South Capel Remediation Project, WA

EPBC 2018/8250

Annual Compliance Report

23 September 2022 – 22 September 2023

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Document control

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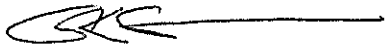
Declaration of accuracy

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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Date: 9/10/2023

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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[1] (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.

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 23rd of September – the date the action commenced. The compliance status and updates are provided in Table 1 below.

[1] Known as the Department of Climate Change, Energy, the Environment and Water since 1 July 2022

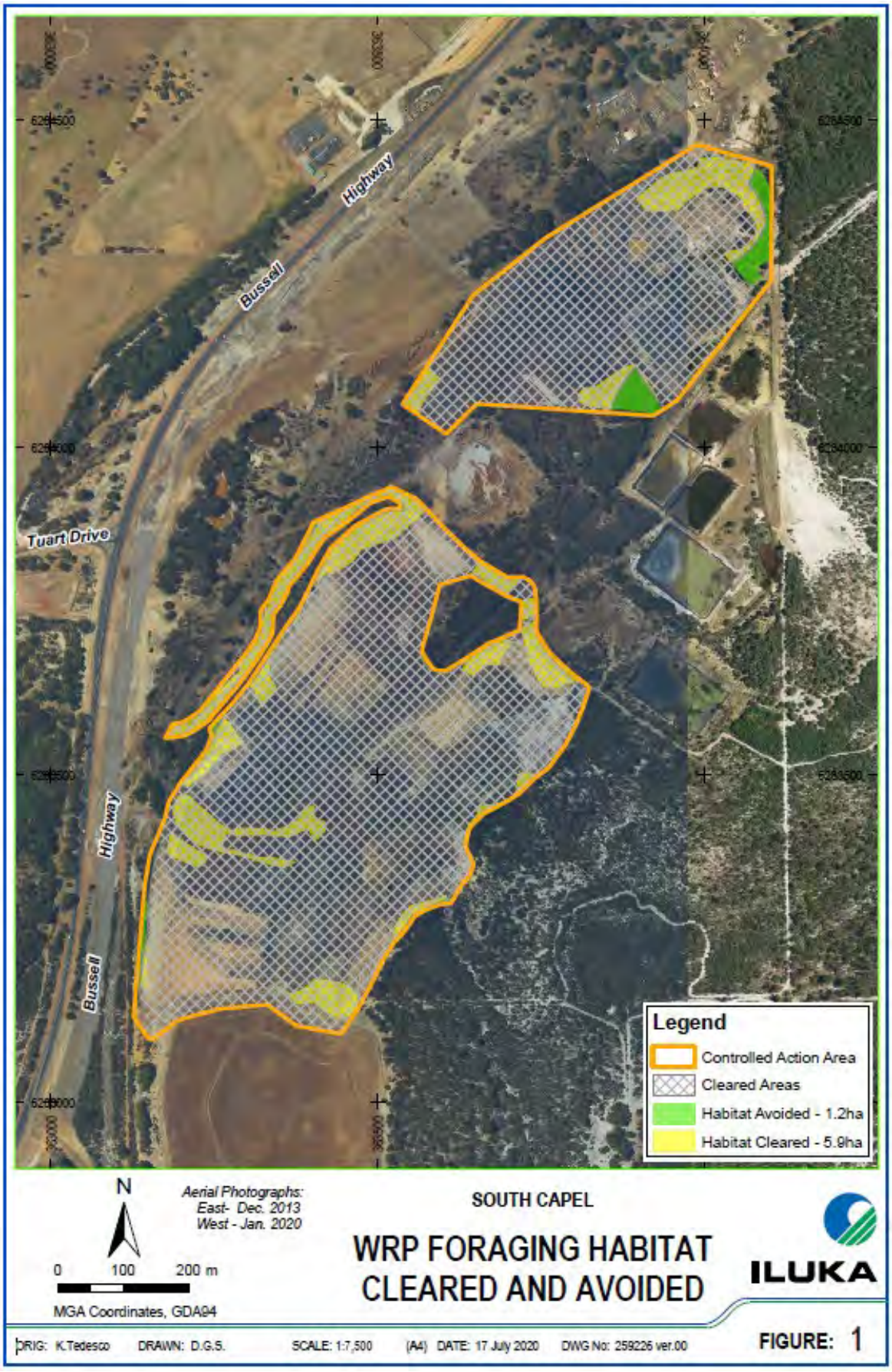

Figure 1 – South Capel WRP Disturbance Area

Figure 2 – Capel Dry Plant WRP Disturbance Area

1.3 Project Status

For the period 23 September 2022 to 22 September 2023, the following works were completed for the Western Ringtail Possum habitat area at South Capel:

- Year 2 monitoring; and
- Weed control works.

RPS Group Australia (RPS) have been appointed to undertake the monitoring program with Year 2 monitoring completed in October 2022. The Revegetation Monitoring Report (RPS, 2023) is provided within Appendix A.

Woody weeds made up of eastern states Acacias (namely *Acacia iteaphylla* and *Acacia longifolia*) were recorded as part of the Year 1 Monitoring Report (RPS, 2022). Woody weed germinants within the planting area were hand pulled, however there were numerous mature plants in the adjacent established vegetation. A woody weed control program targeting these established plants was completed across October and November 2022. Control areas are illustrated within Figure 3.

Additional weed control occurred via spot spray application over Western Ringtail Possum Habitat area in June and July 2023. Application was targeting annual weeds germinating post autumn rainfall (see Figure 4).

Activities planned for 2024 within the Western Ringtail Possum habitat area will be guided by the actions detailed within the RPS monitoring report. Works may include infill planting, weed control or other remedial works as per the Revegetation Management Plan. The next round of monitoring is scheduled to occur in October 2023.

Figure 3 – Woody Weed Control Areas 2022

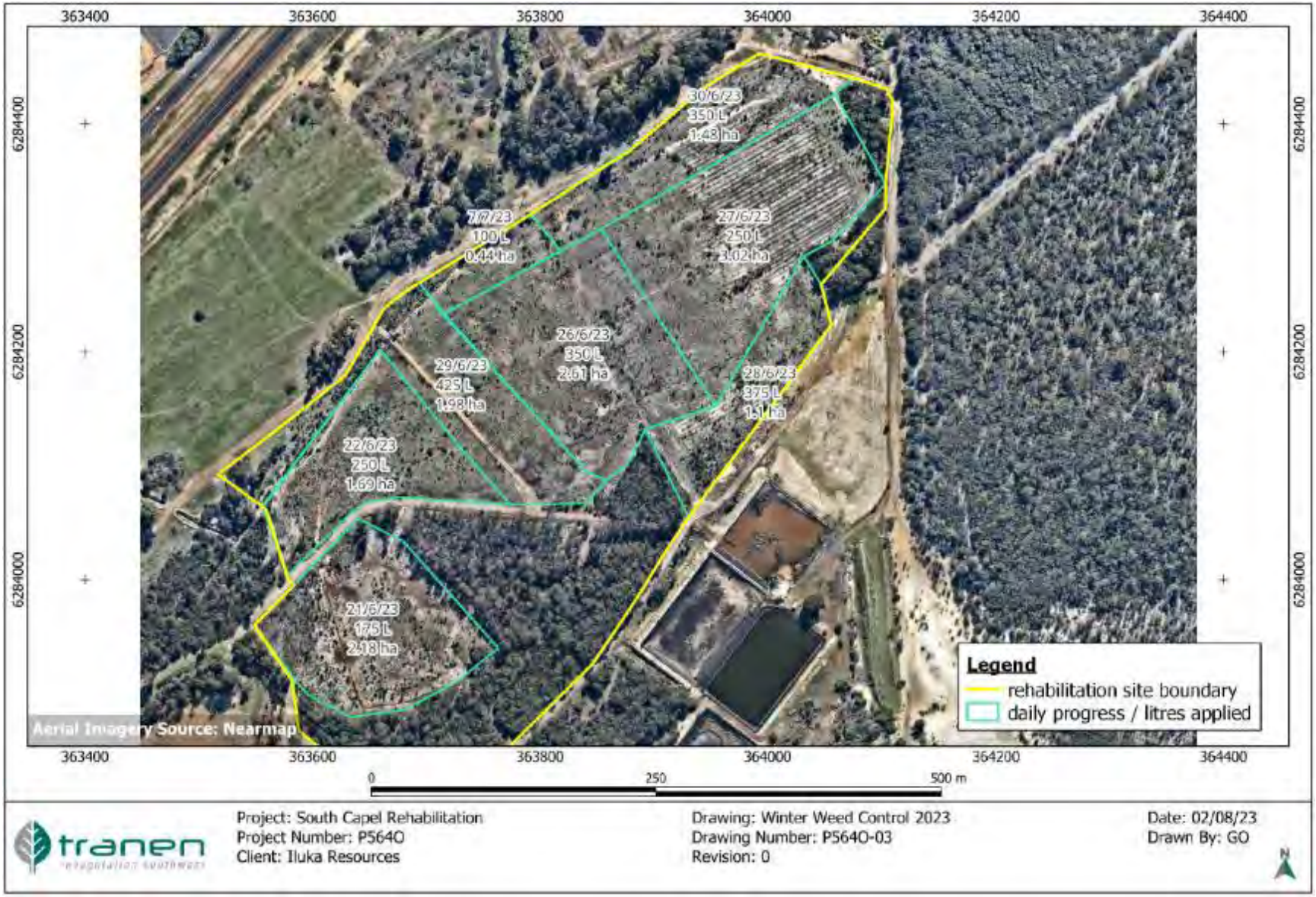

Figure 4 – Annual Weed Control Areas 2023

2 Compliance Audit

Table 1 Compliance with conditions of EPBC 2018/8250 for the 2022 / 2023 reporting period

Condition	Summary of Condition	Compliance	Comments
1	The approval holder must not clear more than 8.44 hectares of Western Ringtail Possum habitat, designated as 'WRP Habitat' on the maps at Appendices B and C, within the project area.	Compliant	A total of 6.68 ha of Western Ringtail Possum habitat was cleared as part of the SCRP as shown in Figures 1 and 2. No further clearing has occurred during the reporting period.
2	For the protection of Western Ringtail Possum, the approval holder must: a. implement the Revegetation Management Plan b. undertake rehabilitation work in accordance with the Revegetation Management Plan c. ensure that a suitably qualified fauna ecologist undertakes preclearance surveying for Western Ringtail Possum prior to all clearing and is present during all clearing. 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 field 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.	Compliant	Revegetation activites were undertaken in accordance with the Revegetation Management Plan. No further clearing has occurred during the reporting period.
3	For the protection of Western Ringtail Possum, the approval holder must engage a suitably qualified ecologist to assess the level of success of rehabilitation and undertake the following tasks: a. By the ten year anniversary of the commencement of planting, assess the success of rehabilitation to determine the extent to which the completion criteria have been met b. Produce and submit to the Department a report evaluating the success of rehabilitation (Rehabilitation Report), within three months of the ten year anniversary of the commencement of planting. If required by the Department, the approval holder must undertake additional ecological assessments and works that contribute to the achievement of completion criteria, as directed by the Department, until the completion criteria have been achieved.	N/A	Revegetation activites were completed in winter of 2021. RPS Group Australia have been appointed to undertake the rehabilitation monitoring program. Year 1 monitoring was completed in October 2021. Year 2 monitoring was completed in October 2022. Year 3 monitoring is scheduled for October 2023.
4	To compensate for the loss of 8.44 hectares of Western Ringtail Possum habitat, the approval holder must, by 31 January 2030, secure the offset site in perpetuity by registering on title a conservation covenant established under section 30B of the *Soil and Land Conservation Act 1945* (WA), or by an alternative approach to legally securing the offset site as agreed in advance by the Department in writing.	N/A	Not yet required: covenant will be sought once the revegetation site is established.

Condition	Summary of Condition	Compliance	Comments
5	The approval holder must notify the Department in writing of the date of commencement of the action within 10 business days after the date of commencement of the action.	Compliant	Action commenced 23/09/2019. The Department was notified by letter, dated 25/09/2019.
6	If the commencement of the action does not occur within 5 years from the date of this approval, then the approval holder must not commence the action without the prior written agreement of the Minister.	N/A	Not applicable: the action commenced within 5 years of the date of approval.
7	The approval holder must maintain accurate and complete compliance records.	Compliant	Records are maintained with Iluka's document control system.
8	If the Department makes a request in writing, the approval holder must provide electronic copies of compliance records to the Department within the timeframe specified in the request.	N/A	Not applicable: no request received during reporting period.
9	The approval holder must: a. submit plans electronically to the Department for approval by the Minister; b. publish each plan on the website within 10 business days of the date the plan is approved by the Minister or of the date a revised action management plan is submitted to the Minister or Department, unless otherwise agreed to in writing by the Minister; c. exclude or redact sensitive ecological data from plans published on the website or provided to a member of the public; and d. keep plans published on the website until the end date of this approval.	N/A	Not applicable: no plans or revised plans developed during reporting period.
10	The approval holder must ensure that any monitoring data (including sensitive ecological data), surveys, maps, and other spatial and metadata required under a plan is prepared in accordance with the Department's Guidelines for biological survey and mapped data (2018) and submitted electronically to the Department in accordance with the requirements of the plan within 3 months of each monitoring event.	N/A	Not applicable: no relevant monitoring data captured during reporting period.

Condition	Summary of Condition	Compliance	Comments
11	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.	Compliant	This report satisfies this condition. Available on the Iluka website at: https://iluka.com/sustainability/transparency-hub Refer to *South Capel Remediation Project EPBC Annual Compliance Report*. There is no information deemed ecologically sensitive in this report.
12	The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify: a. any condition which is or may be in breach; b. a short description of the incident and/or non-compliance; and c. the location (including coordinates), date and time, to the extent that these can be determined, of the incident and/or non-compliance.	N/A	Not applicable: no incidents or non-compliances with conditions or plans occurred during reporting period.
13	The approval holder must provide to the Department the details of any incident or non-compliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying: a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future; b. the potential impacts of the incident or non-compliance; and c. the method and timing of any remedial action that will be undertaken by the approval holder.	N/A	Not applicavle: no incidents or non-compliances with conditions or plans occurred during reporting period.
14	The approval holder must ensure that independent audits of compliance with the conditions are conducted as requested in writing by the Minister.	N/A	Not applicable: no request for independent audits was made by the Minister.

Condition	Summary of Condition	Compliance	Comments
15	For each independent audit, the approval holder must: a. provide the name and qualifications of the independent auditor and the draft audit criteria to the Department; b. only commence the independent audit once the auditor and audit criteria have been approved in writing by the Department; and c. submit an audit report to the Department within the timeframe specified in the approved audit criteria.	N/A	Not applicable: no request for independent audits was made by the Minister.
16	The approval holder must publish the audit report on the website within 10 business days of receiving the Department's approval of the audit report and keep the audit report published on the website until the end date of this approval.	N/A	Not applicable: no request for independent audits was made by the Minister.
17	The approval holder may, at any time, apply to the Minister for a variation to an action management plan approved by the Minister under condition 2, or as subsequently revised in accordance with these conditions, by submitting an application in accordance with the requirements of section 143A of the EPBC Act. If the Minister approves a revised action management plan (RAMP) then, from the date specified, the approval holder must implement the RAMP in place of the previous action management plan	N/A	Not applicable: no variation was requested.
18	The approval holder may choose to revise an action management plan approved by the Minister under condition 2, or as subsequently revised in accordance with these conditions, without submitting it for approval under section 143A of the EPBC Act, if the taking of the action in accordance with the RAMP would not be likely to have a new or increased impact.	N/A	Not applicable: no revision was requested.

Condition	Summary of Condition	Compliance	Comments
19	If the approval holder makes the choice under condition 18 to revise an action management plan without submitting it for approval, the approval holder must: a. notify the Department in writing that the approved action management plan has been revised and provide the Department with: i. an electronic copy of the RAMP; ii. an electronic copy of the RAMP marked up with track changes to show the differences between the approved action management plan and the RAMP; iii. an explanation of the differences between the approved action management plan and the RAMP; iv. the reasons the approval holder considers that taking the action in accordance with the RAMP would not be likely to have a new or increased impact; and v. written notice of the date on which the approval holder will implement the RAMP (RAMP implementation date), being at least 60 business days after the date of providing notice of the revision of the action management plan, or a date agreed to in writing with the Department. b. subject to condition 21, implement the RAMP from the RAMP implementation date.	N/A	Not applicable: no revision was requested.
20	The approval holder may revoke their choice to implement a RAMP under condition 18 at any time by giving written notice to the Department. If the approval holder revokes the choice under condition 18, the approval holder must implement the action management plan in force immediately prior to the revision undertaken under condition 18.	N/A	Not applicable: no revision was requested.
21	If the Minister gives a notice to the approval holder that the Minister is satisfied that the taking of the action in accordance with the RAMP would be likely to have a new or increased impact, then: a. condition 18 does not apply, or ceases to apply, in relation to the RAMP; and b. the approval holder must implement the action management plan specified by the Minister in the notice.	N/A	Not applicable: no revision was requested.
22	At the time of giving the notice under condition 21, the Minister may also notify that for a specified period of time, condition 18 does not apply for one or more specified action management plans.	N/A	Not applicable: no revision was requested.
23	Within 10 days after the completion of the action, the approval holder must notify the Department in writing and provide completion data.	N/A	Not yet required: the action is not yet complete.

3 Revegetation Management Plan Compliance Review

3.1 Status of Revegetation

Remediation activities were completed in June 2020 and revegetation activities were completed in Winter of 2021. To date, revegetation and monitoring activities have been completed in line with the timeline of revegetation works detailed in Table 2.

Monitoring has not yet indicated the need for infill planting.

Table 2 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							
Planting								X			X		*		*		*		*
Monitoring									X		X								

X = Completed; * If required

Plate 1 illustrates the development within one quadrat over a 24 month period. Plate 2 provides a broader view of plant establishment across the site.

A

B

C

Plate 1 – WRP Offset Area Monitoring Quadrat
A: October 2021; B: October 2022; C: September 2023

A

B

Plate 2 – Plant Establishment

A: October 2022 B: September 2023

4 References

Iluka Resources Limited (2019). South Capel Remediation Project Revegetation Management Plan. EPBC 2018/8250, July 2019.

RPS Australia (2023). Revegetation Monitoring Report, South Capel Remediation Project. May 2023.

Appendix A: Year 2 Revegetation Monitoring Report

REVEGETATION MONITORING REPORT

South Capel Remediation Project, spring survey Year 2

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rpsgroup.com

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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 SCRP Revegetation Management Plan (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 SCRP approvals:

Table 1: SCRP Revegetation/Offset Management Plan approvals

Act	Approval/ permit	Assessing agency	Condition
Environment Protection and Biodiversity Conservation Act 1999 (Cth).	EPBC 2018/8250	Dept of Agriculture, Water and Environment.	Condition 2: "For the protection of western ringtail possum, the approval holder must: a. Implement the Revegetation Management Plan b. Undertake rehabilitation work in accordance with the Revegetation Management Plan c. Ensure that a suitably qualified fauna ecologist undertakes preclearance surveying for western ringtail possum prior to all clearing and is present during all clearing. If western ringtail possums are present in the area to be cleared, then translocation is required, and all translocations 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 *Environmental Protection Act 1986* (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 *Contaminated Sites Act 2003* 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*', including but not limited to the following actions:"
Part V of the *Environmental Protection Act 1986* (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 shallow groundwater.

An extension to the purpose-designed by-product storage facility at South Capel, which resulted in the clearing of vegetation that provided habitat for the critically endangered western ringtail possum (*Pseudocherirus occidentalis*) (WRP), has been completed as part of the remediation work. Approximately 60,000 m^3 of historic by-product previously stored at CDP and approximately 407,000 m^3 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 SCRP 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 SCRP, 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 (SCRP 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) that 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 SCRP RMP (Table 2), RPS was engaged to undertake the ‘Spring Survey Year 1’ after vegetation establishment and associated reporting in spring 2021 (Revegetation Monitoring Report, South Capel Remediation Project, 2 May 2022, RPS AAP Consulting Pty Ltd). RPS was again engaged to undertake the ‘Spring Survey Year 2’ after vegetation establishment monitoring, and associated reporting in spring 2022 (this report).

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: • Five species that provide foraging value • Five species that provide canopy value • Five species that provide understorey value (Note that one species can provide more than one value)	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^2 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%[1] 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.

[1] "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 SCRMP 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
Acacia cyclops	75	1,095	Foraging, ground protection, canopy
Acacia pulchella	150	2,190	Ground protection
Acacia saligna	75	1,095	Foraging, ground protection, canopy
Agonis flexuosa	150	2,190	Foraging, canopy
Allocasuarina fraseriana	75	1,095	Foraging, canopy
Anigozanthos flavidus	75	1,095	Ground protection
Calothamnus quadrifidus	75	1,095	Ground protection
Corymbia calophylla	200	2,920	Foraging, canopy
Eucalyptus rudis	200	2,920	Foraging, canopy
Hardenbergia comptoniana	100	1,460	Foraging, ground protection
Kunzea glabrescens	75	1,095	Foraging, ground protection, canopy
Melaleuca preissiana	75	1,095	Foraging, ground protection, canopy
Paraserianthes lophantha	150	2,190	Foraging, ground protection, canopy
Patersonia occidentalis	35	511	Ground protection
Spyridium globulosum	150	2,190	Foraging, ground protection, canopy
Viminaria juncea	75	1,095	Ground protection
Total	**1,735**	**25,331**	

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 SCRP 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 SCRP RMP at the following intervals;

- Year 1 first spring following planting. Completed spring 2021
- Year 2 after planting (this report)
- Year 3 after planting
- Year 5 after planting
- Year 7 after planting
- Year 10 after planting.

At Years 5, 7 and 10 a 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 2 AFTER PLANTING)

The site was surveyed on 4 October 2022 by Gary McMahon (BSc, M Mgmt, PG Dip Bushfire Protection); Kelly Paterson (BSc Hons. (Nat Rs Mgmt); Danae Plowman (BSc Pst GradDip. Engy and Env); Hayley Drake (BSc Cons. Wildlife Bio and Mol.Bio); and Dani Cuthbert (Dip Bus and Dip TM) from Ecosystem Solutions. Kelly Paterson holds a Flora Taking (Biological Assessment) Licence (FB62000182).

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 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, 2022) 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
- 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 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 4 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 2022 drone orthomosaic. The aerial imagery and photo from the north-west corner for each quadrat are presented in Appendix B and C respectively.

Shading within a table denotes that the species is not part of the initial planting and is therefore 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, and some are part of the original species list. 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. While it is beyond the expertise of the botanists conducting the monitoring to assess whether the erosion present needs management, it can be stated that no major ruts, gullies or deep erosion were observed.

A comparison between the first- and second-year's post-planting is included in Table 6 below.

5.1 Quadrat 1

Quadrat 1 was surveyed on 4 October 2022. Species turnover from the 2021 survey include the loss of *Acacia pulchella* and *Agonis flexuosa* from the quadrat. *Acacia saligna* and *Kunzea glabrescens* were additions to the native species recorded, indicating the presence of a soil seed bank.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
4 species	31 stems/100 m^2	5%	40%	30%

Quadrat 1 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia saligna	20	✓	✓	✓
Calothamnus quadrifidus	1			✓
Eucalyptus rudis	2	✓	✓	
Kunzea glabrescens	8	✓	✓	✓
Number of species		3	3	3
Number of stems		30	30	29
Number of stems/hectare		3000	3000	2900
Weed species		**Mulch cover**	**Erosion**	
10		75%	Yes – pooling of mulch	

5.2 Quadrat 2

Quadrat 2 was surveyed on 4 October 2022. Species turnover from the 2021 survey include the loss of *Spyridium globulosum* from the quadrat. *Anigozanthos flavidus, Allocasuarina fraseriana and Acacia cyclops* were additions to the native species recorded, indicating the presence of a soil seed bank.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
13 species	270 stems/100 m^2	25%	40%	5%

Quadrat 2 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia saligna	57	✓	✓	✓
Acacia cyclops	1	✓	✓	✓
Agonis flexuosa	1	✓	✓	
Allocasuarina fraseriana	2	✓	✓	
Anigozanthos flavidus	8			✓
Billardiera fusiformis	1	?	?	?
Calothamnus quadrifidus	41			✓
Callistachys lanceolata	4	?	?	?
Eucalyptus rudis	102	✓	✓	
Gompholobium tomentosum	1	?	?	?
Jacksonia sp.	1	?	?	?
Kunzea glabrescens	48	✓	✓	✓
Paraserianthes lophantha	3	✓	✓	✓
Number of species		7	7	6
Number of stems		214	214	158
Number of stems/hectare		21,400	21,400	15,800
Weed species		**Mulch cover**	**Erosion**	
14		85%	Yes – pooling of mulch	

5.3 Quadrat 3

Quadrat 3 was surveyed on 4 October 2022. *Acacia saligna* and *Kunzea glabrescens* were additions to the native species recorded, indicating the presence of a soil seed bank.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
5 species	17 stems/100 m^2	10%	40%	25%

Quadrat 3 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia saligna	12	✓	✓	✓
Anigozanthos flavidus	1			✓
Eucalyptus rudis	1	✓	✓	
Kunzea glabrescens	1	✓	✓	✓
Melaleuca preissiana	2	✓	✓	✓
Number of species		4	4	4
Number of stems		16	16	16
Number of stems/hectare		1600	1600	1600
Weed species		**Mulch cover**	**Erosion**	
16		40%	Yes – pooling of mulch	

5.4 Quadrat 4

Quadrat 4 was surveyed on 4 October 2022. Species turnover from the 2021 survey includes the loss of *Corymbia calophylla* from the quadrat. *Acacia cyclops* and *Allocasuarina fraseriana* were additions to the native species recorded, indicating the presence of a soil seed bank.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
9 species	260 stems/100 m^2	10%	60%	20%

Quadrat 4 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia cyclops	6	✓	✓	✓
Acacia saligna	*5*	✓	✓	✓
Agonis flexuosa	4	✓	✓	
Allocasuarina fraseriana.	2	✓	✓	
Calothamnus quadrifidus	55			✓
Billardiera fusiformis	1	?	?	?
Eucalyptus rudis	1	✓	✓	
Kunzea glabrescens	183	✓	✓	✓
Paraserianthes lophantha	2	✓	✓	✓
Number of species		7	7	5
Number of stems		203	203	251
Number of stems/hectare		20,300	20,300	25,100
Weed species		**Mulch cover**	**Erosion**	
16		30%	Yes – pooling of mulch	

5.5 Quadrat 5

Quadrat 5 was surveyed on 4 October 2022. *Allocasuarina fraseriana* and *Calothamnus quadrifidus* were additions to the native species recorded, indicating the presence of a soil seed bank. The 2021 monitoring event tentatively identified 100 seedlings as *Rytidosperma* in Quadrat 5. No plants were identified as *Rytidosperma* in the current survey, nor is there a large increase in numbers of identified species, likely indicating a lack of survival of the tentatively identified individuals.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
7 species	44 stems/100 m^2	2%	70%	10%

Quadrat 5 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia saligna	2	✓	✓	✓
Agonis flexuosa	2	✓	✓	
Allocasuarina fraseriana	1	✓	✓	
Calothamnus quadrifidus	8			✓
Corymbia calophylla	6	✓	✓	
Eucalyptus rudis	5	✓	✓	
Kunzea glabrescens	20	✓	✓	✓
Number of species		6	6	3
Number of stems		36	36	30
Number of stems/hectare		3,600	3,600	3,000
Weed species		**Mulch cover**	**Erosion**	
10		10%	Yes – pooling of mulch	

5.6 Quadrat 6

Quadrat 6 was surveyed on 4 October 2022. Species turnover from the 2021 survey includes the loss of *Paraserianthes lophantha* from the quadrat. *Agonis flexuosa* and *Viminaria juncea* were additions to the native species recorded, indicating the presence of a soil seed bank.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
10 species	22 stems/100 m^2	10%	30%	10%

Quadrat 6 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia saligna	6	✓	✓	✓
Agonis flexuosa	1	✓	✓	
Anigozanthos flavidus	1			✓
Calothamnus quadrifidus	4			✓
Corymbia calophylla	2	✓	✓	
Eucalyptus rudis	2	✓	✓	
Kennedia prostrata	1	?	?	?
Kunzea glabrescens	2	✓	✓	✓
Melaleuca preissiana	2	✓	✓	✓
Viminaria juncea	1			✓
Number of species		6	6	7
Number of stems		15	15	17
Number of stems/hectare		1,500	1,500	1,700

Weed species	Mulch cover	Erosion
13	50%	Yes + pooling of mulch

5.7 Quadrat 7

Quadrat 7 was surveyed on 4 October 2022. *Acacia saligna* and *Kunzea glabrescens* were additions to the native species recorded, indicating the presence of a soil seed bank.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
13 species	72 stems/100 m^2	5%	5%	5%

Quadrat 7 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia pulchella	1			✓
Acacia saligna	1	✓	✓	✓
Agonis flexuosa	2	✓	✓	
Allocasuarina fraseriana	6	✓	✓	
Anigozanthos flavidus	6			✓
Calothamnus quadrifidus	10			✓
Corymbia calophylla	3	✓	✓	
Eucalyptus rudis	1	✓	✓	
Hardenbergia comptoniana	1		✓	✓
Jacksonia sp.	2	?	?	?
Kunzea glabrescens	37	✓	✓	✓

Species	Number	Canopy value	Forage value	Ground protection value
Melaleuca preissiana	1	✓	✓	✓
Spyridium globulosum	1	✓	✓	✓
Number of species		8	9	8
Number of stems		52	53	58
Number of stems/hectare		5,200	5,300	5,800
Weed species		**Mulch cover**	**Erosion**	
14		90%	Yes – pooling of mulch	

5.8 Quadrat 8

Quadrat 8 was surveyed on 4 October 2022. Species turnover from the 2021 survey includes the loss of *Acacia pulchella* and *Kunzea glabrescens* from the quadrat. *Melaleuca preissiana* was an addition to the native species recorded, indicating the presence of a soil seed bank.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
9 species	20 stems/100 m^2	2%	30%	80%

Quadrat 8 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia sp.	1	?	?	?
Acacia saligna	1	✓	✓	✓
Agonis flexuosa	1	✓	✓	
Billardiera fusiformis	3	?	?	?
Corymbia calophylla	4	✓	✓	
Drosera sp	1	?	?	?
Eucalyptus rudis	6	✓	✓	
Kunzea glabrescens	1	✓	✓	✓
Melaleuca preissiana	3	✓	✓	✓
Number of species		6	6	3
Number of stems		16	16	5
Number of stems/hectare		1,600	1,600	500
Weed species		**Mulch cover**	**Erosion**	
14		30%	Yes – pooling of mulch	

5.9 Quadrat 9

Quadrat 9 was surveyed on 4 October 2022. Species turnover from the 2021 survey includes the loss of *Hardenbergia comptoniana* from the quadrat. *Acacia cyclops, Acacia saligna, Calothamnus quadrifidus, Kunzea glabrescens, Melaleuca preissiana* and *Paraserianthes lophantha* were additions to the native species recorded, indicating the presence of a soil seed bank.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
19 species	387 stems/100 m^2	35%	5%	20%

Quadrat 9 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia cyclops	3	✓	✓	✓
Acacia pulchella	1			✓
Acacia saligna	5	✓	✓	✓
Agonis flexuosa	4	✓	✓	
Allocasuarina fraseriana	58	✓	✓	
Anigozanthos flavidus	38			✓
Astartea sp. (?)	4	?	?	?
Billardiera fusiformis	1	?	?	?
Calothamnus quadrifidus	75			✓
Callistachys lanceolata	3			
Corymbia calophylla	4	✓	✓	
Eucalyptus rudis	12	✓	✓	
Hypocalymma angustifolium	6	?	?	?
Jacksonia sp.	1	?	?	?
Kunzea glabrescens	160	✓	✓	✓
Melaleauca preissiana	7	✓	✓	✓
Muehlenbeckia adpressa	1	?	?	?
Paraserianthes lophantha	2	✓	✓	✓
Spyridium globulosum	3	✓	✓	✓
Number of species		10	10	9
Number of stems		258	258	294
Number of stems/hectare		258,000	258,000	294,000
Weed species		**Mulch cover**	**Erosion**	
16		80%	Nil	

5.10 Quadrat 10

Quadrat 10 was surveyed on 4 October 2022. Species turnover from the 2021 survey includes the loss of *Spyridium globulosum* from the quadrat. *Acacia pulchella, Allocasuarina fraseriana, Anigozanthos flavidus, Calothamnus quadrifidus* and *Melaleuca preissiana* were additions to the native species recorded, indicating the presence of a soil seed bank.

Species richness	Stem density	Canopy cover	Weed cover (%)	Bare earth (%)
11 species	172 stems/100 m^2	5%	1%	50%

Quadrat 10 – summary

Species	Number	Canopy value	Forage value	Ground protection value
Acacia saligna	10	✓	✓	✓
Acacia pulchella	1			✓
Agonis flexuosa	3	✓	✓	
Allocasuarina fraseriana	34	✓	✓	
Anigozanthos flavidus	11			✓
Calothamnus quadrifidus	13			✓
Corymbia calophylla	5	✓	✓	

Species	Number	Canopy value	Forage value	Ground protection value
Eucalyptus rudis	6	✓	✓	
Hardenbergia comptoniana	1		✓	✓
Kunzea glabrescens	87	✓	✓	✓
Melaleuca preissiana	1	✓	✓	✓
Number of species		7	8	7
Number of stems		146	147	124
Number of stems/hectare		14,600	14,700	12,400

Weed species	Mulch cover	Erosion
11	50%	Yes- pooling of mulch

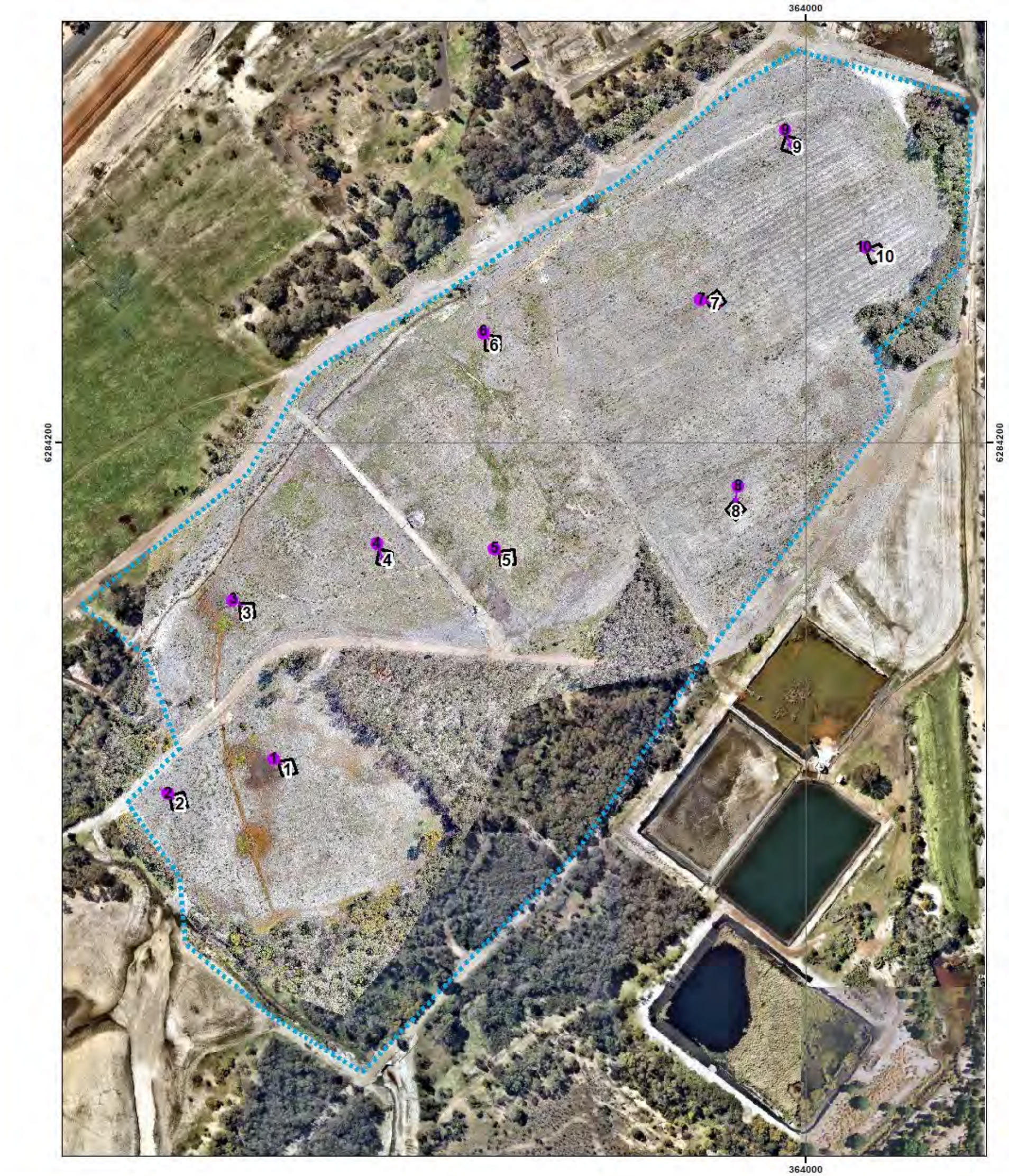

Figure 2: Site photo points and quadrats

6 NATURALLY RECRUITED SPECIES

A total of ten native taxa not included in the revegetation species list were observed germinating from seed within the quadrats. Many of these were too small to accurately identify the species, and it is possible that a later monitoring event will decide that some taxa are from the species list, in particular the *Acacia* 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
Acacia sp.
Astartea sp.
Billardiera fusiformis
Callistachys lanceolata
Drosera sp.
Gompholobium tomentosum
Hypocalymma angustifolium
Jacksonia sp.
Juncus sp.
Kennedia prostrata

In addition, there was a large amount of natural recruitment of species that were included in the species list, predominantly *Allocasuarina fraseriana, Kunzea glabrescens, Calothamnus quadrifidus* and *Eucalyptus rudis.*

7 WEED SPECIES

A total of 31 weed species were observed within the quadrats. None of these species are known Declared plants (DPIRD, 2022) or Weeds of National Significance (WoNS) (Weeds Australia, 2022), however whilst moving throughout the revegetation area **Gomphocarpus fruticosus* (narrow leaf cotton bush) was observed within 20 m of Quadrat 4. This is a Declared Plant (DPIRD, 2022) and potentially a Weed of National Significance (Weeds Australia, 2022). *Cucumis myriocarpus* (Paddy melon) was also observed within the revegetation area.

Table 5 Weed species identified in quadrats

Species		
Acacia iteaphylla	*Erodium* sp.	*Lysimachia arvensis*
Acacia longifolia	*Hypochaeris* sp.	*Lythrum hyssopifolia*
Arctotheca calendula	*Isolepis prolifera*	*Oxalis* sp.
Callistemon sp.	*Juncus microcephalus*	*Phalaris* sp.
Centrolepis sp.	*Juncus* sp.	*Pseudognaphalium luteoalbum*
Conzya sp.	*Lolium* sp.	*Romulea rosea*
Cotula coronopifolia	*Lotus angustissimus*	*Solanum* sp.
Cynodon dactylon	*Lotus subbiflorus*	*Sonchus* sp.
Cyperaceae sp.	*Lotus angustissimus*	*Trifolium* sp.
Daisy sp.	*Lotus subbiflorus*	*Zantedeschia aethiopica*
Ehrharta longiflora	*Lupinus* sp.	

There were eight additional weed species observed within the quadrats during the second-year monitoring event compared to the first year, these are shaded in Table 5 above.

There were seven weed species observed within the quadrats during the first-year monitoring event that were not observed within any of the quadrats in the second-year monitoring event, **Avena* sp.*, *Briza maxima, *Briza minor, *Elytrigia repens, *Monopsis debilis, *Cyperus tenellus* and **Vulpia* sp. This may in part be due to the earlier survey time, with some annual species not yet having emerged. However, some of these species were noted to be growing elsewhere on the site (e.g. *Monopsis debilis*), so this does not explain their absence from the quadrats. As previously noted, 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. Alternatively, the presence of an annual taxon one year does not automatically presage its presence in following years.

Iluka commissioned spot spraying activities across the site in May and June 2022, as per Completion Criterion CC02 (Table 2).

8 MONITORING EVENT COMPARISION

A comparison for each quadrat between sampling years is provided in Table 6 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 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 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Acacia cyclops				✓				✓										✓		
Acacia pulchella	✓												✓	✓	✓		✓	✓		✓
Acacia saligna		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓
Agonis flexuosa	✓		✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Allocasuarina fraseriana				✓				✓		✓			✓	✓				✓		✓
Anigozanthos flavidus				✓	✓	✓					✓	✓	✓	✓			✓	✓		✓
Calothamnus quadrifidus	✓	✓	✓	✓			✓	✓		✓	✓	✓	✓	✓				✓		✓
Corymbia calophylla							✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eucalyptus rudis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hardenbergia comptoniana													✓	✓			✓		✓	✓
Kunzea glabrescens		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓	✓
Melaleuca preissiana											✓	✓	✓	✓		✓		✓		✓
Paraserianthes lophantha			✓	✓		✓	✓	✓			✓				✓	✓		✓		
Patersonia occidentalis																				
Spyridium globulosum			✓										✓	✓			✓	✓	✓	
Viminaria juncea												✓								
Number of revegetation list species	4	4	7	9	2	5	7	8	5	7	8	9	10	12	7	6	7	13	7	11
Number of native species	5	4	14	13	3	5	14	9	8	7	9	10	10	13	10	9	13	19	10	11
Number of native species stems	7	31	115	270	33	17	78	260	22	44	19	22	31	72	22	20	29	387	37	172
Canopy cover percentage	0.5%	5%	15%	25%	0.5%	10%	0.5%	10%	1%	2%	1%	10%	1%	5%	2%	2%	2%	35%	2%	5%
Number of weed species	17	10	19	14	11	16	10	16	9	16	19	13	19	14	11	14	12	16	7	11
Weed cover percentage	25%	40%	20%	40%	40%	40%	4%	60%	10%	70%	5%	30%	1%	5%	20%	30%	1%	5%	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	40% x	40% x	40% x	60% x	70% x	30% x	5% ✓	30% x	5% ✓	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: • Five species that provide foraging value • Five species that provide canopy value • Five species that provide ground protection value	✓ **Eleven species have been selected that provide foraging value.** All the 11 species selected for foraging value were present within quadrats, being *Acacia cyclops, Acacia saligna, Agonis flexuosa, Allocasuarina fraseriana, Corymbia calophylla, Eucalyptus rudis, Hardenbergia comptoniana, Kunzea glabrescens, Melaleuca preissiana, Paraserianthes lophantha* and *Spyridium globulosum.* ✓ **Ten species have been selected that provide canopy value.** All the ten species selected to provide canopy value were present within quadrats, being *Acacia cyclops, Acacia saligna, Agonis flexuosa, Allocasuarina fraseriana, Corymbia calophylla, Eucalyptus rudis, Kunzea glabrescens, Melaleuca preissiana, Paraserianthes lophantha* and *Spyridium globulosum.* ✓ **Twelve species have been selected that provide ground protection value.** Eleven of the 12 species selected to provide ground protection were present within the quadrats, being *Acacia cyclops , Acacia pulchella, Acacia saligna, Anigozanthos flavidus, Calothamnus quadrifidus, Hardenbergia comptoniana, Kunzea glabrescens, Melaleuca preissiana, Paraserianthes lophantha, Spyridium globulosum and Viminaria juncea.* ✓ Fifteen species have been recorded in quadrats from the 16 planted. *Patersonia occidentalis* was not recorded within a quadrat however it was observed within the revegetation area.									
CC04: A density of 800 stems per hectare of species contributing to canopy will be established at completion (equal to 8 stems per quadrat)	30 stems ✓	214 stems ✓	16 stems ✓	203 stems ✓	36 stems ✓	15 stems ✓	52 stems ✓	16 stems ✓	258 stems ✓	146 stems ✓
CC05: No areas greater than 250 m^2 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.	5% U	25% U	10% U	10% U	2% U	10% U	5% U	2% U	35% U	5% 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 assessable

CC01 and CC02 – weeds

A total of 31 introduced species were recorded across the quadrats. None of these are Declared plants or WoNS requiring immediate treatment. However, **Gomphocarpus fruticosus* (narrow leaf cotton bush) was observed in the revegetation area, within 20 m of Quadrat 4, this is a Declared Plant and was nominated for assessment as a Weed of National Significance, with the outcome being that it is a weed of potential national significance, with immediate treatment required. *Cucumis myriocarpus* (paddy melon) was also 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.

Weed cover in Quadrats 1, 2, 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 initial survey the weed cover has increased across all quadrats, except for Quadrat 10, which remained at 1% cover. This increase of weed cover was to be 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 has been an increase in weed cover since last year, as the perennial native species grow and become established there will be a certain amount of out-competition of the annual weed species, which in conjunction with weed control should lead to a reduction in weed cover.

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. This may also be said for quadrats 1 and 3, which have low numbers of species and individuals. The questions arising from these observations may be answered by a walk-over of the site to see if they are repeated elsewhere.

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 five species of each value and the total number of species is being met. 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). 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 all 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^2 without a developing understorey

CC05 states that there will be “No areas greater than 250 m^2 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^2 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^2) 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. This criterion is possibly better addressed by modifying the monitoring program and installing 50 metre by 50 metre quadrats (2500 m^2) as are used during Pilbara and Kimberley botanical surveys. These will capture a greater sample area and be better placed to detect gaps in the species composition, although this is a criterion that will be better monitored when plants have grown to a greater size. It is not being suggested that these should also be monitored in the same manner as the smaller quadrats. 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 2% to 35%, averaging out to a canopy cover of 11%, during the second-year monitoring event. A low percentage is to be expected given that the monitoring occurred less than 18 months following the planting of the revegetation species, and this statistic is not meaningful in the context of progress towards completion. 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 has commenced across the revegetation site. It is recommended that weed control is conducted in May and October of 2023. The earlier control will remove early germinating species such as grasses while the later control will target slower dicotyledonous species before they produce seed.
- Immediate weed control is recommended to target the **Gomphocarpus fruitcosus* (narrow leaf cotton bush). Recommended treatment is to hand pull small plants, ensuring removal of as much root material as possible and bagging for removal to prevent the spreading of seeds. RPS will inform Iluka immediately if this species is noted anywhere in the revegetation site.
- Planting has been successful in establishing five species from each WRP value and the criterion to have 15 species established has been met.
- The lower number of individuals in quadrats 1 and 3, 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 2022 monitoring.
- 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 refers 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.
- Canopy cover cannot be expected to be high so soon after planting. Infill planting will only be conducted from five years after planting, the time to assess the progress against this criterion is around the four-year mark

10 REFERENCES

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Weeds Australia (2022) Weed profiles. https://weeds.org.au/weeds-profiles/. Accessed October 2022.

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Appendix A
Quadrat data sheets

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	Project number: EEL2168.001
Quadrat No.: 1	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** HD & KL
Reference photo No. (from NW quadrat corner): Appendix C	**m E:** 115.5309
Datum: GDA94 / **Zone:** 50	**m S:** 33.57515
Quadrat monitoring parameters	
Weed cover (%): 40%	**Declared weeds (present / absent):** Absent
Revegetation species canopy cover (%): 5%	**Size of bare areas (%):** 30%

Field observations

Vegetation condition (Keighery 1994):

~~Pristine~~ ~~Excellent~~ ~~Very Good~~ ~~Good~~ ~~Degraded~~ **Completely Degraded**

Mulch cover (%): 75%

Disturbance level:

~~Low~~ ~~Medium~~ **High**

Erosion evidence (e.g. overland flows rills): Evidence of pooling

Dieback evidence (e.g. localised plant senescence): No evidence

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Kunzea	*glabrescens*	8
Acacia	*saligna*	20
Eucalyptus	*rudis*	2
Calothamnus	*quadrifidus*	1

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

Weed species –

- Lotus x2 spp.
- Cape weed
- *Juncus* sp.
- *Centrolepis* sp.
- Couch
- Clover
- *Conyza* /Fleabane
- *Isolepis prolifera*
- *Lythrum hyssopifolia*

[1] Species richness (total no. of revegetation species) and Stem density (total no. of stems) to be derived from this table

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	Project number: EEL2168.001
Quadrat No.: 2	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** HD & KL
Reference photo No. (from NW quadrat corner): Appendix C	**m E:** 115.5301
Datum: GDA94 / **Zone:** 50	**m S:** 33.57533
Quadrat monitoring parameters	
Weed cover (%): 40%	**Declared weeds (present / absent):** Absent
Revegetation species canopy cover (%): 25%	**Size of bare areas (%):** 5%
Field observations	
Vegetation condition (Keighery 1994):	
~~Pristine~~ ~~Excellent~~ ~~Very Good~~ ~~Good~~ **Degraded** ~~Completely Degraded~~	
Mulch cover (%): 85%	
Disturbance level:	
~~Low~~ ~~Medium~~ **High**	
Erosion evidence (e.g. overland flows rills): Minor evidence of pooling	
Dieback evidence (e.g. localised plant senescence): No evidence	

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Acacia	*saligna*	57
Callistachys	*lanceolata*	4
Eucalyptus	*rudis*	10
Calothamnus	*quadrifidus*	41
Kunzea	*glabrescens*	48
Jacksonia	sp.	1
Paraserianthes	*lophantha*	3
Allocasuarina	sp.	2
Anigozanthos	*manglesii*	8
Acacia	*cyclops*	1
Gompholobium	*tomentosum*	1
Agonis	*flexuosa*	1
Billardiera	*fusiformis*	1

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

Weed species –

- Lotus sp.
- Cape weed
- Couch
- Pimpernel
- *Hypochaeris* sp.
- *Romulea rosea*
- *Pseudo* sp.
- *Juncus* sp.
- *Conyza*/Fleabane
- Clover
- *Erodium* sp.
- *Oxalis* sp.
- *Lythrum hyssopifolia*

[1] Species richness (total no. of revegetation species) and Stem density (total no. of stems) to be derived from this table

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	Project number: EEL2168.001
Quadrat No.: 3	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** HD & KL
Reference photo No. (from NW quadrat corner): Appendix C	**m E:** 115.5306
Datum: GDA94 / **Zone:** 50	**m S:** 33.57422
Quadrat monitoring parameters	
Weed cover (%): 40%	**Declared weeds (present / absent):** Absent
Revegetation species canopy cover (%): 10%	**Size of bare areas (%):** 25%

Field observations

Vegetation condition (Keighery 1994):

~~Pristine~~	~~Excellent~~	~~Very Good~~	~~Good~~	~~Degraded~~	**Completely Degraded**

Mulch cover (%): 40%

Disturbance level:

~~Low~~	~~Medium~~	**High**

Erosion evidence (e.g. overland flows rills): Evidence of pooling

Dieback evidence (e.g. localised plant senescence): No evidence

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Acacia	*saligna*	12
Kunzea	*glabrescens*	1
Anigozanthos	*manglesii*	1
Eucalyptus	*rudis*	1
Melaleuca	sp.	2

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

Weed species –

- Lotus sp.
- *Juncus* spp. X2
- *Isolepis prolifera*
- Veldt grass
- *Centrolepis* sp.
- Grass spp. X3
- *Lythrum hyssopifolia*
- Daisy sp.?
- *Cotula* sp.
- Pimpernel blue
- Cape weed
- *Juncus microcephalus*
- *Cotula coronopifolia*
- *Sonchus* sp.

[1] Species richness (total no. of revegetation species) and Stem density (total no. of stems) to be derived from this table

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	Project number: EEL2168.001
Quadrat No.: 4	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** HD & KL
Reference photo No. (from NW quadrat corner): Appendix C	**m E:** 115.5316
Datum: GDA94 / **Zone:** 50	**m S:** 33.57387
Quadrat monitoring parameters	
Weed cover (%): 60%	**Declared weeds (present / absent):** Absent N.B Cotton bush (*Gomphocarpus fruticosus)* within 20m of quadrat
Revegetation species canopy cover (%): 10%	**Size of bare areas (%):** 15-20%

Field observations

Vegetation condition (Keighery 1994):

~~Pristine~~ ~~Excellent~~ ~~Very Good~~ ~~Good~~ **Degraded** ~~Completely Degraded~~

Mulch cover (%): 30%

Disturbance level:

~~Low~~ ~~Medium~~ **High**

Erosion evidence (e.g. overland flows rills): Evidence of pooling

Dieback evidence (e.g. localised plant senescence): No evidence

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Agonis	*flexuosa*	*4*
Kunzea	*glabrescens*	*183*
Acacia	*cyclops*	*6*
Calothamnus	*sp.*	*55*
Paraserianthes	*lophantha*	*2*
Eucalyptus	*rudis*	*1*
Allocasuarina	*sp.*	*2*
Acacia	*saligna*	*5*
Billardiera	*fusiformis*	*1*

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

Weed species –

- Lupin Blue
- *Callistemon* sp.
- Cape weed
- *Isolepis prolifera*
- *Juncus microcephalus* (Dead)
- Fleabane
- *Erodium* sp.
- Vedlt grass
- Lotus sp. 1
- *Sonchus* sp.
- *Juncus* sp. (N.B. May be native but mature specimens required for confident identification)
- *Lythrum hyssopifolia*
- Clover
- Rye grass
- Anogalis
- Lotus sp. 2

[1] Species richness (total no. of revegetation species) and Stem density (total no. of stems) to be derived from this table

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	Project number: EEL2168.001
Quadrat No.: 5	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** HD & KL
Reference photo No. (from NW quadrat corner): Appendix C	**m E:** 115.534
Datum: GDA94 / **Zone:** 50	**m S:** 33.57237
Quadrat monitoring parameters	
Weed cover (%): 70%	**Declared weeds (present / absent):** Absent
Revegetation species canopy cover (%): 2%	**Size of bare areas (%):** 10%
Field observations	
Vegetation condition (Keighery 1994): ~~Pristine~~ ~~Excellent~~ ~~Very Good~~ ~~Good~~ ~~Degraded~~ **Completely Degraded**	
Mulch cover (%): 40%	
Disturbance level: ~~Low~~ ~~Medium~~ **High**	
Erosion evidence (e.g. overland flows rills): Evidence of pooling	
Dieback evidence (e.g. localised plant senescence): No evidence	

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Eucalyptus	*rudis*	5
Allocasuarina	sp.	1
Kunzea	*glabrescens*	20
Corymbia	*calophylla*	6
Calothamnus	sp.	8
Acacia	*saligna*	2
Agonis	*flexuosa*	2

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

Weed species –

- Lotus x2 spp.
- Cape weed
- *Lythrum hyssopifolia*
- *Juncus* spp.
- Rye grass?
- *Conyza*/Fleabane
- *Sonchus* sp.
- *Hypochaeris* sp.
- *Isolepis prolifera*

[1] Species richness (total no. of revegetation species) and Stem density (total no. of stems) to be derived from this table

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	Project number: EEL2168.001
Quadrat No.: 6	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** DC & DP
Reference photo No. (from NW quadrat corner): Appendix C	**m E:** 115.5325
Datum: GDA94 / **Zone:** 50	**m S:** 33.5739
Quadrat monitoring parameters	
Weed cover (%): 30%	**Declared weeds (present / absent):** Absent
Revegetation species canopy cover (%): 10%	**Size of bare areas (%):** 10%
Field observations	
Vegetation condition (Keighery 1994):	
~~Pristine~~ ~~Excellent~~ ~~Very Good~~ ~~Good~~ **Degraded** ~~Completely Degraded~~	
Mulch cover (%): 50%	
Disturbance level:	
~~Low~~ ~~Medium~~ **High**	
Erosion evidence (e.g. overland flows rills): Evidence of pooling	
Dieback evidence (e.g. localised plant senescence): No evidence	

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Kunzea	*glabrescens*	2
Acacia	*saligna*	6
Calothamnus	*quadrifidus*	4
Corymbia	*calophylla*	2
Eucalyptus	*rudis*	2
Viminaria	*juncea*	1
Anigozanthos	*manglesii*	1
Agonis	*flexuosa*	1
Melaleuca	*preissiana*	2
Kennedia	*prostrata*	1

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

Weed species –

- Cape weed
- Lotus spp. X2
- Blue pimpernel/ Pink pimpernel
- Annual veldt
- *Lythrum hyssopifolia*
- Corkscrew grass
- *Juncus microcephalus*
- Bunny tail (*Phylarus*)
- Flat weed
- *Oxalis* sp.?
- *Juncus* bru?

[1] Species richness (total no. of revegetation species) and Stem density (total no. of stems) to be derived from this table

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	Project number: EEL2168.001
Quadrat No.: 7	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** DC & DP
Reference photo No. (from NW quadrat corner): Appendix C	**m E:** 115.5324
Datum: GDA94 / **Zone:** 50	**m S:** 33.57259
Quadrat monitoring parameters	
Weed cover (%): 5%	**Declared weeds (present / absent):** Absent
Revegetation species canopy cover (%): 5%	**Size of bare areas (%):** 5%

Field observations

Vegetation condition (Keighery 1994):

~~Pristine~~ ~~Excellent~~ ~~Very Good~~ ~~Good~~ **Degraded** ~~Completely Degraded~~

Mulch cover (%): 85%

Disturbance level:

~~Low~~ ~~Medium~~ **High**

Erosion evidence (e.g. overland flows rills): Evidence of pooling

Dieback evidence (e.g. localised plant senescence): No evidence

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Corymbia	*calophylla*	3
Eucalyptus	*rudis*	1
Agonis	*flexuosa*	2
Kunzea	*glabrescens*	37
Anigozanthos	*manglesii*	6
Melaleuca	pressiana	1
Allocasuarina	*fraseriana*	6
Calothamnus	*quadrifidus*	10
Acacia	*saligna*	1
Acacia	*pulchella*	1
Spyridium	*globulosum*	1
Hardenbergia	*Comptoniana*	1
Jacksonia	sp.	2

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

Weed species –

- Pink pimpernel
- *Lythrum hyssopifolia*
- *Juncus* sp. (Red base)
- Lotus sp.
- 2 x *Acacia iteaphylla*
- *Callistemon* sp.
- Fleabane
- Lotus sp.
- Cape weed
- Pineapple weed
- Annual veldt grass
- *Oxalis sp.*
- Proacea with hair
- Corkscrew

[1] Species richness (total no. of revegetation species) and Stem density (total no. of stems) to be derived from this table

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	Project number: EEL2168.001
Quadrat No.: 8	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** DC & DP
Reference photo No. (from NW quadrat corner): Appendix C	**m E: 115.5342**
Datum: GDA94 / **Zone:** 50	**m S: 33.5361**
Quadrat monitoring parameters	
Weed cover (%): 30%	**Declared weeds (present / absent):** Absent
Revegetation species canopy cover (%): 2%	**Size of bare areas (%):** 80%

Field observations

Vegetation condition (Keighery 1994):

~~Pristine~~ ~~Excellent~~ ~~Very Good~~ ~~Good~~ **Degraded** ~~Completely Degraded~~

Mulch cover (%): 30%

Disturbance level:

~~Low~~ ~~Medium~~ **High**

Erosion evidence (e.g. overland flows rills): Evidence of pooling

Dieback evidence (e.g. localised plant senescence): No evidence

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Eucalyptus	*rudis*	6
Agonis	*flexuosa*	1
Kunzea	*glabrescens*	1
Acacia	*sp.(seed)*	1
Corymbia	*calophylla*	4
Acacia	*saligna*	1
Melaleuca	*pressiana*	2
Billardiera	*fusiformis*	3

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

Weed species –

- *Juncus* sp. (Red base)
- *Juncus microcephalus*
- *Isolepis prolifera*
- Lotus sp.
- Flat weed
- Cape weed
- Pink/purple pimpernel/ Veitch?
- Small grass
- Corkscrew grass
- Rye grass
- *Oxalis* sp.
- *Juncus* sp.
- Blue pimpernel
- Clover

[1] Species richness (total no. of revegetation species) and Stem density (total no. of stems) to be derived from this table

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	**Project number: EEL2168.001**
Quadrat No.: 9	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** DC & DP
Reference photo No. (from NW quadrat corner): Appendix C	**m E: 115.5346**
Datum: GDA94 / **Zone:** 50	**m S: 33.57143**
Quadrat monitoring parameters	
Weed cover (%): 5%	**Declared weeds (present / absent):** Absent
Revegetation species canopy cover (%): 35%	**Size of bare areas (%):** 20%
Field observations	

Vegetation condition (Keighery 1994):

~~Pristine~~ ~~Excellent~~ ~~Very Good~~ ~~Good~~ **Degraded** ~~Completely Degraded~~

Mulch cover (%): 80%

Disturbance level:

~~Low~~ ~~Medium~~ **High**

Erosion evidence (e.g. overland flows rills): Nil

Dieback evidence (e.g. localised plant senescence): No evidence

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Allocasuarina	sp.	58
Anigozanthos	*manglesii*	38
Kunzea	*glabrescens*	160
Calothamnus	*quadrifidus*	75
Agonis	*flexuosa*	4
Callistachys	*lanceolata*	3
Spyridium	*globulosum*	3
Melaleuca	*preissiana*	7
Paraserianthes	*lophantha*	2
Acacia	*saligna*	5
Corymbia	*calophylla*	4
Eucalyptus	*rudis*	12
Hypocalymma	*angustifolium*	6
Acacia	*pulchella*	1
Jacksonia	sp.	1
Billardiera	*fusiformis*	1
Astatia	sp.	4
Acacia	*cyclops*	3
Muehlenbeckia	*adpressa*	1

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

Weed species –

- Lotus sp. X2
- Flat weed
- *Juncus* (Red base)
- Pineapple
- Cape weed
- Annual veldt grass
- Cyperaceae (Dead)
- Nightshade
- *Oxalis* sp.
- Yellow daisy
- Blue pimpernel
- *Callistemon* sp.
- Arum lily
- *Juncus microcephalus*

[1] Species richness (total no. of revegetation species) and Stem density (total no. of stems) to be derived from this table

FIELD RECORDING SHEET

Project: Iluka Revegetation Monitoring	**Project number: EEL2168.001**
Quadrat No.: 10	**Date:** 04/10/2022
Quadrat size: 10 m x 10 m	**Recorder:** DC & DP
Reference photo No. (from NW quadrat corner): Appendix C	**m E: 115.5352**
Datum: GDA94 / **Zone:** 50	**m S: 33.57214**
Quadrat monitoring parameters	
Weed cover (%): 1%	**Declared weeds (present / absent):** Absent
Revegetation species canopy cover (%): 5%	**Size of bare areas (%):** 50%

Field observations

Vegetation condition (Keighery 1994):

~~Pristine~~ ~~Excellent~~ ~~Very Good~~ ~~Good~~ **Degraded** ~~Completely Degraded~~

Mulch cover (%): 50%

Disturbance level:

~~Low~~ ~~Medium~~ **High**

Erosion evidence (e.g. overland flows rills): Minor movement of mulch

Dieback evidence (e.g. localised plant senescence): No evidence

Species list - Revegetation species[1]		
Genus	***species***	**Stem density (No. of stems)**
Agonis	*flexuosa*	3
Calothamnus	*quadrifidus*	13
Acacia	*saligna*	10
Kunzea	*glabrescens*	87
Eucalyptus	rudis	6
Allocasuarina	*fraseriana*	34
Anigozanthos	*manglesii*	11
Corymbia	*Calophylla*	5
Hardenbergia	Comptonia	1
Melaleuca	*preissiana*	1
Acacia	*pulchella*	1

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

Weed species –

- Lotus sp. X2
- Annual veldt grasss
- Flat weed
- *Acacia iteaphylla* (1)
- *Acacia longifolia* (2)
- Cape weed
- Fleshy white flower
- *Oxalis* sp.
- *Cyperaceae* sp. Isolepis
- Nightshade

[1] 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

Site Map

Iluka South Capel Revegetation

Legend

Site Boundary

Quadrat

N

Meters

0 12.5 25 50 75 100

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	Sept 2021

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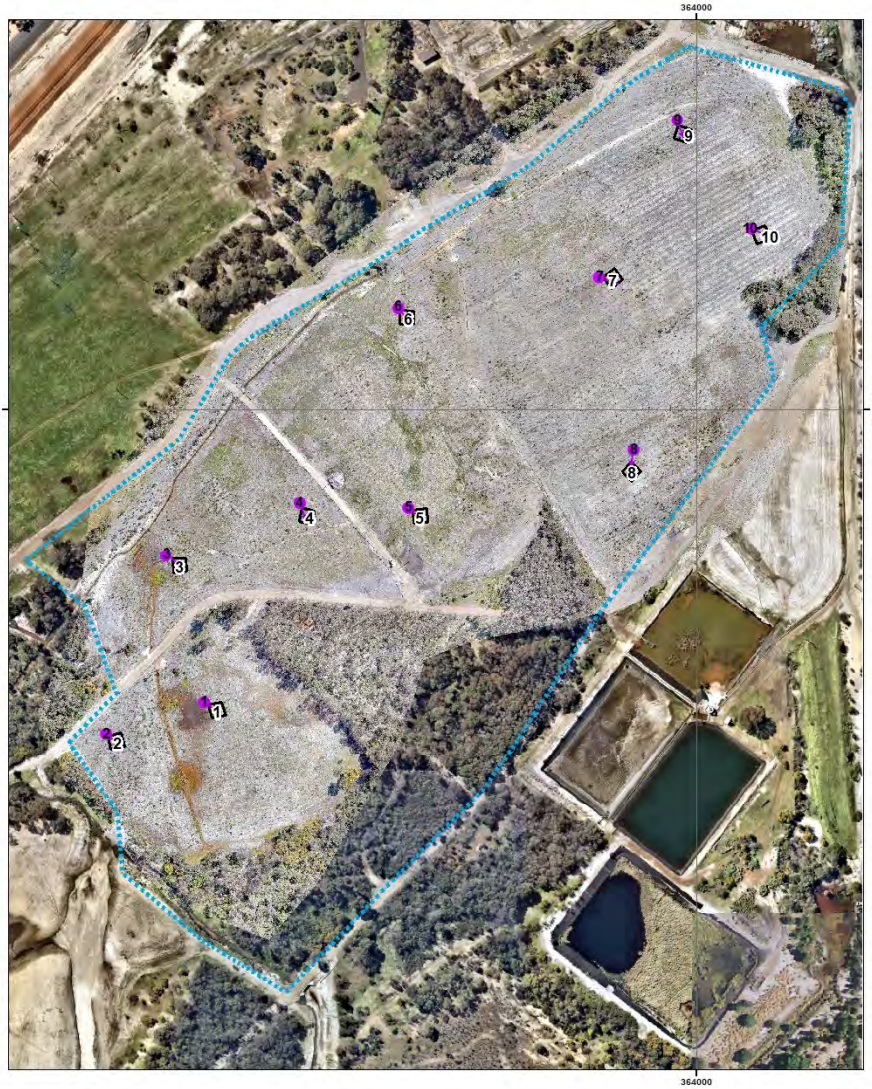

Quadrats & Photo Points

Iluka South Capel Revegetation

Legend

- Site Boundary
- Quadrat
- Photo Points

N

Meters 0 12.5 25 50 75 100

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	4 Oct 2022

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Quadrat 1

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay
October 2022 (2cm/pixel)

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

N

Meters
0 1 2

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Quadrat 2

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay
October 2022 (2cm/pixel)

N

Meters
0 1 2

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

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Quadrat 3

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay
October 2022 (2cm/pixel)

N

Meters
0 1 2

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

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Quadrat 4

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay October 2022 (2cm/pixel)

N

Meters 0 1 2

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

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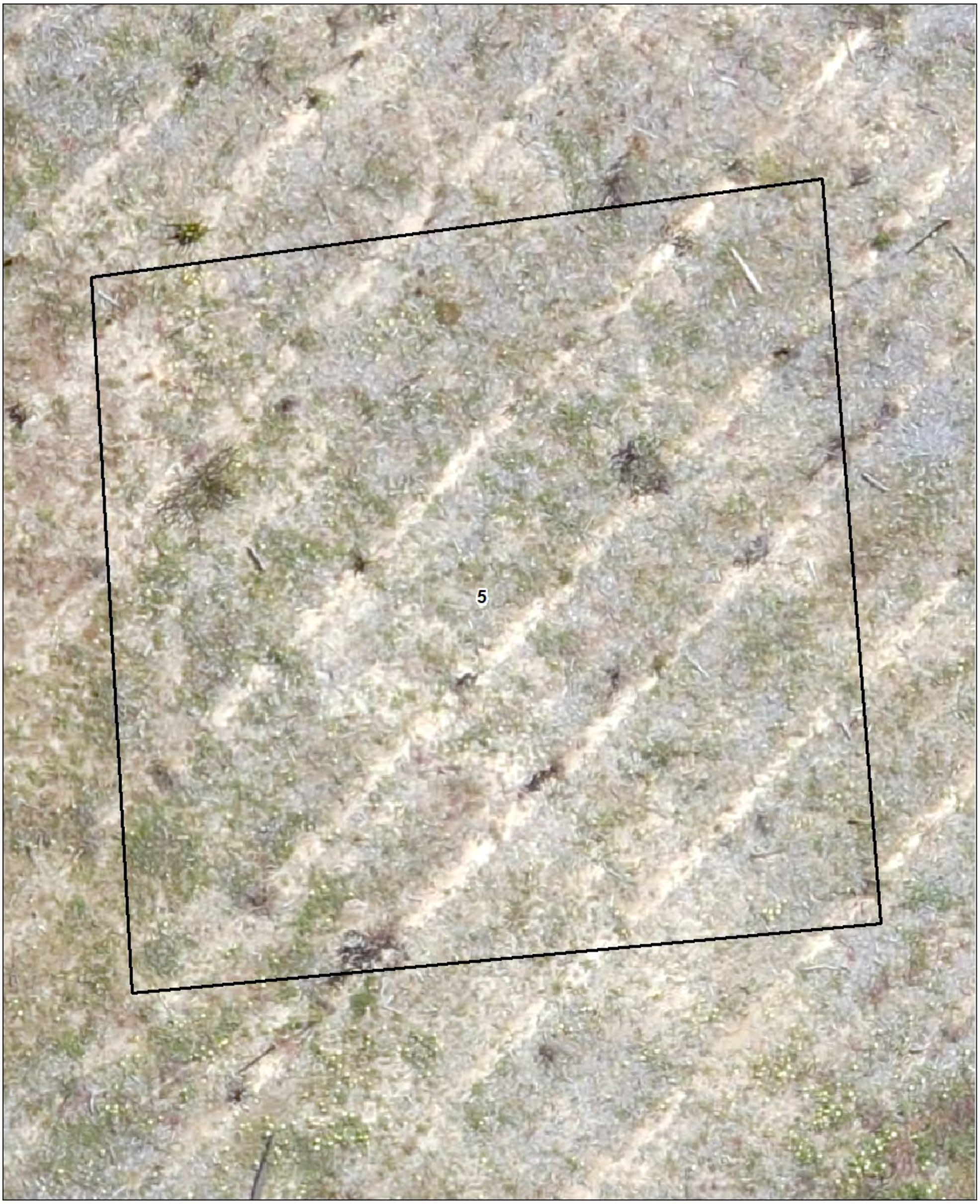

Quadrat 5

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay
October 2022 (2cm/pixel)

N

Meters
0 1 2

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

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Quadrat 6

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay
October 2022 (2cm/pixel)

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

N

Meters
0 1 2

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Quadrat 7

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay
October 2022 (2cm/pixel)

N

Meters
0 1 2

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

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Quadrat 8

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay
October 2022 (2cm/pixel)

N

Meters
0 1 2

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

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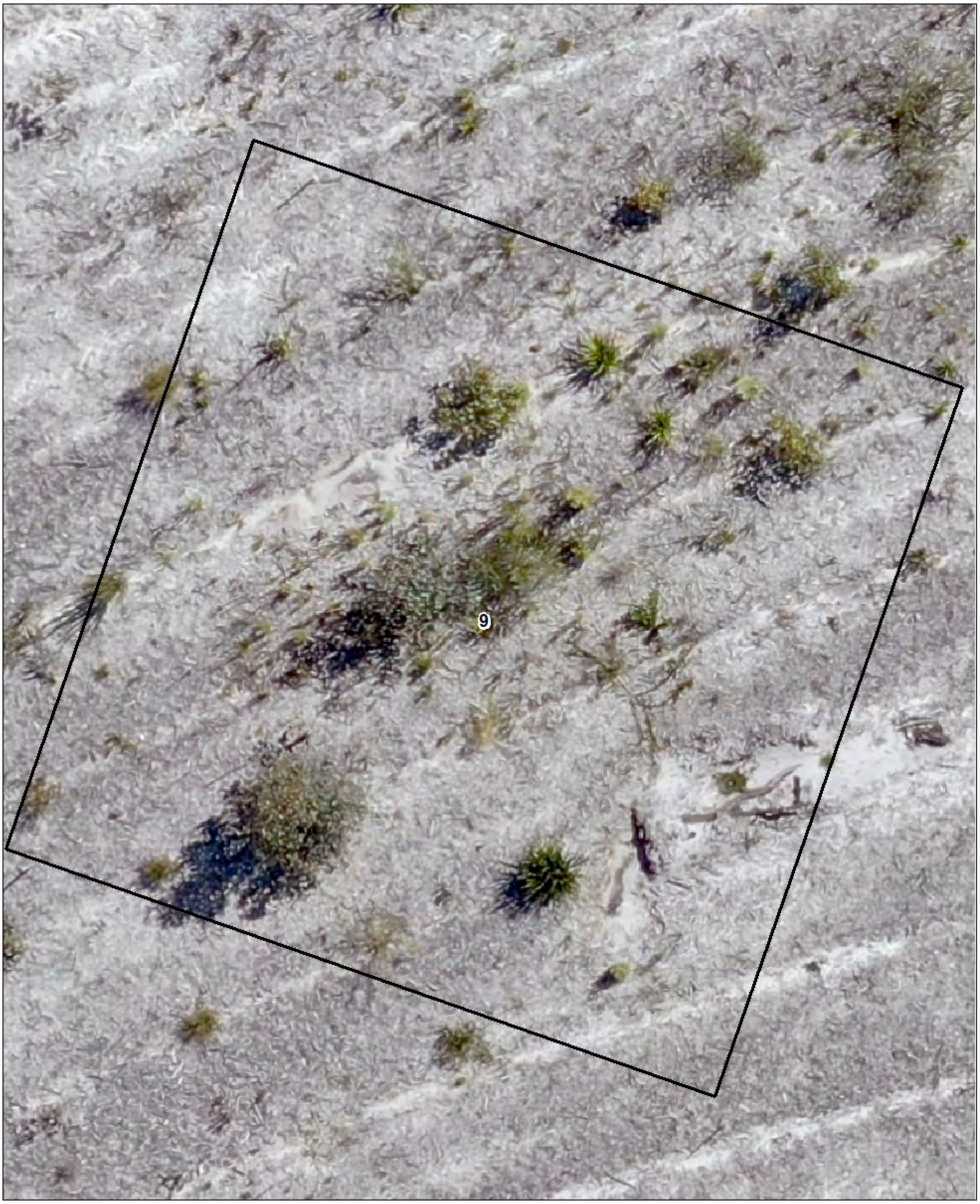

Quadrat 9

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay
October 2022 (2cm/pixel)

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

N

Meters
0 1 2

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Quadrat 10

Iluka South Capel Revegetation

Legend

Quadrat

Map includes Drone image overlay
October 2022 (2cm/pixel)

Project:	221380
Report:	Reveg Mon.
Assessment date:	04/10/2022
Prepared by:	D. Cuthbert
Aerial photo date:	04/10/2022

N

Meters 0 1 2

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Appendix C
NW reference photo comparison

APPENDIX C: NW REFERENCE PHOTO COMPARISON

Quadrat 1

Year 1 monitoring event

Year 2 monitoring event

Quadrat 2

Year 1 monitoring event

Year 2 monitoring event

Quadrat 3

Year 1 monitoring event

Year 2 monitoring event

Quadrat 4

Year 1 monitoring event

Year 2 monitoring event

Quadrat 5

Year 1 monitoring event

Year 2 monitoring event

Quadrat 6

Year 1 monitoring event

Year 2 monitoring event

Quadrat 7

Year 1 monitoring event

Year 2 monitoring event

Quadrat 8

Year 1 monitoring event

Year 2 monitoring event

Quadrat 9

Year 1 monitoring event

Year 2 monitoring event

Quadrat 10

Year 1 monitoring event

Year 2 monitoring event