



Iluka Resources Limited  
South Capel Remediation Project  
EPBC 2018/8250  
Annual Compliance Report  
23 September 2024 – 22 September 2025  
Document Number: PUW2EJ62XMPT-1245019849-235282



**ILUKA**

## DOCUMENT CONTROL

Revision	Details Of Review Or Changes	Date Created	Document Reference
0	Approved for submission	24/09/2025	PUW2EJ62XMPT-1245019849-235282

### DECLARATION OF ACCURACY:

In making this declaration, I am aware that sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this compliance report is true and correct in every particular. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed:  \_\_\_\_\_

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## 1. INTRODUCTION

The South Capel Remediation Project (SCRP) being undertaken by Iluka Resources Ltd (Iluka) is remediating point sources of groundwater contamination associated with historic by-product storage at both the South Capel facility (Figure 1) and the Capel Dry Plant (Figure 2). In July 2018, Iluka referred the SCRP to the Department of Agriculture, Water and the Environment (the Department) under the *Environmental Protection and Biodiversity Conservation Act 1999*. In October 2018, Iluka received formal notification that the SCRP was a controlled action likely to have significant impact on Matters of National Environmental Significance including listed flora species and the Western Ringtail Possum (WRP) (*Pseudocheirus occidentalis*). On the 19 September 2019 approval was granted for the controlled action (EPBC 2018/8250) as per details in Section 1.1.

Works under Phase 1 of the SCRP were completed in June 2020, with completion reporting submitted to the Department of Water and Environmental Regulation (DWER) in August 2020.T

### 1.1 EPBC Approval Details

Approval Number: EPBC 2018/8250

Approval Holder: Iluka Resources Limited

Duration: This approval has effect until 31st December 2045

Action: To undertake remediation works at Capel Dry Plant and South Capel mineral sands mining and processing site [see EPBC Act referral 2018/8250]

### 1.2 Purpose

The purpose of this report is to document compliance with conditions under EPBC 2018/8250 as required by Condition 11 which states:

*“The approval holder must prepare a compliance report for each 12 month period following the date of commencement of the action, or otherwise in accordance with an annual date that has been agreed to in writing by the Minister. The approval holder must:*

- a. publish each compliance report on the website within 20 business days following the relevant 12 month period;*
- b. notify the Department by email that a compliance report has been published on the website and provide the weblink for the compliance report within five business days of the date of publication, and provide a link to the location of the published report;*
- c. keep all compliance reports publicly available on the website until this approval expires;*
- d. exclude or redact sensitive ecological data from compliance reports published on the website; and*
- e. where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the Department within 5 business days of publication.”*

Iluka have nominated the 12 month period as being from the 23<sup>rd</sup> of September – the date the action commenced. The compliance status and updates are provided in Table 1 below.



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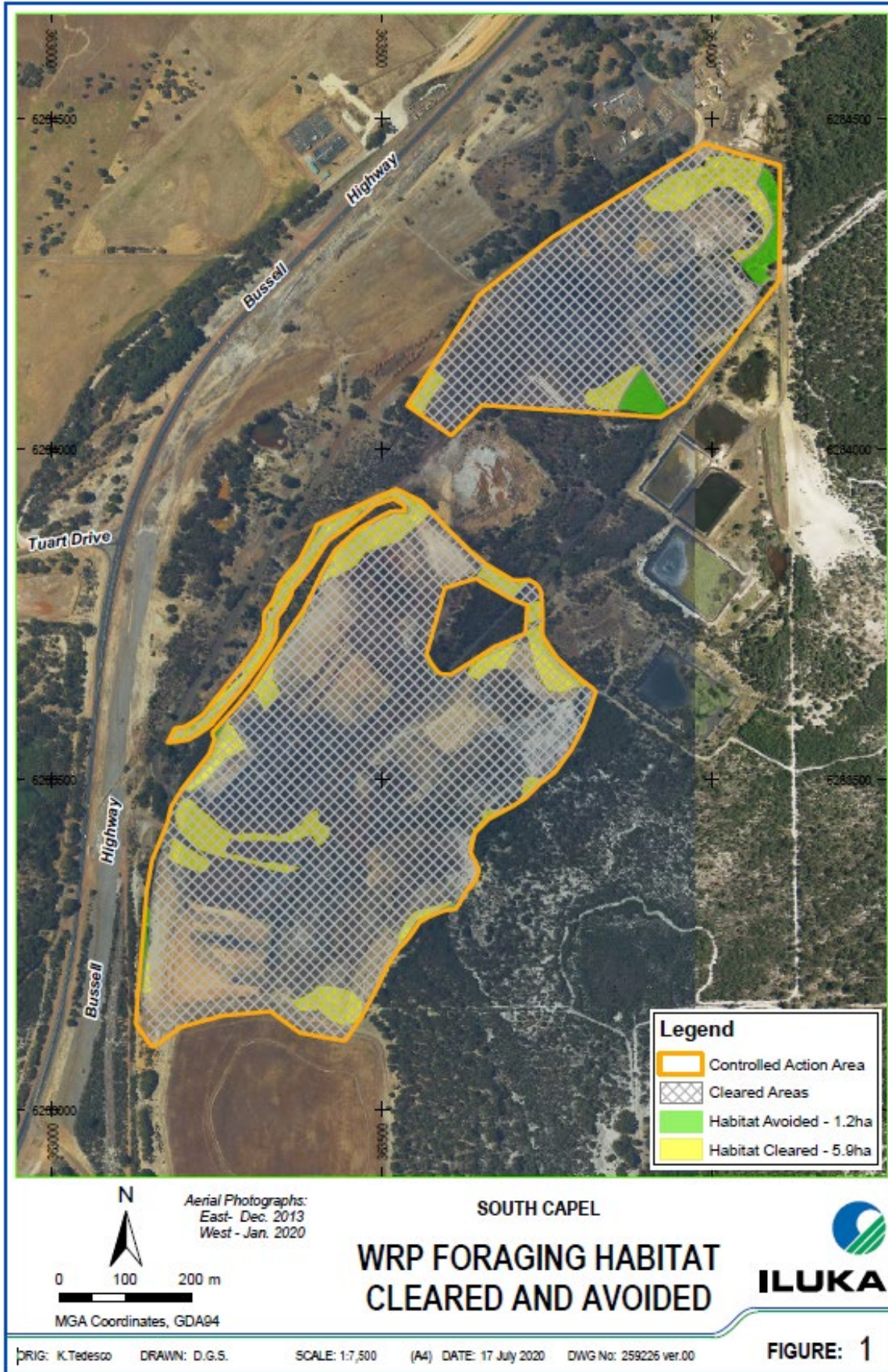


Figure 1: South Capel WRP Disturbance Area



Figure 2: Capel Dry Plant WRP Disturbance Area

### 1.3 Project Status

Clearing was completed in 2019. Remediation activities were completed in June 2020 and revegetation activities were completed in Winter of 2021. To date, revegetation activities have been completed in line with the timeline of revegetation works detailed in Table 1, and summarised below:

- Fauna and vermin fencing enclosing 19.6 ha of established vegetation and revegetation of Western Ringtail Possum (WRP) habitat.
- 14.6 ha revegetated to WRP habitat, site works include:
  - Contoured deep ripping;
  - Mulching;
  - Pre-planting weed control events;
  - Planting of 25,331 native tubestock; and
  - Completion of the post planting monitoring events in 2021, 2022 and 2023. Established monitoring quadrat locations are illustrated in Figure 3.
- Weed control works undertaken in 2024 include:
  - Herbicide application targeting annual weeds within the WRP habitat area.
  - Weed control targeting woody weeds (non-native *Acacia* sp.) within the WRP habitat area was completed in November 2024 (see Figure 4).
- Annual weed control in 2025 commenced on the 29<sup>th</sup> of August.
- The 2025 post planting monitoring event is scheduled to commence in October.

Table 1: Timeline of Revegetation Activities

Activity	2019		2020				2021				2022	2023	2024	2025	2026	2027	2028	2029	2030
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4									
Remediation	X	X	X	X															
Final landform development				X															
Installation of interceptor and water harvesting banks				X				*											
Deep ripping								X											
Mulching								X											
Fencing								X											
Weed control								X	*		X	X	X	X					
Planting								X			*	*	*		*		*		*
Monitoring									X		X	X							
Covenant establishment																			

- X = Completed; \* If required



Figure 3: Monitoring Quadrat Locations

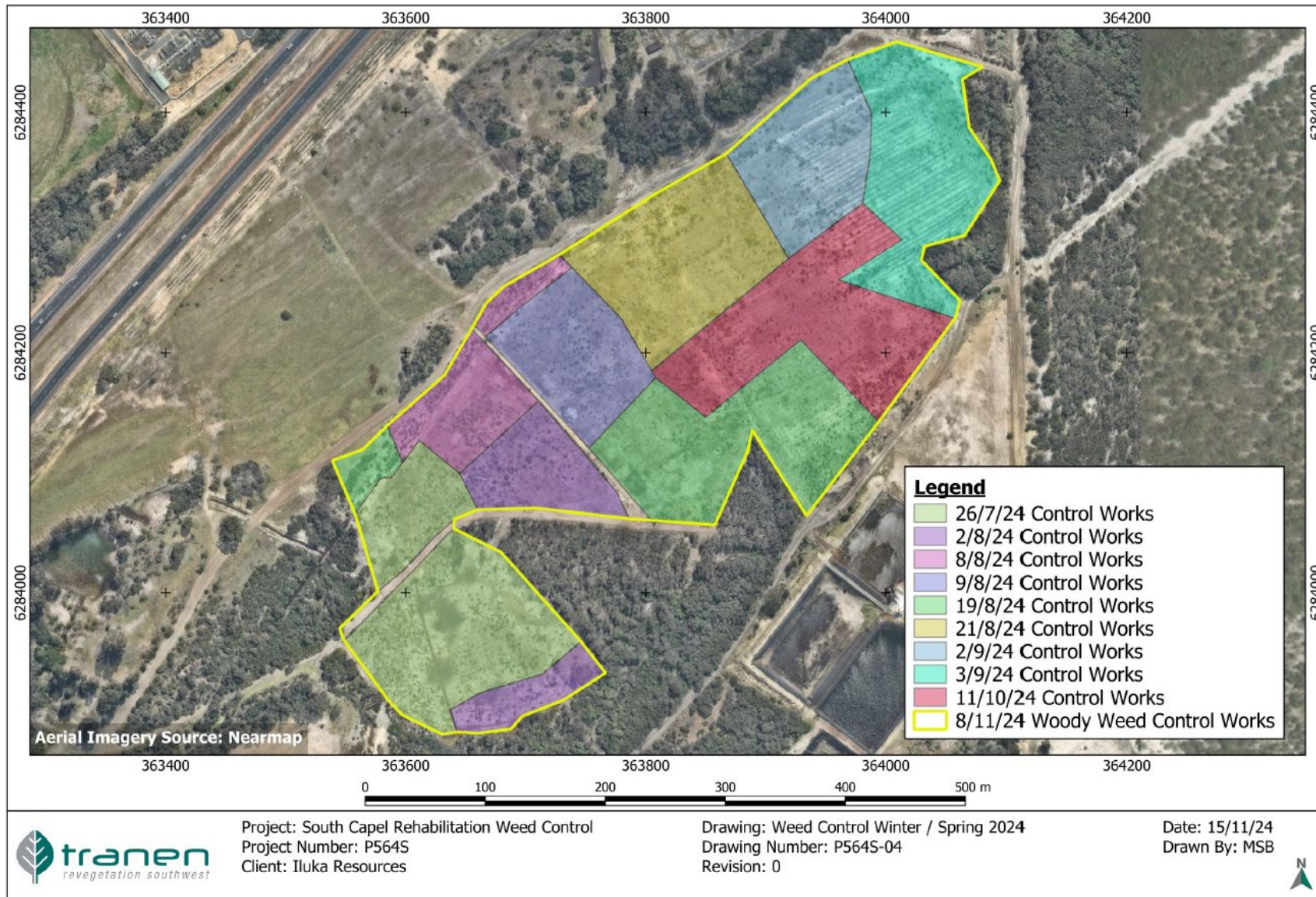


Figure 4: Annual Weed Control Summary 2024

## 2. COMPLIANCE

Table 2 outlines conditions of CPS8092/1 and provides commentary on compliance.

Table 2: Compliance with CPS8092/1 for the 2024/ 2025 reporting period

Condition	Summary of Condition	Compliance	Comments
1	In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference: (a) avoid the clearing of native vegetation; (b) minimise the amount of native vegetation to be cleared; and (c) reduce the impact of clearing on any environmental value.	N/A for 2024/2025	No clearing was conducted in the reporting period.
2	When undertaking clearing authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of weeds and dieback: (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared; (b) ensure that no known dieback or weed-affected soil, mulch, fill or other material is brought into the area to be cleared; and (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.	N/A for 2024/2025	No clearing was conducted in the reporting period.
3(a)	In relation to the area cross-hatched yellow on attached Plan 8092/1a, the Permit Holder must engage a fauna specialist to inspect that area immediately prior to, and for the duration of clearing, for the presence of ( <i>Pseudocheirus occidentalis</i> ) western ringtail possum(s).	N/A for 2024/2025	No clearing was conducted in the reporting period..
3(b)	Clearing must cease in any area where fauna referred to in condition 3(a) above are identified until either: (i) the western ringtail possum(s) individual has been removed by a fauna specialist; or (ii) the western ringtail possum(s) individual has moved on from that area to adjoining suitable habitat	N/A for 2024/2025	No clearing was conducted in the reporting period..
3(c)	Any western ringtail possum ( <i>Pseudocheirus occidentalis</i> ) individuals removed in accordance with condition 3(b)(i) of this Permit must be relocated by a fauna specialist to suitable habitat.	N/A for 2024/2025	No clearing was conducted in the reporting period and, therefore, no relocation of western ringtail possums was required.
3(d)	Where fauna is identified under condition 3(a) of this Permit, the Permit Holder must provide the following records to the CEO as soon as practicable: (i) the number of individuals identified; (ii) the date each individual was identified; (iii) the location where each individual was identified recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees; (iv) the number of individuals removed and relocated; (v) the date each individual was removed; (vi) the date each individual was relocated; (vii) the location where each individual was relocated to, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees; and	N/A for 2024/2025	No clearing was conducted in the reporting period and, therefore, no relocation of western ringtail possums was required.

Condition	Summary of Condition	Compliance	Comments
4	<p>(viii) details pertaining to the circumstances of any death of, or injury sustained by, an individual.</p> <p>Within 12 months of completion of remediation works as required under the <i>Contaminated Sites Act 2003</i> and no later than April 2023, the Permit Holder shall implement and adhere to the revegetation commitments in ‘CPS 8066/1 and CPS 8092/1 Offset proposal and associated attachments’, including but not limited to the following actions;</p> <p>(a) commence revegetating and rehabilitating the area hatched red on Plan 8066/1b by;</p> <p>(i) undertaking an extensive pre-planting weed control program;</p> <p>(ii) deliberately planting native vegetation that will provide suitable habitat for western ringtail possum; and</p> <p>(iii) ensuring only local provenance seeds and propagating material are used to revegetate and rehabilitate the area.</p> <p>(b) establishing ten 10 x 10 metre quadrat monitoring sites within the rehabilitated area;</p> <p>(c) fencing the rehabilitated area;</p> <p>(d) implementing hygiene protocols by cleaning earth-moving machinery of soil and vegetation prior to entering and leaving the site;</p> <p>(e) undertaking annual weed control activities to maintain a minimum 80 per cent weed free state by the end of the project maintenance period;</p> <p>(f) achieve the following completion criteria after the ten year monitoring period for the area revegetated and rehabilitated under this Permit;</p> <p><i>(completion criteria not included here as not relevant for the 2024 compliance report)</i></p>	Compliant	<p>Revegetation works were completed in July 2021. A summary of the works completed is provided within Appendix A – SCRCP Revegetation Monitoring Plan (May 2023).</p> <p>i. pre-planting weed control events were undertaken on 8 March 2021 and 1 June 2021.</p> <p>ii. native vegetation selected and planted in accordance with South Capel Revegetation Management Plan (Iluka, 2019). Planting works were completed in July 2021.</p> <p>iii. plants were sourced from local nurseries and propagated from locally sourced seed.</p> <p>Monitoring quadrats were established with initial monitoring undertaken in October 2021 (see Figure 2 and Appendix 1 Revegetation Monitoring Report, South Capel Remediation Project (RPS, 2024)).</p> <p>Fencing works were completed in May 2021.</p> <p>All vehicles and machinery are to be cleaned and inspected prior to entering the revegetation area. Cleanliness is validated via a Vehicle and Machinery Hygiene Inspection Sheet.</p> <p>Weed control targetting annual weeds was completed between July and October 2024 across the site. In addition, in November 2024 woody weeds were removed from WRP habitat area. 2025 weed control commenced on 29 August.</p> <p>Not applicable for this reporting period.<sup>1</sup></p>
5	<p>Two years prior to completion of revegetation commitments under Condition 4 of this Permit and no later than April 2030, the Permit Holder shall:</p> <p>(a) give a conservation covenant under section 30B of the Soil and Land Conservation Act 1945 setting aside the area hatched red on attached Plan 8092/1b for the protection and management of vegetation in perpetuity; and</p> <p>(b) provide to the CEO a copy of the executed conservation covenant.</p>	N/A for 2024/2025	<p>Not applicable for this reporting period.</p> <p>Covenant planning will commence 2027.</p>

<sup>1</sup> An assessment against the completion criteria is available within Appendix 1.

Condition	Summary of Condition	Compliance	Comments
6(a)	<p>The Permit Holder must maintain the following records for activities done pursuant to this Permit:</p> <p>In relation to the clearing of native vegetation authorised under this Permit:</p> <p>(i) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;</p> <p>(ii) the date that the area was cleared;</p> <p>(iii) the size of the area cleared (in hectares);</p>	Compliant	<p>Records of clearing activities are maintained within Iluka's Document Management System.</p> <p>Relevant records are available upon request.</p>
6(b)	Actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with Condition 1 of this Permit	N/A for 2024/2025	No further clearing was undertaken in the reporting period
6(c)	Actions taken to minimise the risk of the introduction and spread of dieback and weeds in accordance with Condition 2 of this Permit	N/A for 2024/2025	No further clearing was undertaken in the reporting period.
6(d)	Activities in relation to Condition 3 of this permit	N/A for 2024/2025	No further clearing was undertaken in the reporting period and therefore, no relocation of western ringtail possums was required.
6(e)	<p>In relation to the revegetation of areas pursuant to Condition 4 of this Permit:</p> <p>(i) a description of the revegetation and rehabilitation activities undertaken;</p> <p>(ii) the size of the area revegetated and rehabilitated (in hectares); and</p> <p>(iii) the date that the area was revegetated and rehabilitated;</p>	Compliant	Refer to Section 1.2 and Appendix 1.
6(f)	Actions taken to give a conservation covenant in accordance with Condition 5 of this Permit	N/A for 2024/2025	Revegetation was undertaken in 2021. A covenant will be sought once established in accordance with revegetation commitments under Condition 4 of the Permit
7	<p>(a) The Permit Holder must provide a written report to the General Manager Environmental Compliance, Resource and Environmental Compliance Division, Department of Mines, Industry Regulation and Safety by 30 June of each year for the life of this Permit:</p> <p>(i) of records required under Condition 6 of this Permit; and</p> <p>(ii) concerning activities done by the Permit Holder under this Permit between 1 January to 31 December of the preceding calendar year.</p> <p>(b) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar year, a written report confirming that no clearing under this permit has been carried out, must be provided to the General Manager Environmental Compliance, Resource and Environmental Compliance Division, Department of Mines, Industry Regulation and Safety by 30 June of each year.</p> <p>(c) Prior to 31 August 2034, the Permit Holder must provide to the General Manager Environmental Compliance, Resource and Environmental Compliance Division, Department of Mines, Industry Regulation and Safety a written report of records required under Condition 6 of this Permit where these records have not already been provided under condition 7(a) of this Permit.</p>	Compliant	<p>Condition 7a is not applicable for the reporting period</p> <p>This report meets the requirements for 7b. Note, the reporting periods aligns with the period 12 months post the commencement of action (Monday 23 September 2019).</p> <p>Condition 7c is not applicable for the reporting period.</p>

### **3. APPENDICES**

*Appendix 1 – Revegetation Monitoring Report, South Capel Remediation Project (RPS, 2024)*

# REVEGETATION MONITORING REPORT

South Capel Remediation Project, spring survey  
Year 3

AU213001930.001-3  
Rev 1  
06 February 2024

## REPORT

### Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
Rev A	Draft for client review	MarHen/Ecosystem Solutions	MarHen	NA	28/11/2023
Rev B	Draft for client review	MarHen/Ecosystem Solutions	MarHen	NA	29/11/2023
Rev 0	Final for issue	MarHen	GleYea	GleYea	05/12/2023
Rev 1	Final for issue	MarHen	GleYea	GleYea	05/02/2024

### Approval for issue

G. Yeatman



6 February 2024

This report was prepared by RPS within the terms of RPS' engagement with its client and in direct response to a scope of services. This report is supplied for the sole and specific purpose for use by RPS' client. The report does not account for any changes relating the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report. RPS does not accept any responsibility or liability for loss whatsoever to any third party caused by, related to or arising out of any use or reliance on the report.

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# 1 INTRODUCTION AND PROJECT BACKGROUND

## 1.1 Introduction and purpose

Iluka Resources Ltd (Iluka) has commenced the South Capel Remediation Project (SCRP) as part of its commitment to obligations under the Western Australian *Contaminated Sites Act 2003* by remediating point sources of underground water contamination associated with the historic by-product storage at the Capel Dry Plant (CDP) and the South Capel Site.

RPS AAP Consulting Pty Ltd (RPS) contracted Ecosystem Solutions Pty Ltd to:

1. Survey revegetation works for Iluka Resources Ltd's (Iluka) South Capel Remediation Project (SCRP, Figure 1) and report results.
2. Assess progress towards achieving the completion criteria defined in Table 5 of the SCRPE Revegetation Management Plan (SCRPE RMP) and Condition 4 of Native Vegetation Clearing Permits CPS 8066/1 and 8092/1. It should be noted that this aspect is not formally required under the RMP until years 5, 7 and 10 of revegetation works (Section 3.9 of RMP).

This report supports the monitoring and reporting requirements outlined in the South Capel Remediation Project Revegetation Management Plan (July 2019) and the 'CPS 8066/1 and CPS 8092/1 Offset proposal and associated attachments', which are requirements under the following SCRPE approvals:

**Table 1: SCRPE revegetation/offset management plan approvals**

Act	Approval/permit	Assessing agency	Condition
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth).	EPBC 2018/8250	Dept of Agriculture, Water and Environment.	Condition 2: For the protection of western ringtail possum, the approval holder must: <ol style="list-style-type: none"> <li>Implement the Revegetation Management Plan.</li> <li>Undertake rehabilitation work in accordance with the Revegetation Management Plan.</li> <li>Ensure that a suitably qualified fauna ecologist undertakes preclearance surveying for western ringtail possum prior to all clearing and is present during all clearing.</li> </ol> If western ringtail possums are present in the area to be cleared, then translocation is required and all translocation must be overseen on-site by a suitably qualified fauna ecologist. The approval holder must continue rehabilitation work until the completion criteria are met for all areas that are subject to the Revegetation Management Plan.
Part V of the <i>Environmental Protection Act 1986</i> (WA)	(CPS 8066/1)	Department of Water and Environmental Regulation (DWER)	Condition 4: Offset – Revegetation: Within 12 months of completion of remediation works as required under the <i>Contaminated Sites Act 2003</i> and no later than April 2022, the Permit Holder shall implement and adhere to the revegetation commitments in 'CPS 8066/1 and CPS 8092/1 Offset proposal and associated attachments'.
Part V of the <i>Environmental Protection Act 1986</i> (WA)	(CPS 8092/1)	Department of Mines, Industry Regulation and Safety (DMIRS)	

## 1.2 Background

In the mid-1950s the CDP began operations to process mineral sands and is no longer operational. South Capel also commenced mining and mineral separation in the mid-1950s and began processing Synthetic Rutile (SR) in 1968. The South Capel mining and processing areas ceased operations in 1999 and have not supported production activities since. Management of mineral sands processing undertaken at the CDP and at South Capel have historically resulted in the storage of by-products on-site.

Groundwater monitoring completed by Iluka indicated that there are levels of manganese and sulfate in the shallow groundwater directly underneath and adjacent to the by-product storage areas at both CDP and South Capel, which are above environmental standards. The levels pose a potential risk to the environment

if left unabated and may impact water quality in respect to the aesthetics (taste/odour) but do not pose a risk to human health. To minimise the potential for further contamination and allow a natural reduction of the currently elevated levels, Iluka has commenced activities to consolidate and contain the material impacting the superficial groundwater.

As part of the remediation works, an extension to the purpose-designed by-product storage facility at South Capel was completed. This required the clearing of vegetation that provided critical habitat for the endangered western ringtail possum (*Pseudocheirus occidentalis*) (WRP). Approximately 60,000 m<sup>3</sup> of historic by-product previously stored at CDP and approximately 407,000 m<sup>3</sup> from South Capel have been relocated to the purpose-built consolidated storage facility at South Capel. Uncontaminated fill was sourced from South Capel and the Capel Mine Northern Extension.

In July 2018, prior to remedial works, Iluka referred the SCRPs to the Department of Environment and Energy (DoEE) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). In October 2018 it was determined that the project was a controlled action. The controlling provisions were listed threatened species and ecological communities, with the WRP being the Matter of National Environmental Significance (MNES). Two clearing permit applications were lodged for the SCRPs, one with DWER (CPS 8066/1) for the CDP and the other with the Department of Mines, Industry Regulation and Safety (DMIRS, CPS 8092/1) for South Capel.

It was determined that the residual impacts to habitat for WRP were likely to be significant and that offsets would be required. In response, the South Capel Remediation Project Revegetation Management Plan (SCRPs RMP) was prepared (Iluka Resources Ltd, 2019). The Revegetation Management Plan committed to the creation of 14.6 hectares of WRP habitat, with the aim of achieving a quality habitat score of “6” within ten years of revegetation. This plan set out the methods to be used for the implementation of the objective, including species to be planted (Section 2), monitoring, and the completion criteria (Table 2) which the revegetation success would be evaluated against at ten years after planting.

Revegetation earthworks commenced in 2020 and native vegetation establishment was completed in July 2021. As per the requirement of the SCRPs RMP (Table 2), RPS were engaged to undertake the following:

- Year 1 survey and reporting, 2021 (Revegetation monitoring report, South Capel Remediation Project, 2 Dec 2021 RPS)
- Year 2 survey and reporting, 2022 (Revegetation monitoring report, South Capel Remediation Project, 28 Nov 2022 RPS)
- Year 3 survey and reporting, 2023. The current report.



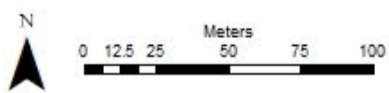
### Site Map

## Iluka South Capel Revegetation

### Legend

-  Site Boundary
-  Quadrat

Project: 231537  
 Report: Revegetation  
 Monitoring  
 Assessment date: 03/10/2023  
 Prepared by: H. Drake  
 Aerial photo date: Oct 2023



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Figure 1: South Capel Remediation Project rehabilitation-site (including quadrat placement)

**Table 2: SCRP RMP monitoring requirements and completion criteria for the South Capel Offset area**

Completion criteria	Monitoring (method, frequency)	Timing	Threshold triggers and remedial actions	Reporting
CC01: No declared weeds present in revegetation	Visual inspection for weeds biannually to identify declared weeds	By ten years after planting	Any declared weeds will be removed or treated	Visual inspection at completion to verify absence of declared weeds.  Third-party report by suitably qualified professional verifying completion criteria have been met.
CC02: Weed cover is less than 20% at completion	Spring survey year 1, 2, 3, 5, 7 and 10 after planting. A minimum of ten 10 m × 10 m quadrats will be established	By ten years after planting	Weeds will be sprayed annually irrespective of percentage cover observed in monitoring	Third party report by suitably qualified professional verifying completion criteria have been met.
CC03: Minimum of 15 species will be selected from WRP habitat/foraging species and established in revegetation prior to completion and will include at least: <ul style="list-style-type: none"> <li>Five species that provide foraging value</li> <li>Five species that provide canopy value</li> <li>Five species that provide understorey value</li> </ul> <i>(note that one species can provide more than one value)</i>	Spring survey year 1, 2, 3, 5, 7 and 10 after planting. A minimum of ten 10 m × 10 m quadrats will be established	By ten years after planting	Infill planting will be conducted if scheduled monitoring shows completion criterion has not been met.	Third party report by suitably qualified professional verifying completion criteria have been met.
CC04: A density of 800 stems per hectare of species contributing to canopy (trees and shrubs) will be established at completion.	Spring survey year 1, 2, 3, 5, 7 and 10 after planting. A minimum of ten 10 m × 10 m quadrats will be established	By ten years after planting	Infill planting will be conducted if scheduled monitoring shows completion criterion has not been met.	Third party report by suitably qualified professional verifying completion criteria have been met.
CC05: No areas greater than 250 m <sup>2</sup> without a developing understorey (foliage cover between 1–50 cm height) at completion.	Spring survey year 1, 2, 3, 5, 7 and 10 after planting. A minimum of ten 10 m × 10 m quadrats will be established	By ten years after planting	Infill planting will be conducted if scheduled monitoring shows completion criterion has not been met.	Third party report by suitably qualified professional verifying completion criteria have been met.
CC06: A minimum of 30% <sup>1</sup> cover by species contributing to canopy (trees and shrubs) will be established in revegetation at completion.	Spring survey year 1, 2, 3, 5, 7 and 10 after planting. A minimum of ten 10 m × 10 m quadrats will be established	By ten years after planting	Infill planting will be conducted from five years after planting if scheduled monitoring shows completion criterion is unlikely to be met by ten years after planting (as assessed by suitably qualified professional)	Third party report by suitably qualified professional verifying completion criteria have been met.
CC07: A perpetual covenant will be established two years prior to completion	n/a	By eight years after planting	n/a	Conservation covenant will be registered on the freehold title at time of completion.

<sup>1</sup> “30% cover by species contributing to canopy” is taken to mean any species that is contributing to canopy cover and is not limited to “canopy species” as identified in Table 3. Many shrubs in Table 3 can contribute to canopy cover once they reach maturity.

## 2 REVEGETATION SPECIES

The SCRPP RMP provided a species list from which revegetation species were to be drawn. The list was comprised of endemic species known to provide habitat and foraging for the western ringtail possum. A minimum of 15 species were required to be used as per the completion criteria. A total of 16 species were selected.

One species, *Anigozanthos manglesii*, was unavailable at the time of species selection and was replaced with the comparable species *Anigozanthos flavidus*. *Anigozanthos flavidus* is a south-western species that is found locally. It is usually found in damp situations along drainage lines or fringing wetlands where it can form dense stands and it is likely to be more suited to the Capel site than the *A. manglesii*.

**Table 3: Revegetation species list and planting density**

Genus and species	Density (plants/ha)	Total number of plants	Wrp value
<i>Acacia cyclops</i>	75	1,095	Foraging, Ground Protection, Canopy
<i>Acacia pulchella</i>	150	2,190	Ground Protection
<i>Acacia saligna</i>	75	1,095	Foraging, Ground Protection, Canopy
<i>Agonis flexuosa</i>	150	2,190	Foraging, Canopy
<i>Allocasuarina fraseriana</i>	75	1,095	Foraging, Canopy
<i>Anigozanthos flavidus</i>	75	1,095	Ground Protection
<i>Calothamnus quadrifidus</i>	75	1,095	Ground Protection
<i>Corymbia calophylla</i>	200	2,920	Foraging, Canopy
<i>Eucalyptus rudis</i>	200	2,920	Foraging, Canopy
<i>Hardenbergia comptoniana</i>	100	1,460	Foraging, Ground Protection
<i>Kunzea glabrescens</i>	75	1,095	Foraging, Ground Protection, Canopy
<i>Melaleuca preissiana</i>	75	1,095	Foraging, Ground Protection, Canopy
<i>Paraserianthes lophantha</i>	150	2,190	Foraging, Ground Protection, Canopy
<i>Patersonia occidentalis</i>	35	511	Ground Protection
<i>Spyridium globulosum</i>	150	2,190	Foraging, Ground Protection, Canopy
<i>Viminaria juncea</i>	75	1,095	Ground Protection
<b>Totals</b>	<b>1,735</b>	<b>25,331</b>	

Tube stock was utilised in the revegetation works, which were completed June–July 2021, with a total of 25,331 plants planted over an area of approximately 14.6 ha out of a total of approximately 19.634 ha fenced by Iluka.

### 3 METHODOLOGY

The SCRPP RMP defines the monitoring requirements after native vegetation establishment to measure the successful achievement of the completion criteria for the offset area by ten years after planting and is presented below.

As required by the RMP, ten 10 m × 10 m quadrats were established across the WRP site. Each quadrat is to be monitored to demonstrate achievement of the completion criteria (Table 2), including the following parameters:

- Species richness
- Stem density
- Weeds
- Percentage canopy cover
- Size of bare area.

In addition to the above, general observations including vegetation condition, mulch cover, erosion and signs of dieback will also be recorded.

Monitoring of the quadrats will occur during spring, in accordance with the requirements set out in Section 3.8 of the SCRPP RMP at the following intervals;

- Year 1 – first spring following planting – completed spring 2021
- Year 2 after planting – completed spring 2022
- Year 3 after planting - this report, spring 2023
- Year 5 after planting
- Year 7 after planting
- Year 10 after planting.

At Year 5, 7 and 10, reporting will occur assessing the progress against completion criteria and implementation of remedial actions as per Table 5 of the RMP.

## 4 SITE SURVEY (YEAR 3 – AFTER PLANTING)

The site was surveyed on 3 October 2023 by Gary McMahon (BSc, M Mgmt., PG Dip Bushfire Protection); Kelly Paterson (BSc Hons. (Nat Rs Mgmt.) and Danae Plowman (BSc PostGrad Dip. Engy & Env) from Ecosystem Solutions. Kelly Paterson (FB62000182, TFL 54-2021) and Danae Plowman (FB62000342) hold a Flora Taking (Biological Assessment) Licence.

Ten 10 m × 10 m quadrats were established in the Year 1 site survey at the locations provided by RPS, using a global positioning system (GPS). RPS chose sites for quadrat placement based on existing soil mapping and previous land use, to capture site variability potentially leading to differences in plant establishment. Consideration was also given to locating quadrats in areas where traversing vegetation works was minimised so as to prevent incidental damage. Each quadrat was marked with a labelled metal fence dropper at each corner. A GPS waypoint was taken at each dropper, allowing for reestablishment of quadrats in future years if required.

A georeferenced photograph of each quadrat was taken from the north-west corner of the quadrat (Appendix C), and this will be repeated at each monitoring event to provide a photographic record of changes.

All quadrats were surveyed, for the parameters listed in Section 3:

- Species richness
  - Each listed revegetation species that was observed within each quadrat was recorded. Any other native species that had germinated within each quadrat were also recorded. The species richness will be determined on the total number of native species occurring within each quadrat, both from revegetation and natural recruitment
- Stem density
  - The individual plants of each revegetation species that are observed within each quadrat were counted and recorded, and classified according to habitat value provided (foraging, ground protection, canopy). The stems of any other native species that had germinated within each quadrat were also recorded. The stem density will be determined as the total number of native species individuals occurring within each quadrat, both from revegetation and natural recruitment.
- Weeds
  - Each quadrat was inspected for the presence of any Declared plants (DPIRD, 202) and Weeds of National Significance (Weeds Australia, 2022)
  - Weed species within each quadrat were recorded
  - The percentage cover of weeds within each quadrat was determined via a visual assessment and recorded
  - Identification by Western Australian Herbarium has occurred for species that are difficult to identify in the field
- Percentage canopy cover
  - The percentage of canopy cover for each quadrat was determined via a visual assessment and recorded
- Size of bare area
  - The percentage of bare area for each quadrat was determined via a visual assessment and recorded. This measurement will be modified in future years to focus on areas bare of understorey species.

In addition to the above, general observations including vegetation condition, mulch cover, erosion and signs of dieback were also recorded.

A georeferenced orthomosaic image was stitched together based on imagery from a Mavic 2 Pro drone, which was flown over the site at 50 m. This resulted in a GeoTIFF image of the site with a pixel resolution of 2 cm per pixel. This process will be conducted at each future monitoring event to enable comparisons. This has been provided as a separate file but has also been used for the close-up satellite imagery of each quadrat in Appendix B.

## 5 RESULTS

This section describes the revegetation monitoring results for each quadrat. Table 7 assesses each quadrat against the completion criteria. Recruitment of native species was also included in the assessment against the completion criteria. Appendix A presents the field data collected. Figure 2 shows the quadrat locations and associated photo points at the north-western corner of each quadrat and a close-up aerial image from the October 2023 drone orthomosaic. The aerial imagery and photo from the northwest corner for each quadrat are presented in Appendix B and C respectively.

Shading within a quadrat table denotes that the species is not part of the initial planting and represents an additional species from the 2022 report. It is likely the plant has self-sown or, in the case of an undetermined species, not confirmed to be one of the initial species planted until a positive identification can be made. These species may still be assessable for their contribution to canopy and other values in a generic context.

A comparison between the first, second and third years after planting is included in Table 6 below.

### 5.1 Quadrat 1

There were no species loss observed however there were some individual loss of *Acacia saligna*, *Eucalyptus rudis* and *Kunzea glabrescens*. The death of some juvenile plants is to be expected and can be due to a range of reasons, including herbivory, competition, seasonal waterlogging, or drought over summer. *Anigozanthos* sp. is an addition to the native species recorded, indicating seed is germinating from within or nearby sources.

\**Juncus* sp. aff. *usitatus*, was observed to be a significant contributor to the weed cover for this quadrat. The species was identified by the Western Australian Herbarium and considered to be a weed, with the closest species being \**Juncus usitatus*, however there is insufficient material in the Herbarium from the other eastern states *Juncus* species to confirm the exact species.

#### Quadrat 1 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
Five species	23 stems/100 m <sup>2</sup>	10%	5%	15%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia saligna</i>	15	✓	✓	✓
<i>Calothamnus quadrifidus</i>	2			✓
<i>Eucalyptus rudis</i>	1	✓	✓	
<i>Kunzea glabrescens</i>	4	✓	✓	✓
<i>Anigozanthos</i> sp.	1		✓	✓
Number of species		3	4	4
Number of stems		20	21	22
Number of stems/hectare		2,000	2,100	2,200
Weed species		Mulch cover	Erosion	
5		80%	No change Pooling is occurring adjacent to the quadrat	

### 5.2 Quadrat 2

Species turnover from the 2022 survey includes the loss of *Acacia cyclops*, *Anigozanthos flavidus* and *Callistachys lanceolata* from the quadrat. Minor reduction in total stem density has occurred with changes in species count of the dominant species *Acacia saligna*, *Calothamnus quadrifidus* and *Kunzea glabrescens* observed. However, an increase in canopy cover was recorded, indicating natural competition of species. The death of some juvenile plants is to be expected and can be due to a range of reasons, including herbivory, competition, seasonal waterlogging, or drought over summer. *Viminaria juncea* and *Conostylis aculeata* (*sens. lat.*) were additions to the native species recorded, indicating seed is germinating from within or nearby sources. The term (*sens. lat.*) is used to mean ‘in the broad sense’ as the particular subspecies of *Conostylis aculeata* has not been identified and is commonly abbreviated to (*s.l.*). Kangaroo scats and areas of rest were evident within the quadrat.

## Quadrat 2 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
12 species	196 stems/100 m <sup>2</sup>	60%	<5%	20%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia saligna</i>	61	✓	✓	✓
<i>Agonis flexuosa</i>	1	✓	✓	
<i>Allocasuarina fraseriana</i>	1	✓	✓	
<i>Billardiera fusiformis</i>	1			
<i>Calothamnus quadrifidus</i>	32			✓
<i>Eucalyptus rudis</i>	69	✓	✓	
<i>Gompholobium tomentosum</i>	1		?	✓
<i>Jacksonia</i> sp.	1		?	✓
<i>Kunzea glabrescens</i>	26	✓	✓	✓
<i>Paraserianthes lophantha</i>	1	✓	✓	✓
<i>Viminaria juncea</i>	1			✓
<i>Conostylis aculeata</i>	61	✓	✓	✓
<b>Number of species</b>		6	6	8
<b>Number of stems</b>		159	159	124
<b>Number of stems/hectare</b>		15,900	15,900	12,400
<b>Weed species</b>		<b>Mulch cover</b>	<b>Erosion</b>	
6		70%	No change	

## 5.3 Quadrat 3

*Anigozanthos flavidus* has senesced since the previous survey. An additional *Acacia saligna* was recorded in this survey compared to 2022. Weed cover included many germinating plants which are unable to be identified as yet however are likely to be cape weed, with *\*Juncus* subgenus *Genuini*, also contributing significantly to weed cover.

## Quadrat 3 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
4 species	17 stems/100 m <sup>2</sup>	30%	70%	20%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia saligna</i>	13	✓	✓	✓
<i>Eucalyptus rudis</i>	1	✓	✓	
<i>Kunzea glabrescens</i>	2	✓	✓	✓
<i>Melaleuca preissiana</i>	1	✓	✓	✓
<b>Number of species</b>		4	4	3
<b>Number of stems</b>		17	17	16
<b>Number of stems/hectare</b>		1,700	1,700	1,600
<b>Weed species</b>		<b>Mulch cover</b>	<b>Erosion</b>	
5		25%	No change	

## 5.4 Quadrat 4

Additional species observed during this survey includes *Acacia pulchella* and *Juncus pallidus*. *Acacia cyclops* was not observed during this survey. A decline in total stem density is mostly attributed to the loss of some *Kunzea glabrescens* which is expected, as each plant grows it requires additional space and nutrients. This reduction in stem density aligns with an increase in canopy cover. There has been an increase in species richness which is supportive of seed germinating from surrounding plants or the soil seed bank.

### Quadrat 4 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
10 species	168 stems/100 m <sup>2</sup>	50%	30%	15%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia saligna</i>	6	✓	✓	✓
<i>Agonis flexuosa</i>	1	✓	✓	
<i>Allocasuarina fraseriana</i>	1	✓	✓	
<i>Calothamnus quadrifidus</i>	56			✓
<i>Billardiera fusiformis</i>	2		?	✓
<i>Eucalyptus rudis</i>	1	✓	✓	
<i>Kunzea glabrescens</i>	98	✓	✓	✓
<i>Paraserianthes lophantha</i>	1	✓	✓	✓
<i>Acacia pulchella</i>	1			✓
<i>Juncus pallidus</i>	1			✓
<b>Number of species</b>		6	6	7
<b>Number of stems</b>		108	108	165
<b>Number of stems/hectare</b>		10,800	10,800	16,500
<b>Weed species</b>		<b>Mulch cover</b>	<b>Erosion</b>	
9		60%	No change	

## 5.5 Quadrat 5

*Allocasuarina fraseriana* is no longer observed. A total reduction in stem density was observed across all species, particularly *Kunzea glabrescens*. While revegetation species cover increased and weed cover reduced, many emergent weeds were observed that were unable to be identified.

### Quadrat 5 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
6 species	20 stems/100 m <sup>2</sup>	15%	30%	20%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia saligna</i>	2	✓	✓	✓
<i>Agonis flexuosa</i>	1	✓	✓	
<i>Calothamnus quadrifidus</i>	3			✓
<i>Corymbia calophylla</i>	2	✓	✓	
<i>Eucalyptus rudis</i>	4	✓	✓	
<i>Kunzea glabrescens</i>	8	✓	✓	✓
<b>Number of species</b>		6	6	7
<b>Number of stems</b>		108	108	165
<b>Number of stems/hectare</b>		10,800	10,800	16,500
<b>Weed species</b>		<b>Mulch cover</b>	<b>Erosion</b>	
7		30%	No change	

## 5.6 Quadrat 6

Species turnover from the 2022 included the loss of *Agonis flexuosa*, *Anigozanthos flavidus*, *Kennedia prostrata* and *Viminaria juncea*. A reduction in total stem density has occurred with no change in total canopy cover. An increase in weed cover has been observed.

### Quadrat 6 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
6 species	17 stems/100 m <sup>2</sup>	10%	80%	25%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia saligna</i>	7	✓	✓	✓
<i>Calothamnus quadrifidus</i>	4			✓
<i>Corymbia calophylla</i>	1	✓	✓	
<i>Eucalyptus rudis</i>	1	✓	✓	
<i>Kunzea glabrescens</i>	2	✓	✓	✓
<i>Melaleuca preissiana</i>	2	✓	✓	✓
<b>Number of species</b>		5	5	4
<b>Number of stems</b>		13	13	15
<b>Number of stems/hectare</b>		1,300	1,300	1,500
Weed species		Mulch cover	Erosion	
9		60%	No change	

## 5.7 Quadrat 7

*Hardenbergia comptoniana* and *Spyridium globulosum* are no longer within the quadrat however additional species observed include *Myrtaceae sp.*, *Billardiera fusiformis*, and *Juncus pallidus*. A total increase in stem density was observed mostly contributed from the dominant species, *Calothamnus quadrifidus* and *Kunzea glabrescens* along with an increase in canopy cover.

### Quadrat 7 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
14 species	111 Stems/100m <sup>2</sup>	20%	10%	5%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia pulchella</i>	1			✓
<i>Acacia saligna</i>	4	✓	✓	✓
<i>Agonis flexuosa</i>	1	✓	✓	
<i>Allocasuarina fraseriana</i>	4	✓	✓	
<i>Anigozanthos flavidus</i>	2			✓
<i>Calothamnus quadrifidus</i>	25			✓
<i>Corymbia calophylla</i>	2	✓	✓	
<i>Eucalyptus rudis</i>	3	✓	✓	
<i>Jacksonia sp.</i>	3	?	?	✓
<i>Kunzea glabrescens</i>	59	✓	✓	✓
<i>Melaleuca preissiana</i>	1	✓	✓	✓
<i>Myrtaceae sp.</i>	1			✓
<i>Billardiera fusiformis</i>	4			✓
<i>Juncus pallidus</i>	1			✓
<b>Number of species</b>		7	7	10
<b>Number of stems</b>		74	74	101
<b>Number of stems/hectare</b>		7,400	7,400	10,100
Weed species		Mulch cover	Erosion	
9		90%	No change	

## 5.8 Quadrat 8

Species turnover from the 2022 survey includes the loss of *Acacia sp.*, *Kunzea glabrescens*, *Drosera sp.* and *Agonis flexuosa* from the quadrat. *Myrtaceae sp.* is an additional species with additional *Acacia saligna* and *Eucalyptus rudis* observed. \**Juncus* subgenus Genuini, is present which is contributing significantly to weed cover.

### Quadrat 8 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
6 species	19 stems/100 m <sup>2</sup>	20%	20%	40%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia saligna</i>	5	✓	✓	✓
<i>Billardiera fusiformis</i>	1		?	✓
<i>Corymbia calophylla</i>	2	✓	✓	
<i>Eucalyptus rudis</i>	7	✓	✓	
<i>Melaleuca preissiana</i>	2	✓	✓	✓
<i>Myrtaceae sp.</i>	2		?	✓
Number of species		4	4	4
Number of stems		16	16	10
Number of stems/hectare		1,600	1,600	1,000
Weed species		Mulch cover	Erosion	
12		30%	No change	

## 5.9 Quadrat 9

Species turnover from the 2022 survey includes the loss of *Acacia cyclops* from the quadrat and a reduction across the species, particularly the dominant species *Calothamnus quadrifidus* and *Kunzea glabrescens*. Additional species included *Kennedia prostrata*, *Aotus gracillima* and *Hardenbergia comptoniana*. While there is a reduction in stem density, there is an increase in species richness and canopy cover.

### Quadrat 9 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
21 species	293 stems/100 m <sup>2</sup>	60%	3%	30%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia pulchella</i>	2			✓
<i>Acacia saligna</i>	7	✓	✓	✓
<i>Agonis flexuosa</i>	3	✓	✓	
<i>Allocasuarina fraseriana</i>	19	✓	✓	
<i>Anigozanthos flavidus</i>	17			✓
<i>Astartea</i> sp.	1		?	✓
<i>Billardiera fusiformis</i>	24		?	✓
<i>Calothamnus quadrifidus</i>	49			✓
<i>Callistachys lanceolata</i>	1	✓	?	
<i>Corymbia calophylla</i>	2	✓	✓	
<i>Eucalyptus rudis</i>	15	✓	✓	
<i>Hypocalymma angustifolium</i>	4		?	✓
<i>Jacksonia</i> sp.	3		?	✓
<i>Kunzea glabrescens</i>	134	✓	✓	✓
<i>Melaleuca preissiana</i>	1	✓	✓	✓
<i>Muehlenbeckia adpressa</i>	1		?	✓
<i>Paraserianthes lophantha</i>	1	✓	✓	✓
<i>Spyridium globulosum</i>	1	✓	✓	✓
<i>Kennedia prostrata</i>	1		?	✓
<i>Aotus gracillima</i>	3		?	✓
<i>Hardenbergia comptoniana</i>	4		?	✓
<b>Number of species</b>		10	9	9
<b>Number of stems</b>		184	183	254
<b>Number of stems/hectare</b>		18,400	18,300	25,400
<b>Weed species</b>		<b>Mulch cover</b>	<b>Erosion</b>	
10		80%	No change	

## 5.10 Quadrat 10

Species turnover from the 2022 survey include the loss of *Acacia pulchella* and *Melaleuca preissiana* from the quadrat. The death of some juvenile plants is to be expected and can be due to a range of reasons, including herbivory, seasonal waterlogging, or drought over summer. *Acacia cyclops*, *Leptomeria cunninghamii*, *Billardiera fusiformis*, *Jacksonia* sp and *Banksia* sp., were additions to the native species recorded, indicating the species incurring from the soil seed bank or surrounding seed sources.

### Quadrat 10 – summary

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
14 species	210 stems/100m <sup>2</sup>	20%	1%	40%
Species	Number	Canopy value	Forage value	Ground protection value
<i>Acacia saligna</i>	11	✓	✓	✓
<i>Agonis flexuosa</i>	2	✓	✓	
<i>Allocasuarina fraseriana</i>	34	✓	✓	
<i>Anigozanthos flavidus</i>	9			✓
<i>Calothamnus quadrifidus</i>	12			✓
<i>Corymbia calophylla</i>	3	✓	✓	
<i>Eucalyptus rudis</i>	3	✓	✓	
<i>Hardenbergia comptoniana</i>	1		✓	✓
<i>Kunzea glabrescens</i>	127	✓	✓	✓
<i>Acacia cyclops</i>	1	✓	✓	✓
<i>Leptomeria cunninghamii</i>	4			✓
<i>Billardiera fusiformis</i>	1			✓
<i>Jacksonia</i> sp.	1			✓
<i>Banksia</i> sp.	1	?	?	✓
<b>Number of species</b>		7	8	10
<b>Number of stems</b>		181	182	168
<b>Number of stems/hectare</b>		18,100	18,200	16,800
<b>Weed species</b>		<b>Mulch cover</b>	<b>Erosion</b>	
8		50%	No change	



### Site Map

## Iluka South Capel Revegetation

- Legend
- Site Boundary
  - Quadrats
  - Photo Points

Project: 231537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023

N

Meters 0 10 20 40 60 80

ecosystem solutions

www.ecosystemsolutions.com.au  
(08) 9759 1960

Figure 2: Site showing photo points and quadrats

## 6 NATURALLY RECRUITED SPECIES

A total of 15 native species, in addition to those listed in Table 3 were identified within the quadrats, most likely through germination from the seed bank. This includes those species that were observed in 2022 and have survived. Some of these species are too small to accurately identify to species level, and it is possible that a later monitoring event will decide that some taxa are actually from the species list, in particular the *Anigozanthos* sp. and *Myrtaceae* sp. The addition of these self-sown species increases the diversity on the WRP site, and volunteer recruitment is expected to continue due to the proximity of remnant vegetation to the rehabilitation area.

**Table 4: Naturally recruited taxa**

Taxon
<i>Anigozanthos</i> sp.
<i>Astartea</i> sp.
<i>Aotus gracillima</i>
<i>Banksia</i> sp.
<i>Billardiera fusiformis</i>
<i>Callistachys lanceolata</i>
<i>Conostylis aculeata</i>
<i>Gompholobium tomentosum</i>
<i>Hypocalymma angustifolium</i>
<i>Jacksonia</i> sp.
<i>Juncus pallidus</i>
<i>Kennedia prostrata</i>
<i>Leptomeria cunninghamii</i>
<i>Muehlenbeckia adpressa</i>
<i>Myrtaceae</i> sp.

There was significant natural recruitment of species included in the species list, predominantly *Allocasuarina fraseriana*, *Kunzea glabrescens*, *Calothamnus quadrifidus* and *Eucalyptus rudis*, observed in 2022. In the 2023 monitoring there has been a decline in the density of these species, particularly *Allocasuarina fraseriana* however a significant number of stems remain for these species.

Monitoring indicates the loss of one naturally recruited species (*Drosera* sp.) within the quadrats observed in 2022. However, there was an opportunistic sighting of this *Drosera* sp. adjacent to Quadrat 8.

Seedling survival is dependent on rainfall, herbivory and competition for space and nutrients. A fluctuation of species survival is expected, especially during the juvenile phase of plant establishment.

## 7 WEED SPECIES

A total of 22 weed species were observed within the quadrats. This is a reduction in species from the second-year monitoring event. None of these species are known Declared plants (DPIRD, 2022) or Weeds of National Significance (WoNS) (Weeds Australia, 2022).

**Table 5: Weed species identified in quadrats**

Species		
<i>Acacia iteaphylla</i>	<i>Cynodon dactylon</i>	<i>Lotus sp.</i>
<i>Acacia longifolia</i>	<i>Erodium sp.</i>	<i>Lysimachia arvensis</i>
<i>Arctotheca calendula</i>	<i>Hypochaeris sp.</i>	<i>Melilotus? sp.</i>
<i>Avena fatua</i>	<i>Isolepis prolifera</i>	<i>Sonchus sp.</i>
<i>Callistemon sp.</i>	<i>Juncus bufonius</i>	<i>Ursinia sp.</i>
<i>Conzya sp.</i>	<i>Juncus sp. aff. usitatus</i>	<i>Vulpia bromoides</i>
<i>Cotula coronopifolia</i>	<i>Juncus microcephalus</i>	
<i>Cotula turbinata</i>	<i>Lotus sp.</i>	

There were four additional weed species observed within the quadrats during the 2023 monitoring event compared to the 2022, these are shaded in Table 5 above.

The woody weeds *Acacia iteaphylla* and *Acacia longifolia* were observed in quadrats 6, 7, 9 and 10. In addition, the coast teatree *Gaudium laevigatum* (syn. *Leptospermum laevigatum*) was observed adjacent to Quadrat 10. Monitoring of these woody weeds and their relative densities and numbers has not been recorded as part of this monitoring program.

*Juncus aff. usitatus*, was observed to be a significant contributor to the weed cover. The species was identified by the Western Australian Herbarium and considered to be a weed with the closest species being *Juncus usitatus*, however there is not enough material in the Herbarium from the other eastern-states *Juncus* species to confirm the exact species. This species was observed in Quadrats 1, 2, 3, 4, 8 and 9 and was the dominant *Juncus* species within those quadrats. The native *Juncus*, *J. pallidus* was identified in quadrat 4 and 7.

*Vulpia bromoides*, a loosely tufted annual grass (Western Australian Herbarium, 1998) is located in Quadrat 4 with identification also confirmed by Western Australian Herbarium. This species was likely present in previous years, however, was unable to be confidently identified due to insufficient sterile material.

There has been a change in weed species from previous years with many emergent species appearing that were not able to be identified.

Iluka engaged a weed control contractor to undertake herbicide application over June–July 2023. Additional works were completed in the surrounding areas during September 2023.

## 8 MONITORING EVENT COMPARISON

A comparison for each quadrat between sampling years is provided in Table 7 below. This includes any fluctuations in the native flora species composition and densities, number of weed species and percentage cover for both native and weed species. Section 9 below provides a discussion on the changes recorded between survey years.

Table 6: Monitoring event comparison

	Q1			Q2			Q3			Q4			Q5			Q6			Q7			Q8			Q9			Q10		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
<i>Acacia cyclops</i>				✓						✓															✓					
<i>Acacia pulchella</i>	✓											✓							✓	✓	✓	✓			✓	✓	✓		✓	
<i>Acacia saligna</i>		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Agonis flexuosa</i>	✓			✓	✓	✓				✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Allocasuarina fraseriana</i>				✓	✓						✓	✓		✓					✓	✓	✓				✓	✓			✓	✓
<i>Anigozanthos flavidus</i>				✓			✓	✓									✓	✓	✓	✓	✓				✓	✓	✓		✓	✓
<i>Calothamnus quadrifidus</i>	✓	✓	✓	✓	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓				✓	✓			✓	✓
<i>Corymbia calophylla</i>										✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Eucalyptus rudis</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Hardenbergia comptoniana</i>																			✓	✓					✓		✓	✓	✓	✓
<i>Kunzea glabrescens</i>		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	✓	✓
<i>Melaleuca preissiana</i>																✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓
<i>Paraserianthes lophantha</i>				✓	✓	✓		✓	✓	✓	✓	✓				✓						✓	✓		✓	✓				
<i>Patersonia occidentalis</i>																														
<i>Spyridium globulosum</i>				✓															✓	✓					✓	✓	✓	✓		
<i>Viminaria juncea</i>						✓												✓												
Number of revegetation list species	4	4	4	7	9	8	2	5	4	7	8	8	5	7	6	8	9	6	10	12	10	7	6	4	7	13	13	7	11	10
Number of native species	5	4	5	14	13	12	3	5	4	14	9	10	8	7	6	9	10	6	10	13	14	10	9	6	13	19	21	10	11	14
Number of native species stems	7	31	23	115	270	196	33	17	17	78	260	168	22	44	20	19	22	17	31	72	111	22	20	19	29	387	293	37	172	210
Canopy cover percentage	0.5%	5%	10%	15%	25%	60%	0.5%	10%	30%	0.5%	10%	50%	1%	2%	15%	1%	10%	10%	1%	5%	20%	2%	2%	20%	2%	35%	60%	2%	5%	20%
Number of weed species	17	10	5	19	14	6	11	16	5	10	16	9	9	16	7	19	13	9	19	14	9	11	14	12	12	16	10	7	11	8
Weed cover percentage	25%	40%	5%	20%	40%	<5%	40%	40%	70%	4%	60%	30%	10%	70%	30%	5%	30%	80%	1%	5%	10%	20%	30%	20%	1%	5%	3%	1%	1%	1%

## 9 DISCUSSION AND SUMMARY

Table 7 assesses the progress of each quadrat against the Completion Criteria described in Table 2 and has been included in this section for ease of reference to the results from Section 5. Each Completion Criterion is discussed below.

**Table 7: Progress against completion criteria**

Completion criteria	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
CC01: No declared weeds present in revegetation	Absent ✓	Absent ✓	Absent ✓	Absent ✓	Absent ✓	Absent ✓	Absent ✓	Absent ✓	Absent ✓	Absent ✓
CC02: Weed cover is less than 20% at completion	5% ✓	<5% ✓	70% x	30% x	30% x	80% x	10% ✓	20% x	3% ✓	1% ✓
CC03: A minimum of 15 species will be selected from the revegetation species table (WRP habitat/foraging species) and established in revegetation prior to completion and will include at least: <ul style="list-style-type: none"> <li>Five species that provide foraging value</li> <li>Five species that provide canopy value</li> <li>Five species that provide ground protection value</li> </ul>	<p>✓ <b>Eleven species have been selected that provide foraging value.</b> All of the 11 species selected for foraging value were present within quadrats, being <i>Acacia cyclops</i>, <i>Acacia saligna</i>, <i>Agonis flexuosa</i>, <i>Allocasuarina fraseriana</i>, <i>Corymbia calophylla</i>, <i>Eucalyptus rudis</i>, <i>Hardenbergia comptoniana</i>, <i>Kunzea glabrescens</i>, <i>Melaleuca preissiana</i>, <i>Paraserianthes lophantha</i> and <i>Spyridium globulosum</i>.</p> <p>✓ <b>Ten species have been selected that provide canopy value.</b> All of the ten species selected to provide canopy value were present within quadrats, being <i>Acacia cyclops</i>, <i>Acacia saligna</i>, <i>Agonis flexuosa</i>, <i>Allocasuarina fraseriana</i>, <i>Corymbia calophylla</i>, <i>Eucalyptus rudis</i>, <i>Kunzea glabrescens</i>, <i>Melaleuca preissiana</i>, <i>Paraserianthes lophantha</i> and <i>Spyridium globulosum</i>.</p> <p>✓ <b>Twelve species have been selected that provide ground protection value.</b> Eleven of the 12 species selected to provide ground protection were present within the quadrats, being <i>Acacia cyclops</i>, <i>Acacia pulchella</i>, <i>Acacia saligna</i>, <i>Anigozanthos flavidus</i>, <i>Calothamnus quadrifidus</i>, <i>Hardenbergia comptoniana</i>, <i>Kunzea glabrescens</i>, <i>Melaleuca preissiana</i>, <i>Paraserianthes lophantha</i>, <i>Spyridium globulosum</i> and <i>Viminaria juncea</i>.</p> <p>✓ Fifteen species have been recorded in quadrats from the 16 planted. <i>Patersonia occidentalis</i> was not recorded within a quadrat however it was observed within the revegetation area.</p>									
CC04: A density of 800 stems per hectare of species contributing to canopy will be established at completion (equal to 8 stems per quadrat)	20 stems ✓	159 stems ✓	17 stems ✓	108 stems ✓	17 stems ✓	13 stems ✓	74 stems ✓	16 stems ✓	184 stems ✓	181 stems ✓
CC05: No areas greater than 250 m <sup>2</sup> without a developing understory at completion.	U	U	U	U	U	U	U	U	U	U
CC06: A minimum of 30% cover by species contributing to canopy will be established in revegetation at completion.	10% U	60% U	30% U	50% U	15% U	10% U	20% U	20% U	60% U	20% U
CC07: A perpetual covenant will be established two years prior to completion.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

✓ currently meets criterion

x does not currently meet criterion

U Currently unassessable

### CC01 and CC02 - Weeds

A total of 22 introduced species were recorded within the quadrats. None of these are Declared plants or WoNS requiring immediate treatment. However, *Gomphocarpus fruitcosus* (narrow leaf cotton bush), a weed of potential national significance, was observed near Quadrat 4 within the Revegetation area in 2022 however it was not observed in 2023, indicating likely successful treatment. *Cucumis myriocarpus* (paddy melon) was observed within the revegetation area, although not a Declared plant or WoNS, this is a vigorously spreading species and control is recommended to prevent negative impact to the revegetation.

This species was observed in 2022 and again in 2023. Weed cover in Quadrats 1, 3, 4, 5, 6 and 8 was 20% or greater, which is higher than CC02 of the SCRP RMP, which states 'Weed cover is less than 20% at completion'. Since the previous survey the weed cover has decreased across all quadrats, with the exception of Quadrats 9, 6 and 7. This change in weed cover is likely due to treatment occurring after the second year (2022 survey), which was a recommendation to ensure spray drift from weed treatment did not affect juvenile native species. It is expected as this initial survey report recommended that 'as the native species are still small and more likely vulnerable to spray drift this may be better left until the second year when seedlings have become more established.', now that the revegetation species are larger it is recommended that weed control be undertaken annually to control the weed cover across the revegetation area. Although there is still significant weed cover, there has also been a steady increase in native canopy cover across all quadrats indicating that as weed treatment occurs, native species will have a chance to out-compete weeds.

### CC03 – Species selection and establishment

Sixteen revegetation species from the list presented in the SCRP RMP were chosen for planting, with one substitution made due to lack of availability at the time. The substitution was of *Anigozanthos flavidus* for *Anigozanthos manglesii*. While generally similar to *A. manglesii*, if more robust, the *A. flavidus* prefers damper habitats and its success here may be helped by this preference. These 16 species provide habitat and foraging values for western ringtail possums.

Of the 16 revegetation species selected 15 were found to be established in quadrats during monitoring. One species planted was not observed within the quadrats, being *Patersonia occidentalis*, however this was observed opportunistically within other parts of the revegetation area. The absence of this species from quadrats may merely reflect the randomness of the planting effort and the subsequent placement of the quadrats.

With the nature of the species chosen for planting being that several provide more than one value (canopy, foraging, ground protection) for WRP, the quadrat records are showing that the CC03 requirement for the total number of stems is being met, however some quadrats have less than five species contributing to these values, in particular ground cover has less than five species contributing for Quadrats 1, 3, 5, 6 and 8. Native recruitment has been occurring, which could increase the ground cover species in future years. The opportunity also exists to increase the species richness of the site by choosing other species from the original revegetation species list as infill plantings (although this is not a requirement). Groundcovers should be chosen that out-compete weeds such as *Billardaria fusiformis*, and *Kennedia prostrata*, which are already growing well in the quadrats. Sedges provide protection for western ringtail possums during hot dry weather and could be included in future planting such as *Lepidosperma gladiatum*. Introduction of different species to the revegetation will contribute to the target of establishment of 15 species being exceeded.

### CC04 – Density of canopy value species

CC04 states that there will be a density of 800 stems/hectare of species contributing to canopy at completion. Currently, all quadrats are over this threshold.

Natural recruitment was observed across most quadrats, and this has contributed to the total stems/hectare counts of canopy species that exceed the 800. While this contribution is pleasing it should be noted that, as seedlings get older and larger, competition will reduce these numbers, for example the *Eucalyptus rudis* in Quadrat 2 and *Kunzea glabrescens* within multiple quadrats will thin out as plants grow and approach a natural density.

It is likely more recruitment will occur, and there will be deaths, as the individuals become established. At this time no infill planting is required as all quadrats currently meet the completion criteria.

### CC05 – No areas greater than 250 m<sup>2</sup> without a developing understorey

CC05 states that there will be 'No areas greater than 250 m<sup>2</sup> without a developing understorey (foliage cover between 1–50 cm height) at completion'. The limiting factor in assessing this criterion by the current monitoring is that quadrats of 100 m<sup>2</sup> are being used to monitor the revegetation, and these are inadequate for addressing an area over twice their size. Ten metre by ten metre quadrats (100 m<sup>2</sup>) are the standard size recommended by the Environmental Protection Authority when undertaking botanical surveys on the Swan Coastal Plain and are adequate for addressing most of the vegetation monitoring requirements of the SCRP

RMP. Consideration has been given to the use of a similar number of larger 50 metre by 50 metre quadrats to capture a larger area. However, it would be necessary to monitor each of these larger quadrats to the same level as the smaller ones – significantly increasing the workload and cost.. Alternatively, as the vegetation grows it may be possible to identify areas using GIS that appear to be lagging and follow this with a ground-truthing visit to areas of concern. As the SCRP RMP intends to use aerial photography over the offset site to assess canopy cover at five and ten years after planting, this may be a task best left until then.

### **CC06 – A minimum of 30% cover by species contributing to canopy will be established in revegetation at completion**

Canopy cover was estimated at 10% to 60%, averaging out to a canopy cover of 29.5%, during the third-year monitoring event. This average canopy cover is on track to meet the target by the next monitoring required, year five. Given the stem density of species contributing to canopy cover exceeds the completion criteria of 800 stems per hectare, it is assumed that the canopy cover percentage will continue to increase as the individuals establish themselves.

### **CC07 A perpetual covenant will be established two years prior to completion**

This criterion is only relevant during the latter period of the monitoring program.

### **In summary**

- Weed control is recommended to continue across the revegetation site.
- Planting has been successful in establishing five species from each WRP value for most values and quadrats, and the criterion to have 15 species established has been met.
- The lower number of individuals in Quadrats 1 and 6, may be an artefact of quadrat placement and/or planting effort. A site walk-over determined that all 16 species planted are within the revegetation area.
- All quadrats are above the 800 stems/hectare threshold, and no infill planting is recommended as a result of the 2023 monitoring though any future planting should focus on ground covers to out-compete weeds.
- It is recommended that consideration be given to implementing a modification to the monitoring program to enable larger underperforming areas to be recognised.
- The SCRP RMP makes reference to the measurement of bare areas as one of the parameters for the monitoring program. Comments received indicate that Iluka considers this to refer to CC05 and areas bare of understorey species, although the SCRP RMP does not make this differentiation.
- Extensive canopy cover is not expected at this stage following planting. The need for infill planting to achieve CC06 will be assessed following the Year 5 monitoring event.

## 10 REFERENCES

- DPIRD (2022) *Western Australian Organism List* <https://www.agric.wa.gov.au/organisms##> Accessed October 2022.
- Western Australian Herbarium (1998). *FloraBase—the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. <https://florabase.dbca.wa.gov.au/> (Accessed 21 November 2023).
- Iluka Resources Ltd (2019). *South Capel Remediation Project, South Capel Revegetation Management Plan EPBC 2018/8250*. Iluka Resources Ltd July 2019.
- WAH (1998-) *Western Australian Herbarium (1998-). FloraBase – the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. <https://florabase.dpaw.wa.gov.au/>.
- Weeds Australia (2022) *Weed profiles*. <https://weeds.org.au/weeds-profiles/>. Accessed October 2022.

## Appendix A

### Quadrat data sheets

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat no.: 1	<b>Date:</b> 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: KP
Reference photo no. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

Weed cover (%):	5	Declared weeds (present / absent):	Absent
Revegetation species canopy cover (%):	10	Size of bare areas (%):	15

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	<del>Very Good</del>	<del>Good</del>	<del>Degraded</del>	Completely Degraded
Mulch cover (%):	80			
Disturbance level:	<del>Low</del>	<del>Medium</del>	High	
Erosion evidence (e.g. overland flows rills):	Same as last year (no worse)			
Dieback evidence (e.g. localised plant senescence):	No			

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
Acacia	saligna	15
Calothamnus	quadrifidus	2
Eucalyptus	rudis	1
Kunzea	glabrescens	4
Anigozanthos	sp.	1

### Additional comments (e.g., key weed species; plant health observations):

*Juncus bufonius*  
*Juncus sp. aff. usitatus*  
*Lotus sp.* ×2  
*Cynodon dactylon*

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat No.: 3	Date: 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: KP
Reference photo No. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

Weed cover (%): 70	Declared weeds (present / absent): Absent
Revegetation species canopy cover (%): 30	Size of bare areas (%): 20

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	<del>Very Good</del>	Good	<del>Degraded</del>	Completely Degraded
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Mulch cover (%): 25

Disturbance level:	<del>Low</del>	Medium	High
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Erosion evidence (e.g. overland flows rills): No new

Dieback evidence (e.g. localised plant senescence): Unknown

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
Acacia	saligna	13
Eucalyptus	rudis	1
Kunzea	glabrescens	2
Melaleuca	preissiana	1

**Additional comments (e.g., key weed species; plant health observations):**

*Lotus* sp.

*Juncus* sp. *aff. usitatus*

*Cotula turbinata*

Emergent weeds

Sterile annual grasses (x2 sp)

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat No.: 4	Date: 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: KP
Reference photo No. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

<b>Weed cover (%)</b> : 30	<b>Declared weeds (present / absent)</b> : Absent
<b>Revegetation species canopy cover (%)</b> : 50	<b>Size of bare areas (%)</b> : 15

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	<del>Very Good</del>	Good	Degraded	Completely Degraded
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Mulch cover (%): 60

Disturbance level:	Low	Medium	High
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**Erosion evidence (e.g. overland flows rills)**: Same as last year

**Dieback evidence (e.g. localised plant senescence)**: Unknown – but absence of sheoak from last year

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
Acacia	saligna	6
Agonis	flexuosa	1
Allocasuarina	fraseriana	1
Calothamnus	quadrifidus	56
Billardiera	fusiformis	2
Eucalyptus	rudis	1
Kunzea	glabrescens	98
Paraserianthes	lophantha	1
Acacia	pulchella	1
Juncus	pallidus	1

**Additional comments (e.g., key weed species; plant health observations):**

*Arctotheca calendula*  
*Juncus* sp. aff. *usitatus*  
*Lotus* sp. ×2  
*Hypochaeris* sp.  
*Isolepis prolifera*  
 Sterile annual grasses  
*Erodium* sp.  
*Callistemon* sp.  
*Vulpa bomoides*

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat No.: 4	Date: 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: KP
Reference photo No. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

<b>Weed cover (%)</b> : 30	<b>Declared weeds (present / absent)</b> : Absent
<b>Revegetation species canopy cover (%)</b> : 50	<b>Size of bare areas (%)</b> : 15

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	Very Good	Good	Degraded	Completely Degraded
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Mulch cover (%): 60

Disturbance level:	Low	Medium	High
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**Erosion evidence (e.g. overland flows rills)**: Same as last year

**Dieback evidence (e.g. localised plant senescence)**: Unknown – but absence of sheoak from last year

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
Acacia	saligna	6
Agonis	flexuosa	1
Allocasuarina	fraseriana	1
Calothamnus	quadrifidus	56
Billardiera	fusiformis	2
Eucalyptus	rudis	1
Kunzea	glabrescens	98
Paraserianthes	lophantha	1
Acacia	pulchella	1
Juncus	pallidus	1

**Additional comments (e.g., key weed species; plant health observations):**

*Arctotheca calendula*  
*Juncus* sp. aff. *usitatus*  
*Lotus* sp. ×2  
*Hypochaeris* sp.  
*Isolepis prolifera*  
 Sterile annual grasses  
*Erodium* sp.  
*Callistemon* sp.  
*Vulpa bomoides*

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat No.: 5	Date: 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: DP
Reference photo No. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

Weed cover (%): 30 (Emergent)	Declared weeds (present / absent): Absent
Revegetation species canopy cover (%): 15	Size of bare areas (%): 20

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	<del>Very Good</del>	<del>Good</del>	<del>Degraded</del>	Completely Degraded
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Mulch cover (%): 30

Disturbance level:	<del>Low</del>	<del>Medium</del>	High
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Erosion evidence (e.g. overland flows rills): Minor where mulch has moved

Dieback evidence (e.g. localised plant senescence): Unknown

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
<i>Acacia</i>	<i>saligna</i>	2
<i>Agonis</i>	<i>flexuosa</i>	1
<i>Calothamnus</i>	<i>quadrifidus</i>	3
<i>Corymbia</i>	<i>calophylla</i>	2
<i>Eucalyptus</i>	<i>rudis</i>	4
<i>Kunzea</i>	<i>glabrescens</i>	8

**Additional comments (e.g., key weed species; plant health observations):**

*Lotus* spp. x2

*Arctotheca calendula*

*Hypochaeris* sp.

*Isolepis prolifera*

*Cotula turbinata*

*Juncus* sp. aff. *Usitatus*

Emergent sterile sp. Likely *Arctotheca calendula*

Many dead *Kunzea*

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat No.: 6	Date: 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: DP
Reference photo No. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

Weed cover (%): 80	Declared weeds (present / absent): Absent
Revegetation species canopy cover (%): 10	Size of bare areas (%): 25

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	<del>Very Good</del>	<del>Good</del>	<del>Degraded</del>	Completely Degraded
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Mulch cover (%): 30

Disturbance level:	<del>Low</del>	<del>Medium</del>	High
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Erosion evidence (e.g. overland flows rills): Minor – previous year?

Dieback evidence (e.g. localised plant senescence): Unknown

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
<i>Acacia</i>	<i>saligna</i>	7
<i>Calothamnus</i>	<i>quadrifidus</i>	4
<i>Corymbia</i>	<i>calophylla</i>	1
<i>Eucalyptus</i>	<i>rudis</i>	1
<i>Kunzea</i>	<i>glabrescens</i>	2
<i>Melaleuca</i>	<i>preissiana</i>	2

**Additional comments (e.g., key weed species; plant health observations):**

*Acacia iteaphylla*

*Lotus* sp.

*Arctotheca calendula*

*Erodium* sp.

*Avena* sp. (wild oats)

*Melilotus* sp. (clover)

*Sonchus* sp.

*Juncus bufonius*

Sterile annual grasses

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat No.: 7	Date: 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: KP
Reference photo No. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

Weed cover (%): 10	Declared weeds (present / absent): Absent
Revegetation species canopy cover (%): 20	Size of bare areas (%): 5

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	<del>Very Good</del>	Good	Degraded	Completely Degraded
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Mulch cover (%): 90

Disturbance level:	Low	Medium	High
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Erosion evidence (e.g. overland flows rills): Minor – less than previously

Dieback evidence (e.g. localised plant senescence): Unknown

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
<i>Acacia</i>	<i>pulchella</i>	1
<i>Acacia</i>	<i>saligna</i>	4
<i>Agonis</i>	<i>flexuosa</i>	1
<i>Allocasuarina</i>	<i>fraseriana</i>	4
<i>Anigozanthos</i>	<i>flavidus</i>	2
<i>Calothamnus</i>	<i>quadrifidus</i>	25
<i>Corymbia</i>	<i>calophylla</i>	2
<i>Eucalyptus</i>	<i>rudis</i>	3
<i>Jacksonia</i>	sp.	3
<i>Kunzea</i>	<i>glabrescens</i>	59
<i>Melaleuca</i>	<i>preissiana</i>	1
<i>Myrtaceae</i>	sp.	1
<i>Billardiera</i>	<i>fusiformis</i>	4
<i>Juncus</i>	<i>pallidus</i>	1

### Additional comments (e.g., key weed species; plant health observations):

*Lotus* spp. x2  
*Arctotheca calendula*  
*Lysimachia arvensis*  
*Hypochaeris* sp.  
*Sonchus* sp.  
*Acacia iteaphylla*  
*Juncus bufonius*  
*Erigeron* sp.

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat No.: 8	Date: 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: KP
Reference photo No. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

Weed cover (%): 20	Declared weeds (present / absent): Absent
Revegetation species canopy cover (%): 20	Size of bare areas (%): 40

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	<del>Very Good</del>	Good	Degraded	Completely Degraded
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Mulch cover (%): 30

Disturbance level:	Low	Medium	High
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Erosion evidence (e.g. overland flows rills): Minor movement of mulch

Dieback evidence (e.g. localised plant senescence): Unknown

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
<i>Acacia</i>	<i>saligna</i>	5
<i>Billardiera</i>	<i>fusiformis</i>	1
<i>Corymbia</i>	<i>calophylla</i>	2
<i>Eucalyptus</i>	<i>rudis</i>	7
<i>Melaleuca</i>	<i>preissiana</i>	2
<i>Myrtaceae</i>	?	2

### Additional comments (e.g., key weed species; plant health observations):

*Juncus microcephalus*

*Arctotheca calendula*

*Lotus* spp. x2

*Hypochaeris* sp.

*Monopsis debilis*

*Juncus bufonius*

*Juncus* sp. aff. *usitatus*

*Isolepis prolifera*

*Erodium* sp.

*Chrysocephala* sp.

*Erigeron* sp.

One *Melaleuca preissiana* is senescing.

*Drosera* sp. nearby.

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat No.: 9	Date: 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: KP
Reference photo No. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

Weed cover (%): 3	Declared weeds (present / absent): Absent
Revegetation species canopy cover (%): 60	Size of bare areas (%): 30

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	Very Good	Good	Degraded	Completely Degraded
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Mulch cover (%): 80

Disturbance level:	Low	Medium	High
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Erosion evidence (e.g. overland flows rills): Minor

Dieback evidence (e.g. localised plant senescence): Unknown

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
Acacia	<i>pulchella</i>	2
Acacia	<i>saligna</i>	7
Agonis	<i>flexuosa</i>	3
Allocasuarina	<i>fraseriana</i>	19
Anigozanthos	<i>flavidus</i>	17
Astartea	sp.	1
Billardiera	<i>fusiformis</i>	24
Calothamnus	<i>quadrifidus</i>	49
Callistachys	<i>lanceolata</i>	1
Corymbia	<i>calophylla</i>	2
Eucalyptus	<i>rudis</i>	15
Hypocalymma	<i>angustifolium</i>	4
Jacksonia	sp.	3
Kunzea	<i>glabrescens</i>	134
Melaleuca	<i>preissiana</i>	1
Muehlenbeckia	<i>adpressa</i>	1
Paraserianthes	<i>lophantha</i>	1
Spyridium	<i>globulosum</i>	1
Kennedia	<i>prostrata</i>	1
Aotus	<i>gracilima</i>	3
Hardenbergia	<i>comptoniana</i>	4

Additional comments (e.g., key weed species; plant health observations):

*Acacia longifolia*

*Lotus* spp. x2

*Isolepis prolifera*

*Hypochaeris* sp.

*Callistemon* sp. one plant

*Ursinia anthemoides*

*Acacia iteaphylla*

*Avena* sp. (wild oats)

*Juncus* sp. *aff. usitatus*

*Gaudium laevigatum* outside quadrat

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## FIELD RECORDING SHEET

<b>Project: Iluka revegetation monitoring</b>	<b>Project number: AU3213001930.001</b>
Quadrat No.: 10	Date: 3/10/2023
Quadrat size: 10 m × 10 m	Recorder: KP
Reference photo No. (from NW quadrat corner):	m E:
Datum: GDA94 / Zone:	m S:

### Quadrat monitoring parameters

Weed cover (%): 1	Declared weeds (present / absent): Absent
Revegetation species canopy cover (%): 20	Size of bare areas (%): 40

### Field observations

Vegetation condition (Keighery 1994): Pristine to Excellent	<del>Very Good</del>	Good	Degraded	Completely Degraded
---	----------------------	------	----------	---------------------

Mulch cover (%): 50

Disturbance level:	Low	Medium	High
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Erosion evidence (e.g. overland flows rills): Minor movement of mulch

Dieback evidence (e.g. localised plant senescence): Unknown

### Species list – revegetation species<sup>1</sup>

Genus	Species	Stem density (no. of stems)
<i>Acacia</i>	<i>saligna</i>	11
<i>Agonis</i>	<i>flexuosa</i>	2
<i>Allocasuarina</i>	<i>fraseriana</i>	34
<i>Anigozanthos</i>	<i>flavidus</i>	9
<i>Calothamnus</i>	<i>quadrifidus</i>	12
<i>Corymbia</i>	<i>calophylla</i>	3
<i>Eucalyptus</i>	<i>rudis</i>	3
<i>Hardenbergia</i>	<i>comptoniana</i>	1
<i>Kunzea</i>	<i>glabrescens</i>	127
<i>Acacia</i>	<i>cyclops</i>	1
<i>Leptomeria</i>	<i>cunninghamii</i>	4
<i>Billardiera</i>	<i>fusiformis</i>	1
<i>Jacksonia</i>	<i>sp.</i>	1
<i>Banksia</i>	<i>?attenuata</i>	1

**Additional comments (e.g., key weed species; plant health observations):**

*Acacia iteaphylla?*

*Lysimachia arvensis*

*Hypochaeris* sp.

*Arctotheca calendula*

*Ursinia anthemoides*

*Lotus* sp.

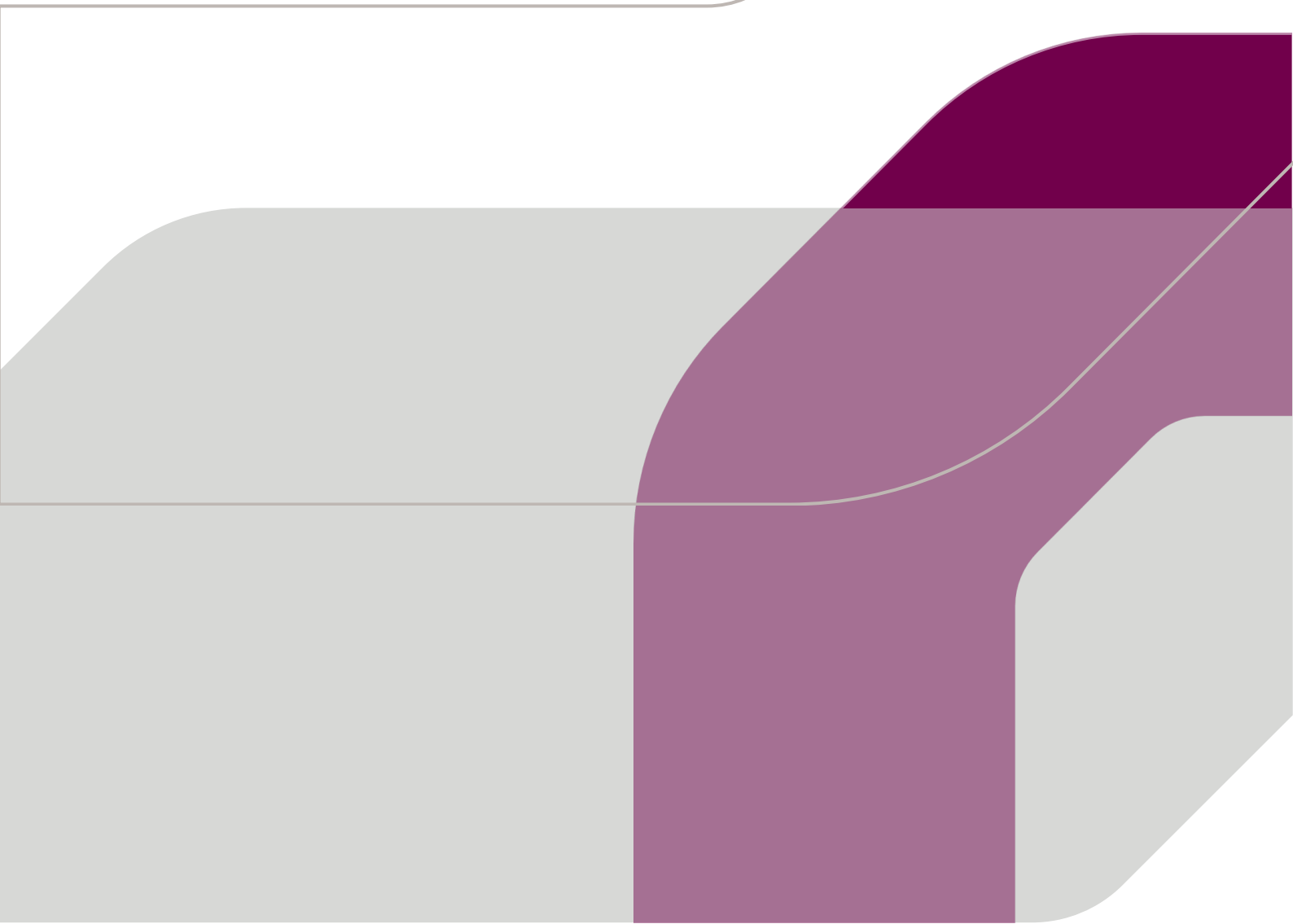
*Erigeron* sp.

*Isolepis prolifera*

<sup>1</sup> Species richness (total no. of revegetation species) and stem density (total no. of stems) to be derived from this table

## Appendix B

### Quadrat aerial imagery



## APPENDIX B: Quadrat aerial imagery



### Quadrat 1 Iluka South Capel Revegetation

Project: 201537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023



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(08) 9759 1500

Legend  
□ Quadrat

Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)



**Quadrat 2**  
**Iluka South Capel Revegetation**

Legend  
□ Quadrat

Project: 201537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023



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(08) 9759 1960

Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)




**Quadrat 3**  
**Iluka South Capel Revegetation**

Legend  
□ Quadrats

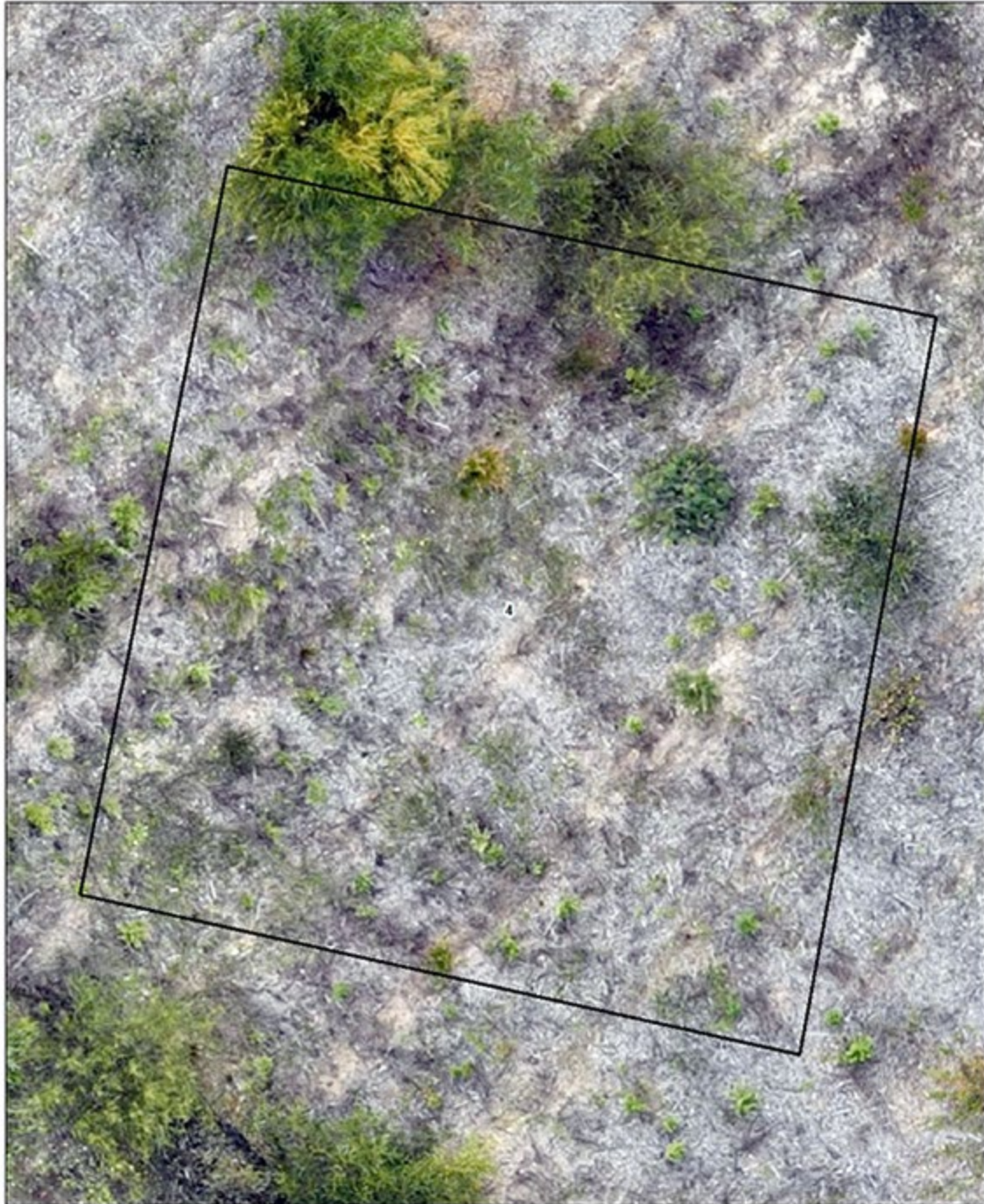
Project: 201537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023

N  
0 1 2  
Meters



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(08) 9759 1960

Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)



**Quadrat 4**  
**Iluka South Capel Revegetation**

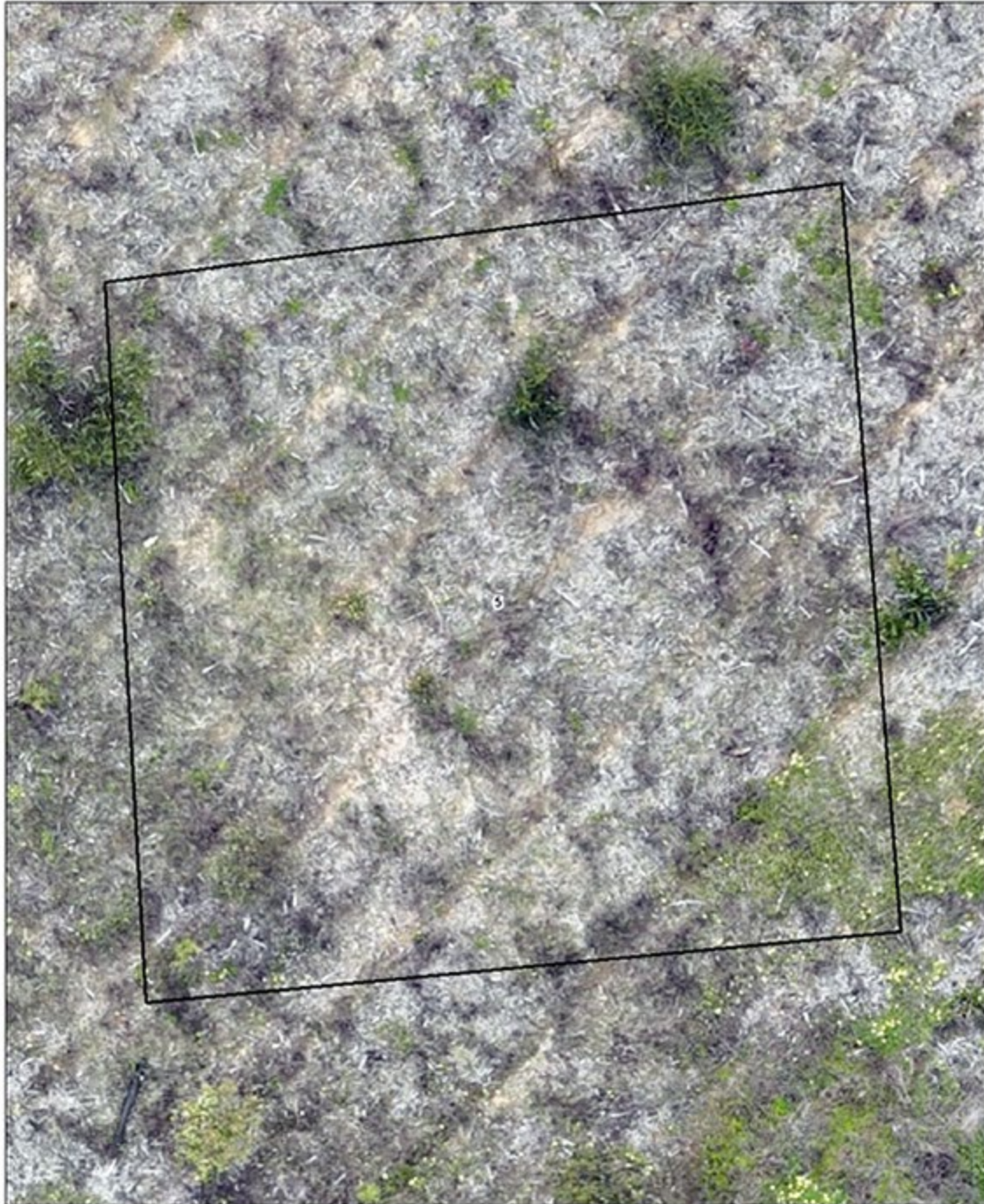
Legend  
□ Quadrats

Project: 201537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023



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Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)



**Quadrat 5**  
**Iluka South Capel Revegetation**

Legend  
□ Quadrats

Project: 201537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023



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Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)



**Quadrat 6**  
**Iluka South Capel Revegetation**

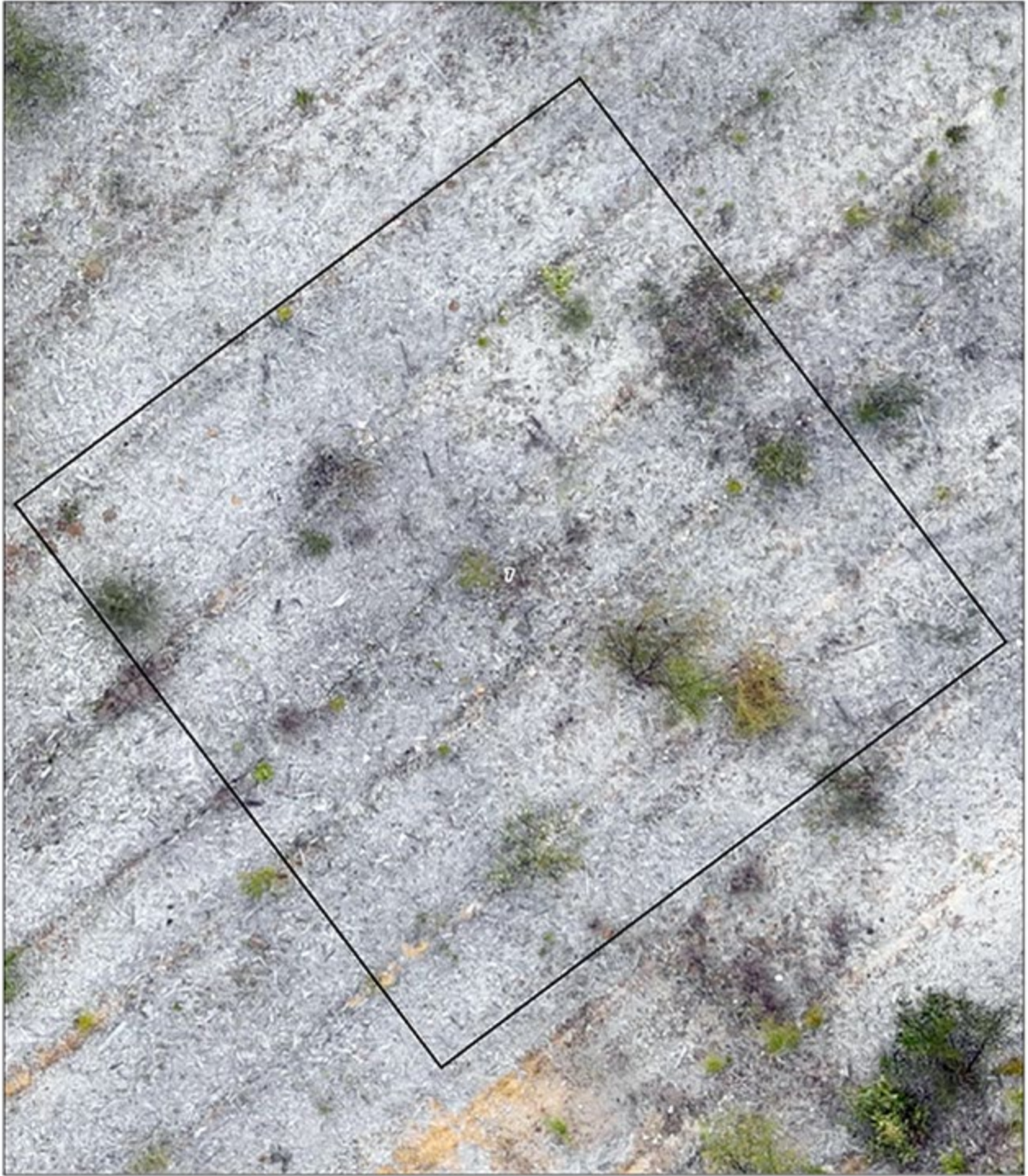
Legend  
□ Quadrats

Project: 231537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023



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Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)



**Quadrat 7**  
**Iluka South Capel Revegetation**

Legend  
□ Quadrats

Project: 231537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023

N  
0 1 2  
Meters

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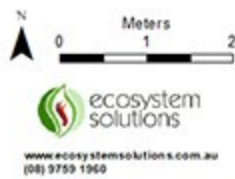
Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)



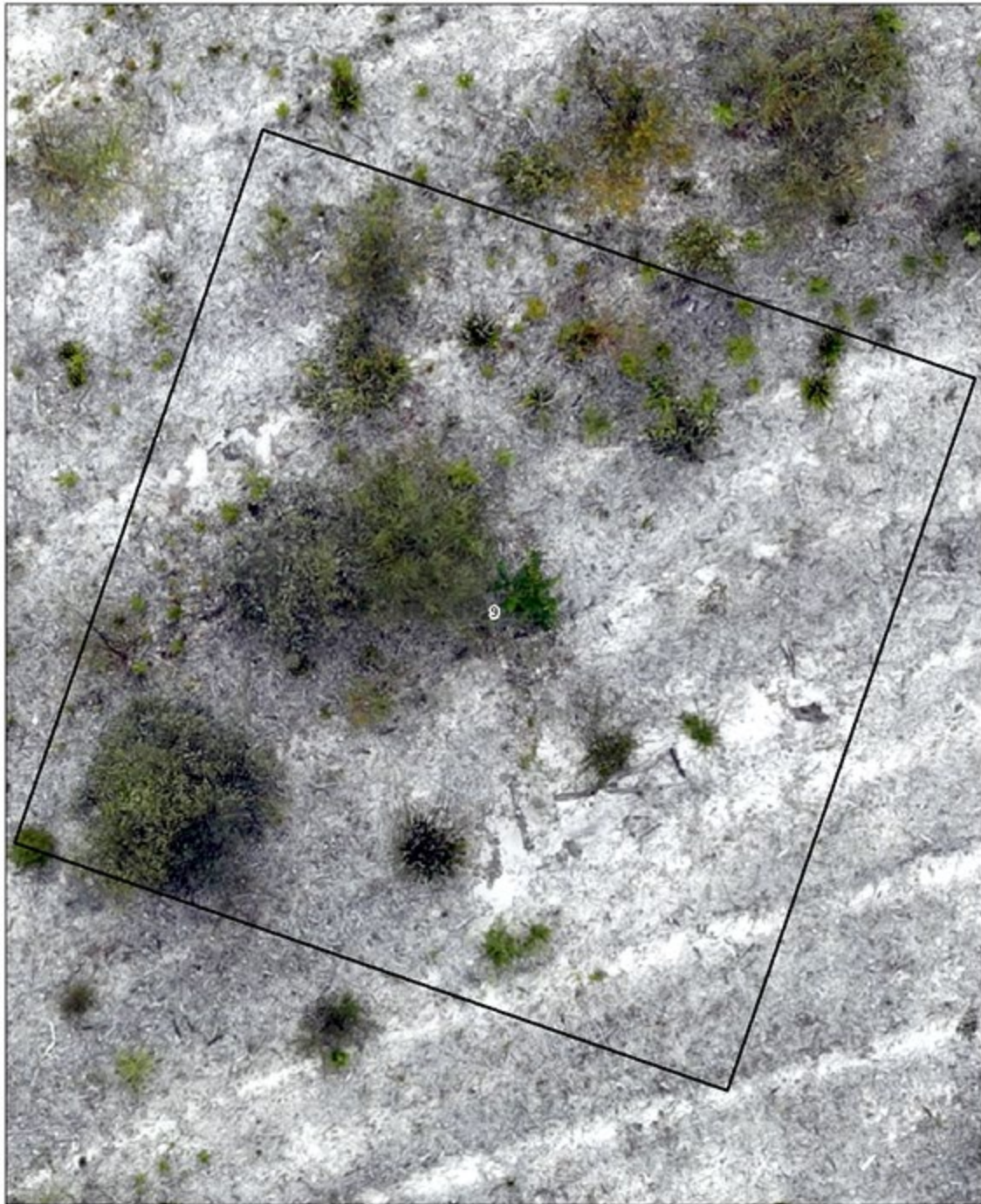
**Quadrat 8**  
**Iluka South Capel Revegetation**

Legend  
□ Quadrats

Project: 201537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023



Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)



**Quadrat 9**  
**Iluka South Capel Revegetation**

Legend  
□ Quadrats

Project: 231537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023



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Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)



**Quadrat 10**  
**Iluka South Capel Revegetation**

Legend  
□ Quadrats

Project: 231537  
Report: Revegetation  
Monitoring  
Assessment date: 06/10/2023  
Prepared by: H. Drake  
Aerial photo date: Oct 2023



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Note: Map includes drone image overlay taken 3 October 2023 (2cm/pixel)

## Appendix C

### NW reference photo comparison



# APPENDIX C: NW REFERENCE PHOTO COMPARISON

## Quadrat 1



Year 1 monitoring event



Year 2 monitoring event

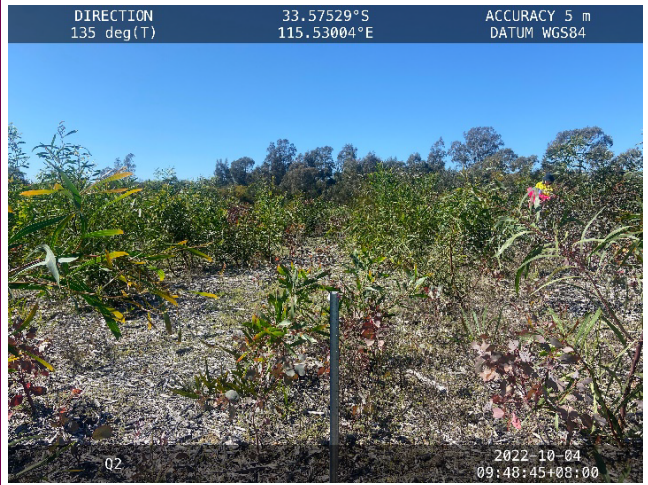


Year 3 monitoring event

## Quadrat 2



Year 1 monitoring event



Year 2 monitoring event



Year 3 monitoring event

# Quadrat 3



Year 1 monitoring event



Year 2 monitoring event

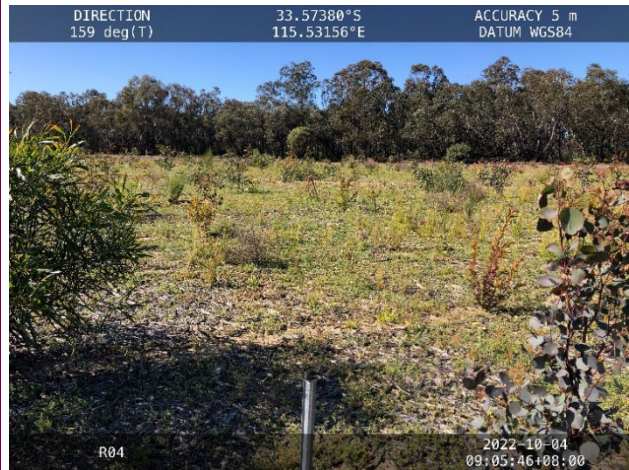


Year 3 monitoring event

# Quadrat 4



Year 1 monitoring event



Year 2 monitoring event



Year 3 monitoring event

# Quadrat 5



Year 1 monitoring event



Year 2 monitoring event



Year 3 monitoring event

# Quadrat 6



Year 1 monitoring event



Year 2 monitoring event



Year 3 monitoring event

# Quadrat 7



Year 1 monitoring event



Year 2 monitoring event



Year 3 monitoring event

# Quadrat 8



Year 1 monitoring event



Year 2 monitoring event



Year 3 monitoring event

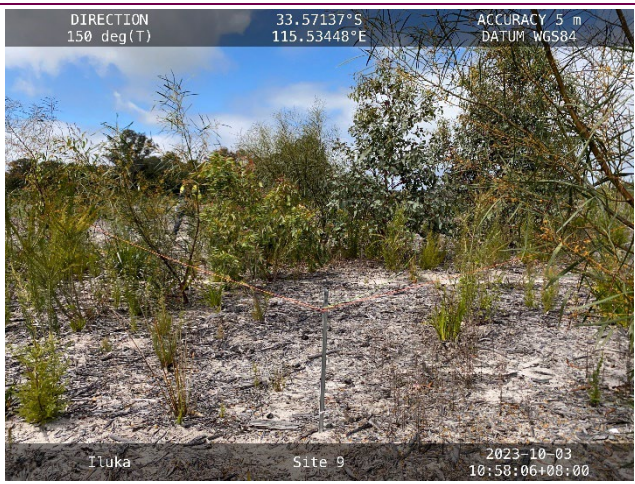
# Quadrat 9



Year 1 monitoring event



Year 2 monitoring event



Year 3 monitoring event

# Quadrat 10



Year 1 monitoring event



Year 2 monitoring event



Year 3 monitoring event