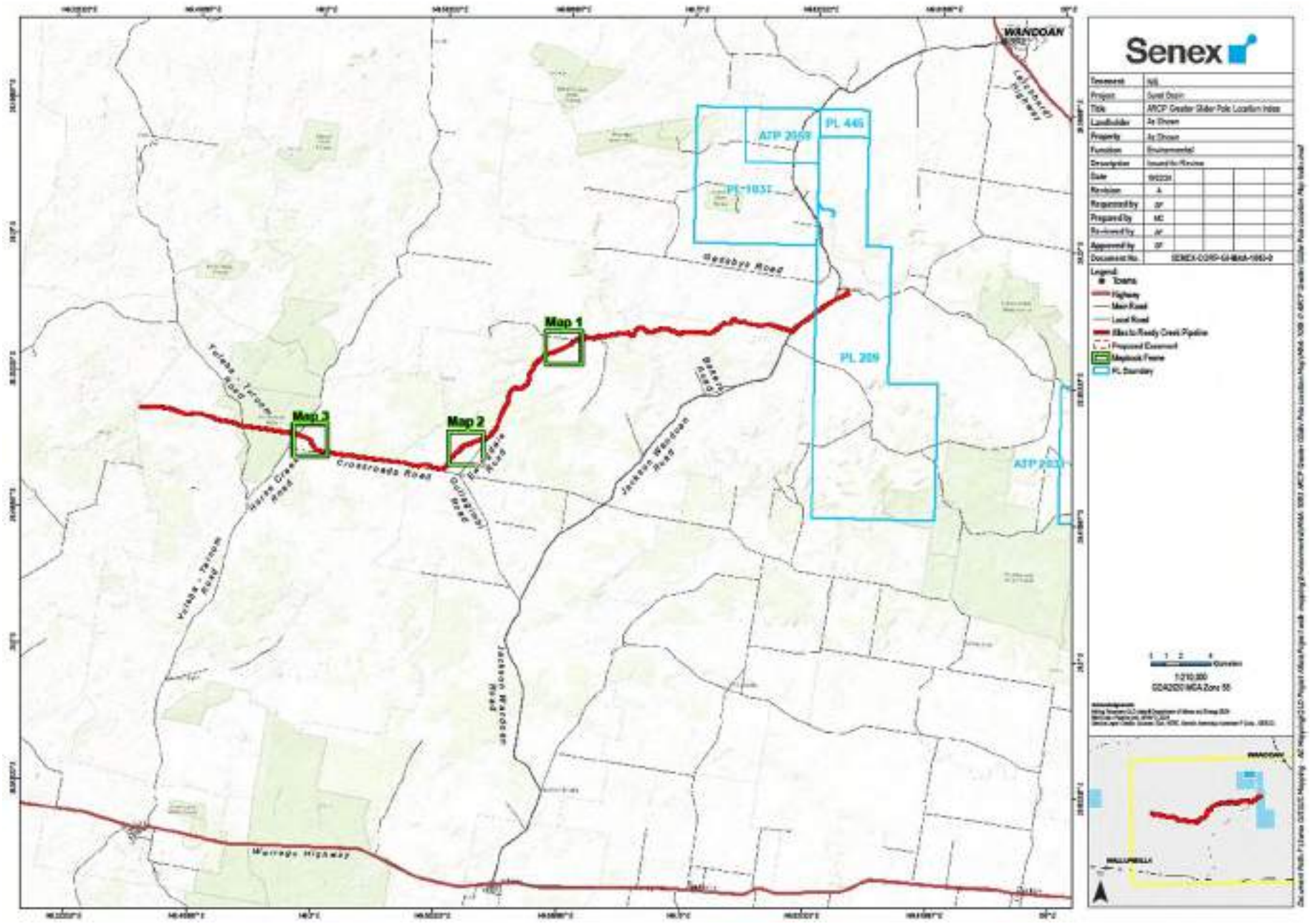
Chainage 53100 - 54800

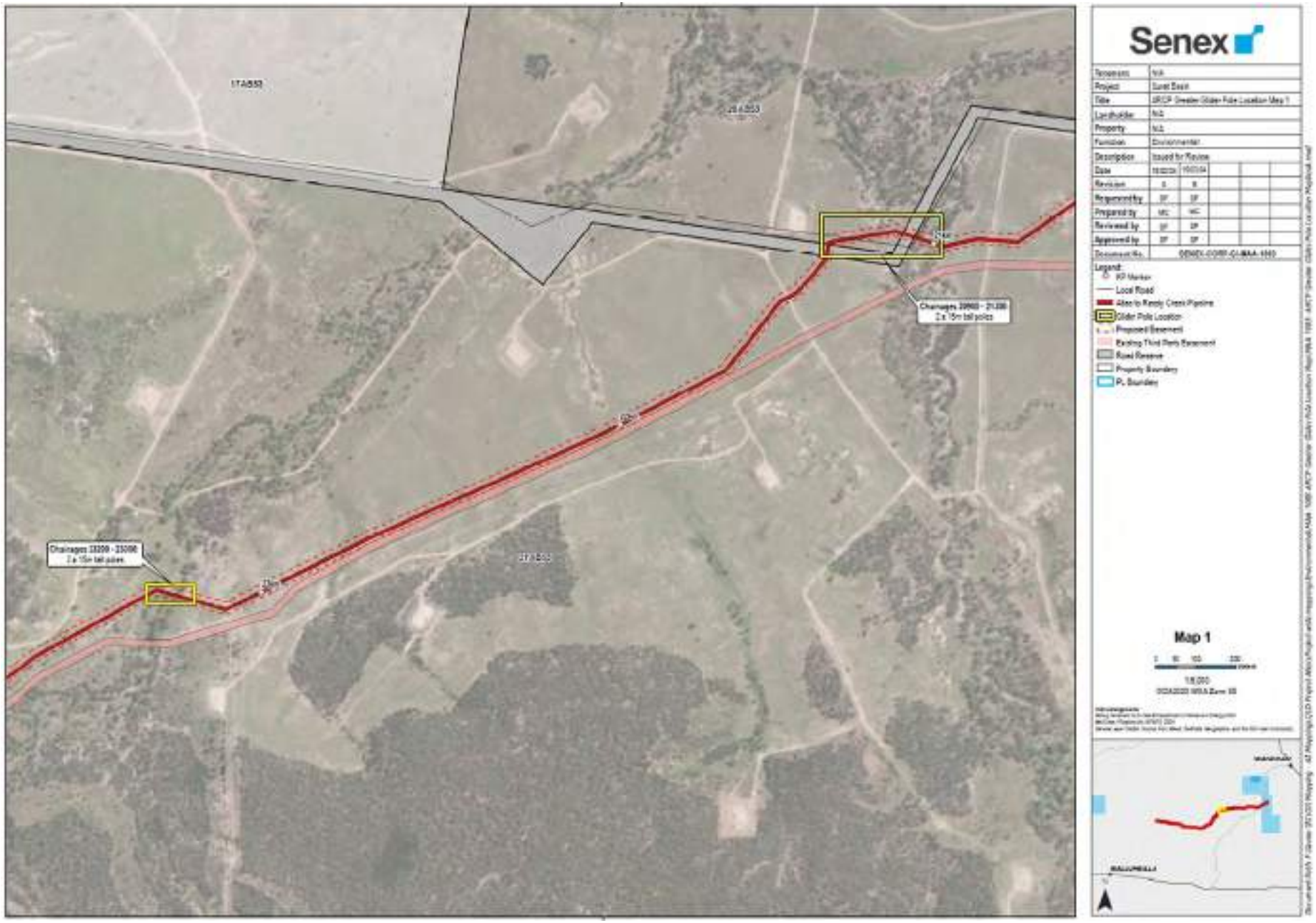


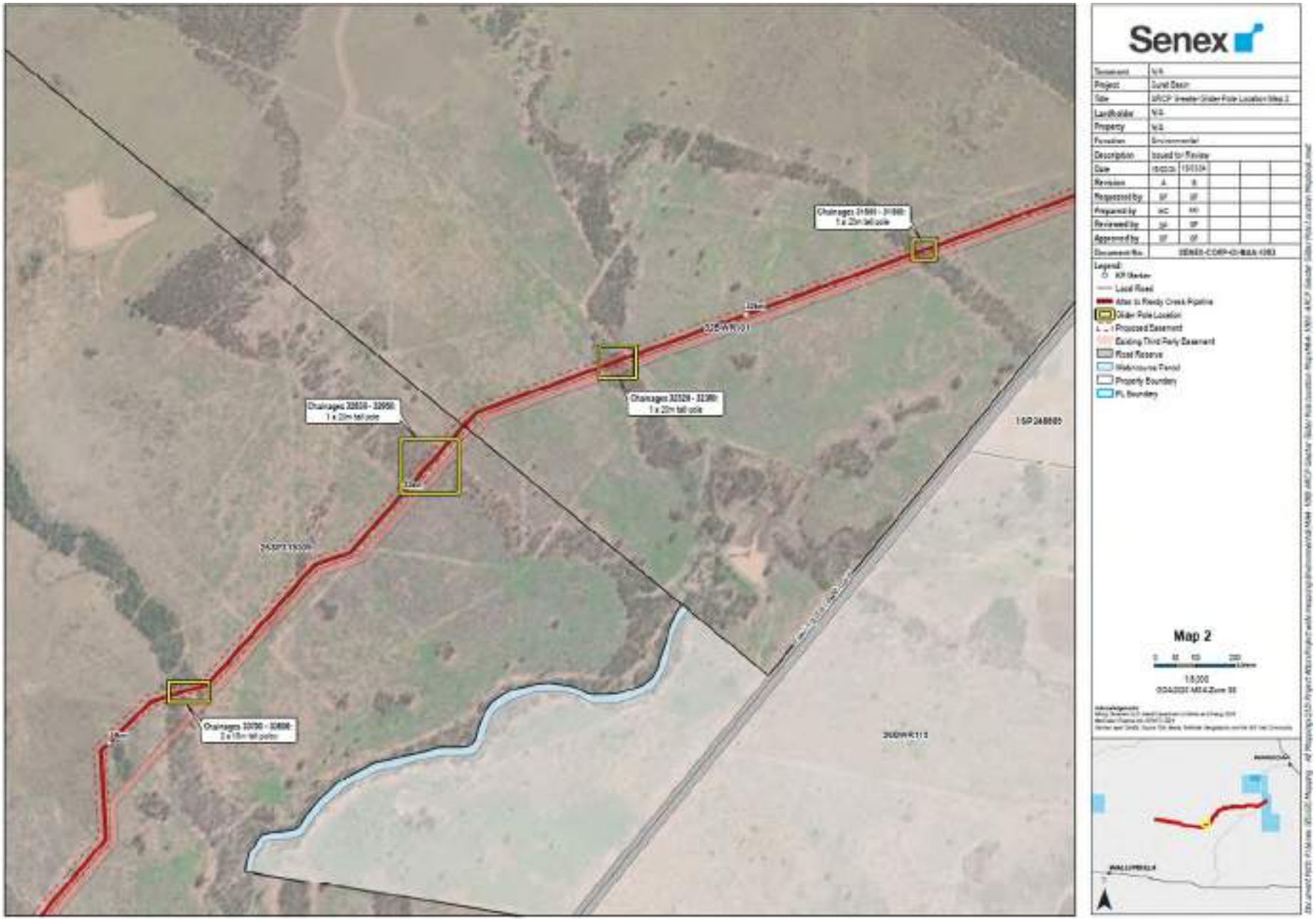
Chainage 54800 - 56300

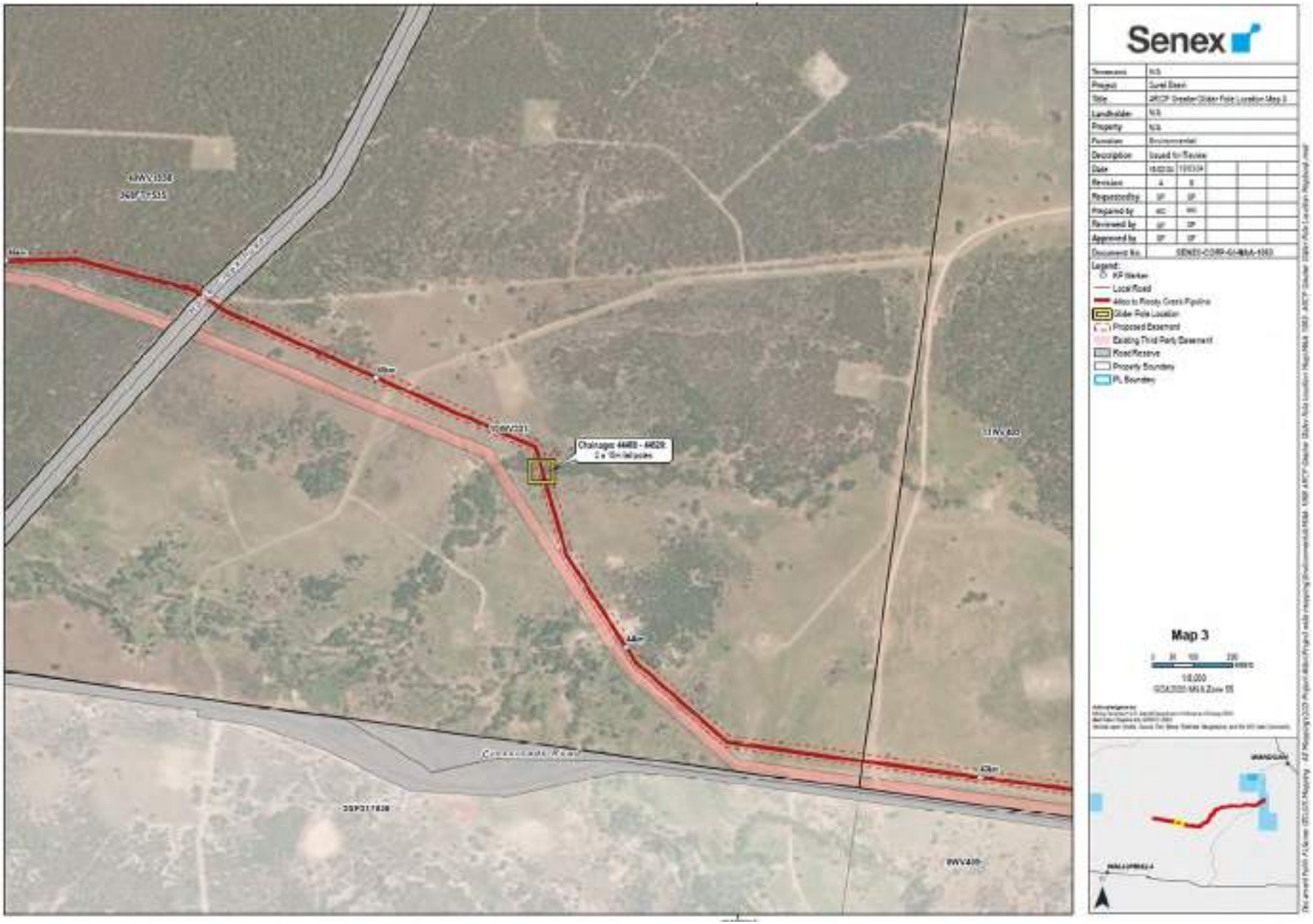
Appendix CC – Glider Pole Locations

(1) Index Map
(2) Location Maps
(3) Glider pole mark ups


Senex
Map 1
Map 2
Map 3
PL 445
PL 209
ATP 2059
Crossroads Road
Jackson Wandoan Road
Warrego Highway
Yuleba - Taroom Road
Horse Creek Road
Gurranang Road
Gentry Road
Wandoan
Senex
Legend:
Towns
Highway
Main Road
Local Road
Proposed Easement
Mapsheet Frame
PL Boundary
1:210,000
GDA2020 MGA Zone 55


Senex
Map 1


Senex
Map 2

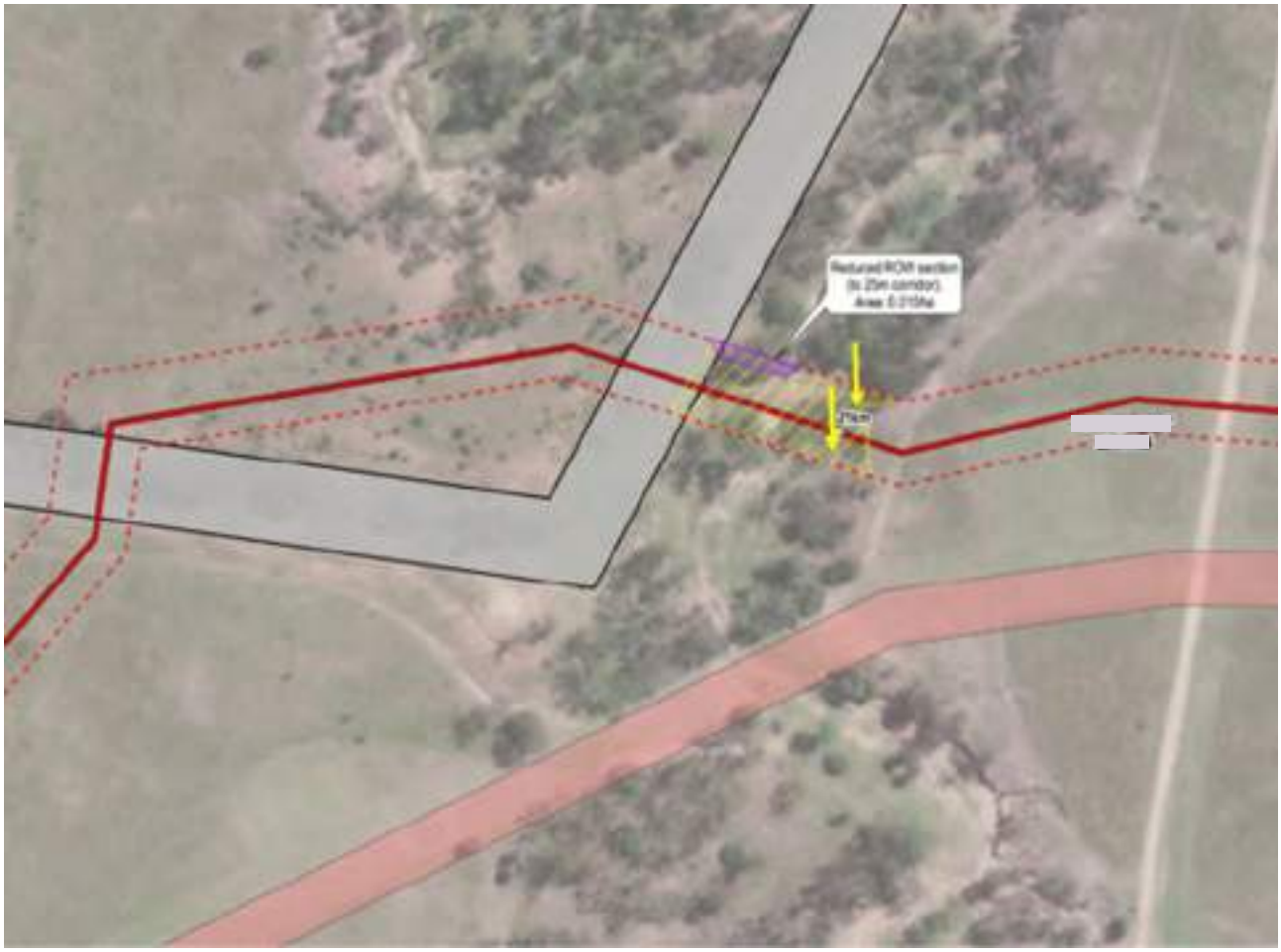

Senex
Map 3
Legend:
KP Marker
Local Road
Atlas to Reedy Creek Pipeline
Glider Pole Location
Proposed Easement
Existing Third Party Easement
Road Reserve
Property Boundary
PL Boundary

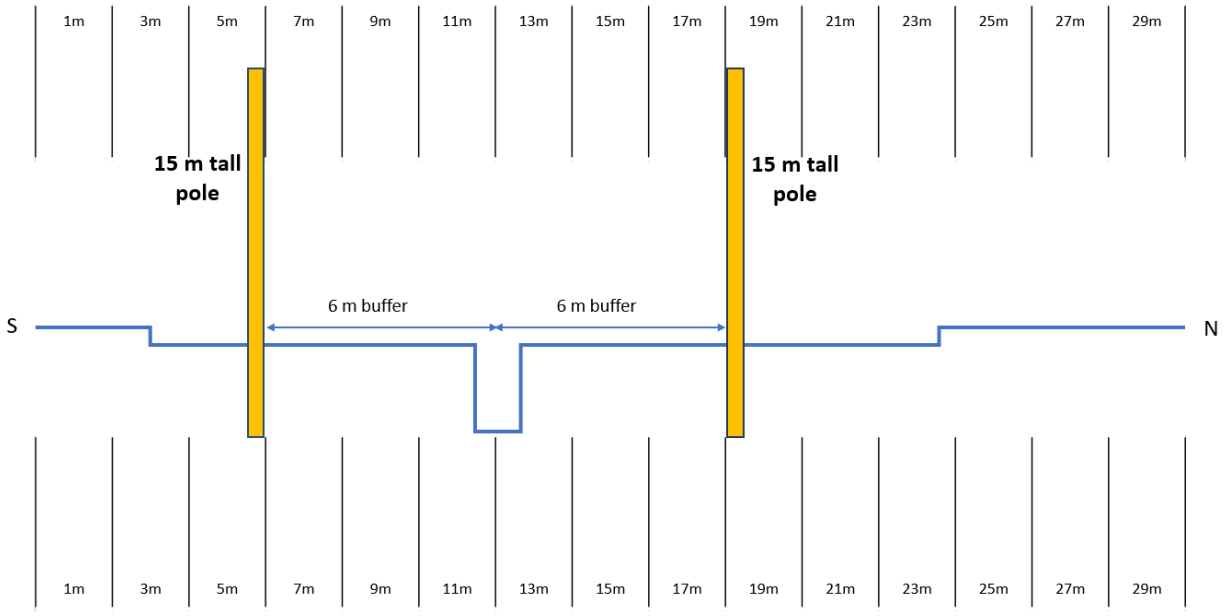
All of the following pole locations are approximate only and subject to ground condition and constructability review.

Purple polygons are parts of ROW that are excluded from disturbance and are retained.
Yellow arrows are approximate pole locations.

Chainage 20980-21300 (25m ROW in part)

2 x 15m tall poles (one each side of pipeline) – only required if the 18m tall tree near the southern ROW boundary can't be retained

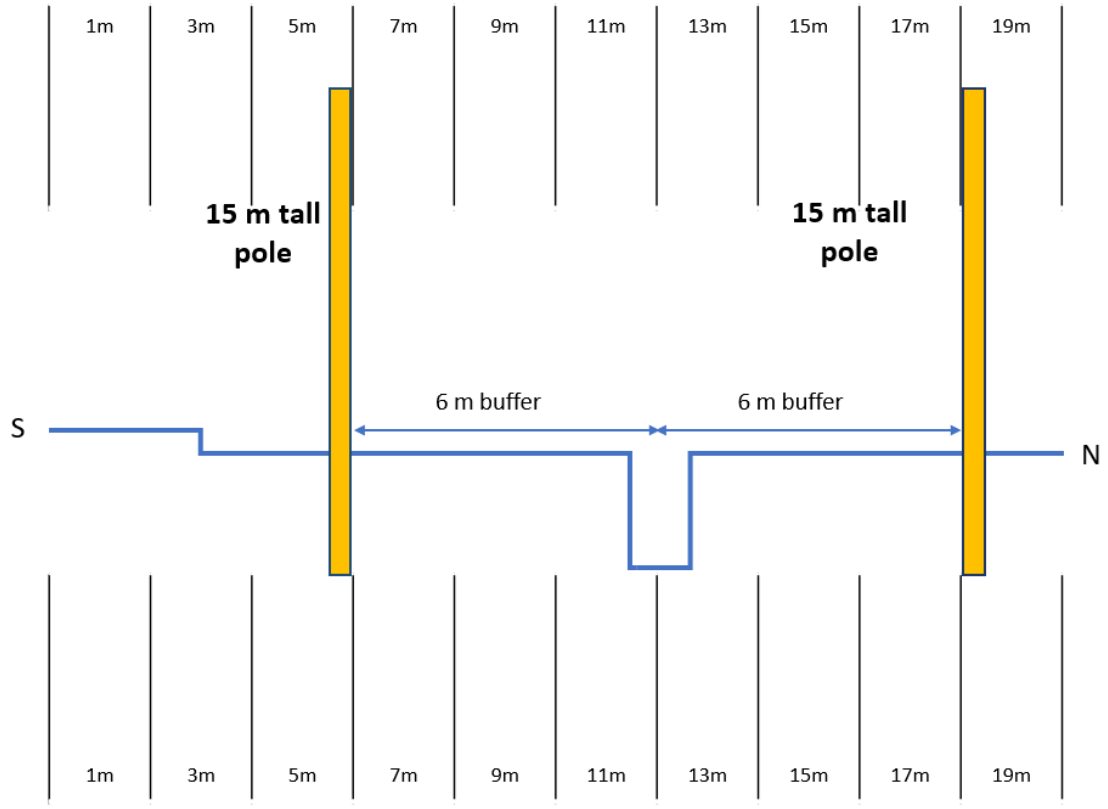




Chainage 23200-23300 (20m ROW)

2 x 15m tall poles (one each side of pipeline)

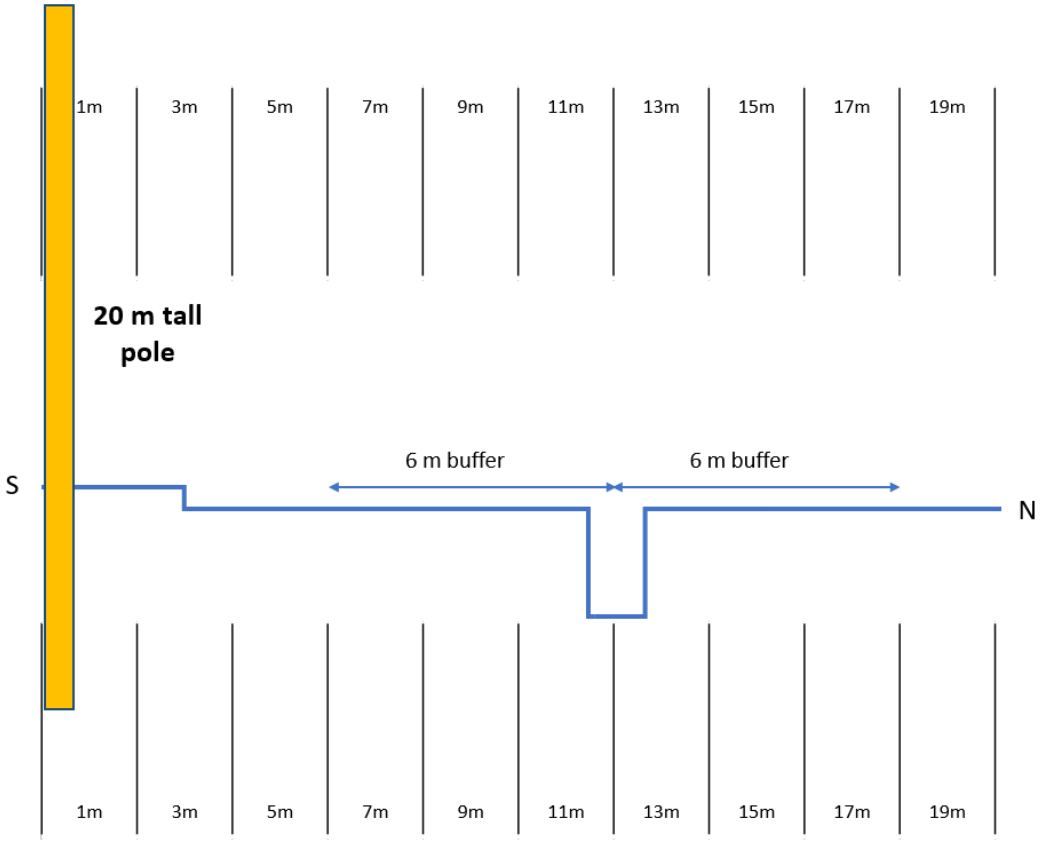




Chainage 31500-31550 (20m ROW adjoining Jemena 30m ROW)

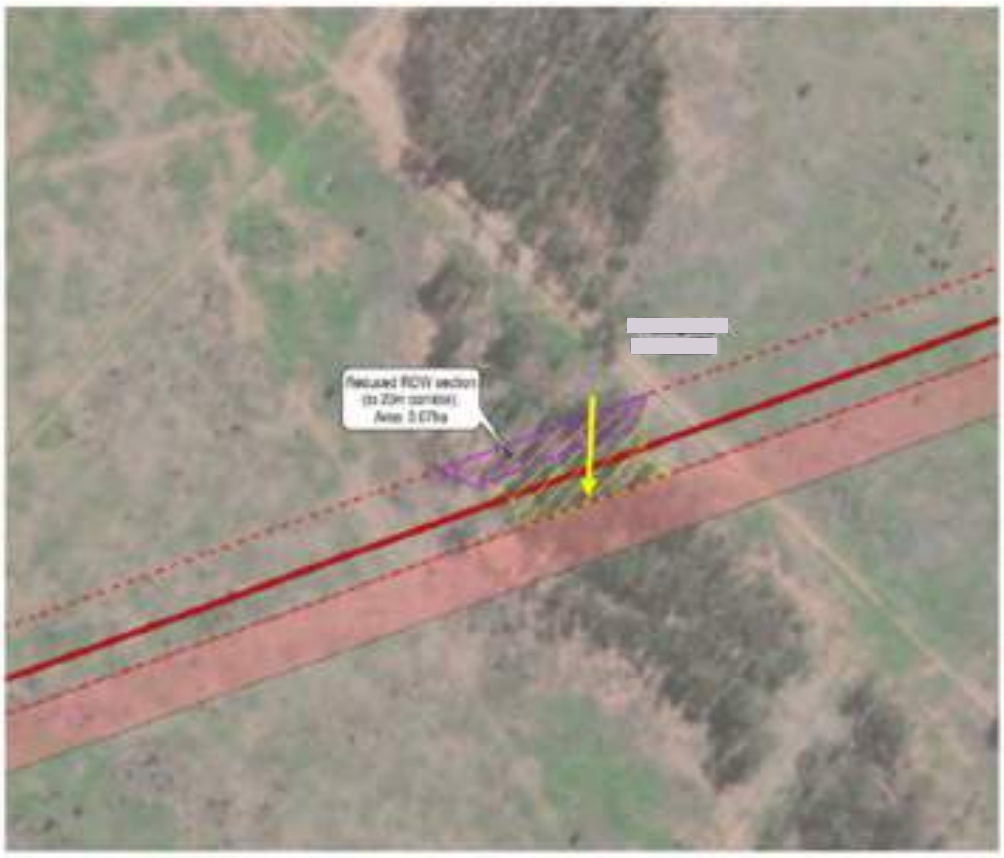
1 x 20m tall pole



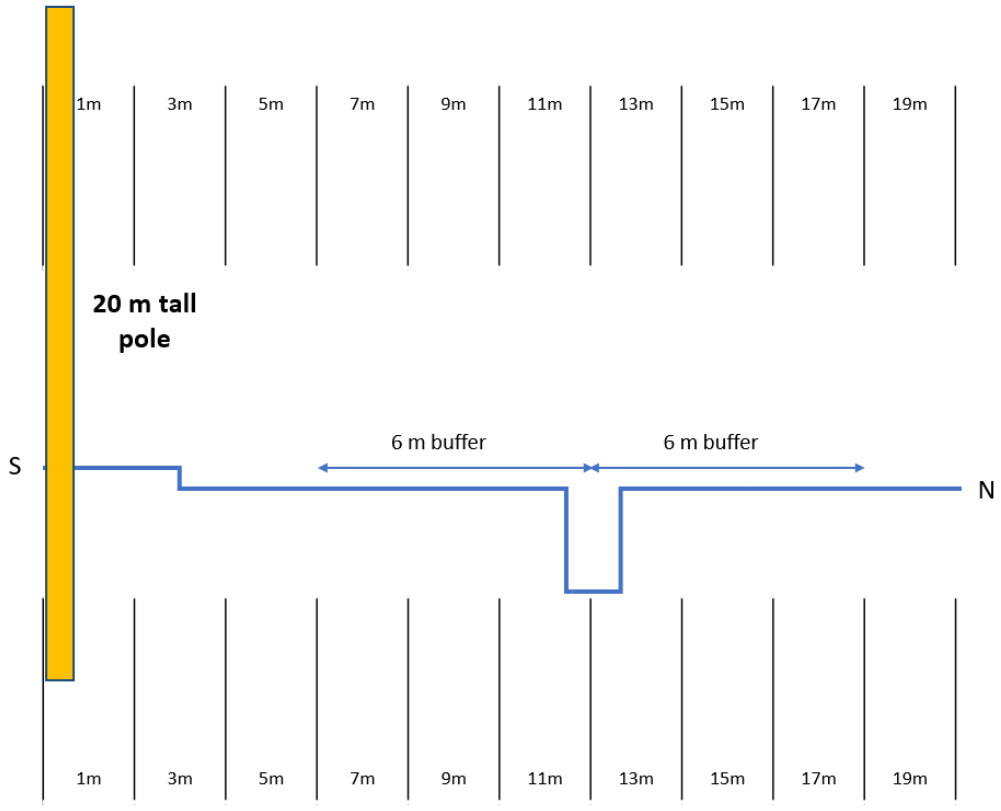


Chainage 32320-32380 (20m ROW adjoining Jemena 30m ROW)

1 x 20m tall pole



Chainage 32320 - 32380

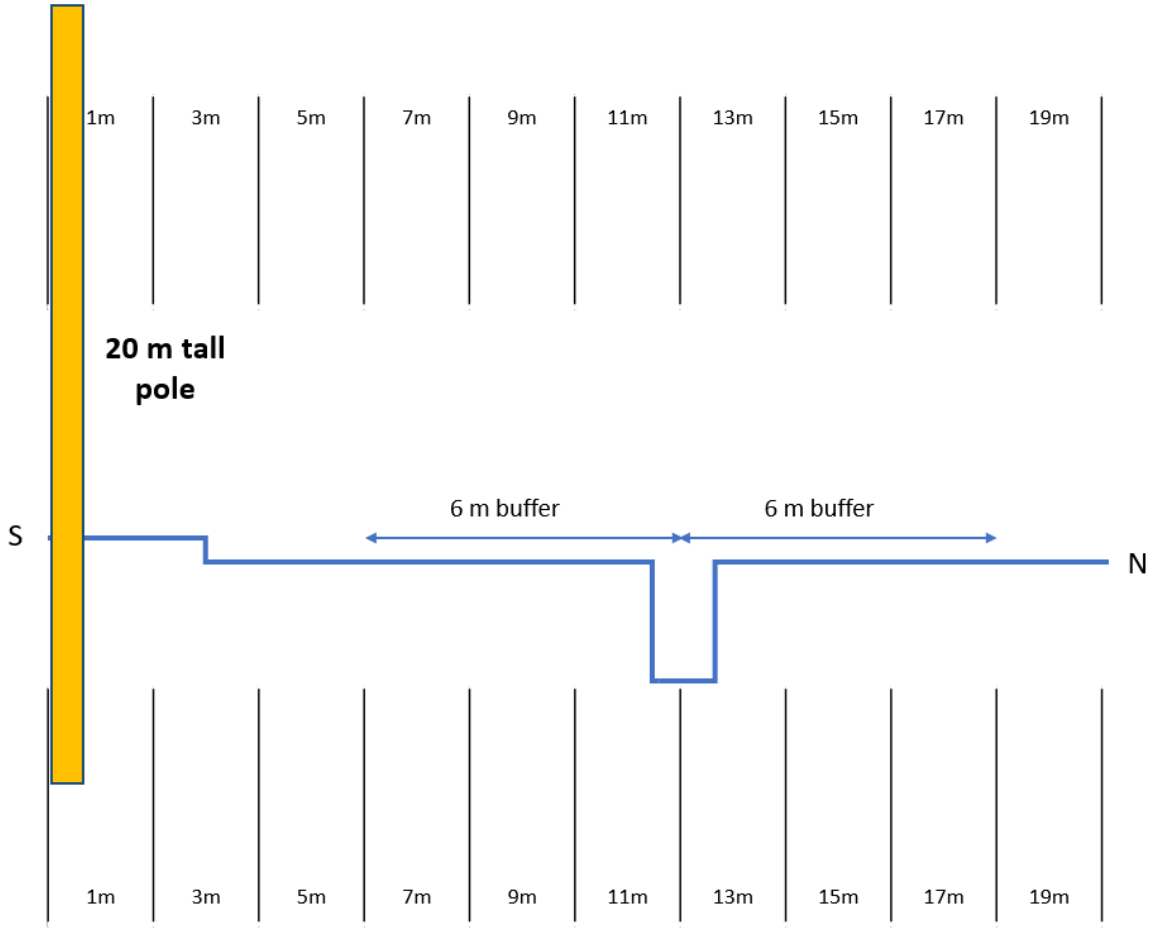


Chainage 32830-32950 (25m ROW adjoining Jemena 30m ROW)

1 x 20m tall pole

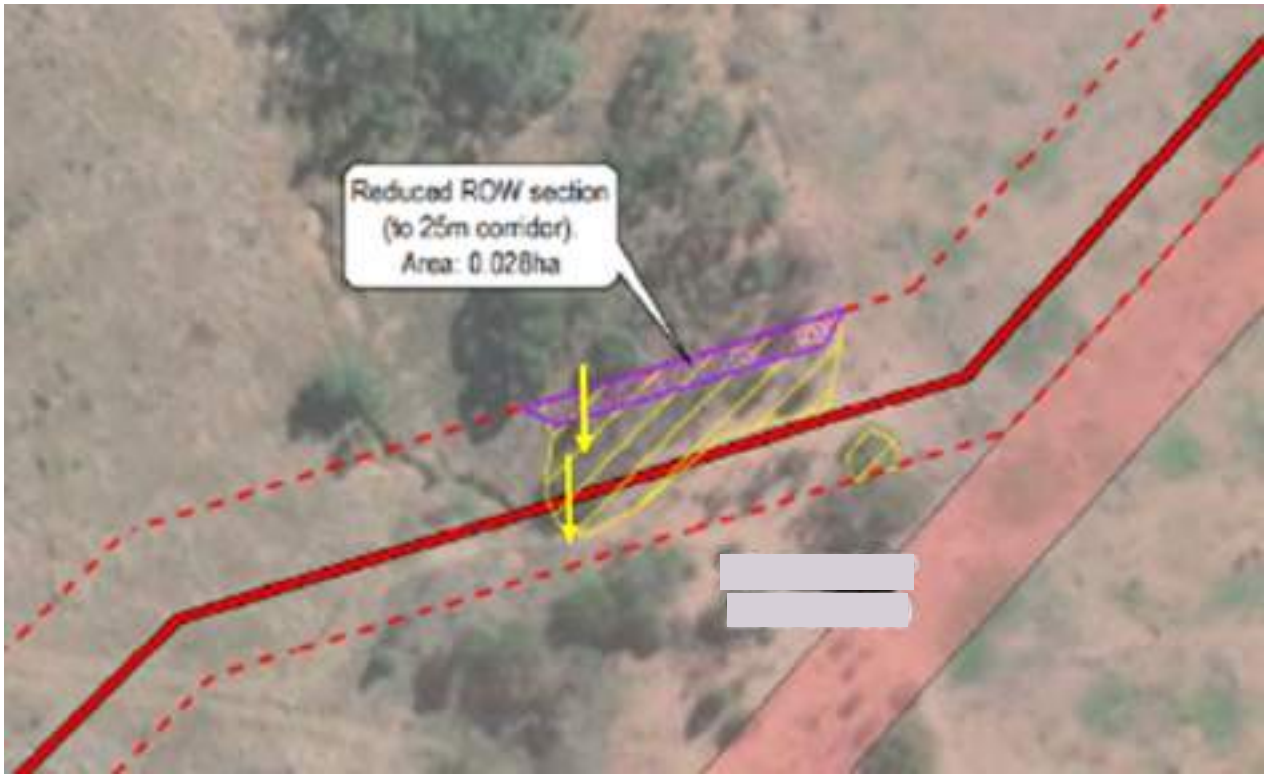


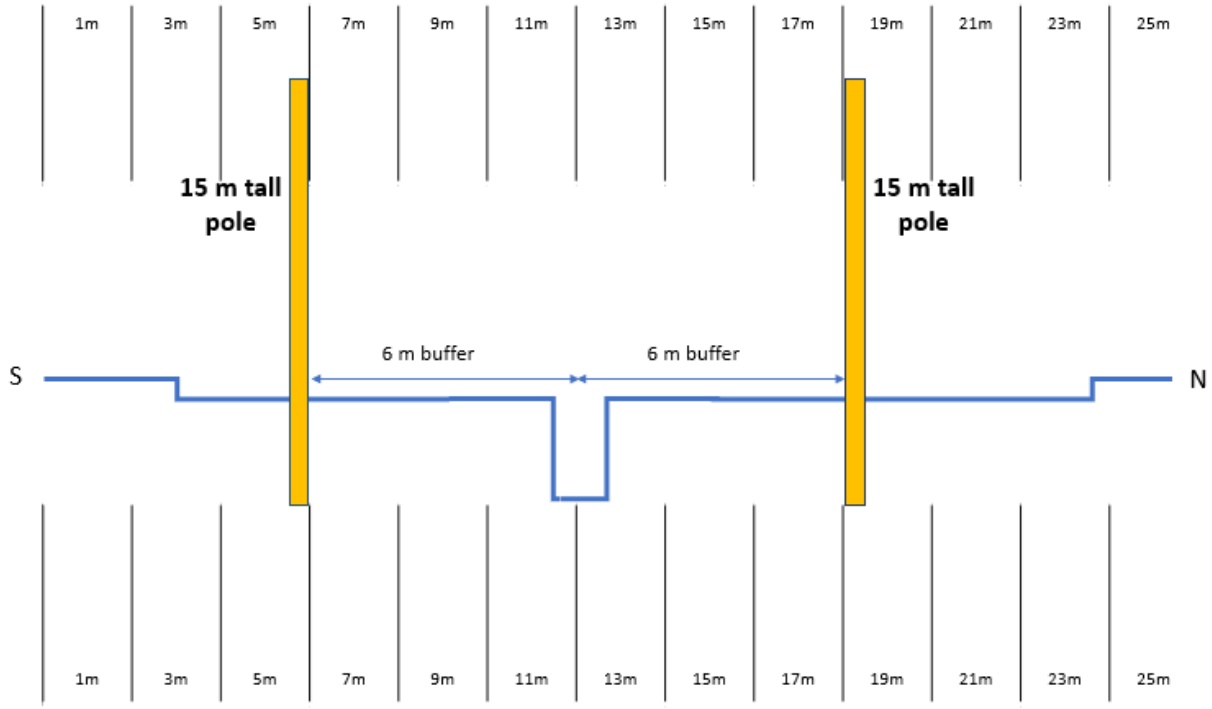
Chainage 32830 - 32950



Chainage 33700-33800 (25m ROW)

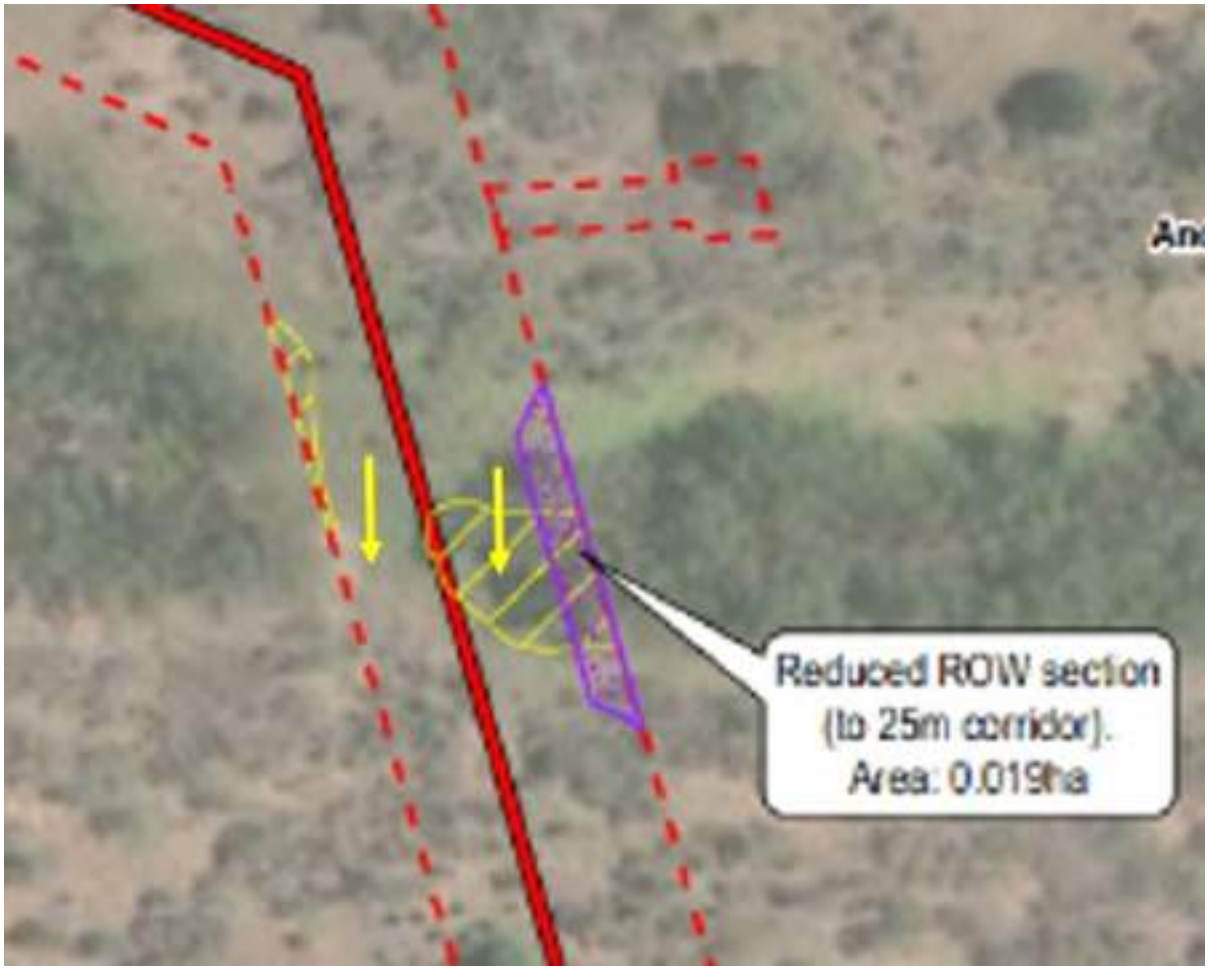
2 x 15m tall poles (one each side of pipeline)

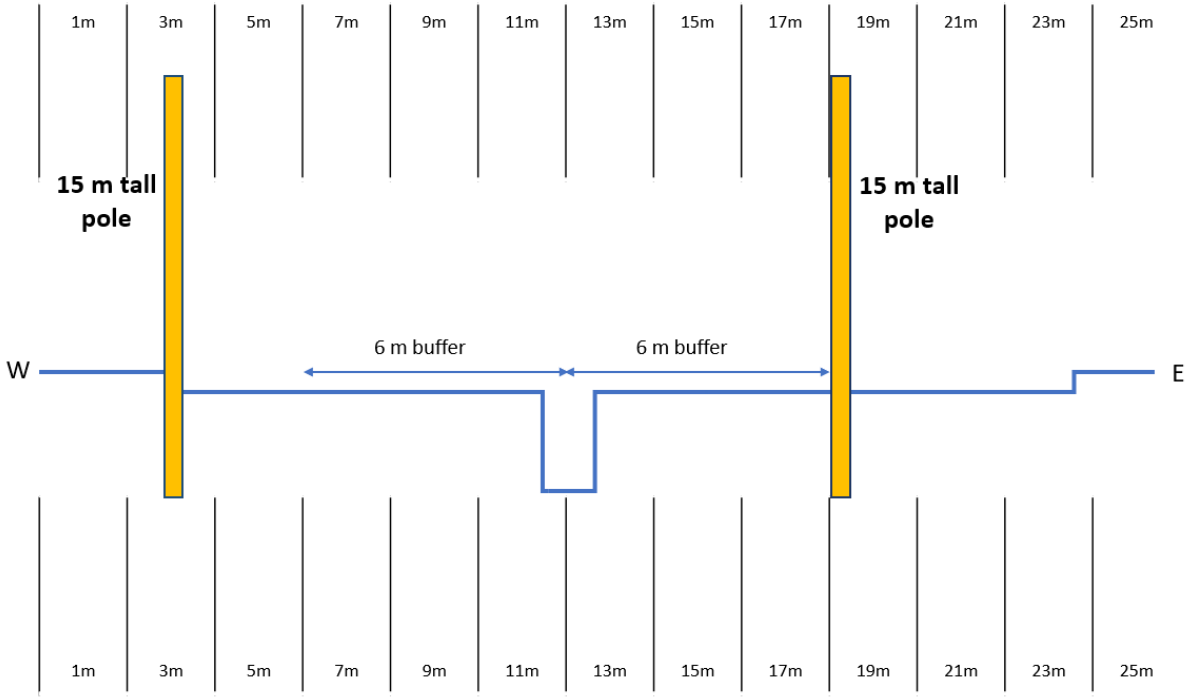




Chainage 44480-44520 (25m ROW)

2 x 15m tall poles (one each side of pipeline)





Registered Office
Level 30, 180 Ann Street,
Brisbane Qld 4000
Postal Address
GPO Box 2233,
Brisbane Qld 4001
Phone: +61 7 3335 9000
Facsimile: +61 7 3335 9999
Web: senexenergy.com.au

Senex Energy Pty Ltd
ABN 50 008 942 827

Appendix U Dulacca Woodland Snail Translocation Strategy



ARC Pipeline Atlas to Reedy Creek Dulacca Snail Translocation Strategy

18 March 2024

ARC Pipeline Pty Ltd
Level 30, 180 Ann Street, Brisbane QLD 4000





Document Management

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Contact Information	
Ph: 07 3062 6960	Website: e2mconsulting.com.au
Level 3, 19 Lang Parade, Milton, Queensland, 4064	PO Box 1444, Milton, Queensland, 4064

1 Background

Construction of the Atlas to Reedy Creek (ARC) gas pipeline (the Project) will necessitate the clearing/removal of 4.80 hectares of potential Dulacca woodland snail (*Adclarkia dulacca*) habitat comprising remnant and regrowth RE11.9.5, as well as remnant REs 11.7.2, 11.5.16, and 11.10.8, along a 30-metre wide right of way (RoW) extending from the south-west of Wandoan, west to Yuleba (see Appendix M, E2M, 2024). While not detected along or adjacent the proposed RoW during surveys, a precautionary approach has been adopted when addressing potential Project impacts on the Dulacca woodland snail, including mortality of animals within the Indicative Footprint during clearing and construction works.

In order to avoid/minimise mortality of Dulacca woodland snails during clearing and construction, animals occurring within the Indicative Footprint will be captured and relocated to nearby suitable habitat prior to the commencement of clearing works. Details of proposed survey, collection and translocation methods for the Dulacca woodland snail (based on published translocation plans for other snail species, including the related Boggomoss snail *Adclarkia dawsonensis* [BAAM Pty Ltd, 2011] and advice from Dulacca Woodland Snail expert, Craig Eddie [Boobook Consulting]) are provided below.

It is noted that the collection, relocation and monitoring of Dulacca woodland snails will not be required if pre-clearance surveys conducted under the guidance/supervision of a suitably qualified expert determine that the species is absent from, or unlikely to occur within, the proposed RoW.

2 Collection and relocation of snails

2.1 Surveys and collection

Pre-clearance surveys targeting Dulacca woodland snail will be conducted by licensed[1] fauna spotter-catchers operating under a Wildlife Spotter Catcher Endorsed Rehabilitation Permit (WSCRP) (issued under S12(e) of the *Nature Conservation (Administration) Regulation* 2006) under the direction/supervision of a suitably qualified snail expert.

In order to maximise the detection of Dulacca woodland snails during pre-clearance surveys, areas of mapped suitable habitat within the RoW will be surveyed at night after rain (when the species is most active and therefore most detectable). During surveys, areas of suitable habitat will be searched for active snails with the aid of a spotlight and/or headlamp, and any animals seen within the RoW will be photographed, marked (with acrylic waterproof paint) and recorded using GPS.

In the absence of rain prior to the commencement of clearing, or if surveys after rain are impractical (due to poor or limited site access under wet conditions), surveys for Dulacca woodland snail within the RoW will be undertaken no more than 48 hours prior to clearing even if this is under drier conditions less suitable for the detection of the species.

Under such conditions, all suitable shelter habitat within the Indicative Footprint (including coarse woody debris, rocks, exfoliating bark at the base of trees, and loose soil/humus under logs) will be searched for snails during daylight hours. Due to the difficulty of locating animals buried in deep leaf litter, large accumulations of litter will also be gathered in disposable garbage bags for redistribution at translocation sites. Any Dulacca woodland snails located during pre-clearance surveys under drier conditions will be placed in calico bags containing dry leaf litter for translocation to receptor/receiving sites. Where necessary (i.e., on warm/hot days), calico bags containing snails will be placed in an insulated foam box or esky and placed within an air-conditioned vehicle prior to translocation. Animals collected from the RoW will be transferred to the nearest available suitable habitat that night.

2.2 Relocation

To maximise the survival of translocated animals, animals will be relocated to the nearest available suitable habitat.

Prior to collection and release of snails, the suitability of translocation/release sites will be assessed in consultation with a suitably qualified snail expert having regard to:

- The availability and quality of shelter and breeding habitat (i.e., logs, rock, deep leaf litter),
- Patch size, potential edge effects and connectivity with other areas of suitable habitat,
- Vegetation cover, including both canopy cover and ground vegetation, required to maintain environmental moisture levels essential for the snails' survival,

[1] The collection and translocation of Dulacca woodland snails will be carried out by fauna spotter catchers operating under a Wildlife Spotter Catcher Endorsed Rehabilitation Permit (WSCRP) (issued under S12(e) Nature Conservation (Administration) Regulation 2006)

- Likely availability of foraging resources (including fungi, lichen, algae, and other detritus/biofilm growing on forest debris), and
- Presence of threats (in particular, cattle and fire).

Translocated animals will only be released at sites likely to meet the long-term feeding, breeding and shelter needs of the species.

If animals are recorded during night time surveys after rain, the area(s) where they have been recorded will be searched a second time no more than 48 hours prior to clearing. Suitable shelter microhabitat within these areas will be relocated into a nearby suitable translocation site regardless of whether or not animals are detected during the second survey.

Animals recorded during the surveys conducted within 48 hours of clearing will be captured, photographed, marked and released at the nearest suitable translocation site the night of their capture. If the proposed translocation site is not within walking distance or the release of captured animals delayed for other reasons (e.g. animals are captured between dawn and late afternoon), calcio bags containing snails will be transferred to an insulated foam box or esky and placed within an air-conditioned vehicle. At the translocation site, translocated animals will be removed from calico bags and carefully placed under logs and/or rocks. To facilitate monitoring (see below) the location of released animals will be photographed and marked with a GPS and a nearby tree shall be tagged and GPS recorded. The number of individual animals released at each location is also to be recorded along with notes detailing the condition of habitat (including presence/availability of shelter, vegetation cover and presence of threats).

At sites where available shelter is limited, consideration may be given to relocating embedded timber from the RoW to provide shelter for translocated animals. Moving embedded timber from the RoW to translocation sites may also facilitate the translocation of animals sheltering inside logs that would be difficult to locate/move under dry conditions.

3 Monitoring

While no successful translocations of Dulacca woodland snail or any other *Adclarkia* species have been documented to date, the successful translocation of woodland snails to areas of nearby suitable habitat appears feasible given the establishment of other native land snail species following accidental translocations elsewhere in Australia (see BAAM Pty Ltd, 2011).

In order to demonstrate the success (or otherwise) of Dulacca woodland snail translocations, the survival/persistence of translocated animals will be monitored at all translocation sites. Monitoring will be undertaken where animals or known occupied shelter microhabitat has been translocated. Suitably qualified ecologists familiar with the species will undertake nocturnal targeted surveys after rain to document the presence and abundance of translocated snails at each translocation site. Monitoring surveys are to be undertaken after rain, when animals are active and more readily detectable. This approach minimises microhabitat disturbance such as removal of biofilm on logs at the translocation site and enhances the detectability of the snails.

Monitoring surveys will be undertaken under suitably wet conditions as soon as possible after translocations have been completed in order to determine whether or not snails have survived the translocation process.

A follow-up survey will be undertaken approximately 12 months later (with the exact timing dependent on rainfall) to assess longer-term survival/persistence of translocated animals at translocation sites.

To facilitate recognition of translocated animals during monitoring surveys, the shells of animals moved from the RoW will be marked with acrylic waterproof paint prior to release at translocation sites. This method of marking has been used elsewhere without any detrimental effects on marked snails (see BAAM Pty Ltd, 2011). During monitoring surveys, the number and location of marked individuals at each translocation site will be recorded with the aid of a GPS along with the location and number of any unmarked individuals located during surveys.

4 Reporting

The number and location of Dulacca woodland snails collected from each habitat patch within the Indicative Footprint will be documented in a written report prepared by the fauna spotter-catcher(s) along with the following information:

- The date of snail recording and/or collection
- The amount of survey effort expended at each area of potential habitat during pre-clearance surveys
- Details of the personnel and qualifications/experience involved in the collection and translocation of snails
- The number of animals released at each translocation site following collection, and
- Photos and GPS coordinates documenting the condition and location of release sites.

A separate report detailing the results of follow-up monitoring surveys will be prepared and submitted to DECCWW following the completion of the second monitoring survey conducted post 12 months after the collection and translocation of animals. This report will detail:

- Survey conditions, the timing of surveys and survey effort expended at each translocation site
- The results of surveys conducted under suitably wet conditions (i.e., when animals are likely to be active) at the first available opportunity and approximately 12 months post-translocation (including the number of marked and unmarked Dulacca woodland snails recorded at each translocation site)
- Limitations of monitoring surveys
- An assessment of the success of translocations; and
- Recommendations regarding future monitoring/translocation of the Dulacca woodland snail.

5 References

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- Threatened Species Scientific Committee (TSSC). (2016). Conservation advice for the Dulacca woodland snail *Adclarkia dulacca*.