Report

Compliance Report EPBC 2017/8133

Trieste Seismic Survey

3 December 2020 to 3 December 2021

Review record

Revision	Date	Reason for issue	Reviewer/s	Consolidator	Approver
A	08/12/2021	Internal review	Z. Bowen	P Catford	
0	22/12/2021	Approved for submission			T. Flowers

THE THREE WHATS
What can go wrong?
What could cause it to go wrong?
What can I do to prevent it?

Compliance Report EPBC 2017/8133

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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	
Full Name (Please Print)	Timothy Flowers
Position (Please Print)	Head of Environment
Organisation (please print including ABN/CAN if applicable)	Beach Energy Resources (Perth Basin) Pty Limited (previously Lattice Energy Resources (Perth Basin) Pty Ltd)) ACN 007845338
Date	22 December 2021

1 Introduction

Beach Energy Resources (Perth Basin) Pty Limited (Beach, previously Lattice Energy Resources (Perth Basin) Pty Ltd)) (ACN 007845338), undertook the onshore Trieste 3D seismic survey, near Eneabba, Western Australia (EPBC 2017 / 8133) between December 2019 and February 2020. The approved action was to undertake an onshore three-dimensional (3D) seismic survey near Eneabba in the North Perth Basin, mapping geological formations to assist in the search for conventional gas reserves. The survey took place in Exploration Permit 320 (EP 320) of the northern Perth Basin, approximately 13 km north of the town of Eneabba and 40 km southeast of the town of Dongara, with an acquisition area of 217 square kilometres (km^2).

The survey was conducted from December 2019 to February 2020. Ongoing activities associated with the seismic survey are limited to rehabilitation monitoring, and (if required) rehabilitation works and reporting This Annual Compliance Report covers the period of 3 December 2020 to 3 December 2021 (the reporting period).

1.1 Approval under the Environmental Protection and Biodiversity Conservations Act 1999

Approval for the Trieste 3D Seismic Survey under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was granted on 11 October 2019 (EPBC Reference 2017-8133) by the Department of the Environment and Energy (DoEE, now the Department of Agriculture, Water and the Environment, AWE) (refer Appendix A).

1.2 Variation of EPBC Conditions

On 12 February 2021 the decision to vary the conditions of approval was made under section 143 of the EPBC Act. The variation meant that conditions 1, 4 and 10 were updated or replaced (Refer Appendix B).

2 Purpose

This Annual Compliance Report has been prepared to meet the requirements of Condition 7 of the EPBC approval 2017/8133 which states that:

"The approval holder must prepare a compliance report for each 12 month period following the date of commencement of the action, or as otherwise agreed to in writing by the Minister".

This Annual Compliance Report covers the period of 3 December 2020 to 3 December 2021 (the reporting period).

3 Description of Activities

3.1 Seismic Survey

The Trieste 3D Seismic Survey was conducted from 3 December 2019 with the commencement of on site inductions for survey personnel and the commencement of seismic line preparation (vegetation clearing). Line preparation (vegetation clearing) was completed on 17 December 2019. The on ground survey acquisition component of the survey was completed in February 2020. Consequently, ongoing activities associated with the seismic survey are limited to rehabilitation monitoring, and (if required) rehabilitation works and reporting. There is currently no requirement for active rehabilitation activities, however these activities may be required in the future if rehabilitation monitoring indicates that regeneration of native vegetation on the survey lines is not meeting the required completion criteria. Further information on the rehabilitation monitoring is provided in Section 3.2.

3.2 Rehabilitation Monitoring

A rehabilitation monitoring methodology was developed and approved for the project in November 2018.

The initial rehabilitation monitoring survey was undertaken between 12 and 15 August 2019. The purpose of the survey was to establish analogue sites prior to vegetation clearing.

The inaugural post survey rehabilitation monitoring event was conducted between 19 and 23 October 2020. These results are provided in *Rehabilitation Assessment Trieste 3D Seismic Project, Arrowsmith* (Mattiske Consulting 2021) (Refer Appendix C) and a summary of the results is provided below.

Eleven rehabilitation transects (6 along sources lines; 5 along receiver lines) were established and monitored along with analogue transects within the Trieste 3D Seismic survey area. Transect locations were selected through field reconnaissance to capture four different vegetation units. The monitoring was undertaken to identify plants present along the analogue and rehabilitation transects and assess the progress of the rehabilitation areas in comparison to the analogue sites.

Completion criteria for native vegetation within 12 months of clearing were set at:

- No new introduction of declared or environmental weeds into operational areas
- 20% of perennial species richness compared with adjacent areas of native vegetation
- 10% foliage cover of perennial native species compared with adjacent areas of native vegetation.

A total of 282 vascular plant taxa, representative of 122 genera and 46 families, were recorded within survey area transects. The majority of taxa recorded were representative of the Proteaceae (45 taxa), Myrtaceae (42 taxa) and Fabaceae (27 taxa) families. No threatened flora species were recorded within the survey area transects.

Four introduced species considered environmental weeds by the Environmental Weed Ranking, were recorded in the survey area, none being a declared a pest. All four weed species recorded within the survey area in October 2020 were annual species and are common in the region and were not necessarily introduced by seismic survey activities. No weeds were recorded in the analogue transects in August 2019.

All rehabilitation transects exceeded the recommended completion criteria target of 20% perennial species richness compared with the adjacent analogue transects.

The mean foliage cover within both receiver and sources lines met the recommended completion criteria target of 10% of the foliage cover. When vegetation units were assessed, three of the four vegetation units met the recommended completion criteria target of 10% of the foliage cover of analogue sites. One vegetation unit (Isolated clumps of mallee shrubs) did not meet the 10% target (8.4%). This vegetation type was represented by one transect (Transect 9). Overall foliage cover across the Project area within rehabilitation transects represented 15.8% of the cover in Analogue transects.

Results from the initial monitoring assessment undertaken in 2020 indicate that one component (vegetation unit Isolated Clumps of Mallee Shrubs) did not meet the 12 month completion target. This vegetation unit was sampled by only one transect (Transect 9). This vegetation is represented by woody shrubs and mallee (Eucalyptus todtiana) which is likely to have a lower plant density to cover ratio, based on size of individual plants and vegetation structure. This vegetation unit also recorded the lowest analogue species richness along with the highest % species return within the rehabilitation transect (91.7%). This data suggests that while this vegetation unit may have a slower recovery and growth post mulching, species return is progressing at the expected rate.

Based on the assessment undertaken, there is no evidence that vegetation recovery is being hampered or is outside the expected rate of recovery.

Following advice received in the post survey rehabilitation monitoring event report the next rehabilitation monitoring event is scheduled to take place in Spring 2022.

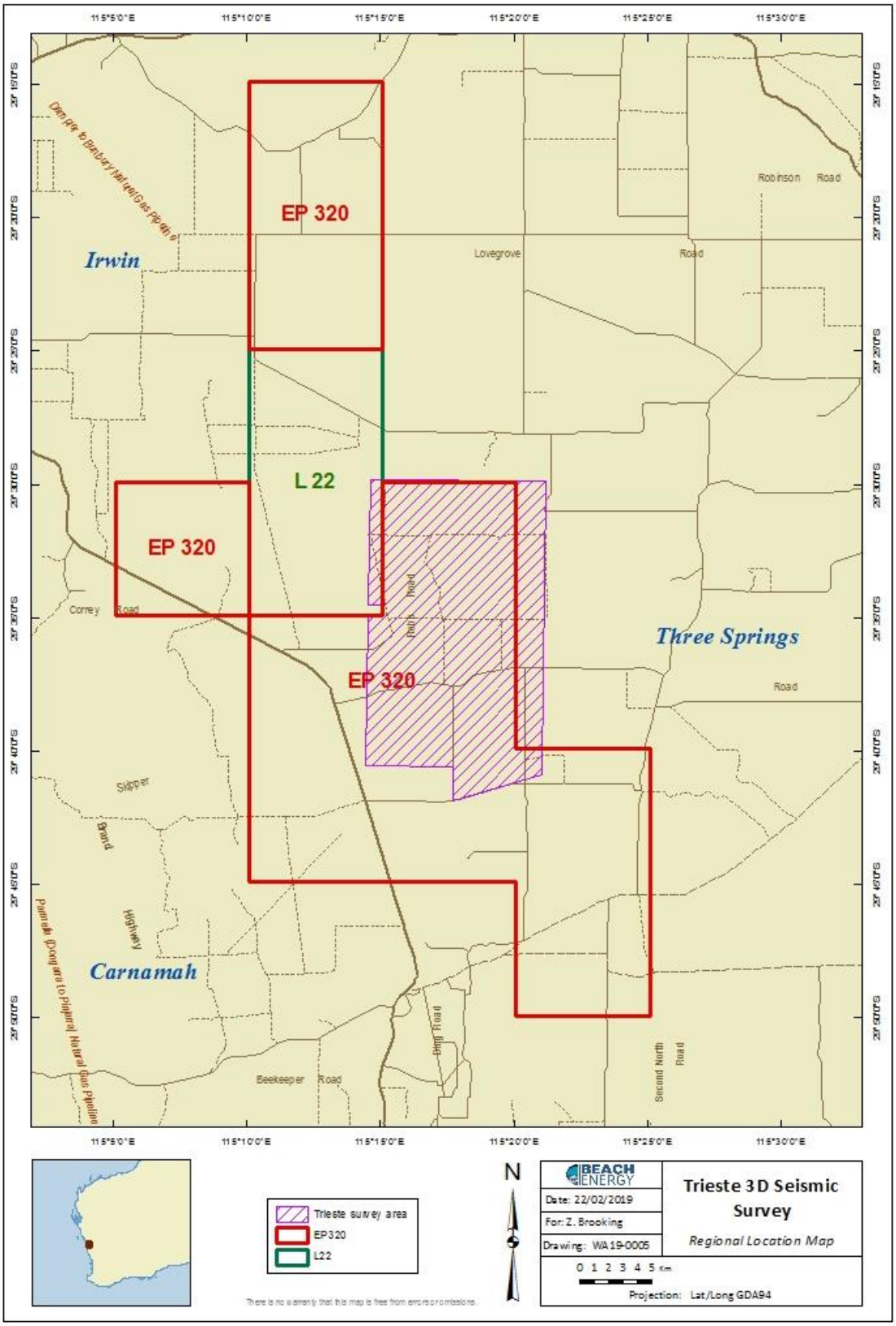

Figure 1: Trieste 3D Seismic Survey location

4 Assessment of Compliance with EPBC 2017 / 8133 Conditions

A summary of compliance against the thirteen conditions of approval defined in the approved EPBC 2017/8133 EPBC, for this reporting period, is provided in Table 1.

Table 1: Compliance with EPBC 2017/8133 Approval Conditions (as issued 12 February 2021)

Condition Number / Reference	EPBC 2017/8133 Condition	Compliance	Evidence / Comments
Part A – Conditions specific to the action			
1	The approval holder must not clear more than 54.36 ha of **foraging habitat** for the **Carnaby's Black Cockatoo** within the survey boundary (map at Attachment A).	Compliant	The on ground survey acquisition component of the survey was completed in February 2020. As a consequence ongoing activities associated with the seismic survey are limited to rehabilitation monitoring, and (if required) rehabilitation works and reporting. Native vegetation clearing for the project occurred between the 03/12/2019 and 17/12/2019. The EPBC Approval and the WA Department of Mines, Industry, Regulation and Safety (DMIRS) Clearing Permit CPS 8171/1 allowed for clearing of up to 74.45 ha of native vegetation however a total of 54.36 ha was cleared for the project. Evidence that no more than 54.36 ha of foraging habitat for the Carnaby's Black Cockatoo was cleared within the survey boundary was provided in the 2020 Compliance Report EPBC 2017/8133.
2	To minimise the impacts of the action on **EPBC Act listed species**, the approval holder must implement condition 8 of the **Western Australian Clearing Permit (8171/1)** for the life of the approval from the **commencement of the action.**	Compliant	**Condition 8** of the WA Clearing Permit (8171/1) refers to Dieback and Weed Control. **Condition 8 (a)** specifies steps that must be undertaken to minimise the risk of the introduction and spread of weeds and dieback. The only project personnel and vehicles to enter the project area since the demobilisation of the seismic crew on 15 February 2020 have been ecological consultants undertaking the rehabilitation monitoring event in October 2020. The consultants utilised pre-existing access tracks in the survey area and did not drive on any undisturbed areas while completing this monitoring. **Condition 8 (b) At least once in each 12 month period for the term of this Permit, the Permit Holder must remove or kill any weeds growing within areas cleared under this Permit.** This condition is not applicable at this stage of the project. If localised areas of significant weed incursion are impacting the ability of the vegetation to regenerate, targeted weed control will be applied on an as-needs basis. This will be informed by the biennial rehabilitation monitoring.
3	To minimise the impacts of the action on **foraging habitat** for the **Carnaby's Black Cockatoo**, the approval holder must implement condition 10 (relating to rehabilitation) of the **Western Australian Clearing Permit (8171/1)**. The objective of	Compliant	**Condition 10 of the WA Clearing Permit (8171/1) refers to Retain and spread vegetation material and topsoil and rehabilitation.**

Condition Number / Reference	EPBC 2017/8133 Condition	Compliance	Evidence / Comments
	rehabilitation works is to re-establish a self-sustaining vegetation cover, integrated with the surrounding ecosystem, providing **foraging habitat** for the **Carnaby's Black Cockatoo**		**Condition 10 (a) retain the vegetative material removed by clearing for the seismic survey authorised under this Permit and stockpile the vegetative material in an area that has already been cleared;** The on ground survey acquisition component of the survey was completed in February 2020. As a consequence ongoing activities associated with the seismic survey are limited to rehabilitation monitoring, and (if required) rehabilitation works and reporting. Native vegetation clearing for the project occurred between the 03/12/2019 and 17/12/2019. The EPBC Approval and the WA Department of Mines, Industry, Regulation and Safety (DMIRS) Clearing Permit CPS 8171/1 allowed for clearing of up to 74.45 ha of native vegetation however a total of 54.36 ha was cleared for the project. Evidence of compliance with Condition 10 (a) of the Clearing Permit was provided in the 2020 Compliance Report EPBC 2017/8133. **Condition 10 (b) within 12 months following clearing authorised for the seismic survey under this permit, *revegetate* and *rehabilitate* the areas that are no longer required, by:** **Condition 10 (b(i)) laying the vegetative material retained under Condition 10(a).** **Condition 10 (c) implement adequate measures to prevent third party access to survey lines and access tracks;** Evidence of compliance with Condition 10 (b) of the Clearing Permit was provided in the 2020 Compliance Report EPBC 2017/8133. **Condition 10 (d) Conduct monitoring in accordance with the document 'Mattiske, 2018. Proposed Seismic Line Rehabilitation Monitoring Methodology, Beharra Springs. Prepared by Mattiske Consulting Pty Ltd for Beach Energy, October 2018'.** Mattiske Consulting completed rehabilitation monitoring survey between 19-23 October 2020 in accordance with the approved rehabilitation method. For details on the rehabilitation monitoring event refer to appendix C.
3a	The approval holder must continue rehabilitation works until the **Department** has provided written acceptance of a report by a **suitably qualified person** certifying and providing evidence that all of the **completion criteria** have been met	Compliant	Rehabilitation works currently consist of rehabilitation monitoring as per Condition 10 (d) of the WA Clearing Permit (8171/1). There is currently no requirement for active rehabilitation works to be undertaken in the project area. The requirement for rehabilitation works will be determined following the conclusion of the initial 5 year rehabilitation monitoring period. In the event that the rehabilitation monitoring program indicates that regeneration of vegetation on seismic lines is not meeting the required completion criteria, then Beach will determine the next course of action to achieve completion criteria. Beach will continue to undertake monitoring by a suitably qualified person until the cleared area has met the completion criteria

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Condition Number / Reference	EPBC 2017/8133 Condition	Compliance	Evidence / Comments
3b	Following submission to the **Department** of the certified report demonstrating that **the completion criteria** have been achieved in accordance with condition 3(a), the **suitably qualified expert** must monitor the rehabilitation area at least once every two years, during spring, for the life of the approval with sufficient effort to reliably ascertain whether the **completion criteria** continue to be met or exceeded	Not Applicable	-
3c	If the monitoring undertaken in accordance with condition 3(b) determines that any of the **completion criteria** are no longer being met, the approval holder must, within 3 months of becoming aware that any of the **completion criteria** are no longer being met, commence undertaking corrective actions and continue these until the **Department** has provided written acceptance of a report by **a suitably qualified person** certifying and providing evidence that all the **completion criteria** have again been met	Not Applicable	-
4	To compensate for the loss of up to 54.36 ha of **foraging habitat** for the **Carnaby's Black Cockatoo**, the approval holder must provide an offset of 338 ha within Lot 10333 Watheroo Road, Boothendarra (map at Attachment B) and, by 3 May 2021:	Compliant	Beach provided an offset of 338ha within Lot 10333 Watheroo Road, Boothendarra by 3 May 2021 (Refer appendix D)
4a	provide written evidence to the Department that a financial contribution has been made to DBCA for the purchase, and management for the period of effect of approval, of the offset specified in condition 4; and	Compliant	Written evidence of financial contribution made to DBCA for purchase and management of the offset was provided to the Department on 30 April 2021 (Refer appendix D).
4b	provide the **Department** with the offset attributes, **shapefiles**, textual descriptions and maps to clearly define the location and boundaries of the offset.	Compliant	Evidence that Beach provided the Department with offset attributes, shapefiles, textural descriptions and maps were presented in the 2020 Compliance Report EPBC 2017/8133. Additional evidence of the location of the increased offset area was provided to the Department on 30 April 2021 (Refer appendix D) and a shapefile of the total offset area has been attached to this report.

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Condition Number / Reference	EPBC 2017/8133 Condition	Compliance	Evidence / Comments
Part B – Standard administrative conditions			
Notification of date of commencement of the action			
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	Evidence that Beach advised the Department that it had commenced the seismic survey on 5 December 2019 was provided in the 2020 Compliance Report EPBC 2017/8133.
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**	Not Applicable	-
Annual Compliance Reporting			
7	The approval holder must prepare a **compliance report** for each 12 month period following the date of **commencement of the action**, or as otherwise agreed to in writing by the **Minister.** The approval holder must:	Compliant	This report addresses this requirement. The Annual Compliance Report will continue to be submitted annually unless otherwise agreed in writing by the minister.
7a	publish each **compliance report** on the **website** within 20 **business days** following the relevant 12 month period;	Compliant	A copy of this report has been published on the Beach website.
7b	notify the **Department** by email that a **compliance report** has been published on the **website** within five **business days** of the date of publication, and provide a link to the published report;	Compliant	Beach will notify the Department within 5 business days of publication on the Beach website.
7c	keep all **compliance reports** publicly available on the **website** until this approval expires;	Compliant	
7d	exclude or redact **sensitive ecological data** from **compliance reports** published on the **website**; and	Compliant	Information on the location of conservation significant taxa detected in the project area during the 2020 rehabilitation monitoring event has been excluded from the Rehabilitation Assessment report provided in Appendix C of the published version of this report.
7e	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	
Reporting Non-compliance			

Compliance Report EPBC 2017/8133

Condition Number / Reference	EPBC 2017/8133 Condition	Compliance	Evidence / Comments
8a	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: the condition which is or may be in breach;	Compliant	No Incidents occurred in the reporting period
8b	a short description of the **incident** and/or non-compliance; and		
8c	the location (including co-ordinates), date and time of the incident and/or non-compliance.		
9	The approval holder must provide to the **Department** the details of any **incident** or noncompliance with the conditions or commitments made in **plans** as soon as practicable and no later than **10 business day**s after becoming aware of the **incident** or non-compliance, specifying:	Compliant	No Incidents occurred in the reporting period
9a	any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;		
9b	the potential impacts of the **incident** or non-compliance; and		
9c	the method and timing of any remedial action that will be undertaken by the approval holder		
Independent Audit			
10	The approval holder must ensure that **independent audits** of compliance with the conditions are conducted as requested in writing by the **Minister.**	Compliant	No independent audits were requested by the minister during the reporting period.
11	For each **independent audit**, the approval holder must:		
11a	provide the name and qualifications of the independent auditor and the draft audit criteria to the **Department;**	Compliant	-
11b	only commence the **independent audit** once the audit criteria have been approved in writing by the **Department;** and	Compliant	-

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Condition Number / Reference	EPBC 2017/8133 Condition	Compliance	Evidence / Comments
11c	submit an audit report to the **Department** within the timeframe specified in the approved audit criteria	Compliant	-
12	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	Compliant	-
Completion of the Action			
13	Within 30 days after the **completion of the action**, the approval holder must notify the **Department** in writing and provide **completion data**	Not Applicable	The on ground survey acquisition component of the survey was completed in February 2020. As a consequence ongoing activities associated with the seismic survey are limited to rehabilitation monitoring, and (if required) rehabilitation works and reporting.

5 Identification of New or Increased Environmental Risks

No new or increased risks have been identified in the reporting period. The on-ground acquisition phase of the seismic survey is now complete. Given that the seismic survey is complete, the likelihood of future incidents is extremely low as the only future activity associated with the project planned to occur on site is routine annual rehabilitation monitoring.

6 Document information and history

Document custodian group

Title	Name/s
HSE&R - Environment	Tim Flowers

Stakeholders

Position	Name
Head of Environment	Tim Flowers
Senior Environmental Advisor SAWA	Zoë Bowen

Document history

Rev	Date	Changes made in first document	Reviewer/s	Consolidator	Approver
A	08/12/2021	Draft issued for internal review	Zoë Bowen	Pearl Catford	-
0	22/12/2021	Approved for submission to DAWE	Zoë Bowen	Pearl Catford	Tim Flowers

Appendix A Approval Notice and Conditions

APPROVAL

Trieste 3D Seismic Survey, near Eneabba, Western Australia (EPBC 2017/8133)

This decision is made under sections 130(1) and 133(1) of the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*. Note that section 134(1A) of the **EPBC Act** applies to this approval, which provides in general terms that if the approval holder authorises another person to undertake any part of the action, the approval holder must take all reasonable steps to ensure that the other person is informed of any conditions attached to this approval, and that the other person complies with any such condition.

Details

Person to whom the approval is granted (approval holder)	Lattice Energy Limited
ACN or ABN of approval holder	007 845 338
Action	To undertake an onshore three-dimensional (3D) seismic survey near Eneabba in the North Perth Basin, mapping geological formations to assist in the search for conventional gas reserves [See EPBC Act referral 2017/8133].

Proposed Approval decision

My decision on whether or not to approve the taking of the action for the purposes of the controlling provision for the action is as follows.

Controlling Provisions

Listed Threatened Species and Communities	
Section 18	Approve
Section 18A	Approve

Period for which the approval has effect

This approval has effect until 1 September 2034.

Decision-maker

Name and position	Chris Videroni A/g Assistant Secretary Assessments (WA, SA, NT) and Post Approval Branch
Signature	
Date of decision	11-10-2019

Conditions of approval

This approval is subject to the conditions under the EPBC Act as set out in ANNEXURE A.

ANNEXURE A – CONDITIONS OF APPROVAL

Part A – Conditions specific to the action

1. The approval holder must not clear more than 74.539 ha of **foraging habitat** for the **Carnaby's Black Cockatoo** within the survey boundary (map at Attachment A).
2. To minimise the impacts of the action on **EPBC Act listed species**, the approval holder must implement condition 8 of the **Western Australian Clearing Permit (8171/1)** for the life of the approval from the **commencement of the action**.
3. To minimise the impacts of the action on **foraging habitat** for the **Carnaby's Black Cockatoo**, the approval holder must implement condition 10 (relating to rehabilitation) of the **Western Australian Clearing Permit (8171/1)**. The objective of rehabilitation works is to re-establish a self-sustaining vegetation cover, integrated with the surrounding ecosystem, providing **foraging habitat** for the **Carnaby's Black Cockatoo**.
    a. The approval holder must continue rehabilitation works until the **Department** has provided written acceptance of a report by a **suitably qualified person** certifying and providing evidence that all of the **completion criteria** have been met.
    b. Following submission to the **Department** of the certified report demonstrating that the **completion criteria** have been achieved in accordance with condition 3(a), the **suitably qualified expert** must monitor the rehabilitation area at least once every two years, during spring, for the life of the approval with sufficient effort to reliably ascertain whether the **completion criteria** continue to be met or exceeded.
    c. If the monitoring undertaken in accordance with condition 3(b) determines that any of the **completion criteria** are no longer being met, the approval holder must, within 3 months of becoming aware that any of the **completion criteria** are no longer being met, commence undertaking corrective actions and continue these until the **Department** has provided written acceptance of a report by a **suitably qualified person** certifying and providing evidence that all the **completion criteria** have again been met.
4. To compensate for the loss of up to 74.539 ha of **foraging habitat** for the **Carnaby's Black Cockatoo**, the approval holder must:
    a. Within one year of the **commencement of the action** submit to the **Minister** for approval:
        i. details of an offset that includes a minimum of 218.46 ha of **foraging habitat** for the **Carnaby's Black Cockatoo.** The approval holder must demonstrate that the proposed offset meets the principles of the **Department's EPBC Environmental Offsets Policy**
        ii. an Offset Management Plan for the proposed offset provided in accordance with condition 4(a)(i). The Offset Management Plan must include time-bound performance targets, completion criteria, details of a monitoring program, management actions, corrective actions and triggers for corrective actions to be undertaken in the event that performance targets have not been met.
    b. Within two years of the **commencement of the action**, provide written evidence to the **Department** that a financial contribution of at least $104, 860.80 has been made to an **approved conservation fund** for the purchase and ongoing management of the approved offset required by condition 4(a).
    c. Provide the **Department** with the offset attributes, **shapefiles**, textual descriptions and maps to clearly define the location and boundaries of the offset site(s).

Part B – Standard administrative conditions

Notification of date of commencement of the action

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**.

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**.

Annual compliance reporting

7. The approval holder must prepare a **compliance report** for each 12 month period following the date of **commencement of the action**, or as otherwise 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** within five **business days** of the date of publication, and provide a link to 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.

Note: **Compliance reports** may be published on the **Department**'s website.

Reporting non-compliance

8. 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. the condition which is or may be in breach;

   b. a short description of the **incident** and/or non-compliance; and

   c. the location (including co-ordinates), date and time of the incident and/or non-compliance.

9. 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.

Independent audit

10. The approval holder must ensure that **independent audits** of compliance with the conditions are conducted for the 12 month period from **commencement of the action** and for every subsequent 12 month period, or as otherwise requested in writing by the **Minister**.

11. 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 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.

12. 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.

Completion of the action

13. Within 30 days after the **completion of the action**, the approval holder must notify the **Department** in writing and provide **completion data**.

Part C - Definitions

In these conditions, except where contrary intention is expressed, the following definitions are used:

Approved conservation fund is a conservation fund approved by the **Department** for the purpose of providing long-term management and improvement of **foraging habitat** for the **Carnaby's Black Cockatoo**.

Business days means a day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.

Carnaby's Black Cockatoo means the EPBC Act listed Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*).

Clear means the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of vegetation.

Commencement of the action means the first instance of any specified activity associated with the action including clearance of vegetation and **construction** of any infrastructure. **Commencement of the action** does not include minor physical disturbance necessary to:

i. undertake pre-clearance surveys or monitoring programs;

ii. install signage and /or temporary fencing to prevent unapproved use of the project area;

iii. protect environmental and property assets from fire, weeds and feral animals, including erection or **construction** of fencing and signage, and maintenance or use of existing surface access tracks, if agreed in writing by the **Department**; and

Completion criteria are the completion criteria identified in Mattiske Consulting Pty Ltd (2018) *Proposed seismic line rehabilitation monitoring methodology*.

Completion data means an environmental report and spatial data information clearly detailing how the conditions of this approval have been met. The **Department's** preferred spatial data format is shapefile.

Completion of the action means all specified activities associated with the action have permanently ceased.

Compliance records means all documentation or other material in whatever form required to demonstrate compliance with the conditions of approval in the approval holder's possession or that are within the approval holder's power to obtain lawfully.

Compliance reports means written reports:

i. providing accurate and complete details of compliance, **incidents**, and non-compliance with these approval conditions and commitments in the **plans**;

ii. details of contingency measures or corrective actions that have been or will be implemented;

iii. consistent with the **Department's** *Annual Compliance Report Guidelines* (2014);

iv. include a shapefile of any clearance of any **protected matters**, or their habitat, undertaken within the relevant 12 month period; and

v. annexing a schedule of all **plans** prepared and in existence in relation to the conditions during the relevant 12 month period.

Construction means the erection of a building or structure that is or is to be fixed to the ground and wholly or partially fabricated on-site; the alteration, maintenance, repair or demolition of any building or structure; preliminary site preparation work which involves breaking of the ground (including pile driving); the laying of pipes and other prefabricated materials in the ground, and any associated excavation work; but excluding the installation of fences and signage.

Department means the Australian Government agency responsible for administering the **EPBC Act**.

Department's EPBC Act Environmental Offsets Policy means the Department of Sustainability, Environment, Water, Population and Communities (2012) *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* available on the Department's website at: http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy

EPBC Act means the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

EPBC Act listed species means the EPBC Act listed Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), Sandplain Duck Orchid (*Paracleana dixonii*), Star Sun Orchid (*Thelymitra stellata*) and Yandanooka Mallee (*Eucalyptus crispata*).

EPBC Regulations means the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth).

Foraging habitat means foraging habitat for the **Carnaby' Black Cockatoo** as identified in the Department of Sustainability, Environment, Water, Population and Communities (2012) *EPBC Act referral guidelines for three threatened black cockatoo species* available on the Department's website at: http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-three-threatened-black-cockatoo-species-carnabys-cockatoo

Incident means any event which has the potential to, or does, impact on **protected matter(s)**.

Independent audit: means an audit conducted by an independent and **suitably qualified person** as detailed in the *Environment Protection and Biodiversity Conservation Act 1999 Independent Audit and Audit Report Guidelines* (2015).

Monitoring data means the data required to be recorded under the conditions of this approval.

Minister means the Australian Government Minister administering the **EPBC Act** including any delegate thereof.

Plan(s) means any of the documents required to be prepared, approved by the **Minister**, and/or implemented by the approval holder and published on the **website** in accordance with these conditions (includes action management plans and/or strategies).

Protected matter means a matter protected under a controlling provision in Part 3 of the **EPBC Act** for which this approval has effect.

Sensitive ecological data means data as defined in the Australian Government Department of the Environment (2016) *Sensitive Ecological Data – Access and Management Policy V1.0.*

Shapefile means location and attribute information of the action provided in an Esri shapefile format. Shapefiles must contain '.shp', '.shx' , '.dbf' files and a '.prj' file that specifies the projection/geographic coordinate system used. Shapefiles must also include an '.xml' metadata file that describes the shapefile for discovery and identification purposes.

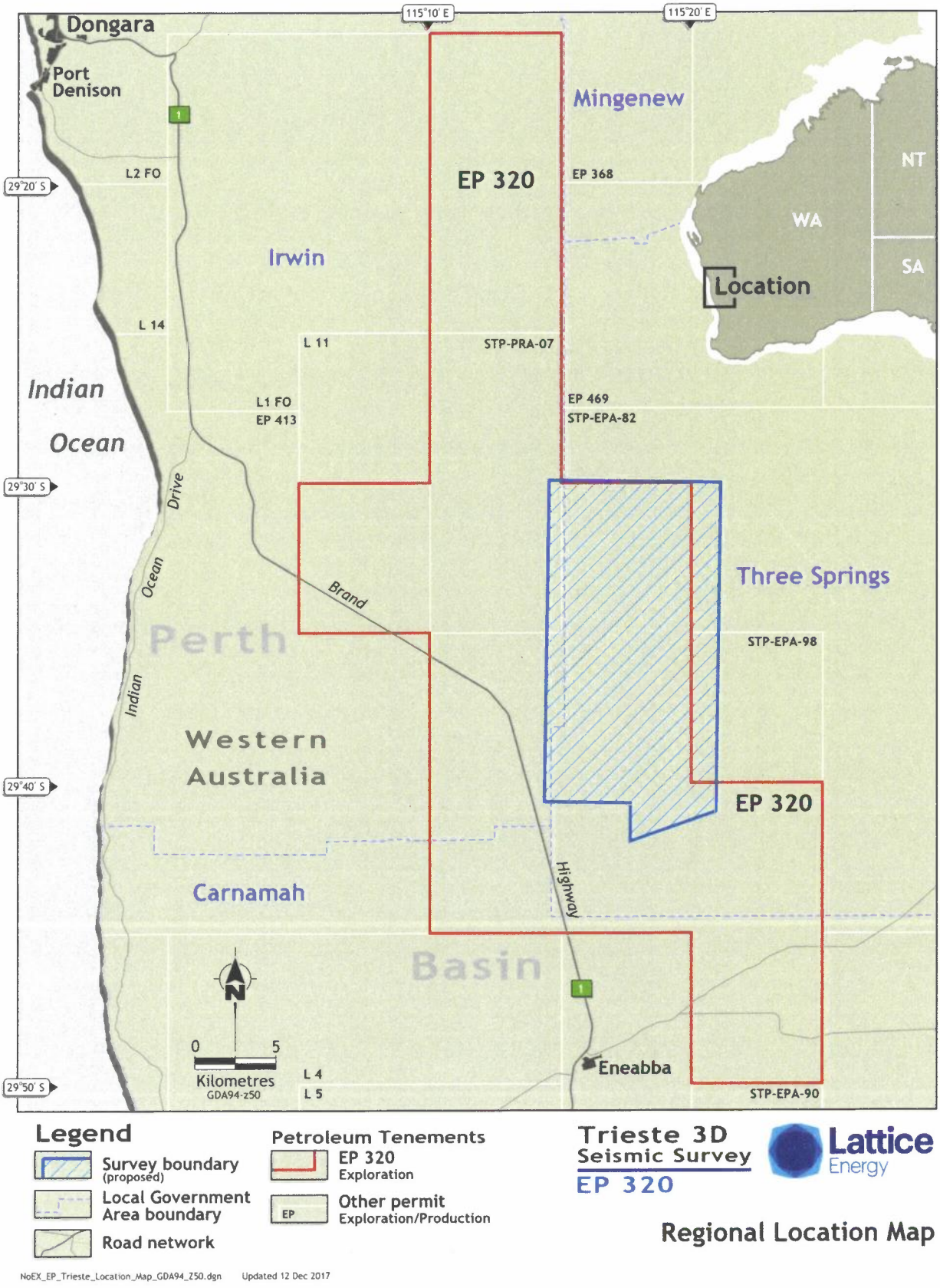
Suitably qualified person means a person who has professional qualifications, training, skills and/or experience related to the nominated subject matter and can give authoritative independent assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods and/or literature.

Website means a set of related web pages located under a single domain name attributed to the approval holder and available to the public.

Western Australian Clearing Permit (8171/1) means the Western Australian Clearing Permit (8171/1) granted by the Government of Western Australia under section 51E of the *Environment Protection Act 1986 (WA)* on 9 May 2019.

ATTACHMENTS

1. **Attachment A: Map of survey boundary**



Appendix B Variation of EPBC Conditions.

Australian Government
Department of Agriculture, Water and the Environment

VARIATION OF CONDITIONS ATTACHED TO APPROVAL
Trieste 3D Seismic Survey, near Eneabba, Western Australia (EPBC 2017/8133)

This decision to vary conditions of approval is made under section 143 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Approved action

Person to whom the approval is granted	Lattice Energy Limited ACN: 007 845 338
Approved action	To undertake an onshore three-dimensional (3D) seismic survey near Eneabba in the North Perth Basin, mapping geological formations to assist in the search for conventional gas reserves [See EPBC Act referral 2017/8133]

Variation

Variation of conditions attached to approval	The variation is: Delete conditions 1, 4 and 10 attached to the approval and substitute with the conditions specified in the table below. Add new definitions of DBCA specified in the table below.
Date of effect	This variation has effect on the date the instrument is signed.

Person authorised to make decision

Name and position	Declan O'Connor-Cox Assistant Secretary Assessments (Vic, Tas) and Post Approvals Branch
Signature	
Date of decision	12 February 2021

Date of decision	Part A - Conditions specific to the action
As varied on the date this instrument was signed	1. The approval holder must not clear more than 54.36 ha of **foraging habitat** for the **Carnaby's Black Cockatoo** within the survey boundary (map at Attachment A).
Original dated 11/02/2019	2. To minimise the impacts of the action on **EPBC Act listed species,** the approval holder must implement condition 8 of the **Western Australian Clearing Permit (8171/1)** for the life of the approval from the **commencement of the action.**
Original dated 11/02/2019	3. To minimise the impacts of the action on **foraging habitat** for the **Carnaby's Black Cockatoo,** the approval holder must implement condition 10 (relating to rehabilitation) of the **Western Australian Clearing Permit (8171/1).** The objective of rehabilitation works is to re-establish a self-sustaining vegetation cover, integrated with the surrounding ecosystem, providing **foraging habitat** for the **Carnaby's Black Cockatoo.** a. The approval holder must continue rehabilitation works until the **Department** has provided written acceptance of a report by a **suitably qualified person** certifying and providing evidence that all of the **completion criteria** have been met. b. Following submission to the **Department** of the certified report demonstrating that the **completion criteria** have been achieved in accordance with condition 3(a), the **suitably qualified expert** must monitor the rehabilitation area at least once every two years, during spring, for the life of the approval with sufficient effort to reliably ascertain whether the **completion criteria** continue to be met or exceeded. c. If the monitoring undertaken in accordance with condition 3(b) determines that any of the **completion criteria** are no longer being met, the approval holder must, within 3 months of becoming aware that any of the **completion criteria** are no longer being met, commence undertaking corrective actions and continue these until the **Department** has provided written acceptance of a report by a **suitably qualified person** certifying and providing evidence that all the **completion criteria** have again been met.
As varied on the date this instrument was signed	4. To compensate for the loss of up to 54.36 ha of **foraging habitat** for the **Carnaby's Black Cockatoo,** the approval holder must provide an offset of 338 ha within Lot 10333 Watheroo Road, Boothendarra (map at Attachment B) and, by 3 May 2021: a. provide written evidence to the **Department** that a financial contribution has been made to **DBCA** for the purchase, and management for the period of effect of approval, of the offset specified in condition 4; and b. provide the **Department** with the offset attributes, **shapefiles,** textual descriptions and maps to clearly define the location and boundaries of the offset.

Date of decision	Part B – Standard administrative conditions
Original dated 11/02/2019	**Notification of date of commencement of the action** 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.**
Original dated 11/02/2019	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.**
Original dated 11/02/2019	**Annual compliance reporting** 7. The approval holder must prepare a **compliance report** for each 12 month period following the date of **commencement of the action,** or as otherwise 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** within five **business days** of the date of publication, and provide a link to 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. **Note: Compliance reports** may be published on the **Department's** website.
Original dated 11/02/2019	**Reporting non-compliance** 8. 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. the condition which is or may be in breach; b. a short description of the **incident** and/or non-compliance; and c. the location (including co-ordinates), date and time of the incident and/or non-compliance.
Original dated 11/02/2019	9. 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.

Date of decision	Part B – Standard administrative conditions
As varied on the date this instrument was signed	**Independent audit** 10. The approval holder must ensure that **independent audits** of compliance with the conditions are conducted as requested in writing by the **Minister.**
Original dated 11/02/2019	11. 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 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.
Original dated 11/02/2019	12. 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.
Original dated 11/02/2019	**Completion of the action** 13. Within 30 days after the **completion of the action,** the approval holder must notify the **Department** in writing and provide **completion data.**

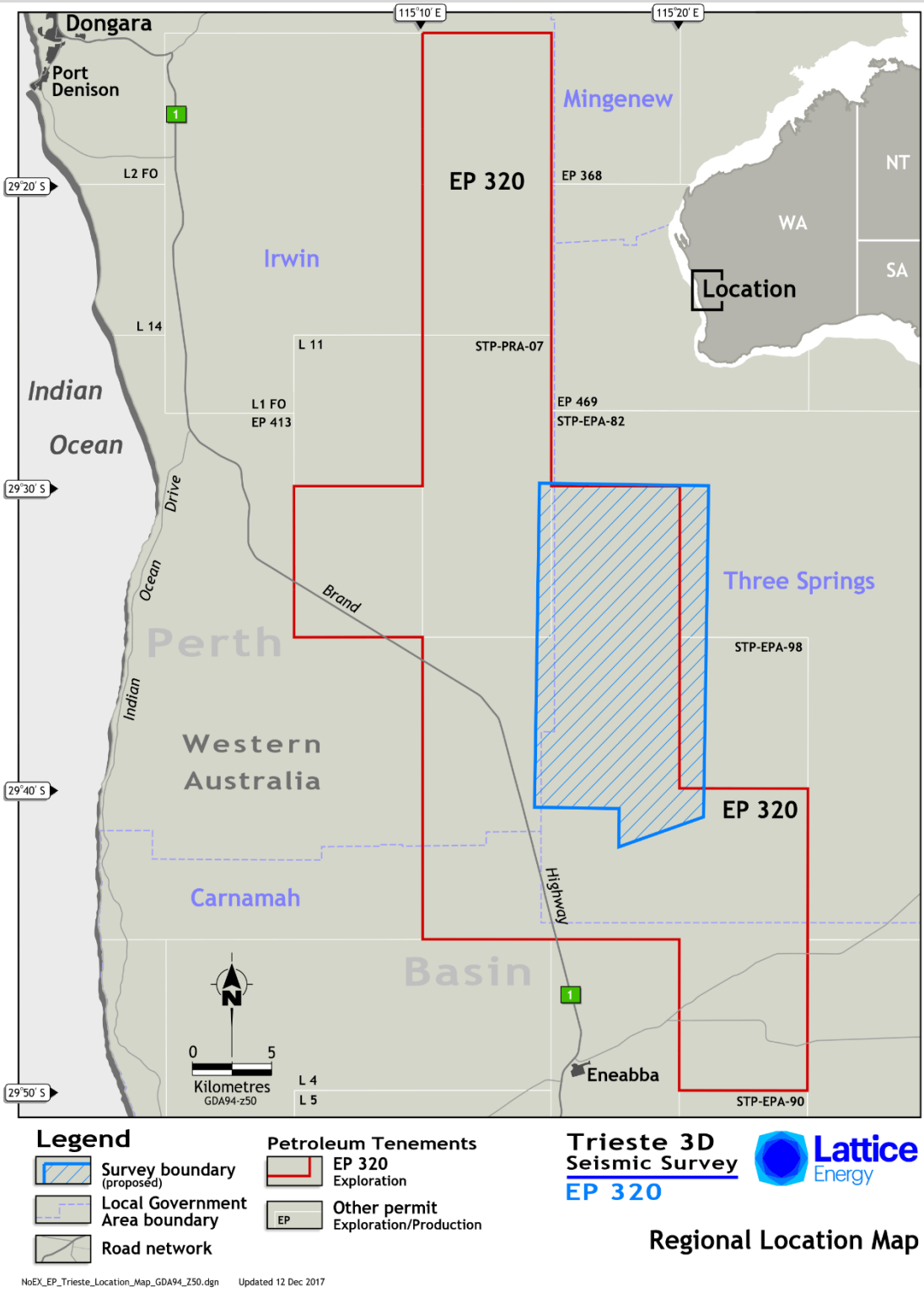
Date of decision	Part C - Definitions attached to approval
Original dated 11/02/2019	In these conditions, except where contrary intention is expressed, the following definitions are used: **Approved conservation fund** is a conservation fund approved by the **Department** for the purpose of providing long-term management and improvement of **foraging habitat** for the **Carnaby's Black Cockatoo.**
Original dated 11/02/2019	**Business days** means a day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.
Original dated 11/02/2019	**Carnaby's Black Cockatoo** means the EPBC Act listed Carnaby's Black Cockatoo (*Calyptorhynchus latirostris).*
Original dated 11/02/2019	**Clear** means the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of vegetation.
Original dated 11/02/2019	**Commencement of the action** means the first instance of any specified activity associated with the action including clearance of vegetation and **construction** of any infrastructure. **Commencement of the action** does not include minor physical disturbance necessary to: i. undertake pre-clearance surveys or monitoring programs; ii. install signage and /or temporary fencing to prevent unapproved use of the project area; and iii. protect environmental and property assets from fire, weeds and feral animals, including erection or **construction** of fencing and signage, and maintenance or use of existing surface access tracks, if agreed in writing by the **Department.**
Original dated 11/02/2019	**Completion criteria** are the completion criteria identified in Mattiske Consulting Pty Ltd (2018). *Proposed seismic line rehabilitation monitoring methodology.*

Date of decision	Part C - Definitions attached to approval
Original dated 11/02/2019	**Completion data** means an environmental report and spatial data information clearly detailing how the conditions of this approval have been met. The **Department's** preferred spatial data format is shapefile.
Original dated 11/02/2019	**Completion of the action** means all specified activities associated with the action have permanently ceased.
Original dated 11/02/2019	**Compliance records** means all documentation or other material in whatever form required to demonstrate compliance with the conditions of approval in the approval holder's possession or that are within the approval holder's power to obtain lawfully.
Original dated 11/02/2019	**Compliance reports** means written reports: i. providing accurate and complete details of compliance, **incidents,** and non-compliance with these approval conditions and commitments in the **plans;** ii. details of contingency measures or corrective actions that have been or will be implemented; iii. consistent with the **Department's** *Annual Compliance Report Guidelines* (2014); iv. include a shapefile of any clearance of any **protected matters,** or their habitat, undertaken within the relevant 12 month period; and v. annexing a schedule of all **plans** prepared and in existence in relation to the conditions during the relevant 12 month period.
Original dated 11/02/2019	**Construction** means the erection of a building or structure that is or is to be fixed to the ground and wholly or partially fabricated on-site; the alteration, maintenance, repair or demolition of any building or structure; preliminary site preparation work which involves breaking of the ground (including pile driving); the laying of pipes and other prefabricated materials in the ground, and any associated excavation work; but excluding the installation of fences and signage.
As varied on the date this instrument was signed	**DBCA** means the Western Australian Department of Biodiversity, Conservation and Attractions.
Original dated 11/02/2019	**Department** means the Australian Government agency responsible for administering the **EPBC Act.**
Original dated 11/02/2019	**Department's EPBC Act Environmental Offsets Policy** means the Department of Sustainability, Environment, Water, Population and Communities (2012) *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* available on the Department's website at: http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy
Original dated 11/02/2019	**EPBC Act** means the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).
Original dated 11/02/2019	**EPBC Act listed species** means the EPBC Act listed Carnaby's Black Cockatoo *(Calyptorhynchus latirostris),* Sandplain Duck Orchid *(Paracleana dixonii),* Star Sun Orchid *(Thelymitra stellata)* and Yandanooka Mallee *(Eucalyptus crispata).*
Original dated 11/02/2019	**EPBC Regulations** means the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth).

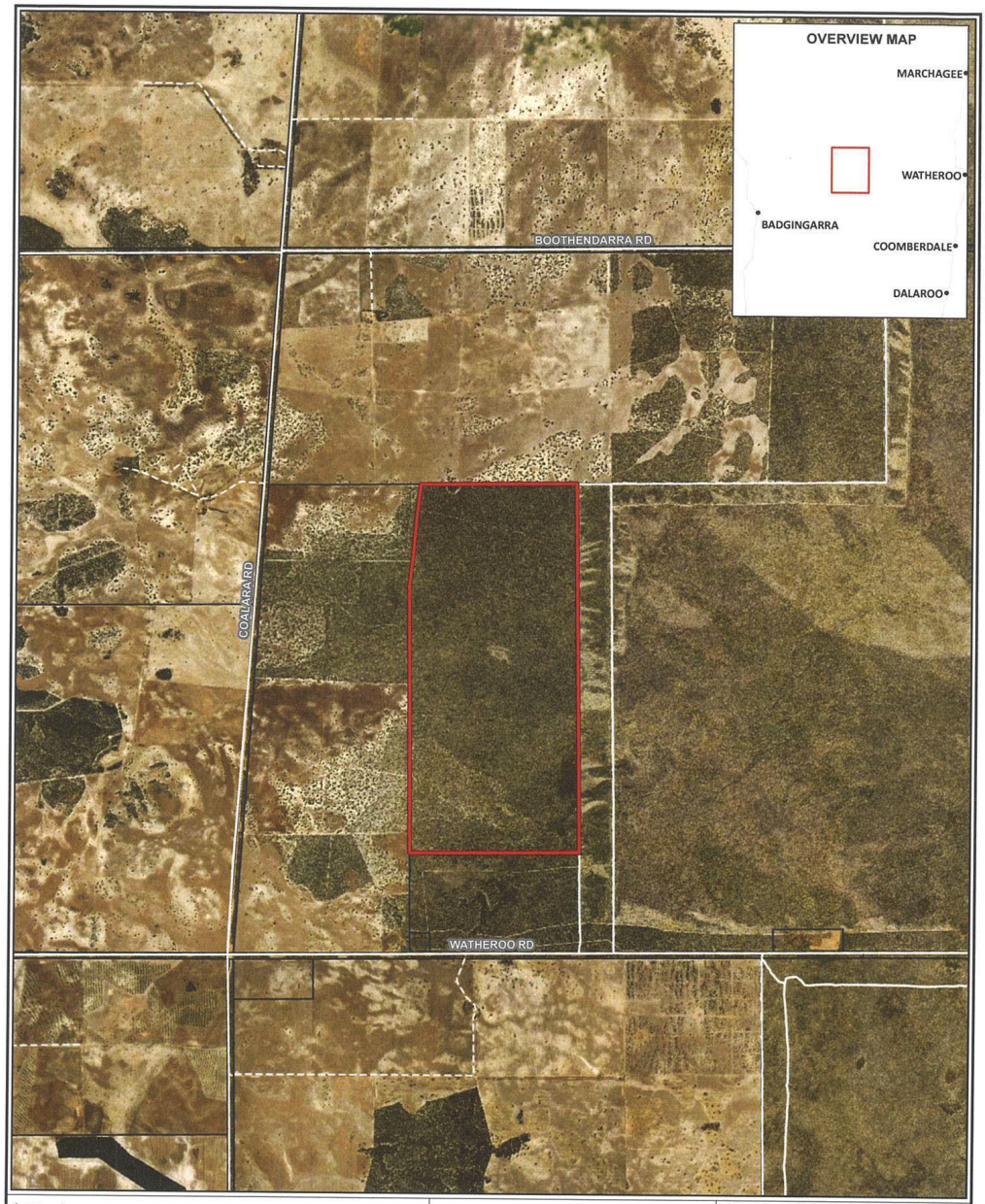
Date of decision	Part C - Definitions attached to approval
Original dated 11/02/2019	**Foraging habitat** means foraging habitat for the **Carnaby' Black Cockatoo** as identified in the Department of Sustainability, Environment, Water, Population and Communities (2012) *EPBC Act referral guidelines for three threatened black cockatoo species* available on the Department's website at: http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-three-threatened-black-cockatoo-species-carnabys-cockatoo
Original dated 11/02/2019	**Incident** means any event which has the potential to, or does, impact on **protected matter(s).**
Original dated 11/02/2019	**Independent audit:** means an audit conducted by an independent and **suitably qualified person** as detailed in the *Environment Protection and Biodiversity Conservation Act 1999 Independent Audit and Audit Report Guidelines* (2015).
Original dated 11/02/2019	**Monitoring data** means the data required to be recorded under the conditions of this approval.
Original dated 11/02/2019	**Minister** means the Australian Government Minister administering the **EPBC Act** including any delegate thereof.
Original dated 11/02/2019	**Plan(s)** means any of the documents required to be prepared, approved by the **Minister,** and/or implemented by the approval holder and published on the **website** in accordance with these conditions (includes action management plans and/or strategies).
Original dated 11/02/2019	**Protected matter** means a matter protected under a controlling provision in Part 3 of the **EPBC Act** for which this approval has effect.
Original dated 11/02/2019	**Sensitive ecological data** means data as defined in the Australian Government Department of the Environment (2016) Sensitive Ecological Data – Access and Management Policy V1.0
Original dated 11/02/2019	**Shapefile** means location and attribute information of the action provided in an Esri shapefile format. Shapefiles must contain '.shp', '.shx', '.dbf' files and a '.prj' file that specifies the projection/geographic coordinate system used. Shapefiles must also include an '.xml' metadata file that describes the shapefile for discovery and identification purposes.
Original dated 11/02/2019	**Suitably qualified person** means a person who has professional qualifications, training, skills and/or experience related to the nominated subject matter and can give authoritative independent assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods and/or literature.
Original dated 11/02/2019	**Website** means a set of related web pages located under a single domain name attributed to the approval holder and available to the public.
Original dated 11/02/2019	**Western Australian Clearing Permit (8171/1)** means the Western Australian Clearing Permit (8171/1) granted by the Government of Western Australia under section 5IE of the *Environment Protection Act 1986 (WA)* on 9 May 2019.

Date of decision
Original dated 11/02/2019

Attachment A: Map of survey boundary



Date of decision	**Attachment B: Map of survey boundary**
As varied on the date this instrument was signed	ATTACHMENT B



Appendix C 2020 Rehabilitation Assessment, Trieste 3D Seismic Project, Arrowsmith

Rehabilitation Assessment Trieste 3D Seismic Project, Arrowsmith. Prepared by Mattiske Consulting Pty Ltd for Beach Energy Ltd, January 2021.

REHABILITATION ASSESSMENT

TRIESTE 3D SEISMIC PROJECT,

ARROWSMITH

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Beach Energy Limited

Date

January 2021




DOCUMENT STATUS				
DOCUMENT REFERENCE: BEP2002/028/2020				
VERSION	**TYPE**	**AUTHOR/S**	**REVIEWER/S**	**DATE DISTRIBUTED**
V1	Internal review	R. Dayrell	S. Ruoss	-
V2	Draft for client	R. Dayrell	E.M. Mattiske	18/12/2020
V3	Client review	R. Dayrell / L Cockram	E.M. Mattiske	13/01/2021

(ACN 063 507 175, ABN 39 063 507 175)

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LIST OF ABBREVIATIONS

BAM Act:	*Biosecurity and Agriculture Management Act 2007* (WA)
BC Act:	*Biodiversity Conservation Act 2016* (WA)
BOM:	Bureau of Meteorology
DAWE:	Department of the Environment and Energy
DBCA:	Department of Biodiversity, Conservation and Attractions
DPaW:	Department of Parks and Wildlife (now under DBCA)
DPIRD:	Department of Primary Industries and Regional Development (includes Agriculture and Food)
EP Act:	*Environmental Protection Act 1986* (WA)
EPA:	Environmental Protection Authority
EPBC Act:	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
IBRA:	Interim Biogeographical Regionalisation for Australia
MCPL:	Mattiske Consulting Pty Ltd
WAH:	Western Australian Herbarium (PERTH)
WAOL:	Western Australian Organism List
WC Act:	*Wildlife Conservation Act 1950* (WA) (superseded by BC Act as of 01 January 2010)

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd was commissioned in September 2020 by Beach Energy Limited to establish a series of rehabilitation transects and monitor these transects and their respective analogues within the Trieste 3D Seismic survey area, which lies east of the Brand Highway between the towns Eneabba and Dongara, Western Australia. A large portion of the Trieste 3D Seismic survey area is Unallocated Crown Land in which vegetation monitoring was undertaken to assess the progress of regrowth after seismic activities, which took place at the end of 2019 and beginning of 2020. In October 2020, rehabilitation transects were established in disturbed sites adjacent to pre-established analogue transects to evaluate impact and recovery of native vegetation along source and receiver lines.

A total of 282 vascular plant taxa, representative of 122 genera and 46 families, were recorded within the Trieste 3D Seismic survey area transects. The majority of taxa recorded were representative of the Proteaceae (45 taxa), Myrtaceae (42 taxa) and Fabaceae (27 taxa) families.

No threatened flora species were recorded within the Trieste 3D Seismic survey area transects. Seven priority flora taxa were recorded within the survey area: *Tricoryne soullierae* (P1), *Banksia fraseri* var. *crebra* (P3), *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3), *Hypocalymma gardneri* (P3), *Mesomelaena stygia* subsp. *deflexa* (P3), *Stylidium drummondianum* (P3) and *Banksia scabrella* (P4). Two potential priority species *Persoonia* ?*filiformis* (P3) and *Conostephium* ?*magnum* (P4) were also recorded within the survey area. Four priority taxa were recorded in both analogue and rehabilitation transects.

Four introduced species considered environmental weeds were recorded within the Trieste 3D Seismic survey area in October 2020. None of these species are declared pests (s22) pursuant to the Biosecurity and Agriculture Management Act 2007. Since no weeds had been recorded in the analogue transects in 2019, the rehabilitation transects failed to meet the target of no new introduction of declared or environmental weeds into operational areas within 12 months. As the weeds recorded in 2020 are short-lived annuals it is expected that as the native foliage cover increases on the rehabilitated areas these species will reduce in numbers and cover.

All rehabilitation transects exceeded the recommended completion criteria target of 20% perennial species richness compared with the adjacent analogue transects within 12 months. Nine out of eleven rehabilitation transects met the recommended completion criteria target of 10% foliage cover of perennial species compared with the adjacent analogue transects within 12 months. Transects 9R and 11S did not meet the met completion criteria for perennial foliage cover.

In conclusion, results have shown that rehabilitation transects along source and receiver lines within the Trieste 3D seismic survey area retained a high number of perennial species richness, including four of the priority taxa, and that perennial species foliage cover shows early signs of recovery. Further disturbance along source and receiver lines should be prevented to avoid spread of the weeds and to allow for the recovery of perennial foliage cover. It is recommended that further monitoring is

undertaken at 24 months and 5 years to ensure the introduced species decrease when native foliage increases and to monitor the recovery of species richness and foliage cover of native species.

1. INTRODUCTION

Mattiske Consulting Pty Ltd (MCPL) was commissioned in September 2020 by Beach Energy Limited to establish a series of rehabilitation transects and monitor these transects and their respective analogues within the Trieste 3D Seismic survey area. More specifically, this survey outlines the methodology and results from rehabilitation assessment conducted in October 2020 along and adjacent to Source and Receiver lines within the Trieste 3D Seismic Project area, located within EP320.

1.1. Location and Scope of Project

The Trieste 3D Seismic survey area lies within the Irwin Botanical District of the South-West Botanical Province (Beard, 1990), east of the Brand Highway between the towns Eneabba and Dongara, Western Australia. The Trieste 3D Seismic Project covers 21,820 ha, and includes areas of native vegetation, a small portion of Nature Reserve (R 25495) and a section of the Arrowsmith River, with remnant vegetation patches and large areas on private properties (Figure 1). The Unallocated Crown Land (UCL; accessible by Correy Road) formed the focus area in which analogue transects were established in August 2019 to characterise the area and provide baseline information prior to disturbance by 3D Seismic survey along source and receiver line, which took place at the end of 2019 and beginning of 2020. In October 2020, rehabilitation transects were established in disturbed sites adjacent to analogue transects to evaluate impact and recovery of native vegetation along source and receiver lines. Assessing the progress of regrowth after seismic activities through comparisons with analogue sites can allow for progressive improvements and remedial actions to be undertaken in management practices.

1.2. Environmental Legislation and Guidelines

The following key Commonwealth (federal) legislation relevant to this survey is the:

- *Environment Protection and Biodiversity Conservation Act 1999.*

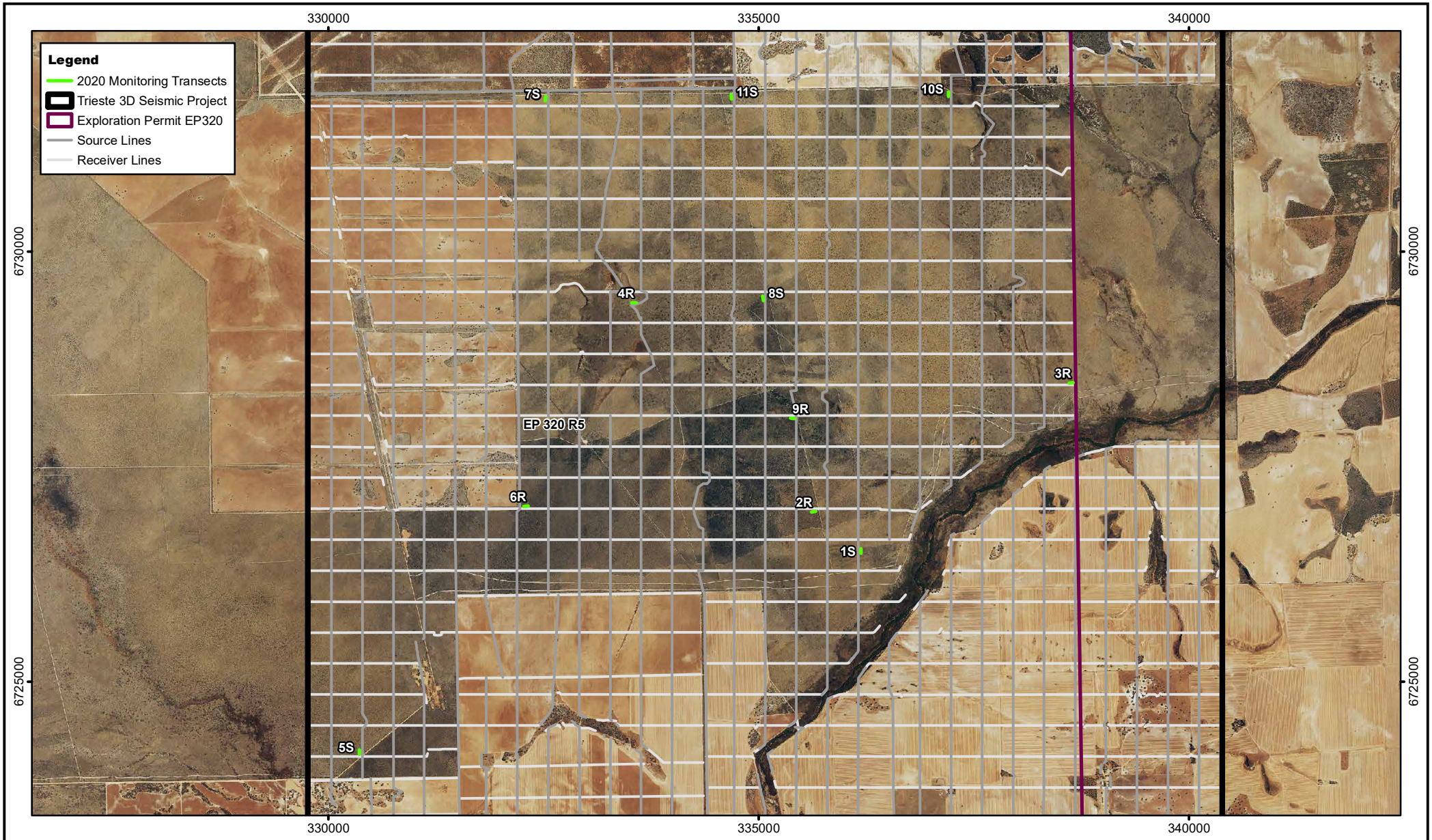
The following key Western Australian (state) legislation relevant to this survey include the:

- *Biodiversity Conservation Act 2016* (BC Act);
- *Biosecurity and Agriculture Management Act 2007* (BAM Act); and
- *Environmental Protection Act 1986* (EP Act).

Furthermore, key Western Australian guidelines relevant to this survey are the:

- *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority [EPA] 2016a);
- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b); and

Source:



Client: BEACH ENERGY

N

0 0.75 1.5km

Scale: 1:60,000
MGA94 (Zone 50)

CAD Ref: a2505F005

Date: December 2020 | Rev: A | A4

Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640
Author: E M Matttiske | MCPL Ref: BEP2002/028/20
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

Trieste 3D Seismic Survey
Transects
December 2020

Figure: 1

2. BACKGROUND

2.1. Regional Context

The Trieste 3D Seismic survey area lies within the Irwin Botanical District of the South-West Botanical Province (Beard, 1990). More recently, the vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographical Regionalisation for Australia – IBRA (Version 7), with the survey area being within the Lesueur Sandplain sub region of the Geraldton Sandplains Bioregion (DAWE 2020a).

2.2. Climate

Beard (1990) described the climate of the Northern Sandplains as dry, warm Mediterranean. The area has a winter precipitation of 300-500 mm and 7-8 dry months per year. Rainfall and temperature data for Eneabba is no longer available due to the closing of the Eneabba weather station, therefore rainfall data from Green Grove and long-term temperature data from Carnamah (Bureau of Meteorology – BOM, 2020) are illustrated in Figure 2. Below average rainfall was recorded in the beginning of the wet season prior to the survey (May and June 2020; 82 mm cf. 181 mm) while August 2020 rainfall was 33.8 mm above average (Figure 2).

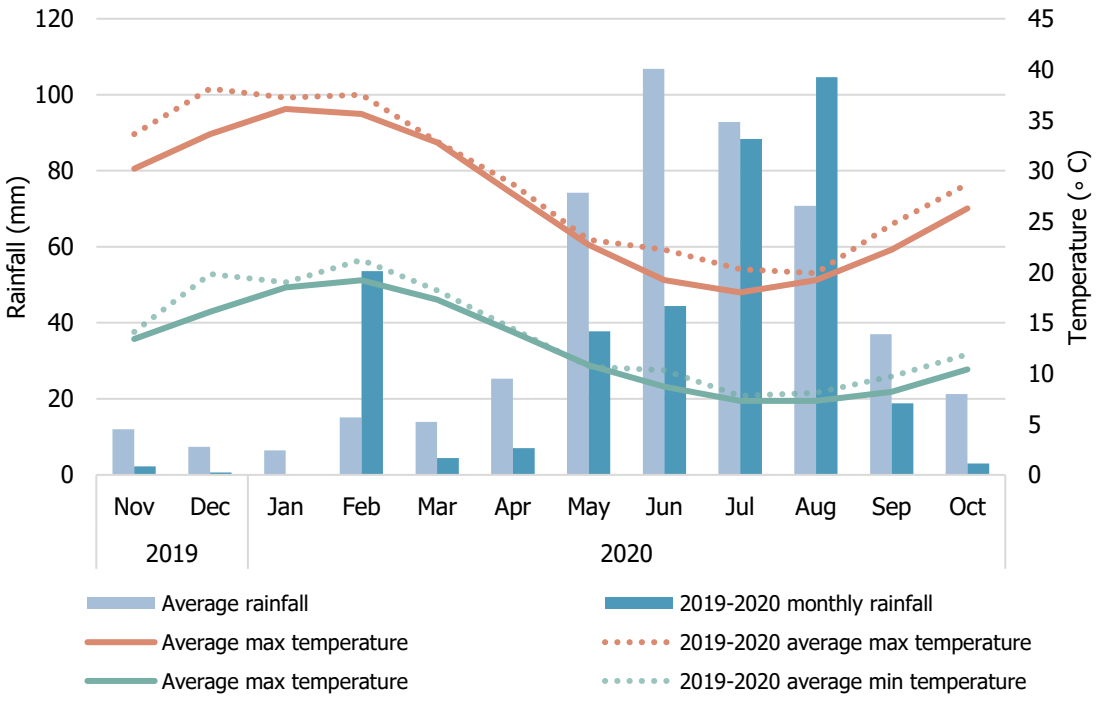


Figure 2: Rainfall and temperature data for Trieste 3D Seismic survey area

Note: Long-term average monthly rainfall (1951-2020) for Green Grove and temperature (1940-2020) for Carnamah, together with monthly rainfall and temperature data for the period of November 2019 to October 2020 (BOM, 2020).

2.3. Soils and Topography

The Trieste 3D Seismic survey area is located within the Lesueur Sandplain sub region of the Geraldton Sandplains Bioregion (IBRA Version 7; DAWE, 2020a). The system present in the 3D Seismic survey area is the Eridoon system, which occupies a flat coastal plain between coastal limestone deposits and the Pleistocene shoreline. The extensive, undulating, lateritic sandplains mantling Permian to Cretaceous strata (Desmond and Chant 2001), consist of yellow sand that has been blown into ridges, with lakes and swamps in the depressions (Beard, 1976).

3. OBJECTIVES

The aim of this survey was to undertake flora and vegetation monitoring of transects within the Trieste 3D Seismic survey area to compare botanical values of rehabilitation areas with those of analogue sites. Specifically, the objectives were to:

- Establish a series of rehabilitation transects in impacted areas, adjacent to analogue transects previously established in 2019, along source and receiver lines within the Trieste 3D Seismic survey area;
- Collect and identify vascular plant species present within analogue and rehabilitation transects;
- Review the conservation status of the vascular plant species recorded by reference to current literature and current listings by the Department of Biodiversity Conservation and Attractions and plant collections held at the Western Australian Herbarium (WAH 1998-) and listed by the Department of the Environment and Energy (2019) under the *Environment Protection and Biodiversity Conservation Act 1999*;
- Review the management status of vascular plant species recorded with reference to the *Biosecurity and Agriculture Management Act 2007* (Department of Primary Industries and Regional Development, 2020) and Environmental Weed Strategy for WA (Department of Parks and Wildlife, 2013);
- Assess each site for species richness and foliage cover; and
- Prepare a report summarising the findings.

4. METHODS

4.1. Field Survey

Establishment of rehabilitation transects and monitoring of rehabilitation and analogue transects in the Trieste 3D Seismic survey area were undertaken by four experienced botanists from MCPL, between the 20th and 23th of October 2020, in accordance with methods outlined in *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA, 2016b). All botanists held valid collection licences to collect flora for scientific purposes, issued under the BC Act.

Eleven rehabilitation transects (6 along sources lines; 5 along receiver lines) were established and monitored along with analogue transects within the Trieste 3D Seismic survey area. Transects' locations were selected through field reconnaissance to capture a variety of plant communities. Transect 4R was relocated to the closest disturbed area, 2.3 km away from the transect monitored in August 2019, as no disturbance had taken place on the adjacent receiver line in that specific location (333341 E/ 6729920 N, GDA94_50J). Transect locations are displayed in Table 1 and Figure 1. Photographs taken at the start and end of each transect are displayed in Appendix B.

Table 1: Location of transects monitored in the Trieste 3D Seismic survey area, October 2020

Note: S=source line, R=receiver line

Transect	Analog / Rehabilitation	Start (GDA94_50J)		End (GDA94_50J)	
		Easting	Northing	Easting	Northing
1S	Analogue				
	Rehabilitation				
2R	Analogue				
	Rehabilitation				
3R	Analogue				
	Rehabilitation				
4R	Analogue				
	Rehabilitation				
5S	Analogue				
	Rehabilitation				
6R	Analogue				
	Rehabilitation				
7S	Analogue				
	Rehabilitation				
8S	Analogue				
	Rehabilitation				
9R	Analogue				
	Rehabilitation				
10S	Analogue				
	Rehabilitation				
11S	Analogue				
	Rehabilitation				

All plant specimens collected during the field surveys were dried and processed in accordance with the requirements of the WAH. The plant species were identified based on taxonomic literature and through comparison with pressed specimens housed at the WAH. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded is in accordance with the WAH (1998-). Definitions of flora and vegetation terminology commonly used throughout this report are provided in Appendix A.

4.2. Sampling and Transect Design

Transect and quadrat layout is specified below:

- Analogue transects were established in August 2019 parallel to Source and Receiver lines, at least 20 m away in representative vegetation.
- Rehabilitation transects were established in October 2020 in sites along source and receiver lines disturbed by 3D Seismic survey, adjacent to analogue transects.
- Each 50 m transect made up of 10, 2 x 2 m quadrats spaced at 5 m intervals on the right-hand side of the transect. Photographs taken from the 'start' of transects (Appendix B; metal stakes indicate start and end points of each transect).

The layout of transects is displayed below in Figure 3.

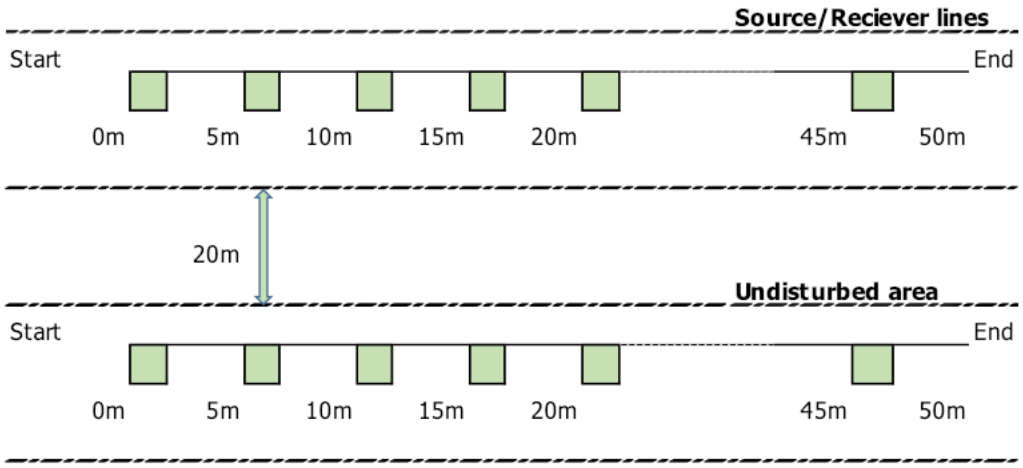


Figure 3: Layout of transects established and monitored in the Trieste 3D seismic survey area, October 2020

The parameters recorded at each transect included: GPS location of start and end of transect; photo at start and end of transect. The floristic parameters recorded at each 2 x 2 m quadrat included: the percentage of alive and dead foliage (vegetation) cover of each taxa; number of alive and dead plants of each taxa and average height of each taxa.

4.3. Data analysis

Temporal and spatial comparisons were made between rehabilitation and analogue transects, including weed abundance and indicators of regrowth (species richness and foliage cover). The completion criteria are summarised in Table 2 below following the Guidance Statement No. 6 (Environmental Protection Authority, 2006).

Table 2: Summary of the rehabilitation criteria for flora and vegetation

Measurement to monitor	Completion Criteria
Weeds	No new introduction of declared[1] or environmental[2] weeds into operational areas within 12 months.
Perennial species richness	20% of perennial species richness compared with adjacent areas of native vegetation within 12 months. 40% of perennial species richness in adjacent areas of native vegetation within 24 months.
% Foliage cover of perennial species	10% foliage cover of perennial native species compared with adjacent areas of native vegetation within 12 months. 20% foliage cover of perennial native species compared with adjacent areas of native vegetation within 24 months. 40% foliage cover of perennial native species compared with adjacent areas of native vegetation within 5 years.

[1]Declared organism list (Department of Primary Industries and Regional Development, 2020)
[2]Environmental Weed Ranking: *Environmental Weed Strategy for W.A.* (Department of Parks and Wildlife, 2013)

5. FIELD SURVEY RESULTS

5.1. Flora

A total of 282 vascular plant taxa, representative of 122 genera and 46 families, were recorded within the Trieste 3D Seismic survey area transects. The majority of taxa recorded were representative of the Proteaceae (45 taxa), Myrtaceae (42 taxa) and Fabaceae (27 taxa) families (see Appendix C for a complete species list).

5.1.1. Threatened and Priority Flora

No threatened flora species pursuant to Part 2, Division 1, Subdivision 2 of the BC Act and as listed by DBCA (2018a), or pursuant to section 179 of the EPBC Act or listed by the DAWE (2020b), were recorded within the Trieste 3D Seismic survey area transects.

Seven priority flora species, as listed by DBCA (2018b), were recorded within the Trieste 3D Seismic survey area transects (see Appendix D for numbers and locations). One Priority 1 taxon (*Tricoryne soullierae*), five Priority 3 taxa (*Banksia fraseri* var. *crebra*, *Hemiandra* sp. Eneabba (H. Demarz 3687), *Hypocalymma gardneri, Mesomelaena stygia* subsp. *deflexa* and *Stylidium drummondianum*) and one Priority 4 taxon (*Banksia scabrella*). Two potential priority species, *Persoonia* ?*filiformis* (Priority 3) and *Conostephium* ?*magnum* (Priority 4), were also recorded within the survey area, but lacked required taxonomic features at the time of collection to confirm identification. A brief description of these taxa is provided below:

PRIORITY 1:

***Tricoryne soullierae* (P1) – HEMEROCALLIDACEAE –** *Tricoryne soullierae* (P1) is a sprawling herb with a perennial rootstock. It has been recorded with yellow flowers in an umbel during October. This species has been found on rises and upper slopes in yellow sandy soils and has a restricted distribution in remnant vegetation in the northern Wheatbelt (Macfarlane & Keighery, 2015). WAH houses 3 specimens of *Tricoryne soullierae* (P1) from the Avon Wheatbelt (WAH 1998-)

PRIORITY 3:

***Banksia fraseri* var. *crebra* (P3) – PROTEACEAE –** *Banksia fraseri* var. *crebra* (P3) is a shrub growing to 60 cm high. It produces yellow/green flowers and has been recorded as flowering in April to September. It grows in white, grey, yellow or red sand, gravel, laterite or granite. WAH houses 16 specimens of *Banksia fraseri* var. *crebra* (P3) from the Geraldton Sandplains and Swan Coastal Plain (WAH 1998-).

***Hemiandra* sp. Eneabba (H. Demarz 3687) (P3) – LAMIACEAE –** *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3) is a straggly erect shrub growing to 90 cm high. It produces blue/violet flowers and has been recorded as flowering in February. It grows in yellow/grey sand on flat land sometimes associated with disturbance. WAH houses 35 specimens of *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3) from the Geraldton Sandplains (WAH 1998-).

Plate 1: *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3)

***Hypocalymma gardneri* (P3) – MYRTACEAE –** *Hypocalymma gardneri* (P3) is a shrub growing to 30 cm high. It produces yellow flowers and has been recorded as flowering in August to September. It grows in grey-brown sand and laterite on sandplains, upper slopes and heathland. WAH houses 22 specimens of *Hypocalymma gardneri* (P3) from the Geraldton Sandplains (WAH 1998-).

Plate 2: *Hypocalymma gardneri* (P3)

***Mesomelaena stygia* subsp. *deflexa* (P3) – CYPERACEAE –** *Mesomelaena stygia* subsp. *deflexa* (P3) is a tufted perennial sedge to 50 cm high. It produces brown-black flowers and has been recorded as flowering in March to October. It grows in white, grey or lateritic sand. WAH houses 29 specimens of *Mesomelaena stygia* subsp. *deflexa* (P3) from the Geraldton Sandplains (WAH 1998-).

Plate 3: *Mesomelaena stygia* subsp. *deflexa* (P3)

***Persoonia* ?*filiformis* (P3) – PROTEACEAE –** *Persoonia* ?*filiformis* (P3) is an erect spreading shrub to 40 cm high. It produces yellow flowers and has been recorded as flowering in November to December. It grows in yellow or white sand over laterite. WAH houses 24 specimens of *Persoonia* ?*filiformis* (P3) from the Geraldton Sandplains (WAH 1998-).

Plate 4: *Persoonia* ?*filiformis* (P3)

***Stylidium drummondianum* (P3) – STYLIDACEAE –** *Stylidium drummondianum* (P3) is a rosetted perennial herb to 25 cm high. It produces pink flowers and has been recorded as flowering in August to October. It grows in sand or clayey sand over laterite on hillslopes and breakaways. WAH houses 36 specimens of *Stylidium drummondianum* (P3) from the Geraldton Sandplains and Avon Wheatbelt (WAH 1998-).

Plate 5: *Stylidium drummondianum* (P3)

PRIORITY 4:

***Banksia scabrella* (P4) – PROTEACEAE –** *Banksia scabrella* (P4) is a lignotuberous shrub growing to 2 m high. It produces yellow/cream/purple flowers and has been recorded as flowering in September to January. It grows in white, grey or yellow sand, sometimes with lateritic gravel on sandplains and lateritic ridges. WAH houses 51 specimens of *Banksia scabrella* (P4) from the Geraldton Sandplains (WAH 1998-).

Plate 6: *Banksia scabrella* (P4)

***Conostephium* ?*magnum* (P4) – ERICACEAE –** *Conostephium* ?*magnum* (P4) is an erect multi stemmed shrub growing to 2 m high. It produces pink-purple flowers and has been recorded as flowering in July to September. It grows in white-grey sand, sometimes associated with lateritic gravels in sand dunes, swampland, disturbed roadsides, drainage channels and open woodland. WAH houses 32 specimens of *Conostephium* ?*magnum* (P4) from the Geraldton Sandplains and Swan Coastal Plain (WAH 1998-).

Five of the Priority taxa, *Banksia fraseri* var. *crebra*, *Banksia scabrella*, *Conostephium* ?*magnum*, *Hypocalymma gardneri* and *Persoonia* ?*filiformis*, were only recorded in analogue transects within the Trieste 3D Seismic survey area transects in October 2020. The other four Priority taxa, *Hemiandra* sp. Eneabba (H. Demarz 3687), *Mesomelaena stygia* subsp. *deflexa*, *Stylidium drummondianum* and *Tricoryne soullierae*, were recorded in both analogue and rehabilitation transects in October 2020 (Figure 4).

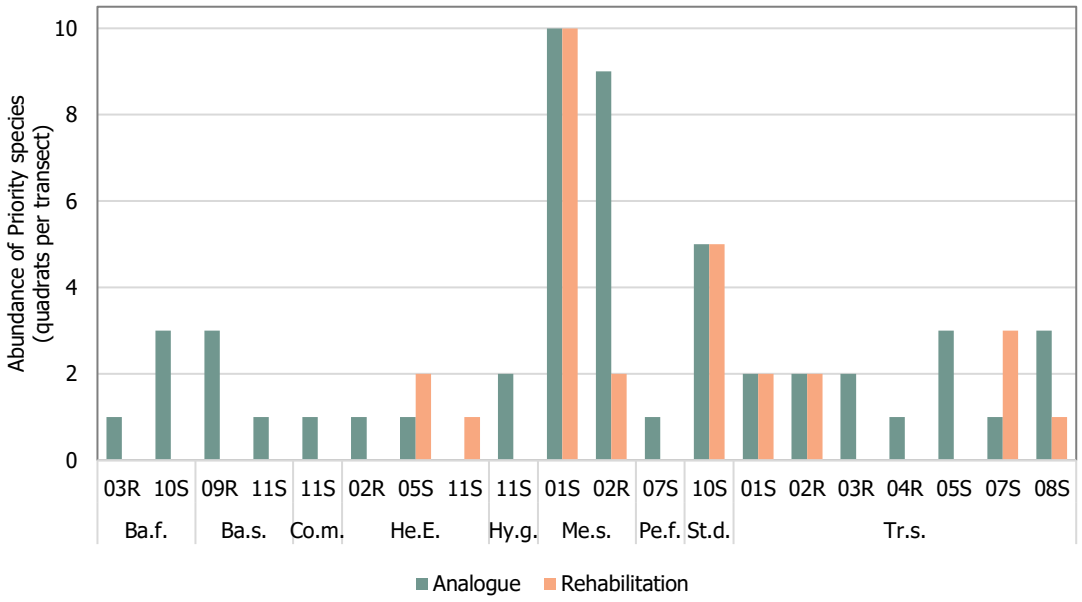


Figure 4: Number of quadrats with recordings of each Priority taxa recorded in monitored transects within the Trieste 3D seismic survey area, October 2020

Note: S=source line, R=receiver line. Ba.f.=*Banksia fraseri* var. *crebra*, Ba.s.=*Banksia scabrella*, Co.m.=*Conostephium* ?*magnum*, He.E.=*Hemiandra* sp. Eneabba (H. Demarz 3687), Hy.g.=*Hypocalymma gardneri*, Me.s.=*Mesomelaena stygia* subsp. *deflexa*, Pe.f.=*Persoonia* ?*filiformis*, St.d.=*Stylidium drummondianum*, Tr.s.=*Tricoryne soullierae*.

5.1.2. Introduced (Weed) Species

Four introduced species considered environmental weeds by the Environmental Weed Ranking (Department of Parks and Wildlife, 2013) were recorded within the Trieste 3D Seismic survey area in October 2020, none being a declared pest (s22) pursuant to the Biosecurity and Agriculture Management Act 2007 (Department of Primary Industries and Regional Development, 2020). The weeds were present in 29 quadrats within 7 rehabilitation transects, and in 2 quadrats within 2 analogue transects (Figure 5). No weeds had been recorded in the analogue transects in August 2019.

**Hypochaeris glabra* was the most abundant weed, recorded in 7 rehabilitation transects and in 1 analogue transect. **Wahlenbergia capensis* was recorded in 1 rehabilitation and 1 analogue transect. **Ursinia anthemoides* and **Aira caryophyllea* were each recorded in one quadrat within 1 rehabilitation transect. Geographic locations of introduced species and number of quadrats in which the species was recorded in 2020 are summarised in Appendix E. Since no weeds had been recorded in the analogue transects in August 2019, the rehabilitation transects failed to meet the target of no new introduction of declared or environmental weeds into operational areas within 12 months.

All four weed species recorded within the Trieste 3D Seismic survey area in October 2020 were rated as rapid for invasiveness by the Weed Prioritisation Process for DPaW (Department of Parks and Wildlife, 2013). **Ursinia anthemoides* and **Aira caryophyllea* were ranked as high for ecological impact,

*_Hypochaeris glabra_ as low, and *_Wahlenbergia capensis_ as unknown by the Weed Prioritisation Process for DPaW (Department of Parks and Wildlife, 2013).

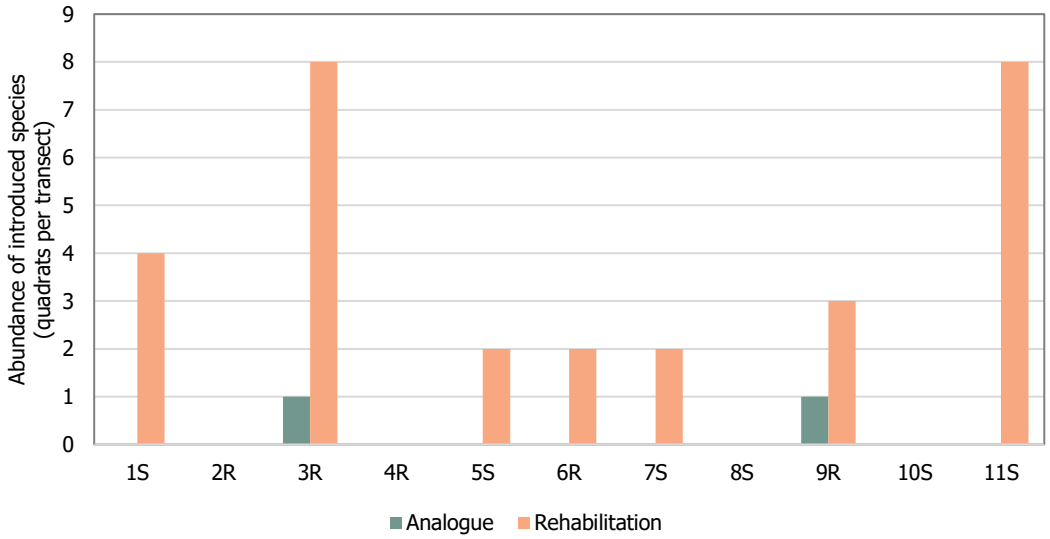


Figure 5: Number of quadrats with recordings of introduced species across monitored transects Trieste 3D seismic survey area, October 2020

Note: S=source line, R=receiver line. No introduced species were recorded in analogue transects in August 2019.

5.1.3. Species Richness

Species richness of the 11 rehabilitation transects established and monitored in the Trieste 3D Seismic survey area in October 2020 ranged from 14 to 21 taxa per quadrat. Similar species richness was recorded in the analogue transects in 2019 and 2020, ranging from 17 to 27 taxa per quadrat. The average species richness was 16.6 taxa per quadrat in rehabilitation transects and 21.2 in analogue sites in 2020 (Figure 6; Appendix F).

Perennial species richness of the 11 rehabilitation transects established and monitored in the Trieste 3D Seismic survey area in October 2020 ranged from 8 to 17 taxa per quadrat. The analogue transects exhibited similar perennial species richness in the 2019 and 2020 surveys, ranging from 14.5 to 26 taxa per quadrat (Figure 7). The average perennial species richness was 14 taxa per quadrat in rehabilitation transects and 20.5 in analogue sites. All rehabilitation transects exceeded the recommended completion criteria target of 20% perennial species richness compared with the adjacent analogue transects.

The percentage of annuals relative to total number of species per quadrat ranged from 1.1% to 41.3% in rehabilitation transects in the Trieste 3D Seismic survey area in October 2020, and from 0 to 12.7% in analogue sites in 2019 and 2020 (Figure 8). On average, annual species amounted to 14.1% of species

richness in rehabilitation transects, in comparison with 3.1% and 4.2% of species richness in analogue transects in 2019 and 2020 surveys, respectively.

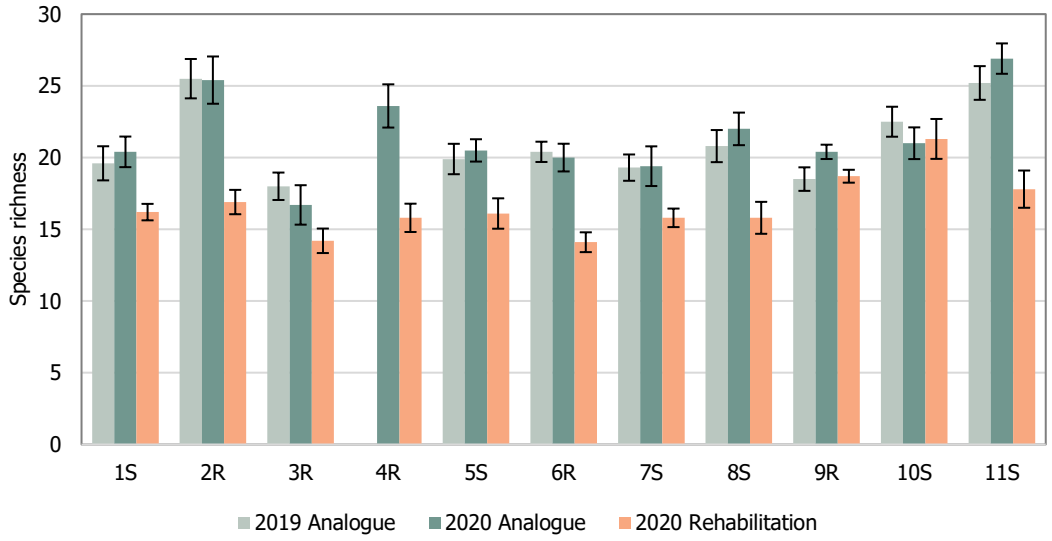


Figure 6: Total species richness per quadrat across monitored transects Trieste 3D seismic survey area, August 2019 and October 2020

Note: S=source line, R=receiver line.

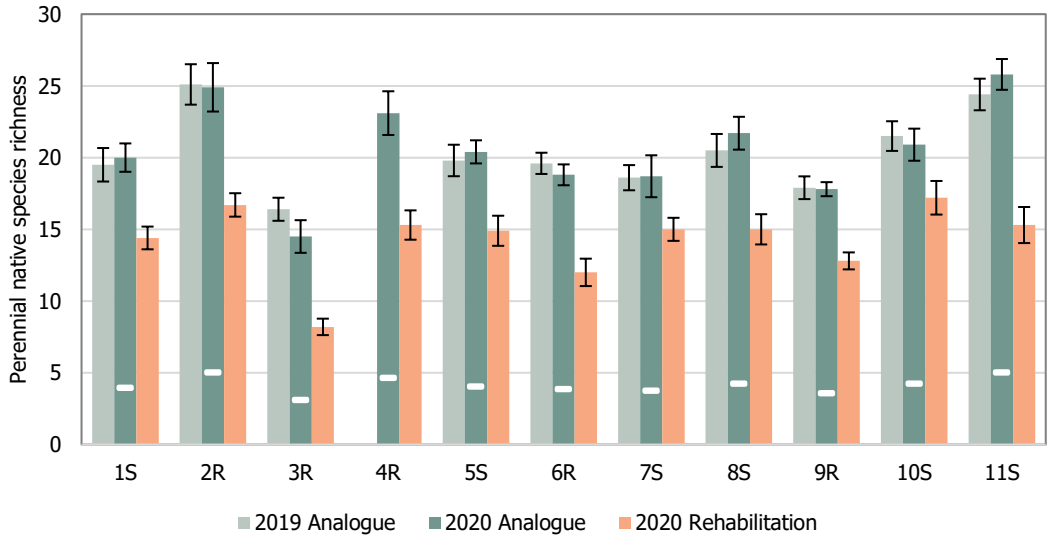


Figure 7: Perennial native species richness per quadrat across monitored transects Trieste 3D seismic survey area, August 2019 and October 2020

Note: S=source line, R=receiver line; white dash indicates minimum 20% target for rehabilitation sites at 12 months.

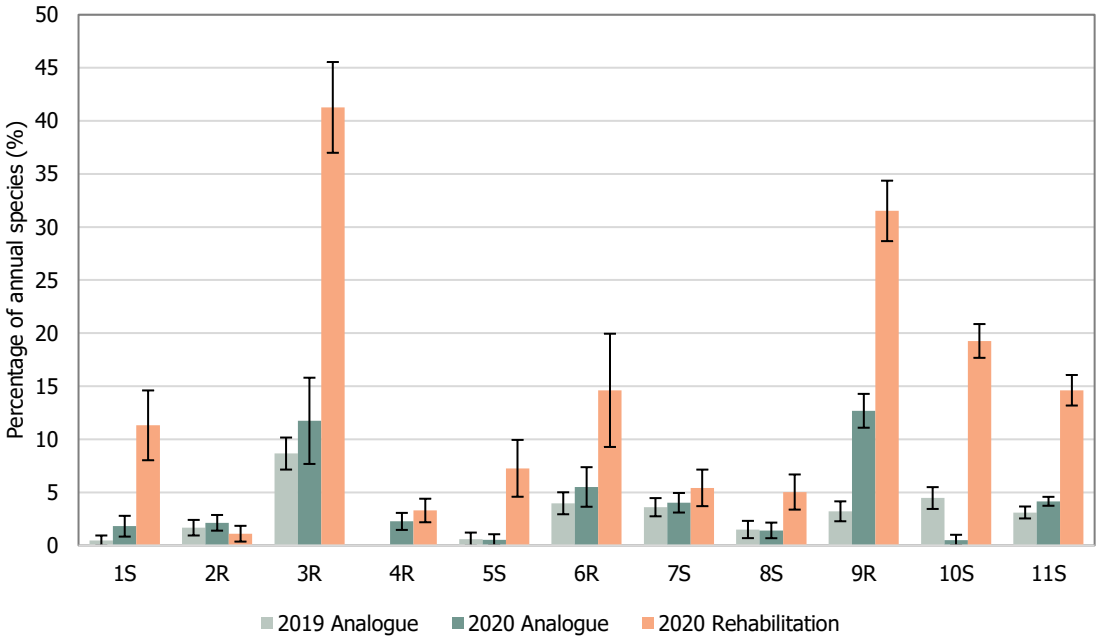


Figure 8: Percentage of annuals relative to total number of species per quadrat across monitored transects Trieste 3D seismic survey area, August 2019 and October 2020

Note: S=source line, R=receiver line.

5.1.4. Species Foliage Cover

Perennial species accounted for 84% to 100% of total foliage cover in rehabilitation transects established and monitored in the Trieste 3D Seismic survey area in October 2020, and for 99.6 to 100% total foliage cover in analogue transects in 2019 and 2020.

Foliage cover of perennial native species in the 11 rehabilitation transects established and monitored in the Trieste 3D Seismic survey area in October 2020 ranged from 6.6% to 17.1% cover per quadrat. Similar foliage cover of perennial species was recorded in the analogue transects in 2019 and 2020, ranging from 57.1% to 94% cover per quadrat. The average foliage cover of perennial species was 11% cover per quadrat for rehabilitation transects, in comparison with 73.6% and 72% for analogue sites in 2019 and 2020, respectively (Figure 9; Appendix F).

Nine rehabilitation transects exceeded the recommended completion criteria target of 10% foliage cover of perennial species compared with the adjacent analogue transects. The average cover of perennial species for transects 9R and 11S was 2.1% and 0.4%, respectively, below the target of 10% foliage cover of perennial species in the adjacent analogue transects.

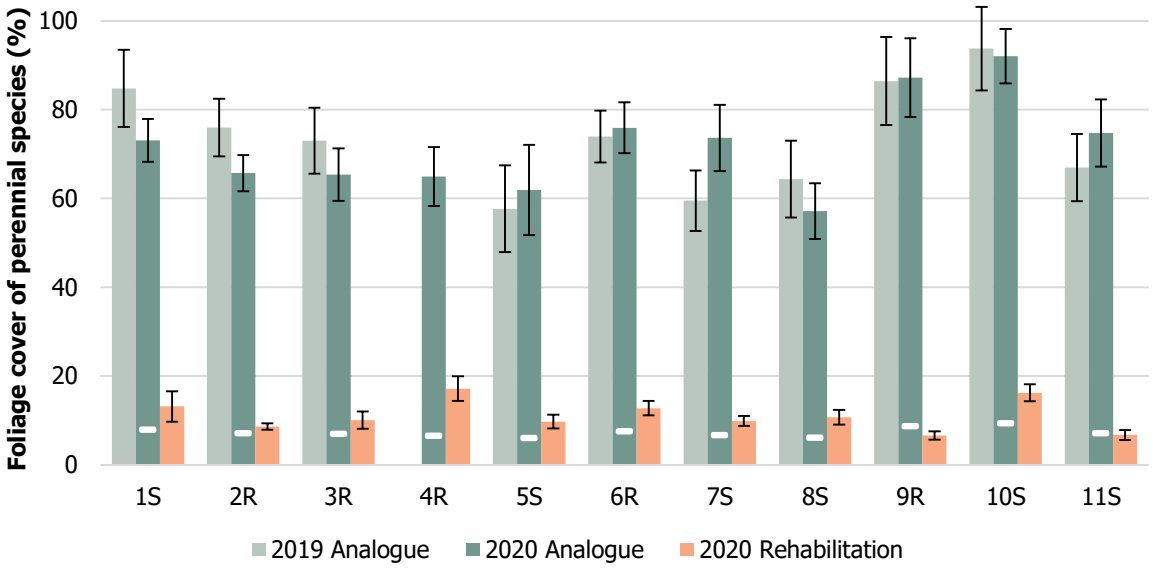


Figure 9: Foliage cover of perennial native species per quadrat across monitored transects Trieste 3D seismic survey area, August 2019 and October 2020

Note: S=source line, R=receiver line; white dash indicates recommended completion criteria target for rehabilitation sites of 10% foliage cover at 12 months.

6. DISCUSSION AND CONCLUSIONS

Mattiske Consulting Pty Ltd was commissioned in September 2020 by Beach Energy Limited to establish a series of rehabilitation transects and monitor these transects and their respective analogues within the Trieste 3D Seismic survey area, which lies east of the Brand Highway between the towns Eneabba and Dongara, Western Australia. A large portion of the Trieste 3D Seismic survey area is Unallocated Crown Land and formed the focus area in which analogue transects were established in August 2019 to characterise the area and provide baseline information prior to disturbance by 3D Seismic survey along source and receiver lines, which took place at the end of 2019 and beginning of 2020. In October 2020, rehabilitation transects were established in disturbed sites adjacent to pre-established analogue transects to evaluate impact and recovery of native vegetation along source and receiver lines.

A total of 282 vascular plant taxa, representative of 122 genera and 46 families, were recorded within the Trieste 3D Seismic survey area transects. The majority of taxa recorded were representative of the Proteaceae (45 taxa), Myrtaceae (42 taxa) and Fabaceae (27 taxa) families.

No threatened flora species were recorded within the Trieste 3D Seismic survey area transects. Seven priority flora taxa, according to DBCA (2018b), were recorded within the Trieste 3D Seismic survey area transects: one Priority 1 taxon (*Tricoryne soullierae*), five Priority 3 taxa (*Banksia fraseri* var. *crebra*, *Hemiandra* sp. Eneabba (H. Demarz 3687), *Hypocalymma gardneri, Mesomelaena stygia* subsp. *deflexa* and *Stylidium drummondianum*) and one Priority 4 taxon (*Banksia scabrella*). Two potential priority species, *Persoonia* ?*filiformis* (Priority 3) and *Conostephium* ?*magnum* (Priority 4), were also recorded within the survey area, but lacked required taxonomic features at the time of collection to confirm identification. *Tricoryne soullierae* was the most commonly occurring priority species, recorded from seven analogue transects and four rehabilitation transects. Other three priority taxa, *Hemiandra* sp. Eneabba (H. Demarz 3687), *Mesomelaena stygia* subsp. *deflexa*, *Stylidium drummondianum*, were also recorded in both analogue and rehabilitation transects in October 2020.

Four introduced species listed as environmental weeds by the Environmental Weed Ranking (Department of Parks and Wildlife, 2013) were recorded within the Trieste 3D Seismic survey area in October 2020: **Aira caryophyllea*, **Hypochaeris glabra*, **Wahlenbergia capensis* and **Ursinia anthemoides*. None of these species are declared pests (s22) pursuant to the Biosecurity and Agriculture Management Act 2007. The weeds were recorded in 29 quadrats within rehabilitation transects, in comparison with 2 quadrats within analogue transects in October 2020. Since no weeds had been recorded in the analogue transects in August 2019, the rehabilitation transects failed to meet the target of no new introduction of environmental weeds into operational areas within 12 months. Two weeds, **Aira caryophyllea* and **Ursinia anthemoides*, ranked as high for ecological impact by the Environmental Weed Ranking (Department of Parks and Wildlife, 2013) were each recorded in only one quadrat within 1 rehabilitation transect, while most abundant weed, **Hypochaeris glabra*, was ranked as low for ecological impact. The Environmental Weed Ranking also rated all four weed species recorded in the surveyed transects as rapid for invasiveness (Department of Parks and Wildlife, 2013).

The weeds recorded within the Trieste 3D Seismic survey area in October 2020 are annual species (**Hypochaeris glabra* can also be biennial), reproducing through seeds, and rely on wind and adhesion for seed dispersal (WAH 1998-). All four weed species are common in southwest Australia and thus, their seeds were not necessarily introduced by the seismic survey activities. Adjacent agriculture areas and recreational use of the tracks could serve as sources for seeds to enter the area. Disturbance in plant cover alone is able to promote recruitment of weedy species from soil seed bank, most likely due to reduced competition from neighbouring plants (Hobbs & Huenneke 1992). For instance, **Aira caryophyllea*, **Hypochaeris glabra* and **Ursinia anthemoides* have been recorded as prolific after fire, but were not found in areas that had not been burnt in more than 5 years (Hobbs & Atkins 1990). The seismic survey activities have led to some opening of the foliage cover of the vegetation and as a result there has been some recruitment of weeds in the disturbed area, but it is likely that weed numbers will decrease as rehabilitation progresses if no further disturbance takes place along source and receiver lines within the survey area. At this juncture in view of the range of weeds and other potential sources weed control measures do not appear to be justified. The latter management approach should be reviewed after future monitoring results are collected.

Key indicators of rehabilitation success, namely perennial native species richness and perennial native species foliage cover, were assessed for analogue and rehabilitation transects in the Trieste 3D Seismic survey area in October 2020. The average species richness was 14 (range: 8–17) taxa per quadrat in rehabilitation transects and 20.5 (range: 14.5–26) in analogue sites. All rehabilitation transects exceeded the recommended completion criteria target of 20% perennial species richness compared with the adjacent analogue transects within 12 months. The average foliage cover of perennial species was 11% (range: 6.6%–17.1%) cover per quadrat for rehabilitation transects, in comparison with 73% (57.1%–94%) for analogue sites in 2019 and 2020. Nine rehabilitation transects exceeded the recommended completion criteria target of 10% foliage cover of perennial species compared with the adjacent analogue transects within 12 months. The average cover of perennial species for transects 9R and 11S was 2.1% and 0.4%, respectively, below the target of 10% foliage cover of perennial species in the adjacent analogue transects.

The results have shown a positive start point for recovery of disturbed sites as relatively high perennial species richness was recorded in all rehabilitation transects, exceeding the recommended completion criteria target within 12 months. This indicates that the disturbed sites contain a high diversity of seeds and propagules that can promote regeneration through seedling recruitment and resprouting of belowground organs. Perennial foliage cover in rehabilitation transects showed signs of recovery, and nine out of eleven rehabilitation transects met the recommended completion criteria target of 10% foliage cover of perennial species compared with the adjacent analogue transects within 12 months. Transects 9R and 11S did not meet the met completion criteria for perennial foliage cover.

In conclusion, the Unallocated Crown Land area within the Trieste 3D Seismic survey area supports high conservation values with a high level of native species richness, native foliage cover and high number of priority taxa. Results have shown that rehabilitation transects along source and receiver lines within the Trieste 3D seismic survey area retained a high number of perennial species richness, including some of

the priority taxa, and that perennial species foliage cover shows early signs of recovery. Further disturbance along source and receiver lines should be prevented to avoid spread of the weeds and to allow for the recovery of perennial foliage cover. It is recommended that further monitoring is undertaken at 24 months and 5 years to ensure the introduced species decrease when native foliage increases and to monitor the recovery of species richness and foliage cover of native species.

7. ACKNOWLEDGEMENTS

The authors would like to thank John Mitchell and Zoe Bowen from Beach Energy Limited for their assistance with this project.

8. PERSONNEL

The following Mattiske Consulting Pty Ltd personnel were involved in this project:

NAME	POSITION	PROJECT INVOLVEMENT	FLORA COLLECTION PERMITS
Dr EM Mattiske	Managing Director & Principal Ecologist	Planning, managing, reporting	N/A
Dr S Ruoss	Project Leader	Planning, fieldwork, editing, reporting	FB62000031-2; Permit to Take Declared Rare Flora [TFL 17-1819]
Ms L Cockram	Experienced Botanist	Fieldwork, reporting	FB62000266
Dr R Dayrell	Botanist	Fieldwork, data analysis, reporting	FB62000282
Ms E Chetwin	Botanist	Fieldwork	FB62000026-2
Ms E Cowan	Botanist	Plant identification	N/A
Mr B Ellery	Taxonomist	Plant identification	N/A

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APPENDIX A1: THREATENED AND PRIORITY FLORA DEFINITIONS

Under section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), **threatened flora** are categorised as extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent (Table A1.1).

Table A1.1 Federal definition of threatened flora species

Note: Adapted from section 179 of the EPBC Act.

CODE	CATEGORY	DEFINITION
Ex	**Extinct**	Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild**	Species which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered**	Species which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered**	Species which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	**Vulnerable**	Species which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent**	Species which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

The *Biodiversity Conservation Act 2016* (BC Act) provides for (amongst other things) the protection of flora that is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future in Western Australia under Part 10 (Division 2).

Threatened flora are listed in the *Wildlife Conservation (Rare Flora) Notice 2018* (under Part 2, Division 1, Subdivision 2 of the BC Act; Department of Biodiversity, Conservation and Attractions (2018a) and are categorised under Schedules 1-3**.** A flora species is defined as **threatened** if it is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future, pursuant to sections 20, 21 and 22 of the BC Act (DBCA 2018a). Threatened species are categorised as critically endangered, endangered, and vulnerable (Table A1.2).

Table A1.2 State definition of threatened flora species

Note: Adapted from Department of Biodiversity, Conservation and Attractions (2018a).

CODE	CATEGORY	DEFINITION
CR	**Critically endangered**	Species considered to be facing an extremely high risk of becoming extinct in the wild (listed under Schedule 1 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
EN	**Endangered**	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 2 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
VU	**Vulnerable**	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 3 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
EX	**Presumed extinct species**	Species that have been adequately searched for and there is no reasonable doubt that the last individual has died (listed under Schedule 4 of the *Wildlife Conservation (Rare Flora) Notice 2018*).

Priority flora species are defined as "possibly threatened species that do not meet the survey criteria, or are otherwise data deficient" or species that are "adequately known, are rare but not threatened, meet criteria for near threatened or have recently been removed from the threatened species list" for other than taxonomic reasons" (Department of Biodiversity, Conservation and Attractions 2019). Priority species are not afforded any additional protection under state or federal legislation, however are considered significant under the Environmental Protection Authority's *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a). The Department of Biodiversity, Conservation and Attractions categorises priority flora into four categories: Priority 1; Priority 2, Priority 3 and Priority 4 (Table A1.3).

Table A1.3: State definition of priority flora species

Note: Adapted from Department of Biodiversity, Conservation and Attractions (2018b).

CODE	CATEGORY	DEFINITION
P1	**Priority 1:** Poorly-known species	Known from one or a few locations (< 5) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation; or are otherwise under threat of habitat destruction or degradation. In urgent need of further survey.
P2	**Priority 2:** Poorly-known species	Known from one or a few locations (< 5). Some occurrences are on lands managed primarily for nature conservation. In urgent need of further survey.
P3	**Priority 3:** Poorly-known species	Known from several locations and the species does not appear to be under imminent threat; or from few but widespread locations with either a large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. In need of further survey.
P4	**Priority 4:** Rare, Near Threatened, and other species in need of monitoring	**a) Rare -** Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. **b) Near Threatened -** Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. **c) Other -** Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

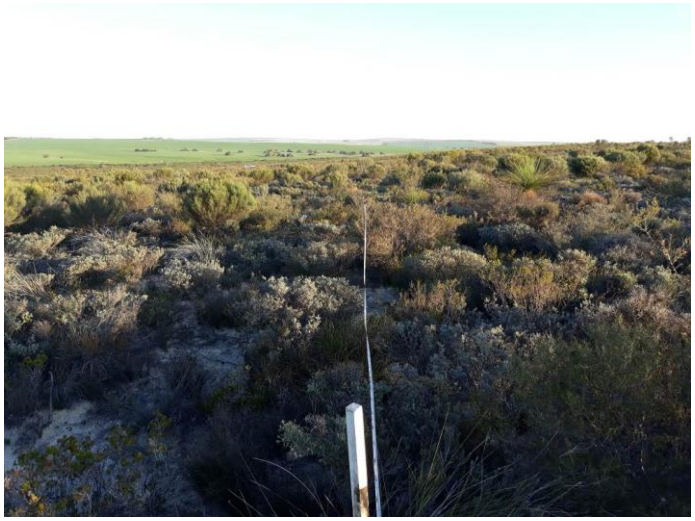
Transect 1S Analogue Start 2020

Transect 1S Analogue Start 2019

Transect 1S Rehab Start 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

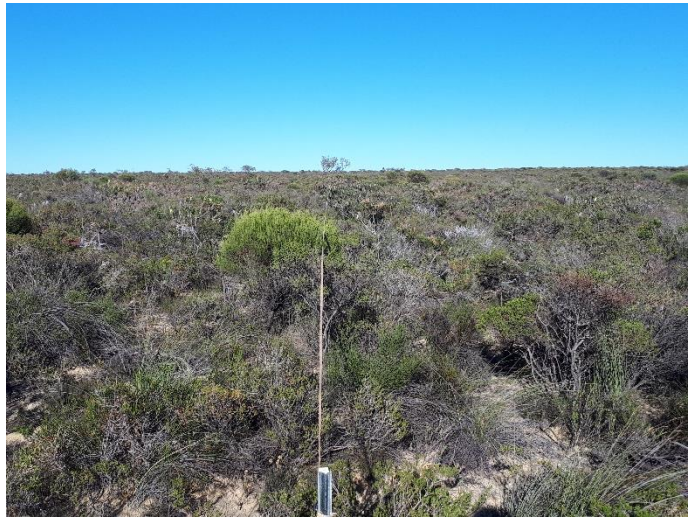
Transect 1S Analogue End 2020



Transect 1S Analogue End 2019

Transect 1S Rehab End 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020



Transect 2R Analogue Start 2020

Transect 2R Analogue Start 2019

Transect 2R Rehab Start 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Transect 2R Analogue End 2020

Transect 2R Analogue End 2019

Transect 2R Rehab End 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Transect 3R Analogue Start 2020

Transect 3R Analogue Start 2019

Transect 3R Rehab Start 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Transect 3R Analogue End 2020

Transect 3R Analogue End 2019

Transect 3R Rehab End 2020

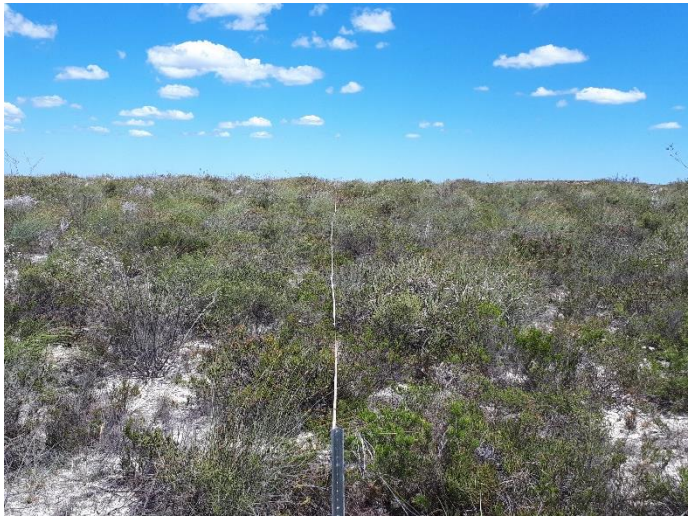
APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Transect 4R Analogue Start 2020

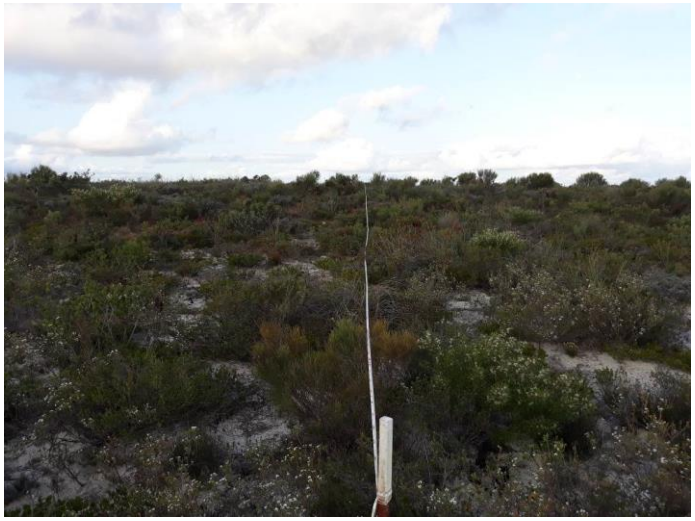
Transect 4R Analogue Start 2019

Transect 4R Rehab Start 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020



Transect 4R Analogue End 2020



Transect 4R Analogue End 2019

Transect 4R Rehab End 2020

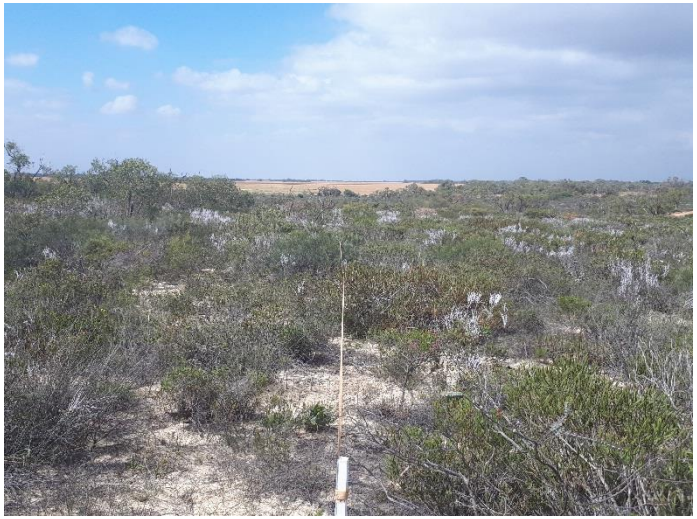
APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Transect 5S Analogue Start 2020

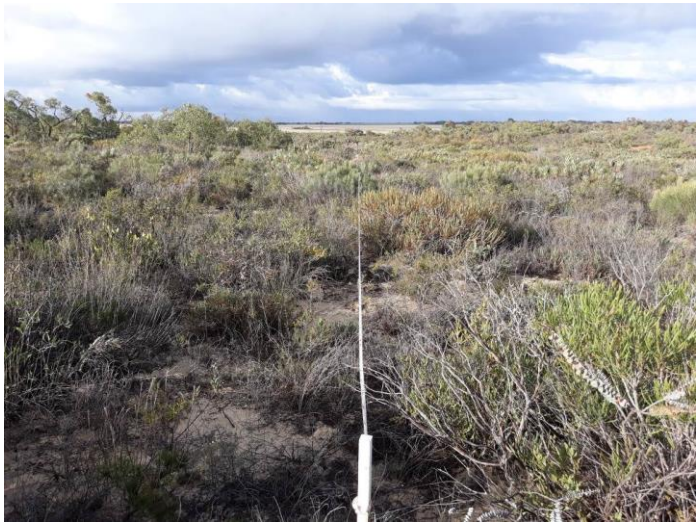
Transect 5S Analogue Start 2019

Transect 5S Rehab Start 2020

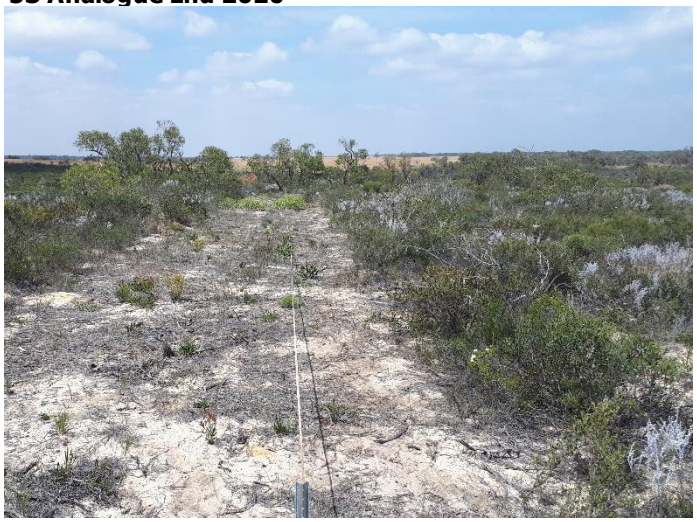
APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020



Transect 5S Analogue End 2020

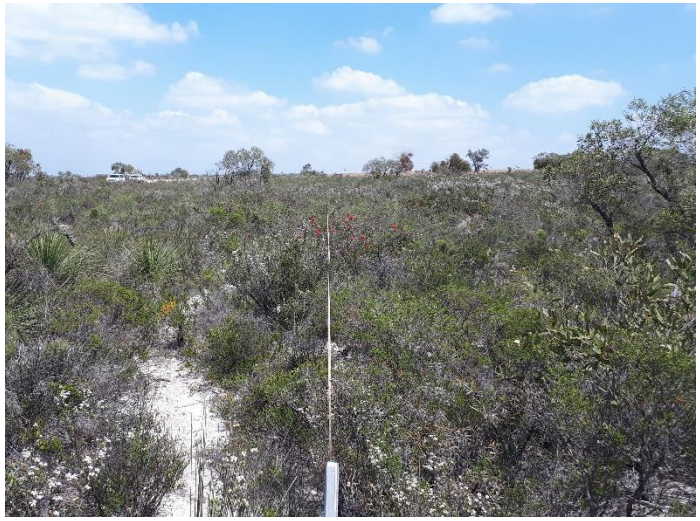


Transect 5S Analogue End 2019



Transect 5S Rehab End 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020



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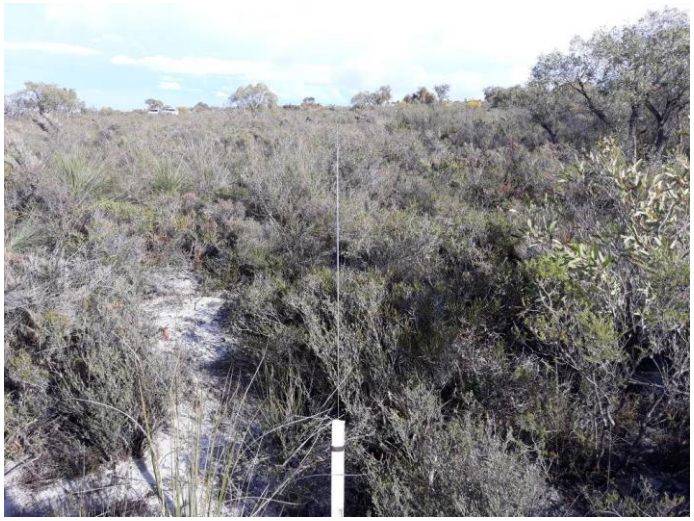

Transect 6R Analogue Start 2019

Transect 6R Rehab Start 2020

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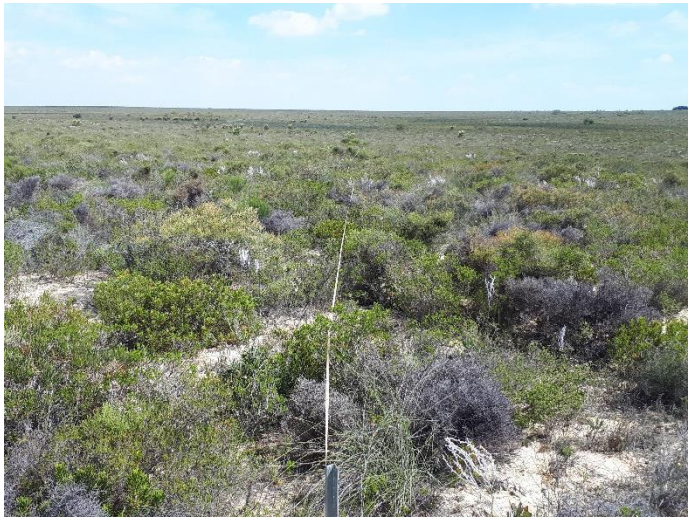
Transect 6R Analogue End 2020

Transect 6R Analogue End 2019

Transect 6R Rehab End 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020



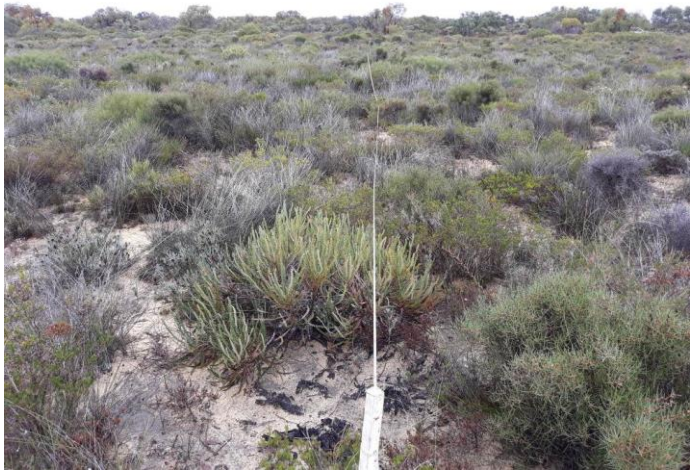
Transect 7S Analogue Start 2020

Transect 7S Analogue Start 2019

Transect 7S Rehab Start 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Transect 7S Analogue End 2020

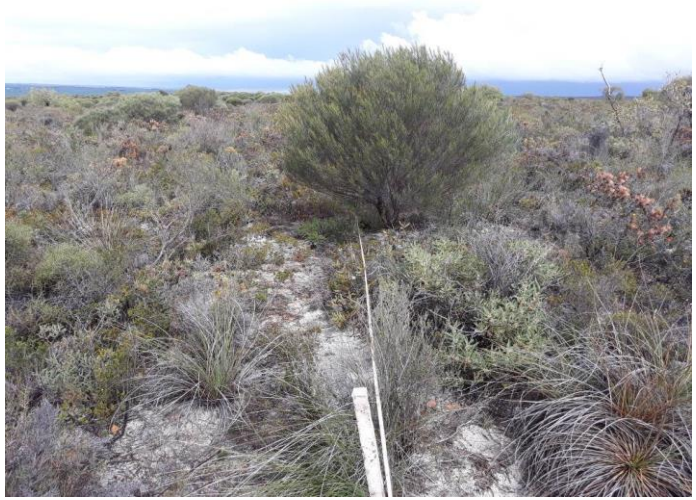


Transect 7S Analogue End 2019

Transect 7S Rehab End 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Transect 8S Analogue Start 2020



Transect 8S Analogue Start 2019

Transect 8S Rehab Start 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Transect 8S Analogue End 2020

Transect 8S Analogue End 2019

Transect 8S Rehab End 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Transect 9R Analogue Start 2020

Transect 9R Analogue Start 2019

Transect 9R Rehab Start 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

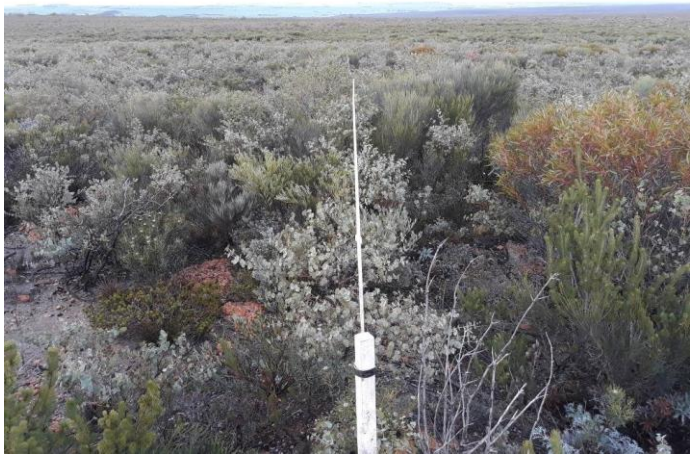
Transect 9R Analogue End 2020

Transect 9R Analogue End 2019

Transect 9R Rehab End 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

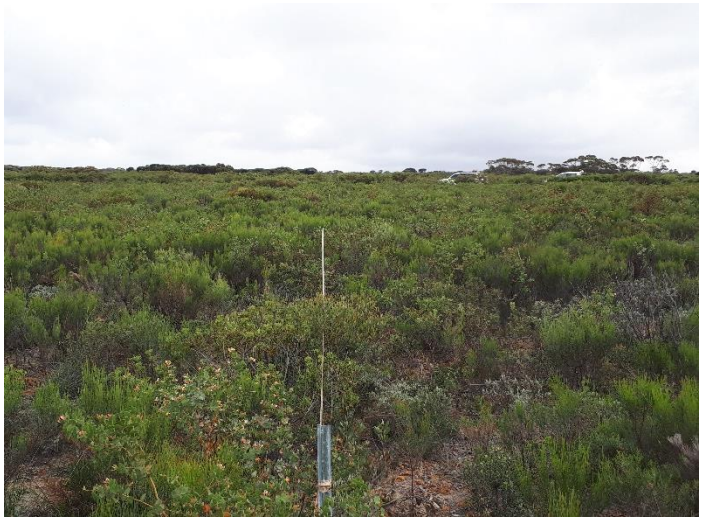
Transect 10S Analogue Start 2020



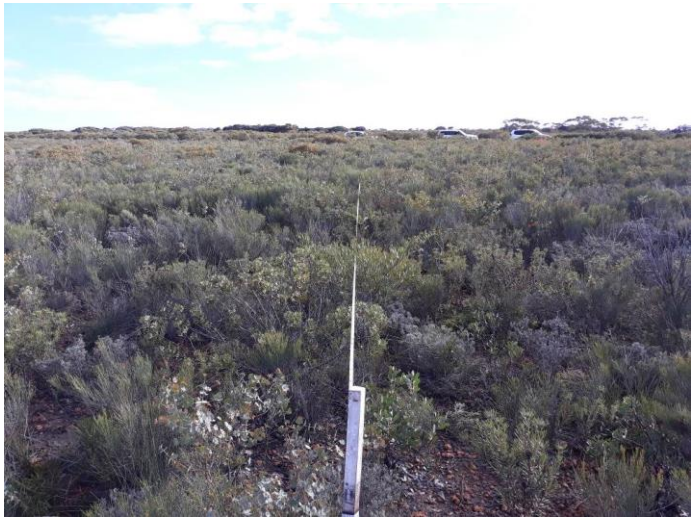
Transect 10S Analogue Start 2019

Transect 10S Rehab Start 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020



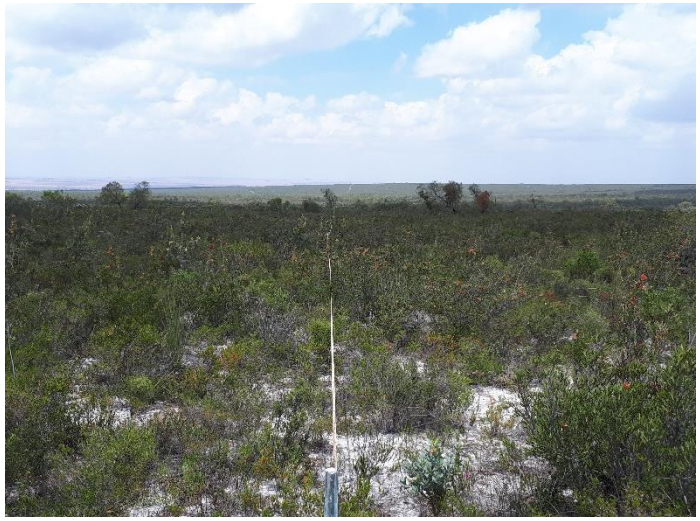
Transect 10S Analogue End 2020



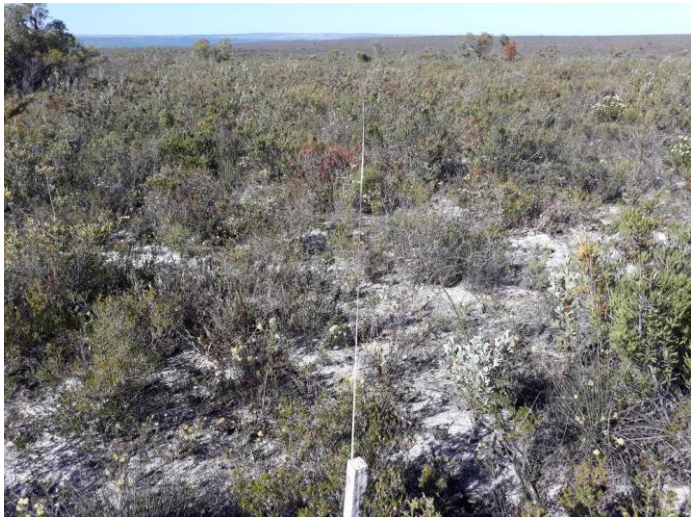
Transect 10S Analogue End 2019

Transect 10S Rehab End 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020



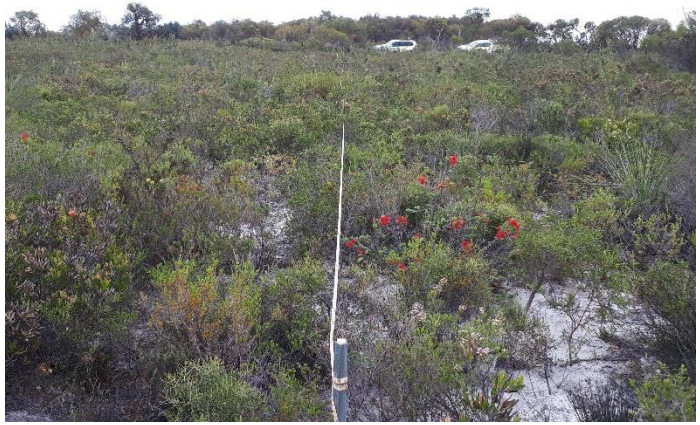
Transect 11S Analogue Start 2020



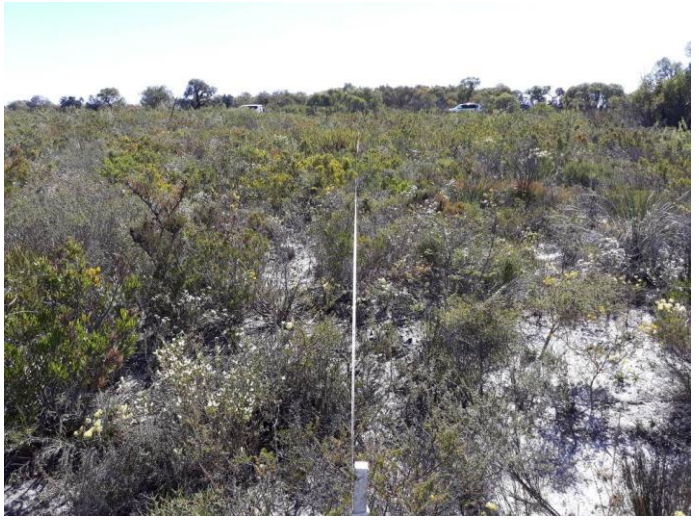
Transect 11S Analogue Start 2019

Transect 11S Rehab Start 2020

APPENDIX B: PHOTOS OF REHABILITATION AND ANALOGUE TRANSECTS MONITORED IN THE TRIESTE 3D SEISMIC SURVEY AREA, AUGUST 2019 AND OCTOBER 2020



Transect 11S Analogue End 2020



Transect 11S Analogue End 2019

Transect 11S Rehab End 2020

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN TRANSECTS FROM TRIESTE 3D SEISMIC SUREVY AREA, AUGUST 2019 AND OCTOBER 2020

Note: * denotes introduced species; P1-P4 denote priority flora species (DBCA 2019, WAH 1998-).

Family	Species	Analogue		Rehabilitation
		2019	2020	2020
Amaranthaceae	*Ptilotus polystachyus*			x
	Ptilotus stirlingii subsp. *stirlingii*			x
Anarthriaceae	*Lyginia barbata*	x	x	x
Apiaceae	*Actinotus leucocephalus*		x	x
	Xanthosia huegelii	x	x	
	Xanthosia sp.	x		
	Apiaceae sp.	x		
Araliaceae	*Trachymene pilosa*			x
Asparagaceae	*Acanthocarpus preissii*	x	x	x
	Laxmannia sessiliflora	x	x	x
	Lomandra hastilis		x	x
	Lomandra ?*suaveolens*	x	x	x
	Lomandra sp.	x	x	x
	Thysanotus ?*dichotomus*	x	x	
	Thysanotus sp.		x	
	Thysanotus sp. (climbing)	x	x	
Asteraceae	*Gnephosis tenuissima*	x	x	x
	Hyalosperma cotula		x	x
	* *Hypochaeris glabra*		x	x
	Podotheca angustifolia		x	x
	Pterochaeta paniculata	x	x	x
	* *Ursinia anthemoides*			x
	Waitzia acuminata			x
	Waitzia suaveolens var. *suaveolens*			x
	Asteraceae sp.		x	
Boraginaceae	*Halgania* sp. Wongan Hills (K.F. Kenneally 2393)	x	x	x
Boryaceae	*Borya sphaerocephala*	x	x	x
Campanulaceae	*Isotoma hypocrateriformis*			x
	Lobelia heterophylla		x	x
	* *Wahlenbergia capensis*		x	x
	Wahlenbergia preissii		x	x
Casuarinaceae	*Allocasuarina campestris*	x	x	x
	Allocasuarina humilis	x	x	x
	Allocasuarina microstachya	x	x	x
	Allocasuarina sp.			x
Celastraceae	*Tripterococcus brunonis*			x
Centrolepidaceae	*Centrolepis aristata*		x	
	Centrolepis pilosa	x		
Colchicaceae	*Burchardia congesta*	x	x	x
Crassulaceae	*Crassula colorata*		x	x

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN TRANSECTS FROM TRIESTE 3D SEISMIC SUREVY AREA, AUGUST 2019 AND OCTOBER 2020

Note: * denotes introduced species; P1-P4 denote priority flora species (DBCA 2019, WAH 1998-).

Family	Species	Analogue		Rehabilitation
		2019	2020	2020
Cyperaceae	*Caustis dioica*	x	x	x
	Chaetospora curvifolia	x	x	x
	Lepidosperma ?*apricola*	x	x	x
	Lepidosperma ?*squamatum*	x	x	x
	Lepidosperma sp. P1 small head (M.D. Tindale 166A)	x	x	x
	Lepidosperma sp.	x	x	x
	Mesomelaena pseudostygia	x	x	x
	Mesomelaena stygia subsp. *deflexa* (P3)	x	x	x
	Schoenus ?*andrewsii*	x	x	x
	Schoenus brevisetis			x
	Schoenus clandestinus	x	x	x
	Schoenus nanus			x
	Schoenus pleiostemoneus	x	x	x
	Schoenus sp.			x
	Cyperaceae sp.			x
Dasypogonaceae	*Calectasia narragara*	x	x	x
Dilleniaceae	*Hibbertia acerosa*	x	x	x
	Hibbertia aurea	x	x	
	Hibbertia crassifolia	x	x	x
	Hibbertia hypericoides subsp. *hypericoides*	x	x	x
	Hibbertia robur	x	x	x
	Hibbertia subvaginata	x	x	x
	Hibbertia sp.			x
Droseraceae	*Drosera eneabba*	x	x	x
	Drosera erythrorhiza	x	x	x
	Drosera pallida	x	x	x
	Drosera sp.	x	x	x
	Drosera sp. (climbing)	x	x	x
Ecdeiocoleaceae	*Ecdeiocolea monostachya*	x	x	x
	Georgeantha hexandra	x	x	x
Ericaceae	*Andersonia heterophylla*	x	x	
	Andersonia lehmanniana subsp. *lehmanniana*	x	x	x
	Andersonia sp.	x		
	Conostephium ?*magnum* (P4)	x	x	
	Conostephium sp.			x
	Leucopogon inflexus	x	x	x
	Leucopogon sp. Northern ciliate (R. Davis 3393)	x	x	x
	Leucopogon sp.	x	x	
	Lysinema pentapetalum	x	x	
	Styphelia microdonta	x	x	
	Styphelia tortifolia	x	x	x
	Styphelia xerophylla	x	x	x
	Styphelia sp. Eneabba (N. Marchant s.n. PERTH 01291777)	x	x	x
	Ericaceae sp.	x		x
Euphorbiaceae	*Monotaxis grandiflora*	x	x	x
	Stachystemon axillaris	x	x	x

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN TRANSECTS FROM TRIESTE 3D SEISMIC SUREVY AREA, AUGUST 2019 AND OCTOBER 2020

Note: * denotes introduced species; P1-P4 denote priority flora species (DBCA 2019, WAH 1998-).

Family	Species	Analogue		Rehabilitation
		2019	2020	2020
Fabaceae	*Acacia auronitens*	x	x	x
	Acacia blakelyi	x	x	x
	Acacia dilatata	x	x	
	Acacia lasiocarpa		x	x
	Acacia pulchella	x	x	x
	Acacia stenoptera	x	x	x
	Acacia sp.		x	x
	Bossiaea eriocarpa	x	x	x
	Cristonia stenophylla	x	x	
	Daviesia daphnoides	x	x	
	Daviesia divaricata subsp. *divaricata*	x	x	x
	Daviesia ?incrassata subsp. *teres*	x	x	x
	Daviesia nudiflora	x	x	x
	Daviesia pedunculata	x	x	x
	Daviesia podophylla	x	x	
	Daviesia triflora	x	x	
	Daviesia sp.		x	x
	Gastrolobium spinosum	x	x	x
	Gompholobium tomentosum	x	x	x
	Isotropis cuneifolia	x	x	x
	Jacksonia floribunda	x	x	x
	Jacksonia hakeoides	x	x	x
	Jacksonia nutans	x	x	
	Jacksonia restioides		x	
	Jacksonia sp.	x		
	Mirbelia trichocalyx	x	x	
	Fabaceae sp.			x
Goodeniaceae	*Dampiera carinata*		x	x
	Dampiera spicigera	x	x	x
	Dampiera sp.	x	x	x
	Goodenia reinwardtii	x	x	
	Lechenaultia biloba			x
	Scaevola canescens	x	x	x
	Scaevola phlebopetala			x
	Goodeniaceae sp.			x
Haemodoraceae	*Anigozanthos humilis*	x	x	x
	Conostylis ?aculeata	x		
	Conostylis androstemma	x	x	
	Conostylis angustifolia	x	x	
	Conostylis aurea	x	x	x
	Conostylis candicans		x	x
	Conostylis canteriata		x	x
	Conostylis neocymosa	x	x	
	Conostylis resinosa		x	
	Conostylis sp.	x	x	x
	Haemodorum ?venosum		x	x
	Haemodorum sp.	x	x	x
Hemerocallidaceae	*Johnsonia pubescens*	x	x	x
	Tricoryne soullierae (P1)		x	x
Iridaceae	*Patersonia drummondii*	x	x	
	Patersonia occidentalis			x

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN TRANSECTS FROM TRIESTE 3D SEISMIC SUREVY AREA, AUGUST 2019 AND OCTOBER 2020

Note: * denotes introduced species; P1-P4 denote priority flora species (DBCA 2019, WAH 1998-).

Family	Species	Analogue		Rehabilitation
		2019	2020	2020
Lamiaceae	*Hemiandra* sp. Eneabba (H. Demarz 3687) (P3)	x	x	x
	Hemiphora bartlingii			x
	Pityrodia hemigenioides	x	x	
Lauraceae	*Cassytha glabella*	x	x	
	Cassytha ?racemosa	x	x	
	Cassytha sp.	x	x	x
Loganiaceae	*Orianthera spermacocea*		x	
	Phyllangium paradoxum			x
Malvaceae	*Guichenotia sarotes*	x	x	x
	Lasiopetalum drummondii	x	x	x
Myrtaceae	*Babingtonia camphorosmae*	x	x	x
	Babingtonia grandiflora		x	x
	Beaufortia elegans	x	x	x
	Calothamnus blepharospermus	x	x	x
	Calothamnus longissimus	x	x	
	Calothamnus quadrifidus subsp. *angustifolius*	x	x	x
	Calothamnus sanguineus	x	x	x
	Calothamnus sp.			x
	Calytrix cravenii		x	
	Calytrix ?drummondii	x		
	Calytrix leschenaultii			x
	Calytrix sapphirina	x	x	
	Calytrix strigosa		x	
	Calytrix sp.	x	x	
	Darwinia speciosa	x	x	x
	Eremaea beaufortioides	x	x	x
	Eremaea ectadioclada	x	x	
	Eremaea violacea subsp. *violacea*	x	x	x
	Eremaea sp.			x
	Eucalyptus horistes	x	x	
	Eucalyptus todtiana	x	x	x
	Hypocalymma gardneri (P3)	x	x	
	Hypocalymma hirsutum	x	x	
	Hypocalymma xanthopetalum		x	x
	Hypocalymma sp.	x	x	x
	Leptospermum oligandrum	x	x	x
	Leptospermum spinescens	x	x	x
	Melaleuca aspalathoides	x	x	x
	Melaleuca leuropoma	x	x	x
	Melaleuca ?trichophylla	x	x	x
	Melaleuca sp.			x
	Pileanthus filifolius	x	x	x
	Scholtzia laxiflora	x	x	x
	Thryptomene racemulosa		x	
	Verticordia densiflora	x	x	
	Verticordia densiflora var. *densiflora*		x	
	Verticordia grandis	x	x	x
	Verticordia nobilis		x	
	Verticordia pennigera		x	x
	Verticordia ?plumosa	x		
	Verticordia sp.	x	x	
	Myrtaceae sp.		x	x

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN TRANSECTS FROM TRIESTE 3D SEISMIC SUREVY AREA, AUGUST 2019 AND OCTOBER 2020

Note: * denotes introduced species; P1-P4 denote priority flora species (DBCA 2019, WAH 1998-).

Family	Species	Analogue		Rehabilitation
		2019	2020	2020
Olacaceae	*Olax benthamiana*	x	x	
Orchidaceae	*Caladenia* sp.	x		
	Prasophyllum sp.	x		
	Orchidaceae sp.	x	x	
Phyllanthaceae	*Poranthera microphylla*			x
Poaceae	* *Aira caryophyllea*			x
	Amphipogon caricinus var. *caricinus*			x
	Amphipogon turbinatus	x	x	x
	Amphipogon sp.	x	x	x
	Aristida holathera			x
	Austrostipa macalpinei		x	x
	Eragrostis sp.		x	
	Neurachne alopecuroidea	x	x	x
	Poaceae sp.	x	x	x
Polygalaceae	*Comesperma* sp.	x	x	x
Proteaceae	*Adenanthos cygnorum*	x		
	Banksia attenuata	x	x	x
	Banksia candolleana	x	x	x
	Banksia carlinoides	x	x	x
	Banksia dallanneyi	x		
	Banksia fraseri var. *crebra* (P3)	x	x	
	Banksia hookeriana	x	x	
	Banksia nivea	x	x	x
	Banksia scabrella (P4)	x	x	
	Banksia sessilis	x	x	x
	Banksia shuttleworthiana	x	x	x
	Banksia sphaerocarpa var. *sphaerocarpa*	x	x	x
	Banksia tridentata	x	x	x
	Banksia sp.			x
	Conospermum triplinervium	x	x	x
	Conospermum unilaterale	x	x	
	Grevillea biformis subsp. *biformis*	x	x	
	Grevillea eriostachya	x	x	x
	Grevillea shuttleworthiana subsp. *canarina*	x	x	
	Grevillea sp.			x
	Hakea auriculata	x	x	x
	Hakea circumalata	x	x	x
	Hakea costata	x	x	
	Hakea eneabba	x	x	x
	Hakea incrassata	x	x	x
	Hakea lissocarpha	x	x	
	Hakea neospathulata	x	x	
	Hakea polyanthema	x	x	
	Hakea prostrata	x		
	Hakea trifurcata	x	x	x
	Hakea sp.			x
	Isopogon linearis		x	x
	Isopogon tridens	x	x	x
	Lambertia multiflora	x	x	x
	Persoonia acicularis	x	x	x
	Persoonia ?filiformis (P3)	x	x	
	Petrophile brevifolia	x	x	x

APPENDIX C: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN TRANSECTS FROM TRIESTE 3D SEISMIC SUREVY AREA, AUGUST 2019 AND OCTOBER 2020

Note: * denotes introduced species; P1-P4 denote priority flora species (DBCA 2019, WAH 1998-).

Family	Species	Analogue		Rehabilitation
		2019	2020	2020
Proteaceae (continued)	*Petrophile drummondii*	x	x	x
	Petrophile linearis	x	x	
	Petrophile macrostachya	x	x	x
	Petrophile scabriuscula	x	x	
	Petrophile shuttleworthiana	x	x	x
	Petrophile sp.			x
	Xylomelum angustifolium			x
	Proteaceae sp.			x
Restionaceae	*Alexgeorgea nitens*	x	x	x
	Chordifex sinuosus	x	x	x
	Chordifex sp.			x
	Desmocladus asper	x	x	x
	Desmocladus parthenicus	x	x	x
	Desmocladus semiplanus	x	x	x
	Desmocladus sp.			x
	Lepidobolus preissianus	x	x	x
Rhamnaceae	*Cryptandra myriantha*	x	x	
	Cryptandra sp.	x	x	
	Polianthion wichurae	x		
	Stenanthemum notiale subsp. *notiale*	x	x	x
Rubiaceae	*Opercularia vaginata*	x	x	x
Rutaceae	*Boronia cymosa*	x	x	x
	Cyanothamnus ramosus subsp. *anethifolius*	x		x
	Rutaceae sp.		x	
Sapindaceae	*Dodonaea ericoides*	x	x	x
Stylidiaceae	*Levenhookia pusilla*		x	x
	Levenhookia stipitata		x	x
	Stylidium adpressum		x	x
	Stylidium crossocephalum	x	x	x
	Stylidium diuroides subsp. *paucifoliatum*		x	
	Stylidium drummondianum (P3)	x	x	x
	Stylidium flagellum	x	x	x
	Stylidium kalbarriense			x
	Stylidium ponticulus		x	x
	Stylidium repens		x	x
	Stylidium sp.	x	x	x
Thymelaeaceae	*Pimelea leucantha*		x	x
	Pimelea sp.	x	x	x
Violaceae	*Hybanthus floribundus* subsp. Hill River (E.M. Bennett 2252)	x	x	x
Xanthorrhoeaceae	*Chamaescilla versicolor*	x	x	x
	Xanthorrhoea drummondii	x	x	x

APPENDIX E: GEOGRAPHIC LOCATIONS OF INTRODUCED TAXA RECORDED IN THE TRIESTE 3D SEISMIC SURVEY AREA, OCTOBER 2020

Note: * indicates introduced species. Co-ordinates represent the start for the transect.

Under 'Analogue/ Rehabilitation', A= Analogue, R = Rehabilitation.

Under 'surveyed year', number of quadrats in which the species was recorded. Shaded box indicates plot not surveyed.

SPECIES	Transect	Analogue/ Rehabilitation	LOCATION (GDA94 Z50)		SURVEY YEAR	
			Easting (mE)	Northing (mN)	2019	2020
* *Aira caryophyllea*	11S	R	334714	6731825		1
* *Hypochaeris glabra*	01S	R	336147	6726494		4
	03R	A	338652	6728473	0	1
	03R	R	338651	6728449		5
	05S	R	330390	6724168		2
	06R	R	332313	6727008		2
	07S	R	332552	6731798		2
	09R	R	335351	6728088		3
	11S	R	334714	6731825		6
* *Ursinia anthemoides*	11S	R	334714	6731825		1
* *Wahlenbergia capensis*	03R	R	338651	6728449		3
	09R	A	335412	6728058	0	1

APPENDIX F: AVERAGE SPECIES RICHNESS AND PERENNIAL FOLIAGE COVER ACROSS MONITORED TRANSECTS IN THE TRIESTE SURVEY AREA, AUGUST 2019 AND OCTOBER 2020

Note: * results shown as average ± standard error.

Transect	Average Species Richness			Average Perennial Foliage Cover (%)		
	2019	2020		2019	2020	
	Analogue	Analogue	Rehabilitation	Analogue	Analogue	Rehabilitation
1S	19.60 ±1.19	20.40 ±1.07	16.20 ±0.57	84.79 ± 8.71	73.12 ±4.82	13.20 ±3.44
2R	25.50 ±1.37	25.40 ±1.65	16.90 ±0.85	75.98 ± 6.51	65.70 ±4.08	8.62 ±0.75
3R	18.00 ±0.96	16.70 ±1.37	14.20 ±0.85	73.08 ± 7.44	65.60 ±5.9	11.65 ±1.8
4R	-	23.60 ±1.51	15.80 ±0.99	-	64.94 ±6.65	17.14 ±2.78
5S	19.90 ±1.06	20.50 ±0.78	16.10 ±1.06	57.69 ± 9.77	61.91 ±10.15	10.00 ±1.62
6R	20.40 ±0.71	20.00 ±0.97	14.10 ±0.69	74.02 ± 5.84	76.19 ±5.71	12.80 ±1.61
7S	19.30 ±0.92	19.40 ±1.38	15.80 ±0.65	59.58 ± 6.8	73.64 ±7.47	9.93 ±1.09
8S	20.80 ±1.12	22.00 ±1.14	15.80 ±1.11	64.37 ± 8.67	57.15 ±6.31	10.76 ±1.65
9R	18.50 ±0.82	20.40 ±0.5	18.70 ±0.45	86.61 ± 9.86	87.37 ±8.89	7.33 ±0.97
10S	22.50 ±1.05	21.00 ±1.11	21.30 ±1.39	94.04 ± 9.34	92.05 ±6.15	16.77 ±1.89
11S	25.20 ±1.17	26.90 ±1.06	17.80 ±1.3	67.05 ± 7.56	74.75 ±7.56	7.27 ±1.07

Appendix D Offset Provision as per Condition 4 of EPBC Approval

Beach Energy Limited | ABN 20 007 617 969
Level 8, 80 Flinders Street Adelaide, South Australia 5000
GPO Box 175, Adelaide, South Australia 5001
T +61 8 8338 2833 | **F** +61 8 8338 2336
beachenergy.com.au

30 April 2021

Ref: BPT / EX0049/21

By Email

Department of Agriculture, Water and the Environment
Attn: Kara DeFay
Environment Approvals Division
PO Box 787, CANBERRA CITY
ACT 2601

Dear Kara

Re: EPBC 2017/8133 Trieste Seismic Survey, WA

On the 15 March 2021, AWE provided Approval of Variation for the Trieste 3D seismic survey (EPBC 2017/8133). Condition 4 of the Variation required that in order *to compensate for the loss of up to 54.36 ha of foraging habitat for the Carnaby's Black Cockatoo, the approval holder must provide an offset of 338 ha within Lot 10333 Watheroo Road, Boothendarra by 3 May 2021*. Beach Energy (Beach) wish to advise AWE that the provision of 338 ha offset within the Lot 10333 Watheroo Road, Boothendarra has been completed. As previously advised, Beach originally made a payment for the purchase of 218.46 offsets ha in 2019 in the Watheroo Road property. Beach has now made a payment for the purchase of an additional 119.45 ha to bring the total area of offsets purchased for the Trieste project to 338 ha. As proof of purchase the following evidence is provided:

- Copy of invoice from DBCA for the purchase of additional 119.54 ha of offset in the Watheroo Road property which will be managed by DBCA.
- Copy of remittance advice confirming payment of DBCA invoice by Beach on 30 April 2021.
- Copy of the Offset Site Evaluation Report prepared for Beach by JBS&G in January 2021, which includes details of the offset site attributes, an ecological assessment and a map showing the location and boundary of the 600 ha (total) offset site that will be managed by DBCA.

We trust that this information satisfies Condition 4 of the Variation. If you require any further information please contact Zoë Bowen on (08) 8338 2833.

Yours sincerely

Tim Flowers
Head of Environment

Enc.

Copy of DBCA Invoice for the purchase of additional offsets area for Trieste Seismic Survey

Screenshot from accounts payable of payment confirmation of DBCA invoice on 30 April 2021

Copy of Offset Site Evaluation Report

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**

TAX INVOICE
ABN: 38 052 249 024

Date 01-APR-21
Page 1 of 1

Number 21722

Customer 68616
Site 168710

Enquiries To : PVS DIVISION
Phone Number (08) 9219 8207

Attn: Accounts Payable
BEACH ENERGY LTD
80 FLINDERS ST
ADELAIDE SA 5001

Terms 30 NET
Salesrep
Due Date 01-MAY-21

Item	Description	Qty Ordered	Unit Price	Amount
1	EPBC 2017/8133 Offset Contribution for 119.54ha	1	60,000.00	60,000.00
2	5% administration fee on land purchases	1	3,000.00	3,000.00

Special Instructions
Please quote invoice and customer number with your payment - thank you

Item Amount	GST	Freight	Total
63,000.00	300.00	0.00	63,300.00

Currency: AUD

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**

ABN: 38 052 249 024

Remittance Advice

PLEASE DETACH AND RETURN WITH YOUR PAYMENT

Remittance Advice to be emailed to:
Revenue Officer
Email: revenue@dbca.wa.gov.au

Pay By Direct Deposit:
BSB 066-040
A/C No 11300006
Account Name: Department of Biodiversity, Conservation and Attractions
Reference: 68616 / 21722

Pay By Credit Card
(visa and mastercard only)
Call (08) 9219 9317

Pay By Cheque:
Make cheque payable to: Department of Biodiversity, Conservation and Attractions
Mail to: Department of Biodiversity, Conservation and Attractions
Locked Bag 104, Bentley Delivery Centre WA 6983

Customer Number	Invoice Number	Invoice Date	Invoice Total
68616	21722	01-APR-21	63,300.00

Beach Energy Limited | ABN 20 007 617 969
Level 8, 80 Flinders Street Adelaide, South Australia 5000
GPO Box 175, Adelaide, South Australia 5001
T +61 8 8338 2833 | **F** +61 8 8338 2336
beachenergy.com.au

Screen shot of payment for Dept Biodiversity, Conservation & Attractions WA scheduled for 30/04/2021. DBCA will also receive a remittance by email.

Vendor 103591
Company Code 2010

Name Dept Biodiversity, Conserv & Attrac
City Kensington

S	CoCd	DocumentNo	Doc. Type	Doc..Date	Reference	PBk	Curr.	Σ	Amount in doc. curr.	Net due date	DD	Σ	Amount in local currency	LCurr	Clearing date	Clrng doc.
	2010	5105692636	RE	01.04.2021	21722		AUD		63,300.00-	01.05.2021			63,300.00-	AUD	30.04.2021	2000076696
		2000076696	ZP	30.04.2021			AUD		63,300.00	30.04.2021			63,300.00	AUD	30.04.2021	

M01 Foraging habitat assessment (Rev B)

Name:	Tim Flowers	Date:	19 January 2021
Company:	Beach Energy Limited	Job/Doc. No.:	59592
Email:	tim.flowers@beachenergy.com.au	Inquiries:	Dale Newsome

Trieste Offset Prospect – Black cockatoo foraging habitat assessment and assessment of offset suitability

1. Introduction

Beach Energy has identified a potential offset site (Figure 1) within a portion of Lot 10333 Watheroo Road, Boothendarra, in the Shire of Dandaragan to support its Trieste 3D seismic survey project, which has conditional approval for the clearing of up to 74.45 ha of foraging habitat for the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed Endangered Carnaby's Black Cockatoo. Native vegetation clearing (line clearing) for the Trieste seismic survey was completed in December 2019, and all survey activities were completed by March 2020. The total area of native vegetation cleared during the survey was 54.36 ha, which is less than the anticipated and approved 74.45 ha under EPBC Act Approval notice (EPBC 2017/8133). This reduction was achieved by reducing the width of some of the seismic survey lines.

This memorandum presents the findings of a Black Cockatoo foraging habitat assessment conducted in September 2020 by Strategen-JBS&G on the potential offset property (Survey Area), to determine the suitability of the proposed offset site identified in Figure 1.

To support the offset suitability assessment, a methodology for scoring Black Cockatoo foraging habitat is presented (Appendix A). This presented methodology is also used to assess the foraging habitat value of the Trieste 3D seismic survey impact area in order to support an assessment of the ability for the offset site to provide a suitable offset.

This memorandum also provides an assessment of the suitability of the site as an offset for the Trieste 3D seismic survey with reference to the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DSEWPaC 2012a).

2. Habitat Scoring Method

The Department of Agriculture, Water and the Environment (DAWE) have recognised that the scoring tool to determine the value of Black Cockatoo habitat, contained in the 2017 *Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo (Endangered) Calyptorhynchus latirostris Baudin's Cockatoo (Vulnerable) Calyptorhynchus baudinii Forest Red-tailed Black Cockatoo (Vulnerable) Calyptorhynchus banksii naso* (DotEE 2017), is flawed and as such have recommended against the use of this tool.

Bamford Consulting Ecologists (2018) have developed a Black Cockatoo foraging habitat scoring system (Attachment A), which has been previously accepted by the DAWE for projects subject to EPBC Act assessment. The Bamford Consulting Ecologists (2018) scoring system comprises of the following components to determine an overall score out of 10:

- Step 1: A score out of 6 for the vegetation composition, condition and structure. This represents the condition of the site in relation to the ecological requirements of the Threatened species and includes considerations of vegetation condition and structure and the density of foraging species present.
- Step 2: A score out 3 for the context of the site, where consideration is given to the extent of native vegetation remaining within 15km of the Project Area and the percentage of that extent that the Project Area represents, and if breeding is known/likely or unlikely to occur within 15km. This represents the relative importance to the site with regard to its position in the landscape including connectivity needs of the Threatened species. This includes considerations of the proximity of the site in relation to breeding and roosting habitat, and the importance of the role the site may plater in relation to the overall species population.

Site context scoring is applied as outlined below in Table 2.1.

Table 2.1: Site context scoring

Site context score / 3	Percentage of the existing native vegetation within the 'local' area that the study site represents	
	Local (within 15km) breeding known/likely	Local (within 15km) breeding unlikely
3	>5%	>10%
2	1-5%	5-10%
1	0.1-1%	1-5%
0	<0.1%	<0.1%

- Step 3: A species density score out of 1, where consideration is given to any sightings or foraging evidence recorded within the Project Area. If foraging evidence or sightings have been made within the Project Area, a score of 1 is assigned.
- Step 4: Determining the total score out of 10, which may require moderation where a score of 2 of lower has been ascribed at Step 1.

Where a raw foraging score of 2 or less out of 6 has been assigned, a site context score and species density score of 0 has been applied, so as not to overstate foraging value (Bamford Consulting Ecologists 2018).

3. Proposed Offset Site Survey Methods

The Survey Area was inspected on 24 September 2020 by Strategen personnel with relevant experience as specified by the *EPBC Act Referral guidelines for three threatened black cockatoo species* (DSEWPaC 2012b).

The Survey Area was traversed on foot, inspecting vegetation across the site. Observations were recorded at representative locations across the Survey Area, sampling the varying vegetation units. Aerial photography interpretation and field notes taken during the survey were then used to develop mapping polygon boundaries over the Survey area. These polygon boundaries were then digitised using the Geographic Information System (GIS) software.

For each vegetation unit, a foraging habitat quality score was assigned. As only Carnaby's Black Cockatoo are likely to occur within the area, no other species were scored for. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area, and can be influenced by the context such as the availability of foraging habitat nearby.

4. Foraging habitat quality of proposed offset site

The foraging habitat quality identified within the Survey Area is shown in Figure 2. All of the vegetation within the Survey Area is considered to be foraging habitat for Carnaby's Black Cockatoo. Table 4.1 outlines the vegetation units and associated foraging habitat value scores.

All three vegetation units were considered to have 'low to moderate' foraging habitat value based on density of suitable foraging species. The site represents 0.56% of the existing native vegetation within the local area (15km radius) and therefore was assigned a context score of one. No recent foraging evidence was recorded during the site survey, and no Black cockatoos were seen or heard. Therefore, a score of zero was assigned for species density.

The resulting habitat score for each vegetation unit was four out of a possible ten.

Table 4.1: Foraging habitat quality of proposed offset

Vegetation description	Area (ha)	Vegetation composition score	Site Context score	Species density	Total score
Eucalyptus wandoo woodland	0.84	3 - Low to Moderate foraging value	1	0	4
Eucalyptus todtiana very open woodland over mixed proteaceous heathland/ shrubland	251.75	3 - Low to Moderate foraging value	1	0	4
Mixed proteaceous heathland/ shrubland with scattered *Eucalyptus todtiana* and *Callitris preissii*	136.08	3 - Low to Moderate foraging value	1	0	4
Cleared	4.43	0 – No foraging value	0	0	0

5. Foraging habitat quality of Trieste impact area

Western Wildlife undertook a Level 1 Vertebrate Fauna Survey and Black Cockatoo Habitat Survey (2017) and Mattiske undertook a Targeted Flora Survey (2017). The survey identified two vegetation types, described as:

- open heathland (myrtaceous-proteaceous kwongan, grasstree kwongan and sedge kwongan), sometimes with isolated trees *(Eucalyptus todtiana* (Coastal Blackbutt) and/or *Xylomelum angustifolium* (Sandplain Woody Pear).
- open shrublands (either dominated by *Banksia hookeriana (*Hooker's Banksia) and *Banksia attenuata* (Slender Banksia), *or Allocasuarina campestris, or Banksia scabrella* (P4 – Burma Road Banksia) and *Banksia leptophylla,* often over open heathland or sedgeland (Mesomelaena spp).

Both vegetation types contain Carnaby's Black Cockatoo foraging species, however, no evidence of current or past foraging activity (e.g. chewed Banksia cones) was recorded, despite searching in several locations.

Both vegetation units were considered to have 'low to moderate' foraging habitat value based on density of suitable foraging species. The project area comprises 22,393 ha, and the survey area 4,118 ha. The approval for the Trieste Seismic survey was granted for the clearing of 74.5 ha of native vegetation within the survey area, leaving the majority of the vegetation within the survey area, 98%, unaffected. In addition, there is extensive in-tact native vegetation adjacent to the west, north and south of the project area. Therefore a context score of one was assigned. No recent foraging evidence was recorded during the site survey, and no Black cockatoos were seen or heard.

Therefore, a score of zero was assigned for species density. A summary of foraging habitat quality is provided in Table 5.1.

Table 5.1: Foraging habitat quality of impact area

Vegetation description	Vegetation composition score	Site Context score	Species density	Total score
Open heathland (myrtaceous-proteaceous kwongan, grasstree kwongan and sedge kwongan), sometimes with isolated trees (usually *Eucalyptus todtiana* (Coastal Blackbutt) and/or *Xylomelum angustifolium* (Sandplain Woody Pear).	3 - Low to Moderate foraging value	1	0	4
Open shrublands (either dominated by *Banksia hookeriana* (Hooker's Banksia) and *Banksia attenuata* (Slender Banksia), or *Allocasuarina campestris*, or *Banksia scabrella* (P4 – Burma Road Banksia) and *Banksia leptophylla*, often over open heathland or sedgeland (*Mesomelaena* spp.).	3 - Low to Moderate foraging value	1	0	4

6. Comparison of impact site and proposed offset site

The proposed offset site is approximately 80 km south-south-east of the Trieste 3D Survey Project Area and is located adjacent to the western boundary of the Watheroo National Park in Bootherdarra, WA. The proposed offset forms part of a contiguous area of in-tact native vegetation that is in excess of 125,000 ha. Table 6.1 presents a comparison of the key characteristics of the impact site and the proposed offset site.

Table 6.1: Summary of environmental characteristics

Characteristic / Factor	Proposed Clearing Area	Proposed Offset Site
Botanical District / Regional vegetation	Irwin Botanical District of the South-west Botanical Province (Beard 1990). Vegetation Association 379 of the Tathra System (shrublands; scrub-heath on lateritic sandplain) (Beard 1976; Mattiske Consulting Pty Ltd 2017). Vegetation Association 378 of the Eridoon System (shrublands; scrub-heath with scattered *Banksia* spp., *Eucalyptus todtiana* and *Xylomelum angustifolium* on deep sandy flats) form the dominant vegetation associations of the Project (Beard 1976; Mattiske Consulting Pty Ltd 2017).	Irwin Botanical District of the South-west Botanical Province (Beard 1990). Vegetation Association 1036.1 of the Warro system (Low woodland or open low woodland with acacia, banksia, peppermint, cypress pine, casuarina, York gum, Acacia spp., Banksia spp., *Agonis flexuosa*, Callitris spp., *Allocasuarina* spp., *Eucalyptus loxophleba*).
Black cockatoo habitat region	The site within the modelled distribution (partially breeding and partially non-breeding) and is located within the Wheatbelt black cockatoo habitat region (DotEE 2017)	The site is within the modelled distribution (breeding) and is located within the Perth black cockatoo habitat region, close to the border of the Wheatbelt habitat region (DotEE 2017).
Vegetation Type	The vegetation being impacted comprises: open heathland (myrtaceous-proteaceous kwongan, grasstree kwongan and sedge kwongan), sometimes with isolated trees (usually *Eucalyptus todtiana* (Coastal Blackbutt) and/or *Xylomelum angustifolium* (Sandplain Woody Pear). open shrublands (either dominated by *Banksia hookeriana* (Hooker's Banksia) and *Banksia attenuata* (Slender Banksia), or *Allocasuarina campestris*, or *Banksia scabrella* (P4 – Burma Road	The site contains vegetation types: • *Eucalyptus wandoo* woodland • *Eucalyptus todtiana* very open woodland over mixed proteaceous heathland/ shrubland • Mixed proteaceous heathland/ shrubland with scattered *Eucalyptus todtiana* and *Callitris preissii*

Characteristic / Factor	Proposed Clearing Area	Proposed Offset Site
	Banksia) and *Banksia leptophylla*, often over open heathland or sedgeland (*Mesomelaena* spp.). Also encountered in the survey area, however not being impacted, were open woodlands (*Eucalyptus accedens* (Powderbark Wandoo) and *Eucalyptus arachnaea* subsp. *arachnaea* (Black-stemmed Mallee))	
Vegetation Condition	The majority of the site was classified as Pristine, or nearly so, with some areas classified as 'Excellent' (vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species. Other minor disturbances included damage to trees caused by fire and occasional vehicle tracks.	The majority of the site was classified as 'Pristine' or nearly so, with vegetation bordering cleared areas classified as 'Excellent' (vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species).
Fauna habitat	Fauna habitat across the site is described as 'mixed shrubland with patches of Banksia spp. Shrubland and patches of open *Eucalyptus todtiana* woodland' Only potential black cockatoo foraging habitat is being impacted, with impacts to all potential habitat trees avoided. Key black cockatoo foraging species identified include: • *Banksia attenuata* • *Banksia hookeriana* • *Banksia sphaerocarpa* • *Banksia scabrella* • *Hakea trifurcate* • *Banksia sessilis* No known roosting or breeding sites are located within the clearing footprint.	All of the vegetation within the Survey Area is considered to be foraging habitat for Carnaby's Black Cockatoo. No known roosting or breeding sites are located within the proposed offset site.
Fauna Habitat condition	Habitat was not identified to be impacted by dieback and vegetation comprised very few weed species. An overall habitat condition rating of 4 has been calculated based on the outcomes provided in Table 5.1.	Habitat was not identified to be impacted by dieback and vegetation comprised very few weed species. An overall habitat condition rating of 4 has been calculated based on the outcomes provided in Table 4.1.

7. Assessment against the Offset Policy principles and justification of offset calculator values

Table 7.1 provides justification for how the proposed offset site meets the requirements of an offset site against the Offset Policy Principles as outlined within the EPBC Act *Environmental Offsets Policy* (DSEWPaC 2012a). Justification for the input values used in the offset calculator (Appendix B) are provided in Table 7.2 to support the assessment of the proposed offset as a suitable offset.

Table 7.1: Offset requirements and justification of the proposed offset site

Offset Policy principle	Proposed offset site justification
1. Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the aspect of the protected matter that is protected by national environmental laws and affected by the proposed action	The proposed offset for Black Cockatoo species will result in an improved overall conservation outcome, ensuring protection of key habitat for the species. The location and scale of the offset secures habitat in perpetuity for the species. The proposed offset site is privately owned, and currently zoned as Rural under the Shire of Dandaragan Local Planning Scheme (LPS) No. 7, which permits uses such as: • Agriculture Extensive – meaning premises used for the raising of stock or crops • Rural Pursuit – meaning premises used for the rearing or agistment of animals, stabling, agistment or training of horses, the growing of trees, plants, shrubs or flowers for replanting in domestic, commercial or industrial gardens, and the sale of produce grown solely on the lot. The proposed offset site contains vegetation classified as 'Pristine' or nearly so and contains Carnaby's Black Cockatoo foraging habitat of equivalent quality (score of 4) to that contained within the impact site. Furthermore, the proposed offset forms part of a contiguous area of in-tact native vegetation that is in excess of 125,000 ha, and is situated at the western boundary of Watheroo National Park. Statutory protection will be provided for the offset, being the placement under formal protection in perpetuity and managed by the Department of Biodiversity and Attractions (DBCA) as part of the State conservation estate.
2. Suitable offsets must be built around direct offsets but may include other compensatory measures	100% of the proposed offset is a direct offset. The selected site will provide Carnaby's Black Cockatoo foraging habitat of equal or better quality to that contained within the impact site, and directly compensates for the loss of Carnaby's Black Cockatoo habitat, ensuring long term viability of suitable habitat within the region.
3. Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter	The proposed offset is consistent with the requirements of the *EPBC Act Environmental Offsets Policy* (DSEWPaC 2012a) and the accompanying offset calculator, as provided in Appendix A. The area and value of required offset has been calculated as commensurate to the 'Endangered' conservation status of Carnaby's Black Cockatoo. Statutory protection will be provided for the offset, being the placement under formal protection in perpetuity and managed by the Department of Biodiversity and Attractions (DBCA) as part of the State conservation estate.
4. Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter	The extent of habitat to be protected within the proposed offset site will be proportionate to the residual impacts from clearing up to 54.4 ha of Carnaby's Black Cockatoo habitat. The extent to be protected within the proposed offset site is 338 ha, which is proportionate to the residual impacts on the protected matter, Carnaby's Black Cockatoo, providing 100.00% offset of impacts. The proposed offset site provides foraging habitat at proportions that meets the values of the impact site. The local and regional aspect of the offset connects with existing conservation estate, increasing the environmental reliance and security of the existing adjacent conservation estate.
5. Suitable offsets must effectively account for and manage the risk of the offset not succeeding	The risk of the offset option not fulfilling the aims for which it is designed is considered to be very low, and a confidence level of 90% has been used in the offset calculator. The proposed offset site will be vested in the conservation estate to be managed by DBCA and protected in perpetuity, ensuring that the offset measures undertaken are enduring in terms of their maintenance of the local habitat values.
6. Suitable offsets must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action)	The proposed offset site has been purchased and ceded to the State conservation estate as required by the State clearing permit process but has also been negotiated to fulfil the Commonwealth offset requirement, as the native vegetation clearing has been undertaken for the same action.

Offset Policy principle	Proposed offset site justification
7. Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable	The proposed offset meets the requirements of *EPBC Act Environmental Offsets Policy* (DSEWPaC 2012a). The purchase and protection of the proposed offset site provides immediate and permanent protection for the significant values contained within the site.
8. Suitable offsets must have transparent governance arrangements, including being able to be readily measured, monitored, audited and enforced	The proposed offset site has been purchased and vested in the State conservation estate as required by the State clearing permit process, and will be managed by DBCA as part of the conservation estate.

Table 7.2: Carnaby's Black Cockatoo (Endangered) offset calculations and justification

Offset parameter	Values used in calculator	Justification of value
Impact site		
Area of impact (ha)	54.4	The maximum area of impact of the proposed action, as permitted by the EPBC Act Approval notice (EPBC 2017/8133), is the clearing of up to 54.4 ha of Carnaby's Black Cockatoo foraging habitat.
Start quality (impacted area)	4	A starting quality of 4 for the impact site has been assigned, based on the below. The impact site contains the following vegetation types: • open heathland (myrtaceous-proteaceous kwongan, grasstree kwongan and sedge kwongan), sometimes with isolated trees *(Eucalyptus todtiana* (Coastal Blackbutt) and/or *Xylomelum angustifolium* (Sandplain Woody Pear). • open shrublands (either dominated by *Banksia hookeriana (*Hooker's Banksia) and *Banksia attenuata* (Slender Banksia), *or Allocasuarina campestris, or Banksia scabrella* (P4 – Burma Road Banksia) and *Banksia leptophylla,* often over open heathland or sedgeland (Mesomelaena spp). The majority of this vegetation was assessed to be in 'Pristine' or nearly so condition. Both vegetation types contain Carnaby's Black Cockatoo foraging species, however, no evidence of current or past foraging activity was recorded, and no Carnaby's Black Cockatoos were seen or heard during the surveys. As per Table 5.1, both of the above vegetation units are considered to have a 'Low to Moderate' foraging value based on the density of suitable foraging species and have been assigned a vegetation composition score of 3. A context score of 1 has been assigned based on the presence of extensive intact vegetation adjacent to the west, north and south of the impact site. As no recent foraging evidence was recorded during the survey and no Carnaby's Black Cockatoos were seen or heard, a species density score of 0 has been assigned.
Proposed offset site		
Proposed offset (ha)	338	This is the minimum offset area required to offset 100% of the impact of clearing 54.4 ha of Black Cockatoo foraging habitat.
Time over which loss is averted (years)	20	It is intended that the proposed offset site will be purchased and placed under formal protection within the State of Western Australia Conservation Estate. The maximum time allowed in the calculator is 20 years, however the offset site would be formally protected in perpetuity and managed by DBCA.
Time until ecological benefit (years)	7	This value has been assigned to allow for the purchase of the proposed offset site and the subsequent ceding to the relevant State agency, DBCA, for conservation in perpetuity within the Conservation Estate. This also allows for the implementation of physical protection mechanisms for the offset site, such as installation of conservation fencing and signage.
Start quality	4	A starting quality of 4 for the proposed offset site has been assigned, based on the below.

		The proposed offset site comprises of three vegetation types: • *Eucalyptus wandoo* woodland (0.84 ha) • *Eucalyptus todtiana* very open woodland over mixed proteaceous heathland/ shrubland (251.75 ha) • Mixed proteaceous heathland/ shrubland with scattered *Eucalyptus todtiana* and *Callitris preissii* (136.08 ha) The majority of this vegetation was assessed to be in 'Pristine' or nearly so condition. As shown in Table 4.1, all three vegetation units were considered to have 'Low to Moderate' foraging habitat value based on density of suitable foraging species, and have each been assigned a vegetation composition score of 3. The proposed offset site represents 0.56% of the existing native vegetation within the local area (15km radius) and therefore was assigned a context score of one. No recent foraging evidence was recorded during the site survey, and no Black cockatoos were seen or heard. Therefore, a score of zero was assigned for species density. Furthermore, the proposed offset forms part of a contiguous area of in-tact native vegetation that is in excess of 125,000 ha and is situated at the western boundary of Watheroo National Park.
Risk of loss (%) without offset	4	Based on recent advice from the Department, this value has been assessed at 4%, based on the proposed offset site being privately owned, and currently zoned as Rural under the Shire of Dandaragan Local Planning Scheme (LPS) No. 7, which permits uses that represent a potential threat/risk to the proposed offset site, such as: • Agriculture Extensive – meaning premises used for the raising of stock or crops • Rural Pursuit – meaning premises used for the rearing or agistment of animals, stabling, agistment or training of horses, the growing of trees, plants, shrubs or flowers for replanting in domestic, commercial or industrial gardens, and the sale of produce grown solely on the lot.
Future quality without offset	3	Given that the proposed offset site is privately owned, and zoned as 'Rural', there is risk that the land owner may sell the land or pursue any of the following uses within the site which threaten to reduce the overall quality: • Agriculture Extensive – meaning premises used for the raising of stock or crops • Rural Pursuit – meaning premises used for the rearing or agistment of animals, stabling, agistment or training of horses, the growing of trees, plants, shrubs or flowers for replanting in domestic, commercial or industrial gardens, and the sale of produce grown solely on the lot. The land immediately to the north, west and south of the proposed offset site is also zoned as Rural under the Shire of Dandaragan LPS No. 7, which is considered to constitute a threatening process to the proposed offset as it may be vulnerable to weed and disease incursion, unauthorised access and grazing pressures along these boundaries. The potential activities under the above current permitted uses of the site, coupled with the location of the site with regard to active, agricultural (grazing) activities located to the north, west and south of the site, have the potential to result in threatening processes such as stock and weed and disease incursion and damage to vegetation, or on-selling of the land allowing a future landowner to undertake the above-listed activities. These threatening process may result in a decrease in the site's future quality.
Risk of loss (%) with offset	0	A value of 0% has been assigned, as it is anticipated that the purchase and ceding of the proposed offset site to the State Conservation Estate will remove the risk of the land being sold and used for the current permitted land uses as a result of the 'Rural' zoning.

		Although a formal offset management plan will not be implemented, it is intended that the proposed offset site will be fenced and signage installed which will largely reduce threatening processes from degrading the quality of the site.
Future quality with offset	4	It is not expected that the quality of the proposed offset site will increase as a result of the offset, given that the majority of vegetation is already in a 'Pristine' or nearly so condition, however, the introduction of simple and standard management measures by DBCA such as fencing and weed monitoring will assist to maintain the current quality levels. Although a formal offset management plan will not be implemented, it is intended that the proposed offset site will be fenced and signage installed which will largely reduce threatening processes from degrading the quality of the site.
Confidence in result (%)	90	The proposed offset site is mapped directly to the west of land already within the conservation estate and has been endorsed by DBCA for addition to the estate. The proposed offset site: • Comprises vegetation of which the majority has been assessed to be in 'Pristine' condition; • Contains 'Low to Moderate' foraging habitat, equivalent to that of the impact site as assessed in accordance with Bamford Consulting Ecologists (2018) methodology • Is contiguous with an area of intact vegetation in excess of 125,000 ha contained within the Watheroo National Park • Would be placed under formal protection in perpetuity and managed by DBCA The estimation of risk of loss and change in quality is considered to be highly conservative and therefore the confidence that the offset can be achieved as identified is high.
Inputting the above values into the Offset Calculator (Appendix B) determines that acquisition of a 338 ha portion of land will achieve a 100% direct offset, specifically, offsetting 100.00% of the impact of the proposed action for Carnaby's Black Cockatoo, being the clearing of up to 54.4 ha of foraging habitat for this species.		

8. Conclusion

The proposed offset site contains Carnaby's Black Cockatoo habitat values that are equal and comparable to the Carnaby's Black Cockatoo habitat values proposed to be impacted by the Trieste 3D Seismic Survey. The proposed offset site is a suitable offset and extends the existing conservation estate in the region.

9. References

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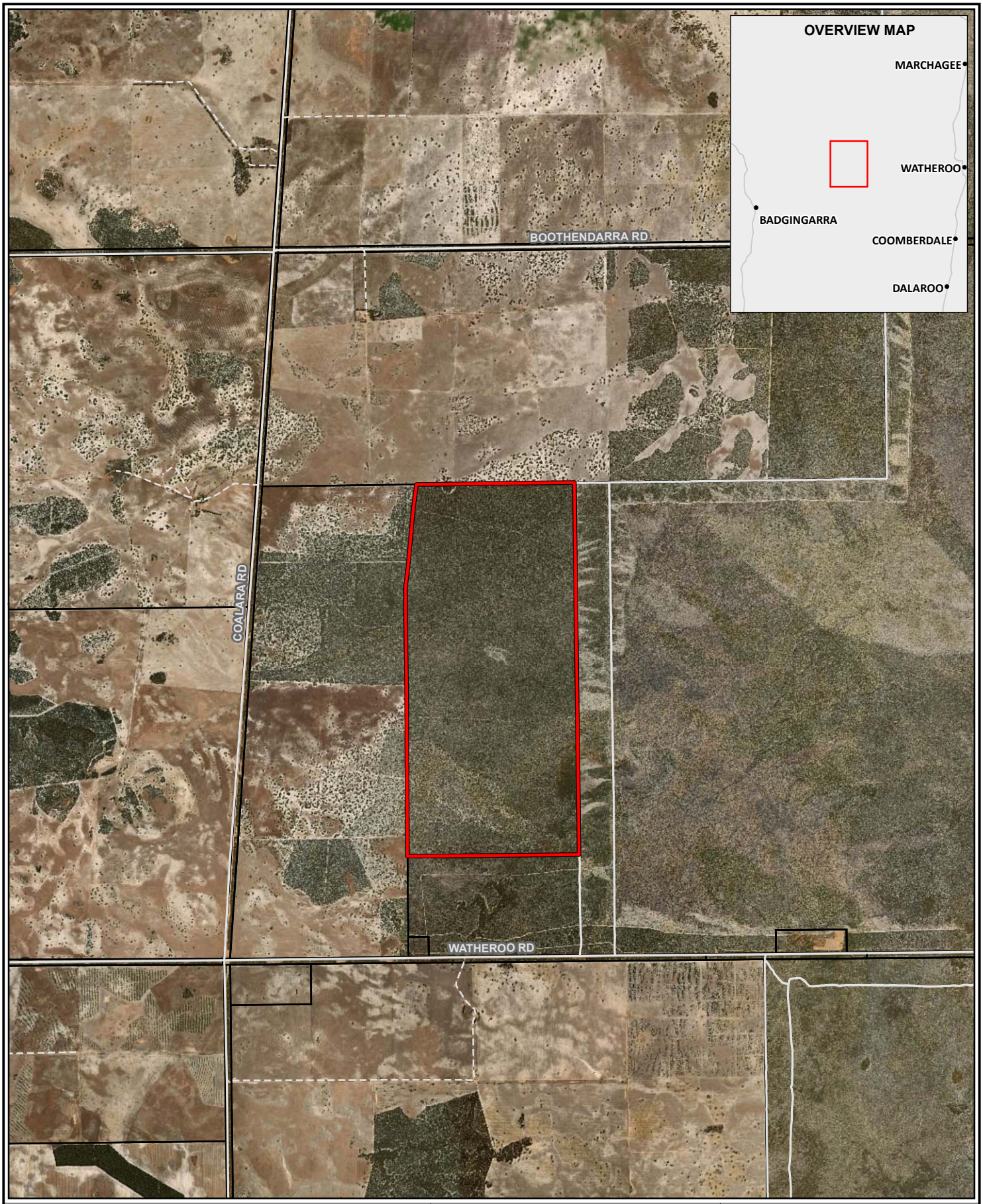

Legend

- Survey area
- Cadastral boundary
- Minor road
- Track

Scale 1:50,000 at A4 (0, 0.5, 1 km)		**Boothendarra, WA**
Coord. Sys. GDA 1994 MGA Zone 50		**SURVEY AREA**
Job No: 59592		
Client: Beach Energy		**FIGURE 1**
Version: A	Date: 03-Nov-2020	strategen JBS&G
Drawn By: cthatcher	Checked By: TS	

File Name: W:\Projects\1)Open\Beach Energy\59592 Trieste BC Offset Survey\GIS\Maps\M01_Rev_A\59592_01_SurveyArea.mxd
Image Reference: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Survey area
- Cadastral boundary

Black cockatoo foraging habitat quality

- Low
- Low to moderate
- Minor road

Scale 1:12,500 at A4

0 100 200
Meters

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 59592

Client: Beach Energy

Version: A | Date: 12-Oct-2020

Drawn By: cthatcher | Checked By: TS

Boothendarra, WA

BLACK COCKATOO FORAGING HABITAT

FIGURE 2

strategen JBS&G

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Beach Energy\59592 Trieste BC Offset Survey\GIS\Maps\M01_Rev_A\59592_02_BCHabitat.mxd
Image Reference: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Plate 1: *Eucalyptus todtiana* very open woodland over mixed proteaceous heathland/ shrubland

Plate 2: Mixed proteaceous heathland/ shrubland with scattered *Eucalyptus todtiana* and *Callitris preissii*

Plate 3: *Eucalyptus wandoo* woodland

Attachment A – Habitat scoring system (Bamford Consulting Ecologists)

Step 1: Vegetation composition, condition and structure scoring

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	Baudin's Black-Cockatoo	Forest Red-tailed Black-Cockatoo
0	**No foraging value**. No Proteaceae, eucalypts or other potential sources of food. Examples: Water bodies (e.g. salt lakes, dams, rivers); Bare ground; Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).	**No foraging value**. No eucalypts or other potential sources of food. Examples: Water bodies (e.g. dams, rivers); Bare ground; Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).	No foraging value. No eucalypts or other potential sources of food. Examples: Water bodies (e.g. dams, rivers); Bare ground; Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).
1	**Negligible to low foraging value**. Examples: Scattered specimens of known food plants but projected foliage cover of these is < 2%. This could include urban areas with scattered foraging trees; Paddocks that are partly vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source; Blue Gum plantations (foraging by Carnaby's Black-Cockatoos has been reported but appears to be unusual).	**Negligible to low foraging value**. Scattered specimens of known food plants but projected foliage cover of these < 1%. This could include urban areas with scattered foraging trees.	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. Could include urban areas with scattered foraging trees.
2	**Low foraging value**. Examples: Shrubland in which species of foraging value, such as shrubby banksias, have < 10% projected foliage cover; Woodland with tree banksias 2-5% projected foliage cover; Open eucalypt woodland/mallee of small-fruited species; Paddocks that are densely vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source.	**Low foraging value**. Examples: Woodland with scattered specimens of known food plants (e.g. Marri and Jarrah) 1-5% projected foliage cover; Urban areas with scattered foraging trees.	Low foraging value. Examples: Woodland with scattered specimens of known food plants (e.g. Marri, Jarrah or Sheoak) 1-5% projected foliage cover; Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys*.
3	**Low to Moderate foraging value**. Examples: Shrubland in which species of foraging value, such as shrubby banksias, have 10-20% projected foliage cover; Woodland with tree banksias 5-20% projected foliage cover; Eucalypt Woodland/Mallee of small-fruited species; Eucalypt Woodland with Marri < 10% projected foliage cover.	**Low to Moderate foraging value**. Examples: Eucalypt Woodland with known food plants (especially Marri) 5-20% projected foliage cover; Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).	Low to Moderate foraging value. Examples: Eucalypt Woodland with known food plants (especially Marri and Jarrah) 5-20% projected foliage cover; Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).

4	**Moderate foraging value**. Examples: Woodland/forest with tree banksias 20-40% projected foliage cover; Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover.	**Moderate foraging value**. Examples: Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. Eucalypt Woodland/Forest with diverse, healthy understorey and known food trees (especially Marri) 10-20% projected foliage cover. Orchards with highly desirable food sources (e.g. apples, pears, some stone fruits).	Moderate foraging value. Examples: Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Sheoak Forest with 40-60% projected foliage cover.
5	**Moderate to High foraging value**. Examples: Banksia Forest with 40-60% projected foliage cover; Banksia Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Pine plantations with trees more than 10 years old.	**Moderate to High foraging value**. Examples: Marri-Jarrah Forest with 40-60% projected foliage cover; Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths.	Moderate to High foraging value. Examples: Marri-Jarrah Forest with 40-60% projected foliage cover; Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. Sheoak Forest with > 60% projected foliage cover.
6	**High foraging value**. Example: Banksia Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	**High foraging value**. Example: Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).

Vegetation structural class terminology follows Keighery (1994).

Step 2: Site context

The maximum score is given in situations where foraging habitat is supporting breeding birds. It can also be given in fragmented landscapes where there is little foraging habitat remaining and thus what is left has a high contextual value. The site context score is species-specific as it depends upon factors such as the vegetation type and extent, and the presence of breeding birds, and the following table, developed by Bamford consulting in conjunction with DEE, provides a *guide* to the assignation of site context scores (note that 'local area' is defined as within a 15 km radius of the centre point of the study site):

Site Context Score	Percentage of the existing native vegetation within the 'local' area that the study site represents.	
	'Local' breeding known/likely	'Local' breeding unlikely
3	> 5%	> 10%
2	1 - 5%	5 - 10%
1	0.1 - 1%	0.1 - 5%
0	< 0.1%	< 0.1%

Step 3: Species density

Assignation of the species density score (0 or 1) is based upon the black-cockatoo species being either abundant or not abundant, and is species specific. A score of 1 is used where the species is seen or reported regularly and/or there is abundant foraging evidence. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year. A score of 0 is used when the species is recorded or reported very infrequently and there is little or no foraging evidence.

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	CBC
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes		**Area**	54.36	Hectares	
			Quality	**4**	Scale 0-10	
			Total quantum of impact	21.74	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	21.74	Adjusted hectares	Watheroo Rd Offset Site	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	338	**Risk of loss (%) without offset**	4%	**Risk of loss (%) with offset**	0%	13.52	90%	12.17	9.59	21.74	100.00%	Yes	
									Future area without offset (adjusted hectares)	324.5	**Future area with offset (adjusted hectares)**	338.0								
					Time until ecological benefit	7	**Start quality (scale of 0-10)**	**4**	**Future quality without offset (scale of 0-10)**	**3**	**Future quality with offset (scale of 0-10)**	**4**	1.00	60%	0.60	0.55				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	21.744	21.74	100.00%	**Yes**	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**