Great Central Road (Outback Way) (SLK 87-205)

Biological Survey

Prepared for

mainroads WESTERN AUSTRALIA

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BOTANICA CONSULTING

33 Brewer St PERTH WA 6000 | 0419 916 034

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Cover Photo: Vegetation within the Outback Way survey area (taken 02/08/2023)

Prepared by: Kelby Jennings
Senior Environmental Consultant
Botanica Consulting

Reviewed by: Andrea Williams
Director
Botanica Consulting

Approved by: Jim Williams
Director
Botanica Consulting

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APPENDICES

1 EXECUTIVE SUMMARY

The Outback Hwy Biological Survey Area (hereafter referred to as the 'survey area') consists of a section of highway between SLK 87 – SLK 205. This section extends for approximately for approximately 118 km and extends 100m either side of the road centreline, as well as including associated sections for material resource pits and laydown areas. The survey area is approximately 2,929.9.4 ha in extent and is located in the Shire of Laverton. The scope of work includes:

- Desktop assessment within a 30-kilometre (km) radius of the Outback Hwy Biological Survey Area survey area (referred to as the 'desktop study area');
- Detailed flora and vegetation survey and targeted flora survey of the survey area, covering an area of approximately 2,929.9 ha; and
- Basic fauna survey of the survey area, covering an area of approximately 2,929.9 ha.

The desktop assessment identified 372 vascular flora species as occurring within 40 km of the survey area, representing 153 genera from 50 families. The most diverse families were Fabaceae (47 species), Asteraceae (40 species) and Chenopodiaceae (39 species). The most dominant genera were *Eremophila* (29 species), *Acacia* (27 species) and *Eucalyptus* (25 species). The desktop assessment identified 25 significant flora species occurring within the desktop study area, consisting of seven Priority 1, one Priority 2, 12 Priority 3 and five Priority 4 flora taxa. These taxa were assessed for distribution and known habitat to determine their likelihood of occurrence within the survey area. This assessment identified two species as previously recorded within the survey area, consisting of one Priority 3 and one Priority 4 taxa. In addition, two species were assessed as likely to occur, consisting of two Priority 3 taxa, and three species were assessed as possibly occurring, consisting of one Priority 3 and two Priority 4 flora taxa.

The desktop assessment did not identify any significant ecological communities within the desktop study area.

The field assessment did not identify any Threatened, Priority or otherwise significant flora taxa within the survey area.

The desktop assessment identified two significant fauna species as potentially occurring within the survey area: Grey Falcon (*Falco hypoleucos*) - Vulnerable (EPBC Act and BC Act) and Southern Whiteface (*Aphelocephala leucopsis*) - Vulnerable (EPBC Act).

The north-eastern extent of the survey area is located adjacent to the Yeo Lake Nature Reserve, which is also categorised an as Environmentally Sensitive Area under the *Environmental Protection Act 1986* (EP Act).

During the field survey a total of eight vegetation types were identified within the survey area. These vegetation types were located within three landform types and comprised of five NVIS major vegetation groups. Vegetation was represented by a total of 110 vascular flora taxa within the survey area. These taxa represented 57 genera across 29 families.

No significant flora species were identified within the survey area during the field survey. Areas with historical records of significant flora were found to be affected by fire, and individuals and populations were not observed despite targeted searches in these areas. These populations may recover over time but were not detectable at the time of survey.

No significant ecological communities were identified within the survey area.

Based on the vegetation condition rating scale specified in the Environmental Protection Authority (EPA) *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016* (EPA, 2016a), vegetation condition was categorised as 'very good' to 'degraded'.

Disturbance in the survey area was a result of fire events, access roads and associated infrastructure, localised vegetation clearing and cumulative historical impacts.

A total of two introduced flora species (weeds) were identified within the survey area, representing 1.8% of floristic diversity: Buffel Grass (*Cenchrus ciliaris*) and Ruby Dock (*Rumex vesicarius*). Neither of these species are categorised as Declared Plants or WoNS.

Six broad scale terrestrial fauna habitats were identified within the survey area: Results of the literature review identified 105 bird, 15 mammal, 81 reptile and six amphibian species as having been previously recorded in the desktop study area, some of which have the potential to occur within the survey area.

No significant fauna taxa were recorded within the survey area. Suitable habitat for the Grey Falcon (*Falco hypoleucos*) may be present but is unlikely to represent critical habitat, with no potential nesting locations observed. This species potentially utilizes the survey area as part of a much larger home range.

2 INTRODUCTION

The Outback Hwy Biological Survey Area (hereafter referred to as the 'survey area') consists of a section of highway between SLK 87 – SLK 205. This section extends for approximately for approximately 118 km and extends 100m either side of the road centreline, as well as including associated sections for material resource pits and laydown areas. The survey area is approximately 2,929.9 ha in extent and is located in the Shire of Laverton. The scope of work includes:

- Desktop assessment within a 30-kilometre (km) radius of the Outback Hwy Biological Survey Area survey area (referred to as the 'desktop study area');
- Detailed flora and vegetation survey and targeted flora survey of the survey area, covering an area of approximately 2,929.9 ha; and
- Basic fauna survey of the survey area, covering an area of approximately 2,929.9 ha.

2.1 Objectives

The flora/vegetation assessment was conducted in accordance with the requirements of a detailed and targeted survey as defined in *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016* (EPA, 2016a). The objectives of the assessment were to:

1. Gather background information on flora and vegetation in the desktop study area (literature review, database and map-based searches);
2. Conduct a field survey to verify / ground truth the desktop assessment findings through detailed and targeted surveys;
3. Define and map vegetation communities of the survey area to a scale appropriate for the Bioregion and described according to the National Vegetation Information System (NVIS) classification (NVIS Level V – Association);
4. Record the species composition (abundance and diversity) of each vegetation community within the survey area and compile a species list for the survey area by vegetation type;
5. Provide quadrat-based data from plots representative of each vegetation type (minimum of three quadrats per vegetation type) according to Environmental Protection Authority (EPA) guidelines;
6. Assess the species composition of each quadrat;
7. Determine the local and regional significance of flora and vegetation within the survey area;
8. Identify and record the locations of any significant flora/vegetation within the survey area;
9. Identify and record the locations of any introduced flora species (including Declared Pests) within the survey area;
10. Provide a map showing the distribution of significant flora/vegetation within the survey area; and
11. Define and map the condition of vegetation within the survey area in accordance with the vegetation condition rating scale specified in the Environmental Protection Authority (EPA) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016* (EPA, 2016a).

The fauna assessment was conducted in accordance with the requirements of a basic terrestrial fauna survey as defined in *Technical Guidance – Terrestrial Fauna Surveys for Environmental Impact Assessment – June 2020* (EPA, 2020). The objectives of the assessment were to:

1. Undertake a literature review, including map-based information searches of all current and relevant literature sources and databases relating to the survey area;
2. Undertake a desktop investigation to identify any previously recorded occurrences of or potentially occurring Threatened and Priority listed fauna within the survey area;
3. Undertake searches on available databases for details relating to any Threatened and Priority

listed fauna previously identified as occurring or potentially occurring within the survey area;
4. Conduct fauna habitat mapping and identify habitat types which are suitable for each significant fauna considered likely or possible to occur, or fauna recorded in the survey area;
5. Compile an inventory of fauna species occurrences within the survey area;
6. Undertake opportunistic, low intensity sampling of fauna; and
7. Report on the conservation status of species present using the Western Australian Museum and *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) databases for presence of Threatened and Priority listed fauna species within the survey area.

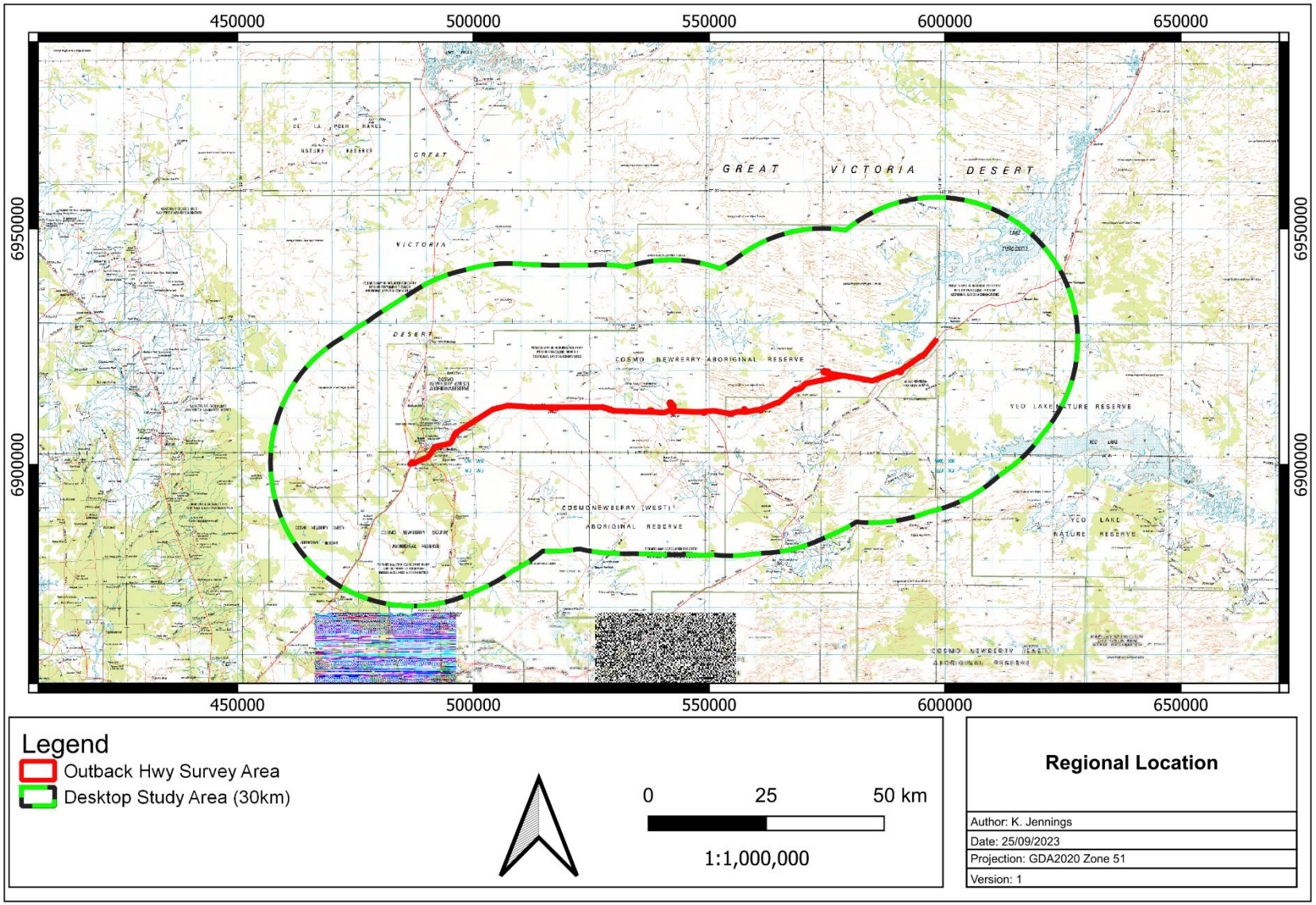

Figure 2-1: Regional map of the desktop study area/ survey area

3 REGIONAL BIOPHYSICAL ENVIRONMENT

3.1 Regional Environment

As defined by the Interim Biogeographic Regionalisation of Australia (IBRA), the desktop study area occurs in the Shield (GVD1) and Central (GVD2) subregions of the Great Victoria Desert Bioregion.

The Shield subregion comprises salt lakes and major valley floors with lake derived dunes, sandplains with patches of seif dunes running east west and areas of moderate relief without-cropping and silcrete-capped mesas and plateaus (breakaways). The subregion contains a major palaeochannel of Ponton Creek. Spinifex (*Triodia* spp.) and mallee (*Eucalyptus kingsmillii*, *E*. *youngiana*) over hummock grassland dominated by *Triodia basedowii* occur on the aeolian sandplain. Scattered marble gum (*E*. *gongylocarpa*) and native pine (*Callitris*) occur on the deeper sands of the sand plains. Mulga and Acacia woodlands occur mainly on the colluvial and residual soils. Salt bush (*Atriplex* spp.), Bluebush (*Maireana* spp.), and samphire (Tecticornia spp.) occur on the margins of salt lakes and in saline drainage areas (Barton & Cowan, 2001a).

The Central (GVD2) subregion consists of salt lakes and major valley floors with lake derived dunes. The subregion comprises sand plains with extensive seif dunes running east west, occasional outcropping (breakaways) and quartzite hills which provide minor relief. Vegetation is primarily a tree steppe of *Eucalyptus gongylocarpa*, Mulga and *E*. *youngiana* over hummock grassland dominated by *Triodia basedowii* on the aeolian sands. Acacia dominates colluvial soils with *Eremophila* and *Santalum* spp.. Halophytes are confined to edges of salt lakes and saline drainage systems (Barton & Cowan, 2001b).

In accordance with Beard (1990) the Great Victoria Desert region is located in the Helms Botanical District of the Eremaean Province. The landscape is described as undulating and generally featureless, with longitudinal dunes. Soils are principally shallow earthy loams overlying red-brown hardpan between dunes, with red earthy to red-brown sands in the dunes. Vegetation is consistently mantled with a hummock grassland consisting of *Triodia basedowii*, in which there are scattered trees, mallees, sclerophyll tall shrubs and small ericoid shrubs. The characteristic tree is the marble gum *Eucalyptus gongylocarpa*, with *Eucalyptus youngiana* being the most common mallee. Other mallees include *E*. *rigidula*, *E*. *leptopoda*, *E*. *concinna* and *E*. *oleosa*. Large sclerophyll shrubs include *Acacia ligulata*, *A*. *helmsiana*, *A*. *murrayana*, *Alyogyne pinoniana*, *Eremophila leucophylla*, *Grevillea juncifolia*, *G*. *pterosperma*, *Hakea multilineata*, *H*. *lorea* and *Melaleuca leiocarpa*. Small ericoid shrubs include *Enekbatus cryptandroides*, and *Homalocalyx thryptomenoides*. The climate is arid with summer and winter rain and an annual precipitation of approximately 200mm.

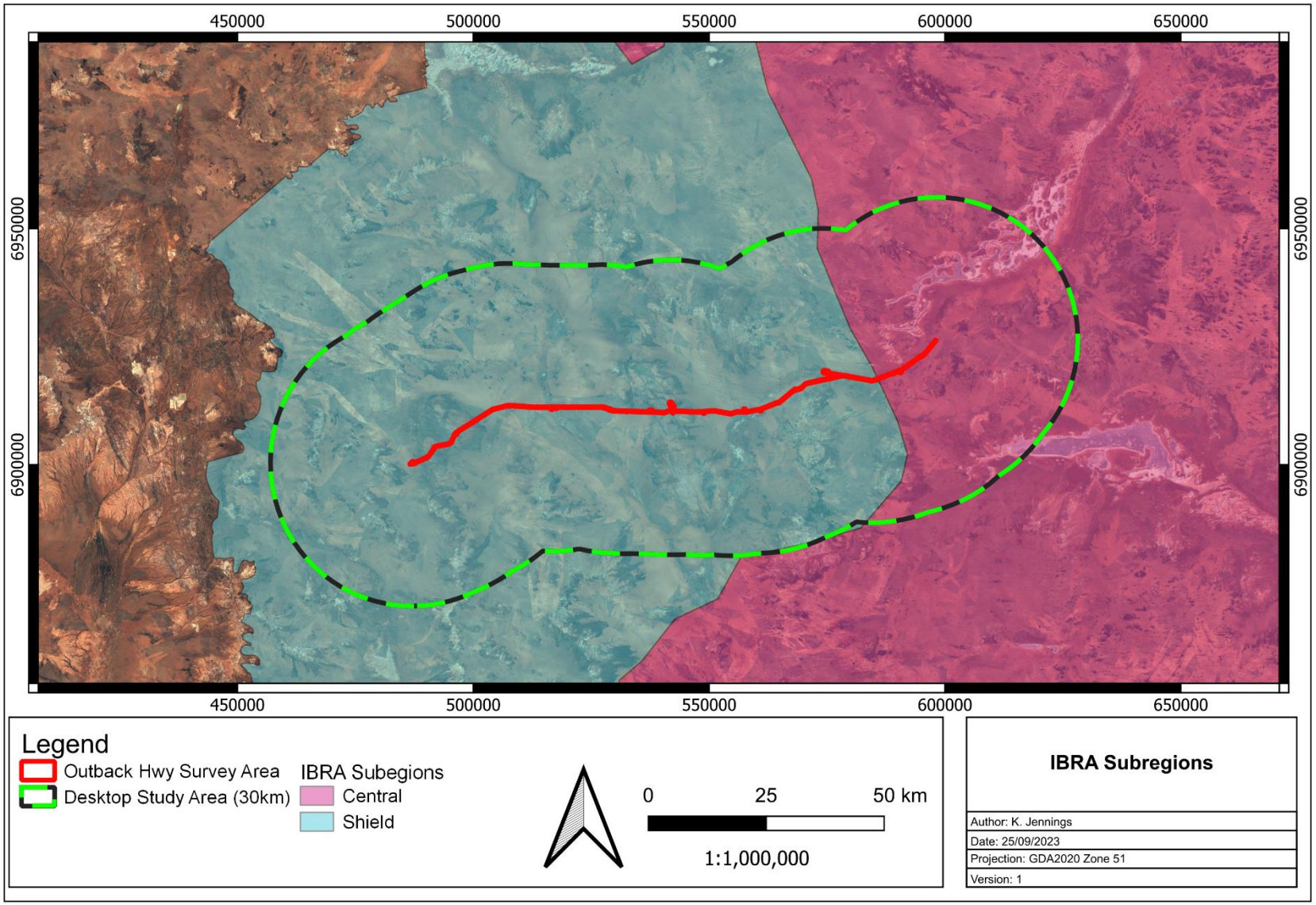

Figure 3-1: Map of IBRA subregions in relation to the desktop study area/ survey area

3.2 Soil Landscape Systems

The survey area lies within the North-Western Great Victoria Desert (Zone 122) and Southern Great Victoria Desert (Zone 124) of the Gunbarrel Province and the Leemans Sandplain (Zone 274) of the Murchison Province.

The North-Western Great Victoria Desert Sandplains is located in the southern arid interior between Lake Carnegie, Rason Lake and Warburton. It consists of sandplains and dunes (with some undulating plains and uplands) on sedimentary rocks of the Gunbarrel Basin. Soils include red sandy earths and red deep sands with some red loamy earths and red-brown hardpan shallow loams. Vegetation is typically mulga shrublands and spinifex grasslands with mallee.

Southern Great Victoria Desert Sandplains is located in the central Arid Interior between Well No. 24 (Canning Stock Route) and Lake Burnside. The landscape is typified by sandplains and dunes (with some uplands and mesas) on sedimentary rocks of the Gunbarrel Basin. Soils include red sandy earths with red deep sands and some shallow gravels, red loamy earths and red-brown hardpan shallow loams. Vegetation consists of spinifex grasslands with desert bloodwood and shrubs and some mulga scrub.

These zones are further divided into soil landscape systems, with the soil landscape systems of the desktop study area/ survey area described in Table 3-1 and shown in Figure 3-2 (ASRIS, 2014).

Table 3-1: Soil landscape systems within the desktop study area/ survey area

Soil Landscape System	Description	Desktop Area		Survey Area	
		Area (ha)	%	Area (ha)	%
AB47	Plains and dunes--longitudinal and ring dunes with interdune corridors and plains; occasional salt pans	53353.4	5.3	352.5	12.0
AB49	Plains with a variable proportion of longitudinal sand dunes and scattered residuals of hard sedimentary rocks and laterites	96451.3	9.5	67.3	2.3
Ararak System	Broad plains with mantles of ironstone gravel supporting mulga shrublands with wanderrie grasses.	4014.6	0.4	121	4.1
Bandy System	Gritty-surfaced plains and low outcrops of granite with scattered acacia shrublands.	383.4	0	17.7	0.6
Bevon System	Irregular low ironstone hills with stony lower slopes supporting mulga shrublands.	2122.5	0.2	-	-
Bullimore System	Gently undulating sandplain with occasional linear dunes and stripped surfaces supporting spinifex grasslands with mallees and acacia shrubs.	376442.5	37.2	576.2	19.7
BY6	Scarpland-breakaways and residuals of various forms, cuestas, mesas, buttes, stony hillocks, and hills commonly with large bare slabs of silcrete; stone and gravel pavements are common;	36760.2	3.6	-	-
BY7	Scarpland--low lateritic breakaways on granites and gneisses	33840.7	3.3	-	-
Carnegie System	Salt lakes with fringing saline alluvial plains, kopi dunes and sandy banks, supporting halophytic shrublands and acacia tall shrublands.	534.5	0.1	30.2	6.7
Challenge System	Gently undulating gritty and sandy surfaced plains, occasional granite hills, tors and low breakaways, supporting acacia shrublands and occasional halophytic shrublands.	379.8	0	6.8	1.5
Cosmo System	Calcreted drainage tracts through sandplain with spinfex hummock grasslands and occasional black oak or mulga open woodlands.	3434	0.3	-	-
Darlot System	Salt lakes, fringing saline alluvial plains, regularly arranged sandy banks and numerous claypans and swamps, supporting halophytic shrublands and spinifex and wanderrie grasslands.	526.9	0.1	-	-

Soil Landscape System	Description	Desktop Area		Survey Area	
		Area (ha)	%	Area (ha)	%
Fa7	Greenstone hills and low ranges with some slate and basalt	39828	3.9	167	5.7
Gransal System	Stony plains and low rises based on granite supporting mainly halophytic low shrublands.	788	0.1	-	-
Gumbreak System	Low granite breakaways with extensive lower saline alluvial plains, supporting halophytic low shrublands.	2723.8	0.3	-	-
Gundockerta System	Extensive, gently undulating calcareous stony plains supporting bluebush shrublands.	1090.5	0.1	55.1	1.9
Laverton System	Greenstone hills and ridges with acacia shrublands.	3607.1	0.4	76.5	2.6
Melaleuca System	Sandy-surfaced plains and calcareous plains supporting spinifex or mulga shrublands with wanderrie grasses.	156.4	0	-	-
Monitor System	Distributary alluvial fans and wash plains supporting mulga - chenopod shrublands.	384.1	0	-	-
Mx22	Plains often flanking areas of regional drainage (unit SV10); some longitudinal sand dunes	33293.4	3.3	596	20.3
My99	Plains with extensive gravel pavements and small tracts of longitudinal dunes	254883	25.2	673.7	23
Sherwood System	Breakaways, kaolinised footslopes and extensive gently sloping plains on granite supporting mulga shrublands and minor halophytic shrublands.	6752.8	0.7	-	-
Sunrise System	Stony plains supporting mulga shrublands.	125.5	0	-	-
SV10	Shallow valleys with lakes, clay pans, salt pans, calcrete (kunkar) platforms, sand dunes, kopi dunes, and calcareous dunes	47753.9	4.7	-	-
Violet System	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands.	178.2	0	208	7.1
Waguin System	Sandplains and stripped granite or laterite surfaces with low fringing breakaways and lower plains; supports bowgada and mulga shrublands with wanderrie grasses and minor halophytic shrublands.	7740.6	0.8	18.9	0.6
Windarra System	Gently undulating stony plains and low rises with quartz mantles on granite, supporting acacia-eremophila shrublands.	576.9	0.1	-	-
Wyarri System	Granite domes, hills and tor fields with gritty-surfaced fringing plains supporting mulga and granite wattle shrublands.	142.6	0	-	-
Yanganoo System	Almost flat hardpan wash plains, with or without small wanderrie banks and weak groving; supporting mulga shrublands and wanderrie grasses on banks.	3876.1	0.4	-	-
Total		**1,012,144.7**	**100**	**2,929.9**	**100**

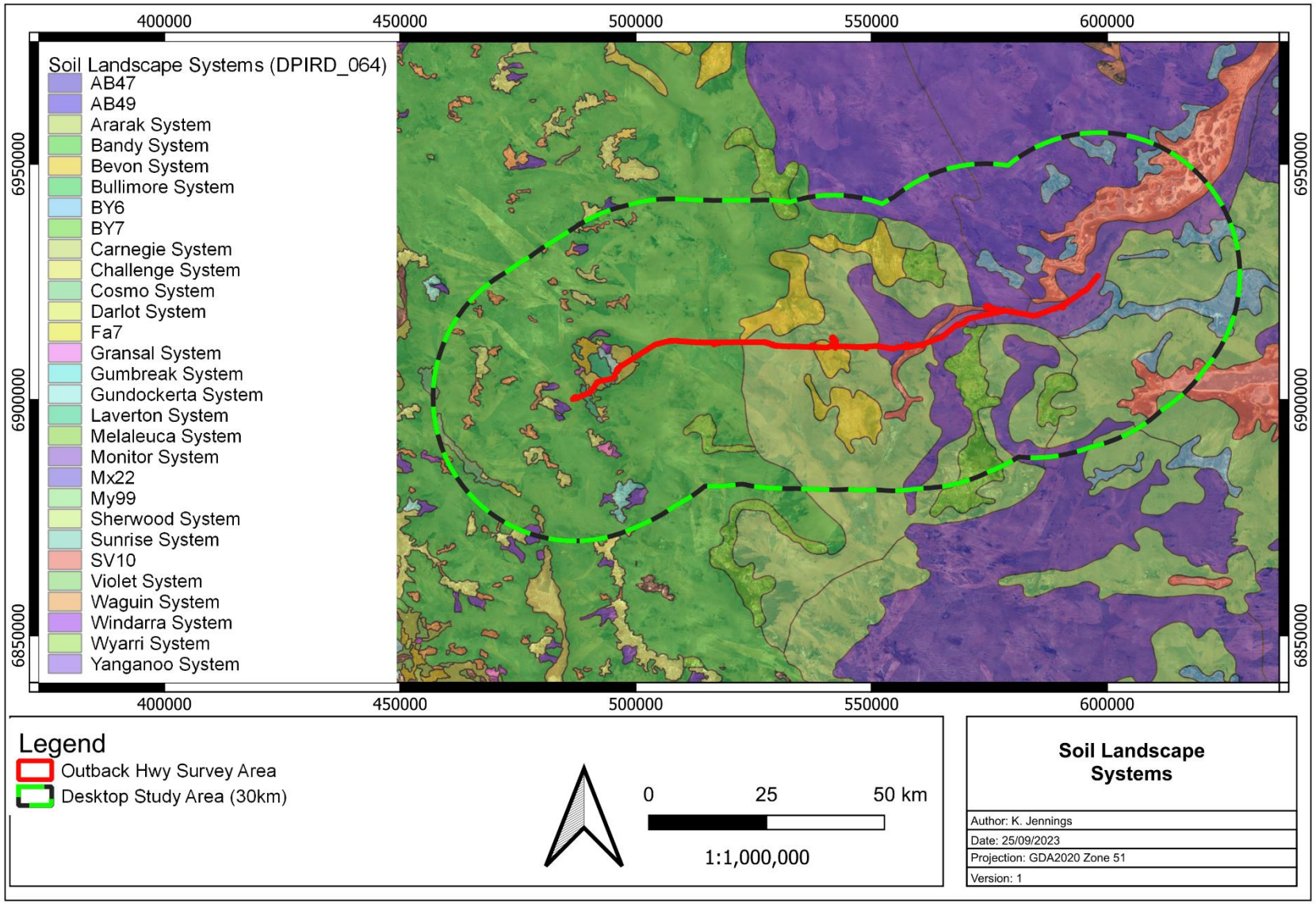

Figure 3-2: Map of soil landscape systems within the desktop study area/ survey area

3.3 Vegetation

Tille (2006) describes the vegetation of the Gunbarrel Province as 'hummock grasslands of hard spinifex (*Triodia basedowii*) are common on sandplains in the south. These are found in association with open low tree and mallee steppe of marble gum (*Eucalyptus gongylocarpa*) and mallees (e.g., *E*. *youngiana*). To the north, mulga (*Acacia aneura*) scrub replaces marble gum and mallee. Grassland of feathertop spinifex (*T*. *schinzii*) with scattered desert bloodwood (*Corymbia dichromophloia*) and mixed shrubs also appears on the dunefields. Hard spinifex and mulga dominate the gravelly plains of the Gibson Desert.'

The vegetation of the Murchison Province is described as 'Mulga (*Acacia aneura*) shrublands and woodlands with gidgee (*A*. *pruinocarpa*), curara (*A*. *tetragonophylla*), *A*. *linophylla*, bowgada (*A*. *ramulosa*), jam (*A*. *acuminata*), minniritchie (*A*. *grasbyi*), *Senna* spp. and *Eremophila* spp. dominate the hardpan wash plains.

In the local and regional context of the survey area, sandplains support grasslands of hard spinifex (*Triodia* basedowii), with an open tree and shrub steppe of mulga, marble gum (*Eucalyptus gongylocarpa*), mallees (*E*. *kingsmillii*, *E*. *trichopoda*, *E*. *comitae-vallis* and *E*. *youngiana*).' (Tille, 2006)

The DPIRD GIS file (2018), based on Beard *et*. *al*. (1990) vegetation mapping, indicates that the desktop study area and survey area is located within Pre-European vegetation associations of the Great Victoria Desert systems of the Shield (GVD1) and Central (GVD2) subregions of the Great Victoria Desert Bioregion. The extent of these vegetation associations, as specified in the *2018 Statewide Vegetation Statistics* (Government of Western Australia, 2019), is provided in Table 3-2 and shown in Figure 3-3.

Areas retaining less than 30% of their pre-European vegetation extent generally experience exponentially accelerated species loss, while areas with less than 10% are considered "endangered" (EPA, 2000). All vegetation associations within the desktop study area retain 100% of their pre-European extent, and clearing within the survey area will not significantly reduce the extent of these vegetation associations.

Table 3-2: Beard vegetation associations within the desktop study area/ survey area

Vegetation Association	Current extent (ha)	Pre-European extent remaining (%)	% of current extent within DBCA managed lands	Description	Desktop Area		Survey Area	
					Area (ha)	%	Area (ha)	%
Great Victoria Desert_18	4976367.0	100.00	0.24	Low woodland; mulga (*Acacia aneura*)	159641.4	15.8	368.3	12.6
Great Victoria Desert_19	2566664.1	100.00	-	Low woodland; mulga between sandridges	745	0.1	-	-
Great Victoria Desert_24	204204.4	100.00	-	Low woodland; *Allocasuarina cristata*	36937.9	3.6	100.7	3.4
Great Victoria Desert_39	1031024.8	100.00	3.39	Shrublands; mulga scrub	109424.3	10.8	390	13.3
Great Victoria Desert_45	73640.1	100.00	-	Shrublands; mallee scrub (Great Victoria Desert)	63164.9	6.2	873.4	29.8
Great Victoria Desert_84	904690.7	100.00	3.67	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (*Eucalyptus youngiana*) over hard spinifex *Triodia basedowii* between sandhills	101604.7	10	109.9	3.8
Great Victoria Desert_85	3049469.0	100.00	15.96	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (*Eucalyptus youngiana*) over hard spinifex on sandplain	113835.4	11.2	196.4	6.7
Great Victoria Desert_95	115129.7	100.00	-	Hummock grasslands, shrub steppe; acacia & grevillea over *Triodia basedowii*	14502.8	1.4	-	-
Great Victoria Desert_125	149366.6	100.00	27.34	Bare areas; salt lakes	7785.3	0.8	-	-
Great Victoria Desert_239	122137.7	100.00	-	Hummock grasslands, open medium tree & mallee steppe; marble gum (*Eucalyptus gongylocarpa* & mallee (*E. youngiana*) over hard spinifex, *Triodia basedowii* between sandhills	10985.3	1.1	-	-
Great Victoria Desert_676	103609.5	100.00	14.65	Succulent steppe; samphire	23428.2	2.3	152	5.2
Great Victoria Desert_1239	1393809.7	100.00	2.46	Hummock grasslands, open medium tree & mallee steppe; marble gum & mallee (*E. youngiana*) over hard spinifex *Triodia basedowii* on sandplain	365975.9	36.2	739.2	25.2
Great Victoria Desert_1446	12896.3	100.00	-	Succulent steppe with scrub; mulga over bluebush	4113.6	0.4	-	-
Total					**1012144.7**	**100**	**2929.9**	**100.0**

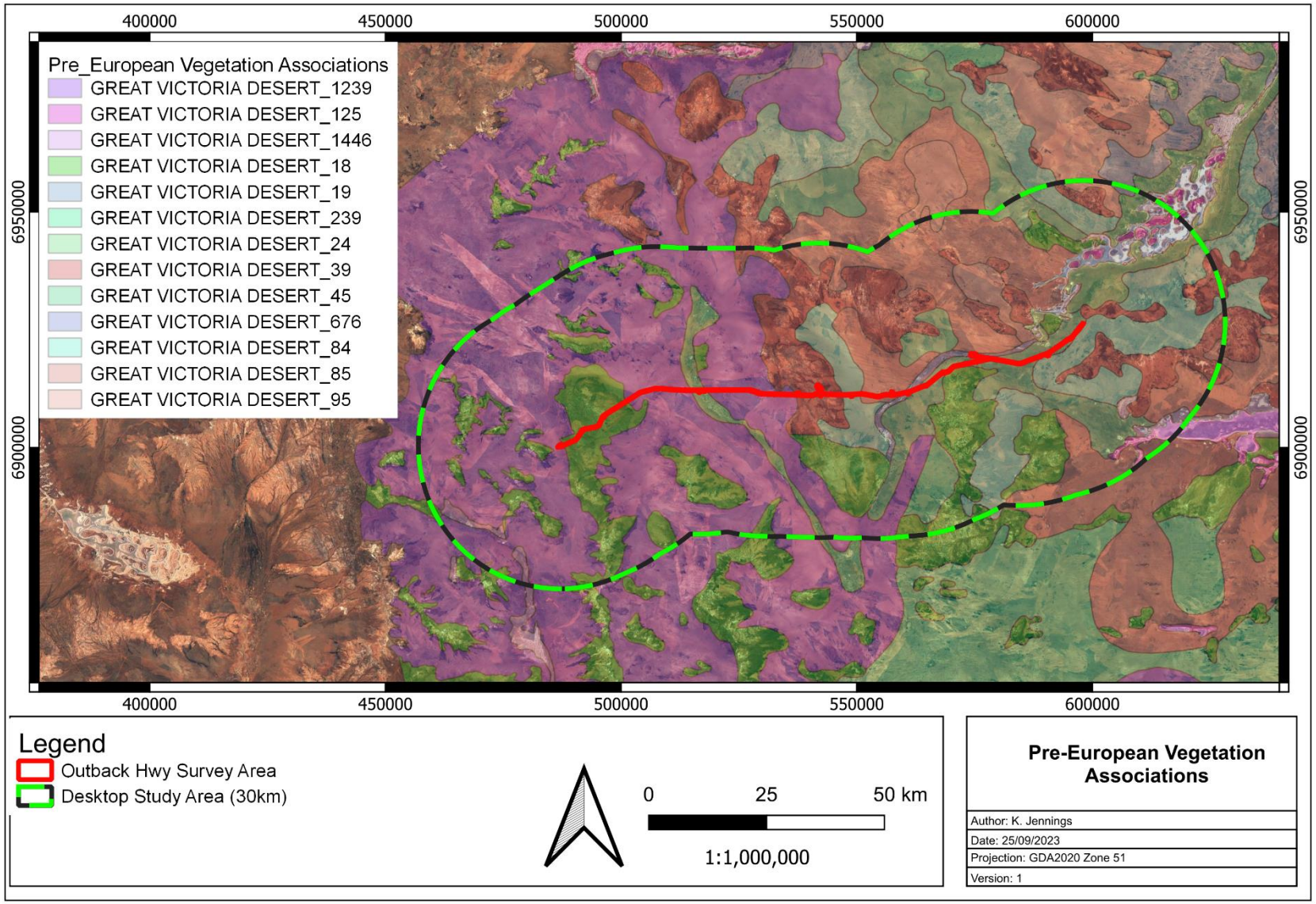

Figure 3-3: Pre-European vegetation associations within the desktop study area/ survey area

3.4 Climate

The climate of the Great Victoria Desert subregion is characterised as an arid climate with mainly winter rainfall and annual rainfall of approximately 200 millimetres (mm) (Beard, 1990; Cowan, 2001). The climate of the Shield and Central subregion is arid, with summer and winter rain averaging 150 –190 mm per annum (Barton & Cowan, 2001a; Barton & Cowan, 2001b). Rainfall and climate data for the Laverton weather station (#12305) located approximately 78km south-west of the southern extremity of the survey area is shown in Figure 2-4 and Figure 2-5 (BoM, 2020a). Rainfall data for the Laverton Aero weather station (#12305), located approximately 78 km south-west of the western extremity of the survey area, is shown in Figure 3-4. Mean monthly rainfall ranges from 52.4 mm in February to 7.7 mm in September, with a mean annual rainfall of 275.9 mm. The survey was conducted in August 2023, with the preceding months receiving below-average rainfall. Climate conditions are likely to represent a survey constraint, with reduced presence of flowering material and ephemeral species.

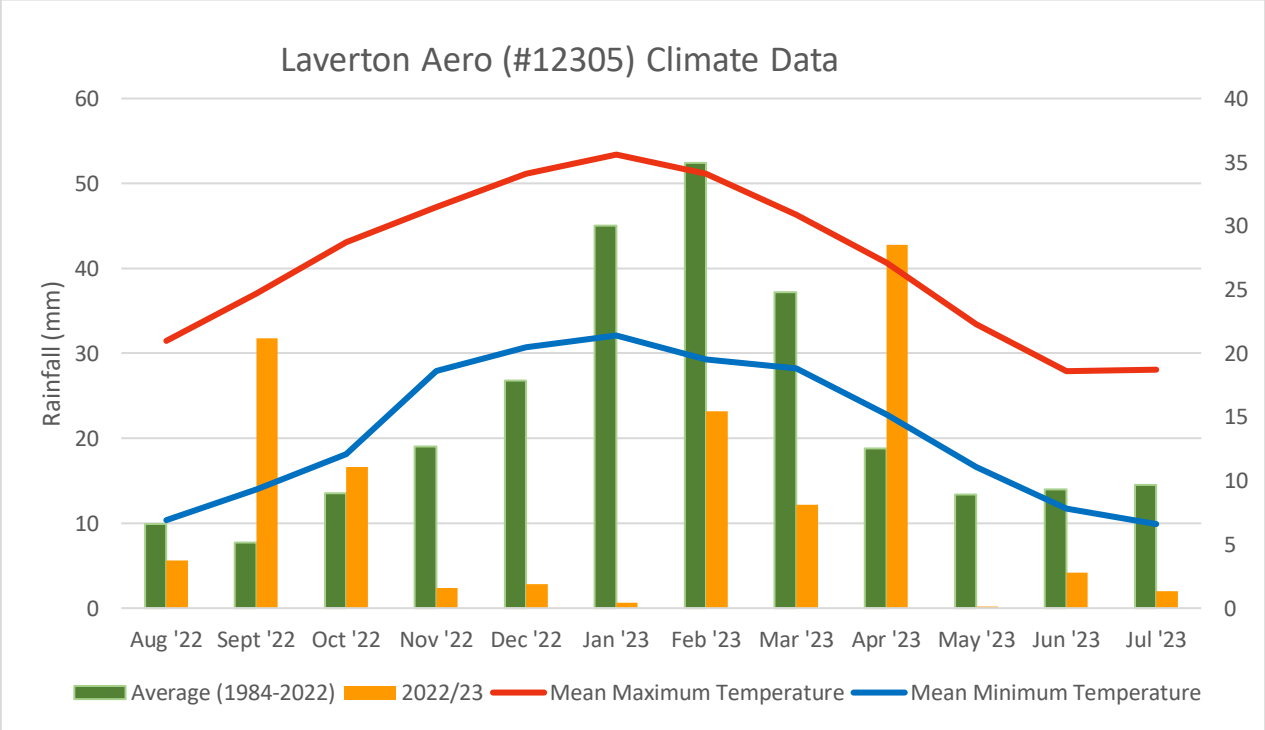

Figure 3-4: Rainfall and temperature data for Laverton Aero weather station (#12305) (BoM, 2023a)

3.5 Land Use

The Shield subregion dominant land uses include; Aboriginal reserves (12.3%), Conservation Reserves (7%), grazing-native pastures (24.8%), UCL and Crown Reserves (55.7%) and other-lake and major watercourses (0.1%). The Central subregion dominant land uses include: Aboriginal reserves (7.4%), Conservation Reserves (9.1%), grazing-native pastures (4.4%), UCL and Crown Reserves (78.9%) and other-lake and major watercourses (0.2%) (Barton & Cowan, 2001a and 2001b).

3.6 Hydrology

According to the Geoscience Australia database (2015) and the Hydrography, Linear (Hierarchy) (DWER-031) dataset, there are numerous ephemeral drainage lines, multiple un-named salt lakes and the following lakes located within the desktop study area as shown in Figure 3-5:

- Lake Throssell; and
- Yeo Lake.

Yeo Lake is recognised as a nationally important wetlands (Australian Nature Conservation Agency (ANCA) Wetlands).

There are no surface water bodies within the survey area. Multiple ephemeral drainage lines intersect with the survey area.

Groundwater Dependent Ecosystems (GDE) includes biological assemblages of species such as wetlands or woodlands that use groundwater either opportunistically or as their primary water source. For the purposes of this report, a GDE is defined as any vegetation community that derives part of its water budget from groundwater and must be assumed to have some degree of groundwater dependency. According to the BoM Atlas of Groundwater Dependent Ecosystems (BoM, 2022b) database several potential terrestrial and aquatic GDE's are located within the desktop study area. Within the survey area, there are no potential aquatic GDE's, one high-potential terrestrial GDE, one moderate-potential terrestrial GDE and four low-potential GDE's, as listed in Table 3-3 and shown in Figure 3-5.

Table 3-3: Potential GDE's within the survey area

Type	Geomorphology	Potential	Ecosystem Description	Area (ha)	% of Survey Area
Terrestrial	Sandplain with some gravel plains, mesas and small salt lakes.	High	Succulent steppe; samphire	152	5.2
		Moderate	Shrublands; mallee scrub (Great Victoria Desert)	885.9	30.2
		Low	Broad plains with mantles of ironstone gravel supporting mulga shrublands with wanderrie grasses.	59.3	2
		Low	Gritty-surfaced plains and low outcrops of granite with scattered acacia shrublands.	17.7	0.6
		Low	Shrublands; mulga scrub	391.8	13.4
	West-east longitudinal dunes, broken by low tablelands and ridges in the northwest.	Low	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee (*Eucalyptus youngiana*) over hard spinifex *Triodia basedowii* between sandhills	9.7	0.3
Total				**1,516.4**	**51.7**

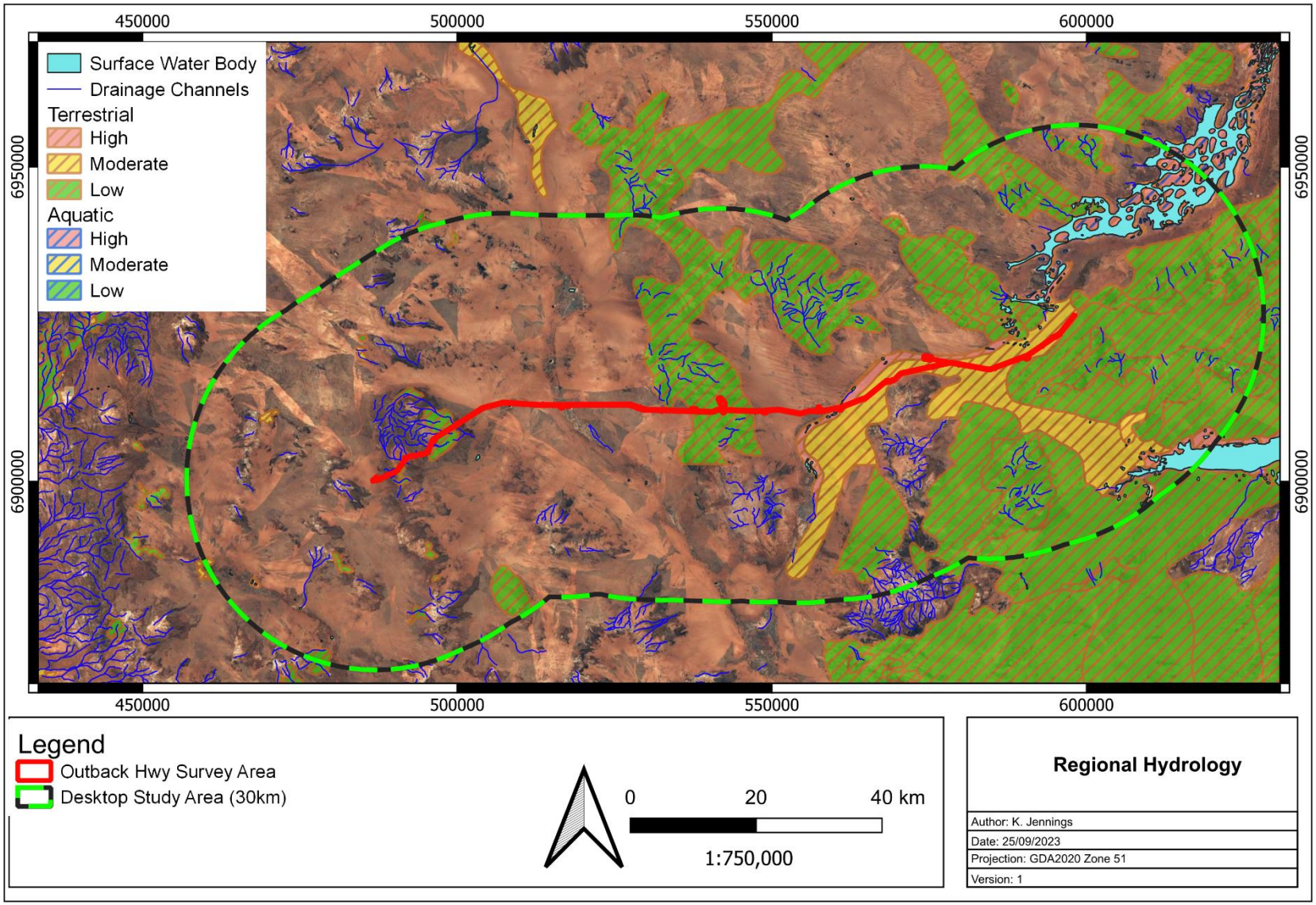

Figure 3-5: Hydrology of the desktop study area/ survey area

4 SURVEY METHODOLOGY

4.1 Desktop Assessment

Prior to the field assessment a literature review was undertaken of previous flora and fauna assessments conducted within the local region. Documents reviewed included:

- Botanica Consulting Pty Ltd. (2020). *Flora, Vegetation and Fauna Assessment of the Great Central Road Stage 1 Biological Survey*. Prepared for Main Roads Western Australia, August 2020
- Botanica Consulting (2011). *Level 1 Yamarna Proposed Haul Road Flora and Vegetation Survey*. Botanica Consulting.
- Botanica Consulting (2012). *Level 2 Flora and Vegetation Survey, Yamarna Project*. Botanica Consulting.
- Botanica Consulting (2014a). *Level 1 Flora and Vegetation Survey, Gruyere Project*. Botanica Consulting.
- Botanica Consulting (2014b). *Level 1 Flora and Vegetation Survey, Murrin Murrin to Sunrise Dam Gold Mine Gas Pipeline*. Botanica Consulting.
- Botanica Consulting (2015a). *Level 2 Flora and Vegetation Survey of the Gruyere Project*. Botanica Consulting.
- Botanica Consulting (2017). *Level 1 Flora & Fauna Survey Yamarna Gas Pipeline Project*. Botanica Consulting.
- DAFWA (1994). *Technical Bulletin: An inventory and condition survey of the north-eastern Goldfields Western Australia (No. 87)*, Department of Agriculture WA, 1994.
- Ecologia (2009a). *Tropicana Gold Project*. *Operational Area Vertebrate Fauna Assessment*. Unpublished report for Tropicana Joint Venture. February 2009.
- Ecologia (2009b). *Tropicana Gold Project*. *Tropicana-Transline Infrastructure Corridor, Level 1 Fauna Assessment*. Unpublished report for Tropicana Joint Venture. July 2009.
- Hall, N. J., McKenzie, N. L. and Keighery, G. J. (eds) (1994). *The Biological Survey of the Eastern Goldfields of WA - Pt 10: Sandstone-Sir Samuel and Laverton-Leonora Survey Areas*. Records of the WAM, Supplement 47: 1 – 166.
- Harewood, G. (2011). *Terrestrial Fauna Survey (Level 1) of Yamarna Gold Project (Central Bore, Attila, Alaric, Haul Road and Khan North)*. Unpublished report for Gold Road Resources. September 2011.
- Harewood G. (2014). *Fauna Assessment (Level 1) Gruyere Project*. Unpublished report for Gold Road Resources Ltd. July 2014.
- Harewood, G (2017). *Fauna Survey (Level 2) Phase 1 and 2 - Lake Wells Potash Project*. Unpublished report for Australian Potash Limited. August 2017.
- Keith Linbeck and Associates (2012). *Fauna Assessment (Level 2) Yamarna Project*. Unpublished report for Gold Road Resources. October 2012.
- Kingfisher Environmental Consulting (2014a). *Murrin Murrin – Sunrise Dam Infrastructure Corridor Level 1 Fauna Survey*. Unpublished report for AngloGold.
- Kingfisher Environmental Consulting (2014b). *Sunrise Dam – Tropicana Infrastructure Corridor Level 1 Fauna Survey*. Unpublished report for AngloGold.
- Martnick and Associates Pty Ltd (1996). *Environmental Appraisal –Yamarna Gold Project Area*. Unpublished report for Zanex NL. January 1996.
- MBS Environmental (2014). *Gruyere Project - Desktop Environmental Review and Work Program*. Unpublished report for Gold Road Resources. February 2014.

- Ninox Wildlife Consulting (2009). *A Level One Survey of the Vertebrate Fauna, Infrastructure Corridor – Pinjin Option*. *L 31/57, L 39/185, Pinjin –Tropicana Gold Project*. Unpublished report for Tropicana Joint Venture. January 2009.
- Rapallo Environmental (2015). *Fauna Survey of the Gruyere Project Area*. Unpublished report for Gold Road Resources Limited. May 2015.

Searches of the following databases were undertaken to aid in the compilation of a list of flora, vegetation and fauna taxa within the survey area:

- Department of Biodiversity, Conservation and Attractions (DBCA) Priority/ Threatened Flora Database Search (DBCA, 2022a) (provided by MRWA);
- DBCA Priority/ Threatened Fauna Database Search (DBCA, 2022b) (provided by MRWA);
- DBCA Priority/ Threatened Ecological Communities Database Search (DBCA, 2022c) (provided by MRWA);
- Atlas of Living Australia (ALA) Database (2022); and
- Department of Climate Change, Energy the Environment and Water (DCCEEW) Protected Matters search tool (DCCEEW, 2022a).

The ALA and Protected Matters Search were conducted for the extent of the desktop study area.

It should be noted that these lists are based on observations from a broader area than the assessment area (30 km radius) and therefore may include taxa not present. The databases also often include very old records that may be incorrect or in some cases the taxa in question have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information also need to be taken into consideration when determining what actual species may be present within the specific area being investigated.

The significance of flora and fauna taxa was assessed using data from the following sources:

- *EPBC Act 1999*. Administered by the Australian Government (DCCEEW);
- *BC Act 2016*. Administered by the WA Government (DBCA);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List – the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- Priority Flora/ Fauna list. A non-legislative list maintained by DBCA for management purposes (fauna list released 7th October 2022; flora list released 22nd June 2022).

The EPBC Act also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA)[1];
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

Most but not all migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as Matters of National Environmental Significance (MNES) under the EPBC Act. Categories of significant species and communities are described in Appendix A.

Flora of significance identified during the literature review and database searches as previously being recorded in the desktop study area were assessed and ranked for their likelihood of occurrence within the survey area. The rankings and criteria used were:

- Unlikely: Area is outside of the currently documented distribution for the species/no suitable habitat (type, quality and extent) was identified as being present during the field/desktop study.

- Possible: Area is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field/desktop study, supported in some cases by recent records being documented from within or near the area.

- Likely to Occur: The survey area is located within the known distribution of the species in question and suitable habitat is expected to occur within the survey area.

- Known to Occur: The species in question was positively identified as being present during previous field surveys.

4.2 Flora and Vegetation Field Assessment

Botanica conducted a single-phase detailed flora and vegetation survey 02nd-03rd August 2023. The survey area was traversed by two people via 4WD and on foot. The survey was undertaken by Jim Williams (Director/Principal Botanist, Diploma of Horticulture) and Jennifer Jackson (Senior Botanist, BSc. (Honours) Environmental Management). A total of 33 vegetation quadrats (50m x 50m) were assessed within the survey area, consisting of 20 quadrats that were installed by Botanica in 2020 and re-scored during this survey. An additional 13 quadrats were installed during this 2023 survey. The location of quadrats and a GPS track log of the survey effort is shown in Figure 4-2 to Figure 4-10.

[1] Most but not all species listed under JAMBA are also specially protected under Specially Protected Species of the BC Act.

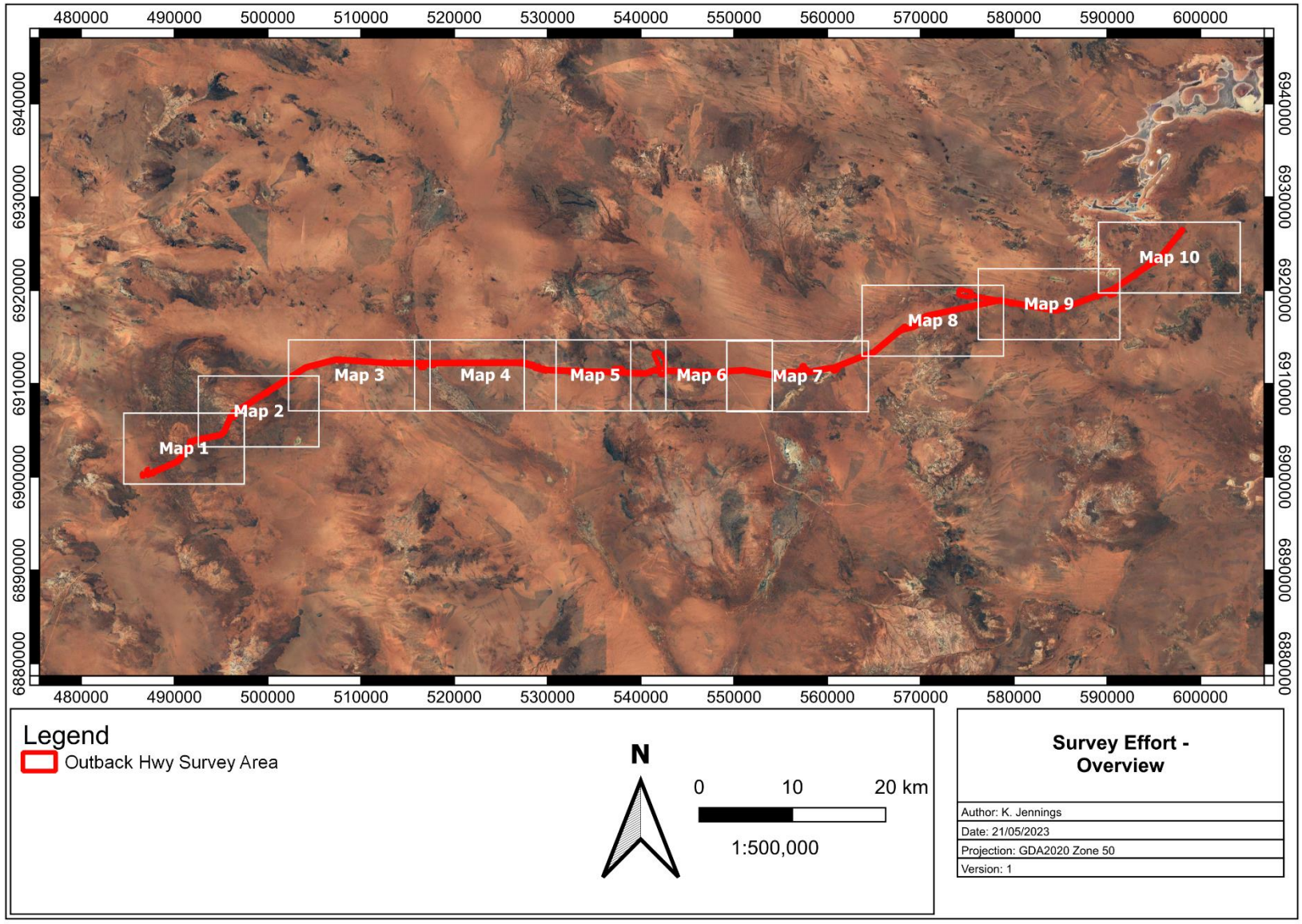

Figure 4-1: Overview of survey effort map series (1-10)

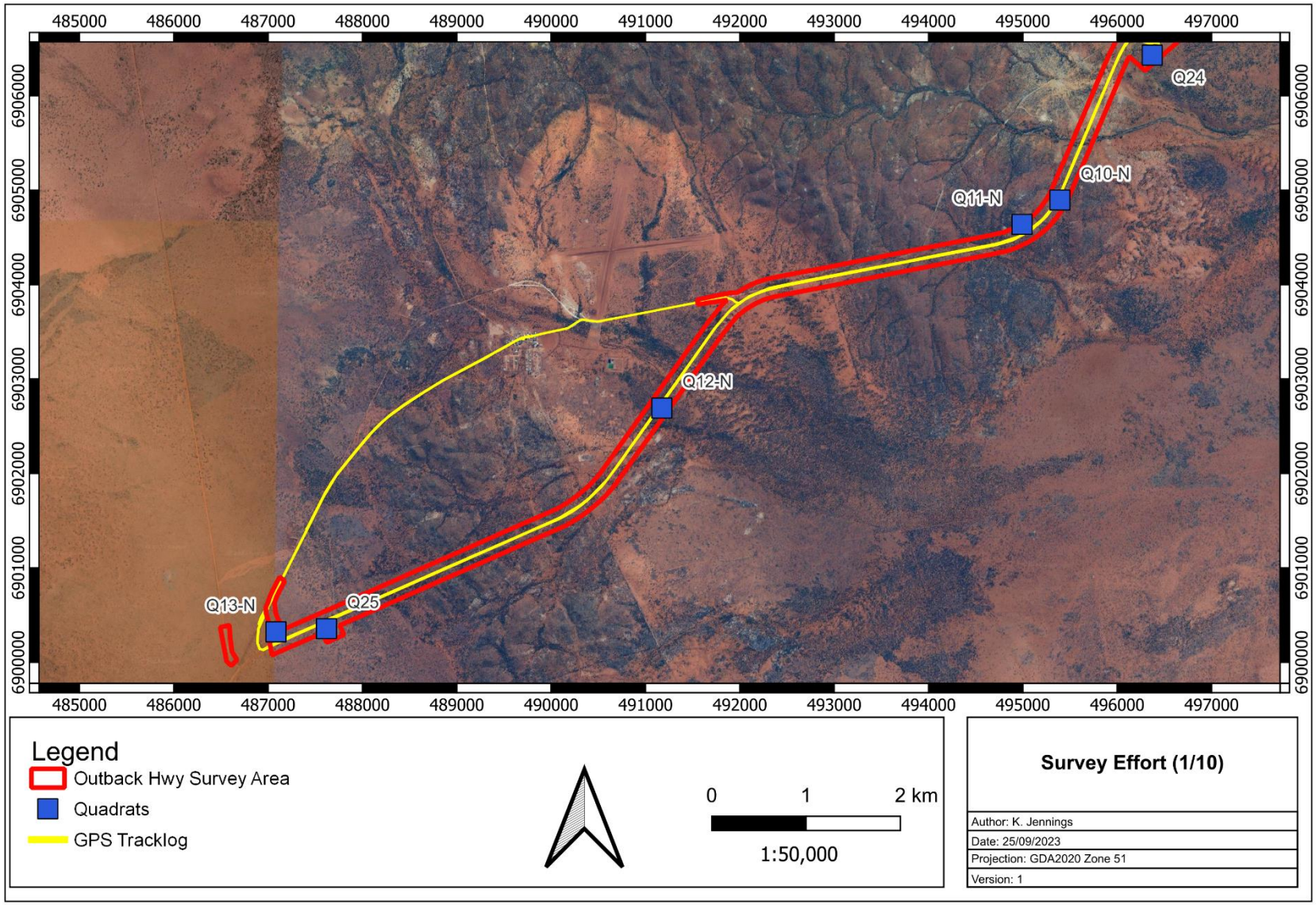

Figure 4-2: Survey effort within the survey area (1/10)

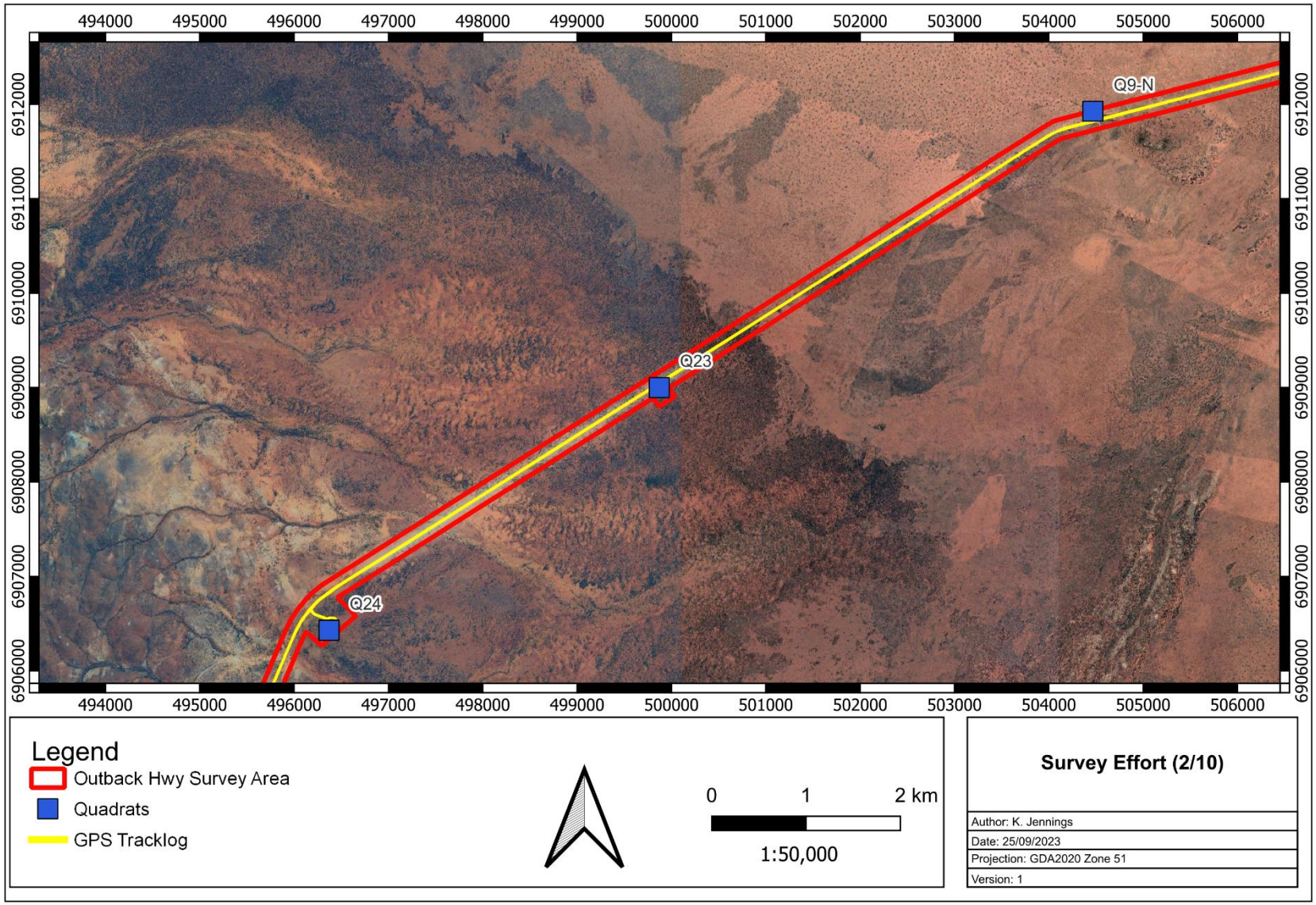

Figure 4-3: Survey effort within the survey area (2/10)

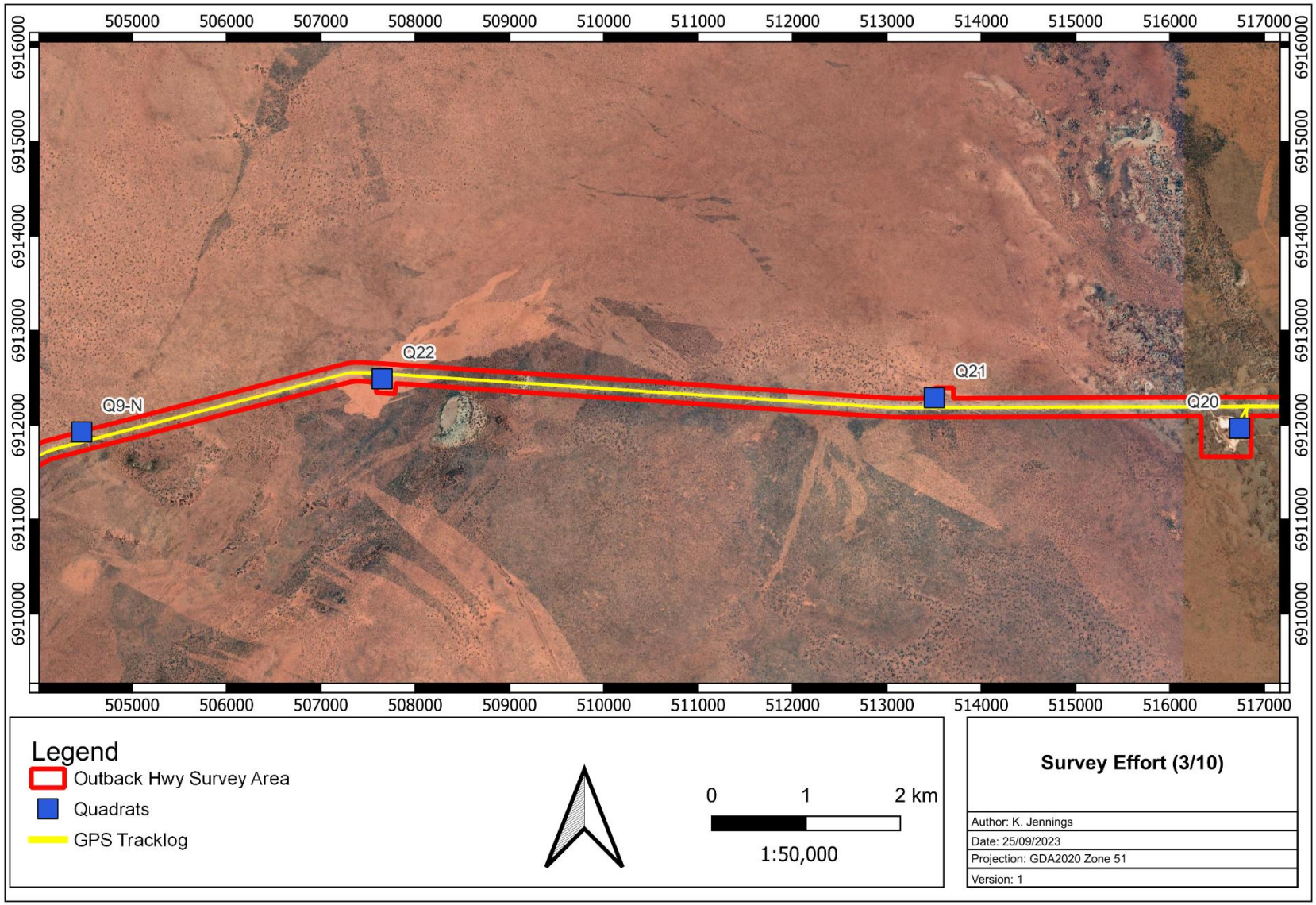

Figure 4-4: Survey effort within the survey area (3/10)

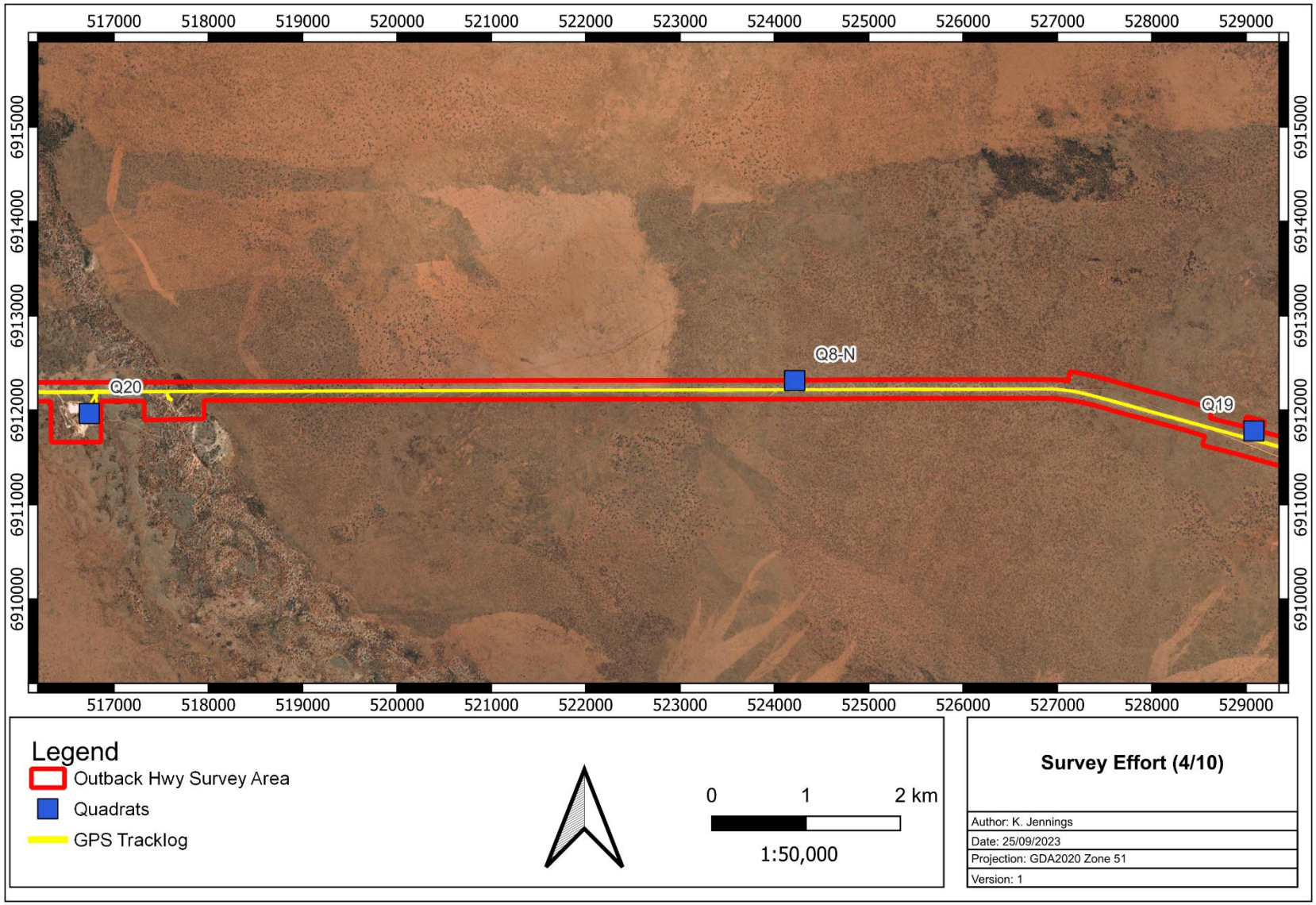

Figure 4-5: Survey effort within the survey area (4/10)

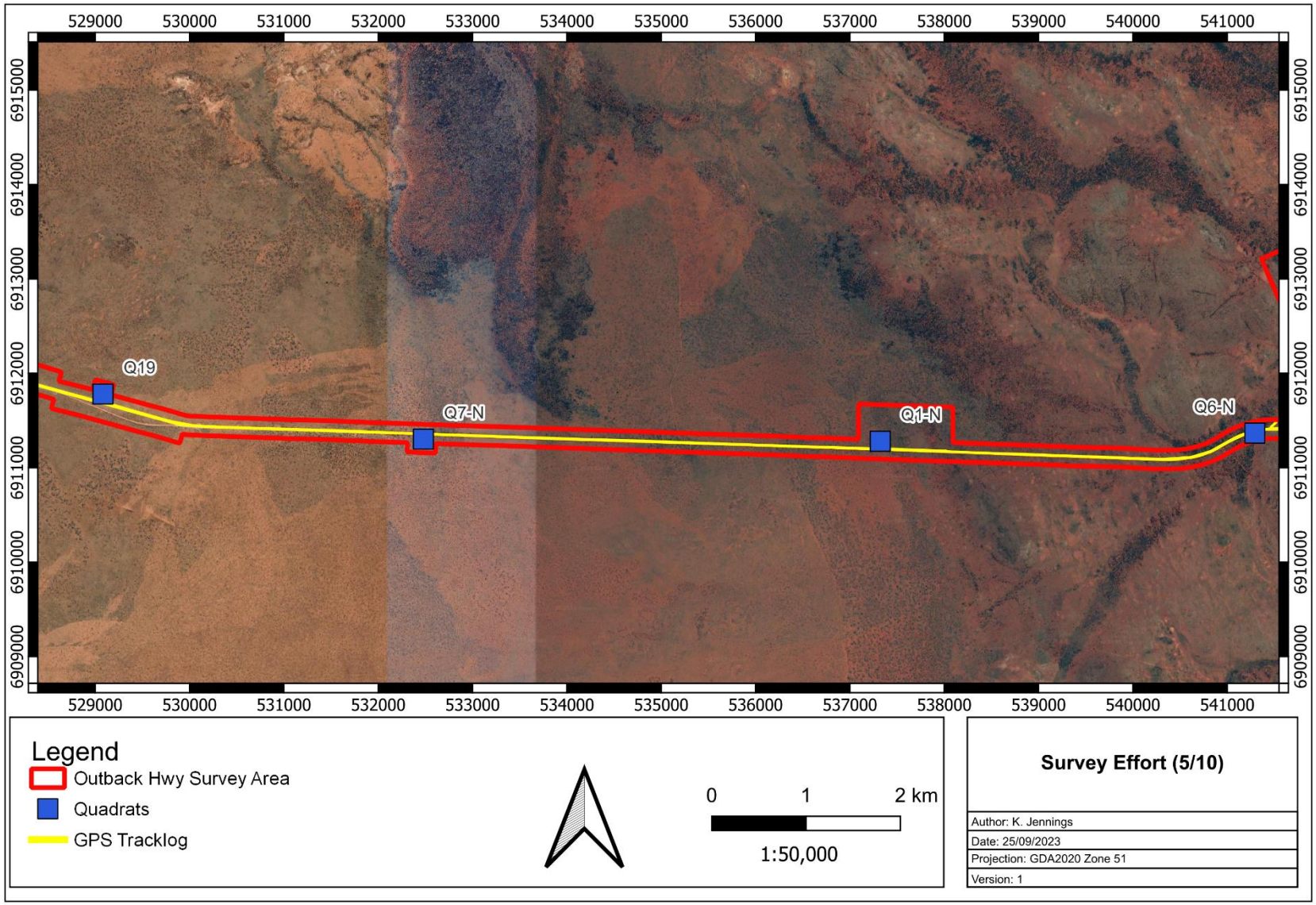

Figure 4-6: Survey effort within the survey area (5/10)

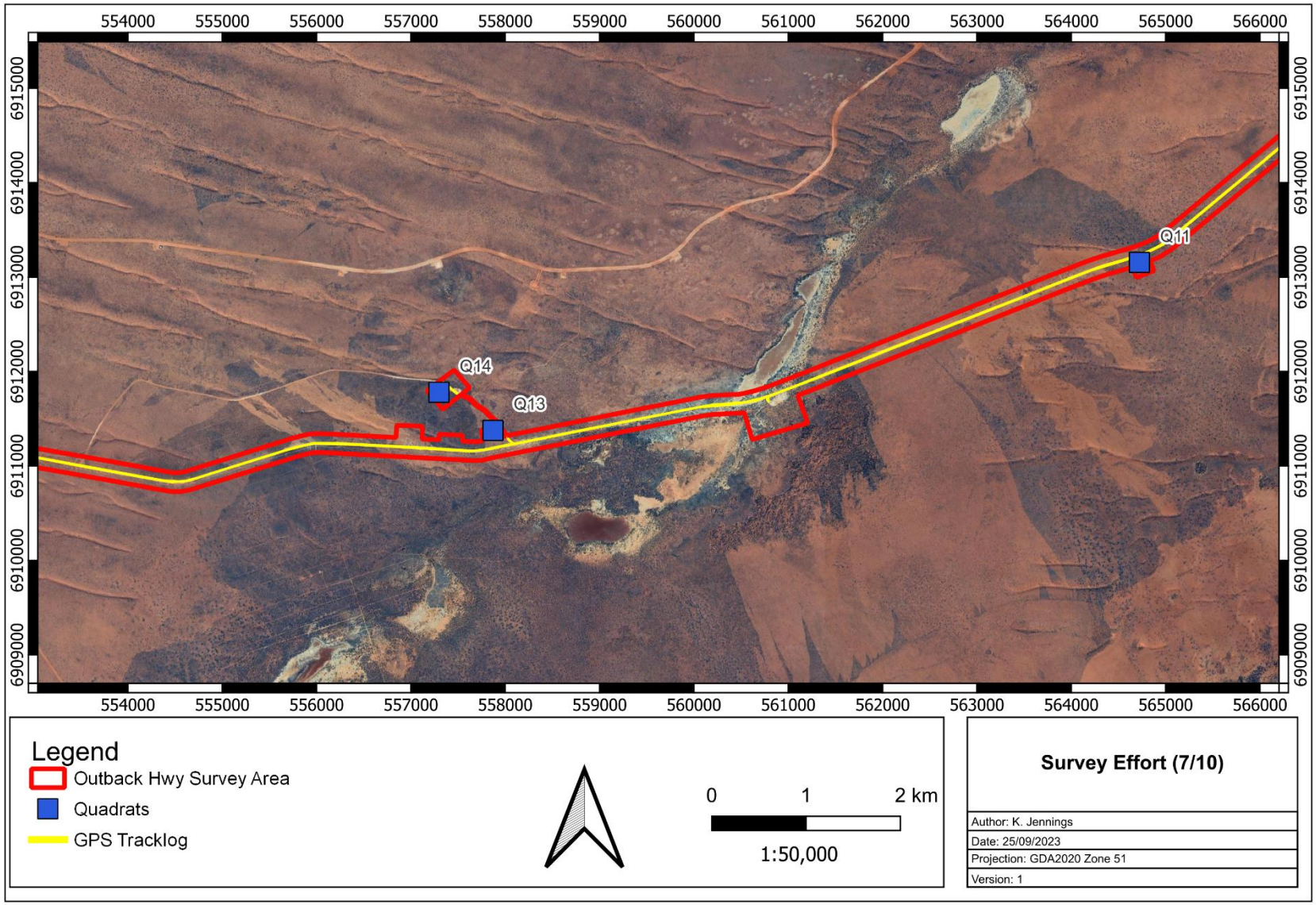

Figure 4-7: Survey effort within the survey area (7/10)

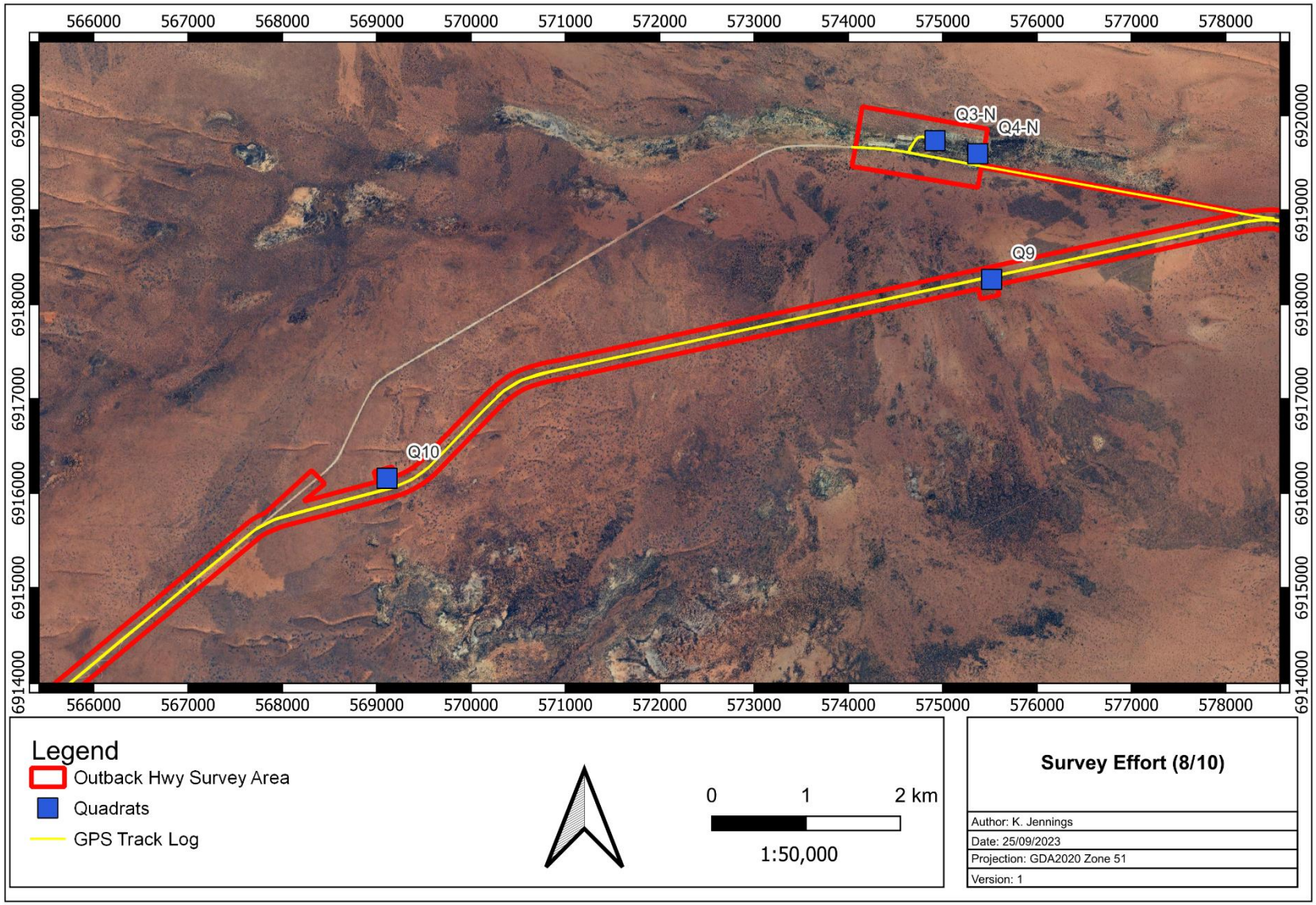

Figure 4-8: Survey effort within the survey area (8/10)

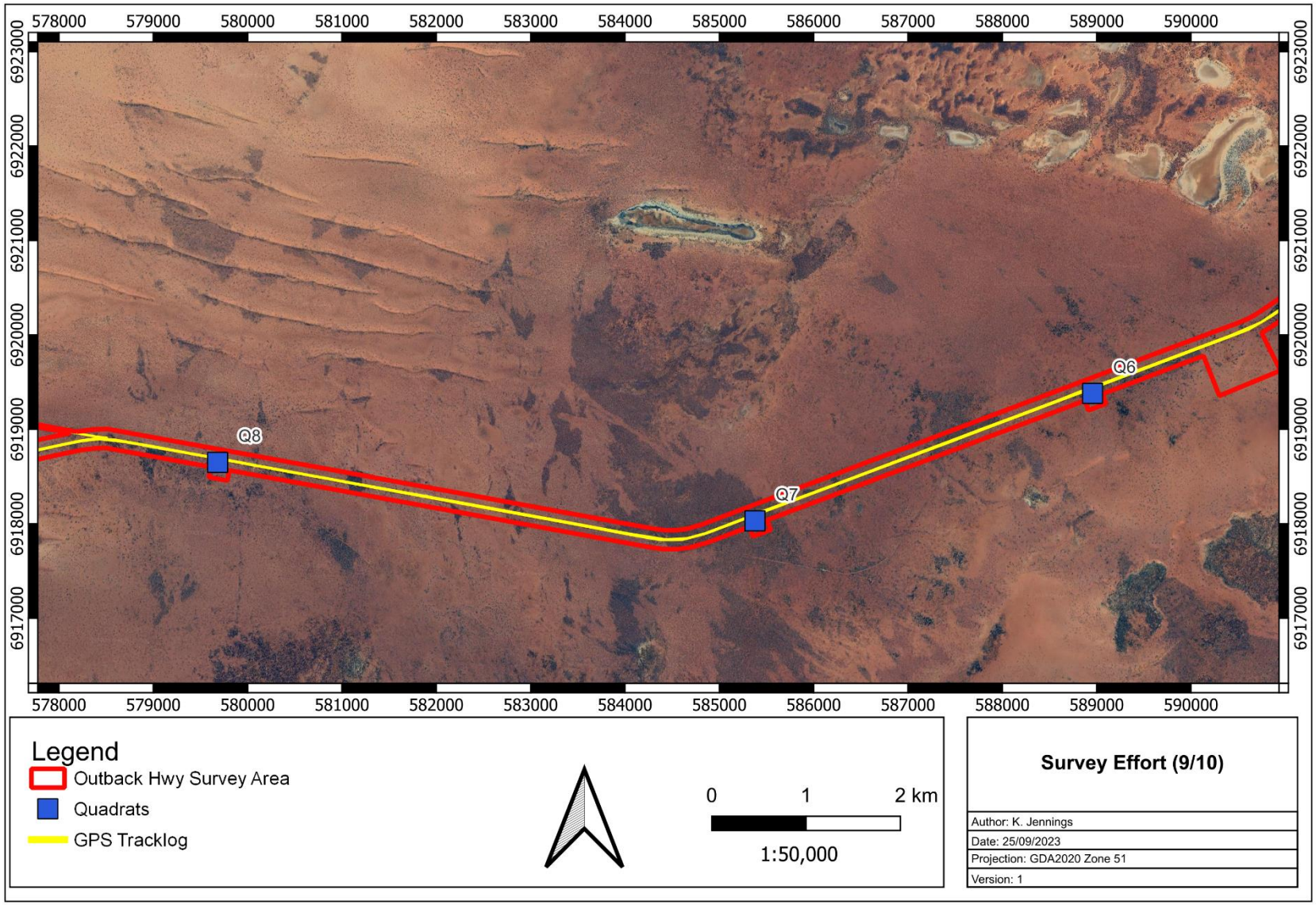

Figure 4-9: Survey effort within the survey area (9/10)

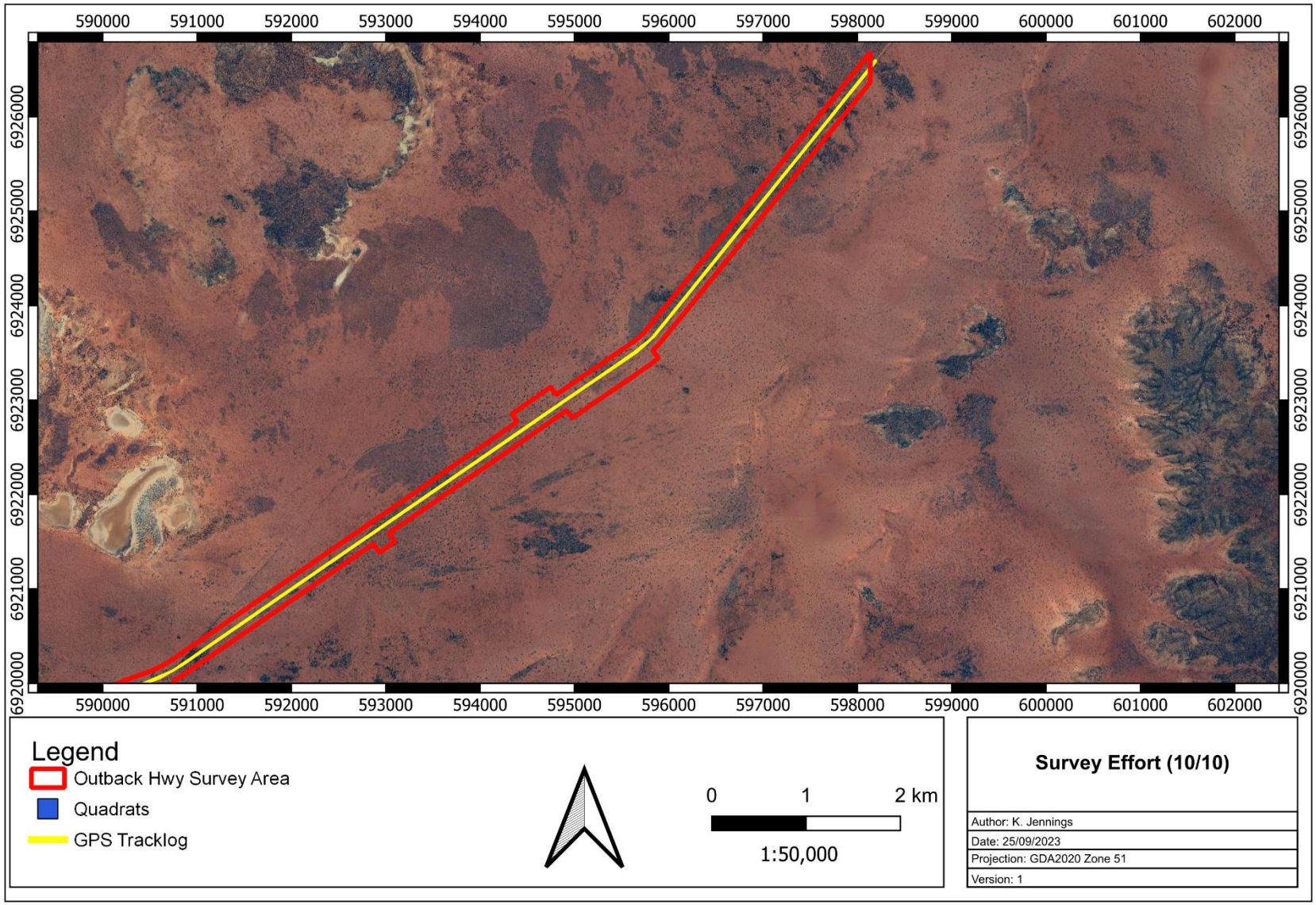

Figure 4-10: Survey effort within the survey area (10/10)

4.2.1 Vegetation Mapping

Prior to the commencement of field work, aerial photography was inspected and obvious differences in the vegetation assemblages were identified. The different vegetation types identified were then inspected during the field survey to assess their validity. A handheld GPS unit was used to record the coordinates of the boundaries between vegetation types.

At each quadrat, the following information was recorded:

- GPS location;
- Photograph of vegetation;
- Dominant taxa for each stratum (including height and percentage cover of dominant taxa);
- All vascular taxa (including annual taxa);
- Landform classification;
- Vegetation condition rating;
- Collection and documentation of unknown plant specimens; and
- Collection of significant flora for taxonomic identification.

Vegetation types were classified in accordance with the NVIS Level V-Association classification.

4.2.2 Detailed Flora and Vegetation Survey

A total of 33 quadrats (50 m x 50 m) were established within the survey area (Figure 4-2 and Appendix D). The quadrats were established by inserting metal pickets into the NW corner, and measuring the length of the resultant boundaries to verify the quadrats were 50m x 50 m (square quadrats). The objective was to have at least three quadrats per vegetation type to capture the floristic variations within the survey area. In vegetation communities with restricted distribution, fewer quadrats may be required to adequately represent floristic structure and diversity.

Following their establishment and boundary verification, the NW corner of each quadrat was recorded by GPS (Appendix D). All vascular plants within the quadrat were recorded (Appendix E) and three photographs of the quadrat were taken from the NW corner (Appendix G). This included recording of dominant taxa from the upper, middle and lower stratum, and sampling of all unknown taxa. Unknown taxa were identified using Botanica's own reference herbarium and relevant taxonomic keys or by a taxonomic consultant. Data on level of disturbance, presence of coarse fragments on surface, topographical position, elevation, aspect, percentage litter, percentage bare ground, percentage surface rock (bedrock and surface deposits), soil types (colour, profile, field texture and surface type), and vegetation structure were collected from each quadrat (Appendix E). Methods of recording data from these quadrats largely follow those outlined in CSIRO's Australian Soil and Land Survey Field Handbook (McDonald et al. 1998) and in accordance with EPA Guidelines (2016). Presence/absence data of taxa from sample sites were used to compile the representative vegetation types.

4.2.3 Targeted Flora Survey

A targeted search for Threatened and Priority flora was conducted within the survey area. Potential habitats for Threatened and Priority Flora were searched on foot (meandering through suitable habitat within the survey area) by two Botanica staff members to identify and record the locations of Threatened and Priority flora. Any locations of Threatened and Priority flora were recorded using a hand-held GPS and a simple plant count (not differentiated between juvenile/mature plants, flowering or non-flowering plants) was conducted for each record.

4.2.4 Flora Identification

Unknown specimens collected during the survey were identified with the aid of samples housed at the Botanica Herbarium and the Western Australian Herbarium.

4.3 Data Analysis Tools

Following field assessments, vegetation types and condition were mapped using the GIS program QGIS, and the hectare area/ percentage area of each vegetation type and condition within the survey area was calculated. Spatial maps illustrating the location of vegetation types and any significant flora/ vegetation and fauna were generated using QGIS.

4.3.1 PATN Analysis

The PATN software package was used to assess the similarities/ dissimilarities between quadrats based on presence/absence of species. Three annual species were excluded. Singleton taxa were included in the analysis. A total of 121 taxa recorded within the quadrats were included in the analysis.

The analysis produced a quantitative estimate of the relationship between species composition of each quadrat. The classifications were based upon a Bray-Curtis association matrix using a flexible Unweighted Pair Group Arithmetic Mean (UPGMA) method (with a beta value of -0.1) which standardises the data enabling the analysis to be completed. Semi-strong hybrid (SSH) ordination of the quadrat is then undertaken to show spatial relationships between groups and to elucidate possible environmental correlates with the classification.

The analysis also produced a stress value which is a measure of the ‘strength’ of the analysis (i.e., how well the quadrats are grouped together into the appropriate floristic groups). The lower the stress value the greater the strength of the analysis with a value of less than 0.3 showing that the analysis appropriately grouped quadrats. A stress value greater than 0.3 suggests that the analysis was unable to group quadrats appropriately due to extraneous variables (i.e., other factors influencing differences in floristic groups other than species composition e.g., fire, clearing disturbance etc.). The stress factor of 0.2059 indicates that the quadrat analysis was sufficiently robust.

4.3.2 EstimateS

EstimateS software was used to estimate species richness present using the Chao2 richness estimator. For any number of samples, the estimator uses the existing pattern of species accumulation to estimate the true number of species at a site. The estimators tend to under-estimate species number when sample size is small, hence the estimated number of true species can be seen to increase with sample size. This software was also used to compute Coleman rarefaction curves estimates which were used to calculate species accumulation curves.

4.4 Terrestrial Fauna Field Assessment

Botanica conducted a basic fauna survey on 02nd-03rd August 2023. The survey area was traversed by two people via 4WD and on foot. The survey was undertaken by Jim Williams (Director/Principal Botanist, Diploma of Horticulture) and Jennifer Jackson (Senior Botanist, BSc. (Honours) Environmental Management) (Figure 4-2).

Fauna habitat types were identified across the survey area based on broad major vegetation groups and associated landform. A handheld GPS unit was used to record the coordinates of the boundaries between fauna habitats and each habitat was photographed.

The main aim of the fauna habitat assessment was to determine the likelihood of significant fauna species utilising habitat within the survey area. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

Available information on the habitat requirements of significant fauna species listed as possibly occurring in the area (determined from the desktop assessment) was researched. During the field survey, the habitats within the survey area were assessed and specific elements identified, if present, to determine the likelihood of listed Threatened and Priority species utilising habitat within the survey area. Opportunistic observations of fauna species were made during all field survey work.

Fauna of significance identified during the literature review and database searches as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the survey area. The rankings and criteria used were:

- Would Not Occur: There is no suitable habitat for the species in the survey area and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).

- Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 20 km of the survey area. Populations do however persist outside of this area.

- Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the Great Victoria Desert region. Populations do however persist outside of this area.

- Unlikely to Occur: The survey area is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located nearby but the site itself would not support a population or part population of the species.

- Possibly Occurs: Survey area is within the known distribution of the species in question and habitat of at least marginal quality was identified as likely to be present during the literature review and background assessment, supported in some cases by recent records being documented in literature or database searches from within the desktop search area. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

- Likely to Occur: Survey area is within the known distribution of the species in question and habitat of high quality was identified as likely to be present during the literature review and background assessment, supported in some cases by recent records being documented in literature or database searches from within or near the survey area.

- Known to Occur: The species in question has been positively identified as being present (for sedentary species) or as using the survey area as habitat for some other purpose (for non-sedentary/mobile species) during field surveys within or near the survey area. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. tracks, foraging debris, scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

4.5 Personnel Involved

Table 4-1: Personnel involved with the flora, vegetation and fauna survey/ reporting

Staff Member	Position/ Qualifications	Experience	Tasks conducted during survey
Jim Williams	Director/Principal Botanist, Diploma of Horticulture	20+ years' experience across WA	Flora and vegetation survey- identifying flora species within quadrats and opportunistic flora observations. Identifying and recording vegetation types Fauna survey-opportunistic fauna observations and fauna habitat assessments.
Jennifer Jackson	Senior Environmental Consultant (BSc-Honours Environmental Management)	20 years' experience across WA	Flora and vegetation survey- identifying flora species within quadrats and opportunistic flora observations. Identifying and recording vegetation types Fauna survey-opportunistic fauna observations and fauna habitat assessments.

4.6 Scientific Licences

Table 4-2: Scientific Licenses of Botanica Staff coordinating the survey

Licensed Staff	Permit Number	Expiry
Jim Williams	FB62000457(licence to take flora for scientific purposes)	04/08/2025
Jennifer Jackson	FB62000309 (licence to take flora for scientific purposes)	11/01/2024

4.7 Survey Limitations and Constraints

It is important to note that flora/ vegetation and fauna surveys will entail limitations notwithstanding careful planning and design. Potential limitations are listed in Table 4-3.

Table 4-3: Limitations and constraints associated with the flora/ vegetation and fauna survey

Variable	Potential Impact on Survey	Details
Access problems	Minor constraint	The survey was conducted via 4WD and on foot. Access was readily available via access tracks extending through the survey area. However, heritage restrictions prevented some areas from being assessed, these areas were minor and Botanica considers this is unlikely to reduce the effectiveness and completeness of the survey effort.
Competency/ Experience	Not a constraint	The Botanica personnel that conducted the survey were regarded as suitably qualified and experienced. **Coordinating Staff**: Jim Williams and Jennifer Jackson **Field Staff**: Jim Williams (Botanist) and Jennifer Jackson (Senior Botanist) **Data Interpretation**: Jennifer Jackson (Botanist) and Kelby Jennings (Senior Environmental Consultant).
Timing of survey, weather & season	Minor constraint	Fieldwork was undertaken within the EPA's recommended primary survey time period for the Eremaean Province (i.e., 6-8 weeks following winter rainfall). However, below-average rainfall in the months preceding the survey have limited the presence of flowering material and ephemeral species.
Area disturbance	Minor constraint	The majority of native vegetation within the survey area was in good to very good condition. However, recent fires (5-10 years) have occurred in large sections of the survey area. Although vegetation is recovering well, structure and floristic composition of native vegetation complexes have been affected.
Survey Effort/ Extent	Not a constraint	Survey intensity was appropriate for the size/significance of the area with a detailed flora survey and basic fauna survey completed to identify vegetation types/ fauna habitats and significant flora, fauna and vegetation. A targeted search to identify significant flora was conducted within potential habitats within the survey area.
Availability of contextual information at a regional and local scale	Not a constraint	Significant flora data provided by the DBCA were used to identify any potential locations of Threatened/Priority flora species. BoM, DWER, DPIRD, DBCA and DCCEEW databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region. Botanica has conducted numerous surveys within the Great Victoria Desert bioregion and was also able to obtain information about the area from previous research conducted within the area. Results of previous assessments in the local area were reviewed to provide context on the local environment.
Data Analysis	Not a constraint	Botanica staff conducting the PATN statistical analyses are not statistical analysts and have basic statistics training. These analyses were used to provide basic information on the relationships between vegetation communities delineated in the field.
Completeness	Not a constraint	In the opinion of Botanica, the survey area was covered sufficiently in order to identify vegetation assemblages. All observed flora individuals were able to be identified to species level. The vegetation associations for this study were based on visual descriptions of locations in the field. The distribution of these vegetation associations outside the study area is not known, however vegetation associations identified were categorised via comparison

Variable	Potential Impact on Survey	Details
		to vegetation distributions throughout WA given on NVIS (DotEE, 2017).

5 RESULTS

5.1 Desktop Assessment

5.1.1 Flora/ Vegetation

The ALA desktop search identified 372 vascular flora species as occurring within 40 km of the survey area, representing 153 genera from 50 families. The most diverse families were Fabaceae (47 species), Asteraceae (40 species) and Chenopodiaceae (39 species). The most dominant genera were *Eremophila* (29 species), *Acacia* (27 species) and *Eucalyptus* (25 species). The total species list for the ALA desktop search is located in Appendix H.

5.1.1.1 Significant Flora

The results of the literature review, combined search of the DBCA's Flora of Conservation Significance databases (DBCA, 2021a), ALA search (2022) and DCCEEW protected matters search tool (DCCEEW, 2023a). The desktop assessment identified 25 significant flora species occurring within the desktop study area, consisting of seven Priority 1, one Priority 2, 12 Priority 3 and five Priority 4 flora taxa (Table 5-1). No Threatened flora were identified as potentially occurring.

These taxa were assessed for distribution and known habitat to determine their likelihood of occurrence within the survey area. This assessment identified two species as previously recorded within the survey area, consisting of one Priority 3 and one Priority 4 taxa. In addition, two species were assessed as likely to occur, consisting of two Priority 3 taxa, and three species were assessed as possibly occurring, consisting of one Priority 3 and two Priority 4 flora taxa (Table 5-1). The location of significant flora records within the desktop study area is shown in Figure 5-1.

Table 5-1: Pre-survey Likelihood of occurrence for Threatened and Priority flora within the survey area

Taxon	EPBC Act	BC Act	DBCA Priority	Description (WAHERB, 2020)	Assessment	Likelihood of Occurrence
Grevillea sp. Victoria Desert (R. Davis et al. RD 11611)	-	-	P1	Red sand. Flat, seasonally inundated areas.	Isolated records in region, habitat unlikely to be present.	Unlikely
Lechenaultia aphylla	-	-	P1	Small, tangled shrub, 0.3 m high, apparently leafless. Red sand. Slopes, drainage areas.	Isolated records in region, habitat unlikely to be present.	Unlikely
Philotheca linearis	-	-	P1	Shrub, to 2 m high. Fl. white, Jul. Yellow sand. Base of granite outcrop.	Isolated records in region, habitat unlikely to be present.	Unlikely
Philotheca tubiflora	-	-	P1	Compact, much-branched shrub, 0.2-0.6 m high. Fl. pink-white, Jun to Oct. Rocky rises & hills, outcrops.	At extreme of known range, habitat unlikely to be present.	Unlikely
Tecticornia mellarium	-	-	P1	Erect, perennial shrub, 0.2-0.4 m high. Well-drained red gypseous sand, clay. Gypseous dunes, margins of playa lakes, on clay pans.	Outside known range of species.	Unlikely
Tecticornia sp. Lake Way (P. Armstrong 05/961)	-	-	P1	Small upright shrub 30 to 40 cm tall with a spread to 10 cm. dense succulent, foliage yellow and green. Flat, clay, Salt Lake on	Outside known range of species.	Unlikely
Vittadinia cervicularis var. *oldfieldii*	-	-	P1	Annual, herb, 0.1-0.3 m high. Fl. white-purple-blue, Aug to Sep. Alluvium.	Isolated records in region, habitat unlikely to be present.	Unlikely
Calytrix warburtonensis	-	-	P2	Shrub, 0.3-0.6 m high. Fl. white, Mar or Sep to Oct. Rocky hills, breakaways.	Within known range, habitat unlikely to be present	Unlikely
Bossiaea eremaea	-	-	P3	Divaricately-branched, spreading shrub, to 1.2 m high. Fl. red-yellow-purple-brown, Jul to Sep. Deep red sand.	Within known range, habitat likely to be present.	Likely
Calytrix hislopii	-	-	P3	Breakaways, outcrops.	At extreme of known range, no previous records in vicinity of survey area.	Unlikely
Calytrix praecipua	-	-	P3	Shrub, 0.3-0.7 m high. Fl. pink-white, Jun to Jul or Sep to Nov. Skeletal sandy soils over granite or laterite. Breakaways, outcrops.	At extreme of known range, habitat unlikely to be present.	Unlikely
Eremophila annosocaulis	-	-	P3	Erect shrub, 40 cm high x 40 cm wide. Flowers purple / violet. Population structure: adult. Reproductive method: seeds. Rocky	Outside known range of species.	Unlikely
Goodenia lyrata	-	-	P3	Prostrate herb, with lyrate leaves. Fl. yellow, Aug. Red sandy loam. Near claypan.	Isolated records in region, habitat unlikely to be present.	Unlikely

Taxon	EPBC Act	BC Act	DBCA Priority	Description (WAHERB, 2020)	Assessment	Likelihood of Occurrence
Grevillea obliquistigma subsp. *cullenii*	-	-	P3	Spreading shrub, 0.3-0.7 m high. Fl. cream, Mar. Red sand.	Within known range, habitat likely to be present.	Likely
Lysiandra baeckeoides	-	-	P3	Shrub, 0.5-1.5 m high. Fl. white-yellow/green-yellow, Jul to Sep. Red lateritic & sandy clay soils. Granite outcrops.	At extreme of known range, habitat unlikely to be present.	Unlikely
Melaleuca apostiba	-	-	P3	Spreading shrub, to 2 m high, with grey fissured bark and dull green leaves. Fl. red, Jun.	Within known range, previously recorded in vicinity of survey area.	Previously Recorded
Olearia mucronata	-	-	P3	Densely branched, unpleasantly aromatic shrub, 0.6-1 m high. Fl. white & yellow, Aug to Dec or Jan. Schistose hills, along drainage	Isolated records in region, habitat unlikely to be present.	Unlikely
Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	-	-	P3	Shrub, 0.3-1 m high. Fl. yellow, Jun. Red sand. Plains.	Isolated records in region, habitat may be present.	Possible
Tecticornia cymbiformis	-	-	P3	Erect, perennial shrub, 0.3-0.5 m high. Saline soils. Along the edge of creeklines.	At extreme of known range, habitat unlikely to be present.	Unlikely
Thryptomene nealensis	-	-	P3	Shrub, ca 0.3 m high. Fl. pink, Oct. Lateritic breakaways	At extreme of known range, habitat unlikely to be present.	Unlikely
Comesperma viscidulum	-	-	P4	Shrub, to ca 0.7 m high.	Within known range, previously recorded in vicinity of survey area.	Previously Recorded
Conospermum toddii	-	-	P4	Spreading shrub, 1.2-2 m high. Fl. white/white-yellow, Jul to Oct. Yellow sand. Sand dunes.	Within known range, habitat may be present	Possible
Frankenia glomerata	-	-	P4	Prostrate shrub. Fl. pink-white, Nov. White sand.	Isolated records in region, habitat unlikely to be present.	Unlikely
Grevillea secunda	-	-	P4	Low spreading shrub, 0.3-0.8 m high. Fl. red, Sep to Oct. Yellow or red sand. Sand dunes, sandplains.	Isolated records in region, habitat may be present.	Possible
Olearia arida	-	-	P4	Erect shrub, to 0.4 m high. Fl. white, Jul to Sep. Red or yellow sand. Undulating low rises.	Outside known range of species.	Unlikely

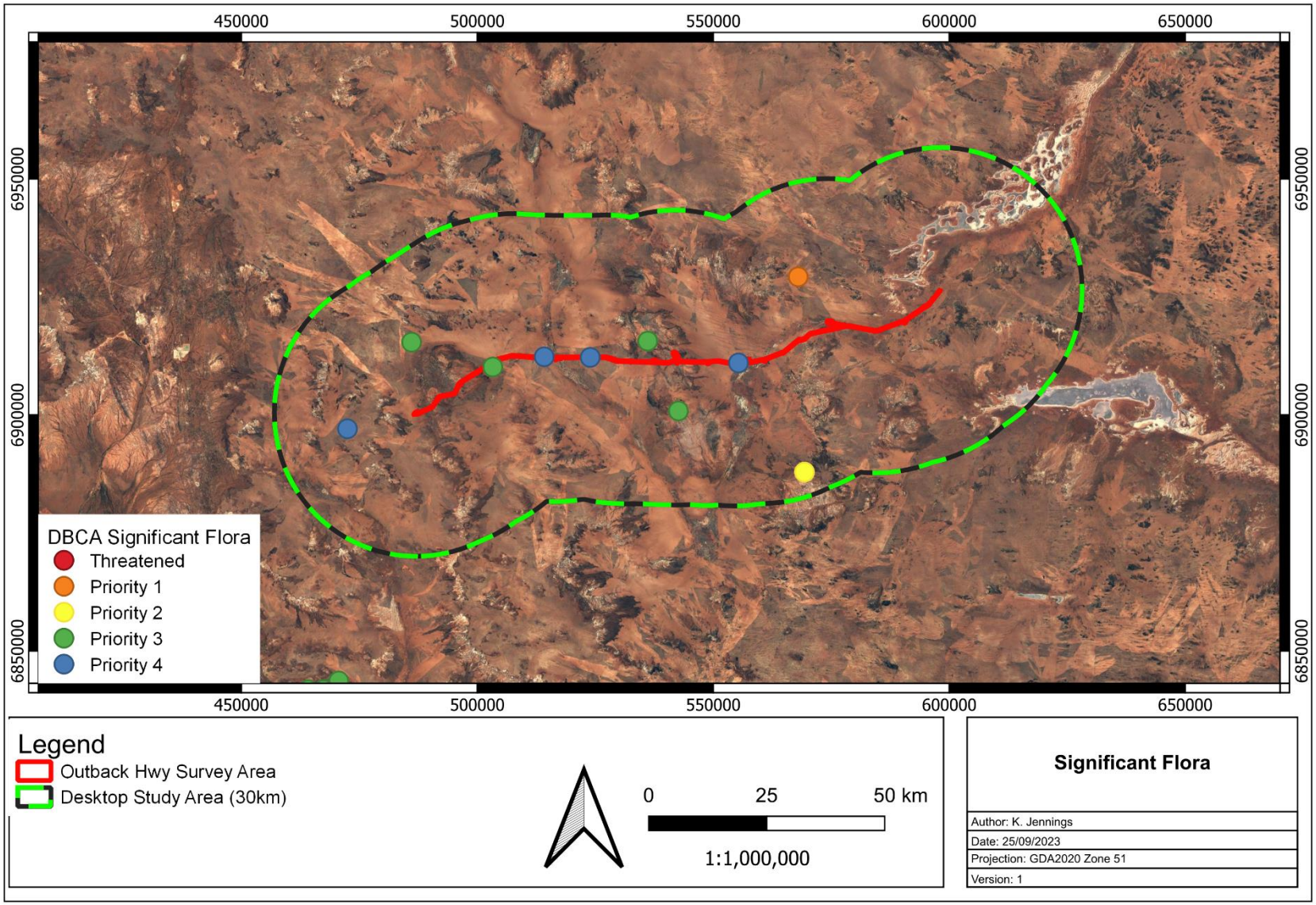

Figure 5-1: Significant flora within the desktop study area

5.1.2 Ecological Communities

The EPBC Protected Matters search did not identify any Threatened Ecological Communities (TEC's), as listed under the Commonwealth EPBC Act, occurring within the desktop study area.

The DBCA's Priority/ Threatened Ecological Communities Database Search (DBCA, 2022) did not identify any TEC's or Priority Ecological Communities (PEC) occurring within the desktop survey area.

Analysis of the Priority Ecological Communities within the Great Victoria Desert region (DBCA, 2021) did not identify any additional significant vegetation assemblages as likely or possibly occurring within the survey area.

5.1.3 Fauna

The ALA desktop search identified 207 native vertebrate fauna species recorded within the desktop survey area, consisting of 105 bird, 15 mammal, 81 reptile and six amphibian species, some of which have the potential to occur in or utilise sections of the survey area at times.

5.1.3.1 Introduced (Feral) Fauna

The desktop review identified two species of introduced animals, representing two families, that could frequent the area, as listed in Table 5-2.

Table 5-2: Introduced fauna potentially occurring within 40 km of the survey area

Family	Species	Common Name
Camelidae	*Camelus dromedarius*	Dromedary Camel
Muridae	*Mus musculus*	House Mouse

5.1.3.2 Significant Fauna

The EPBC Protected Matters Search (DCCEEW, 2023a) identified nine fauna species of significance, consisting of seven Threatened and two Migratory taxa or Specially Protected, as previously being recorded within the desktop study area. In addition, five migratory shorebird species were assessed collectively due to their similar habitat requirements. These species were assessed for habitat requirements in relation to the survey area (Table 5-3). The assessment identified two significant fauna species as potentially occurring within the survey area: Grey Falcon (*Falco hypoleucos*)(VU) and Southern Whiteface (*Aphelocephala leucopsis)*(VU). These species are discussed in further detail in Section 5.2.10.

The DBCA Priority/ Threatened Fauna Database Search (DBCA, 2021b) did not identify any significant fauna records within the desktop study area.

Table 5-3: Potentially occurring significant fauna assessment

Taxon	Common Name	EPBC Act	BC Act	DBCA	Range/ Habitat	Assessment	Likelihood
Birds							
Pezoporus occidentalis	Night Parrot	EN	CR	-	Most habitat records are of *Triodia* (Spinifex) grasslands and/or chenopod shrublands in the arid and semi-arid zones, or *Astrebla* spp. (Mitchell grass), shrubby samphire and chenopod associations, scattered trees and shrubs, *Acacia aneura* (Mulga) woodland, treeless areas and bare gibber are associated with sightings of the species. Roosting and nesting sites are consistently reported as within clumps of dense vegetation, primarily old and large Spinifex (*Triodia*) clumps, but sometimes other vegetation types (DCCEEW, 2022b).	Outside known range, no suitable habitat.	Would Not Occur
Falco hypoleucos	Grey Falcon	VU	VU	-	Occurs at low densities across inland Australia. Frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. Has been observed hunting in treeless areas and frequents tussock grassland and open woodland.	Survey area may form part of larger home range.	Possible
Polytelis alexandrae	Princess Parrot, Alexandra's Parrot	VU	-	P4	Occurs across the arid zone from near Oodnadatta in South Australia, west to near Coolgardie and the east Murchison River in Western Australia, and north to near the Fitzroy River in Western Australia. Usually recorded from shrubland in swales between sand dunes, with occupied sites typically having a variety of shrubs (including *Grevillea*, *Hakea*, *Cassia* and *Eremophila* species) among scattered emergent trees, with a ground-cover of spinifex *Triodia* species. The species occurs less often in woodland, and sometimes occurs in vegetated riverine and littoral areas.	Low population densities throughout range, habitat likely marginal.	Unlikely
Leipoa ocellata	Malleefowl	VU	VU	-	Scrublands and woodlands dominated by mallee and wattle species (DCCEEW, 2022b).	Within known range, habitat unsuitable for breeding and marginal for transient presence. No records in desktop study area.	Unlikely
Aphelocephala leucopsis	Southern Whiteface	VU	-	-	Occurs across most of mainland Australia south of the tropics, from the north-eastern edge of the Western Australian wheatbelt, east to the Great Dividing Range. Habitat includes 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. Critical habitat includes relatively undisturbed open woodlands and shrublands with an understorey of grasses and/or shrubs, habitat with low tree densities and an herbaceous understory litter cover which provides essential foraging habitat, and living and dead trees with hollows and crevices which are essential for roosting and nesting.	Within known range, habitat may be present.	Possible

Taxon	Common Name	EPBC Act	BC Act	DBCA	Range/ Habitat	Assessment	Likelihood
Apus pacificus	Fork-tailed Swift	MI	MI	-	Low to very high airspace over varied habitat from rainforest to semi desert (Birdlife Australia, 2019).	Very occasional aerial transients only.	Unlikely
Motacilla cinerea	Grey Wagtail	MI	-	-	Running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields (Morecombe 2004).	No suitable habitat.	Would Not Occur
Migratory shorebirds (various species)	-	CR/MI	CR/MI	-	Muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland.	No suitable habitat.	Would Not Occur
Mammals							
Sminthopsis psammophila	Sandhill Dunnart	EN	EN	-	Recorded from five widely-separated localities in the Great Victoria Desert. Occur in sand dunes and when the vegetation is dominated by spinifex hummock grassland (*Triodia* spp.). Overstorey vegetation is variable, with groves of desert oak (*Allocasuarina decaisneana*), or low, open Eucalyptus and Callitris woodlands.	No records in desktop study area.	Unlikely
Reptiles							
Liopholis kintorei	Great Desert Skink	VU	VU	--	Endemic to the Australian arid zone in the western deserts region. There appears to have been a range contraction in WA with surveys failing to detect the species in former strongholds in the Gibson Desert north of Warburton and in the Great Victoria Desert. Habitats include palaeodrainage country vegetated with *Melaleuca glomerata* (white tea tree) and *Triodia pungens* (gummy spinifex); and lateritic downs and plains with *Triodia basedowi* (lobed spinifex).	Outside known range of species.	Unlikely

5.1.4 Other Areas of Conservation Significance

Yeo Lake is categorized as a wetland of national importance (Australian Nature Conservation Agency Wetlands) and is located within the desktop study area. This wetland does not intersect the survey area, and proposed development activities are unlikely to impact values within this area.

The north-eastern extent of the survey area is located adjacent to the Yeo Lake Nature Reserve, which is also categorised an as Environmentally Sensitive Area under the *Environmental Protection Act 1986* (EP Act). Proposed development activities are unlikely to impact conservation values within this area.

Both proposed and gazetted conservation reserves are managed by DBCA with gazetted conservation reserves vested with the Conservation and Parks Commission of Western Australia. The Conservation and Parks Commission is an independent statutory authority that was established under the Conservation and Land Management (CALM) Act 1984 in November 2000 and is the controlling body in which the State's conservation estate, including national parks, conservation parks, nature reserves, state forests and timber reserves, are vested. The Conservation and Parks Commission develops policies and provides independent advice to the Minister for Environment with respect to conservation, the management of ecological biodiversity and the application of ecologically sustainable forest management. The DBCA manages land on behalf of the Conservation and Parks Commission.

A map showing areas of conservation significance in relation to the survey area are shown in Figure 5-2.

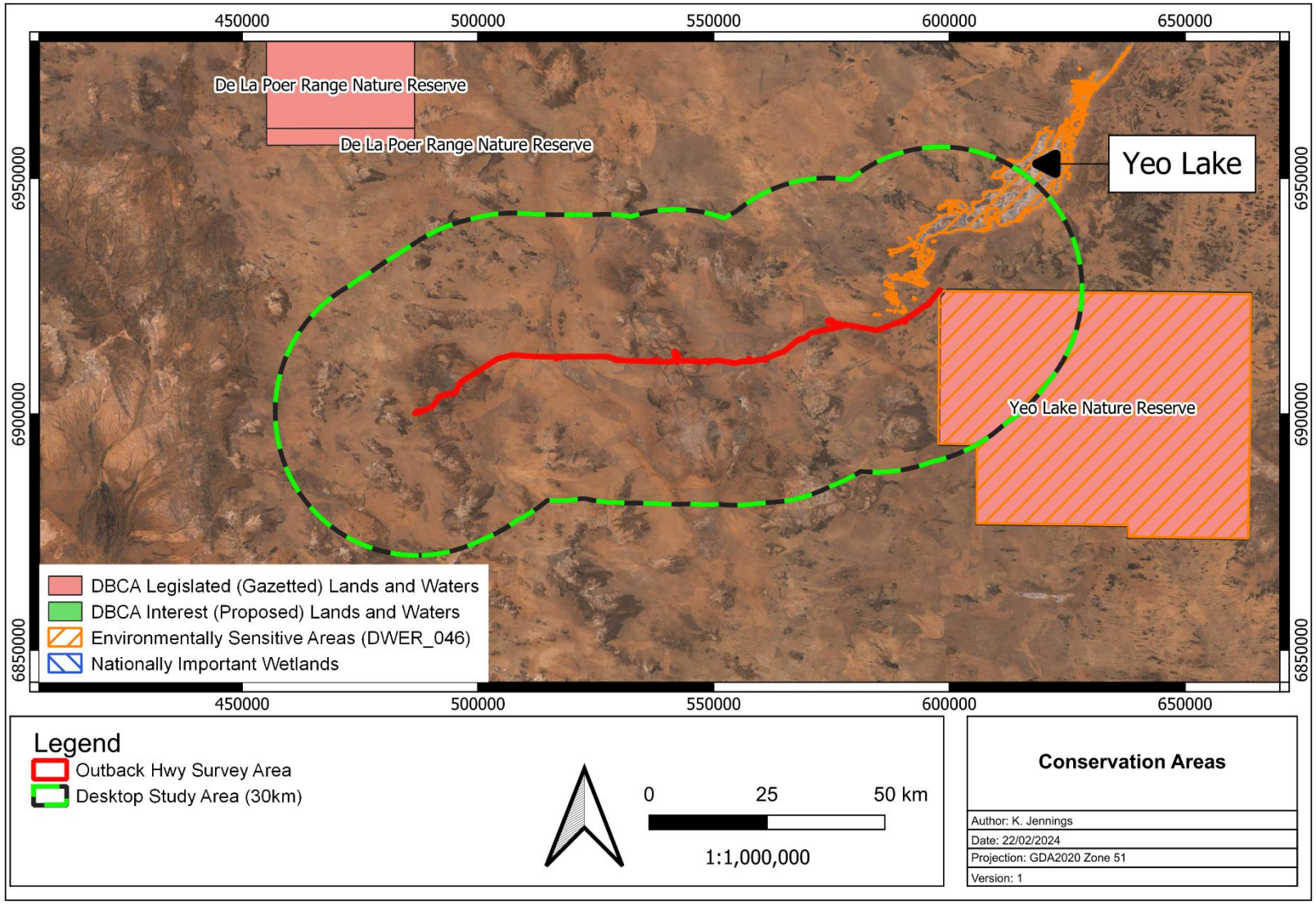

Figure 5-2: Conservation areas in relation to the desktop study area/ survey area

5.2 Field Assessment

5.2.1 Flora

The field survey identified 110 vascular flora taxa within the survey area. These taxa represented 57 genera across 29 families, with the most diverse families being Fabaceae (17 species), Chenopodiaceae (12 species) and Myrtaceae (nine species). Dominant genera include *Eremophila* (12 species), *Acacia* (10 species) and *Ptilotus* (six species). This total includes two introduced (weed) species. The full field species inventory is listed in Appendix B.

5.2.2 Introduced Flora

A total of two introduced flora species (weeds) were identified within the survey area, representing 1.8% of floristic diversity: Buffel Grass (*Cenchrus ciliaris*) and Ruby Dock (*Rumex vesicarius*). Neither of these species are categorised as Declared Plants or WoNS.

5.2.3 Significant Flora

According to the EPA Environmental Factor Guideline for Flora and Vegetation (EPA, 2016b) significant flora includes:

- flora being identified as Threatened or Priority species;
- locally endemic flora or flora associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- flora representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; and
- flora with relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

The field assessment did not identify any Threatened Flora taxa listed under EPBC Act or BC Act within the survey area.

The field assessment did not identify any Priority or otherwise significant flora taxa within the survey area. Previous

Based on the results of the field survey, the remaining 13 Priority Flora identified in the desktop assessment as ‘previously recorded’, ‘likely’ or ‘possible’ to occur were re-assessed for likelihood of presence within the survey area, as detailed in Table 5-7.

Table 5-4: Post-survey likelihood assessment

Taxon	EPBC Act	BC Act	DBCA	Description (WAHERB, 2020)	Assessment	Likelihood of Occurrence	Post-survey
Bossiaea eremaea	-	-	P3	Divaricately-branched, spreading shrub, to 1.2 m high. Fl. red-yellow-purple-brown, Jul to Sep. Deep red sand.	Perennial species. Habitat present but no individuals recorded. Potential habitat impacted by fire.	Likely	Possible
Grevillea obliquistigma subsp. *cullenii*	-	-	P3	Spreading shrub, 0.3-0.7 m high. Fl. cream, Mar. Red sand.	Perennial species. Habitat present but no individuals recorded. Potential habitat impacted by fire.	Likely	Possible
Melaleuca apostiba	-	-	P3	Spreading shrub, to 2 m high, with grey fissured bark and dull green leaves. Fl. red, Jun.	Previously recorded in vicinity of survey area (1963), so likely to be inaccurate.	Previously Recorded	Possible
Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	-	-	P3	Shrub, 0.3-1 m high. Fl. yellow, Jun. Red sand. Plains.	Perennial species, isolated records in region. Habitat present but no individuals recorded. Potential habitat impacted by fire.	Possible	Unlikely
Comesperma viscidulum	-	-	P4	Shrub, to ca 0.7 m high.	Previously recorded in vicinity of survey area, potential habitat impacted by fire. Historical records are dated from 2000 and 2001, but are located on the highway surface, so are not accurate indications of the locations of these individuals. Population size not recorded.	Previously Recorded	Possible
Conospermum toddii	-	-	P4	Spreading shrub, 1.2-2 m high. Fl. white/white-yellow, Jul to Oct. Yellow sand. Sand dunes.	Perennial species, isolated records in region. Habitat present but no individuals recorded. Potential habitat impacted by fire.	Possible	Unlikely
Grevillea secunda	-	-	P4	Low spreading shrub, 0.3-0.8 m high. Fl. red, Sep to Oct. Yellow or red sand. Sand dunes, sandplains.	Perennial species, isolated records in region. Habitat present but no individuals recorded. Potential habitat impacted by fire.	Possible	Unlikely

5.2.4 Vegetation Types

A total of eight vegetation types were identified within the survey area. These vegetation types were located within three landform types and comprised of five NVIS major vegetation groups. A summary of vegetation types is presented in Table 5-5. Vegetation maps are shown in Figure 5-4 to Figure 5-13.

Table 5-5: Summary of vegetation types within the survey area

Landform	NVIS Major Vegetation Group	Vegetation Type	Vegetation Code	Quadrat	Area (ha)	Area (%)
Clay-loam Plain	MVG 6 - Acacia forests and woodlands	*Acacia caesaneura*, *A. aptaneura*, *A. incurvaneura* low woodland over *Senna artemisioides* subsp. x *artemisioides*, *Senna artemisioides* subsp. *helmsii* mid shrubland over *Ptilotus obovatus* low shrubland	CLP-AFW1	Q10-N, Q11-N, Q12-N Q23, Q24	288.6	9.9
Sandy Plain	MVG 6 - Acacia forests and woodlands	*Acacia caesaneura*, *A. incurvaneura* low open woodland over *Triodia basedowii* closed hummock grassland	S-AFW1	Q5-N, Q6-N, Q17	191.9	6.5
	MVG 13 - Acacia open woodlands	*Acacia caesaneura*, *A incurvaneura* low open woodland over *Senna artemisioides* subsp. *filifolia*, *Eremophila latrobei* subsp. *latrobei* mid open shrubland over *Triodia basedowii* hummock grassland	S-AOW1	Q1-N, Q6, Q7, Q8, Q9, Q16, Q15	779.2	26.6
	MVG 8 - Casuarina forests and woodlands	*Acacia burkittii*/ *Allocasuarina helmsii* low open woodland over *Eremophila latrobei* mid open shrubland over *Triodia basedowii* hummock grassland	S-CFW1	Q20,	45.1	1.5
	MVG 11 - Eucalyptus Open Woodland	*Eucalyptus gongylocarpa* low woodland over *Acacia ligulata* mid shrubland over *Triodia basedowii* closed hummock grassland	S-EW1	Q9-N, Q13-N, Q21, Q25,	249	8.5
	MVG 14 - Mallee woodlands and shrublands	*Eucalyptus leptopoda* subsp. *elevata*, *Eucalyptus youngiana* open mallee woodland over *Acacia ligulata*, *Grevillea juncifolia* subsp. *juncifolia*, *Aluta maisonneuvei* mid isolated shrubs over *Triodia basedowii* hummock grassland	S-MWS1	Q2-N, Q7-N, Q8-N, Q11, Q13, Q14, Q19, Q22	868.5	29.6
	MVG 14 - Mallee woodlands and shrublands	*Eucalyptus concinna* open mallee woodland over *Eremophila latrobei* subsp. *glabra* mid open shrubland over *Triodia irritans* hummock grassland	S-MWS3	Q3-N, Q4-N	89.3	3.1
Sand Dune	MVG 11 - Eucalyptus Open Woodland	*Eucalyptus gongylocarpa* low open woodland over *Eucalyptus youngiana* open mallee shrubland over *Triodia basedowii* hummock grassland	SD-EW/MWS1	Q10	19.3	0.7
N/A	N/A	N/A	Cleared		399	13.6
Total					**2929.9**	**100**

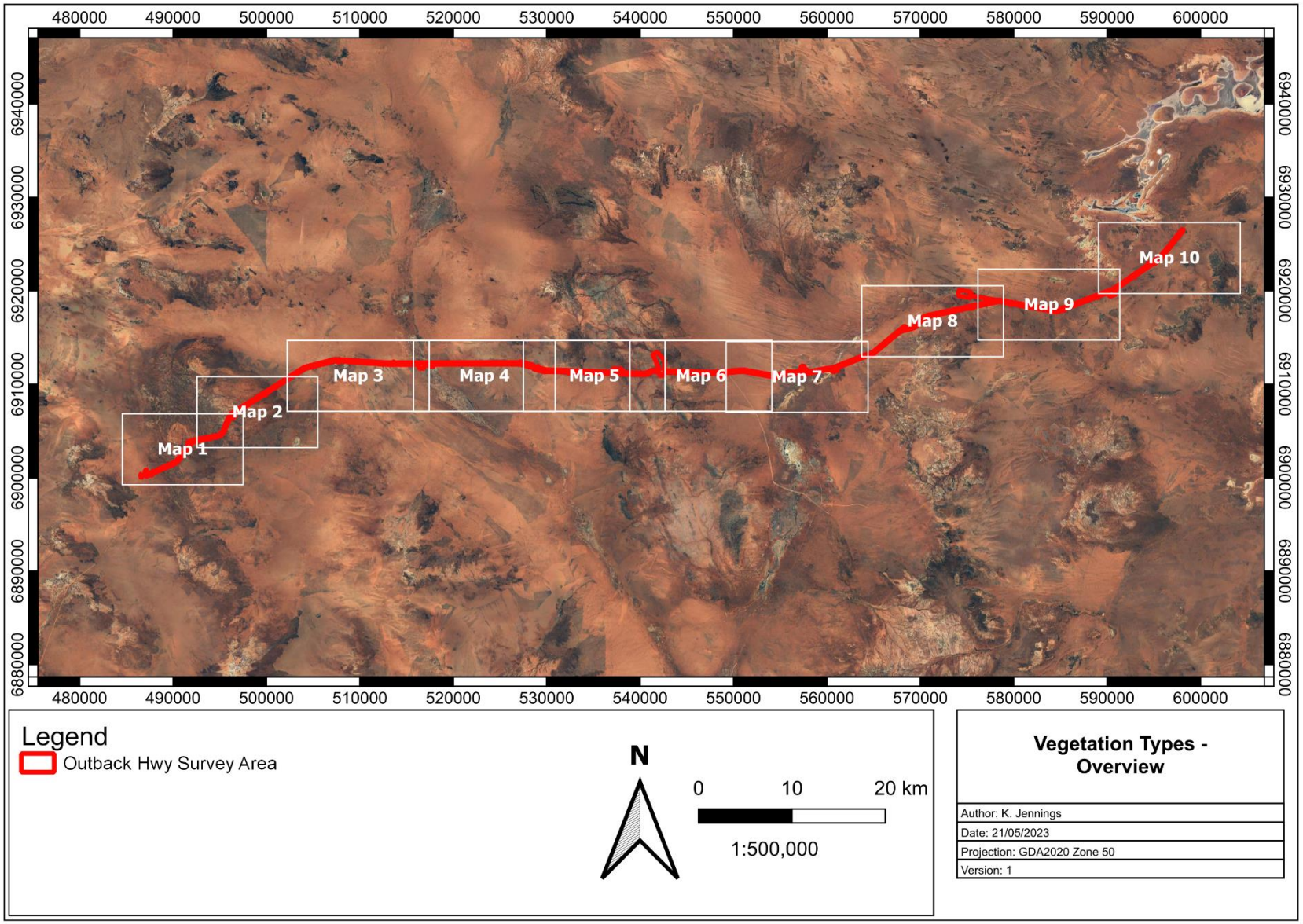

Figure 5-3: Overview of vegetation communities map series (1-10)

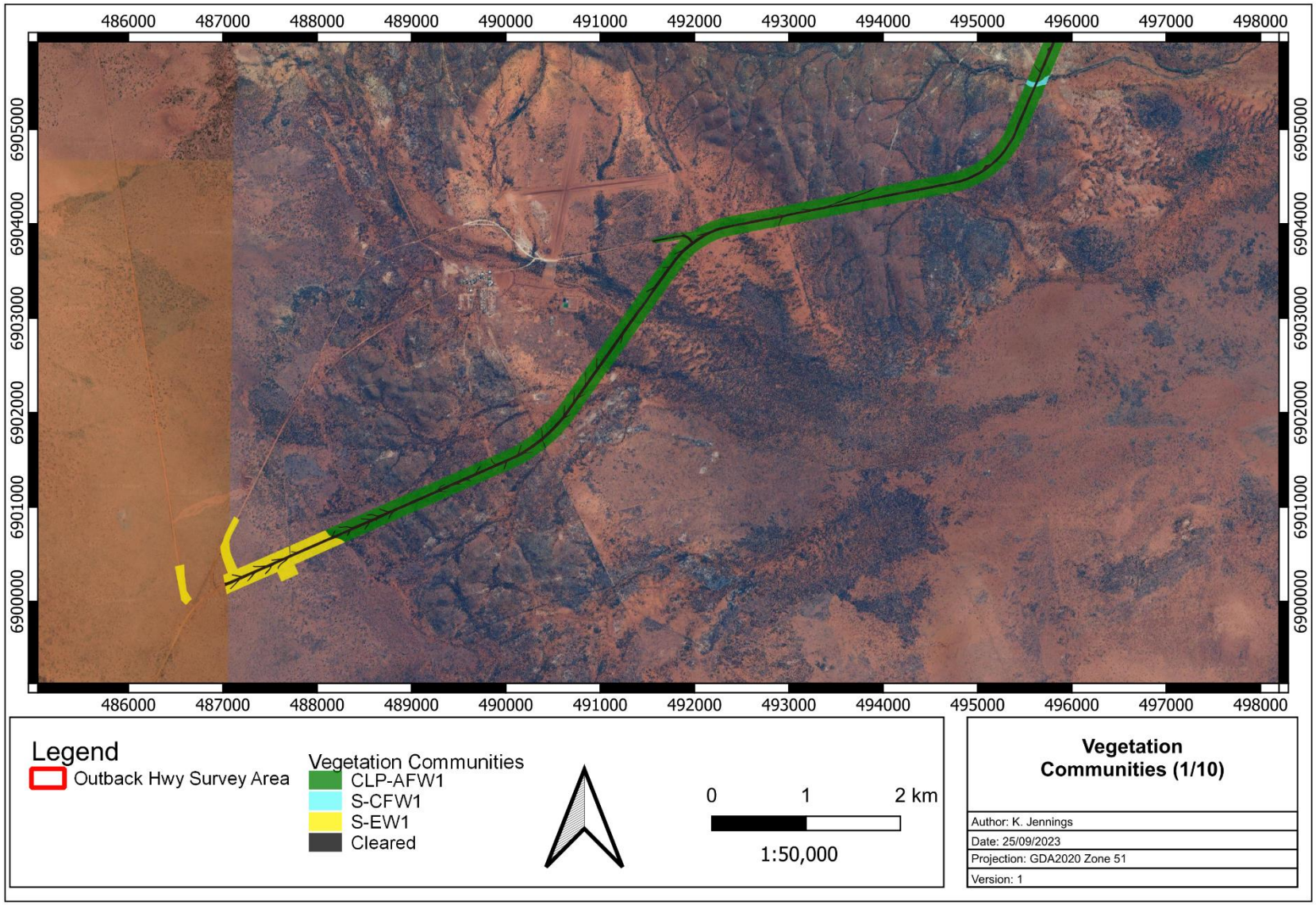

Figure 5-4: Vegetation communities within the survey area (1/10)

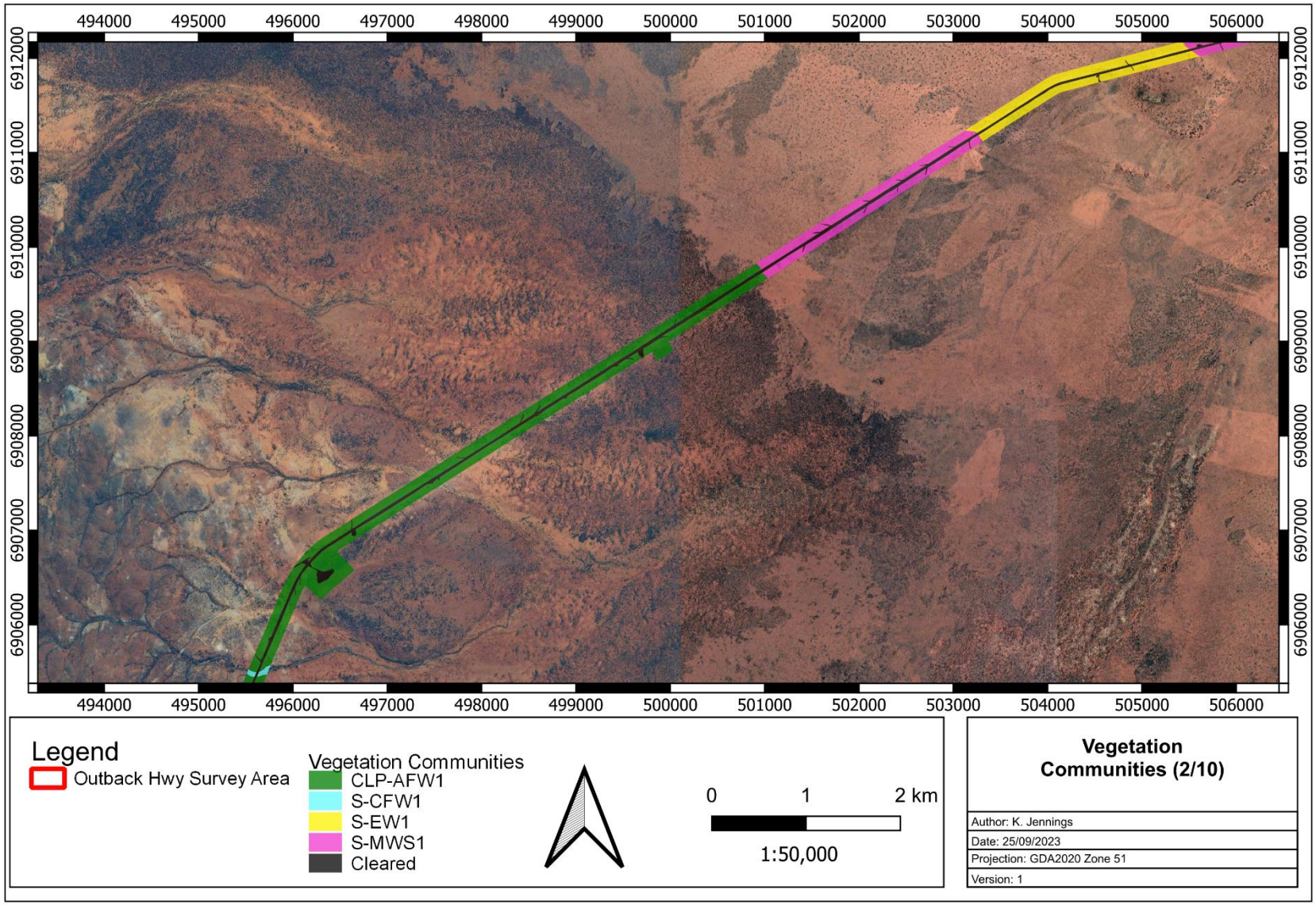

Figure 5-5: Vegetation communities within the survey area (2/10)

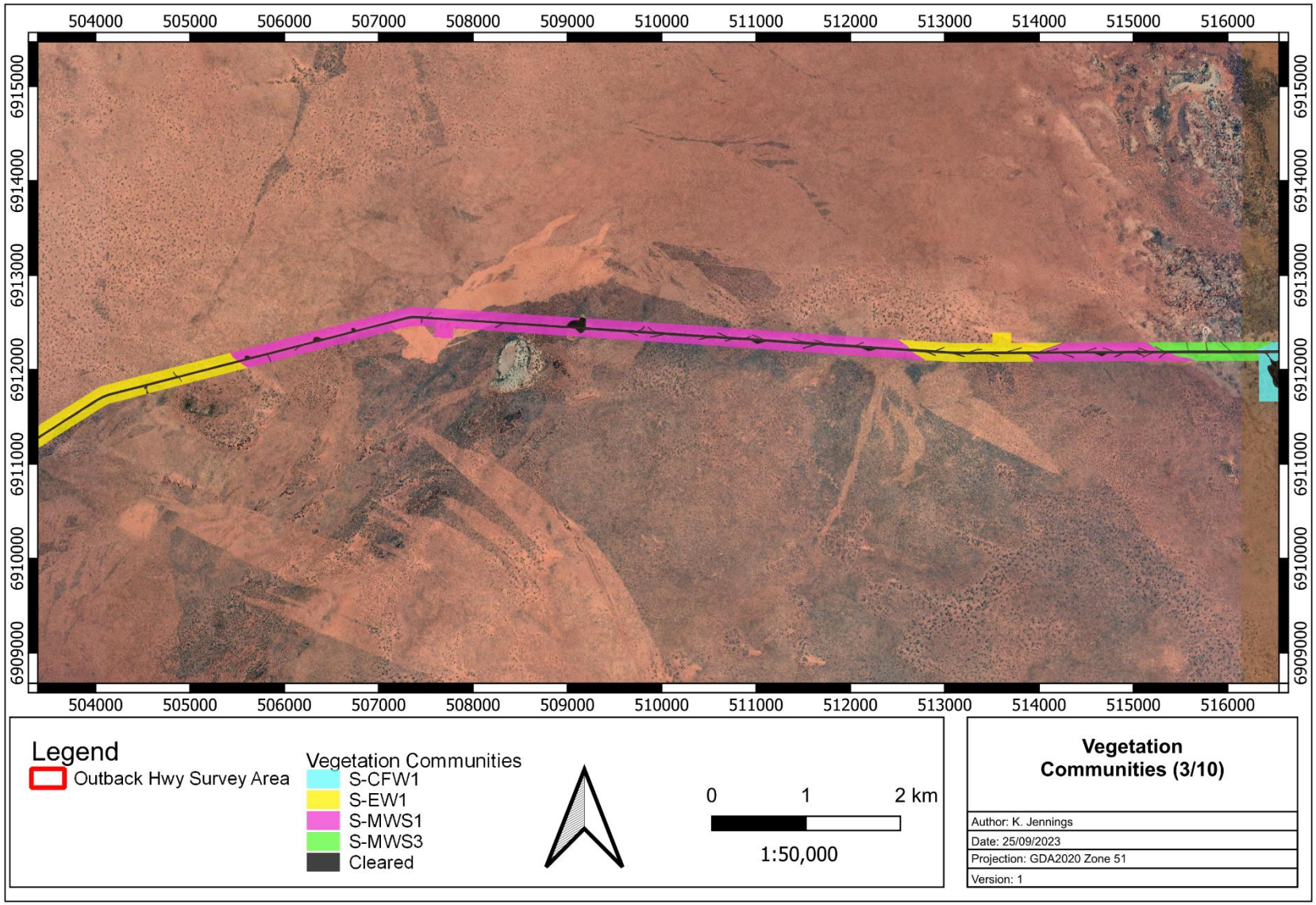

Figure 5-6: Vegetation communities within the survey area (3/10)

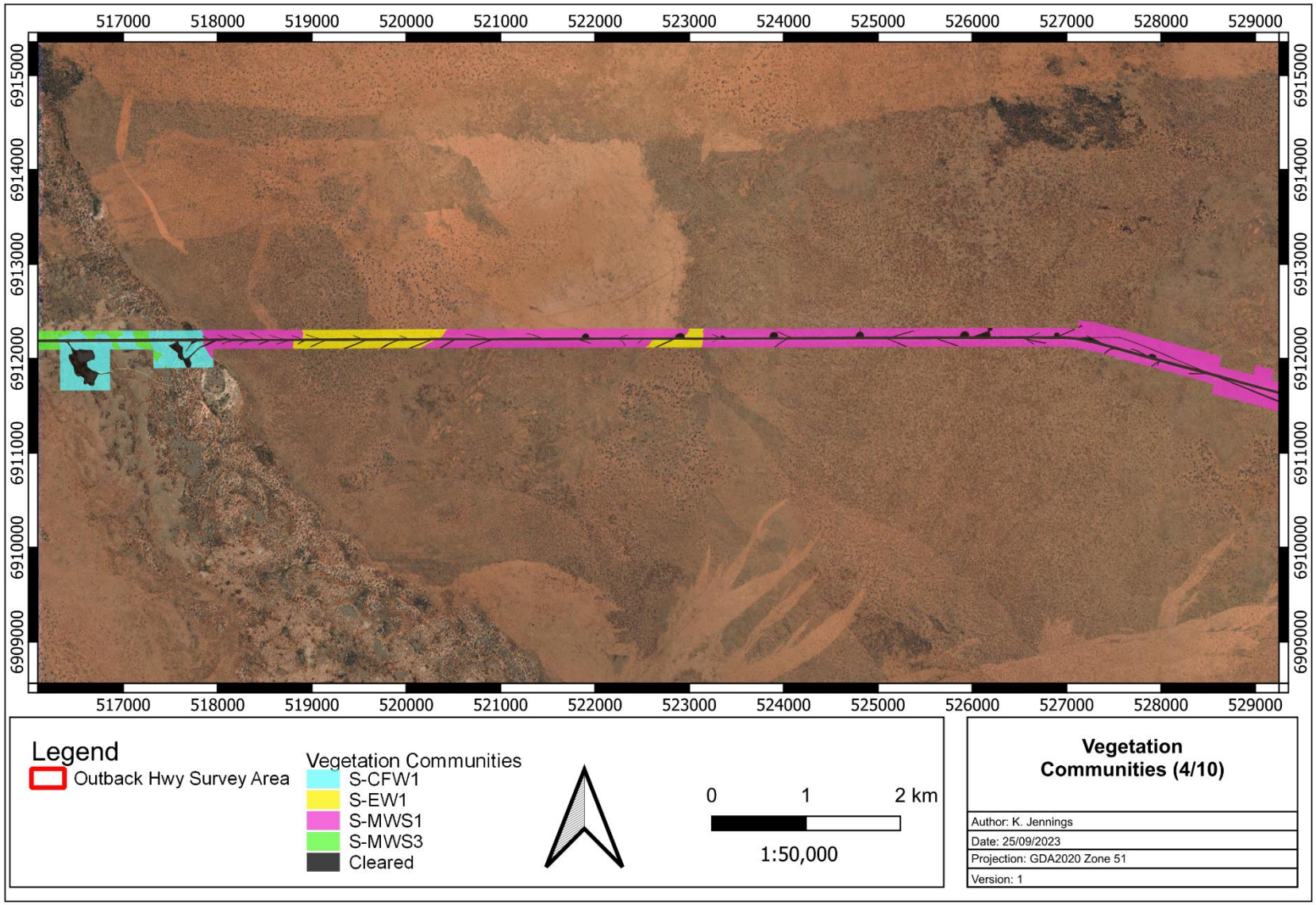

Figure 5-7: Vegetation communities within the survey area (4/10)

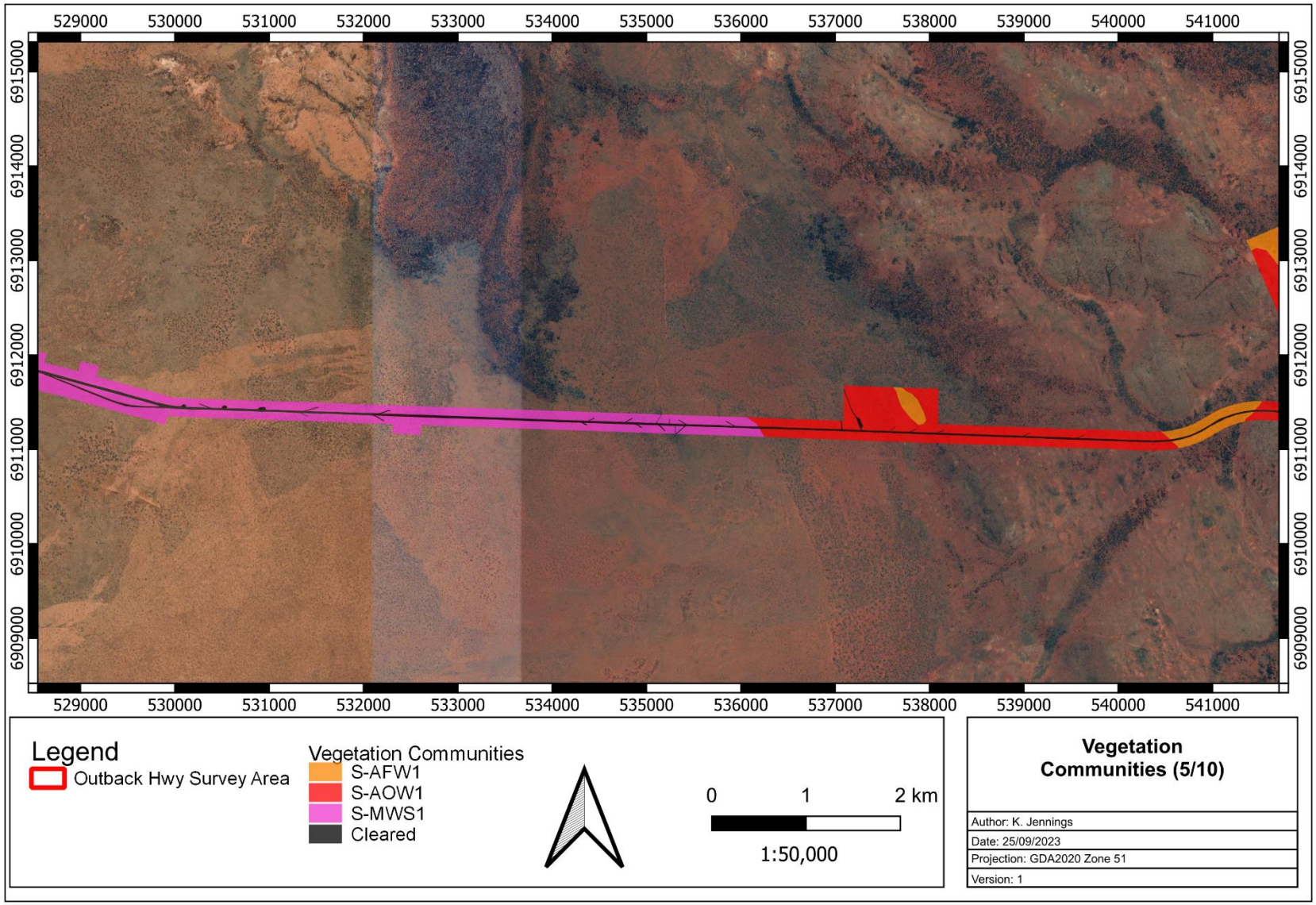

Figure 5-8: Vegetation communities within the survey area (5/10)

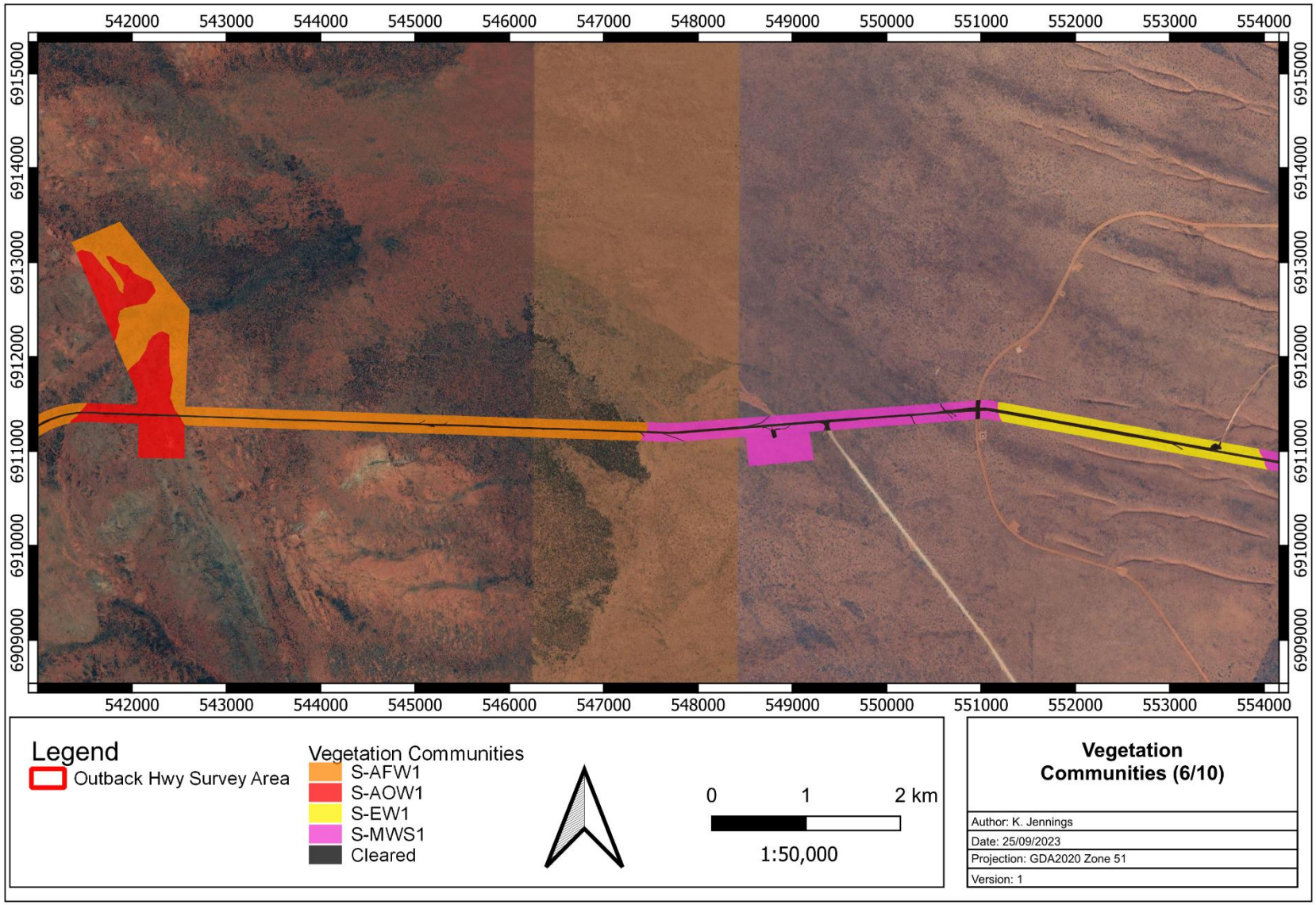

Figure 5-9: Vegetation communities within the survey area (6/10)

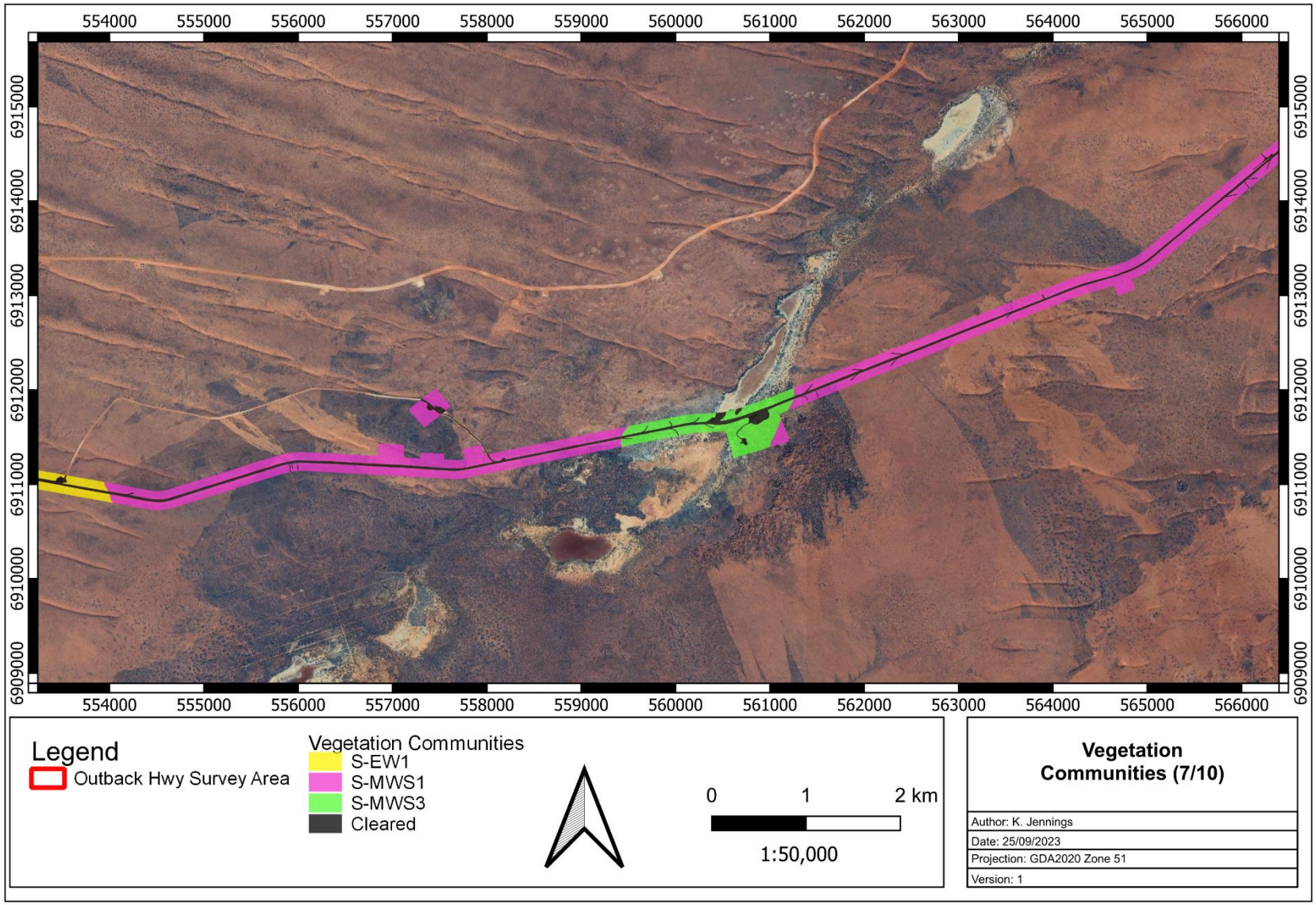

Figure 5-10: Vegetation communities within the survey area (7/10)

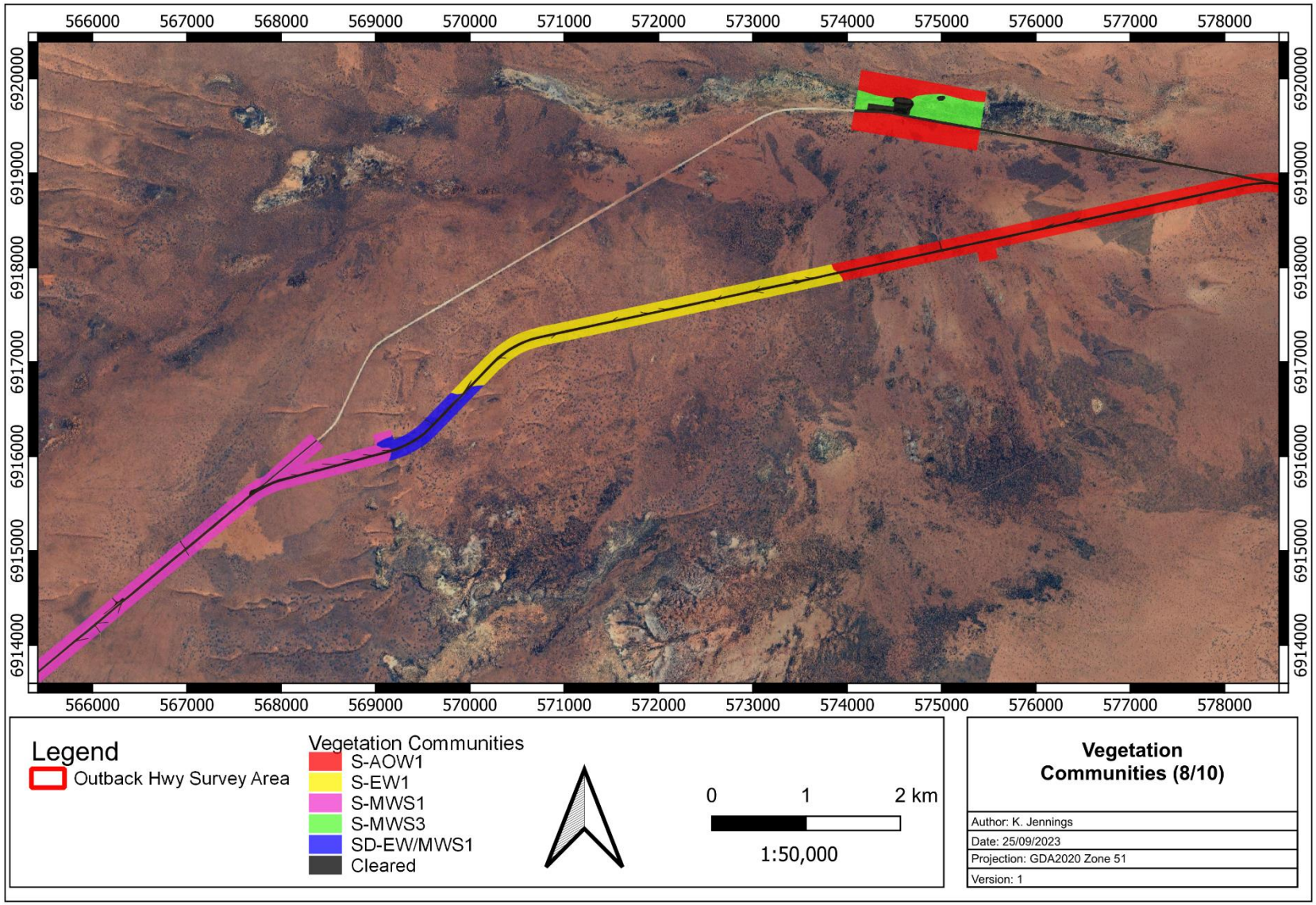

Figure 5-11: Vegetation communities within the survey area (8/10)

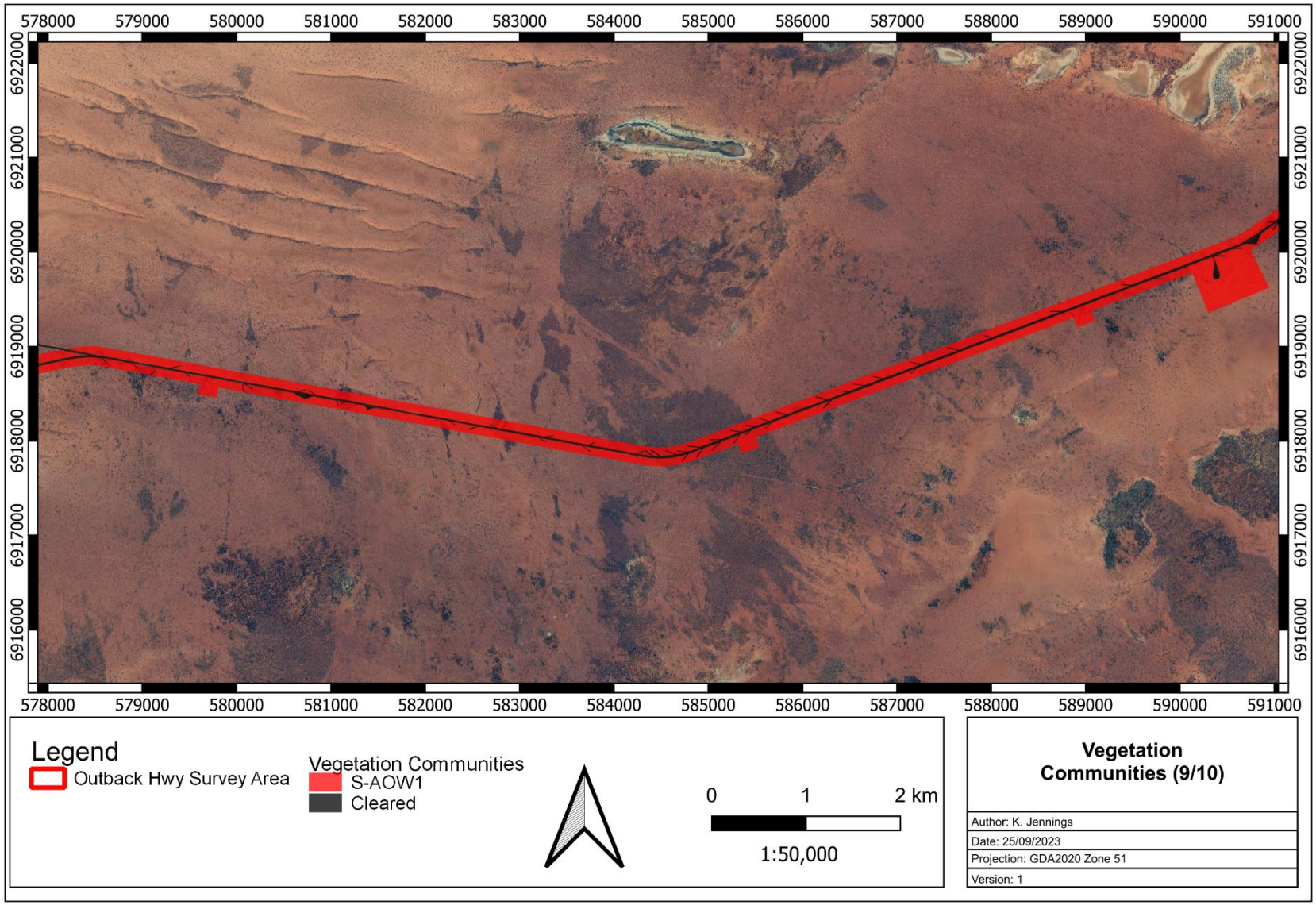

Figure 5-12: Vegetation communities within the survey area (9/10)

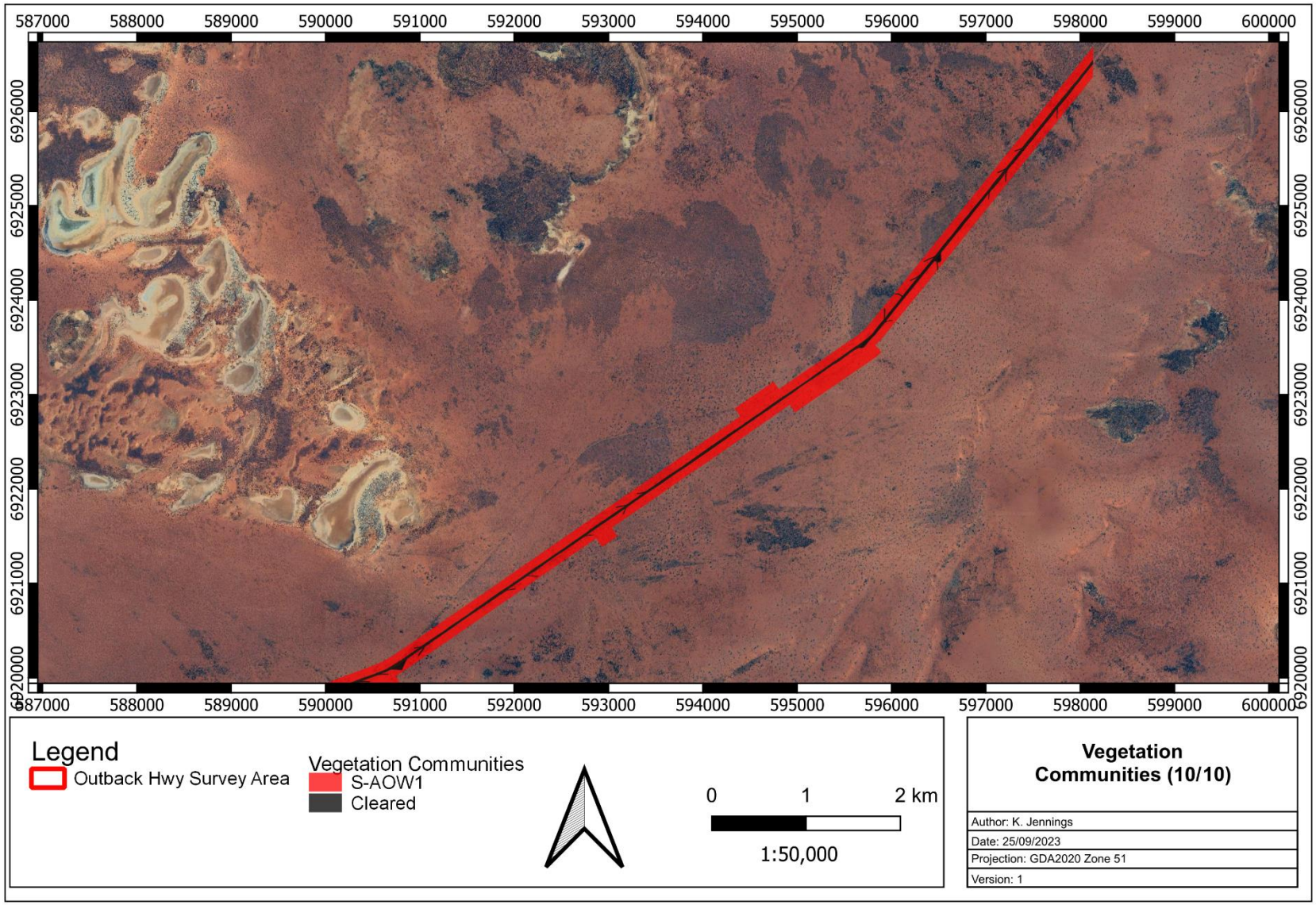

Figure 5-13: Vegetation communities within the survey area (10/10)

Clay-loam Plain: Acacia Open Forest and Woodland

5.2.4.1 *Acacia caesaneura*, *A*. *aptaneura*, *A*. *incurvaneura* low woodland over *Senna artemisioides* subsp. x *artemisioides*, *Senna artemisioides* subsp. *helmsii* mid shrubland over *Ptilotus obovatus* low shrubland on clay-loam plain (CLP-AFW1)

The total flora recorded within this vegetation type was represented by a total of 12 families, 15 genera and 29 taxa (Plate 1 and Appendix B). Dominant taxa from the vegetation type are shown in Table 5-6. According to the NVIS, this vegetation type is best represented by MVG 6 - Acacia forests and woodlands (DotEE, 2017).

Table 5-6: *Acacia caesaneura, A*. *aptaneura, A*. *incurvaneura* low woodland over *Senna artemisioides* subsp. *x artemisioides, Senna artemisioides* subsp. *helmsii* mid shrubland over *Ptilotus obovatus* low shrubland on clay-loam plain

Life Form/Height Class	Canopy Cover	Dominant Taxa
Shrub >3m	30-70%	*Acacia caesaneura* *Acacia aptaneura* *Acacia incurvaneura*
Shrub 1-3m	10-30%	*Senna artemisioides* subsp. *x artemisioides* *Senna artemisioides* subsp. *helmsii*
Shrubs <1m	<10%	*Ptilotus obovatus*

Plate 1: *Acacia caesaneura, A*. *aptaneura, A*. *incurvaneura* low woodland over *Senna artemisioides* subsp. *x artemisioides, Senna artemisioides* subsp. *helmsii* mid shrubland over *Ptilotus obovatus* low shrubland on clay-loam plain

Sand Plain: Acacia Open Woodland

5.2.4.2 *Acacia caesaneura, A. incurvaneura* low open woodland over *Triodia basedowii* open hummock grassland on sand plain (S-AFW1)

The total flora recorded within this vegetation type was represented by a total of 16 families, 23 genera and 42 taxa (Plate 1 and Appendix B). Dominant taxa from the vegetation type are shown in Table 5-7. According to the NVIS, this vegetation type is best represented by MVG 6 - Acacia forests and woodlands (DotEE, 2017).

Table 5-7: Vegetation assemblage for *Acacia caesaneura, A. incurvaneura* low open woodland over *Triodia basedowii* open hummock grassland on sand plain

Life Form/Height Class	Canopy Cover	Dominant Taxa
Shrubs >3m	<10%	*Acacia caesaneura* *Acacia incurvaneura*
Grass 0.5-1m	10-30%	*Triodia basedowii*

Plate 2: *Acacia caesaneura, A. incurvaneura* low open woodland over *Triodia basedowii* open hummock grassland on sand plain

Sand Plain: Acacia Open Woodland

5.2.4.3 *Acacia caesaneura, A incurvaneura* low open woodland over *Senna artemisioides* subsp. *filifolia, Eremophila latrobei* subsp. *latrobei* mid open shrubland over *Triodia basedowii* hummock grassland on sand plain (S-AOW1)

The total flora recorded within this vegetation type was represented by a total of 38 families, 64 genera and 104 taxa (Plate 3 and Appendix B). Dominant taxa from the vegetation type are shown in Table 5-8. According to the NVIS, this vegetation type is best represented by the MVG 13 - Acacia open woodlands (DotEE, 2017).

Table 5-8: Vegetation assemblage for *Acacia caesaneura, A incurvaneura* low open woodland over *Senna artemisioides* subsp. *filifolia, Eremophila latrobei* subsp. *latrobei* mid open shrubland over *Triodia basedowii* hummock grassland on sand plain

Life Form/Height Class	Canopy Cover	Dominant Taxa
Shrub <3m	<10%	*Acacia caesaneura* *Acacia incurvaneura*
Shrub >3m	10-30%	*Senna artemisioides* subsp. *filifolia* *Eremophila latrobei* subsp. *latrobei*
Grass 0.5-1m	10-30%	*Triodia basedowii*

Plate 3: *Acacia caesaneura, A incurvaneura* low open woodland over *Senna artemisioides* subsp. *filifolia, Eremophila latrobei* subsp. *latrobei* mid open shrubland over *Triodia basedowii* hummock grassland on sand plain

Sand Plain: Casuarina Open Woodland

5.2.4.4 *Acacia burkittii/ Allocasuarina helmsii* low open woodland over *Eremophila latrobei* mid open shrubland over *Triodia basedowii* hummock grassland on sand plain (S-CFW1)

The total flora recorded within this vegetation type was represented by a total of 13 families, 15 genera and 19 taxa (Plate 4 and Appendix B). Dominant taxa from the vegetation type are shown in Table 5-9. According to the NVIS, this vegetation type is best represented by the MVG 8 - Casuarina forests and woodlands (DotEE, 2017).

Table 5-9: Vegetation assemblage for *Acacia burkittii/ Allocasuarina helmsii* low open woodland over *Eremophila latrobei* mid open shrubland over *Triodia basedowii* hummock grassland on sand plain

Life Form/Height Class	Canopy Cover	Dominant Taxa
Shrub <3m	10-30%	*Allocasuarina helmsii* *Acacia burkittii*
Shrub >3m	10-30%	*Eremophila latrobei*
Grass 0.5-1m	10-30%	*Triodia basedowii*

Plate 4: *Acacia burkittii/ Allocasuarina helmsii low open woodland over Eremophila latrobei mid open shrubland over Triodia basedowii hummock grassland on sand plain*

Sand Plain: Eucalyptus Open Woodland

5.2.4.5 *Eucalyptus gongylocarpa* low woodland over *Acacia ligulata* mid shrubland over *Triodia basedowii* closed hummock grassland on sand plain (S-EW1)

The total flora recorded within this vegetation type was represented by a total of eight families, 11 genera and 13 taxa (plate 5 and Appendix B). Dominant taxa from the vegetation type are shown in Table 5-10. According to the NVIS, this vegetation type is best represented by the MVG 11 - Eucalyptus Open Woodland (DotEE, 2017).

Table 5-10: Vegetation assemblage for *Eucalyptus gongylocarpa* low woodland over *Acacia ligulata* mid shrubland over *Triodia basedowii* closed hummock grassland on sand plain

Life Form/Height Class	Canopy Cover	Dominant Taxa
Trees <10m	10-30%	*Eucalyptus gongylocarpa*
Shrub >3m	10-30%	*Acacia ligulata*
Grass 0.5-1m	10-30%	*Triodia basedowii*

Plate 5: *Eucalyptus gongylocarpa* low woodland over *Acacia ligulata* mid shrubland over *Triodia basedowii* closed hummock grassland on sand plain

Sand Plain: Mallee Open Woodland

5.2.4.6 *Eucalyptus leptopoda* subsp. *elevata, Eucalyptus youngiana* open mallee woodland over *Acacia ligulata, Grevillea juncifolia* subsp. *juncifolia, Aluta maisonneuvei* mid isolated shrubs over *Triodia basedowii* hummock grassland on sand plain (S-MWS1)

The total flora recorded within this vegetation type was represented by a total of 11 families, 17 genera and 21 taxa (Plate 4 and Appendix B). Dominant taxa from the vegetation type are shown in Table 5-11. According to the NVIS, this vegetation type is best represented by the MVG 14 - Mallee woodlands and shrublands (DotEE, 2017).

Table 5-11: Vegetation assemblage for *Eucalyptus leptopoda* subsp. *elevata, Eucalyptus youngiana* open mallee woodland over *Acacia ligulata, Grevillea juncifolia* subsp. *juncifolia, Aluta maisonneuvei* mid isolated shrubs over *Triodia basedowii* hummock grassland on sand plain

Life Form/Height Class	Canopy Cover	Dominant Taxa
Mallee <10m	10-30%	*Eucalyptus leptopoda* subsp. *elevata* *Eucalyptus youngiana*
Shrub >3m	>2%	*Acacia ligulata* *Grevillea juncifolia* subsp. *juncifolia* *Aluta maisonneuvei*
Grass 0.5-1m	10-30%	*Triodia basedowii*

Plate 6: *Eucalyptus leptopoda* subsp. *elevata, Eucalyptus youngiana* open mallee woodland over *Acacia ligulata, Grevillea juncifolia* subsp. *juncifolia, Aluta maisonneuvei* mid isolated shrubs over *Triodia basedowii* hummock grassland on sand plain

Sand Plain: Mallee Open Woodland

5.2.4.7 *Eucalyptus concinna* open mallee woodland over *Eremophila latrobei* subsp. *glabra* mid open shrubland over *Triodia irritans* hummock grassland on sand plain (S-MWS3)

The total flora recorded within this vegetation type was represented by a total of seven families, nine genera and nine taxa (Plate 7 and Appendix B). Dominant taxa from the vegetation type are shown in Table 5-12. According to the NVIS, this vegetation type is best represented by the MVG 14 - Mallee woodlands and shrublands (DotEE, 2017).

Table 5-12: Vegetation assemblage for *Eucalyptus concinna* open mallee woodland over *Eremophila latrobei* subsp. *glabra* mid open shrubland over *Triodia irritans* hummock grassland on sand plain

Life Form/Height Class	Canopy Cover	Dominant Taxa
Mallee <3m	10-30%	*Eucalyptus concinna* *Acacia burkittii*
Shrub >3m	10-30%	*Eremophila latrobei* subsp. *glabra*
Grass 0.5-1m	10-30%	*Triodia irritans*

Plate 7: *Eucalyptus concinna* open mallee woodland over *Eremophila latrobei* subsp. *glabra* mid open shrubland over *Triodia irritans* hummock grassland on sand plain

Sand Plain: Eucalyptus Open Woodland/Mallee Open Woodland

5.2.4.8 *Eucalyptus gongylocarpa* low open woodland over *Eucalyptus youngiana* open mallee shrubland over *Triodia basedowii* hummock grassland on sand dune (SD-EW/MWS1)

The total flora recorded within this vegetation type was represented by a total of 14 families, 22 genera and 31 taxa (Plate 8 and Appendix B). Dominant taxa from the vegetation type are shown in Table 5-13. According to the NVIS, this vegetation type is best represented by the MVG 11 - Eucalyptus Open Woodland (DotEE, 2017).

Table 5-13: Vegetation assemblage for *Eucalyptus gongylocarpa* low open woodland over *Eucalyptus youngiana* open mallee shrubland over *Triodia basedowii* hummock grassland on sand dune

Life Form/Height Class	Canopy Cover	Dominant Taxa
Tree <10m	<10%	*Eucalyptus gongylocarpa*
Mallee >3m	<10%	*Eucalyptus youngiana*
Grass 0.25-0.5m	10-30%	*Triodia basedowii*

Plate 8: *Eucalyptus gongylocarpa* low open woodland over *Eucalyptus youngiana* open mallee shrubland over *Triodia basedowii* hummock grassland on sand dune

5.2.5 Statistical Analysis

Statistical analysis was conducted on quadrat data obtained from the survey to determine the similarities or differences in floristic composition between vegetation associations. Of the total 104 taxa recorded in the quadrats, 18 annual taxa and 35 singleton and introduced taxa were omitted from the analysis. Seven subspecies were reconciled to a three species. This resulted in a total of 47 species used in the analysis. Appendix F provides the dendrogram, two-way table and ordination graph generated from the PATN statistical analysis. A list of the 31 quadrats and their respective vegetation associations are provided in Table 5-14 below. The PATN analysis produced a stress value of 0.2059.

Table 5-14: **Vegetation types with corresponding quadrats**

Floristic Group	Vegetation Type	Vegetation Code	Quadrat
I	*Acacia caesaneura*, *A incurvaneura* low open woodland over *Senna artemisioides* subsp. *filifolia*, *Eremophila latrobei* subsp. *latrobei* mid open shrubland over *Triodia basedowii* hummock grassland	S-AOW1	Q1-N, Q6, Q7, Q8, Q9, Q16, Q15
II	*Acacia burkittiil Allocasuarina helmsii* low open forest over *Eremophila latrobei* mid open shrubland over *Triodia basedowii* hummock grassland	S-CFW1	Q20
III	*Acacia caesaneura*, *A. aptaneura*, *A. incurvaneura* low woodland over *Senna artemisioides* subsp. x *artemisioides*, *Senna artemisioides* subsp. *helmsii* mid shrubland over *Ptilotus obovatus* low shrubland	CLP-AFW1	Q10-N, Q11-N, Q12-N Q23, Q24
IV	*Acacia caesaneura*, *A. incurvaneura* low open forest over *Triodia basedowii* closed hummock grassland	S-AFW1	Q5-N, Q6-N, Q17
V	*Eucalyptus gongylocarpa* low open woodland over *Eucalyptus youngiana* open mallee shrubland over *Triodia basedowii* hummock grassland	SD-EW/MWS1	Q10
VI	*Eucalyptus gongylocarpa* low woodland over *Acacia ligulata* mid shrubland over *Triodia basedowii* closed hummock grassland	S-EW1	Q9-N, Q13-N, Q21, Q25
VII	*Eucalyptus leptopoda* subsp. *elevata*, *Eucalyptus youngiana* open mallee woodland over *Acacia ligulata*, *Grevillea juncifolia* subsp. *juncifolia*, *Aluta maisonneuvei* mid isolated shrubs over *Triodia basedowii* hummock grassland	S-MWS1	Q2-N, Q7-N, Q8-N, Q11, Q13, Q14, Q19, Q22
VIII	*Eucalyptus concinna* open mallee woodland over *Eremophila latrobei* subsp. *glabra* mid open shrubland over *Triodia irritans* hummock grassland	S-MWS3	Q3-N, Q4-N

A total of six species groups were identified in the analysis (species group A to F) as shown in the two-way table (Appendix F).

Floristic group I was characterised by species group B (see two-way table provided in Appendix F) with an average species richness of 10.4 taxa per quadrat (ranged from six to 18 taxa per quadrat).

Floristic group II was characterised by species group B, C, E and H (Appendix F). This floristic group was represented by one quadrat, with nine species present.

Floristic group III was mostly characterised by species group A, B and D (Appendix F). This floristic group had an average species richness of 10.2 taxa per quadrat (ranged from eight to 13 taxa per quadrat).

Floristic group IV mostly characterised by species groups E and F (Appendix F). This floristic group had an average species richness of 7.5 taxa per quadrat (ranged from six to nine taxa per quadrat).

Floristic group V was mostly characterised by species group E (Appendix F). This floristic group was represented by one quadrat, with 21 species present.

Floristic group VI was mostly by species groups F and H (Appendix F). This floristic group had an average species richness of 8.25 taxa per quadrat (ranged from seven to 10 taxa per quadrat).

Floristic group VII was characterised by species groups F, G and H (Appendix F). This floristic group had an average species richness of nine taxa per quadrat (ranged from six to 12 taxa per quadrat).

Floristic group VIII was mostly characterised by species groups B, E and F (Appendix F). This floristic group had an average species richness of nine taxa per quadrat (ranged from eight to 10 taxa per quadrat).

The result of the floristic analysis broadly supported the vegetation community delineations made during the field survey, with broad vegetation communities and their landscape position quantified by the statistical analysis.

Species Richness and Accumulation Estimates

The Chao 2 richness estimator provided an estimated species richness of 126 species in 50 sample sites (quadrats). Species richness recorded for the 31 quadrats surveyed was 104 species. A species accumulation curve was created to display the rate of species accumulation. The R^2 value (0.9993) suggests that the data "fits" the species accumulation curve shown in Figure 5-14. Species accumulation ranged from eight to four species per quadrat from 1-10 sample sites, three species for 11-18 quadrats, two species for 19-32 and one species for 33-50 sample sites. Botanica has determined that according to this data, a sufficient number of quadrats were established in the survey area to adequately assess the floristic composition of the area.

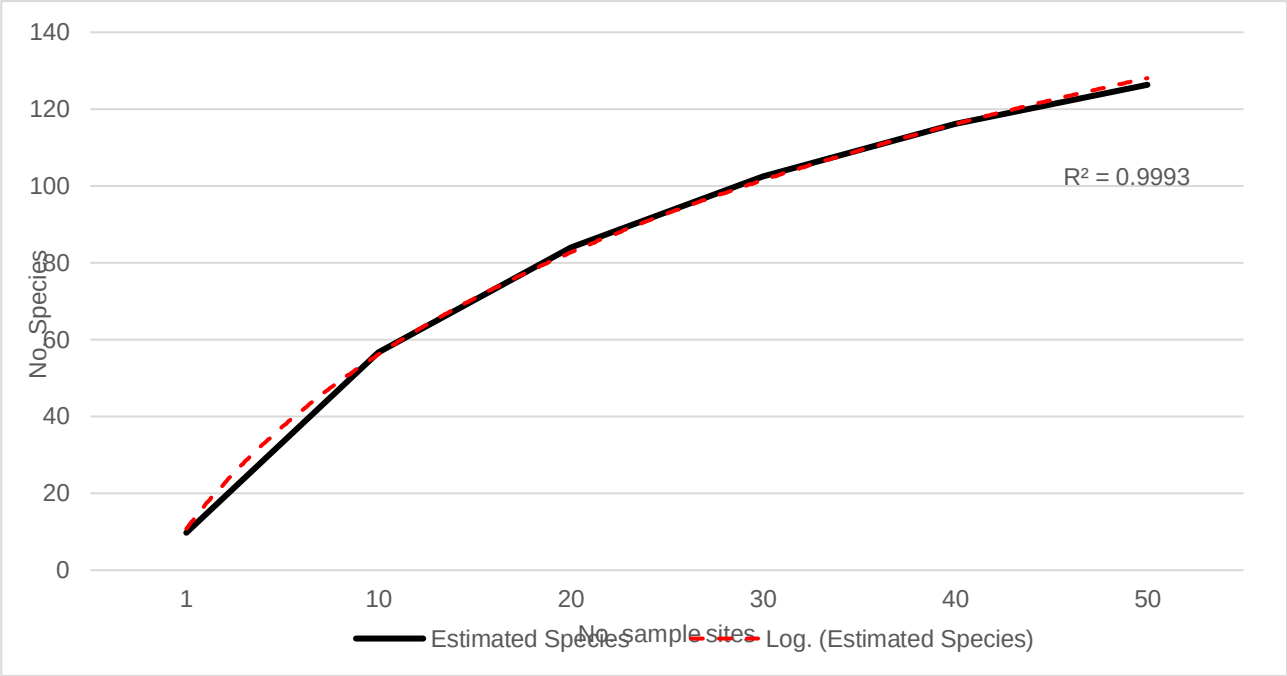

Figure 5-14: Species accumulation curve

5.2.6 Significant Vegetation

According to the EPA Environmental Factor Guideline for Flora and Vegetation (EPA, 2016b) significant vegetation includes:

- vegetation being identified as Threatened or Priority Ecological Communities;
- vegetation with restricted distribution;
- vegetation subject to a high degree of historical impact from threatening processes;
- vegetation which provides a role as a refuge; and
- vegetation providing an important function required to maintain ecological integrity of a significant ecosystem.

No significant vegetation or ecological communities (as described above) were identified within the survey area, and all vegetation communities were well represented in the local and regional context.

5.2.7 Vegetation Condition

Based on the vegetation condition rating scale obtained from the EPA (2016a) provided in Appendix C, vegetation ranged from 'very good' to 'degraded' condition (Table 5-15). Disturbance in the survey area includes wildfire events, possibly five to ten years ago; roads, tracks and associated infrastructure; localised vegetation clearing and cumulative historical impacts. No significant weed presence was observed within the survey area. Vegetation condition maps are provided in Figure 5-16 to Figure 5-25.

Table 5-15: Vegetation condition rating within the survey area

Condition rating	Description (EPA, 2016a)	Area (ha)	Area (%)
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	1506.1	51.4
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.	956.9	32.7
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.	53.7	1.8
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.	14.2	0.5
Cleared	N/A	399.0	13.6
TOTAL		**2929.9**	**100**

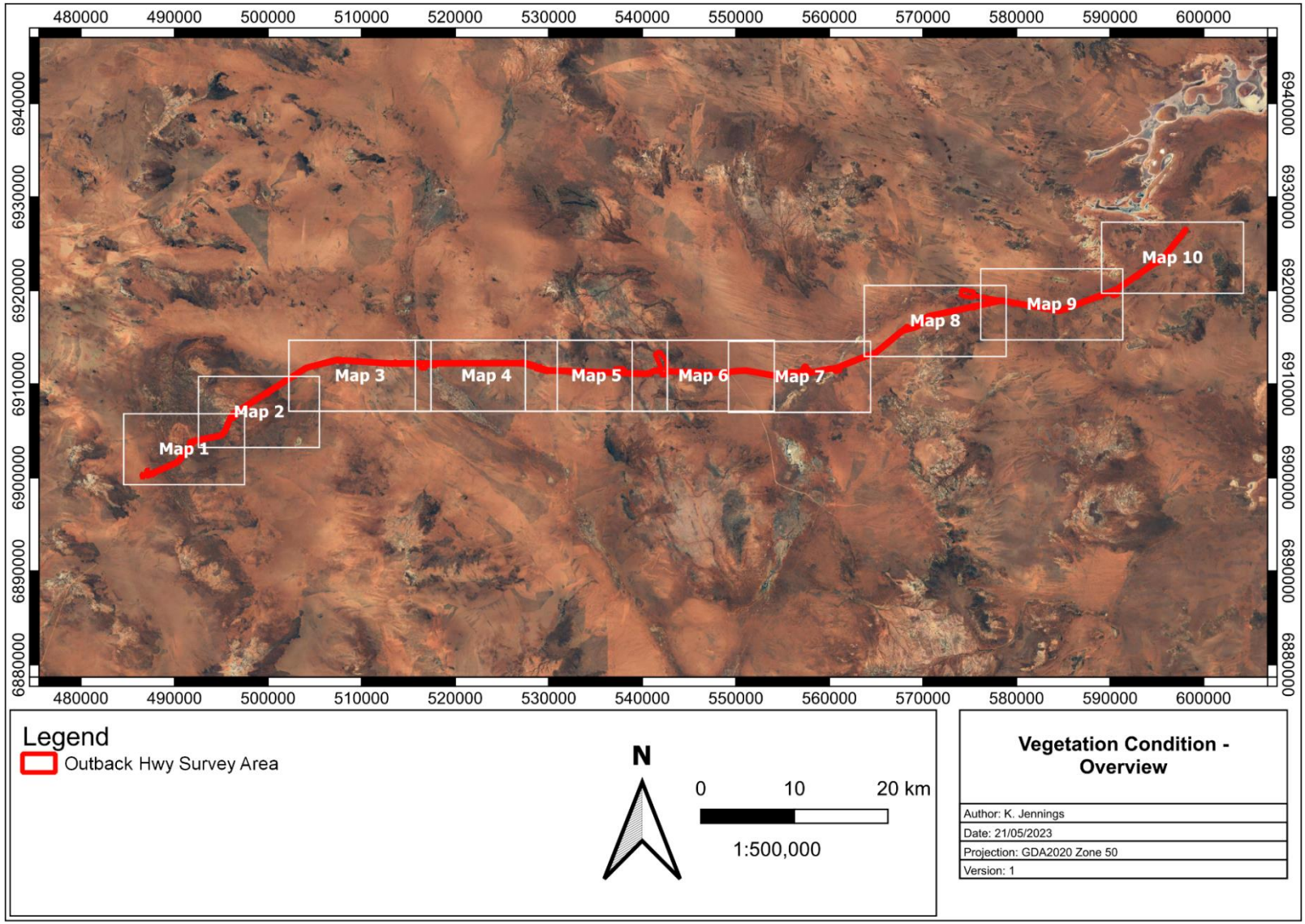

Figure 5-15: Overview of vegetation condition map series (1-10)

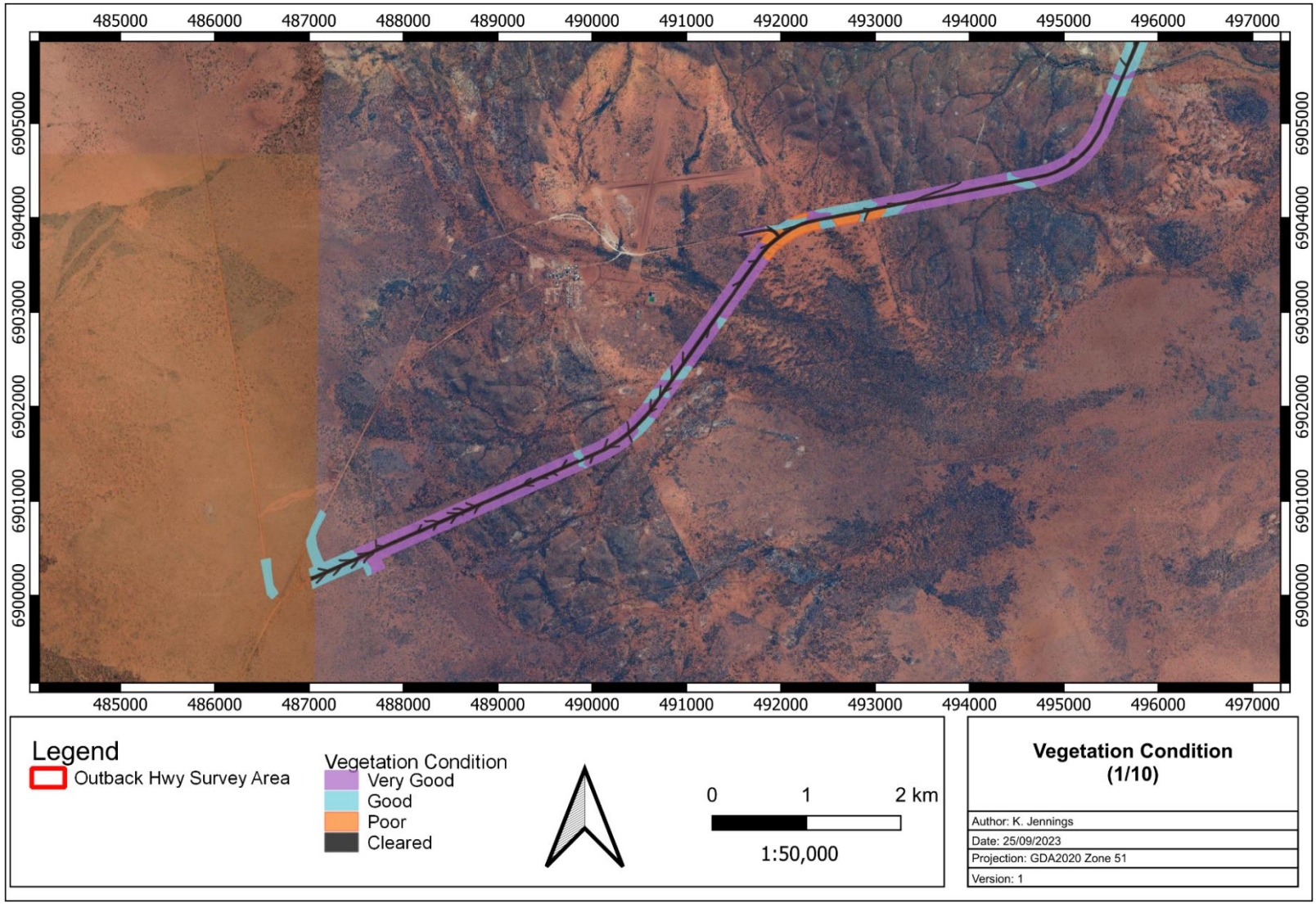

Figure 5-16: Vegetation condition within the survey area (1/10)

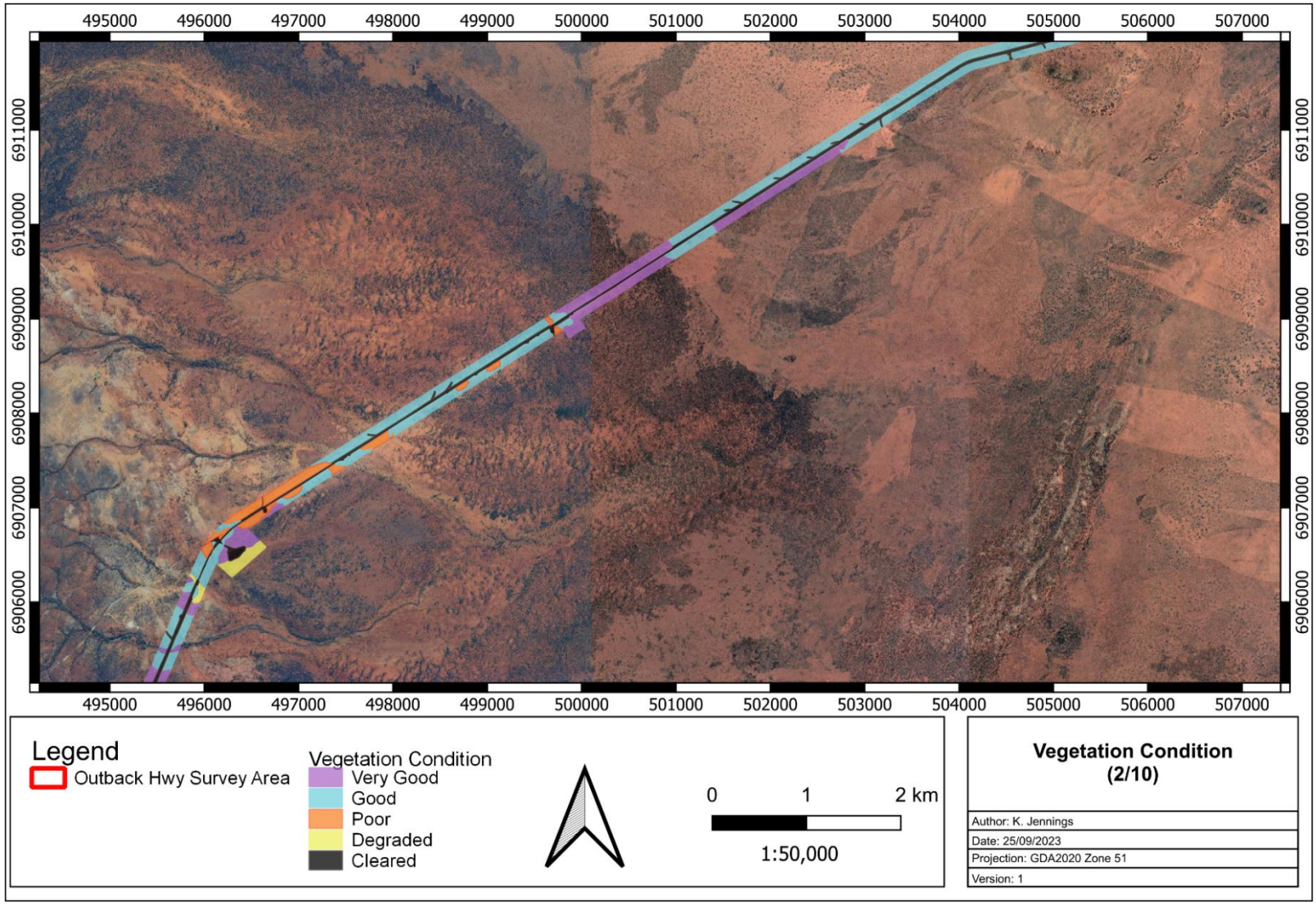

Figure 5-17: Vegetation condition within the survey area (2/10)

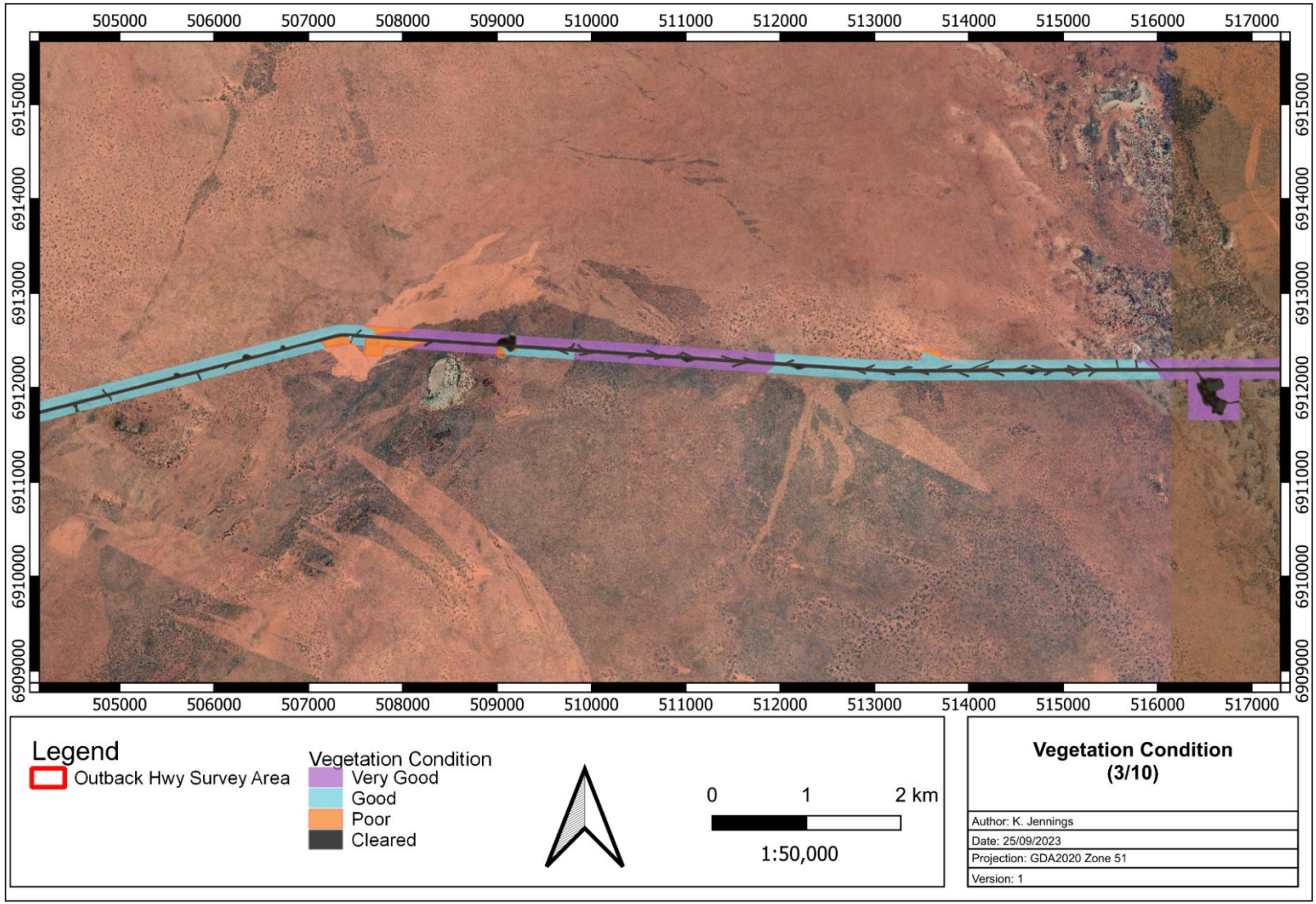

Figure 5-18: Vegetation condition within the survey area (3/10)

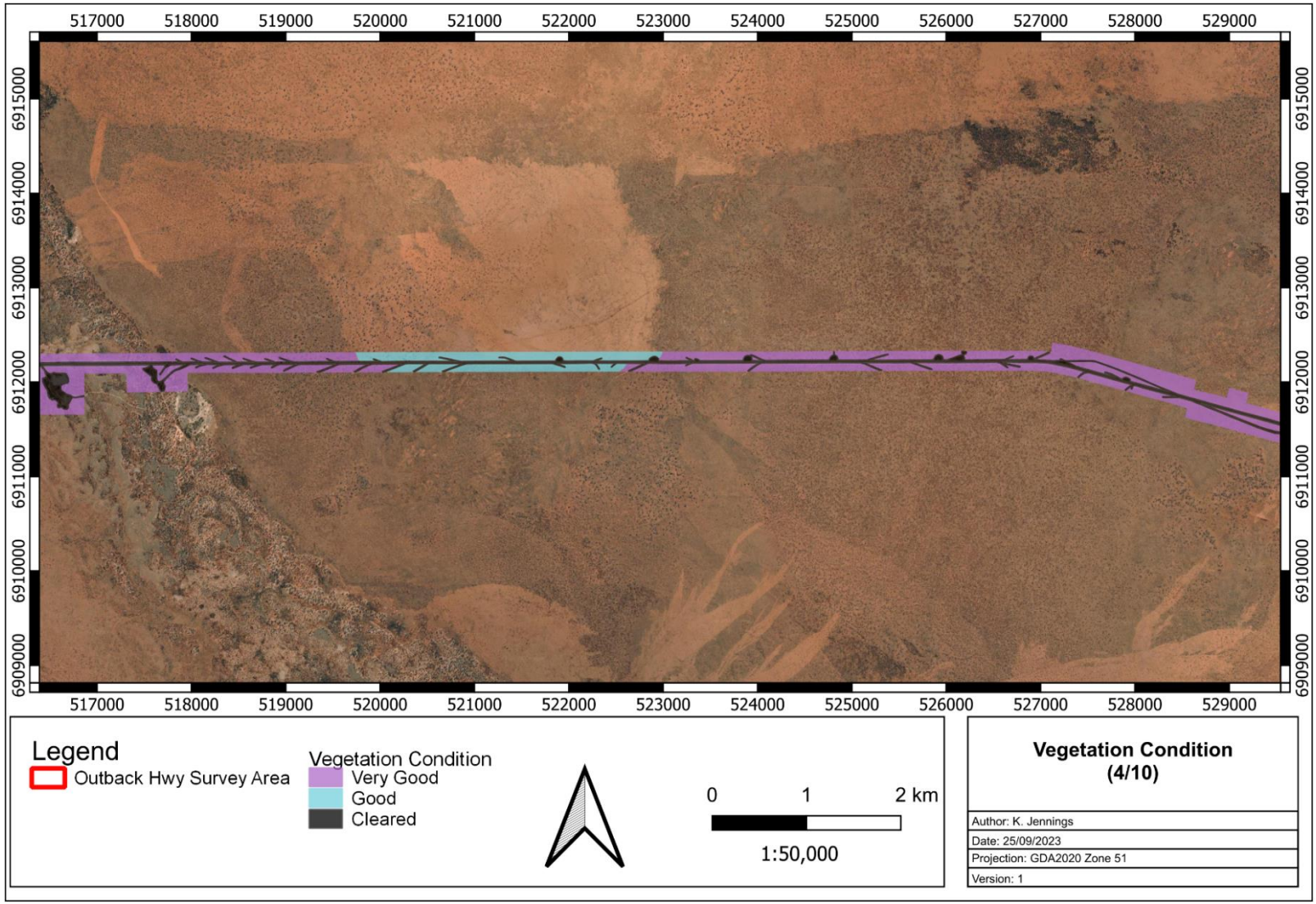

Figure 5-19: Vegetation condition within the survey area (4/10)

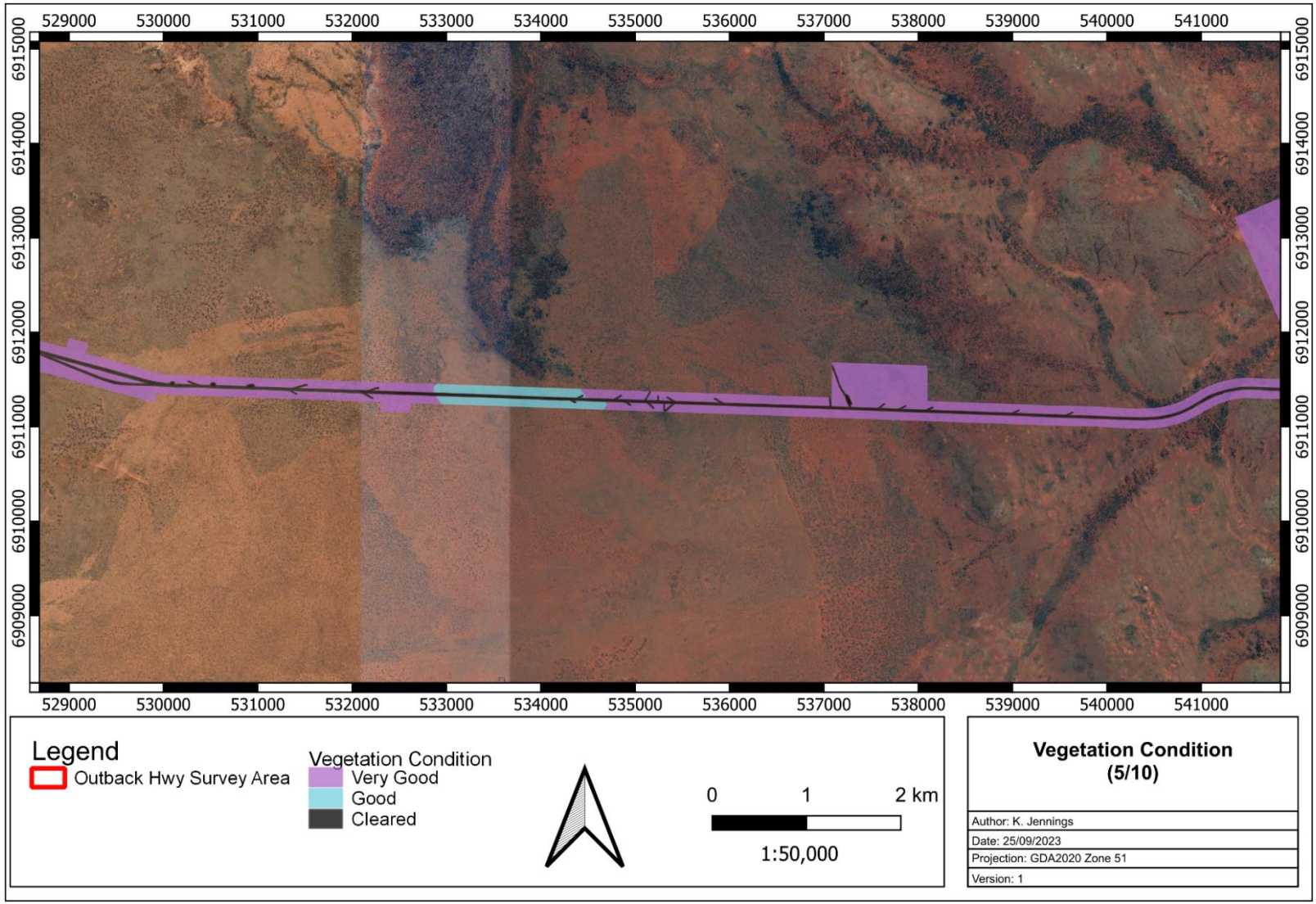

Figure 5-20: Vegetation condition within the survey area (5/10)

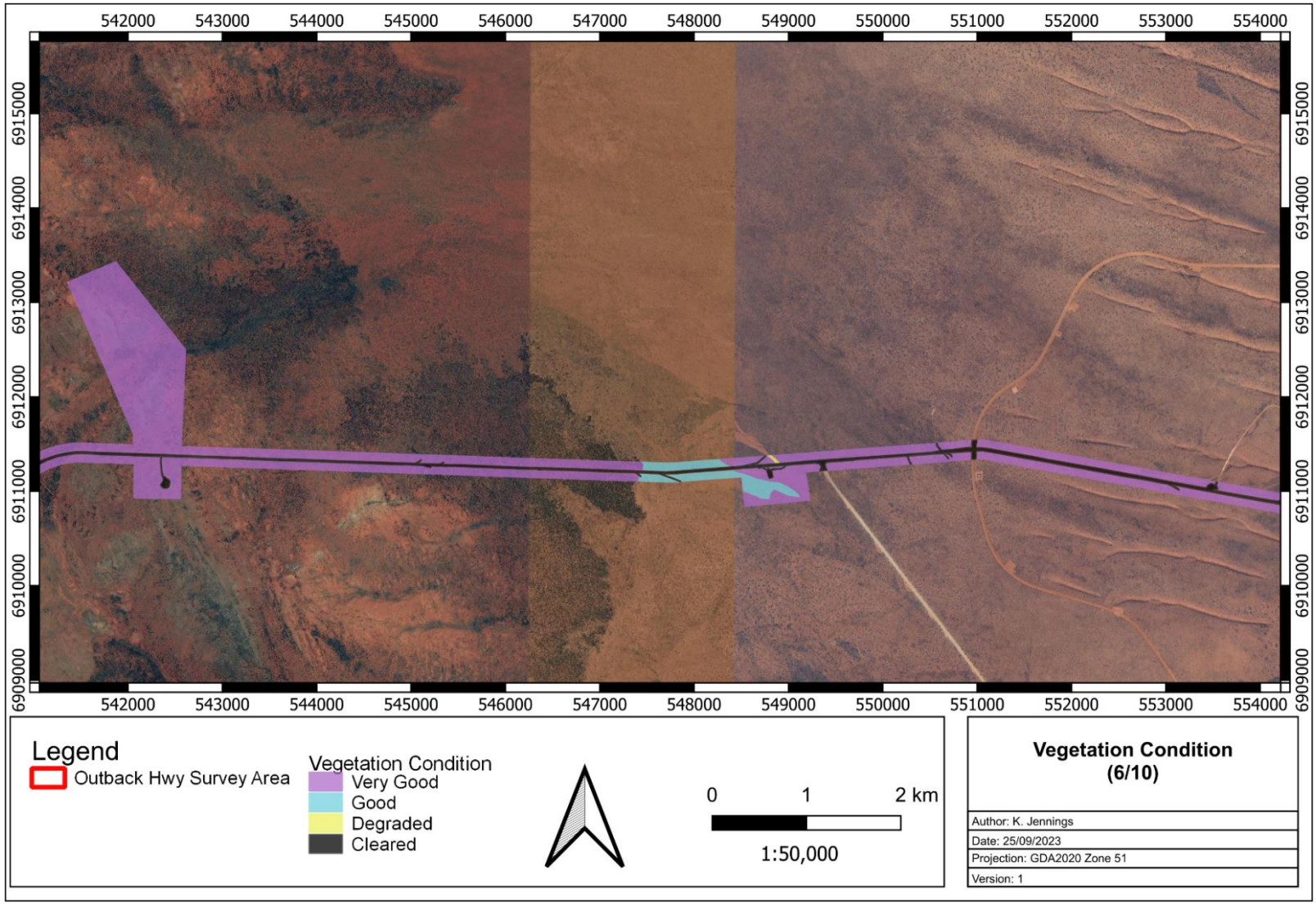

Figure 5-21: Vegetation condition within the survey area (6/10)

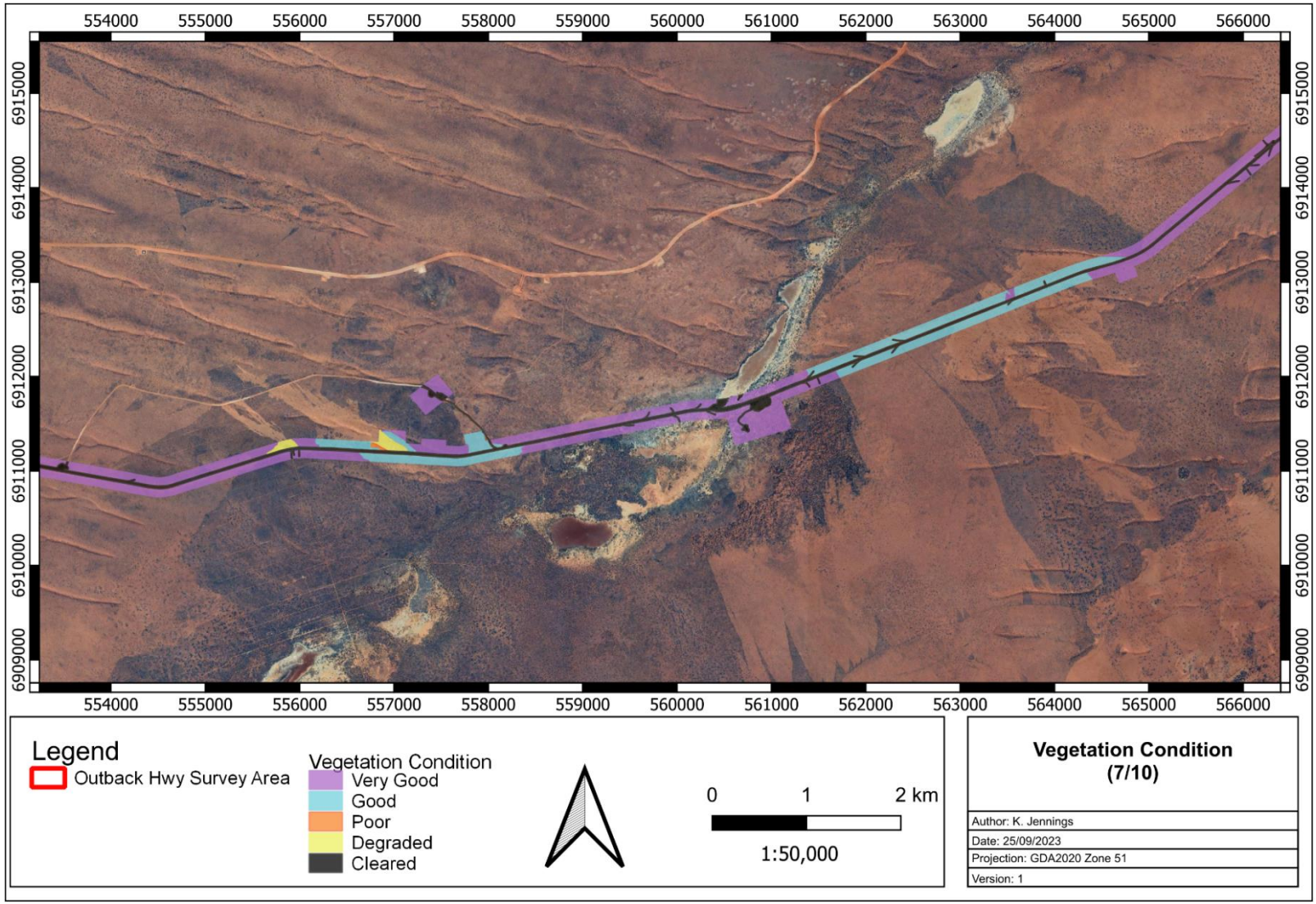

Figure 5-22: Vegetation condition within the survey area (7/10)

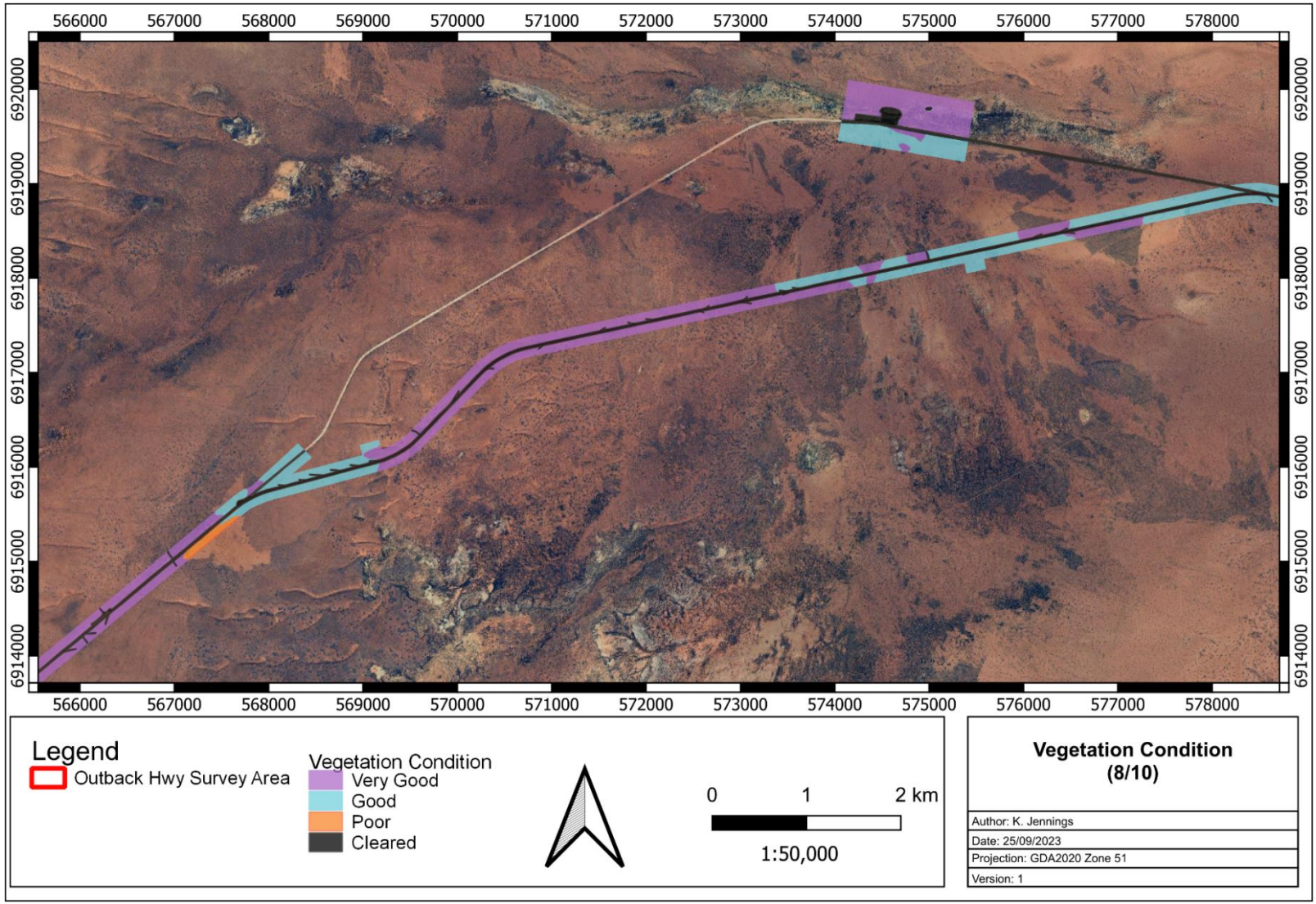

Figure 5-23: Vegetation condition within the survey area (8/10)

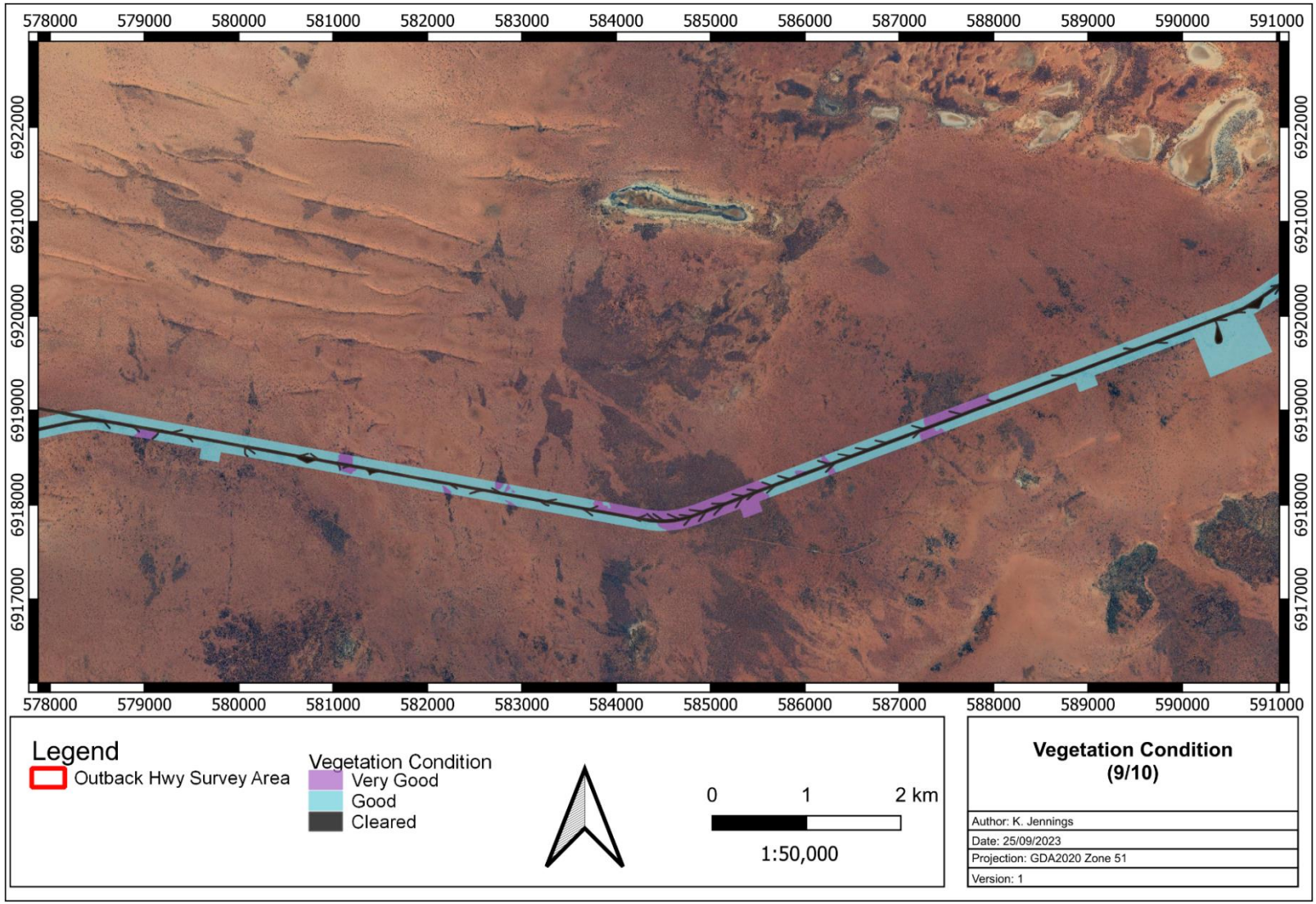

Figure 5-24: Vegetation condition within the survey area (9/10)

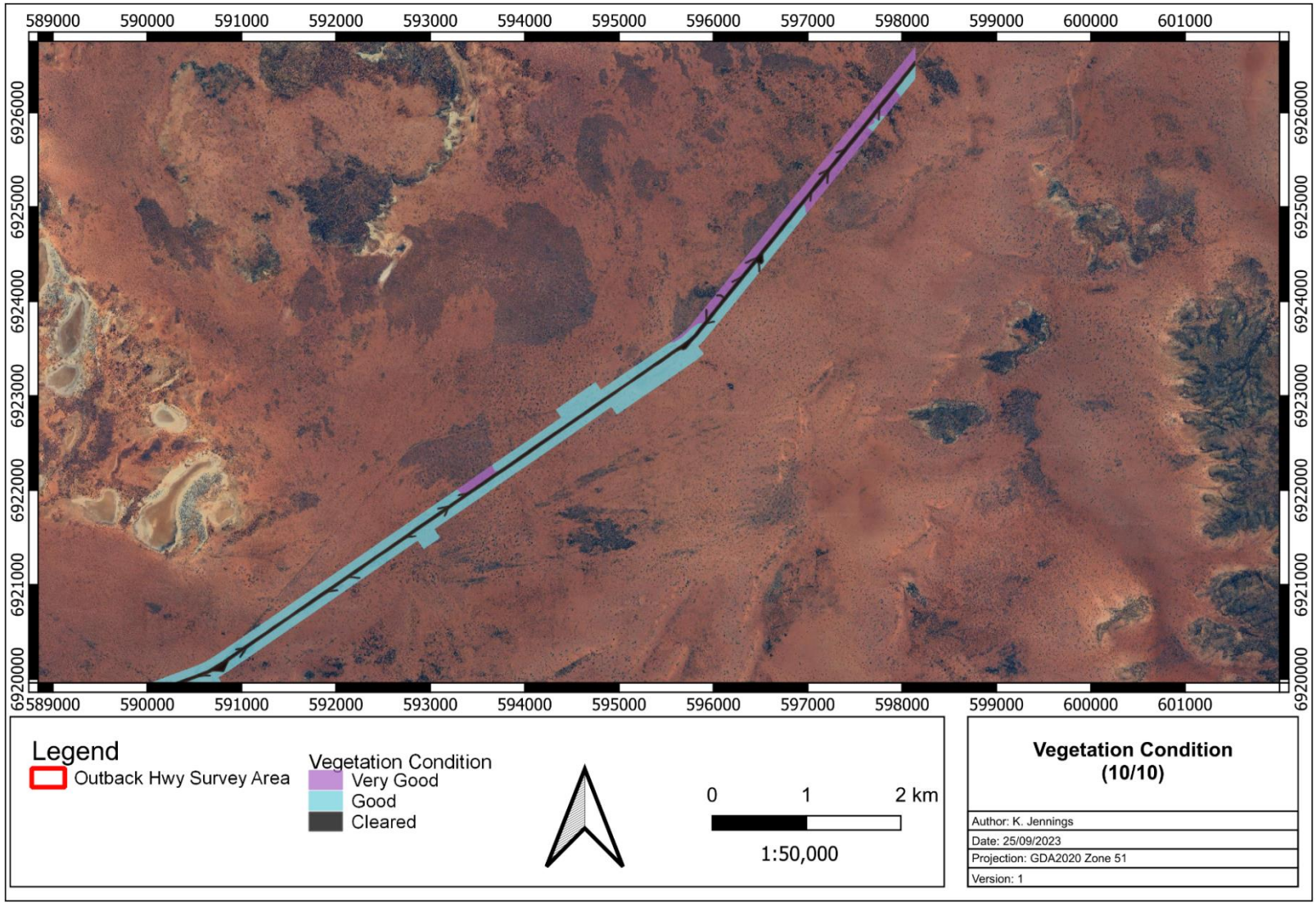

Figure 5-25: Vegetation condition within the survey area (10/10)

5.2.8 Fauna Habitat

Six broad scale terrestrial fauna habitats were identified within the survey area. The extent of the identified fauna habitats and a summary description is provided in Table 5-16 below. Fauna habitat maps are provided in Figure 5-27 to Figure 5-36.

Table 5-16: Main terrestrial fauna habitats within the survey area

Fauna Habitat	Description	Representative Fauna Attributes	Significant Species that possibly occur in habitat	Representative Vegetation Communities	Example Image
<u>Clay-loam Plain</u> Acacia woodlands Area= 288.6 ha (9.9%)	*Acacia* woodland over *Ptilotus* low open shrubland	• Ground not especially suited to burrowing species. • Low diversity vegetation strata supporting low avifauna assemblage. • Low vegetation density and low leaf litter.	Grey Falcon *Falco hypoleucos*	CLP-AFW1	
<u>Sand Plain</u> Acacia Shrublands Area= 971.1 ha (33.1%)	*Acacia* woodland over *Triodia* hummock grassland	• Ground suited to burrowing species. • Low diversity vegetation strata supporting low avifauna assemblage. • Low to moderate vegetation density and low leaf litter.	N/A	S-AFW1 S-AOW1	

Fauna Habitat	Description	Representative Fauna Attributes	Significant Species that possibly occur in habitat	Representative Vegetation Communities	Example Image
<u>Sand Plain</u> Acacia/Allocasuarina Woodlands Area= 45.1 ha (1.5%)	*Acacia/ Allocasuarina* woodland over *Triodia* hummock grassland	• Ground suited to burrowing species. • Moderate diversity vegetation strata supporting moderate avifauna assemblage. • Moderate vegetation density and low leaf litter.	Grey Falcon *Falco hypoleucos*	S-CFW1	
<u>Sand Plain</u> Eucalyptus mallee woodlands Area= 957.8 ha (32.7%)	*Eucalyptus* mallee woodland over *Triodia* hummock grassland	• Ground suited to burrowing species. • Low diversity vegetation strata supporting low avifauna assemblage. • Low vegetation density and low leaf litter. • Hummock grass provides good habitat for small fauna	N/A	S-MWS1 S-MWS3	

Fauna Habitat	Description	Representative Fauna Attributes	Significant Species that possibly occur in habitat	Representative Vegetation Communities	Example Image
<u>Sand Plain</u> Eucalyptus Woodlands Area= 249.0 ha (8.5%)	*Eucalyptus* woodland over *Acacia* shrubland over *Triodia* hummock grassland	• Ground suited to burrowing species. • Low diversity vegetation strata supporting moderate avifauna assemblage. • Low to moderate vegetation density and low leaf litter.	Grey Falcon *Falco hypoleucos*	S-EW1	
<u>Sand Dune</u> Eucalyptus woodland/ mallee woodland Area= 19.3 ha (0.7%)	*Eucalyptus* woodland/ mallee woodland over *Triodia* hummock grassland	• Ground suited to burrowing species. • Low diversity vegetation strata supporting moderate avifauna assemblage. • Low to moderate vegetation density and low leaf litter.	Grey Falcon *Falco hypoleucos*	SD-EW/MWS1	
Cleared Area= 399.0 ha (13.6%)	N/A	N/A	N/A	N/A	N/A

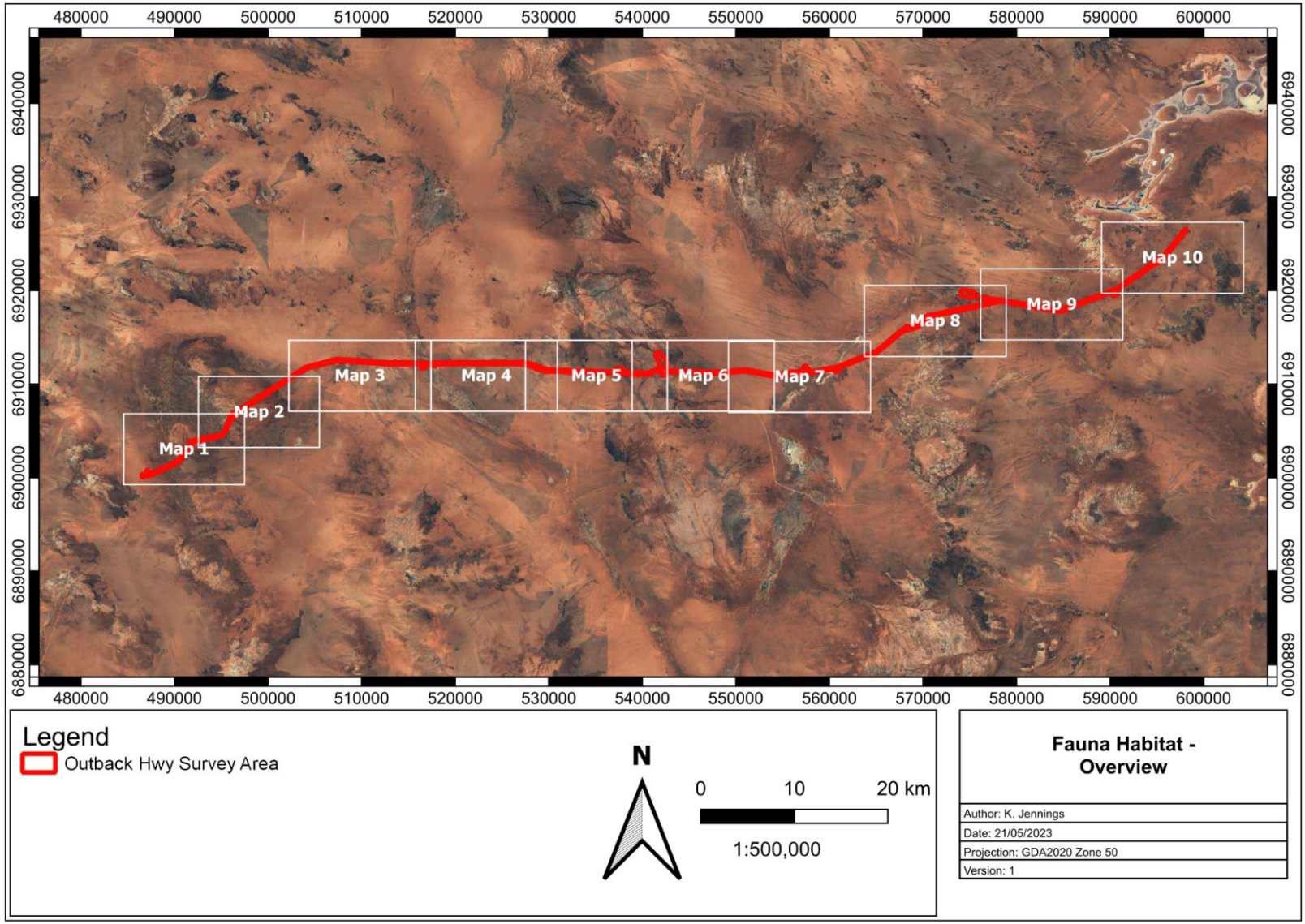

Figure 5-26: Overview of fauna habitat map series (1-10)

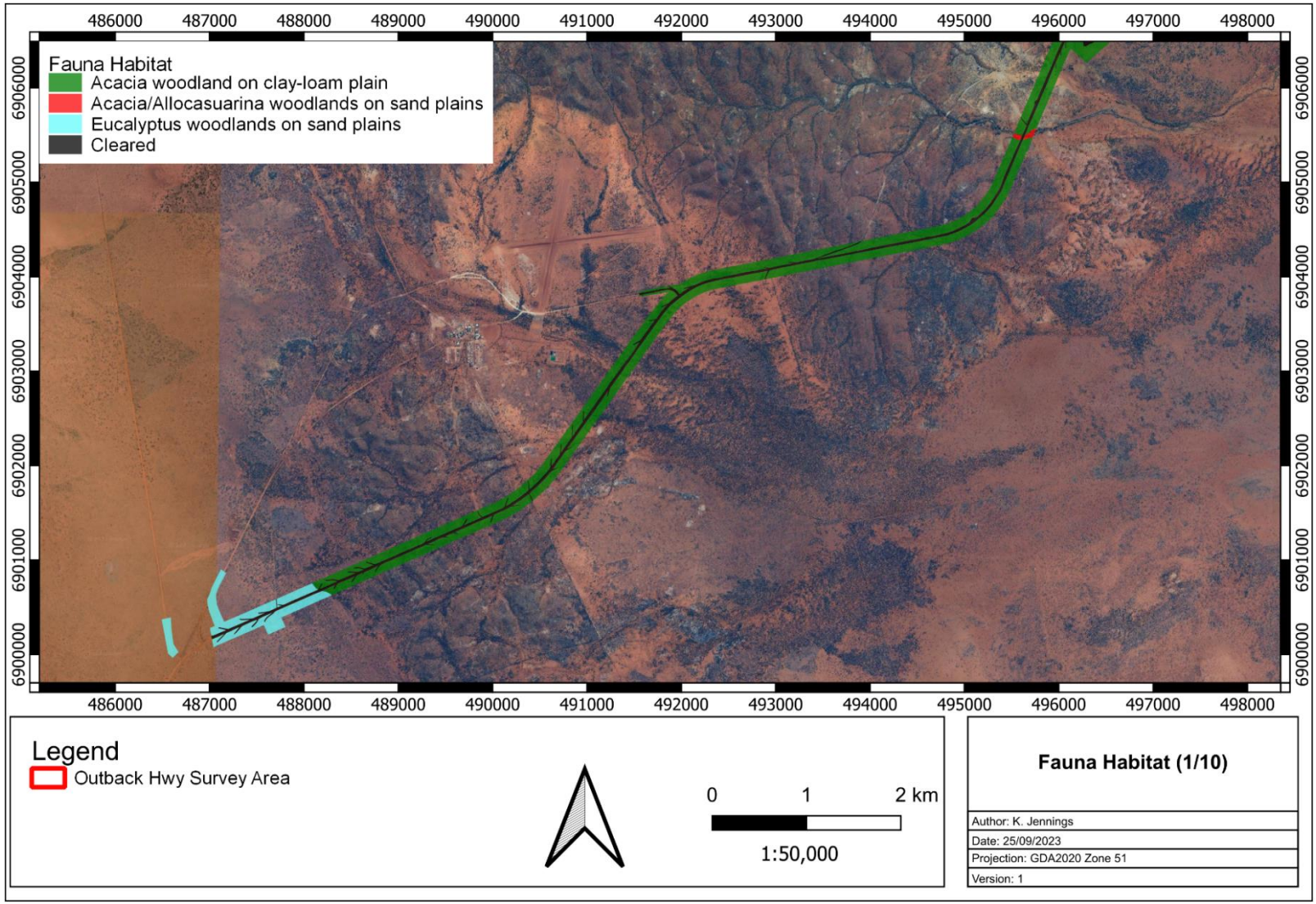

Figure 5-27: Fauna habitat within the survey area (1/10)

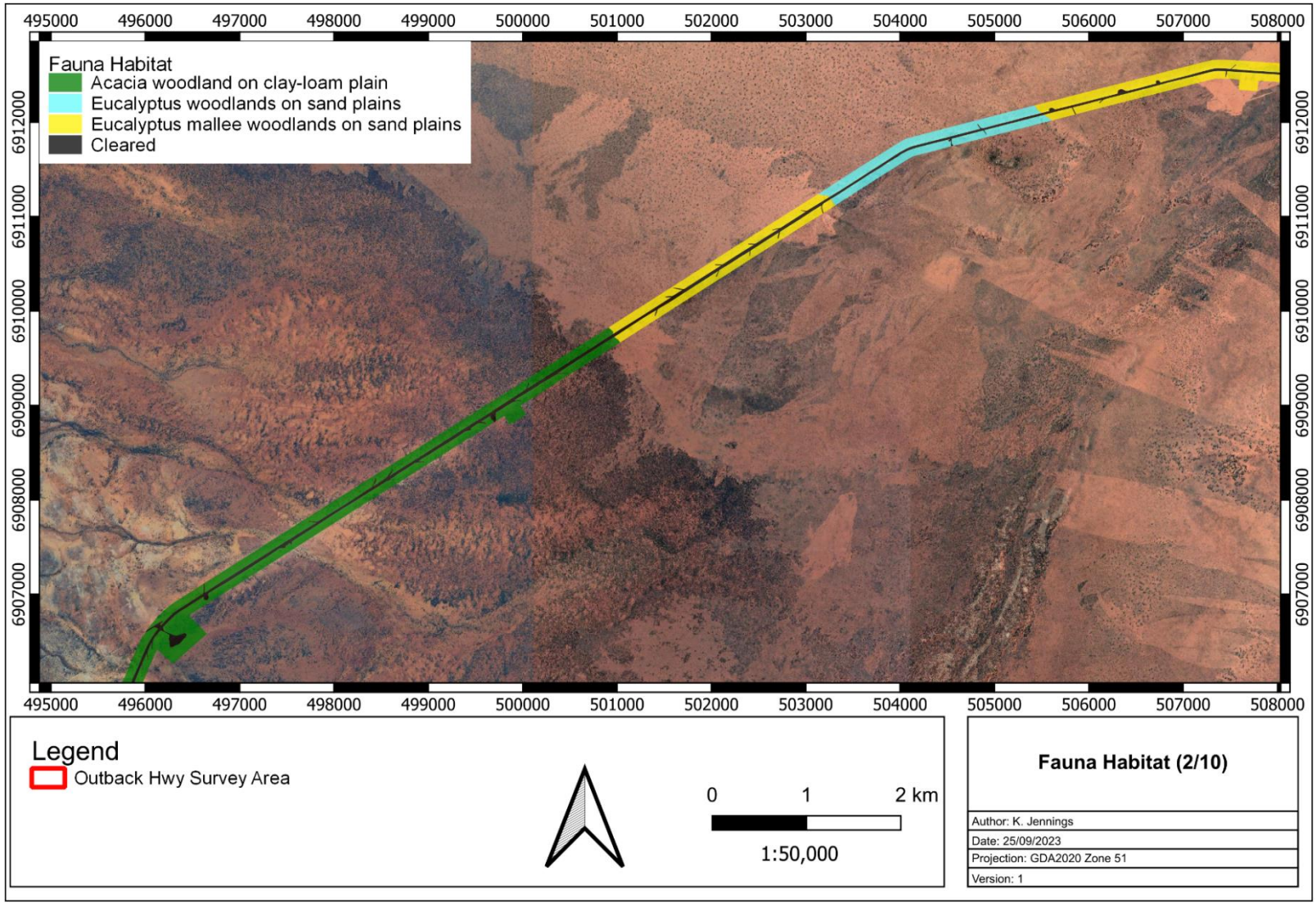

Figure 5-28: Fauna habitat within the survey area (2/10)

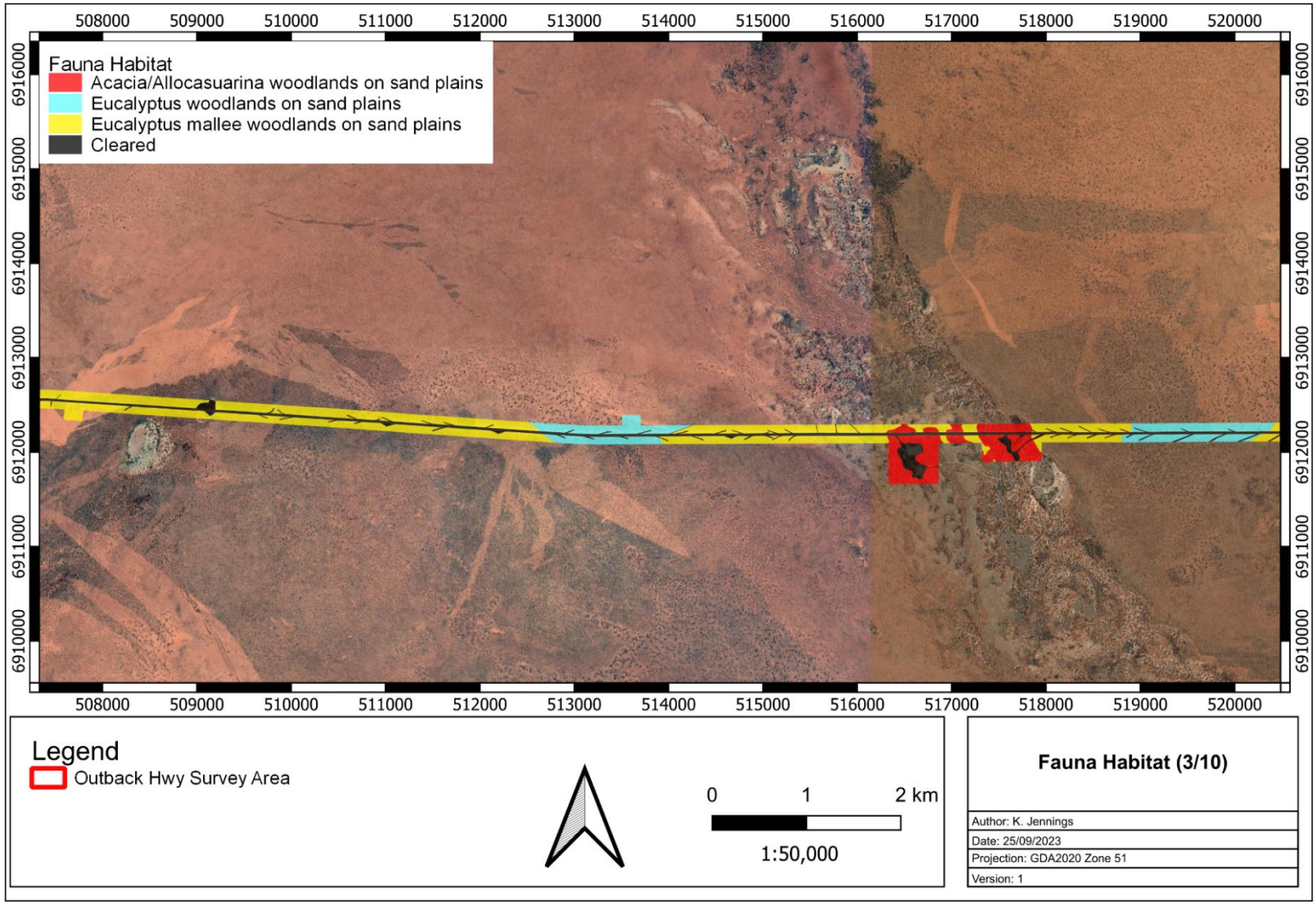

Figure 5-29: Fauna habitat within the survey area (3/10)

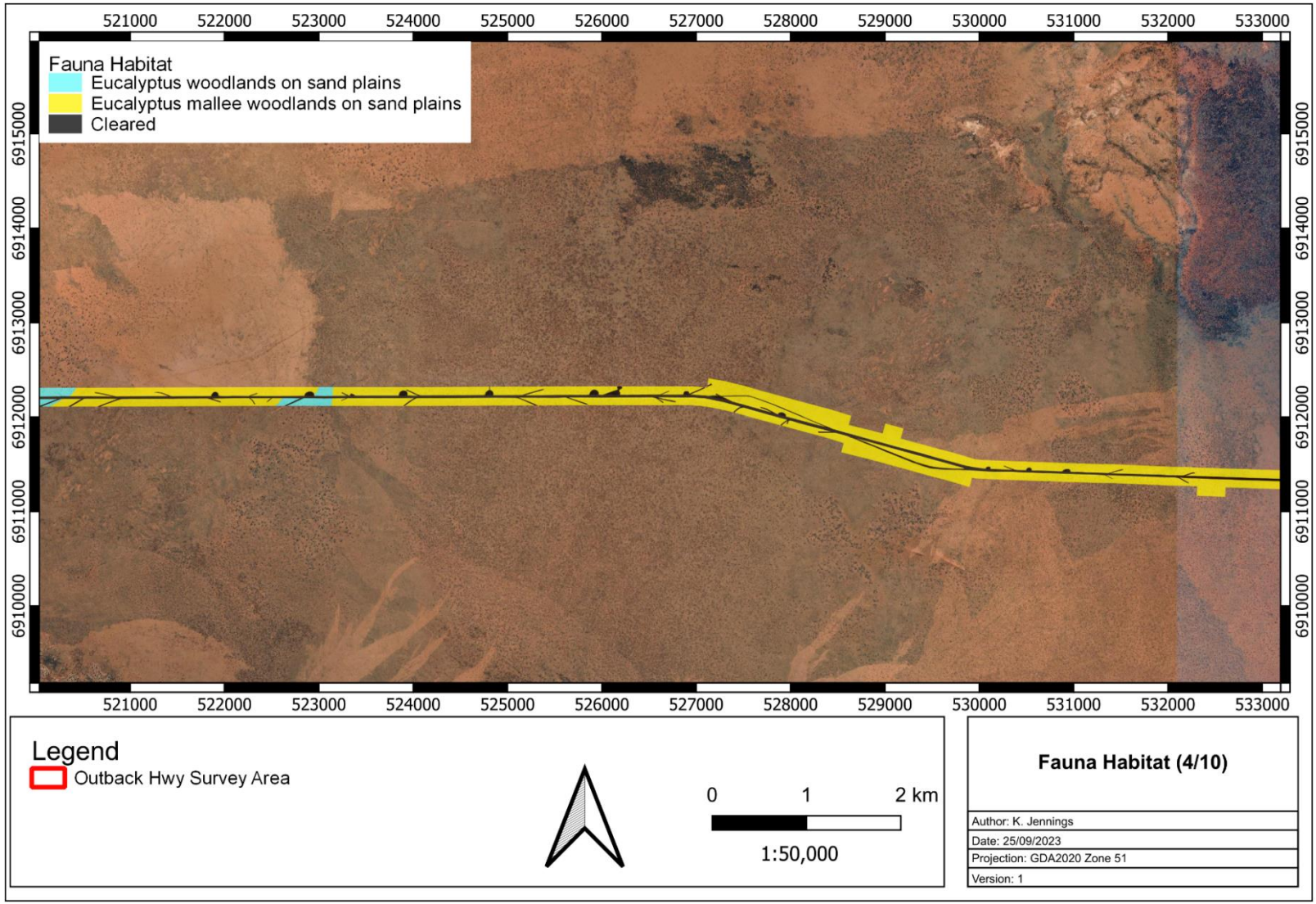

Figure 5-30: Fauna habitat within the survey area (4/10)

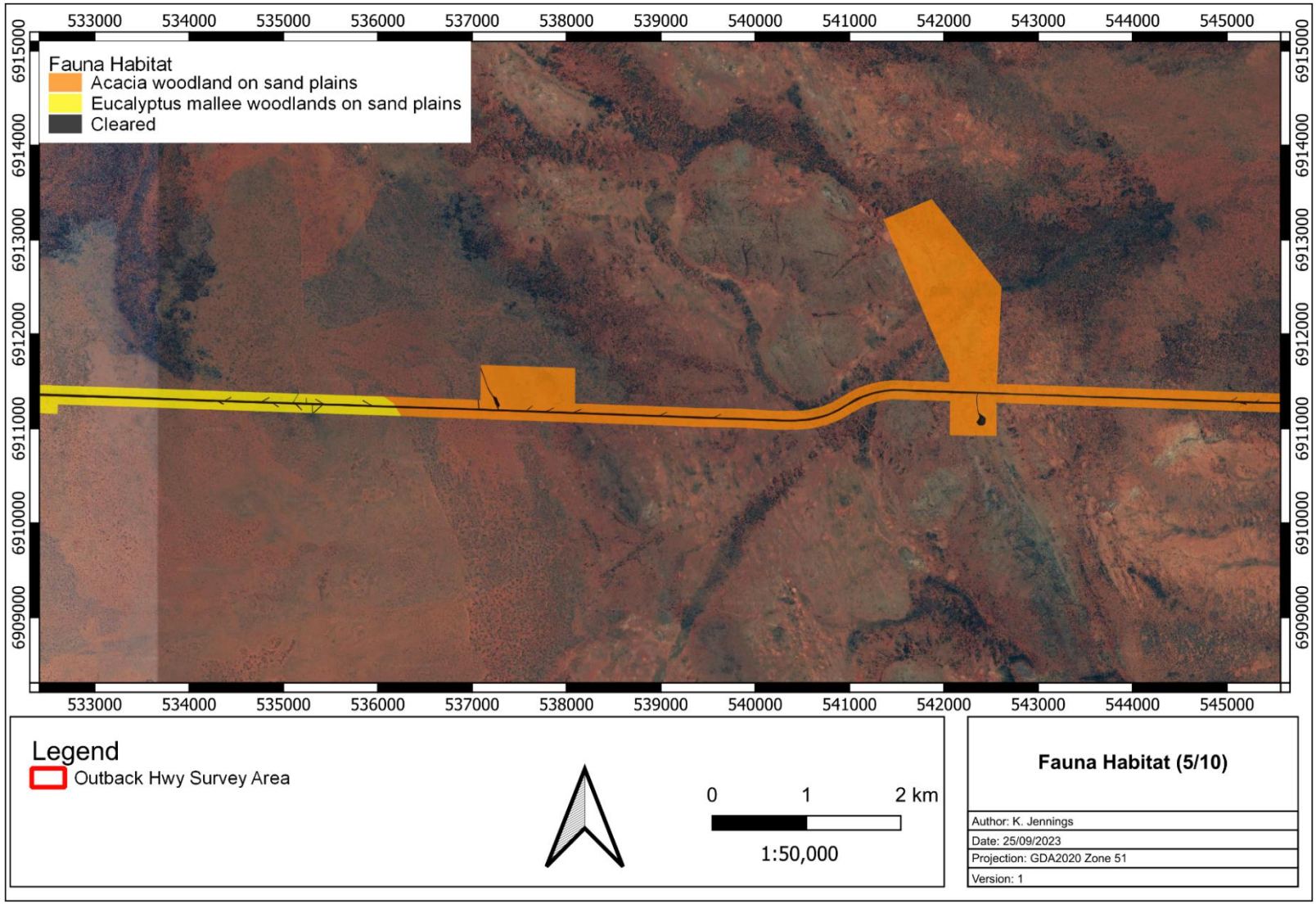

Figure 5-31: Fauna habitat within the survey area (5/10)

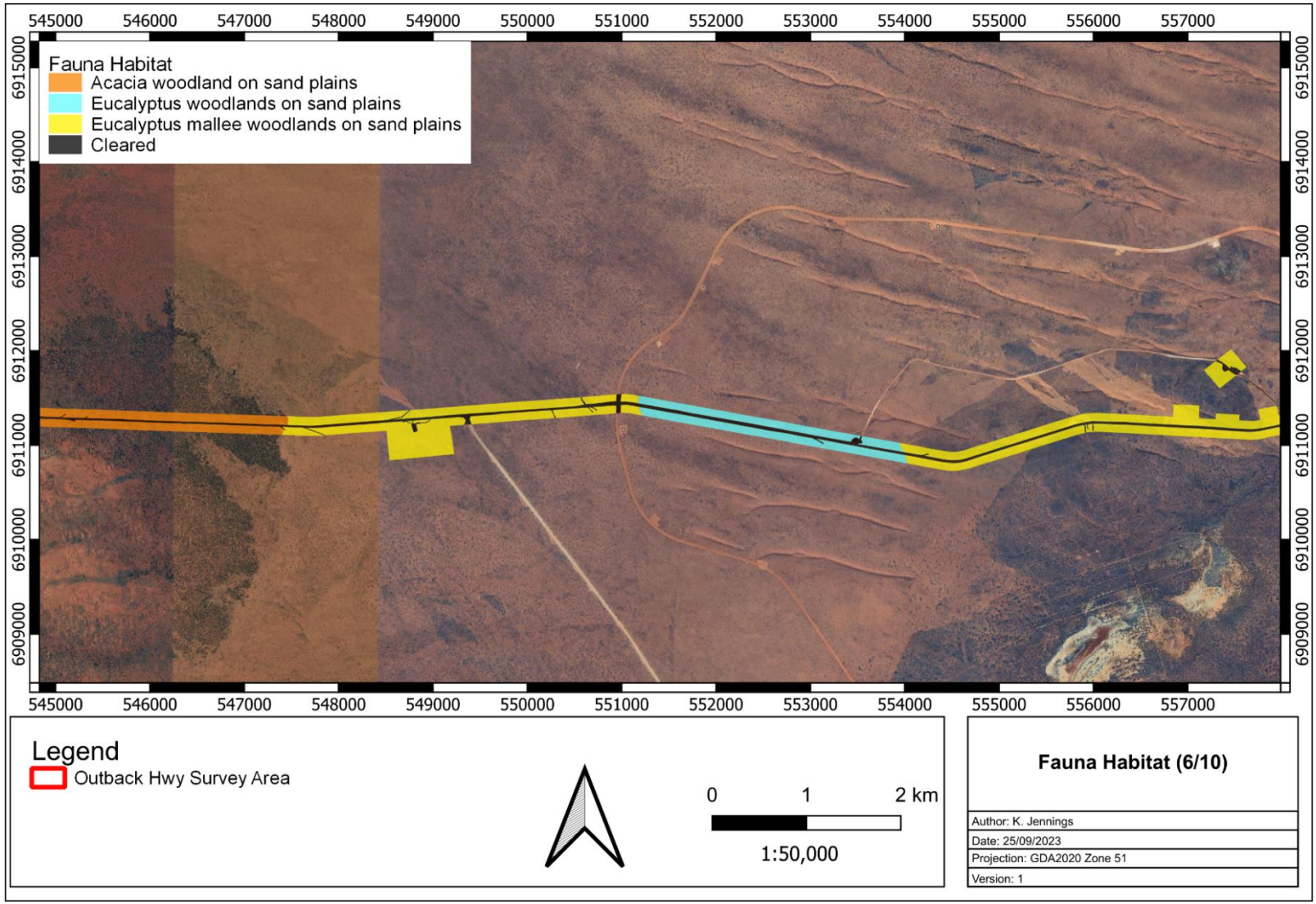

Figure 5-32: Fauna habitat within the survey area (6/10)

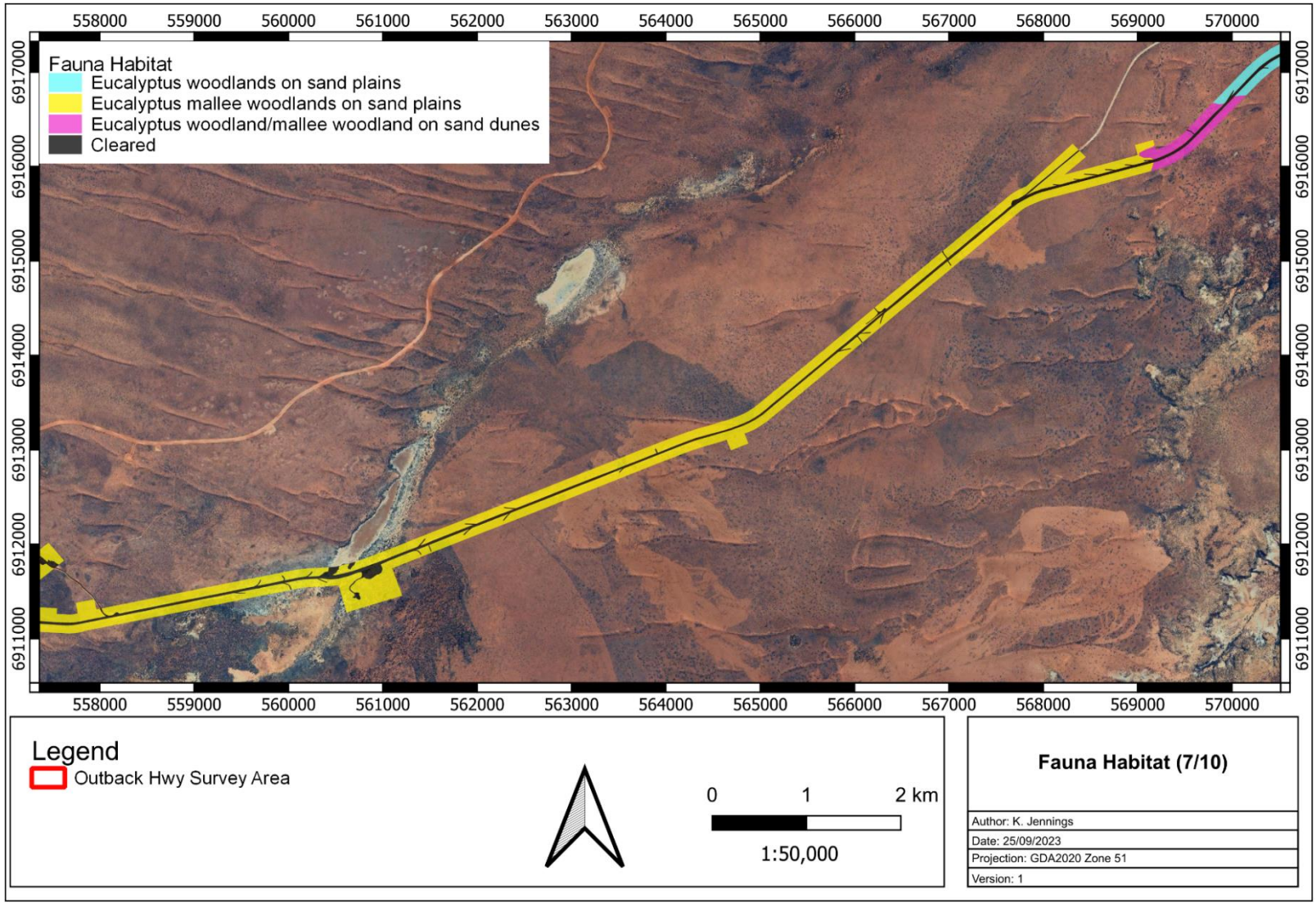

Figure 5-33: Fauna habitat within the survey area (7/10)

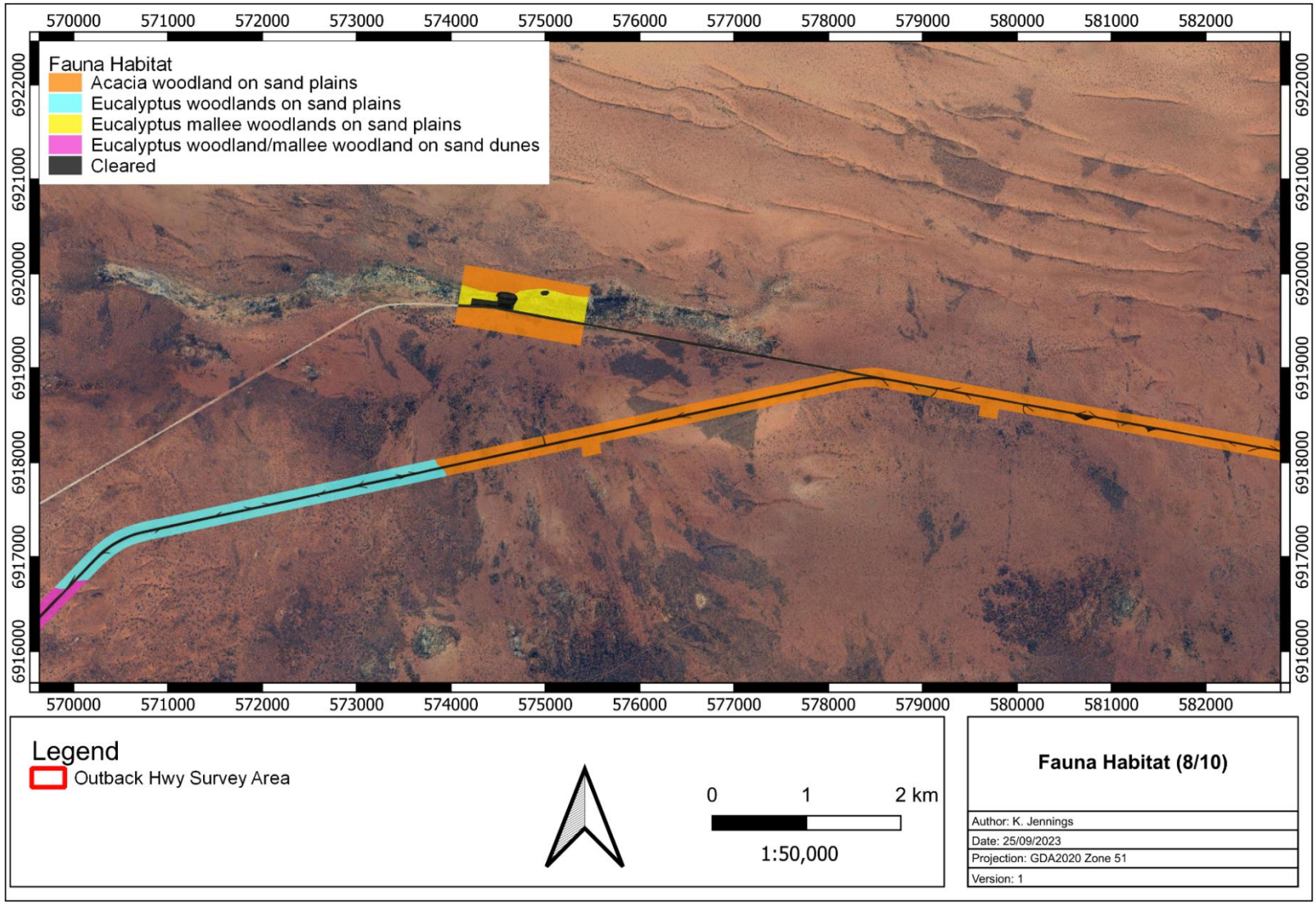

Figure 5-34: Fauna habitat within the survey area (8/10)

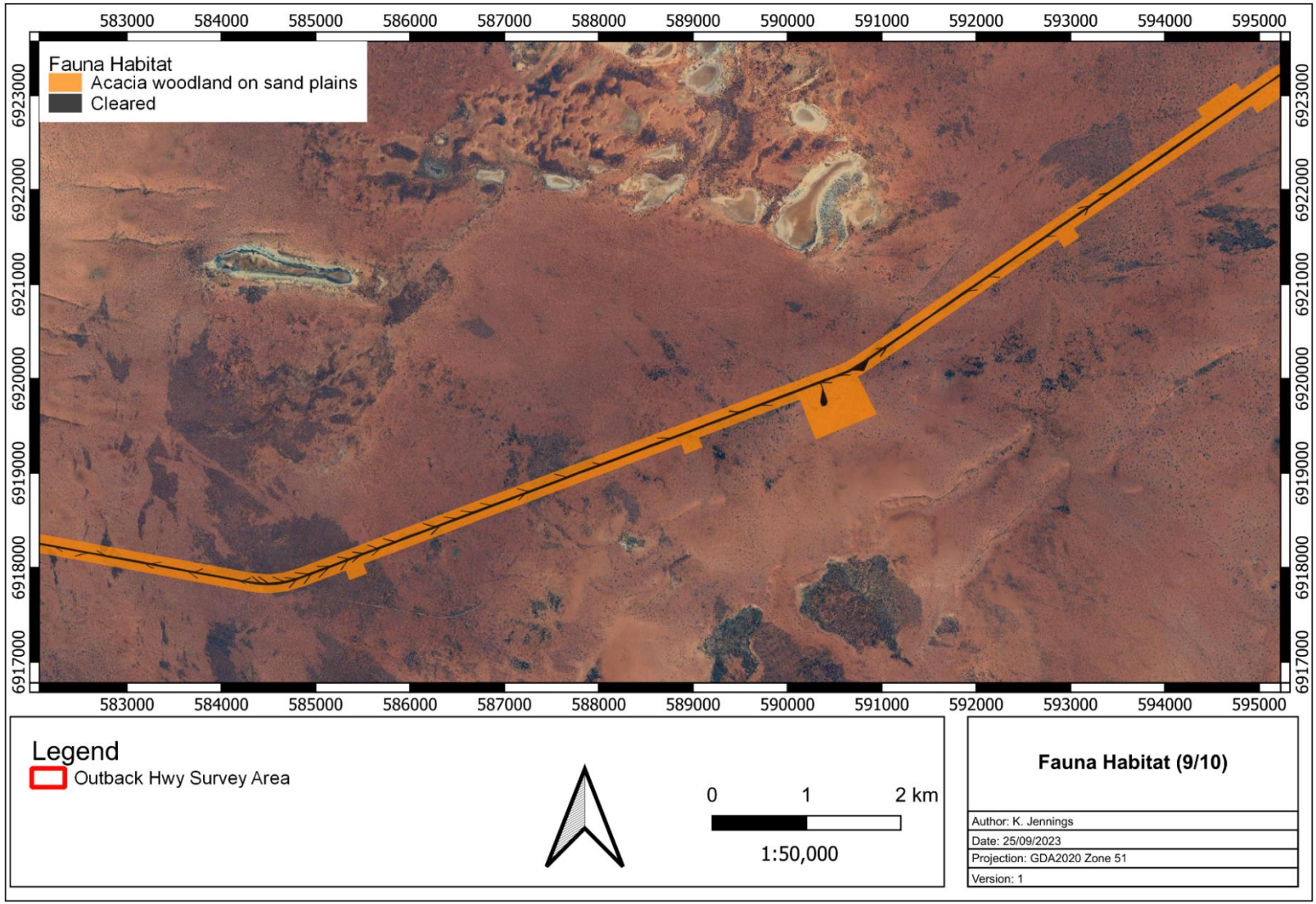

Figure 5-35: Fauna habitat within the survey area (9/10)

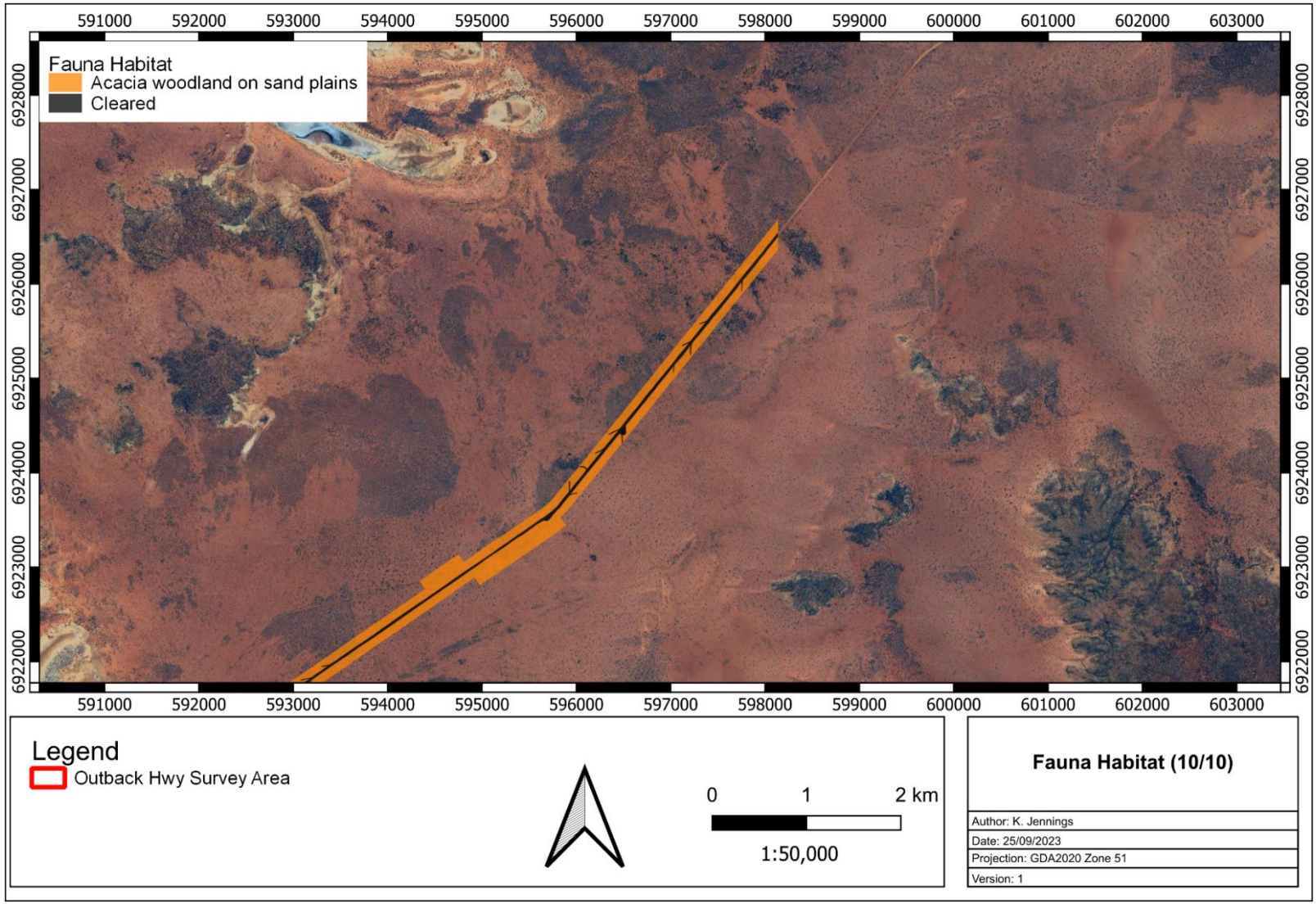

Figure 5-36: Fauna habitat within the survey area (10/10)

5.2.9 Fauna Species

Table 5-17 summarises the number of fauna species potentially occurring within or utilising at times the survey area, based on results from the literature review and observations made during the field assessment.

Table 5-17: Summary of potential vertebrate fauna species

Group	Total number of Potential species	Potential number of significant fauna species	Number of species observed within the survey area
Amphibians	6	0	0
Reptiles	81	1	2
Birds	105	6	4
Mammals	15	1	0
Total	**207**	**8**	**6**

5.2.10 Significant Fauna

According to the EPA Environmental Factor Guideline for Terrestrial Fauna (EPA, 2016c) significant fauna includes:

- Fauna being identified as a Threatened or Priority species;
- Fauna species with restricted distribution;
- Fauna subject to a high degree of historical impact from threatening processes; and
- Fauna providing an important function required to maintain the ecological integrity of a significant ecosystem.

No significant fauna taxa were recorded within the survey area.

Based on the habitats present and/ or recent nearby records, the following species of significance can be regarded as possibly occurring within the survey area:

- **Grey Falcon (*Falco hypoleucos*) - Vulnerable (EPBC Act and BC Act)**

  This species is sparsely recorded throughout inland Australia. Suitable habitat may be present but is unlikely to represent critical habitat (relatively undisturbed open woodlands and shrublands with an understorey of grasses and/or shrubs). No potential nesting hollows and crevices were observed. May traverse the survey area as part of its larger range, but is unlikely to utilize the area.

  Post-survey likelihood of occurrence: Unlikely

- **Southern Whiteface (*Aphelocephala leucopsis*) - Vulnerable (EPBC Act)**

  This species occurs across most of mainland Australia south of the tropics, from the north-eastern edge of the Western Australian wheatbelt to east to the Great Dividing Range. Critical habitat includes relatively undisturbed open woodlands and shrublands with an understorey of grasses and/or shrubs, habitat with low tree densities and an herbaceous understory litter cover which provides essential foraging habitat, and living and dead trees with hollows and crevices which are essential for roosting and nesting. These vegetation features were not widely present within the survey area, and it is considered unlikely to occur.

  Post-survey likelihood of occurrence: Unlikely

6 DISCUSSION

Botanica conducted this single-phase detailed flora and vegetation survey in early August 2023. A total of 33 vegetation quadrats (50m x 50m) were assessed during this 2023 survey. This included 20 quadrats that were installed by Botanica in 2020 and re-scored during this survey. An additional 13 quadrats were installed during this 2023 survey.

The field survey identified 104 vascular flora taxa from these 33 quadrats. The Chaos 2 species accumulation curve predicted 126 species over 50 quadrats, indicating that 87.3% of present species were detected.

The desktop assessment identified 25 significant flora species occurring within the desktop study area, consisting of seven Priority 1, one Priority 2, 12 Priority 3 and five Priority 4 flora taxa. These taxa were assessed for distribution and known habitat to determine their likelihood of occurrence within the survey area. This assessment identified two species as previously recorded within the survey area, consisting of one Priority 3 and one Priority 4 taxa. In addition, two species were assessed as likely to occur, consisting of two Priority 3 taxa, and three species were assessed as possibly occurring, consisting of one Priority 3 and two Priority 4 flora taxa.

The field survey did not identify any significant flora species within the survey area. Of the two Priority flora that had been previously recorded in the survey area, *Melaleuca apostiba* (P3) was a record from 1963, therefore its exact location is likely to be inaccurate. *Comesperma viscidulum* (P4) records are from 2000, and the locality just says, “east of Cosmo Newberry”. Their locations may not have been recorded with a GPS and therefore the locations could be inaccurate.

The field survey identified six fauna habitats within the survey area. Fauna habitat within the survey area was assessed against the one significant fauna species identified as potentially occurring by the desktop study: Grey Falcon (*Falco hypoleucos*). It was determined that the survey area did not contain critical habitat, with no potential nesting locations observed.

A total of eight vegetation types were identified within the survey area. These vegetation types were located within three landform types and comprised of five NVIS major vegetation groups. Vegetation was represented by a total of 110 vascular flora taxa within the survey area. These taxa represented 57 genera across 29 families. All vegetation types within the survey area were well represented in the broader landscape and were comprised of native species typical to the region.

Vegetation within the survey area is well represented in a regional context and has not been subject to extensive clearing or disturbance. Vegetation was broadly in concurrence with the vegetation associations and land systems identified in the desktop assessment.

Vegetation condition ranged from ‘very good’ to ‘degraded’. Disturbances in the survey area include:

- wildfire events, in some quadrats from a fire event as recent as 12 months ago,
- roads, tracks and associated infrastructure;
- some localised vegetation clearing, and
- cumulative historical impacts, including from grazing by large feral herbivores and a drying climate.

No significant weed presence was observed within the survey area

The north-eastern extent of the survey area is located adjacent to the Yeo Lake Nature Reserve, which is also categorised an as Environmentally Sensitive Area under the *Environmental Protection Act 1986* (EP Act).

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APPENDIX A:
CONSERVATION SIGNIFICANT SPECIES/ COMMUNITIES CATEGORIES (BC ACT AND EPBC ACT)

Definitions of Conservation Significant Species

Code	Category
State categories of Threatened and Priority species	
Threatened Species (T) Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as Threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).	
CR	**Critically Endangered** Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
EN	**Endangered** Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
VU	**Vulnerable** Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.
Extinct species Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.	
EX	**Extinct** Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.
EW	**Extinct in the Wild** Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no Threatened fauna or Threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.
Specially protected species Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as Threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.	
IA	**International Agreement/ Migratory** Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals,

Code	Category
	that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.
CD	**Species of special conservation interest** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as Threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.
OS	**Other specially protected species** Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.
Priority species Possibly Threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of Priority for survey and evaluation of conservation status so that consideration can be given to their declaration as Threatened Fauna or Flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.	
P1	**Priority 1: Poorly-known species** Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
P2	**Priority 2: Poorly-known species** Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
P3	**Priority 3: Poorly-known species** Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
P4	**Priority 4: Rare, Near Threatened and other species in need of monitoring** (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
Commonwealth categories of Threatened species	
EX	**Extinct** Taxa where there is no reasonable doubt that the last member of the species has died.
EW	**Extinct in the Wild** Taxa where it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat,

Code	Category
	at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CR	**Critically Endangered** Taxa that are facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
EN	**Endangered** Taxa which are not critically endangered and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
VU	**Vulnerable** Taxa which are not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Definitions of conservation significant communities

Category Code	Category
State categories of Threatened Ecological Communities (TEC)	
PD	**Presumed Totally Destroyed**
	An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies:
	• records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or;
	• all occurrences recorded within the last 50 years have since been destroyed.
CR	**Critically Endangered**
	An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria:
	The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification;
	The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;
	The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	**Endangered**
	An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria:
	The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short-term future, or is unlikely to be substantially rehabilitated in the short-term future due to modification;
	The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;
	The ecological community is highly modified with potential of being rehabilitated in the short-term future.

Category Code	Category
VU	**Vulnerable**
	An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria:
	The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated;
	The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution;
	The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.
Commonwealth categories of Threatened Ecological Communities (TEC)	
CE	**Critically Endangered** If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
EN	**Endangered** If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).
VU	**Vulnerable** If, at that time, an ecological community is not critically endangered or endangered, but is facing a high risk of extinction in the wild in the medium–term future (indicative timeframe being the next 50 years).
Priority Ecological Communities	
P1	**Poorly-known ecological communities**
	Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.
P2	**Poorly-known ecological communities**
	Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.
P3	**Poorly known ecological communities**
	Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:
	Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;
	Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	**Ecological communities that are adequately known, rare but not threatened** or meet criteria for near threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
P5	**Conservation Dependent ecological communities**
	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX B:
LIST OF SPECIES IDENTIFIED WITHIN EACH VEGETATION TYPE

Family	Species	CLP-AFW1	S-AFW1	S-AOW1	S-CFW1	S-EW1	S-MWS1	S-MWS3	SD-EW/MWS1
Amaranthaceae	*Ptilotus exaltatus (A)*								
Amaranthaceae	*Ptilotus helipteroides (A)*	*	*		*	*	*		
Amaranthaceae	*Ptilotus obovatus*	*	*					*	
Amaranthaceae	*Ptilotus polystachyus (A)*								
Amaranthaceae	*Ptilotus schwartzii*			*	*				
Asteraceae	*Cephalipterum drummondii*			*					
Asteraceae	*Gnephosis tenuissima*				*				
Asteraceae	*Rhodanthe charsleyae (A)*				*				
Asteraceae	*Rhodanthe floribunda (A)*		*		*				
Asteraceae	*Rhodanthe sterilescens (A)*		*						
Asteraceae	*Rhodanthe stricta (A)*				*				
Asteraceae	*Vittadinia eremaea (A)*				*				
Asteraceae	*Waitzia fitzgibbonii (A)*		*						
Boraginaceae	*Halgania cyanea* var. *allambi*								*
Brassicaceae	*Lepidium oxytrichum*				*				
Brassicaceae	*Lepidium platypetalum*		*						
Casuarinaceae	*Allocasuarina helmsii*	*					*		
Chenopodiaceae	*Atriplex bunburyana*	*							
Chenopodiaceae	*Atriplex vesicaria*								*
Chenopodiaceae	*Dysphania kalpari (A)*		*						
Chenopodiaceae	*Maireana georgei*		*						
Chenopodiaceae	*Maireana pyramidata*		*						
Chenopodiaceae	*Maireana thesioides*			*	*				
Chenopodiaceae	*Maireana triptera*		*						
Chenopodiaceae	*Rhagodia eremaea*	*		*					
Chenopodiaceae	*Salsola australis (A)*		*						
Chenopodiaceae	*Sclerolaena cuneata*		*						
Chenopodiaceae	*Sclerolaena densiflora*		*						
Chenopodiaceae	*Sclerolaena diacantha*	*	*						
Convolvulaceae	*Bonamia erecta*				*		*		*
Convolvulaceae	*Duperreya commixta*								*
Fabaceae	*Acacia aptaneura*								*
Fabaceae	*Acacia burkittii*	*							
Fabaceae	*Acacia caesaneura*	*	*	*			*		
Fabaceae	*Acacia desertorum*					*			*

Family	Species	CLP-AFW1	S-AFW1	S-AOW1	S-CFW1	S-EW1	S-MWS1	S-MWS3	SD-EW/MWS1
Fabaceae	*Acacia doreta*	*							
Fabaceae	*Acacia incurvaneura*	*	*	*	*		*		
Fabaceae	*Acacia kempeana*							*	
Fabaceae	*Acacia ligulata*	*	*			*	*		*
Fabaceae	*Acacia pachyacra*								*
Fabaceae	*Acacia tetragonophylla*	*	*	*	*		*		*
Fabaceae	*Kennedia prorepens*					*			
Fabaceae	*Leptosema chambersii*					*	*		*
Fabaceae	*Senna* sp. Meekatharra (E. Bailey 1-26)		*						
Fabaceae	*Senna artemisioides* subsp. *filifolia*	*	*					*	*
Fabaceae	*Senna artemisioides* subsp. *helmsii*	*							*
Fabaceae	*Senna artemisioides* subsp. x *artemisioides*	*	*						
Fabaceae	*Swainsona formosa (A)*								
Geraniaceae	*Erodium* sp. *(A)*				*				
Goodeniaceae	*Goodenia macroplectra (A)*		*						
Goodeniaceae	*Scaevola restiacea*								*
Goodeniaceae	*Scaevola spinescens*	*	*						
Hemerocallidaceae	*Dianella revoluta*			*					*
Lamiaceae	*Dicrastylis exsuccosa*						*		*
Lamiaceae	*Microcorys macredieana*						*		
Lamiaceae	*Teucrium teucriiflorum*		*	*					
Lamiaceae	*Westringia rigida*						*	*	
Malvaceae	*Alyogyne pinoniana*								*
Malvaceae	*Seringia elliptica*					*	*		*
Malvaceae	*Seringia exastia*					*			
Malvaceae	*Sida calyxhymenia*								*
Montiaceae	*Calandrinia* sp. *(A)*				*				
Myrtaceae	*Aluta maisonneuvei*								*
Myrtaceae	*Aluta maisonneuvei* subsp. *auriculata*						*		
Myrtaceae	*Enekbatus eremaeus*								*
Myrtaceae	*Eucalyptus concinna*		*					*	
Myrtaceae	*Eucalyptus gongylocarpa*		*						*

Family	Species	CLP-AFW1	S-AFW1	S-AOW1	S-CFW1	S-EW1	S-MWS1	S-MWS3	SD-EW/MWS1
Myrtaceae	*Eucalyptus leptopoda* subsp. *elevata*					*	*		*
Myrtaceae	*Eucalyptus mannensis*		*						
Myrtaceae	*Eucalyptus youngiana*		*				*		*
Myrtaceae	*Melaleuca interioris*						*		
Poaceae	*Cenchrus ciliaris (W)*								
Poaceae	*Enneapogon caerulescens*		*						
Poaceae	Enneapogon polyphyllus								
Poaceae	*Eragrostis dielsii (A)*		*		*				
Poaceae	*Eragrostis eriopoda*		*			*			
Poaceae	*Triodia basedowii*	*	*	*		*	*		*
Poaceae	*Triodia desertorum*		*						
Poaceae	*Triodia irritans*							*	
Polygonaceae	*Rumex vesicarius (W) (A)*		*						
Proteaceae	*Grevillea acacioides*								*
Proteaceae	*Grevillea juncifolia* subsp. *juncifolia*						*	*	*
Proteaceae	*Hakea francisiana*						*		*
Proteaceae	*Hakea lorea*		*		*	*		*	
Pteridaceae	*Cheilanthes sieberi*			*					
Rubiaceae	*Psydrax latifolia*			*					*
Rubiaceae	*Psydrax suaveolens*	*	*						
Santalaceae	*Exocarpos aphyllus*	*							
Santalaceae	*Exocarpos sparteus*								*
Santalaceae	*Santalum acuminatum*	*							
Scrophulariaceae	*Eremophila abietina*	*							
Scrophulariaceae	*Eremophila abietina* subsp. *ciliata*		*						
Scrophulariaceae	*Eremophila georgei*	*							
Scrophulariaceae	*Eremophila gilesii*			*					
Scrophulariaceae	*Eremophila glabra*	*	*						
Scrophulariaceae	*Eremophila longifolia*	*	*		*				
Scrophulariaceae	*Eremophila platythamnos*								*
Scrophulariaceae	*Eremophila forrestii* subsp. *forrestii*	*		*		*			*
Scrophulariaceae	*Eremophila latrobei* subsp. *glabra*				*				

Family	Species	CLP-AFW1	S-AFW1	S-AOW1	S-CFW1	S-EW1	S-MWS1	S-MWS3	SD-EW/MWS1
Scrophulariaceae	*Eremophila latrobei* subsp. *latrobei*	*	*						
Scrophulariaceae	*Eremophila oldfieldii* subsp. *angustifolia*	*							
Scrophulariaceae	*Eremophila pantonii*	*							
Solanaceae	*Anthotroche pannosa*						*		
Solanaceae	*Nicotiana rosulata (A)*				*				
Solanum	*Solanum lasiophyllum*	*	*						
Stylidiaceae	*Levenhookia* sp. *(A)*				*				
Thymelaeaceae	*Pimelea trichostachya*						*		
Xanthorrhoeaceae	*Xanthorrhoea thorntonii*					*			
Zygophyllaceae	*Roepera eremaea (A)*	*	*					*	

(A) Denotes annua/ephemeral species
(W) Denotes introduced (weed) species

APPENDIX C:
VEGETATION CONDITION RATING

Vegetation Condition Rating	South West and Interzone Botanical Provinces	Eremaean and Northern Botanical Provinces
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor		Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e., areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX D:
QUADRAT LOCATIONS (NW CORNER-GDA2020 ZONE 51)

Quadrat	Easting	Northing
Q6	588955	6919382
Q7	585377	6918032
Q8	579682	6918651
Q9	569110	6916160
Q10	569110	6916160
Q11	564721	6913156
Q13	557869	6911377
Q14	557297	6911780
Q15	542483	6911178
Q16	542126	6911465
Q17	541788	6912723
Q19	529082	6911782
Q20	516737	6911967
Q21	513502	6912290
Q22	507649	6912490
Q23	499870	6909000
Q24	496370	6906431
Q25	487617	6900358
Q1-N	537321	6911282
Q2-N	548852	6911213
Q3-N	574918	6919735
Q4-N	575371	6919597
Q5-N	546648	6911194
Q6-N	541291	6911368
Q7-N	532478	6911305
Q8-N	524213	6912315
Q9-N	504466	6911927
Q10-N	495392	6904896
Q11-N	494990	6904639
Q12-N	491172	6902694
Q13-N	487083	6900323

APPENDIX E:
QUADRAT DATASHEETS

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 117-121-126
Quadrat No: 6	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 382 m
Coordinates (GDA2020): 51 J 588955E, 6919382N		**Accuracy:** 1m
Aspect: South	**Fire (yrs):** 1-2	**Condition rating:** Poor
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Soft		
%Cover leaf litter: 10%		
%Cover bare ground: 30%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: <10m	**Height:** <1m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 5-10%	**Crown cover:** 5-10%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia incurvaneura	*Eremophila latrobei* subsp. *latrobei*	*Triodia basedowii*

ALL TAXA
Acacia incurvaneura
Eragrostis eriopoda
Eremophila latrobei subsp. *latrobei*
Eremophila longifolia
Eucalyptus gongylocarpa
Eucalyptus youngiana
Hakea lorea
Ptilotus obovatus
Senna artemisioides subsp. *filifolia*
Triodia basedowii

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 916-920-925
Quadrat No: 7	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 378 m
Coordinates (GDA2020): 51 J 585377E, 6918032N		**Accuracy:** 1m
Aspect: South	**Fire (yrs):** >50	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very slow		
Soil (profile/field texture/soil surface): Red/Sand/Firm		
%Cover leaf litter: 20%		
%Cover bare ground: 50%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Mallee	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: <10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 30-70%	**Crown cover:** 10-30%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus concinna	*Eremophila latrobei* subsp. *latrobei*	*Triodia basedowii*
ALL TAXA		
Acacia caesaneura		
Acacia ligulata		
Eremophila latrobei subsp. *latrobei*		
Eucalyptus concinna		
Eucalyptus mannensis		
Ptilotus obovatus		
Sclerolaena densiflora		
Senna artemisioides subsp. *filifolia*		
Solanum lasiophyllum		
Triodia basedowii		

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 830-834-837
Quadrat No: 8	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 382 m
Coordinates (GDA2020): 51 J 579682E, 6918651N		**Accuracy:** 2m
Aspect: South	**Fire (yrs):** 1	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Firm		
%Cover leaf litter: 10%		
%Cover bare ground: 40%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: <10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 5-10%	**Crown cover:** 10-30%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia incurvaneura	*Eremophila latrobei* subsp. *latrobei*	*Triodia desertorum*
ALL TAXA		
Acacia incurvaneura		
Acacia ligulata		
Eremophila latrobei subsp. l*atrobei*		
Eucalyptus mannensis		
Ptilotus obovatus		
Scaevola spinescens		
Senna artemisioides subsp. *filifolia*		
Solanum lasiophyllum		

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 822-827-831
Quadrat No: 9	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 410 m
Coordinates (GDA2020): 51 J 575516E, 6918265N		**Accuracy:** 1m
Aspect: South	**Fire (yrs):** 1-2	**Condition rating:** Poor
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Firm		
%Cover leaf litter: 5%		
%Cover bare ground: 15%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Mallee	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: <10m	**Height:** <1m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 0-5%	**Crown cover:** 5-10%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus youngiana	*Eremophila latrobei* subsp. *latrobei*	*Triodia desertorum*
ALL TAXA		
Acacia caesaneura		
Eremophila latrobei subsp. *latrobei*		
Eucalyptus youngiana		
Ptilotus obovatus		
Solanum lasiophyllum		
Triodia desertorum		

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 800-804-809
Quadrat No: 10	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 410 m
Coordinates (GDA2020): 51 J 569110E, 6916160N		**Accuracy:** 1m
Aspect: South-East	**Fire (yrs):** >40	**Condition rating:** Good
Landform: Sand Dune		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil / Slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Firm		
%Cover leaf litter: 10%		
%Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Mallee	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: <10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 5-10%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus leptopoda subsp. *elevata*	*Grevillea juncifolia* subsp. *juncifolia*	*Triodia basedowii*

ALL TAXA
Acacia ligulata
Aluta maisonneuvei subsp. *auriculata*
Anthotroche pannosa
Dicrastylis exsuccosa
Eucalyptus leptopoda subsp. *elevata*
Grevillea juncifolia subsp. *juncifolia*
Triodia basedowii

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 155-159-203
Quadrat No: 11	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 403 m
Coordinates (GDA2020): 51 J 564721E, 6913156N		**Accuracy:** 2m
Aspect: South-East	**Fire (yrs):** >10	**Condition rating:** Very good
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Soft		
%Cover leaf litter: 20%		
%Cover bare ground: 70%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: <10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 10-30%	**Crown cover:** 5-10%	**Crown cover:** 30- 70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus gongylocarpa	*Eremophila forrestii* subsp. *forrestii*	*Triodia basedowii*

ALL TAXA
Acacia ligulata
Acacia pachyacra
Bonamia erecta
Dicrastylis exsuccosa
Eremophila forrestii subsp. *forrestii*
Eucalyptus gongylocarpa
Eucalyptus youngiana
Exocarpos sparteus
Grevillea juncifolia subsp. *juncifolia*
Leptosema chambersii
Triodia basedowii

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):**
Quadrat No: 13	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 395 m
Coordinates (GDA2020): 51 J 557869E, 6911377N		**Accuracy:** 2
Aspect: South-East	**Fire (yrs):** >10	**Condition rating:** Poor
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Firm		
%Cover leaf litter: 15%		
%Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Mallee	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: <10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 10-30%	**Crown cover:** 10-30%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus youngiana	*Microcorys macredieana*	*Triodia basedowii*

ALL TAXA
Acacia ligulata
Anthotroche pannosa
Bonamia erecta
Eucalyptus youngiana
Grevillea juncifolia subsp. *juncifolia*
Leptosema chambersii
Microcorys macredieana
Seringia elliptica
Westringia rigida

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 107-111-116
Quadrat No: 14	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 394 m
Coordinates (GDA2020): 51 J 557297E, 6911780N		**Accuracy:** 1m
Aspect: South-East	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Very abundant (50-90%)/ Medium gravelly/ Subrounded		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Soft		
%Cover leaf litter: 10%		
%Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Mallee	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: <10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 10-30%	**Crown cover:** 70-100%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus leptopoda subsp. *elevata*	*Allocasuarina helmsii*	*Triodia basedowii*

ALL TAXA
Acacia ligulata
Allocasuarina helmsii
Bonamia erecta
Eucalyptus leptopoda subsp. *elevata*
Eucalyptus youngiana
Grevillea juncifolia subsp. *juncifolia*
Hakea francisiana
Melaleuca interioris
Triodia basedowii
Westringia rigida

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 846-850-857
Quadrat No: 15	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 433 m
Coordinates (GDA2020): 51 J 542483E, 6911178N		**Accuracy:** 1m
Aspect: South-East	**Fire (yrs):** >40	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Common (10-20%)/ Coarse gravelly/ Angular		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Red/ Clay/ Firm		
%Cover leaf litter: 10%		
%Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: <10m	**Height:** 1-2m	**Height:** <0.5m
Crown cover: 5-10%	**Crown cover:** 0-5%	**Crown cover:** 0-5%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia incurvaneura	*Senna artemisioides* subsp. x *artemisioides*	*Ptilotus obovatus*

ALL TAXA
Acacia incurvaneura
Enneapogon caerulescens
Eragrostis eriopoda
Eremophila latrobei subsp. *latrobei*
Goodenia macroplectra
Maireana pyramidata
Ptilotus helipteroides
Ptilotus obovatus
Rhodanthe floribunda
Rhodanthe sterilescens
Salsola australis
Sclerolaena cuneata
Sclerolaena diacantha
Senna artemisioides subsp. x *artemisioides*
Solanum lasiophyllum
Teucrium teucriiflorum
Waitzia fitzgibbonii
Roepera eremaea

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 952-956-000
Quadrat No: 16	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 430 m
Coordinates (GDA2020): 51 J 542126E, 6911465N		**Accuracy:** 2m
Aspect: South-East	**Fire (yrs):** >40	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Common (10-20%)/ Medium gravelly/ Angular		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Red/ Clay/ Firm		
%Cover leaf litter: 30%		
%Cover bare ground: 70%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: <10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 10-30%	**Crown cover:** 10-30%	**Crown cover:** 10-30%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia incurvaneura	*Eremophila latrobei* subsp. *latrobei*	*Ptilotus obovatus*

ALL TAXA
Acacia incurvaneura
Acacia tetragonophylla
Eragrostis eriopoda
Eremophila latrobei subsp. *latrobei*
Lepidium platypetalum
Maireana georgei
Maireana pyramidata
Maireana triptera
Eragrostis dielsii
Ptilotus helipteroides
Ptilotus obovatus
Rhodanthe sterilescens
Rumex vesicarius
Salsola australis (A)
Sclerolaena cuneata
Solanum lasiophyllum

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 507-511-515
Quadrat No: 17	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 432 m
Coordinates (GDA2020): 51 J 541788E, 6912723N		**Accuracy:** 2m
Aspect: South	**Fire (yrs):** >40	**Condition rating:** Good
Landform: Stony rise		
Coarse fragments on the surface: Very abundant (50-90%)/ Coarse gravelly/ Angular		
Rock outcrop (abundance/runoff): Nil		
Soil (profile/field texture/soil surface): Grey/ Clay/ Hard setting		
%Cover leaf litter: 10%		
%Cover bare ground: 90%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Mallee	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: 10-30m	**Height:** 1-2m	**Height:** <1m
Crown cover: 10-30%	**Crown cover:** 70-100%	**Crown cover:** 70-100%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus concinna	*Acacia kempeana*	*Triodia irritans*

ALL TAXA
Acacia kempeana
Eucalyptus concinna
Grevillea juncifolia subsp. *juncifolia*
Hakea lorea
Ptilotus obovatus
Roepera eremaea
Senna artemisioides subsp. *filifolia*
Triodia irritans
Westringia rigida

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 925-930-935
Quadrat No: 19	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 458 m
Coordinates (GDA2020): 51 J 529082E, 6911782N		**Accuracy:** 1m
Aspect: South-East	**Fire (yrs):** >40	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Orange/ Sand/ Soft		
%Cover leaf litter: 10%		
%Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Shrub	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: >2m	**Height:** <1m	**Height:** <1m
Crown cover: 0-5%	**Crown cover:** 30-70%	**Crown cover:** 70-100%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Grevillea juncifolia subsp. *juncifolia*	*Aluta maisonneuvei* subsp. *auriculata*	*Triodia basedowii*

ALL TAXA
Acacia ligulata
Aluta maisonneuvei subsp. *auriculata*
Anthotroche pannosa
Grevillea juncifolia subsp. *juncifolia*
Pimelea trichostachya
Ptilotus helipteroides
Triodia basedowii

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 819-822-826
Quadrat No: 20	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 437 m
Coordinates (GDA2020): 51 J 516737E, 6911967N		**Accuracy:** 1m
Aspect: South-East	**Fire (yrs):** >40	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Very abundant (50-90%)/ Coarse gravelly/ Angular		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Orange/ Sandy-clay/ Hard setting		
%Cover leaf litter: 20%		
%Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Shrub	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height:<10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 30-70%	**Crown cover:** 5-10%	**Crown cover:** 70-100%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia burkittii	*Eremophila latrobei* subsp. *latrobei*	*Triodia basedowii*

ALL TAXA
Acacia burkittii
Allocasuarina helmsii
Eremophila latrobei subsp. *latrobei*
Ptilotus obovatus
Sclerolaena diacantha
Senna artemisioides subsp. x *artemisioides*
Senna artemisioides subsp. *filifolia*
Triodia basedowii

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 055-059-104
Quadrat No: 21	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 435 m
Coordinates (GDA2020): 51 J 513502E, 6912290N		**Accuracy:** 1m
Aspect: South-East	**Fire (yrs):** >40	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Brown/ Sand/ Soft		
%Cover leaf litter: 20%		
%Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height:<10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 10-30%	**Crown cover:** 10-30%	**Crown cover:** 70-100%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus gongylocarpa	*Grevillea juncifolia* subsp. *juncifolia*	*Triodia basedowii*

ALL TAXA
Acacia ligulata
Dicrastylis exsuccosa
Eremophila platythamnos
Eucalyptus gongylocarpa
Eucalyptus youngiana
Grevillea juncifolia subsp. *juncifolia*
Scaevola restiacea
Senna artemisioides subsp. *helmsii*
Seringia elliptica
Sida calyxhymenia
Triodia basedowii

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 336-341-344
Quadrat No: 22	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 441 m
Coordinates (GDA2020): 51 J 507649E, 6912490N		**Accuracy:** 2m
Aspect: South-East	**Fire (yrs):** <1	**Condition rating:** Poor
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Firm		
%Cover leaf litter: 10%		
%Cover bare ground: 40%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Shrub	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: >2m	**Height:** 1-2m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 10-30%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Hakea lorea	*Acacia desertorum*	*Triodia basedowii*

ALL TAXA
Acacia desertorum
Eragrostis eriopoda
Eremophila forrestii subsp. *forrestii*
Eucalyptus leptopoda subsp. *elevata*
Hakea lorea
Kennedia prorepens
Ptilotus helipteroides
Seringia elliptica
Triodia basedowii
Xanthorrhoea thorntonii

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 041-045-049
Quadrat No: 23	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 465 m
Coordinates (GDA2020): 51 J 499870E, 6909000N		**Accuracy:** 1m
Aspect: South-East	**Fire (yrs):** >40	**Condition rating:** Poor
Landform: Plain		
Coarse fragments on the surface: Very abundant (50-90%)/ Fine gravelly/ Rounded		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Red/ Heavy clay/ Firm		
%Cover leaf litter: 20%		
%Cover bare ground: 40%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Tussock Grass
Height: <10m	**Height:** 1-2m	**Height:** <0.5m
Crown cover: 30-70%	**Crown cover:** 5-10%	**Crown cover:** 5-10%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia caesaneura	*Senna artemisioides* subsp. *filifolia*	*Eragrostis eriopoda*
ALL TAXA		
Acacia caesaneura		
Acacia incurvaneura		
Dysphania kalpari		
Eragrostis eriopoda		
Eremophila glabra		
Psydrax suaveolens		
Senna artemisioides subsp. *filifolia*		
Triodia basedowii		

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 245-248-251
Quadrat No: 24	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 486 m
Coordinates (GDA2020):51 J 496370E, 6906431N		**Accuracy:** 1m
Aspect: South-East	**Fire (yrs):** 6 months	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Very abundant (50-90%)/ Coarse gravelly/ Subangular		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Red/ Heavy clay/ Firm		
%Cover leaf litter: 5%		
%Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Tussock Grass
Height: <10m	**Height:** 1-2m	**Height:** <0.5m
Crown cover: 0-5%	**Crown cover:** 0-5%	**Crown cover:** 0-5%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia incurvaneura	*Eremophila abietina* subsp. *ciliata*	*Eragrostis eriopoda*

ALL TAXA
Acacia incurvaneura
Eragrostis eriopoda
Eremophila abietina subsp. *ciliata*
Ptilotus obovatus
Senna sp. Meekatharra (E. Bailey 1-26)
Solanum lasiophyllum
Teucrium teucriiflorum

Project Name: Great Central Road		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 306-312-317
Quadrat No: 25	**Quadrat size/shape:** 50m x50m/ Square	**Elevation (m):** 515 m
Coordinates (GDA2020): 51 J 487617E, 6900358N		**Accuracy:** 1m
Aspect: South-East	**Fire (yrs):** >40	**Condition rating:** Very good
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very Slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Soft		
%Cover leaf litter: 20%		
%Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: <10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 10-30%	**Crown cover:** 70-100%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus gongylocarpa	*Acacia ligulata*	*Triodia basedowii*

ALL TAXA
Acacia ligulata
Acacia pachyacra
Acacia tetragonophylla
Duperreya commixta
Eremophila forrestii subsp. *forrestii*
Eucalyptus gongylocarpa
Eucalyptus youngiana
Exocarpos sparteus
Leptosema chambersii
Psydrax latifolia
Senna artemisioides subsp. *filifolia*
Triodia basedowii

Project Name: Main Roads		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 10:56
Quadrat No: Q1-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 472m
Coordinates (GDA2020): 51 J 537321E, 6911282N		**Accuracy:**
Aspect: West	**Fire (yrs):** <5 years	**Condition rating:** Poor
Landform: Sand-Loam Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Soft		
Cover leaf litter: <5%		
Cover bare ground: 85%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock grass
Height: 3-10m	**Height:** 1-2m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 5-10%	**Crown cover:** 5-10%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus gongylocarpa	*Acacia ligulata*	*Triodia basedowii*
ALL TAXA		
Acacia ligulata		
Alyogyne pinoniana		
Eucalyptus gongylocarpa		
Eucalyptus youngiana		
Halgania cyanea var. Allambi Stn (B.W. Strong 676)		
Triodia basedowii		

Project Name: Main Roads		
Date: 02/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 12:42
Quadrat No: Q2-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 443m
Coordinates (GDA2020): 51 J 548852E, 6911213N		**Accuracy:**
Aspect: North	**Fire (yrs):** 10-20	**Condition rating:** Good
Landform: Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Very slow		
Soil (profile/field texture/soil surface): Red/ Sand/ Soft		
Cover leaf litter: 10%		
Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form: Shrub**	**Growth form:** Hummock grass
Height: **5-10m**	**Height: 1-2m**	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** 5-10%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Hakea lorea	*Acacia ligulata*	*Triodia basedowii*

ALL TAXA
Acacia desertorum
Acacia ligulata
Eragrostis eriopoda
Eremophila forrestii subsp. *forrestii*
Hakea lorea
Leptosema chambersii
Seringia exastia
Triodia basedowii

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 09:38
Quadrat No: Q3-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 365m
Coordinates (GDA2020): 51 J 574918E, 6919735N		**Accuracy:**
Aspect: South west	**Fire (yrs):** 40	**Condition rating:** Good
Landform: Flat/ Plain		
Coarse fragments on the surface: No coarse fragments		
Rock outcrop (abundance/runoff): Nil/ Moderately rapid		
Soil (profile/field texture/soil surface): Brown/ Sandy clay loam/ Firm		
Cover leaf litter: 30%		
Cover bare ground: 30%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-6m	**Height:** 1-3m	**Height:** 1-3m
Crown cover: 10-30%	**Crown cover:** 10-30%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia incurvaneura	*Acacia burkittii*	*Eremophila pantonii*

ALL TAXA
Acacia burkittii
Acacia incurvaneura
Acacia ligulata
Eremophila glabra
Eremophila longifolia
Eremophila pantonii
Exocarpos aphyllus
Ptilotus obovatus
Rhagodia eremaea
Santalum acuminatum
Sclerolaena diacantha
Senna artemisioides subsp. *filifolia*

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 09:55
Quadrat No: Q4-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 366m
Coordinates (GDA2020): 51 J 575371E, 6919597N		**Accuracy:**
Aspect: South	**Fire (yrs):** 40	**Condition rating:** Good
Landform: Flat/ Plain		
Coarse fragments on the surface: Very few (2-10%)/ Medium gravelly (6-20mm)/ Angular		
Rock outcrop (abundance/runoff): Nil/ Moderately rapid		
Soil (profile/field texture/soil surface): Brown/ Sandy clay loam/ Firm		
Cover leaf litter: 20%		
Cover bare ground: 40%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-6m	**Height:**	**Height:** 0.5-1m
Crown cover: 10-30%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia incurvaneura	*Acacia burkittii*	*Senna artemisioides* subsp. *filifolia*

ALL TAXA
Acacia burkittii
Acacia incurvaneura
Acacia ligulata
Atriplex vesicaria
Eremophila glabra
Eremophila pantonii
Ptilotus obovatus
Scaevola spinescens
Senna artemisioides subsp. *filifolia*
Solanum lasiophyllum

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 10:37
Quadrat No: Q5-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 399m
Coordinates (GDA2020): 51 J 546648E, 6911194N		**Accuracy:**
Aspect: North West	**Fire (yrs):** 40	**Condition rating:** Good
Landform: Flat/ Plain		
Coarse fragments on the surface: No coarse fragments		
Rock outcrop (abundance/runoff): Nil/ Moderately rapid		
Soil (profile/field texture/soil surface): Brown/ Medium heavy clay/ Firm		
Cover leaf litter: 15%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Heath Shrub
Height: 3-6m	**Height:** 1-3m	**Height:**
Crown cover: 30-70%	**Crown cover:** <1%	**Crown cover:** 10-30%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia caesaneura	*Eremophila forrestii* subsp. *forrestii*	*Ptilotus schwartzii*

ALL TAXA
Acacia caesaneura
Eremophila forrestii subsp. *forrestii*
Maireana thesioides
Ptilotus schwartzii
Rhagodia eremaea
Teucrium teucriiflorum

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 10:50
Quadrat No: Q6-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 416m
Coordinates (GDA2020): 51 J 541291E, 6911368N		**Accuracy:**
Aspect: South	**Fire (yrs):** 40	**Condition rating:** Good
Landform: Flat/ Plain		
Coarse fragments on the surface: No coarse fragments		
Rock outcrop (abundance/runoff): Nil/ Moderately rapid		
Soil (profile/field texture/soil surface): Brown/ Light heavy clay/ Firm		
Cover leaf litter: 70%		
Cover bare ground: 10%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Tussock Grass
Height: 3-6m	**Height:** 1-3m	**Height:** 0.5-1m
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** 10-30%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia incurvaneura	*Eremophila latrobei* subsp. *glabra*	*Eragrostis dielsii*

ALL TAXA
Acacia incurvaneura
Acacia tetragonophylla
Brachyscome ciliaris
Calandrinia sp.
Eragrostis dielsii
Eremophila latrobei subsp. *glabra*
Eremophila longifolia
Erodium sp.
Gnephosis tenuissima
Hakea lorea
Lepidium oxytrichum
Levenhookia sp.
Maireana thesioides
Nicotiana rosulata
Ptilotus helipteroides
Ptilotus polystachyus
Ptilotus schwartzii
Rhodanthe charsleyae
Rhodanthe floribunda
Rhodanthe stricta
Vittadinia eremaea

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 11:07
Quadrat No: Q7-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 436m
Coordinates (GDA2020): 51 J 532478E, 6911305N		**Accuracy:**
Aspect: South	**Fire (yrs):**40	**Condition rating:** Good
Landform: Flat/ Plain		
Coarse fragments on the surface: No coarse fragments		
Rock outcrop (abundance/runoff): Nil/ Slow		
Soil (profile/field texture/soil surface): Red Brown/ Sand/ Firm		
Cover leaf litter: 20%		
Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Shrub Mallee	**Growth form:** Shrub	**Growth form:** Hummock grass
Height: 3-6m	**Height:** 1-3m	**Height:** <1m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus youngiana	*Acacia desertorum*	*Triodia basedowii*

ALL TAXA
Acacia aptaneura
Acacia desertorum
Acacia ligulata
Acacia pachyacra
Bonamia erecta
Dianella revoluta
Eucalyptus youngiana
Hakea francisiana
Triodia basedowii

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 11:24
Quadrat No: Q8-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 431m
Coordinates (GDA2020): 51 J 524213E, 6912315N		**Accuracy:**
Aspect: North	**Fire (yrs):** 20+	**Condition rating:** Good
Landform: Flat/ Plain		
Coarse fragments on the surface: No coarse fragments		
Rock outcrop (abundance/runoff): Nil/ Slow		
Soil (profile/field texture/soil surface): Red Brown/ Sand/ Soft		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Shrub Mallee	**Growth form:** Shrub	**Growth form:** Hummock grass
Height: 3-6m	**Height:** 1-3m	**Height:** <1m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus youngiana	*Acacia desertorum*	*Triodia basedowii*
ALL TAXA		
Acacia desertorum		
Acacia ligulata		
Dianella revoluta		
Eucalyptus leptopoda subsp. *elevata*		
Eucalyptus youngiana		
Triodia basedowii		

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 11:57
Quadrat No: Q9-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 434m
Coordinates (GDA2020): 51 J 504466E, 6911927N		**Accuracy:**
Aspect: North West	**Fire (yrs):** 20+	**Condition rating:** Good
Landform: Flat/ Plain		
Coarse fragments on the surface: No coarse fragments		
Rock outcrop (abundance/runoff): Nil/ Slow		
Soil (profile/field texture/soil surface): Red Brown/ Sand/ Soft		
Cover leaf litter: 10%		
Cover bare ground: 70%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock grass
Height: 3-10m	**Height:** 1-3m	**Height:** <1m
Crown cover: 5-10%	**Crown cover:** <10%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus gongylocarpa	*Acacia desertorum*	*Triodia basedowii*

ALL TAXA
Acacia desertorum
Acacia ligulata
Aluta maisonneuvei
Dianella revoluta
Enekbatus eremaeus
Eremophila forrestii subsp. *forrestii*
Eucalyptus gongylocarpa
Eucalyptus youngiana
Grevillea acacioides
Triodia basedowii

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 12:15
Quadrat No: Q10-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 474m
Coordinates (GDA2020): 51 J 495392E, 6904896N		**Accuracy:**
Aspect: North East	**Fire (yrs):** 40+	**Condition rating:** Good
Landform: Rocky/ Hillslope		
Coarse fragments on the surface: Very abundant (50-90%)/ Coarse gravelly/ Angular		
Rock outcrop (abundance/runoff): Nil/ Rapid		
Soil (profile/field texture/soil surface): Brown**/** Clay/ Firm		
Cover leaf litter: 10%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: <10m	**Height:** 1-2m	**Height:** <0.5m
Crown cover: 5-10%	**Crown cover:** 5-10%	**Crown cover:** 5-10%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia doreta	*Senna artemisioides* subsp. *helmsii*	*Ptilotus obovatus*

ALL TAXA
Acacia doreta
Acacia tetragonophylla
Eremophila forrestii subsp. *forrestii*
Eremophila georgei
Eremophila abietina
Eremophila oldfieldii subsp. *angustifolia*
Ptilotus obovatus
Ptilotus helipteroides
Roepera eremaea
Scaevola spinescens
Sclerolaena diacantha
Senna artemisioides subsp. *helmsii*
Solanum lasiophyllum

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 12:26
Quadrat No: Q11-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 482m
Coordinates (GDA2020): 51 J 494990E, 6904639N		**Accuracy:**
Aspect: West	**Fire (yrs):** 40+	**Condition rating:** Good
Landform: Rocky/ Hillslope		
Coarse fragments on the surface: Very abundant (50-90%)/ Coarse gravelly/ Angular		
Rock outcrop (abundance/runoff): Nil/ Rapid		
Soil (profile/field texture/soil surface): Brown**/** Clay/ Firm		
Cover leaf litter: 10%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: <10m	**Height:** 1-2m	**Height:** <0.5m
Crown cover: 5-10%	**Crown cover:** 5-10%	**Crown cover:** 5-10%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia doreta	*Eremophila forrestii* subsp. *forrestii*	*Ptilotus obovatus*

ALL TAXA
Acacia doreta
Acacia burkittii
Eremophila oldfieldii subsp. *angustifolia*
Eremophila forrestii subsp. *forrestii*
Psydrax suaveolens
Ptilotus obovatus
Roepera eremaea
Senna artemisioides subsp. *helmsii*

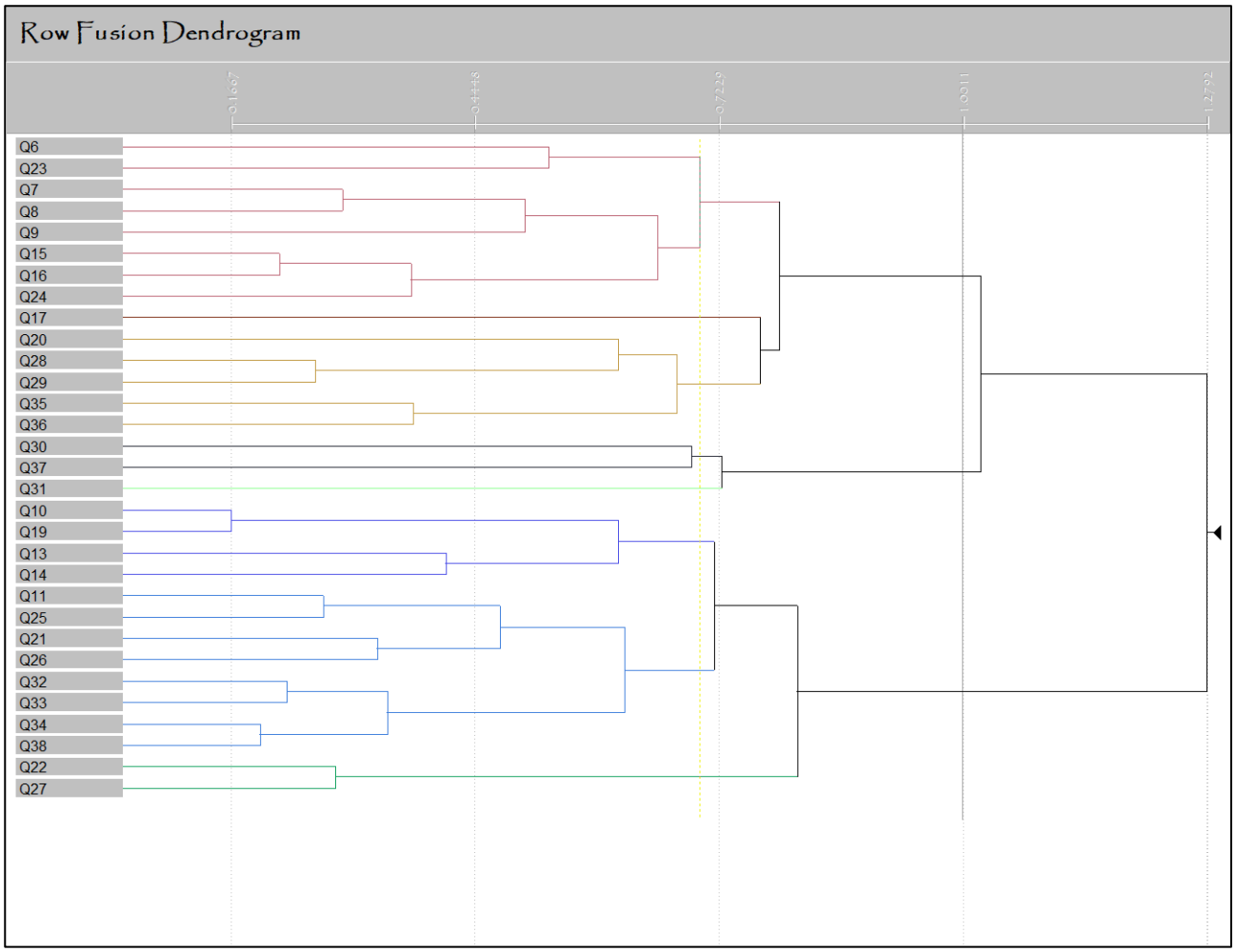
Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 12:46
Quadrat No: Q12-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 481m
Coordinates (GDA2020): 51 J 491172E, 6902694N		**Accuracy:**
Aspect: South	**Fire (yrs):** 40+	**Condition rating:** Good
Landform: Clay-loam/ Plain		
Coarse fragments on the surface: Nil		
Rock outcrop (abundance/runoff): Nil/ Slow		
Soil (profile/field texture/soil surface): Brown/ Sandy clay loam/ Firm		
Cover leaf litter: 20%		
Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock grass
Height: 3-6m	**Height:** 1-2m	**Height:** <1m
Crown cover: 30-70%	**Crown cover:** 5-10%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Acacia incurvaneura	*Eremophila forrestii* subsp. *forrestii*	*Triodia basedowii*

ALL TAXA
Acacia incurvaneura
Acacia tetragonophylla
Cheilanthes sieberi
Dianella revoluta
Eremophila forrestii subsp. *forrestii*
Eremophila gilesii
Psydrax latifolia
Teucrium teucriiflorum
Triodia basedowii

Project Name: Main Roads		
Date: 03/08/2023	**Botanist:** JW + JJ	**Photo number (NW corner):** 13:15
Quadrat No: Q13-N	**Quadrat size/shape:** 50m x 50m/ Square	**Elevation (m):** 491m
Coordinates (GDA2020): 51 J 487083E, 6900323N		**Accuracy:**
Aspect: North	**Fire (yrs):** 10-20	**Condition rating:** Good
Landform: Flat/ Plain		
Coarse fragments on the surface: No coarse fragments		
Rock outcrop (abundance/runoff): Nil/ Slow		
Soil (profile/field texture/soil surface): Red Brown/ Sand/ Firm		
Cover leaf litter: 15%		
Cover bare ground: 70%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Shrub Mallee	**Growth form:** Shrub	**Growth form:** Hummock grass
Height: 3-6m	**Height:** 1-3m	**Height:** <1m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** 30-70%
Dominant taxa:	**Dominant taxa:**	**Dominant taxa:**
Eucalyptus youngiana	*Acacia ligulata*	*Triodia basedowii*

ALL TAXA
Acacia ligulata
Aluta maisonneuvei
Dianella revoluta
Eremophila forrestii subsp. *forrestii*
Eucalyptus youngiana
Hakea francisiana
Triodia basedowii

APPENDIX F:
PATN ANALYSIS RESULTS


Row Fusion Dendrogram
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0.4448
0.7229
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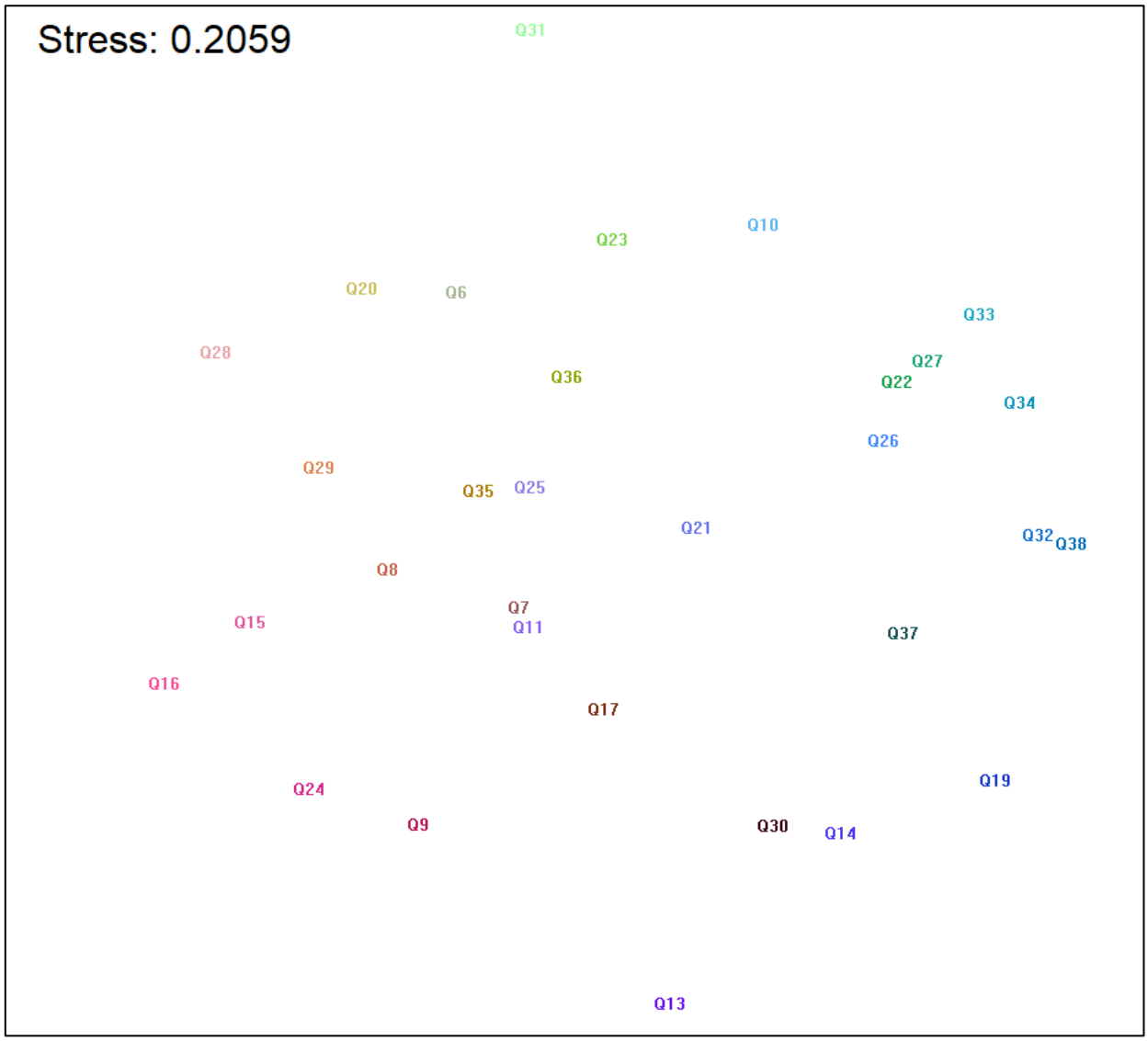
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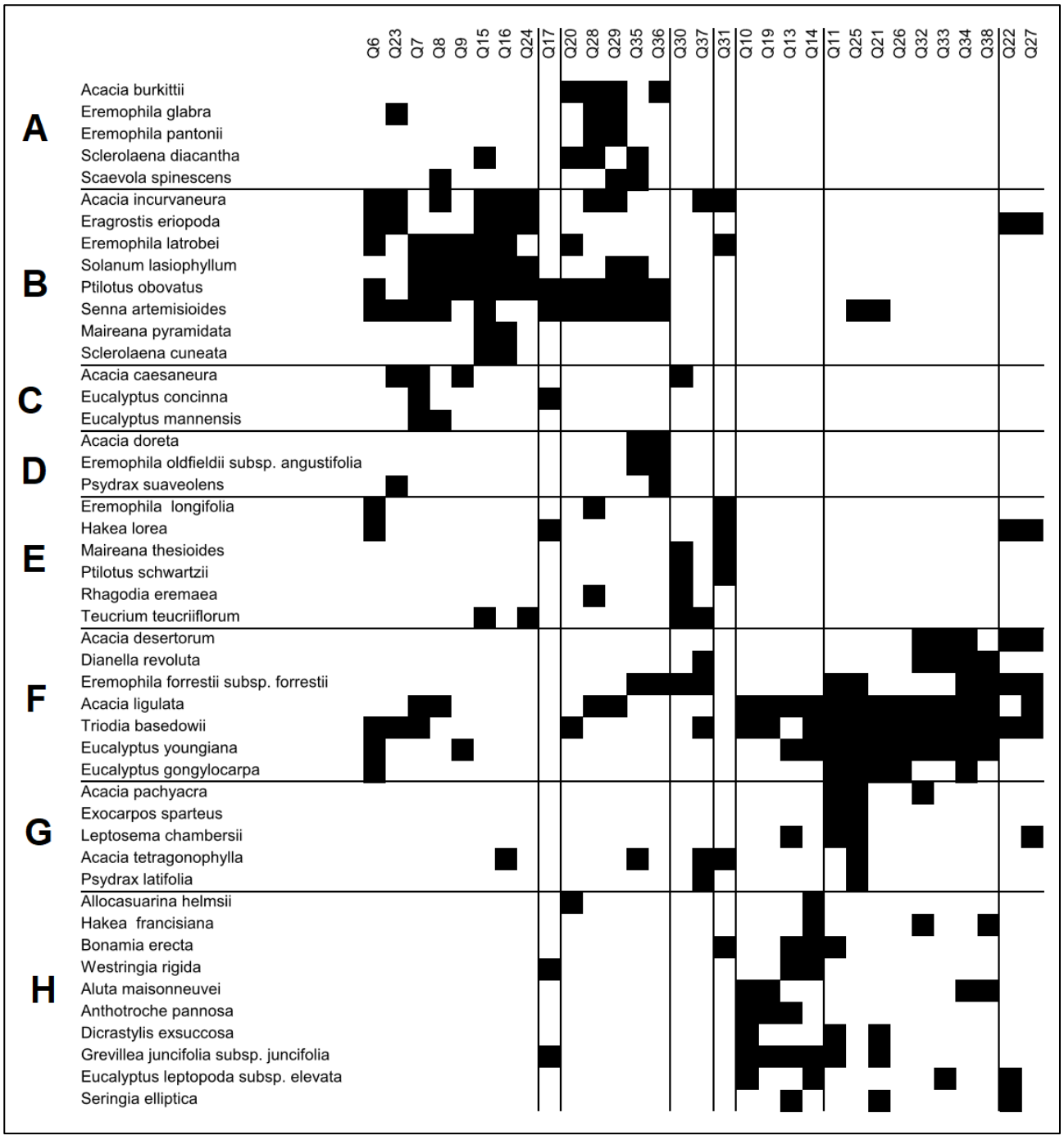
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A
Acacia burkittii
Eremophila glabra
Eremophila pantonii
Sclerolaena diacantha
Scaevola spinescens
B
Acacia incurvaneura
Eragrostis eriopoda
Eremophila latrobei
Solanum lasiophyllum
Ptilotus obovatus
Senna artemisioides
Maireana pyramidata
Sclerolaena cuneata
C
Acacia caesaneura
Eucalyptus concinna
Eucalyptus mannensis
D
Acacia doreta
Eremophila oldfieldii subsp. angustifolia
Psydrax suaveolens
E
Eremophila longifolia
Hakea lorea
Maireana thesioides
Ptilotus schwartzii
Rhagodia eremaea
Teucrium teucriiflorum
F
Acacia desertorum
Dianella revoluta
Eremophila forrestii subsp. forrestii
Acacia ligulata
Triodia basedowii
Eucalyptus youngiana
Eucalyptus gongylocarpa
G
Acacia pachyacra
Exocarpos sparteus
Leptosema chambersii
Acacia tetragonophylla
Psydrax latifolia
H
Allocasuarina helmsii
Hakea francisiana
Bonamia erecta
Westringia rigida
Aluta maisonneuvei
Anthotroche pannosa
Dicrastylis exsuccosa
Grevillea juncifolia subsp. juncifolia
Eucalyptus leptopoda subsp. elevata
Seringia elliptica

APPENDIX G:
QUADRAT PHOTOGRAPHS

Quadrat 6			
Direction	**East**	**South-East**	**South**
Quadrat 7			
Direction	**East**	**South-East**	**South**
Quadrat 8			
Direction	**East**	**South-East**	**South**

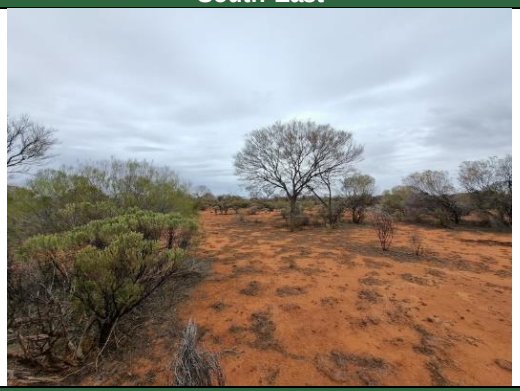
Quadrat 9			
Direction	**East**	**South-East**	**South**
Quadrat 10			
Direction	**East**	**South-East**	**South**
Quadrat 11			
Direction	**East**	**South-East**	**South**

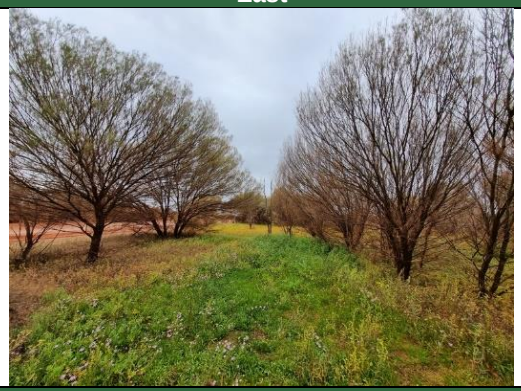
Quadrat 13	N/A	N/A	N/A
Direction	**East**	**South-East**	**South**
Quadrat 14			
Direction	**East**	**South-East**	**South**
Quadrat 15			
Direction	**East**	**South-East**	**South**

Quadrat 16			
Direction	**East**	**South-East**	**South**
Quadrat 17			
Direction	**East**	**South-East**	**South**
Quadrat 19			
Direction	**East**	**South-East**	**South**

Quadrat 20			
Direction	**East**	**South-East**	**South**
Quadrat 21			
Direction	**East**	**South-East**	**South**
Quadrat 22			
Direction	**East**	**South-East**	**South**

Quadrat 23			
Direction	**East**	**South-East**	**South**
Quadrat 24			
Direction	**East**	**South-East**	**South**
Quadrat 25			
Direction	**East**	**South-East**	**South**

Quadrat 1-N			
Direction	**East**	**South-East**	**South**
Quadrat 2-N			
Direction	**East**	**South-East**	**South**
Quadrat 3-N			
Direction	**East**	**South-East**	**South**

Quadrat 4-N			
Direction	**East**	**South-East**	**South**
Quadrat 5-N			
Direction	**East**	**South-East**	**South**
Quadrat 6-N			
Direction	**East**	**South-East**	**South**

Quadrat 7-N			
Direction	**East**	**South-East**	**South**
Quadrat 8-N			
Direction	**East**	**South-East**	**South**
Quadrat 9-N			
Direction	**East**	**South-East**	**South**

Quadrat 10-N			
Direction	**East**	**South-East**	**South**
Quadrat 11-N			
Direction	**East**	**South-East**	**South**
Quadrat 12-N			
Direction	**East**	**South-East**	**South**

Quadrat 13-N			
Direction	**East**	**South-East**	**South**

APPENDIX H:
ATLAS OF LIVING AUSTRALIA (ALA) DATABASE SEARCH RESULTS

VASCULAR FLORA SPECIES

Family	Taxon
Amaranthaceae	*Ptilotus aervoides*
Amaranthaceae	*Ptilotus chamaecladus*
Amaranthaceae	*Ptilotus helipteroides*
Amaranthaceae	*Ptilotus nobilis* subsp. *nobilis*
Amaranthaceae	*Ptilotus obovatus*
Amaranthaceae	*Ptilotus polystachyus*
Amaranthaceae	*Ptilotus xerophilus*
Apiaceae	*Daucus glochidiatus*
Apocynaceae	*Cynanchum viminale* subsp. *australe*
Araliaceae	*Trachymene ornata*
Asparagaceae	*Lomandra leucocephala* subsp. *robusta*
Asparagaceae	*Thysanotus manglesianus*
Asteraceae	*Actinobole oldfieldianum*
Asteraceae	*Angianthus tomentosus*
Asteraceae	*Asteridea athrixioides*
Asteraceae	*Brachyscome ciliaris*
Asteraceae	*Calocephalus beardii*
Asteraceae	*Calocephalus multiflorus*
Asteraceae	*Calotis multicaulis*
Asteraceae	*Cephalipterum drummondii*
Asteraceae	*Chrysocephalum apiculatum* subsp. *glandulosum*
Asteraceae	*Chrysocephalum puteale*
Asteraceae	*Chthonocephalus pseudevax*
Asteraceae	*Gnephosis tenuissima*
Asteraceae	*Helipterum craspedioides*
Asteraceae	*Lawrencella davenportii*
Asteraceae	*Leiocarpa semicalva* subsp. *semicalva*
Asteraceae	*Lemooria burkittii*
Asteraceae	*Leucochrysum stipitatum*
Asteraceae	*Millotia incurva*
Asteraceae	*Olearia eremaea*
Asteraceae	*Olearia incana*
Asteraceae	*Olearia subspicata*
Asteraceae	*Pluchea dentex*
Asteraceae	*Podolepis aristata* subsp. *affinis*
Asteraceae	*Podolepis capillaris*
Asteraceae	*Podolepis eremaea*
Asteraceae	*Rhodanthe charsleyae*
Asteraceae	*Rhodanthe chlorocephala* subsp. *rosea*
Asteraceae	*Rhodanthe chlorocephala* subsp. *splendida*
Asteraceae	*Rhodanthe citrina*
Asteraceae	*Rhodanthe floribunda*
Asteraceae	*Rhodanthe humboldtiana*
Asteraceae	*Rhodanthe propinqua*
Asteraceae	*Rhodanthe pygmaea*
Asteraceae	*Roebuckiella similis*
Asteraceae	*Rutidosis helichrysoides*
Asteraceae	*Senecio glossanthus*
Asteraceae	*Senecio lacustrinus*
Asteraceae	*Senecio quadridentatus*
Asteraceae	*Waitzia acuminata*
Asteraceae	*Waitzia acuminata* var. *acuminata*
Boraginaceae	*Euploca heterantha*
Boraginaceae	*Halgania cyanea*

Family	Taxon
Boraginaceae	*Halgania cyanea* var. Allambi Stn (B.W.Strong 676)
Boraginaceae	*Halgania cyanea* var. Charleville (R.W.Purdie+ 111)
Boraginaceae	*Halgania erecta*
Boraginaceae	*Heliotropium heteranthum*
Brassicaceae	*Brassica tournefortii*
Brassicaceae	*Cuphonotus andraeanus*
Brassicaceae	*Lepidium oxytrichum*
Brassicaceae	*Lepidium phlebopetalum*
Brassicaceae	*Menkea sphaerocarpa*
Brassicaceae	*Sisymbrium orientale*
Brassicaceae	*Stenopetalum anfractum*
Brassicaceae	*Stenopetalum velutinum*
Caryophyllaceae	*Spergularia diandroides*
Casuarinaceae	*Allocasuarina helmsii*
Casuarinaceae	*Casuarina obesa*
Casuarinaceae	*Casuarina pauper*
Celastraceae	*Macgregoria racemigera*
Celastraceae	*Stackhousia megaloptera*
Celastraceae	*Stackhousia muricata* subsp. *Annual (W.R.Barker 2172)*
Chenopodiaceae	*Atriplex bunburyana*
Chenopodiaceae	*Atriplex nana*
Chenopodiaceae	*Atriplex semilunaris*
Chenopodiaceae	*Atriplex vesicaria*
Chenopodiaceae	*Dysphania glomulifera*
Chenopodiaceae	*Dysphania kalpari*
Chenopodiaceae	*Dysphania melanocarpa*
Chenopodiaceae	*Dysphania platycarpa*
Chenopodiaceae	*Dysphania rhadinostachya* subsp. *rhadinostachya*
Chenopodiaceae	*Dysphania saxatilis*
Chenopodiaceae	*Dysphania simulans*
Chenopodiaceae	*Enchylaena tomentosa*
Chenopodiaceae	*Eriochiton sclerolaenoides*
Chenopodiaceae	*Maireana amoena*
Chenopodiaceae	*Maireana carnosa*
Chenopodiaceae	*Maireana georgei*
Chenopodiaceae	*Maireana glomerifolia*
Chenopodiaceae	*Maireana pentatropis*
Chenopodiaceae	*Maireana platycarpa*
Chenopodiaceae	*Maireana pyramidata*
Chenopodiaceae	*Maireana tomentosa* subsp. *tomentosa*
Chenopodiaceae	*Maireana trichoptera*
Chenopodiaceae	*Maireana villosa*
Chenopodiaceae	*Rhagodia eremaea*
Chenopodiaceae	*Salsola australis*
Chenopodiaceae	*Sclerolaena convexula*
Chenopodiaceae	*Sclerolaena cuneata*
Chenopodiaceae	*Sclerolaena densiflora*
Chenopodiaceae	*Sclerolaena diacantha*
Chenopodiaceae	*Sclerolaena eurotioides*
Chenopodiaceae	*Sclerolaena fimbriolata*
Chenopodiaceae	*Sclerolaena georgei*
Chenopodiaceae	*Sclerolaena johnsonii*
Chenopodiaceae	*Sclerolaena parviflora*
Chenopodiaceae	*Sclerolaena patenticuspis*
Chenopodiaceae	*Tecticornia calyptrata*

Family	Taxon
Chenopodiaceae	*Tecticornia disarticulata*
Chenopodiaceae	*Tecticornia indica* subsp. *bidens*
Chenopodiaceae	*Tecticornia pruinosa*
Convolvulaceae	*Bonamia erecta*
Crassulaceae	*Crassula colorata* var. *acuminata*
Cucurbitaceae	*Citrullus colocynthis*
Cupressaceae	*Callitris columellaris*
Cupressaceae	*Callitris verrucosa*
Cyperaceae	*Bulbostylis barbata*
Cyperaceae	*Eleocharis pallens*
Cyperaceae	*Fimbristylis dichotoma*
Cyperaceae	*Isolepis australiensis*
Cyperaceae	*Isolepis congrua*
Euphorbiaceae	*Euphorbia australis*
Euphorbiaceae	*Euphorbia australis* var. *subtomentosa*
Euphorbiaceae	*Euphorbia boophthona*
Euphorbiaceae	*Euphorbia ferdinandi* var. *ferdinandi*
Euphorbiaceae	*Euphorbia porcata*
Euphorbiaceae	*Euphorbia* sect. Anisophyllum
Fabaceae	*Acacia abrupta*
Fabaceae	*Acacia acanthoclada* subsp. *acanthoclada*
Fabaceae	*Acacia aciphylla*
Fabaceae	*Acacia aneura*
Fabaceae	*Acacia aptaneura*
Fabaceae	*Acacia burkittii*
Fabaceae	*Acacia collegialis*
Fabaceae	*Acacia colletioides*
Fabaceae	*Acacia exocarpoides*
Fabaceae	*Acacia heteroneura* var. *prolixa*
Fabaceae	*Acacia jennerae*
Fabaceae	*Acacia kempeana*
Fabaceae	*Acacia ligulata*
Fabaceae	*Acacia melleodora*
Fabaceae	*Acacia nyssophylla*
Fabaceae	*Acacia pachyacra*
Fabaceae	*Acacia pteraneura*
Fabaceae	*Acacia quadrimarginea*
Fabaceae	*Acacia ramulosa* var. *linophylla*
Fabaceae	*Acacia ramulosa* var. *ramulosa*
Fabaceae	*Acacia rhodophloia*
Fabaceae	*Acacia rigens*
Fabaceae	*Acacia sibilans*
Fabaceae	*Acacia sibina*
Fabaceae	*Acacia sibirica*
Fabaceae	*Acacia sp. (NEQ)*
Fabaceae	*Acacia tetragonophylla*
Fabaceae	*Bossiaea eremaea*
Fabaceae	*Daviesia grahamii*
Fabaceae	*Indigofera georgei*
Fabaceae	*Jacksonia arida*
Fabaceae	*Jacksonia nematoclada*
Fabaceae	*Kennedia prorepens*
Fabaceae	*Leptosema chambersii*
Fabaceae	*Petalostylis cassioides*
Fabaceae	*Ptychosema pusillum*

Family	Taxon
Fabaceae	*Senna artemisioides*
Fabaceae	*Senna artemisioides* subsp. *filifolia*
Fabaceae	*Senna artemisioides* subsp. *helmsii*
Fabaceae	*Senna cardiosperma*
Fabaceae	*Senna pleurocarpa*
Fabaceae	*Swainsona affinis*
Fabaceae	*Swainsona canescens*
Fabaceae	*Swainsona formosa*
Fabaceae	*Swainsona kingii*
Fabaceae	*Swainsona microphylla*
Fabaceae	*Swainsona tenuis*
Frankeniaceae	*Frankenia pauciflora*
Frankeniaceae	*Frankenia setosa*
Goodeniaceae	*Brunonia australis*
Goodeniaceae	*Dampiera lavandulacea*
Goodeniaceae	*Dampiera ramosa*
Goodeniaceae	*Dampiera roycei*
Goodeniaceae	*Goodenia capillosa*
Goodeniaceae	*Goodenia cycnopotamica*
Goodeniaceae	*Goodenia eremophila*
Goodeniaceae	*Goodenia glabrata*
Goodeniaceae	*Goodenia havilandii*
Goodeniaceae	*Goodenia macroplectra*
Goodeniaceae	*Goodenia mimuloides*
Goodeniaceae	*Goodenia peacockiana*
Goodeniaceae	*Goodenia rosea*
Goodeniaceae	*Goodenia triodiophila*
Goodeniaceae	*Goodenia xanthosperma*
Goodeniaceae	*Lechenaultia lutescens*
Goodeniaceae	*Scaevola amblyanthera* var. *centralis*
Goodeniaceae	*Scaevola basedowii*
Goodeniaceae	*Velleia rosea*
Gyrostemonaceae	*Gyrostemon ramulosus*
Haloragaceae	*Glischrocaryon aureum*
Haloragaceae	*Glischrocaryon flavescens*
Haloragaceae	*Haloragis gossei*
Haloragaceae	*Haloragis trigonocarpa*
Hemerocallidaceae	*Corynotheca divaricata*
Hemerocallidaceae	*Corynotheca micrantha* var. *divaricata*
Juncaginaceae	*Triglochin nana*
Juncaginaceae	*Triglochin* sp. A Flora of Australia (G.J.Keighery 2477)
Lamiaceae	*Dicrastylis brunnea*
Lamiaceae	*Dicrastylis doranii*
Lamiaceae	*Dicrastylis exsuccosa*
Lamiaceae	*Newcastelia cephalantha*
Lamiaceae	*Newcastelia hexarrhena*
Lamiaceae	*Pityrodia loricata*
Lamiaceae	*Prostanthera althoferi* subsp. *althoferi*
Lamiaceae	*Prostanthera sericea*
Lamiaceae	*Teucrium teucriiflorum*
Lamiaceae	*Westringia rigida*
Loganiaceae	*Orianthera nuda*
Loranthaceae	*Amyema miquelii*
Loranthaceae	*Amyema nestor*
Loranthaceae	*Amyema preissii*

Family	Taxon
Loranthaceae	*Lysiana exocarpi* subsp. *exocarpi*
Loranthaceae	*Lysiana murrayi*
Malvaceae	*Abutilon leucopetalum*
Malvaceae	*Abutilon oxycarpum*
Malvaceae	*Alyogyne pinoniana*
Malvaceae	*Alyogyne pinoniana* var. *pinoniana*
Malvaceae	*Lawrencia glomerata*
Malvaceae	*Seringia exastia*
Malvaceae	*Sida* sp. dark green fruits (S.van Leeuwen 2260)
Molluginaceae	*Hypertelis cerviana*
Myrtaceae	*Aluta maisonneuvei* subsp. *auriculata*
Myrtaceae	*Enekbatus eremaeus*
Myrtaceae	*Eucalyptus camaldulensis* subsp. *obtusa*
Myrtaceae	*Eucalyptus carnei*
Myrtaceae	*Eucalyptus cometae-vallis*
Myrtaceae	*Eucalyptus concinna*
Myrtaceae	*Eucalyptus eremicola*
Myrtaceae	*Eucalyptus eremicola* subsp. *eremicola*
Myrtaceae	*Eucalyptus eremicola* subsp. *peeneri*
Myrtaceae	*Eucalyptus ewartiana*
Myrtaceae	*Eucalyptus gamophylla*
Myrtaceae	*Eucalyptus glomerosa*
Myrtaceae	*Eucalyptus gongylocarpa*
Myrtaceae	*Eucalyptus gypsophila*
Myrtaceae	*Eucalyptus hypolaena*
Myrtaceae	*Eucalyptus leptopoda*
Myrtaceae	*Eucalyptus leptopoda* subsp. *elevata*
Myrtaceae	*Eucalyptus lucasii*
Myrtaceae	*Eucalyptus moderata*
Myrtaceae	*Eucalyptus oldfieldii*
Myrtaceae	*Eucalyptus rigidula*
Myrtaceae	*Eucalyptus rosacea*
Myrtaceae	*Eucalyptus socialis*
Myrtaceae	*Eucalyptus socialis* subsp. *victoriensis*
Myrtaceae	*Eucalyptus trivalva*
Myrtaceae	*Eucalyptus youngiana*
Myrtaceae	*Homalocalyx thryptomenoides*
Myrtaceae	*Lamarchea sulcata*
Myrtaceae	*Melaleuca apostiba*
Myrtaceae	*Melaleuca eleuterostachya*
Myrtaceae	*Melaleuca leiocarpa*
Myrtaceae	*Micromyrtus flaviflora*
Myrtaceae	*Micromyrtus hymenonema*
Nyctaginaceae	*Boerhavia coccinea*
Oleaceae	*Jasminum didymum* subsp. *lineare*
Ophioglossaceae	*Ophioglossum lusitanicum*
Phyllanthaceae	*Poranthera leiosperma*
Phyllanthaceae	*Sauropus* sp. Woolgorong (M.Officer s.n. 10/8/94)
Pittosporaceae	*Pittosporum angustifolium*
Poaceae	*Aristida contorta*
Poaceae	*Austrostipa elegantissima*
Poaceae	*Austrostipa nitida*
Poaceae	*Austrostipa scabra* subsp. *scabra*
Poaceae	*Dactyloctenium radulans*
Poaceae	*Digitaria brownii*

Family	Taxon
Poaceae	*Diplachne fusca* subsp. *muelleri*
Poaceae	*Enneapogon polyphyllus*
Poaceae	*Eragrostis dielsii*
Poaceae	*Eragrostis eriopoda*
Poaceae	*Eragrostis falcata*
Poaceae	*Eragrostis laniflora*
Poaceae	*Eragrostis lanipes*
Poaceae	*Eragrostis leptocarpa*
Poaceae	*Eragrostis pergracilis*
Poaceae	*Eriachne flaccida*
Poaceae	*Eriachne pulchella* subsp. *pulchella*
Poaceae	*Eulalia aurea*
Poaceae	*Iseilema eremaeum*
Poaceae	*Monachather paradoxus*
Poaceae	*Neurachne minor*
Poaceae	*Paractaenum refractum*
Poaceae	*Paspalidium clementii*
Poaceae	*Tragus australianus*
Poaceae	*Triodia basedowii*
Poaceae	*Triodia bromoides*
Poaceae	*Triodia scariosa*
Poaceae	*Triodia schinzii*
Poaceae	*Tripogonella loliiformis*
Polygalaceae	*Comesperma viscidulum*
Polygonaceae	*Rumex hypogaeus*
Portulacaceae	*Calandrinia eremaea*
Portulacaceae	*Calandrinia polyandra*
Proteaceae	*Conospermum toddii*
Proteaceae	*Grevillea acacioides*
Proteaceae	*Grevillea hakeoides* subsp. *stenophylla*
Proteaceae	*Grevillea juncifolia* subsp. *juncifolia*
Proteaceae	*Grevillea nematophylla* subsp. *planicosta*
Proteaceae	*Grevillea obliquistigma* subsp. *cullenii*
Proteaceae	*Grevillea pterosperma*
Proteaceae	*Grevillea sarissa* subsp. *bicolor*
Proteaceae	*Grevillea sarissa* subsp. *sarissa*
Proteaceae	*Grevillea* sp. Victoria Desert (R.Davis et al. RD 11611)
Proteaceae	*Grevillea stenobotrya*
Proteaceae	*Hakea francisiana*
Proteaceae	*Hakea lorea*
Proteaceae	*Hakea lorea* subsp. *lorea*
Proteaceae	*Hakea minyma*
Pteridaceae	*Cheilanthes sieberi* subsp. *sieberi*
Rhamnaceae	*Cryptandra aridicola*
Santalaceae	*Anthobolus leptomerioides*
Santalaceae	*Exocarpos aphyllus*
Santalaceae	*Santalum spicatum*
Sapindaceae	*Alectryon oleifolius* subsp. *canescens*
Sapindaceae	*Diplopeltis stuartii* var. *stuartii*
Sapindaceae	*Dodonaea rigida*
Sapindaceae	*Dodonaea viscosa* subsp. *mucronata*
Scrophulariaceae	*Eremophila abietina*
Scrophulariaceae	*Eremophila abietina* subsp. *abietina*
Scrophulariaceae	*Eremophila abietina* subsp. *ciliata*
Scrophulariaceae	*Eremophila alternifolia*

Family	Taxon
Scrophulariaceae	*Eremophila clarkei*
Scrophulariaceae	*Eremophila eriocalyx*
Scrophulariaceae	*Eremophila exilifolia*
Scrophulariaceae	*Eremophila falcata*
Scrophulariaceae	*Eremophila forrestii* subsp. *forrestii*
Scrophulariaceae	*Eremophila galeata*
Scrophulariaceae	*Eremophila georgei*
Scrophulariaceae	*Eremophila gilesii* subsp. *gilesii*
Scrophulariaceae	*Eremophila gilesii* subsp. *variabilis*
Scrophulariaceae	*Eremophila glabra*
Scrophulariaceae	*Eremophila glabra* subsp. *albicans*
Scrophulariaceae	*Eremophila glabra* subsp. *glabra*
Scrophulariaceae	*Eremophila homoplastica*
Scrophulariaceae	*Eremophila latrobei* subsp. *glabra*
Scrophulariaceae	*Eremophila latrobei* subsp. *latrobei*
Scrophulariaceae	*Eremophila longifolia*
Scrophulariaceae	*Eremophila oldfieldii* subsp. *angustifolia*
Scrophulariaceae	*Eremophila oppositifolia* subsp. *angustifolia*
Scrophulariaceae	*Eremophila paisleyi* subsp. *glandulosa*
Scrophulariaceae	*Eremophila paisleyi* subsp. *paisleyi*
Scrophulariaceae	*Eremophila platycalyx*
Scrophulariaceae	*Eremophila platythamnos* subsp. *exotrachys*
Scrophulariaceae	*Eremophila punctata*
Scrophulariaceae	*Eremophila scoparia*
Scrophulariaceae	*Eremophila serrulata*
Solanaceae	*Anthotroche pannosa*
Solanaceae	*Duboisia hopwoodii*
Solanaceae	*Nicotiana rosulata*
Solanaceae	*Solanum coactiliferum*
Solanaceae	*Solanum lasiophyllum*
Solanaceae	*Solanum orbiculatum*
Solanaceae	*Solanum orbiculatum* subsp. *orbiculatum*
Solanaceae	*Solanum plicatile*
Solanaceae	*Solanum terraneum*
Stylidiaceae	*Stylidium inaequipetalum*
Xanthorrhoeaceae	*Xanthorrhoea thorntonii*
Zygophyllaceae	*Roepera aurantiaca* subsp. *aurantiaca*
Zygophyllaceae	*Roepera compressa*
Zygophyllaceae	*Roepera eichleri*
Zygophyllaceae	*Roepera eremaea*
Zygophyllaceae	*Roepera iodocarpa*
Zygophyllaceae	*Tribulus astrocarpus*

TERRESTRIAL VERTEBRATE FAUNA

Class	Family	Taxon	Vernacular Name
Amphibia	Hylidae	*Cyclorana maini*	Main's Frog
Amphibia	Limnodynastidae	*Neobatrachus aquilonius*	Northern Burrowing Frog
Amphibia	Limnodynastidae	*Neobatrachus kunapalari*	Kunapalari Frog
Amphibia	Limnodynastidae	*Neobatrachus sudellae*	Sudell's Frog
Amphibia	Limnodynastidae	*Neobatrachus sutor*	Shoemaker Frog
Amphibia	Myobatrachidae	*Pseudophryne occidentalis*	Orange-crowned Toadlet
Aves	Acanthizidae	*Acanthiza (Acanthiza) apicalis*	Red-rumped Tit
Aves	Acanthizidae	*Acanthiza (Geobasileus) chrysorrhoa*	Yellow-tail
Aves	Acanthizidae	*Acanthiza (Geobasileus) iredalei*	Slender Thornbill
Aves	Acanthizidae	*Acanthiza (Geobasileus) uropygialis*	Chestnut-rumped Tit
Aves	Acanthizidae	*Acanthiza (Milligania) robustirostris*	Robust Thornbill
Aves	Acanthizidae	*Aphelocephala leucopsis*	Western Whiteface
Aves	Acanthizidae	*Gerygone fusca*	Fuscous Warbler
Aves	Acanthizidae	*Pyrrholaemus brunneus*	Redthroat
Aves	Acanthizidae	*Smicrornis brevirostris*	Brown Weebill
Aves	Accipitridae	*Accipiter (Leucospiza) fasciatus*	Grey-headed Goshawk
Aves	Accipitridae	*Accipiter (Paraspizias) cirrocephalus*	Collared Sparrowhawk
Aves	Accipitridae	*Aquila (Uroaetus) audax*	Wedge-tailed Eagle
Aves	Accipitridae	*Circus assimilis*	Spotted Harrier
Aves	Accipitridae	*Haliastur sphenurus*	Whistling Eagle-hawk
Aves	Accipitridae	*Hieraaetus (Hieraaetus) morphnoides*	Little Eagle
Aves	Aegothelidae	*Aegotheles (Aegotheles) cristatus*	Australian Owlet-nightjar
Aves	Alcedinidae	*Todiramphus (Cyanalcyon) pyrrhopygius*	Red-backed Kingfisher
Aves	Anatidae	*Anas (Nettion) gracilis*	Oceanic Teal
Aves	Anatidae	*Tadorna (Casarca) tadornoides*	Chestnut Sheldrake
Aves	Artamidae	*Artamus (Angroyan) cinereus*	Black-faced Woodswallow
Aves	Artamidae	*Artamus (Angroyan) minor*	Little Woodswallow
Aves	Artamidae	*Artamus (Campbellornis) personatus*	Masked Woodswallow
Aves	Artamidae	*Cracticus nigrogularis*	Pied Butcherbird
Aves	Artamidae	*Cracticus torquatus*	Grey Butcherbird
Aves	Artamidae	*Gymnorhina tibicen*	Australian Magpie
Aves	Artamidae	*Strepera (Neostrepera) versicolor*	Grey Currawong
Aves	Artamidae	*Strepera (Neostrepera) versicolor plumbea*	Grey Currawong (far Nw And Far South-western Sa)
Aves	Cacatuidae	*Eolophus roseicapilla*	Galah
Aves	Cacatuidae	*Eolophus roseicapilla roseicapilla*	
Aves	Cacatuidae	*Nymphicus hollandicus*	Cockatiel
Aves	Campephagidae	*Coracina (Coracina) novaehollandiae*	Black-faced Cuckoo-shrike
Aves	Campephagidae	*Coracina (Pteropodocys) maxima*	Ground Cuckoo-shrike
Aves	Caprimulgidae	*Eurostopodus (Eurostopodus) argus*	Spotted Nightjar
Aves	Casuariidae	*Dromaius novaehollandiae*	Emu
Aves	Charadriidae	*Charadrius (Charadrius)*	
Aves	Charadriidae	*Vanellus (Lobivanellus) tricolor*	Banded Lapwing
Aves	Cinclosomatidae	*Cinclosoma (Samuela) castaneothorax*	Chestnut-breasted Quail-thrush
Aves	Cinclosomatidae	*Cinclosoma (Samuela) marginatum*	
Aves	Climacteridae	*Climacteris (Climacteris) rufus*	Rufous Treecreeper
Aves	Climacteridae	*Climacteris (Climacterobates) affinis*	White-browed Treecreeper
Aves	Columbidae	*Geopelia cuneata*	Diamond Dove
Aves	Columbidae	*Ocyphaps lophotes*	Crested Pigeon
Aves	Columbidae	*Phaps (Phaps) chalcoptera*	Common Bronzewing
Aves	Corvidae	*Corvus bennetti*	Little Crow
Aves	Corvidae	*Corvus orru*	Torresian Crow
Aves	Cuculidae	*Chalcites basalis*	Horsfield's Bronze-cuckoo
Aves	Cuculidae	*Chalcites osculans*	Black-eared Cuckoo

Class	Family	Taxon	Vernacular Name
Aves	Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo
Aves	Dicaeidae	*Dicaeum (Dicaeum) hirundinaceum*	Mistletoebird
Aves	Estrildidae	*Taeniopygia guttata*	Zebra Finch
Aves	Falconidae	*Falco (Falco) longipennis*	Australian Hobby
Aves	Falconidae	*Falco (Hierofalco) peregrinus*	Duck Hawk
Aves	Falconidae	*Falco (Ieracidea) berigora*	Chicken Hawk
Aves	Falconidae	*Falco (Tinnunculus) cenchroides*	Wala
Aves	Falconidae	*Falco (Tinnunculus) cenchroides cenchroides*	Nankeen Kestrel
Aves	Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow
Aves	Hirundinidae	*Petrochelidon (Hylochelidon) nigricans*	Tree Martin
Aves	Locustellidae	*Cincloramphus (Cincloramphus) cruralis*	Brown Songlark
Aves	Locustellidae	*Cincloramphus (Maclennania) mathewsi*	Rufous Songlark
Aves	Maluridae	*Amytornis (Magnamytis) striatus*	Striated Grasswren
Aves	Maluridae	*Amytornis whitei oweni*	Sandhill Rufous Grasswren
Aves	Maluridae	*Malurus (Leggeornis) assimilis*	
Aves	Maluridae	*Malurus (Leggeornis) lamberti*	Variegated Fairy-wren
Aves	Maluridae	*Malurus (Malurus) splendens*	Splendid Fairy-wren
Aves	Maluridae	*Malurus (Musciparus) leucopterus*	White-winged Fairy-wren
Aves	Megapodiidae	*Leipoa ocellata*	Malleefowl
Aves	Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater
Aves	Meliphagidae	*Certhionyx (Certhionyx) variegatus*	Pied Honeyeater
Aves	Meliphagidae	*Epthianura (Parepthianura) tricolor*	Crimson Chat
Aves	Meliphagidae	*Gavicalis virescens*	Singing Honeyeater
Aves	Meliphagidae	*Manorina (Myzantha) flavigula*	Yellow-throated Miner
Aves	Meliphagidae	*Ptilotula plumula*	Grey-fronted Honeyeater
Aves	Meliphagidae	*Purnella albifrons*	White-fronted Honeyeater
Aves	Meliphagidae	*Sugomel nigrum*	Black Honeyeater
Aves	Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Aves	Motacillidae	*Anthus (Anthus) novaeseelandiae*	Australian Pipit
Aves	Motacillidae	*Anthus (Anthus) novaeseelandiae novaeseelandiae*	
Aves	Neosittidae	*Daphoenositta (Neositta) chrysoptera*	Varied Sittella
Aves	Oreoicidae	*Oreoica gutturalis*	Crested Bellbird
Aves	Otididae	*Ardeotis australis*	Plain Turkey
Aves	Pachycephalidae	*Colluricincla (Colluricincla) harmonica*	Grey Shrike-thrush
Aves	Pachycephalidae	*Colluricincla (Colluricincla) harmonica rufiventris*	
Aves	Pachycephalidae	*Pachycephala (Alisterornis) rufiventris*	Rufous Whistler
Aves	Pardalotidae	*Pardalotus (Pardalotinus) rubricatus*	Red-browed Pardalote
Aves	Pardalotidae	*Pardalotus (Pardalotinus) striatus*	Striated Pardalote
Aves	Pardalotidae	*Pardalotus (Pardalotinus) striatus substriatus*	
Aves	Petroicidae	*Melanodryas (Melanodryas) cucullata*	Hooded Robin
Aves	Petroicidae	*Microeca (Microeca) fascinans*	Jacky Winter
Aves	Petroicidae	*Petroica (Petroica) goodenovii*	Red-capped Robin
Aves	Podargidae	*Podargus strigoides*	Tawny Frogmouth
Aves	Pomatostomidae	*Pomatostomus (Morganornis) superciliosus*	White-browed Babbler
Aves	Psittacidae	*Barnardius zonarius*	Australian Ringneck
Aves	Psittacidae	*Melopsittacus undulatus*	Budgerigar
Aves	Psittacidae	*Neophema (Neophema) splendida*	Scarlet-chested Parrot
Aves	Psittacidae	*Neopsephotus bourkii*	Bourke's Parrot
Aves	Psittacidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet
Aves	Psittacidae	*Polytelis alexandrae*	Alexandra's Parrot
Aves	Psittacidae	*Psephotus (Psephotellus) varius*	Mulga Parrot

Class	Family	Taxon	Vernacular Name
Aves	Psophodidae	*Psophodes (Sphenostoma) occidentalis*	Chiming Wedgebill
Aves	Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird
Aves	Rhipiduridae	*Rhipidura (Rhipidura) albiscapa*	Grey Fantail
Aves	Rhipiduridae	*Rhipidura (Sauloprocta) leucophrys*	Willie Wagtail
Aves	Strigidae	*Ninox (Ninox) novaeseelandiae*	Southern Boobook
Aves	Turnicidae	*Turnix (Alphaturnia) velox*	Dotterel Quail
Aves	Tytonidae	*Tyto javanica*	Eastern Barn Owl
Mammalia	Burramyidae	*Cercartetus concinnus*	Western Pygmy-possum
Mammalia	Camelidae	*Camelus dromedarius*	One-humped Camel
Mammalia	Dasyuridae	*Ningaui ridei*	Wongai Ningaui
Mammalia	Dasyuridae	*Pseudantechinus macdonnellensis*	Fat-tailed Pseudantechinus
Mammalia	Dasyuridae	*Sminthopsis hirtipes*	Hairy-footed Dunnart
Mammalia	Dasyuridae	*Sminthopsis macroura*	Stripe-faced Dunnart
Mammalia	Macropodidae	*Osphranter robustus erubescens*	
Mammalia	Macropodidae	*Osphranter rufus*	Red Kangaroo
Mammalia	Muridae	*Mus musculus*	House Mouse
Mammalia	Muridae	*Notomys alexis*	Spinifex Hopping-mouse
Mammalia	Muridae	*Pseudomys desertor*	Desert Mouse
Mammalia	Muridae	*Pseudomys hermannsburgensis*	Sandy Inland Mouse
Mammalia	Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat
Mammalia	Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat
Mammalia	Vespertilionidae	*Vespadelus finlaysoni*	Finlayson's Cave Bat
Reptilia	Agamidae	*Ctenophorus clayi*	Black-collared Dragon
Reptilia	Agamidae	*Ctenophorus fordi*	Mallee Military Dragon
Reptilia	Agamidae	*Ctenophorus isolepis gularis*	
Reptilia	Agamidae	*Ctenophorus nuchalis*	Central Netted Dragon
Reptilia	Agamidae	*Ctenophorus reticulatus*	Western Netted Dragon
Reptilia	Agamidae	*Ctenophorus scutulatus*	Lozenge-marked Dragon
Reptilia	Agamidae	*Gowidon longirostris*	Long-nosed Dragon
Reptilia	Agamidae	*Moloch horridus*	Thorny Devil
Reptilia	Agamidae	*Pogona minor*	Dwarf Bearded Dragon
Reptilia	Agamidae	*Pogona minor minor*	
Reptilia	Carphodactylidae	*Nephrurus laevissimus*	Smooth Knob-tail
Reptilia	Carphodactylidae	*Nephrurus vertebralis*	Midline Knob-tail
Reptilia	Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko
Reptilia	Diplodactylidae	*Diplodactylus laevis*	
Reptilia	Diplodactylidae	*Diplodactylus pulcher*	Fine-faced Gecko
Reptilia	Diplodactylidae	*Lucasium bungabinna*	Southern Sandplain Gecko
Reptilia	Diplodactylidae	*Lucasium damaeum*	Beaded Gecko
Reptilia	Diplodactylidae	*Lucasium stenodactylum*	Sand-plain Gecko
Reptilia	Diplodactylidae	*Rhynchoedura ornata*	Western Beaked Gecko
Reptilia	Diplodactylidae	*Strophurus ciliaris aberrans*	
Reptilia	Diplodactylidae	*Strophurus elderi*	Jewelled Gecko
Reptilia	Diplodactylidae	*Strophurus strophurus*	Western Spiny-tailed Gecko
Reptilia	Diplodactylidae	*Strophurus wellingtonae*	Western Shield Spiny-tailed Gecko
Reptilia	Elapidae	*Brachyurophis fasciolatus fasciatus*	
Reptilia	Elapidae	*Brachyurophis semifasciatus*	Southern Shovel-nosed Snake
Reptilia	Elapidae	*Demansia psammophis cupreiceps*	
Reptilia	Elapidae	*Demansia psammophis psammophis*	
Reptilia	Elapidae	*Neelaps bimaculatus*	Black-naped Snake
Reptilia	Elapidae	*Pseudechis australis*	King Brown Snake
Reptilia	Elapidae	*Pseudonaja mengdeni*	Gwardar
Reptilia	Elapidae	*Pseudonaja modesta*	Ringed Brown Snake
Reptilia	Elapidae	*Simoselaps anomalus*	Desert Banded Snake
Reptilia	Elapidae	*Simoselaps bertholdi*	Jan's Banded Snake

Class	Family	Taxon	Vernacular Name
Reptilia	Elapidae	*Suta fasciata*	Rosen's Snake
Reptilia	Elapidae	*Suta monachus*	Monk Snake
Reptilia	Gekkonidae	*Gehyra montium*	Centralian Dtella
Reptilia	Gekkonidae	*Gehyra purpurascens*	Purplish Dtella
Reptilia	Gekkonidae	*Gehyra variegata*	Tree Dtella
Reptilia	Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko
Reptilia	Pygopodidae	*Delma butleri*	Unbanded Delma
Reptilia	Pygopodidae	*Delma nasuta*	Sharp-snouted Delma
Reptilia	Pygopodidae	*Lialis burtonis*	Burton's Snake-lizard
Reptilia	Pygopodidae	*Pygopus nigriceps*	Western Hooded Scaly-foot
Reptilia	Pythonidae	*Antaresia childreni*	Children's Python
Reptilia	Scincidae	*Ctenotus ariadnae*	Ariadna's Ctenotus
Reptilia	Scincidae	*Ctenotus brooksi*	Wedgesnout Ctenotus
Reptilia	Scincidae	*Ctenotus calurus*	Blue-tailed Ctenotus
Reptilia	Scincidae	*Ctenotus dux*	Fine Side-lined Ctenotus
Reptilia	Scincidae	*Ctenotus grandis grandis*	Grand Ctenotus
Reptilia	Scincidae	*Ctenotus greeri*	Greer's Ctenotus
Reptilia	Scincidae	*Ctenotus helenae*	Clay-soil Ctenotus
Reptilia	Scincidae	*Ctenotus leae*	Orange-tailed Finesnout Ctenotus
Reptilia	Scincidae	*Ctenotus leonhardii*	Leonhardi's Ctenotus
Reptilia	Scincidae	*Ctenotus nasutus*	Nasute Finesnout Ctenotus
Reptilia	Scincidae	*Ctenotus pantherinus ocellifer*	Leopard Ctenotus
Reptilia	Scincidae	*Ctenotus piankai*	Paleface Ctenotus
Reptilia	Scincidae	*Ctenotus quattuordecimlineatus*	Fourteen-lined Ctenotus
Reptilia	Scincidae	*Ctenotus schomburgkii*	Schomburgk's Ctenotus
Reptilia	Scincidae	*Cyclodomorphus melanops melanops*	Northern Slender Blue-tongue
Reptilia	Scincidae	*Egernia formosa*	Goldfields Crevice-skink
Reptilia	Scincidae	*Eremiascincus fasciolatus*	Narrow-banded Sand-swimmer
Reptilia	Scincidae	*Eremiascincus pallidus*	Western Sand-swimming Skink
Reptilia	Scincidae	*Eremiascincus richardsonii*	Broad-banded Sand-swimmer
Reptilia	Scincidae	*Lerista bipes*	North-western Sandslider
Reptilia	Scincidae	*Lerista desertorum*	Central Deserts Robust Slider
Reptilia	Scincidae	*Lerista timida*	Timid Slider
Reptilia	Scincidae	*Liopholis inornata*	Desert Skink
Reptilia	Scincidae	*Liopholis striata*	Nocturnal Desert-skink
Reptilia	Scincidae	*Menetia greyii*	Common Dwarf Skink
Reptilia	Scincidae	*Morethia butleri*	Woodland Morethia Skink
Reptilia	Scincidae	*Proablepharus reginae*	Western Soil-crevice Skink
Reptilia	Scincidae	*Tiliqua multifasciata*	Centralian Blue-tongue
Reptilia	Scincidae	*Tiliqua occipitalis*	Western Blue-tongue
Reptilia	Typhlopidae	*Anilios bicolor*	Dark-spined Blind Snake
Reptilia	Typhlopidae	*Anilios endoterus*	Interior Blind Snake
Reptilia	Typhlopidae	*Anilios hamatus*	Pale-headed Blind Snake
Reptilia	Typhlopidae	*Anilios waitii*	Beaked Blind Snake
Reptilia	Varanidae	*Varanus brevicauda*	Short-tailed Pygmy Goanna
Reptilia	Varanidae	*Varanus caudolineatus*	Stripe-tailed Monitor
Reptilia	Varanidae	*Varanus eremius*	Pygmy Desert Monitor
Reptilia	Varanidae	*Varanus gouldii*	Gould's Goanna

APPENDIX I:
EPBC DATABASE SEARCH RESULTS

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: 03-Apr-2024

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	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	8
Listed Migratory Species:	7

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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	9
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:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	1
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

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	Buffer Status
BIRD			
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat likely to occur within area	In feature area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat likely to occur within area	In feature area
MAMMAL			
Sminthopsis psammophila Sandhill Dunnart [291]	Endangered	Species or species habitat known to occur within area	In feature area
REPTILE			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Liopholis kintorei			
Great Desert Skink, Tjakura, Warrarna, Mulyamiji, Tjalapa, Nampu [83160]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Charadrius veredus			
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Defence		

Commonwealth Land Name	State	Buffer Status
Defence - JINDALEE STATION [50257]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Yeo Lake	Nature Reserve	WA	In feature area

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
Yeo Lake/Lake Throssell	WA	In feature area

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

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

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-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

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

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