



WINDARLING RANGE MINE OPERATIONS

ENVIRONMENTAL PROTECTION ACT
1986 APPLICATION FOR PART V
LICENCE AMENDMENT L8667/2012/1
SUPPORTING DOCUMENT

MINERAL RESOURCES LIMITED

11 APRIL 2024 VERSION 1



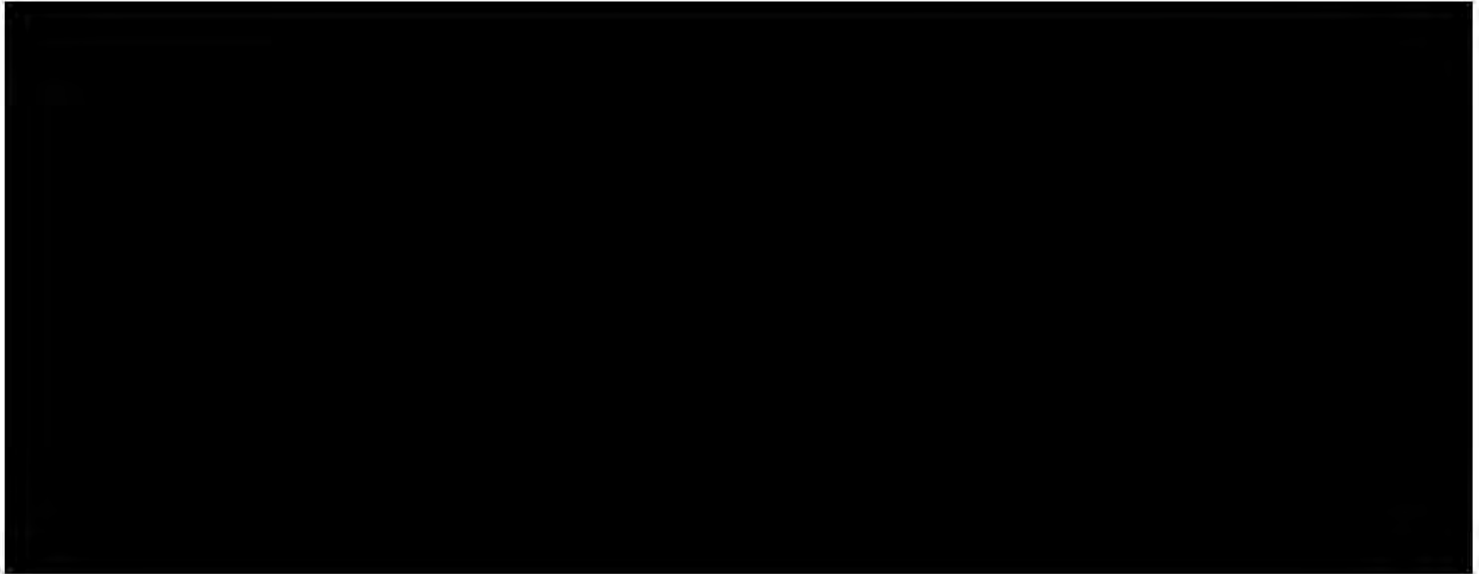


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ABBREVIATIONS

Abbreviation	Definition
Cliffs	Cliffs Asia Pacific Pty Ltd
DoW	Department of Water
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
ha	Hectares
MinRes	Mineral Resources Limited
PEC	Priority Ecological Community
TEC	Threatened Ecological Community
WWTP	Wastewater Treatment Plant
YIPL	Yilgarn Iron Pty Ltd

1. PROJECT BACKGROUND AND SCOPE

1.1 Project Context and Location

The Windarling Range Mine Operations (hereby referred to as the **Project**) is located approximately 130 km northeast of Southern Cross within the Shire of Yilgarn. The Project was acquired by Mineral Resources Limited (**MinRes**) through Yilgarn Iron Pty Ltd (**YIPL**), a 100% owned subsidiary of MinRes, from Cliffs Asia Pacific Pty Ltd (**Cliffs**) in August 2018. The Project prescribed premises occurs within mining tenements M77/1011 (part), M77/999, M77/1038, M77/1039, M77/1000, M77/1257, M77/1258, M77/1259 and L77/235, as depicted in Figure 1. The focus of this licence amendment is the Category 54 Sewage Facility which occurs within mining tenement M77/1038-I.

Annual loading limits for phosphorus and nitrogen were exceeded at the Windarling wastewater treatment plant (**WWTP**) irrigation spray field in 2022 and 2023.

Daily operator inspections are carried out by MinRes in conjunction with monthly service and maintenance inspections undertaken by a third-party wastewater treatment contractor, to ensure the WWTP is operating within its design parameters. A number of factors have been identified to reduce nutrient loading and improve ongoing management, including:

- additional dosing of sucrose to increase carbon to nutrient ratios thereby improving nitrification and denitrification
- increased dosing of polyaluminium chloride to reduce phosphate loads
- increased sludge wasting to reduce phosphate loads
- **upgrades to the existing irrigation sprinkler array which is currently inadequate to optimise irrigation and avoid nutrient exceedances and ponding (the focus of this Licence Amendment).**

Although sludge wasting and chemical addition will assist in reducing phosphate loading, previous trials have failed to elicit the required reductions. The small size (1.1 hectares (**ha**)) of the current irrigation sprinkler array (the extents of which are constrained within the operating Licence) has been identified as the primary contributing factor for high nutrient loads. Flexibility to upgrade the sprinkler system within the irrigation area is required to reduce and maintain nutrient loading rates within acceptable limits.

1.2 Approvals Background to the Project

On 3 May 2012, Works Approval W5141/2012/1 was issued to Cliffs under section 54 of the *Environmental Protection Act 1986*.

On 29 November 2012, L8667/2012/1 was issued to Cliffs to operate the sewage facility.

Subsequent amendments to L8667/2012/1 include:

- 20 June 2023: Licence amendment to add Claw and Altair pits as emission points for dewater.
- 3 September 2020: Licence amendment to add Claw and Altair pits to the Licence for dewatering. Installation of a water transfer pipeline between Deception Turkey's nest and Windarling W2 and inclusion of W3 as a secondary emission point for water storage. Administrative amendment to consolidate/amalgamate separately issued licence amendment notices in the Licence.
- 5 August 2019: Amendment notice 2: to allow extension of Windarling Range operations to include Deception deposit dewatering and landfill activities.
- 5 January 2017: Amendment notice 1: to authorise the dewatering of W10 Pit to W2 Pit.
- 29 April 2016: Licence amendment to extend Licence expiry date to 9 December 2027.
- 28 January 2016: Licence amendment to expand dewatering (W7 Pit) and landfilling operations.

- 21 May 2015: Licence amendment to allow burial of tyres in the landfill areas.
- 15 January 2015: Licence amendment to allow dewatering operations.
- 3 January 2013: Licence amendment for operation of new crushing and screening plant.
- 29 November 2012: New application for licence of sewage facility.

Table 1 outlines the categories that the Project has currently approved under L8667/2012/1.

Table 1: Currently approved prescribed activities.

Prescribed premises category description (Schedule 1, Environmental Protection Regulations 1987)	Assessed production / design capacity
Category 6: Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore.	3,420,000 tonnes per year
Category 12: Screening etc. of material: premises (other than premises within category 5 or 8) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated.	500,000 tonnes per year
Category 54: Sewage facility: premises – a) On which sewage is treated (excluding septic tanks); or b) From which treated sewage is discharged onto land or into waters.	210 cubic metres per day
Category 64: Class I or II putrescible landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled “Landfill Waste Classification and Waste Definitions 1996” published by the Chief Executive Officer, as amended from time to time) is accepted for burial.	500 tonnes per year

1.3 Scope of the Licence Amendment

MinRes is submitting this application for a licence amendment in relation to the Category 54 sewage facility. MinRes requests the removal of the detail shown for the sprinkler array in L8667/2012/1 Schedule 1, Figure 2 (Map of emission points) to provide flexibility to upgrade the sprinkler array within the 23.4 ha designated spray field (Figure 2). This will enable the management of nutrient loading rates within acceptable limits and the avoidance of surface ponding.

The requested licence amendment is limited to Category 54 activities and relates to Condition 16 (discharge point L2, as depicted in Schedule 1, Figure 2). The amendment is required for Condition 8(b) to be met, that is, to ensure that the irrigation of treated wastewater is evenly distributed over the irrigation area.

There are no changes required to:

- existing licence conditions for discharge volumes, nutrient load limits and monitoring requirements
- prescribed premises and activity boundaries, as shown in Figure 1
- aspects of the existing licence related to Categories 6, 12 and 64.

2. PROPOSED ACTIVITY

2.1 Prescribed Premises Boundary (Attachment 2)

The activity subject to this amendment will take place on mining lease M77/1038 within the approved prescribed Category 54 activity boundary shown in **Figure 1**, for discharge point L2 as shown in

Proposed activities relevant to this application within the boundary of the prescribed premises are outlined in this supporting document as follows:

- Proposed infrastructure and equipment – **Section 2.2.**
- Operations activities for licensing – **Section 2.3.**

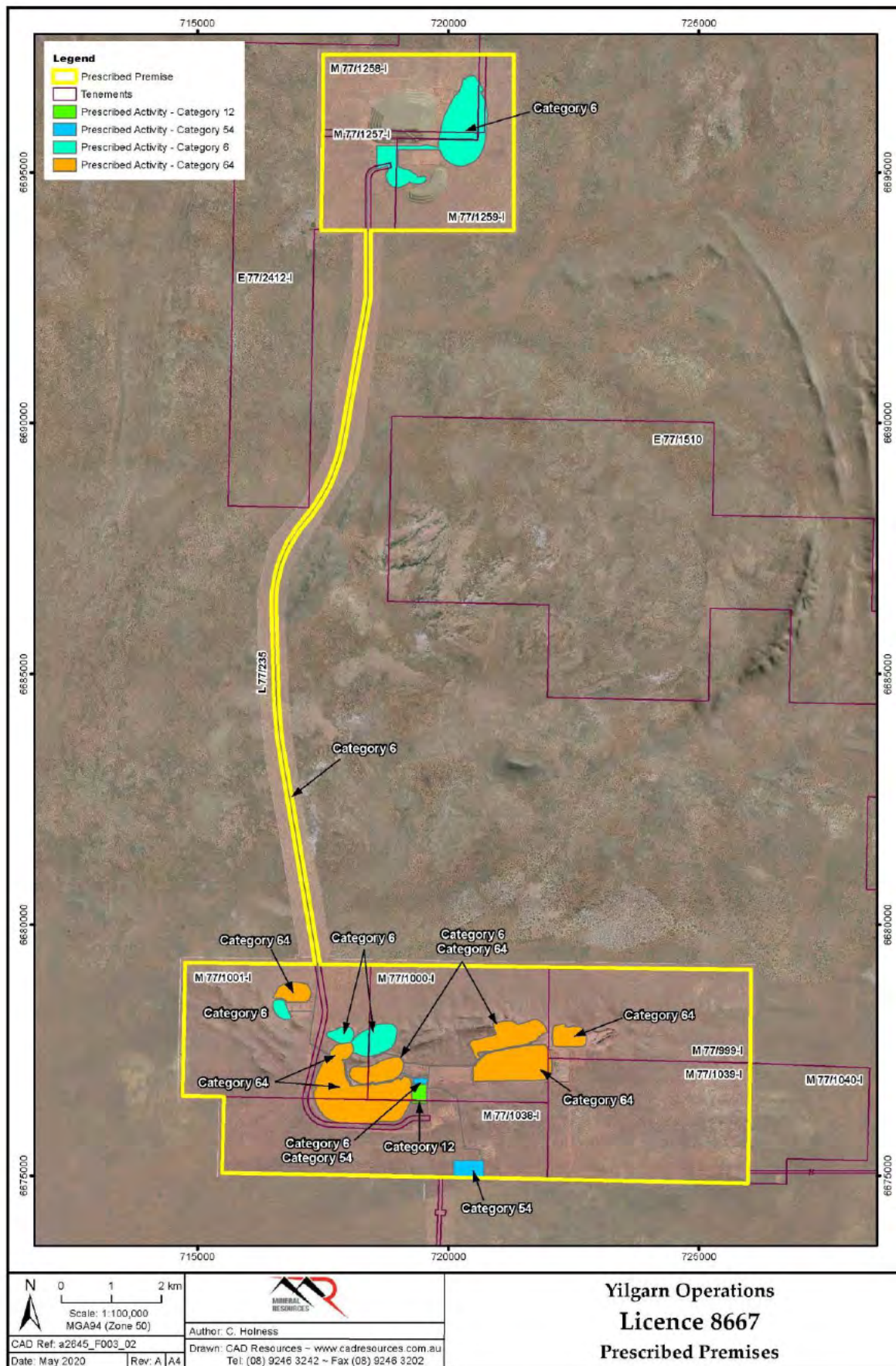
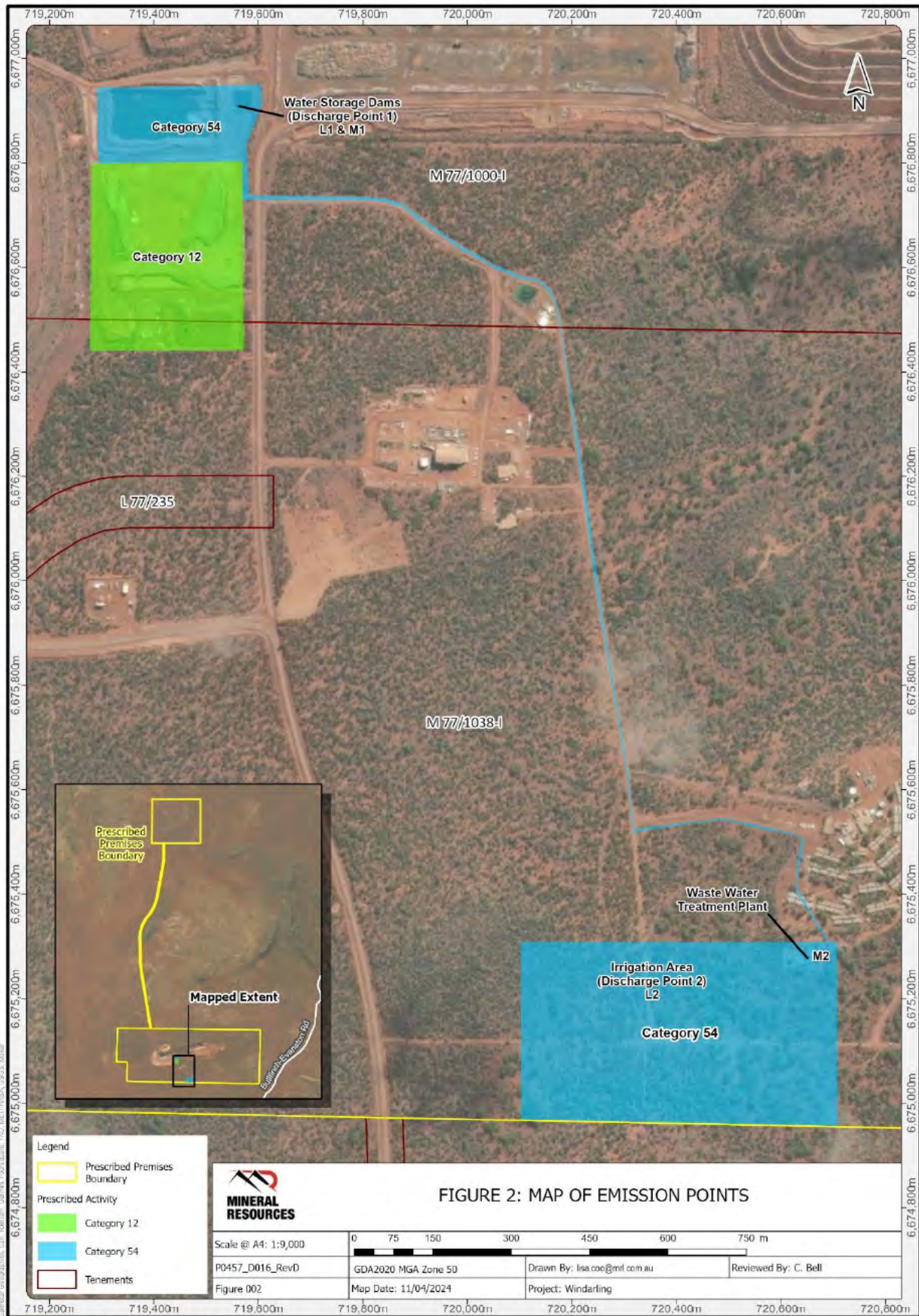


Figure 1: Project location and Premises Map.



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Figure 2: Revised map of emission points.

2.2 Proposed Infrastructure and Equipment (Attachment 3B)

MinRes is seeking flexibility in the Part V licence to modify the sprinkler array shown within Figure 2 of Schedule 1 of the existing L8667, to enable upgrades to be made to the irrigation system. The Premises Map currently prescribes the exact sprinkler locations, which has the effect of limiting the area of irrigation to no more than 1.1 ha, resulting in nutrient exceedances and difficulty managing ponding. The irrigation array will remain within the blue irrigation area (23.4 ha) shown on Figure 2 of Schedule 1, but MinRes is requesting that the individual sprinklers be removed from the map. A revised Map of emission points for L8667 is provided in **Figure 2**.

Upgrades to the irrigation infrastructure will be managed such that no clearing of native vegetation is required, avoiding impacts to the surrounding environment. At current irrigation rates, the irrigation array is intended to cover approximately 4.0 ha within the designated area for irrigation.

Other than the removal of individual sprinklers from the Premises Map, no other amendments to infrastructure in the Licence are required.

2.3 Proposed Operations Activities

2.3.1 Emissions and Discharges (Attachment 6A)

The key emissions and associated actual or likely pathways during operations have previously been considered by DWER during assessment of Licence L8667/2012/1.

The WWTP was active throughout 2023, with regular monitoring carried out to meet Licence conditions. Total suspended solids, Total Nitrogen, Total Phosphorous, pH and E. coli, were assessed at least quarterly from January to September.

The WWTP is currently approved to discharge 210 m³ per day under L8667. The current operating throughput is well below the maximum allowed inflow and discharge limits. During the 2023 monitoring period, the average daily inflow volume was recorded as 55 m³/day (maximum inflow of 68 m³/day) and the average daily discharge volume was recorded as 60 m³/day (maximum discharge of 73 m³/day).

Annual nutrient loading limits for phosphorus and nitrogen within the current prescribed 1.1 ha irrigation area have been exceeded in 2022 and 2023. The maximum application rates for nitrogen and phosphorous are 480 kg/hectare/year and 120 kg/hectare/year, respectively (soil type is fine grained, which indicates low eutrophication risk of surface waters within 500 m of the irrigation site).

Nutrient loading limits have been calculated utilising the volume discharge and quality monitoring with the following formula:

$$\frac{((\text{Total Nutrient} \times \text{Monthly Discharge}) \div 1,000) \div \text{Area of Irrigation Field}}$$

Where:

- **Total Nutrient (mg/L) x Monthly Discharge (m³/month)** = the total nutrient discharge (mg/L) per month.
- Total nutrient discharge (mg/L) per month ÷ 1,000 converts this to kilogram per cubic metre (kg/m³).
- kg/m³ ÷ **Area of Irrigation Field** gives the total nutrient loading kg/ha (the irrigation field is currently 1.1 ha).

The volume of WWTP effluent discharged is monitored monthly. **Table 2** provides the cumulative loading of nutrients based on the monthly discharge to the irrigation field in 2023 (records available up to September 2023). This demonstrates that nitrogen loading of the 1.1 ha was exceeded in June 2023, and phosphorus loading was exceeded in August 2023. The nutrient loading for both nitrogen and phosphorus (based on the actual measured total nutrient discharge) is also calculated for a 4.0 ha irrigation field for comparison. **Table 2** demonstrates that, in a 4.0 ha irrigation area, the nutrient loading limit would not have been exceeded by September 2023 for both nitrogen and phosphorus, and extrapolation of this data indicates that by 31 December 2023, the loading limits would still not be reached. If the maximum discharge volume of 210 m³/day was reached, an irrigation field of at least 8 ha would be required for nitrogen and phosphorus loading levels to remain within the Licence limits.

L8667 requires quarterly monitoring of emissions to land. The results for total nutrients from January to September 2023 and January to February 2024 are provided in **Appendix C**.

Table 2: Nutrient loading recorded in 2023 over the current approved 1.1 ha vs. 4.0 ha irrigation field.

Date of Sample	Cumulative Loading of 1.1 ha from 2023 Monitoring		Cumulative Loading of 4.0 ha based on 2023 Monitoring	
	Nitrogen (kg/ha/year)	Phosphorus (kg/ha/year)	Nitrogen (kg/ha/year)	Phosphorus (kg/ha/year)
29/01/2023	46	14	13	4
26/02/2023	119	31	33	9
26/03/2023	193	47	53	14
30/04/2023	277	75	76	22
31/05/2023	361	89	99	26
30/06/2023	421	100	115	29
31/07/2023	486	110	133	32
31/08/2023	574	139	157	40
30/09/2023	655	164	179	47
Difference Licence Limit and Actual Loading	-235	-44	241	73

Monitoring of wastewater discharge to the irrigation field will continue to be undertaken in accordance with L8667/2012/1. MinRes is seeking flexibility to manage irrigation within the designated area depending on the volumes of treated wastewater requiring irrigation, and intends to initially upgrade the irrigation array to reach an area of 4 ha to ensure that loading limits can be met based on current rates of wastewater treatment.

2.4 Risk Assessment

MinRes has considered the *Statement of environmental principles, factors, objectives and aims of environmental impact assessment (EIA)* (Environmental Protection Authority (EPA), 2023) when assessing the risks of significant impact on the environment from updating the sprinkler array within the approved spray field area. The key outcomes from our assessment are:

- There are no changes to the approved waste processing limits, nutrient loading emission limits to the land nor the requirements of the monitoring of emissions to the land as specified in the conditions of L8667/2012/1. Therefore, there are no expected adverse changes to the potential impacts to the environment as assessed in the approved licence.
- No threatened or priority flora species, or ecological communities were recorded in the 23.4 ha designated irrigation area and the habitat is not considered suitable for any threatened or priority species.
- Existing environmental management plans are implemented to protect and to mitigate any potential direct or indirect impacts to conservation significant fauna, flora and vegetation at Windarling Range operations, as required under the conditions of Ministerial statement 982.
- No listed environmental values will be impacted by the proposal (see **Section 0; Appendix A**).
- The intensity of any potential impact would be reduced by diluting irrigation activities across a larger area.
- The increase in the spray field area is likely to improve environmental outcomes:
 - Reduced stress on the vegetation in the approved area.

- Nutrient loads would remain within acceptable limits.
- Better management of surface ponding through flexibility to optimise sprinkler arrangement and eliminate overloading of specific locations.
- The existing environment has shown resilience to irrigation activities with overall vegetation condition being assessed as very good to excellent (**Section 0; Appendix A**).
- Frequent monitoring will continue to occur, allowing MinRes to monitor potential impacts and adjust mitigation measures as required.
- Public interest in the proposal is low, given the irrigation area has existing approval and is in a remote area which is not accessible by the public.

In consideration of the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023), the proposed amendment is not considered a significant amendment as it would not pose a risk of significant impact to the environment. The EPA's environmental principles and objectives would continue to be adequately met and regulated under Part V of the *Environmental Protection Act 1986*.

3. SITING AND LOCATION (ATTACHMENT 7)

3.1 Sensitive Land Uses, Receptors and Aspects

Nearby sensitive land uses are presented in Section 10.1 of the Application Form. Environmentally sensitive receptors and aspects are presented in Section 10.2 of the Application Form.

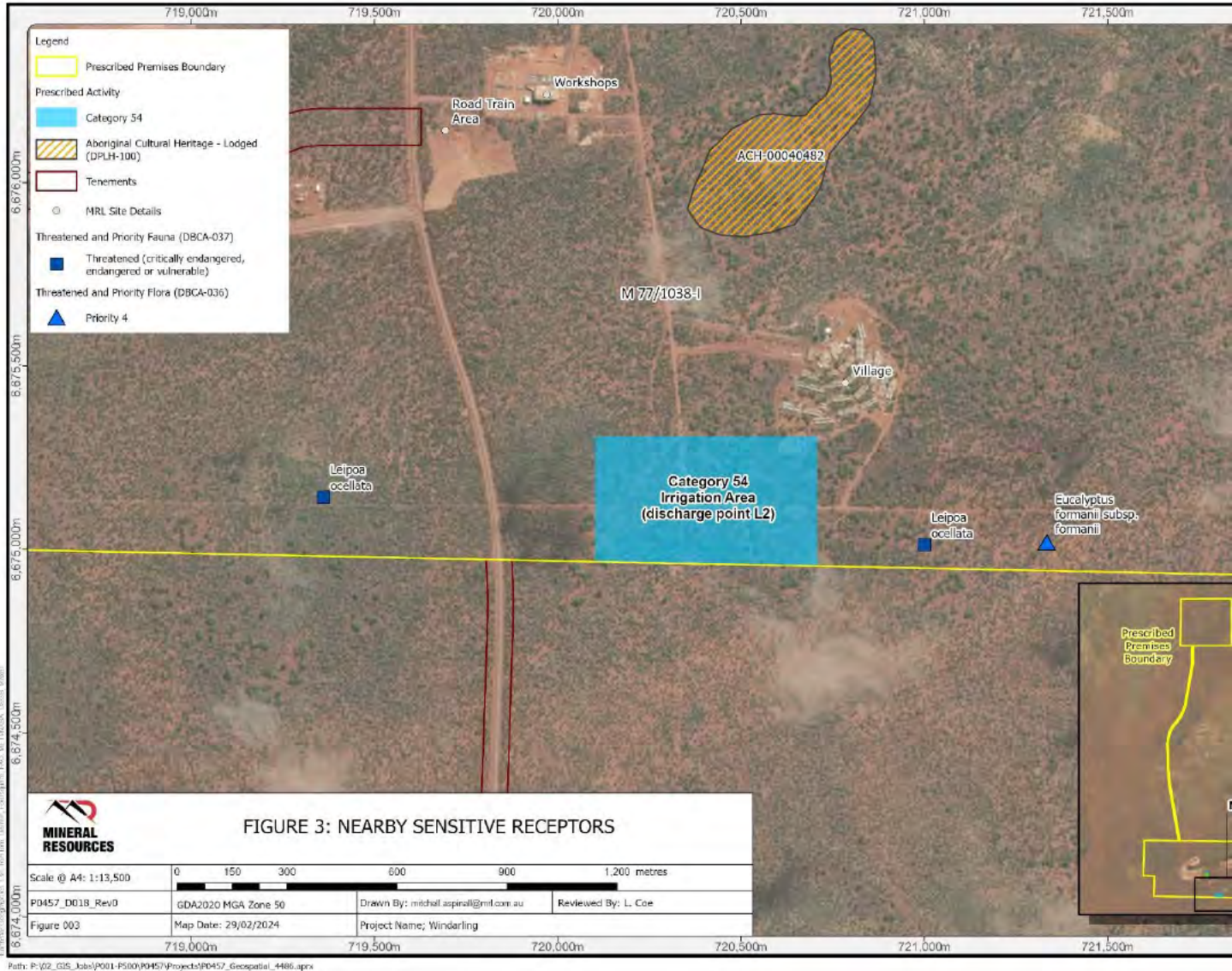


Figure 3: Nearby sensitive receptors (Attachment 7).

(Attachment 7) depicts the nearby sensitive receptors as identified from a desktop search of the following state government databases:

- Department of Planning, Lands and Heritage (DPLH). (2024). *Aboriginal Cultural Heritage Inquiry System (DPLH-100)*.
- Department of Biodiversity, Conservation and Attractions (DBCA). (2023). *Threatened, Specially Protected and Priority Fauna (DBCA-037)*.
- DBCA. (2023). *Threatened and Priority Flora Database (TPFL) (DBCA-036)*.

3.2 Flora and Vegetation

3.2.1 Overview

Emerge Associates (**Emerge**) was commissioned by MinRes in 2022 to undertake a detailed flora and vegetation survey of the Windarling WWTP irrigation field (Emerge, 2023a). A field survey was conducted on 1 October 2022. Following the field survey, an assessment of vegetation health was conducted to evaluate whether the application of wastewater from the Windarling WWTP was impacting native vegetation health (Emerge, 2023b).

3.2.2 Vegetation

Emerge (2023a) identified four vegetation communities within the irrigation field (**Table 3**). The remainder of the irrigation field area supports unsealed roads and the wastewater treatment plant, which are cleared of vegetation (Emerge, 2023a).

Table 3: Vegetation types identified within the Windarling WWTP irrigation field (adapted from Emerge, 2023a).

Vegetation Community	Description	Area (ha)
AaLdSa	Tall shrubland to open shrubland of <i>Acacia aneura</i> over chenopod shrubland of <i>Enchylema tomentosa</i> over forbland of <i>Erodium cygnorum</i> , * <i>Lepidium didymium</i> and * <i>Sagina apetala</i> and grassland of <i>Lachnagrostis filiformis</i> .	1.83
EcCooSaa	Woodland of <i>Eucalyptus concinna</i> and <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> over sparse shrubland of <i>Senna artemisioides</i> subsp. <i>xartemisioides</i> over low open shrubland of <i>Ptilotus obovatus</i> and <i>Roepera eremaea</i> with climber of <i>Vincetoxicum lineare</i> .	8.04
EcEtEb	Woodland of <i>Eucalyptus concinna</i> over chenopod shrubland of <i>Rhagodia drummondii</i> and <i>Enchylaena tomentosa</i> over forbland of * <i>Erigeron bonariensis</i> , * <i>Sagina apetala</i> and * <i>Sonchus oleraceus</i> and isolated clumps of <i>Austrostipa elegantissima</i> .	0.77
EooAa	Open woodland of <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> over tall shrubland of <i>Acacia aneura</i> over forbland of <i>Dianella revoluta</i> over isolated grasses <i>Amphipogon caricinus</i> var. <i>caricinus</i> .	11.68
N/A	Cleared of native vegetation.	1.90
TOTAL AREA		23.41

The structure of AaLdSa and EcEtEb vegetation communities have been influenced by the application of wastewater effluent, with higher understorey cover and weed cover than surrounding remnant vegetation. For this reason, these communities were determined to be in very good condition rather than excellent condition (Emerge, 2023a).

Table 4: Vegetation condition categories within the Windarling WWTP irrigation field (adapted from Emerge, 2023a).

Condition Category (Keighery, 1994)	Area (ha)
Pristine	0
Excellent	19.72
Very Good	2.60
Good	0
Good-Degraded	0
Degraded	0
Completely Degraded	1.09

No threatened or priority ecological communities were identified within the site (Emerge, 2023a).

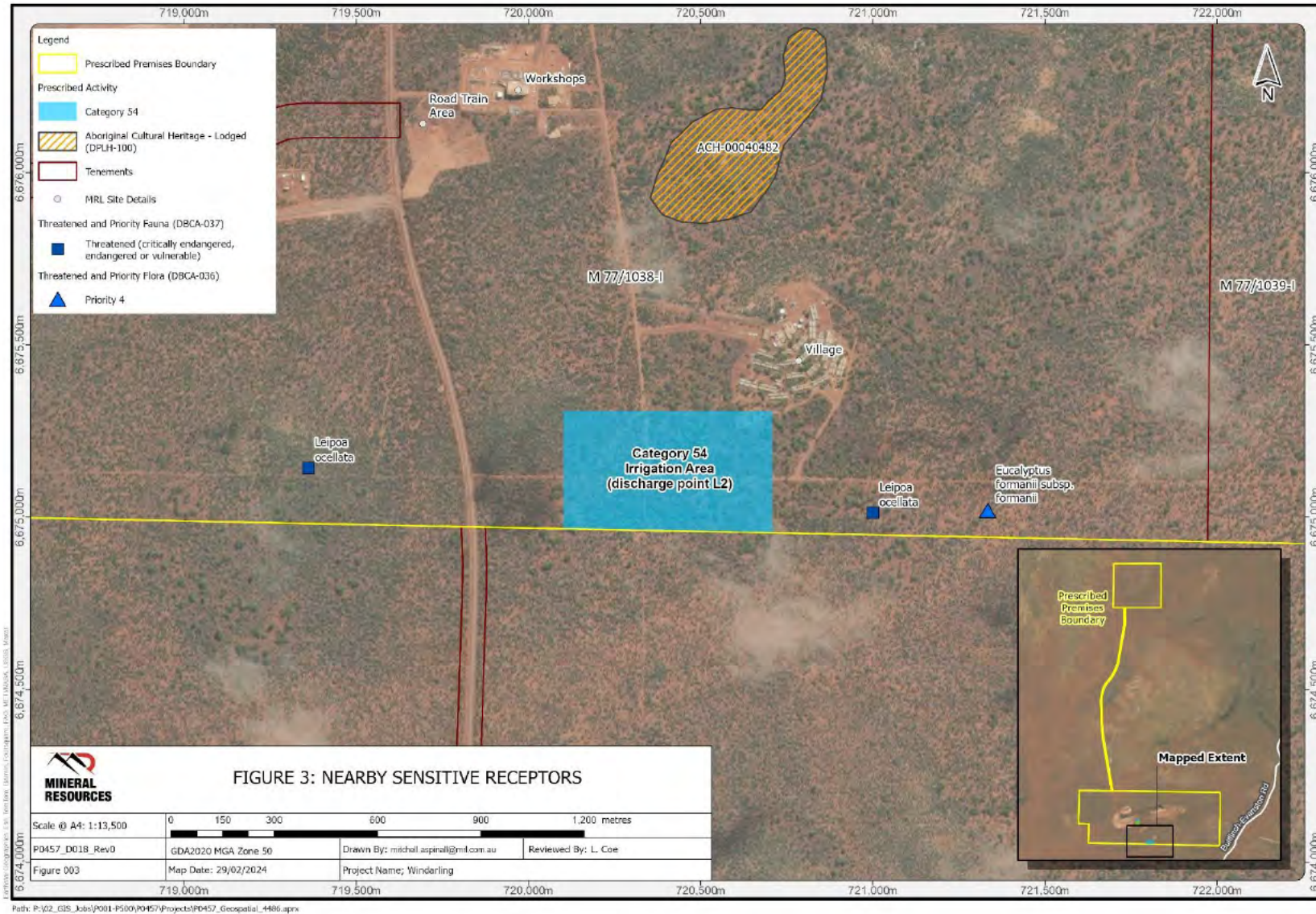


Figure 3: Nearby sensitive receptors (Attachment 7).

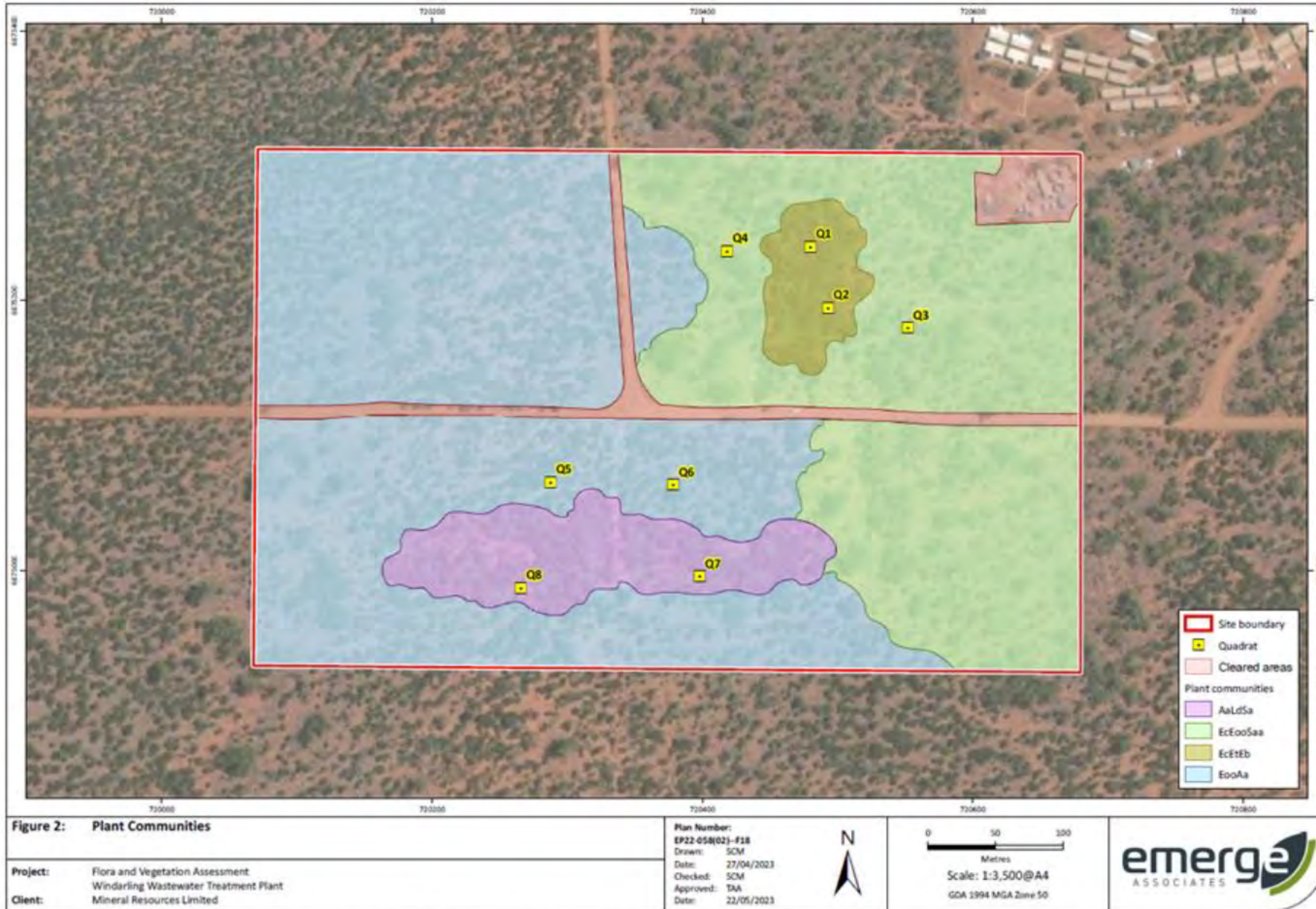


Figure 4: Vegetation communities in Windarling WWTP irrigation field (adapted from Emerge 2023).

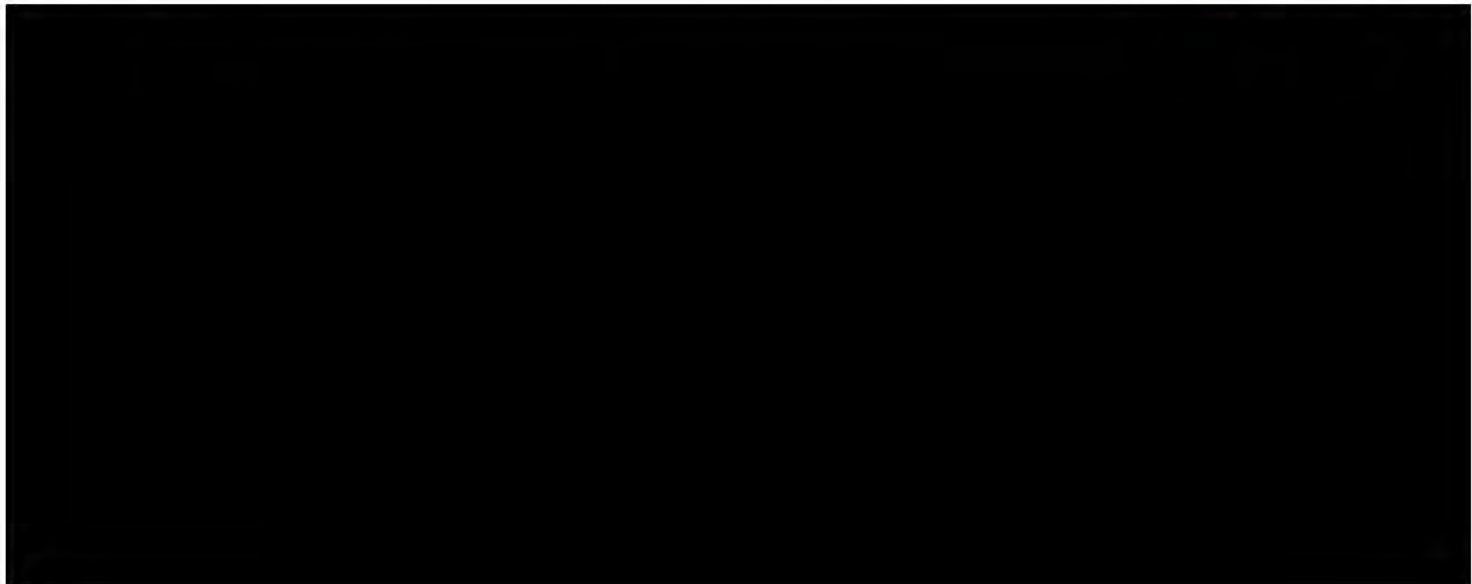
3.2.3 Flora

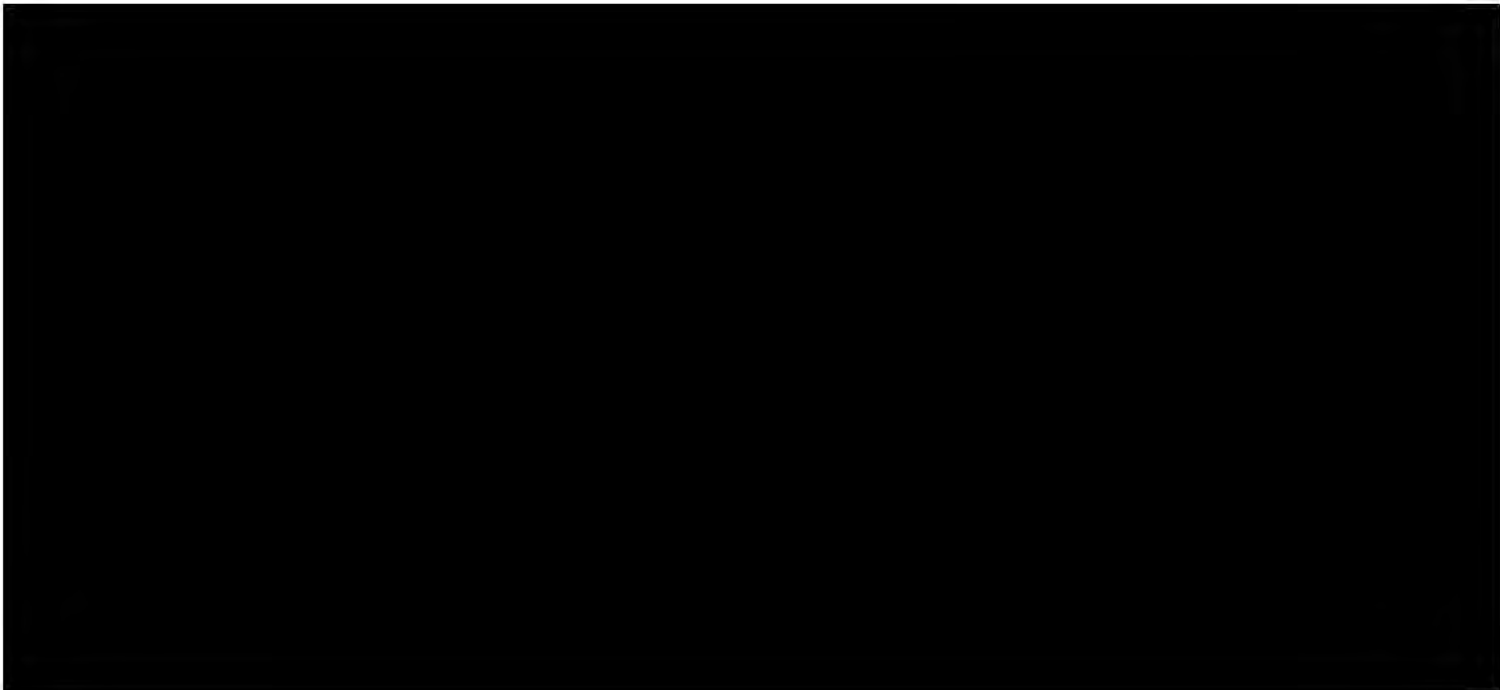
The flora survey conducted by Emerge (2023a) recorded a total of 96 native flora species and six weed species, representing 34 families and 69 genera. The dominant families containing native taxa were Asteraceae (18 native and two non-native taxa) and Chenopodiaceae (12 native taxa) (Emerge, 2023a). The most common genus was *Acacia* (nine taxa) (Emerge, 2023a).

No threatened or priority flora species were recorded within the site (Emerge, 2023a). The habitat was not considered to be suitable for any threatened or priority species that were identified in the desktop assessment and, as no species were recorded, they are not considered likely to occur within the Windarling WWTP irrigation field (Emerge, 2023a).

3.2.4 Vegetation Health

Vegetation health was assessed using four spray field quadrats and four reference (non-spray field) quadrats (Emerge, 2023b). The assessment showed that disposal of effluent from the WWTP was having an effect on overstorey native vegetation in one of the four spray field quadrats, however the remaining vegetation in the irrigation field was healthy or exhibited minor stress similar to that observed in the surrounding reference vegetation (Emerge, 2023b). Overall, vegetation condition in the irrigation area was assessed as being very good or excellent (Emerge, 2023a).







**MINERAL
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APPENDIX A

**EMERGE ASSOCIATES
(2023A). FLORA AND
VEGETATION ASSESSMENT
– WINDARLING
WASTEWATER TREATMENT
PLANT**



APPENDIX B
EMERGE ASSOCIATES
(2023B). VEGETATION
HEALTH ASSESSMENT –
WINDARLING
WASTEWATER TREATMENT
PLANT



APPENDIX C
WINDARLING WWTP
MONTHLY TOTAL
NUTRIENT AND
DISCHARGE
MONITORING

Table C.1: Total nitrogen loading at Emission Point L2 (Irrigation Field) up to February 2024.

Sample Date	Total Nitrogen (mg/L)	Monthly Discharge Volume (m ³ /month)	Monthly Nitrogen Load (kg/ha)	Cumulative Nitrogen Load (kg/ha)
24/01/23	56	903	46	46
28/02/23	51	1,585	73	119
13/03/23	45	1,801	74	193
24/04/23	42	2,203	84	277
08/05/23	41	2,255	84	361
22/06/23	37	1,774	60	421
26/07/23	37	1,943	65	486
14/08/23	45	2,148	88	574
21/09/23	45	1,979	81	655
01/01/24	45	1,573	64	64
01/02/24	74	1,410	95	159

Table C.2: Total phosphorus loading at Emission Point L2 (Irrigation Field) up to February 2024.

Sample Date	Total Phosphorus (mg/L)	Monthly Discharge Volume (m ³ /month)	Monthly Phosphorus Load (kg/ha)	Cumulative Phosphorus Load (kg/ha)
24/01/23	17	903	14	14
28/02/23	12	1,585	17	31
13/03/23	10	1,801	16	47
24/04/23	14	2,203	28	75
08/05/23	6.8	2,255	14	89
22/06/23	7	1,774	11	100
26/07/23	5.9	1,943	10	110
14/08/23	15	2,148	29	139
21/09/23	14	1,979	25	164
01/01/24	16	1,573	23	23
01/02/24	33	1,410	42	65

