SOUTH32
Worsley Alumina

BUSINESS BLUEPRINT

SOUTH32 WORSLEY ALUMINA (ABN 58 008 905 155)

WORSLEY MINE EXPANSION REVISED PROPOSAL
EPA ASSESSMENT NO.2216
EPBC PROPOSAL NUMBER 2019/8437

JANUARY 2025

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1 DECLARATION OF ACCURACY

I declare that:

1. I am aware that:
    a. *Section 491 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth)*.
    b. *Section 112 of the EP Act makes it an offense to give or cause to be given information that to the person's knowledge is false or misleading to the Minister, the Authority, the CEO, a police officer, an inspector or an authorised person.*
    c. *The above offences are punishable on conviction by imprisonment or a fine or both.*
2. 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)

Organisation (please print)

Date: / /

2 EXECUTIVE SUMMARY

South32 Worsley Alumina Pty Ltd (Worsley) has prepared this Local Offset Environmental Management Plan (LOEMP) to detail the biodiversity offsets for the Worsley Mine Expansion Revised Proposal (Revised Proposal) under both the Western Australian *Environmental Protection Act 1986* (EP Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The core objective of the LOEMP is to outline values, outcomes, objectives and risks of implementation for each of the proposed offsets.

The potential direct impacts associated with the Revised Proposal comprise a maximum indicative disturbance footprint of 6,212 hectares (ha) including 3,855.3 ha of native vegetation, 1,678.7 ha of previously cleared land (primarily for agriculture), 603.6 ha of previously rehabilitated mined land (PRML)) and 74.3 ha of plantation. The areas of native vegetation are known to contain or represent habitat for conservation significant fauna species, varying in distribution and abundance within the Primary Assessment Area (PAA).

Species of conservation significance identified through the assessment of the Revised Proposal and for which offsets are proposed along with the scale of Residual Significant Impact (RSI) to each species and proposed offset are as determined in the EPA Report 1768 (July 2024).

Offsets have been selected and designed to align with regulatory requirements including:

- WA Environmental Offsets Policy (EPA 2011)
- WA Environmental Offsets Guidelines (EPA 2014)
- *Environmental Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy (DSEWPaC, 2012a)

The proposed biodiversity offsets (also known as “environmental offsets”) will be provided to address the RSI as the last step of the mitigation hierarchy to ensure the objectives of the State and Commonwealth legislation are upheld (primarily relating to no net loss for species). These offsets have been designed to maintain the value and viability of habitat for impacted conservation significant species over the long-term, achieve no net loss of biodiversity (at a minimum), and meet Commonwealth and Western Australian government requirements (please see Section 3.1.3.2) through*:*

- habitat protection;
- ecological restoration;
- on-ground management; and
- installation of artificial hollows.

Several offsets were identified in EPA Assessment Report No 1768. The offsets have been designed taking into consideration each species' National Recovery / Conservation plan. The resulting proposed offset package is comprised of:

- Direct Offset 1 – Provision of land for habitat protection (4,165.4 ha) and ecological restoration (432.2 ha) for Carnaby’s, Baudin’s and forest red-tailed black cockatoo, chuditch, western ring-tail possum, quokka and numbat.
- Direct Offset 2 – Provision of land for habitat protection (218.6 ha) and ecological restoration (299.8 ha) primarily for red-tailed phascogale. This offset also provides benefits to Carnaby’s, Baudin’s and forest red-tailed black cockatoo, chuditch and numbat;
- Direct Offset 3a – Targeted ecological restoration of black cockatoo habitat (4285.2 ha) in priority locations within the range of the species. This offset also provides benefits for chuditch and numbat;
- Direct Offset 3b – Targeted ecological restoration for landscape scale improvements, including connectivity, buffer enhancement, improvements in degraded land, improvements to inland waters and provision of benefits to MNES and conservation significant species (3,000 ha) (the detail of this offset will be provided in the Regional Offset Environmental Management Plan as described by condition B15-7)
- Direct Offset 4 – Strategic installation of 72 artificial hollows to replace hollows lost through clearing at a ratio of at least 3:1, in priority locations for black cockatoos;
- Woylie Offset which will be described in a Woylie Offset Environmental Management Plan that demonstrates how the environmental outcomes and objectives will be achieved for the Woylie (as described by condition B15-9); and
- Indirect Offset – targeted research projects and partnerships aimed at improving the management and protection of impacted MNES, enhancing habitat values and/or counteracting the impact of clearing MNES habitat (details of this

offset will be provided separately in the Research Offset Environmental Management Plan as required by condition B15-11).

This LOEMP will only describe and outline Direct Offset 1, 2, 3a and 4 as described above.

Offset programs and activities conducted under the LOEMP will be overseen and administered by Worsley with support from the Worsley Environmental Management Liaison Group (WEMLG) who will provide oversight and independent advice.

A summary of the information contained in this LOEMP is provided in Table 1.

Table 1: LOEMP Summary Table

Proposal Name	**Worsley Mine Expansion Revised Proposal**
Proponent Name	South32 Worsley Alumina Pty Ltd
Ministerial Statement Number	Ministerial Statement 1237
Commonwealth Assessment	EPBC 2019/8437
Purpose of EMP	This Local Offset Environmental Management Plan provides a framework for the management of proposed biodiversity offsets. The LOEMP has been prepared to fulfil the requirements set out under Condition B15-4 of MS1237 and to minimise the impact to biodiversity.
Key environmental factors, outcomes and objectives	Key environmental factors are: • Flora and Vegetation; and • Terrestrial Fauna. **Environmental Outcomes** 1. protection and enhancement of no less than 4,384 ha of remnant vegetation in perpetuity; 2. ecological restoration and protection in perpetuity of no less than 4,962 ha of agricultural land to obtain a net-gain in numbat, black cockatoo, chuditch, western ringtail possum, quokka and red-tailed phascogale habitat; 3. installation of three artificial breeding hollows for every tree cleared that is being used, or that has evidence of use, by black cockatoos for breeding, where that clearing is authorised by the CEO under condition B13-1(1)(e); **Environmental Objectives** 1. Minimise risk of uncontrolled fire within offset properties. 2. Minimise risk of spread of *Phytophthora* dieback within offset properties. 3. Minimise unauthorised access to Offset properties. 4. Maximise potential for utilisation of Black Cockatoo Artificial Breeding Hollows (ABH).
Condition Clauses	***B15-2*** The proponent must ensure the implementation of the offsets achieves the following environmental outcomes and objectives: 1) protection and enhancement of no less than 4,384 ha of remnant vegetation in perpetuity; 2) ecological restoration and protection in perpetuity of no less than 4,962 ha of agricultural land to ensure a net-gain in numbat, black cockatoo, chuditch, western ringtail possum, quokka and red-tailed phascogale habitat; 4) installation of three artificial breeding hollows for every tree cleared that is being used, or that has evidence of use, by black cockatoos for

breeding, where that clearing is authorised by the CEO under condition B13-1(1)(e);

B15-4 The proponent must prepare a Local Offset Environmental Management Plan that demonstrates how the environmental outcomes and objectives in conditions B15-2(1) and B15-2(4) will be achieved, monitored and substantiated, and submit it to the CEO.

B15-5 The Local Offset Environmental Management Plan must include the implementation of the offset measures to the extent and at the locations as set out and described in Table 1.

B15-6 The Local Offset Environmental Management Plan shall:

1) demonstrate that the environmental outcomes and objectives in conditions B15-2(1) and B15-2(4) will be met;
2) describe how the offset measures will be implemented consistent with condition B15-5;
3) be prepared in consultation with DBCA
4) spatially identify the areas (Proposed Local Offset Conservation Areas) in condition B15-5 proposed as:

a) acquired lands offset areas;

b) acquired lands offset areas to receive on-ground management offset measures;

5) demonstrate how the environmental values within the Proposed Local Offset Conservation Areas will be maintained, enhanced, managed and restored in order to counterbalance the significant residual impacts to the environmental values in condition B15-1 and achieve the environmental outcomes and objectives in conditions B15-2(1) and B15-2(4);
6) demonstrate application of the principles of the WA Environmental Offsets Policy and the *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy, or any subsequent revisions of these documents;
7) identify how the ongoing performance of the offset measures, and whether they are achieving the outcomes and objectives in conditions B15-2(1) and B15-2(4), will periodically be made publicly available;
8) for the land acquisition offsets identified in condition B15-5:
    a) demonstrate that the Proposed Local Offset Conservation Areas contain the minimum extents of the environmental values identified in condition B15-5;
    b) identify how the Proposed Local Offset Conservation Areas will be protected, being either the sites are ceded to the Crown for the purpose of management for conservation, or the sites are managed under other suitable mechanism for the purpose of conservation;
    c) specify the quantum of works associated with establishing the Proposed Local Offset Conservation Areas including for maintaining the offset for at least twenty (20) years; and
    d) identify the relevant management body for the on-going management of the Proposed Local Offset Conservation Areas, including its role, and the role of the proponent, and confirmation in writing that the relevant management body accepts responsibility for its role.
9) For on-ground management offsets identified in condition B15-5
    a) state the targets for each environmental value to be achieved by the on-ground management, including completion criteria, which will result in a tangible improvement to the environmental values being offset, including, but not limited to:

i. black cockatoo foraging within eight (8) years of restoration;
ii. chuditch, western ringtail possum and quokka presence within 10 years of restoration;
iii. red-tailed phascogale presence within 20 years of restoration;
iv. numbat presence within 20 years of restoration where that restoration could support the population(s) identified in accordance with condition B13-3(2);
v. completion criteria to measure (at a minimum) species diversity, abundance/distribution, habitat structure and vegetation condition;
vi. adaptive management to inform successful restoration; and
vii. use of artificial breeding hollows by black cockatoos.

b) demonstrate the consistency of the targets with the environmental outcomes and objectives in conditions B15-2(1) and B15-2(4) and the objectives of any relevant guidance, including but not limited to, recovery plans or area management plans; and

c) detail the on-ground management actions, with associated timeframes for implementation and completion, to achieve the targets identified in condition B15-6(9)(a) and the requirement of condition B15-3.

10) detail the monitoring, reporting and evaluation mechanisms for the targets and actions identified under condition B15-6(9)(a) and condition B15-6(9)(c).

Key components in the LOEMP	Please refer to Table 17, Table 12 and Table 18 for outcome and objective based provisions.
Proposed construction Date	January 2025
EMP Required pre-construction	Yes

3 CONTEXT, SCOPE AND RATIONALE

3.1 PROPOSAL

South32 Worsley Alumina Pty Ltd (Worsley) operates the Worsley Bauxite-Alumina Project on behalf of the Joint Venture parties. Worsley sought approval for the Worsley Mine Expansion Revised Proposal (the Revised Proposal) to continue existing mining operations and access additional ore resources to maintain the continuity of the Boddington Bauxite Mine (BBM), which has been in operation for over 40 years.

Key elements of the Revised Proposal include:

- expansion of the existing mining envelope at the BBM (to become the Worsley Mining Development Envelope – WMDE),
- establishment of a Bauxite Transport Corridor (BTC) at the BBM, and
- establishment of a Contingency Bauxite Mining Envelope (CBME) and support infrastructure / facilities at the Worsley Refinery (the Refinery).

The alumina refinery production rate remains at 4.7 million tonnes per annum. The full details of the Revised Proposal are detailed in the Worsley Environmental Review Document (Worsley, 2022) and the Response to Submissions document (Worsley, 2024).

3.1.1 Purpose

The Local Offset Environmental Management Plan (LOEMP) provides a framework for the management of the identified biodiversity offsets as required by the EPA's Revised Proposal Assessment No 2216. The LOEMP has been prepared to fulfil requirements set out under the EPA Assessment Report 1768 and MS1237.

The LOEMP describes the objectives, goals and management actions for each Biodiversity Offset planned to offset the RSI of the project. This document has been designed to meet the requirements for biodiversity offsets under both the WA Environmental Offsets Policy (EPA 2011) and the EPBC Act Environmental Offsets Policy (DSEWPaC, 2012a).

3.1.2 Scope

This LOEMP applies to all Worsley operations within the Primary Assessment Area (PAA) associated with the Revised Proposal specifically addressing the properties identified as Environmental Offsets in Condition B15-5 Environmental Offsets Table 1 of MS1237 and also includes elements of condition B15-10. The LOEMP addresses the requirements of the EPA Instructions for *How to prepare* Environmental Protection Act 1986 Part IV *Environmental Management Plans (March 2024)* and includes an implementation plan for each Offset detailing:

- Outcomes;
- Management measures;
- Monitoring;
- Action Plan;
- Relevant assessment criteria;
- Adaptive Management; and
- Reporting.

Impacts, monitoring and management activities associated with the Extended Mining Areas, managed under Part B(B) of MS1237, are excluded from this LOEMP. Also excluded from this LOEMP are the following:

- Regional Offset Environmental Management Plan requirements (Condition 15-7)
- Woylie Offset Environmental Management Plan requirements (Condition 15-9)
- Research Offset Environmental Management Plan requirements (Condition B15-11)

3.1.3 Legislative Policy and Context

3.1.3.1 Relevant Environmental Legislation

Works undertaken by Worsley within the Project Area are governed by a range of State and Commonwealth legislation (refer to Table 2), with the most relevant being the *Environmental Protection Act 1986* (WA) (EP Act), *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) and the *Biodiversity Conservation Act 2016* (BC Act).

Table 2: Relevant Commonwealth and State legislation and regulations

Legislation	Relevance	Regulatory Authority
Commonwealth Legislation		
EPBC Act	Protection of Matters of National Environmental Significance (MNES)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)
State Legislation		
Biosecurity and Agricultural Management Act 2007	Addresses the obligations for control, destruction, and notification of gazetted noxious plants and animals	Department of Primary Industries and Regional Development (DPIRD)
Conservation and Land Management Act 1984	Protection and management of nature reserves, State Forest, National Parks, Timber Reserve, marine parks etc.	Department of Biodiversity, Conservation and Attractions (DBCA)
*Environmental Protection Act 1986 (*EP Act)	Prevention, control and abatement of pollution; and, conservation, protection and enhancement of the environment	Department of Water and Environmental Regulation (DWER) Environmental Protection Authority (EPA)
Soil and Land Conservation Act 1945 (WA)	The conservation of soil and land resources with the mitigation of the effects of erosion, salinity and flooding	DPIRD
*Biodiversity Conservation Act 2016 (*BC Act)	Enhances protection for threatened species, introduces protection for threatened ecological communities. Provides coverage of important matters including; habitats, communities, threatening processes, environmental pests and weeds.	DBCA

3.1.3.2 Alignment with Regulatory Requirements

Biodiversity offsets (also known as “environmental offsets”) are “measurable conservation outcomes of actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken” (BLMP, 2018). In Australia, biodiversity offsets are required by the federal (Commonwealth) government as well as relevant State / Territory governments.

The Revised Proposal has been assessed under the Western Australian and Commonwealth legislation. Offsets have been provided to compensate for residual significant impacts to conservation significant species, which include species listed under the BC Act and MNES listed under the EPBC Act.

Worsley’s calculation of RSI and the associated inputs, including expected environmental impact, avoidance, minimisation and mitigation (i.e. rehabilitation), are found in Sections 4 and 5 of the ERD (Worsley, 2022) and further in the Response to Submissions Document (Worsley, 2024). The response in this document is based on the EPA's assessment of the RSI as presented in EPA Report 1768.

3.1.3.2.1 WA Environmental Protection Act 1986

The Revised Proposal was referred to the WA Environmental Protection Authority (EPA) under Section 38(1) of the *Environmental Protection Act 1986 (*EP Act) with a supporting document on 5 April 2019 (EPA Assessment 2216). On 17 July 2019, the EPA determined that the proposal would be assessed at the level of Public Environmental Review with an eight-week public review period and the following preliminary environmental factors:

- air quality;
- social surroundings;
- flora and vegetation;

- terrestrial environmental quality;
- terrestrial fauna; and
- inland waters.

This LOEMP has been prepared to align with the WA Environmental Offsets Policy (EPA 2011) and in consideration of the WA Environmental Offsets Guidelines (EPA 2014), including:

- Principles for the use of environmental offsets;
- Environmental Offsets Guideline;
- residual impact significance model (ERD Section 5.3.7 Residual Impact Summary - Table 5-51);
- quantifying the significant residual impact (ERD Section 5.3.9) and environmental value of offsets (RTS Appendix G1 section 6); and
- case studies of quantification.

Further detail demonstrating consistency with the above is presented in Table 3.

Table 3: Consistency with the WA Environmental Offsets Policy Principles

Principle	Alignment
The Western Australian Government's approach and requirements for environmental offsets are outlined in *WA Environmental Offsets Policy* (EPA 2011). The WA EPA's assessment and decision-making processes in relation to the use of environmental offsets are underpinned by the following principles.	
Principle 1. Environmental offsets will only be considered after avoidance and mitigation options have been pursued.	Worsley has applied the avoidance and mitigation activities specifically considering biodiversity values, and offsets have only been proposed after full consideration of the mitigation hierarchy (avoid, minimise, mitigate). Specific avoidance minimisation and mitigation measures are further described in the ERD (Section 4 & 5).
Principle 2. Environmental offsets are not appropriate for all projects.	The proposed offsets are considered sufficient to reliably compensate for the significant residual impacts of the Revised Proposal according to both the WA Environmental Offsets Policy (EPA 2011), as well as the EPBC Act Environmental Offsets Policy (DSEWPaC 2012a): • Worsley has fully considered and applied the mitigation hierarchy (avoid, minimise, mitigate (i.e. rehabilitate)) prior to consideration of offsets. Specific avoidance, minimisation and mitigation measures are further described in the ERD (Section 4 & 5). • All conservation significant species for which offsets have been proposed have been identified outside of the PAA in the surrounding landscape. The removal of suitable habitat for these species is reasonably compensated for without long-term detriment to the species. • Proposed offsets for impacts to conservation significant species are those activities known to reliably provide adequate (or better) compensation based on current scientific knowledge and precedent (Section 4.6). • When implemented, the proposed package of offsets will be adequate to provide compensation in full for significant residual impacts to conservation significant species as identified by the *Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999* (RTS Appendix G1, section 5 and EPA Report Section 7 and Appendix D). • In most cases, the proposed offset will provide a net gain for impacted conservation significant species. Broader benefits are expected to be provided as the implementation of proposed offsets will also prioritise the provision of other environmental and social benefits (RTS Appendix G1, section 5 and EPA Report Section 7 and Appendix D and Section 8)).
Principle 3. Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.	Preliminary analyses for offsets have included consideration of cost, benefit and risk to enable offsets which are feasible and cost-effective. Literature reviews (i.e. `threatened species plans, scientific reports) and engagement with recognised species experts (through stakeholder engagement) have been used to verify that proposed actions to be undertaken as offsets are effective and relevant to conservation significant species expected to be impacted by actions undertaken for the Revised Proposal (RTS Appendix G1, section 5 and EPA Report Section 7 and Appendix D).

Principle	Alignment
	The scale of offsets has been determined using both the EPBC offsets assessment guide (DSEWPaC 2012b) and the Department of Water and Environmental Regulation (DWER) WA environmental offsets calculator (DWER 2021) to verify that proposed offsets are not only proportionate to the significance of the environmental value being impacted, but that compensation will be more than adequate (i.e. provide a net benefit) factoring in time, risk and changes in environmental quality (RTS Appendix G1, section 6, table 15 and EPA Report Section 7 and Appendix D)). Additionally, financial provisions have been established to provide economic certainty in the delivery of offsets and compensatory measures if required (RTS Appendix G1, section 7).
Principle 4. Environmental offsets will be based on sound environmental information and knowledge.	Proposed offsets have been informed by relevant baseline studies and knowledge of the Northern Jarrah forest collated over the last 30 years, scientific research, stakeholder engagement (See Appendix C of the ERD), threatened species management plans, species recovery plans and relevant as well as science-based procedures and processes (including protected areas, biodiversity areas of interest, threatened species management and restoration of native vegetation and habitat) (Section 4.6). The offsets incorporate adaptive management guided by the WEMLG to verify that offsets are effective and provide relevant conservation outcomes for impacted conservation significant species over the course of each offset program (Section, 6.2.6, 6.3.5, 6.4.6 & 6.5.6). Worsley will compile an annual report on all offset actions, including performance against objective targets, which will be submitted to DCCEEW and DWER, before being made publicly available (Section 7.3).
Principle 5. Environmental offsets will be applied within a framework of adaptive management.	Offsets have been designed to be consistent with Open Standards for the Practice of Conservation (Conservation Measures Partnership 2020), which includes an adaptive management approach (Sections 6.2.6, 6.3.5, 6.4.6 & 6.5.6). Implementation of offsets under the LOEMP will occur within a framework of adaptive management (Section 7) and will be guided by ongoing advice and assessment from key stakeholders as part of the WEMLG (Section 7.3). The progress of offsets towards conservation outcomes will be reported on annually. These reports will be submitted to both DCCEEW and DWER as part of the Worsley Annual Environmental Reporting before being made publicly available (Section 7.3). These reports will highlight instances where contingency and adaptive management measures have been implemented.
Principle 6. Environmental offsets will be focused on longer term strategic outcomes.	The offsets proposed within the LOEMP are strategic and sit within a broader strategic framework established by the BOS (Section 1.1.1.1), which seeks to: • optimise biodiversity outcomes; • adopt a planned regional approach that seeks linkages between areas of remnant vegetation; and • pursue positive socio-economic outcomes. Further strategic development over the long-term is expected for offsets as the BOS has a vision "to co-develop with our partners an offsets strategy that delivers ecological, community and economic resilience across the region with a focus on innovative approaches and enduring outcomes." The locations for offsets have been selected through a strategic prioritisation of: • habitat restoration sites to maximise landscape connectivity and biodiversity value (Section 4 and sections 6.2, 6.3 and 6.4,); and • strategic prioritisation of locations for installation of artificial hollows to maximise benefits to the impacted species of black cockatoos (e.g. targeted installation to facilitate uptake in areas where hollows are a limiting resource; Section 6.5). Offsets will be long-term and implemented and maintained so that they, at a minimum, deliver appropriate environmental outcomes for the impact from actions related to the Revised Proposal (i.e. 30 years). Offsets will endure past this and will be permanent through the transfer of land and/or conservation covenants to protect areas of ecological restoration or habitat protection (Section 1.1.1).

Principle	Alignment
	Where possible, offsets will involve collaboration with third parties that may continue management of offsets following completion by Worsley. Funding for offsets required in perpetuity (e.g. installation of artificial hollows) will be structured so that management and maintenance of the offsets can continue in perpetuity.

3.1.3.2.2 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Revised Proposal was referred under the EPBC Act on 5 April 2019 to the Commonwealth Minister for the Environment via the Department of the Environment and Energy (DoEE, now Department of Climate Change, Energy, the Environment and Water - DCCEEW) (DoEE; referral no. 2019/8437). The Minister determined that the proposed action is a Controlled Action on 24 October 2019, and that the proposal would be assessed under an accredited assessment under the EP Act, due to expected impacts on listed threatened species and ecological communities.

This LOEMP has been prepared to ensure consistency with the EPBC Act Environmental Offsets Policy (DSEWPaC, 2012a), including:

- offset principles;
- offset requirements; and
- offset assessment guide.

Further detail demonstrating alignment with the above is presented in Table 4.

Table 4: Consistency with the EPBC Act Environmental Offsets.

Principle	Alignment
EPBC Act Principles – The Commonwealth Government's approaches and requirements for environmental offsets are outlined in *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DSEWPaC, 2012a). The LMP's specific compliance with each of the principles in the EPBC Act Environmental Offsets Policy is outlined below.	
Principle 1. Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action.	Worsley propose offsets that will fully compensate for (no net loss) and in many cases provide additional benefit (net gain) to impacted conservation significant species: In total, 4,384 ha will be protected (in perpetuity) and managed (for life of impact) to maintain the viability of impacted MNES including black cockatoo's0 chuditch; western ring-tail possum; red-tailed phascogale and quokka (Section 6.2 and 6.3). In total, at least 4,962 ha will undergo targeted ecological restoration and management to recreate, improve and maintain viability of habitat for black cockatoo's, chuditch and red-tailed phascogales (sections 6.2, 6.3 and 6.4) Artificial hollows, at a ratio of at least 3:1, will be strategically placed in priority locations and maintained, monitored and managed to offset the impact of the removal of confirmed black cockatoo breeding hollows (Section 6.5). Greater than 90% of RSI will be addressed through direct offsets and funding will be provided to support key research projects and partnerships related to the direct offsets that will enable enhancement of habitat values for conservation significant species and/or counteract the impact of clearing habitat for conservation significant species (to be addressed in the Research Offset Environmental Management Plan required by EPA Condition B15-11).
Principle 2. Be built around direct offsets but may include other compensatory measures.	The offset package has been designed with a focus on direct offsets (>90% of RSI), providing a combination of habitat protection, targeted ecological restoration and management. The remainder of the offset package (~10%) will comprise indirect offsets, focussed on research projects that fulfil gaps in knowledge for impacted MNES (to be addressed in the Research Offset Environmental Management Plan required by EPA Condition B15-11). Where research is to be commissioned, this will: • endeavour to improve the viability of the impacted MNES species; • be relevant, applicable and inform on-ground conservation and management action; • be transparent, scientifically robust and timely; and • consider best practice research approaches.

Principle	Alignment
	Research that enhances the outcomes of the direct offset package will be prioritised.
Principle 3. Be in proportion to the level of statutory protection that applies to the protected matter	Offsets have been designed to compensate for the proportion of impact for each conservation significant species (through the use of the EPBC Act offsets assessment guide (DSEWPaC 2012b) offsets calculator and the DWER WA environmental offsets calculator (DWER 2021) to account for the conservation status of that species (RtS Appendix G1, Table 15).
Principle 4. Be of a size and scale proportionate to the residual impacts on the protected matter.	The direct offset package has been designed to account for >90% RSI (and in some instances greater) calculated for each impacted MNES with respect to the quality and quantity of the habitat to be impacted by the actions of the Revised Proposal (RtS Appendix G1, Section 6 and EPA Report 1768, Section 7).
Principle 5. Effectively account for and manage the risks of the offset not succeeding.	The LOEMP has accounted for risk via the following measures: • use of a detailed and conservative methodology for quantifying habitat and offset value for all nine significantly impacted conservation significant species (RtS, Appendix G1 Section 6) including associated risks of loss and confidence in results; • investment in preliminary analysis to inform the design of the offset structure, including offset benchmarking, land analysis and field reconnaissance of land for inclusion in the direct offset (Section 4.5 and RtS Appendix G1, section 6.3); • planning of offsets based on current scientific knowledge gained through document review and stakeholder engagement as well as more than 30 years of Worsley operational implementation of mine-site rehabilitation, including formal procedures, completion criteria and monitoring RtS Appendix G1, section 5.1); • implementation of a transparent offsets monitoring and evaluation framework against which objectives and completion criteria have been developed (Section 5 and section 4.11); • provisions for adaptive management including commitments to corrective actions and contingencies if completion criteria cannot be met (Section 7); • implementation of robust structures; and • governance to review effective design, implementation, evaluation and administration. This includes the WEMLG that will involve key stakeholders who would provide technical support to review that offsets are delivered as per 'best practice' and that offset outcomes are achieved.
Principle 6. 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).	Measures outlined in the LOEMP are new commitments and not required under any other existing approval, scheme or program: • offsets have been developed so they are new/additional conservation actions in consideration of species recovery plans, including their objectives and specific recovery actions, and relevant scientific literature, as well as engagement with relevant stakeholders (Section 4); and • proposed actions will be guided by the WEMLG, subject matter experts and regulators so they achieve benefit for impacted MNES (Section 4).
Principle 7. Be efficient, effective, timely, transparent, scientifically robust and reasonable.	• Efficiency and effectiveness of offsets will be achieved by ensuring that offsets are guided by the WEMLG, subject matter experts and regulators as part of a consultation framework (Section 9); • Proposed offset activities build on already established and successful conservation and land management practices appropriate for the region (Section4.10). • Timeliness has been achieved by ensuring that all offsets will be achieved as soon as practicable, and will be implemented prior to impact (Section 4.4). Time to benefit has been considered and factored into the quantification offset value (Section 4.4). • Transparency has been achieved by ensuring that the preparation of the LOEMP and the OIPs clearly outline key offset elements for all conservation significant species, methodology, assumptions, monitoring and contingency measures. In accordance with

Principle	Alignment
	condition B15-6 (7) the ongoing performance of the offset measures and the progress towards achieving the outcomes will be made publicly available – this will occur on a 5 yearly basis to allow for implementation, align with monitoring regimes and is in accordance with Section 4.4. • Scientific robustness and reasonableness have been achieved through the design of the offsets using existing scientific and on-ground knowledge gained through stakeholder engagement (See ERD Appendix C) as well as the proposed ongoing governance of the offset program (Section 4.6). • Offset design has been developed in consideration of species recovery plans, including their objectives and specific recovery actions, and relevant scientific literature (Section 4 and RTS Appendix G1 Section 5) and proposed actions will be guided by the WEMLG, subject matter experts and regulators so they achieve genuine benefit for impacted MNES (Section 9).
Principle 8. Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	The governance of the LOEMP will be undertaken by Worsley, with input provided by the WEMLG, subject matter experts and regulators as relevant to review ongoing adaptive management that maintains the effectiveness of offsets (Section 7). Transparency and ethicality, planning and implementation of the LOEMP will also involve liaison with relevant third parties. The measurement and monitoring of offset outcomes will occur at pre-defined intervals and with defined criteria to review that the offsets meet key performance indicators and to implement contingency measures should elements of offsets not be delivering tangible benefits for MNES. In accordance with condition B15-6 (7) the ongoing performance of the offset measures and the progress towards achieving the outcomes will be made publicly available – this will occur on a 5 yearly basis to allow for implementation, align with monitoring regimes and is in accordance with Section 7.

3.1.3.2.3 Alignment with Sustainable Development Goals

As a signatory to the 2030 Agenda for Sustainable Development, Australia has committed to the Sustainable Development Goals (SDGs). The SDGs are a suite of 17 aspirational actions focused on balancing economic growth while tackling climate change and working to preserve our oceans and forests as well as eradicating poverty, improving health and education, and reducing inequality. The offsets developed for the within this LOEMP have been designed to contribute to the SDGs. These offsets will predominantly contribute to SDG 15 'Life on land', which aspires to "protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss". Offsets will contribute to this goal through the protection and restoration of habitat and the reinstatement of connectivity throughout the landscape.

Depending on location and offset types, offsets may also provide benefit for: SDG 3 'Good health and wellbeing'; SDG 13 'Climate action'; and SDG 14 'life below water'. Where possible, offsets will be undertaken in conjunction with Traditional Owners, which will contribute to SDG 8 'Decent work and economic growth' and SDG 10 'Reduced inequalities'.

3.2 KEY ENVIRONMENTAL FACTORS

This LOEMP specifically addresses the following EPA key environmental factors:

- Flora and Vegetation, in which the EPA's objective is "To protect flora and vegetation so that biological diversity and ecological integrity are maintained"; and
- Terrestrial Fauna, in which the EPA's objective is "To protect terrestrial fauna so that biological diversity and ecological integrity are maintained".

3.2.1 Proposal Activity

The proposed activity that would affect the listed key environmental factors is clearing 3,855 ha of native vegetation.

3.3 CONDITION REQUIREMENTS

Implementation and management of the Revised Proposal must be in accordance with the conditions of MS1237. Conditions addressed by this LOEMP are included in Table 5.

Table 5: Applicable EP Act and EPBC Act Approval Conditions

Condition	Condition Requirement	Plan Ref
B15-2(1)	protection and enhancement of no less than 4,384 ha of remnant vegetation in perpetuity;	5.1.1 6.2.1 6.3.1
B15-2 (2)	ecological restoration and protection in perpetuity of no less than 4,962 ha of agricultural land to ensure a **net-gain** in numbat, **black cockatoo**, chuditch, western ringtail possum, quokka and red-tailed phascogale habitat;	5.1.1 6.2.1 6.3.1 6.4.1
B15-2 (4)	installation of three artificial breeding hollows for every tree cleared that is being used, or that has **evidence of use**, by **black cockatoos** for breeding, where that clearing is authorised by the **CEO** under condition B13-1(1)(e);	5.1.1 6.5.1
B15-4	The proponent must prepare a Local Offset Environmental Management Plan that demonstrates how the environmental outcomes and objectives in conditions B15-2(1), and B15-2(4) will be achieved, monitored and substantiated, and submit it to the CEO.	This LOEMP 5.1.1 5.1.2
B15-5	The Local Offset Environmental Management Plan must include the implementation of the offset measures to the extent and at the locations as set out and described in Table 1:	4.5.1 Table 10
B15-6(1)	demonstrate that the environmental outcomes and objectives in conditions B15-2(1), (2), (3), (4), (5) will be met;	5
B15-6 (2)	describe how the offset measures will be implemented consistent with condition B15-5 (Table of Properties, Species, Area and Offset Measures);	4.5 4.10 6
B15-6 (3)	be prepared in consultation with DBCA	9.2
B15-6 (4)	spatially identify the areas (Proposed Local Offset Conservation Areas) in condition B15-5 proposed as: (a) acquired lands offset areas; (b) acquired lands offset areas to receive on-ground management offset measures;	Figure 1, Figure 2, Figure 3Figure 5
B15-6 (5)	demonstrate how the environmental values within the Proposed Local Offset Conservation Areas will be maintained, enhanced, managed and restored in order to counterbalance the significant residual impacts to the environmental values in condition B15-1 and achieve the environmental outcomes and objectives in conditions B15-2(1), (4);	6.2.2, 6.2.3, 6.3.2, 6.3.3, 6.4.2, 6.4.3, 6.5.2, 6.5.3
B15-6 (6)	demonstrate application of the principles of the WA Environmental Offsets Policy and the Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy, or any subsequent revisions of these documents;	3.1.3.1, 3.1.3.2
B15-6 (7)	identify how the ongoing performance of the offset measures, and whether they are achieving the outcomes and objectives in conditions B15-2(1), and B15-2(4), will periodically be made publicly available;	7.3
B15-6	For the land acquisition offsets identified in condition B15-5:	
B15-6 (8a)	demonstrate that the Proposed Local Offset Conservation Areas contain the minimum extents of the environmental values identified in condition B15-5;	4.5
B15-6 (8b)	identify how the Proposed Local Offset Conservation Areas will be protected, being either the sites are ceded to the Crown for the purpose of management for conservation, or the sites are managed under other suitable mechanism for the purpose of conservation;	4.10.1
B15-6 (8c)	specify the quantum of works associated with establishing the Proposed Local Offset Conservation Areas including for maintaining the offset for at least twenty (20) years; and	6.1, 6.2.2, 6.3.2, 6.4.2, 6.5.2,

Condition	Condition Requirement	Plan Ref
B15-6 (8d)	identify the relevant management body for the on-going management of the Proposed Local Offset Conservation Areas, including its role, and the role of the proponent, and confirmation in writing that the relevant management body accepts responsibility for its role.	6.1
B15-6	For on-ground management offsets identified in condition B15-5:	
B15-6 (9a)	state the targets for each environmental value to be achieved by the on-ground management, including completion criteria, which will result in a tangible improvement to the environmental values being offset, including, but not limited to: (i) black cockatoo foraging within eight (8) years of restoration; (ii) chuditch, western ringtail possum and quokka presence within 10 years of restoration; (iii) red-tailed phascogale presence within 20 years of restoration; (iv) numbat presence within 20 years of restoration where that restoration could support the population(s) identified in accordance with condition B13-3(2); (v) completion criteria to measure (at a minimum) species diversity, abundance/distribution, habitat structure and vegetation condition; (vi) adaptive management to inform successful restoration; and (vii) use of artificial breeding hollows by black cockatoos.	4.10.6 4.10.5 7.2 5
B15-6 (9b)	demonstrate the consistency of the targets with the environmental outcomes and objectives in conditions B15-2(1) and B15-2(4) and the objectives of any relevant guidance, including but not limited to, recovery plans or area management plans; and	4.10.6 5
B15-6 (9c)	detail the **on-ground management** actions, with associated timeframes for implementation and completion, to achieve the targets identified in condition B15-6(9)(a) and the requirement of condition B15-3.	4.10 5 6

4 RATIONALE AND APPROACH

As environmental offsets represent the final stage in the mitigation hierarchy, and are made to counterbalance the residual significant impact once the previous stages of Avoid, Minimise and Rehabilitate are undertaken, Worsley has undertaken ongoing surveys and assessment to understand the environmental values for protection within the Revised Proposal area. This assessment has assisted to determine where reduced impact to key environmental values will provide the most benefit.

This LOEMP has been drafted to establish that the environmental outcomes and objectives in conditions B15-2(1), B15-2(2) and B15-2(4) will be met and demonstrate the offsets have been designed to consider the National Recovery / Conservation plan for each species.

4.1 ENVIRONMENTAL VALUES

Worsley's calculation of RSI and the associated inputs, including expected environmental impact, avoidance, minimisation and mitigation (i.e. rehabilitation), are found in Sections 4 and 5 of the ERD and further in the Response to Submissions Document. The RSI referenced below is based on the EPA's assessment as published in the EPA's Report 1768.

Condition 15-1 The proponent must implement offsets to counterbalance the significant residual impacts of the proposal on the following environmental values:

- 2,033 ha of woylie (*Bettongia penicillata ogilbyi*) habitat;
- 4,324 ha of numbat (*Myrmecobius fasciatus*) habitat;
- 4,533 ha of black cockatoo habitat including up to 24 trees being used, or that have evidence of use, by black cockatoos for breeding where that clearing is authorised by the CEO under condition B13-1(1)(e);
- 4,459 ha of chuditch (*Dasyurus geoffroii*) habitat;

- 135 ha of western ringtail possum (*Pseudocheirus occidentalis*) habitat;
- 135 ha of quokka (*Setonix brachyurus*) habitat;
- 202 ha of red-tailed phascogale (*Phascogale calura*) habitat;
- 11.9 Williams vegetation complex, and
- 332.5 ha of Michibin vegetation complex.

4.2 ENVIRONMENTAL OUTCOMES

Environmental Outcomes are listed as per EPA Report 1768. Condition B15-2 states, "the proponent must ensure the implementation of the offset achieves the following environmental outcomes and objectives". Table 6 presents the listed outcomes in relation to the individual Offset Plans that will meet these outcomes.

Table 6: Offsets assigned to meet the required outcomes of Condition B-15-2

EPA Commitment	Outcomes	Offset 1	Offset 2	Offset 3A	Offset 4
B15-2(1)	Protection and enhancement of 4,384 ha of remnant vegetation in perpetuity.	X	X		
B15-2(2)	Ecological restoration of 4,962 ha agricultural land and protection in perpetuity to ensure a net-gain in numbat, black cockatoo, chuditch, WRP, quokka and red-tailed phascogale habitat.	X	X	X	
B15-2(4)	Installation of three artificial breeding hollows for every tree cleared that is being used, or that has evidence of use by black cockatoos for breeding.				X

Note # Condition B15-2(3) and B152(5) are covered specifically in the Regional Offset Environmental Management Plan and the Woylie Offset Environmental Management Plan respectively.

4.3 ENVIRONMENTAL OBJECTIVES

In addition to the environmental outcomes the following environmental objectives have been defined for this LOEMP:

- Minimise risk of uncontrolled fire within offset properties.
- Minimise risk of spread of *Phytophthora* dieback within offset properties.
- Minimise unauthorised access to Offset properties.
- Maximise potential for utilisation of Black Cockatoo Artificial Breeding Hollows (ABH).

4.4 MINING TRANCHE DATA AND DELIVERY OF OFFSETS

It is proposed that offsets will be delivered when required in accordance with the Quantum of Impact (QI) associated with the activity and Table 7 shows the delivery schedule compared to the estimated clearing for each five year Mining Tranche.

It should be noted that clearing will not commence beyond the area of Mining Tranche One, (the SRI for Mining Tranche One, which is covered by Offsets 1,2,4) until Offsets 3A has been confirmed and work commenced.

Table 7: Schedule of Proposed Disturbance and Offset Delivery.

	Mining Tranche 1	Mining Tranche 2	Mining Tranche 3
Current Proposed Clearing	2,036 ha	2,088 ha	2,088 ha
Offset 1 Restoration (ha)	✓ 432.2		

	Mining Tranche 1	Mining Tranche 2	Mining Tranche 3
Offset 1 Protection (ha)	✓ 4165.4		
Offset 2 Restoration (ha)	✓ 299.8		
Offset 2 Protection(ha)	✓ 218.6		
Offset 3A Restoration (ha)		✓ 2,114.5	✓ 2,114.5
Offset 4	✓ 72 cockatubes installed/ongoing monitoring	✓ 72 cockatubes monitored	✓ 72 cockatubes monitored

Note [1] Offset 3B is to be further documented in the Regional Offset Environmental Management Plan (EPA Condition B15-2(3))

The information provided in Table 8 and Table 9 provide a breakdown of the clearing type and habitat type for the first mining tranche.

Table 8: Mining Tranche 1 Clearing Type

MNES Species	Mining Tranche 1 Clearing (ha)
Native vegetation	1,338
Plantation	27
Rehabilitation	61
Cleared/ agricultural/degraded land	610
Total	2,036

Table 9: Mining Tranche 1 Habitat Clearing by Species

MNES Species	Mining Tranche 1 Clearing (ha)
Carnaby's Black Cockatoo	1,428
Forest Red-tailed Black Cockatoo	1,428
Baudin's Black Cockatoo	1,428
Chuditch	1,420
Woylie	749
Numbat	1,400
Western Ringtail Possum	20
Quokka	20
Red-tailed Phascogale	245

4.5 OFFSET PROPERTIES

Table 10 presents a comprehensive list of the offset properties proposed by Worsley and confirmed by the EPA via Condition B15-5 to sufficiently offset the SRI referred to in the EPA Assessment Report 1768. Figure 1, Figure 2, Figure 3 and Figure 4 show the relative location and boundaries of each property. From Section 4.4 it is demonstrated how the SRI of the first mining tranche is supported by Offsets 1, 2 and 4. Condition B15-5 included the ecological restoration of the remaining 4,229 ha of land as being within properties still "to be determined". This information has been provided confidentially to EPA and DCCEEW previously. For transparency, the properties that will likely be used for this purpose have been included in Table 10, noting that there is more land than required to meet the extent of areas to receive offset measures outlined in Condition B15-5 and the finalisation of the offset will be confirmed with both the State and Commonwealth regulators as part of the ongoing consultation and this LOEMP will be updated accordingly (following the process outlined in Conditions C2-2 to C2-6 of MS1237) In addition Worsley owns and may precure additional land that is suitable for utilisation to meet offset 3A and these areas may also be substituted, following consultation, for the properties listed below.

4.5.1 Mining and Historical Restoration within Offset Properties

Some offset properties included within Table 10 contain areas which have been previously mined or are planned for future bauxite mining activities. Under the Worsley State Agreement and the *Mining Act 1978* (WA) Worsley has obligations to restore private land in such a way that the total area of native vegetation within a given property remains consistent with what was present prior to mining operations commencing. Desktop baseline flora and vegetation assessment is completed for all private properties prior to mining activities commencing to determine the extent of impact on native vegetation associated with the mining operations and support restoration planning to meet legal obligations.

Worsley has historically completed proactive restoration of some areas of the identified offset properties (i.e. returned pasture to native vegetation without any legal obligation to do so). These areas are considered to represent suitable areas for inclusion in Ecological Restoration Offsets. Figure 4 shows the outcomes of a vegetation assessment for Offset 3A highlighting areas of existing parkland trees, pasture and historical clearing and restoration.

Areas of parkland trees have not been considered for habitat protection offsets, as the areas identified for Offset 3A require substantial restoration activities to ensure they will provide benefit. For example, much of the areas are trees over pasture, with little to no mid or understorey, therefore not suitable for chuditch, numbat, red tailed phascogale or woylie. In addition, these areas would further benefit all three species of black cockatoo for foraging with a reestablished mid and understorey.

Table 10: Lot Numbers and Respective MNES for each Offset Implementation Plan, Areas of Restoration, Protection and Current Ownership

Offset No	Chuditch	Western ringtail possum	Quokka	Numbat	Redtail Phascogale	Black Cockatoo Species	Location	Restoration (ha)	Protection (ha)	Ownership
Offset 1								432.2	4165.4	
1	•	•	•			•	Lot 102 on Deposited Plan 23201	0	2238	Worsley JV
1	•	•	•			•	Lot 100 on Deposited Plan 402144	295	1341	Worsley JV
1	•	•	•			•	Lot 2764 on Deposited Plan 138097	0	91	Worsley JV
1	•			•		•	Lot 5 on Plan 14227	0	229	Worsley JV
1	•			•		•	Lot 7 on Deposited Plan 44367	17.6	1.2	Worsley JV
1	•			•		•	Lot 633 on Deposited Plan 122638	0	97	Worsley JV
1	•			•		•	Lot 591 on Deposited Plan 122639	0	56	Worsley JV
1	•			•		•	Lot 2 on Plan 9255	51.9	16.8	Worsley JV
1	•			•		•	Lot 1 on Diagram 97837	25.7	4.3	Worsley JV
1	•			•		•	Lot 233 & 234 on Deposited Plan 249034	5.9	0.3	Worsley JV
1	•			•		•	Lot 5199 on Deposited Plan 119572	0	13	Worsley JV
1	•			•		•	Lot 6636 on Deposited Plan 123932	2	75.5	Worsley JV
1	•			•		•	Lot 11 on Deposited Plan 24463	14.2	2.3	Worsley JV
1	•			•		•	Lot 388 on Deposited Plan 255829	19.9	0	Worsley JV
Offset 2								299.8	218.6	
2 (Ex- Gibbs)	•			•	•	•	Lot 1771 on deposited plan 106910 Lot 2026 on Deposited Plan 108024 Lot 2027 on Deposited Plan 108025 Lot 6971 on Deposited Plan 126879 Lot 2028 on Deposited Plan 252141	299.8	218.6	Worsley JV

Offset No	Chuditch	Western ringtail possum	Quokka	Numbat	Redtail Phascogale	Black Cockatoo Species	Location	Restoration (ha)	Protection (ha)	Ownership
							Lot 159 on Deposited Plan 301925 Lot 160 on Deposited Plan 301925			
Offset 3A								4285.2	0	
3A Ex Berry	•			•		•	Lot 10974 on Deposited Plan 251312	36.9	0	Worsley JV
3A	•			•		•	Lot 11024 on Deposited Plan 130815	4	0	Worsley JV
3A	•			•		•	Lot 504 on Deposited Plan 63725	204.8	0	Worsley JV
3A	•			•		•	Lot 8034 on Deposited Plan 130811	201.6	0	Worsley JV
ex Cummins	•			•		•	Lot 3796 on Deposited Plan 113639	48.5	0	Worsley JV
Ex-Fortescue	•			•		•	Lot 5 on Deposited Plan 44366	2.8	0	Worsley JV
Ex-Gibbs	•			•		•	Lot 1771 on Deposited Plan 106910	77.8	0	Worsley JV
Ex-Heath	•			•		•	Lot 3800 on Deposited Plan 113639	40.4	0	Worsley JV
Ex Karafil	•			•		•	Lot 1 on Plan 9255	117.6	0	Worsley JV
3A	•			•		•	Lot 1174 on Deposited Plan 252478	40.5	0	Worsley JV
3A	•			•		•	Lot 1347 on Deposited Plan 251306	40.5	0	Worsley JV
3A	•			•		•	Lot 13769 on Deposited Plan 252146	39.2	0	Worsley JV
3A	•			•		•	Lot 13770 on Deposited Plan 252479	39.4	0	Worsley JV
3A	•			•		•	Lot 189 on Deposited Plan 245742	16	0	Worsley JV
3A	•			•		•	Lot 248 on Deposited Plan 250641	15.7	0	Worsley JV
3A	•			•		•	Lot 249 on Deposited Plan 250638	15.7	0	Worsley JV
3A	•			•		•	Lot 261 on Deposited Plan 250639	16.2	0	Worsley JV
3A	•			•		•	Lot 353 on Deposited Plan 250637	40.6	0	Worsley JV
3A	•			•		•	Lot 5820 on Deposited Plan 119650	40.4	0	Worsley JV
3A	•			•		•	Lot 627 on Deposited Plan 121419	64.8	0	Worsley JV
3A	•			•		•	Lot 632 on Deposited Plan 121420	79	0	Worsley JV
3A	•			•		•	Lot 635 on Deposited Plan 121421	121.4	0	Worsley JV
3A	•			•		•	Lot 636 on Deposited Plan 121422	49.2	0	Worsley JV
3A	•			•		•	Lot 6571 on Deposited Plan 128882	80.7	0	Worsley JV
3A	•			•		•	Lot 702 on Deposited Plan 130852	240.3	0	Worsley JV
3A	•			•		•	Lot 7892 on Deposited Plan 132547	42.1	0	Worsley JV
3A	•			•		•	Lot 803 on Deposited Plan 100856	52.3	0	Worsley JV
3A	•			•		•	Lot 904 on Deposited Plan 138711	15.1	0	Worsley JV

Offset No	Chuditch	Western ringtail possum	Quokka	Numbat	Redtail Phascogale	Black Cockatoo Species	Location	Restoration (ha)	Protection (ha)	Ownership
3A	•			•		•	Lot 929 on Deposited Plan 252144	40.5	0	Worsley JV
Ex-King	•			•		•	Lot 730 on Deposited Plan 302056	30.5	0	Worsley JV
Ex-Spencer	•			•		•	Lot 6636 on Deposited Plan 123932	23.9	0	Worsley JV
3A	•			•		•	Lot 900 on Deposited Plan 71903	62.2	0	Worsley JV
3A	•			•		•	Lot 901 on Deposited Plan 71903	37.7	0	Worsley JV
3A	•			•		•	Lot 902 on Deposited Plan 71903	51.5	0	Worsley JV
Ex-Teale	•			•		•	Lot 15189 on Deposited Plan 164471	61.6	0	Worsley JV
Ex Tour Holdings	•			•		•	Lot 1 on Plan 14884	44	0	Worsley JV
Ex-Veitch	•			•		•	Lot 68 on Plan 23032	41.4	0	Worsley JV
Ex-Young	•			•		•	Lot 10 on Deposited Plan 24679	11	0	Worsley JV
Ex-Agoni	•			•		•	Lot 276 on Deposited Plan 245712	37.1	0	Worsley JV
Ex-Arcan	•			•		•	Lot 3797 on Deposited Plan 113639	40.4	0	Worsley JV
Ex-B&S Veitch	•			•		•	Lot 1 on Plan 15317	56.3	0	Worsley JV
Ex-Batt	•			•		•	Lot 117 on Deposited Plan 62926	10.8	0	Worsley JV
3A	•			•		•	Lot 118 on Deposited Plan 62926	0.2	0	Worsley JV
3A	•			•		•	Lot 50 on Diagram 2555 Lot 51 on Diagram 4381	3.6	0	Worsley JV
3A	•			•		•	Lot 69 on Deposited Plan 245668	15.6	0	Worsley JV
3A	•			•		•	Lot 614 on Deposited Plan 419148	29.3	0	Worsley JV
Ex-Dobrowolski	•			•		•	Lot 8790 on Deposited Plan 133001	57.9	0	Worsley JV
3A	•			•		•	Lot 8790 on Deposited Plan 133001	160.7	0	Worsley JV
ex-Goodgame-Campbell	•			•		•	Lot 388 on Deposited Plan 255829	20.6	0	Worsley JV
Ex-Heales	•			•		•	Lot 7 on Plan 44367	22.8	0	Worsley JV
Ex-Holmes	•			•		•	Lot 2 on Plan 14884	67.4	0	Worsley JV
3A	•			•		•	Lot 4 on Plan 14884	50.1	0	Worsley JV
Ex-Jewell	•			•		•	Lot 6 on Deposited Plan 44366	32.6	0	Worsley JV
Ex-Batt	•			•		•	Lot 4 on Deposited Plan 44366	33.2	0	Worsley JV
Ex Kipipirri	•			•		•	Lot 3798 on Deposited Plan 113639	40.7	0	Worsley JV
Ex-Loose End Farm	•			•		•	Lot 3 on Plan 14884 -	71.5	0	Worsley JV
Ex-Lunard	•			•		•	Lot 12 on Plan 20426	43.6	0	Worsley JV
3A	•			•		•	Lot 13 on Plan 20426	40.2	0	Worsley JV
Ex-Matthews	•			•		•	Lot 10 on Deposited Plan 24463	8.3	0	Worsley JV
3A	•			•		•	Lot 3799 on Deposited Plan 113639	63.3	0	Worsley JV
Ex-Nichols	•			•		•	Lot 1 on Diagram 97837	12.6	0	Worsley JV
3A	•			•		•	Lot 2 on Plan 9255	51.4	0	Worsley JV
3A	•			•		•	Lot 233 on Deposited Plan 249034	17.3	0	Worsley JV
3A	•			•		•	Lot 234 on Deposited Plan 249037	14.7	0	Worsley JV

Offset No	Chuditch	Western ringtail possum	Quokka	Numbat	Redtail Phascogale	Black Cockatoo Species	Location	Restoration (ha)	Protection (ha)	Ownership
Ex-Olsson/Hill	•			•		•	Lot 609 on Deposited Plan 419128	37.9	0	Worsley JV
Ex-Robins	•			•		•	Lot 101 on Deposited Plan 411277	93.5	0	Worsley JV
3A	•			•		•	Lot 2 on Diagram 61118 (Farmers Ave)	94	0	Worsley JV
3A	•			•		•	Lot 70 on Plan 24299	89.1	0	Worsley JV
3A	•			•		•	Lot 72 on Plan 24299	87.4	0	Worsley JV
3A	•			•		•	Lot 8029 on Deposited Plan 130810	48.5	0	Worsley JV
Ex-Salmeri	•			•		•	Lot 1285 on Deposited Plan 104633 -	64.9	0	Worsley JV
3A	•			•		•	Lot 1286 on Deposited Plan 104632	64.9	0	Worsley JV
3A	•			•		•	Lot 8515 on Deposited Plan 131238	60.6	0	Worsley JV
3A	•			•		•	Lot 613 on Deposited Plan 419147	40.5	0	Worsley JV
3A	•			•		•	Lot 389 on Deposited Plan 255830	40.5	0	Worsley JV
3A	•			•		•	Lot 1291 on Deposited Plan 104634	40.6	0	Worsley JV
3A	•			•		•	Lot 11 on Deposited Plan 24463	21.2	0	Worsley JV
3A	•			•		•	Lot 601 on Deposited Plan 414262 –	21.4	0	Worsley JV
3A	•			•		•	Lot 604 on Deposited Plan 414262		0	Worsley JV
Ex-Wilson	•			•		•	Lot 5013 on Deposited Plan 118570 - G&S 62	40.5	0	Worsley JV
Ex-Windy Hollow (Wilson, IG)	•			•		•	Lot 30 on Deposited Plan 30008	85.8	0	Worsley JV
Salmeri Block	•			•		•	Lot 11811 on Deposited Plan 252480	40.5	0	Worsley JV
3A	•			•		•	Lot 7615 on Deposited Plan 127858	58.2	0	Worsley JV
3A	•			•		•	Lot 7645 on Deposited Plan 127857	64.8	0	Worsley JV

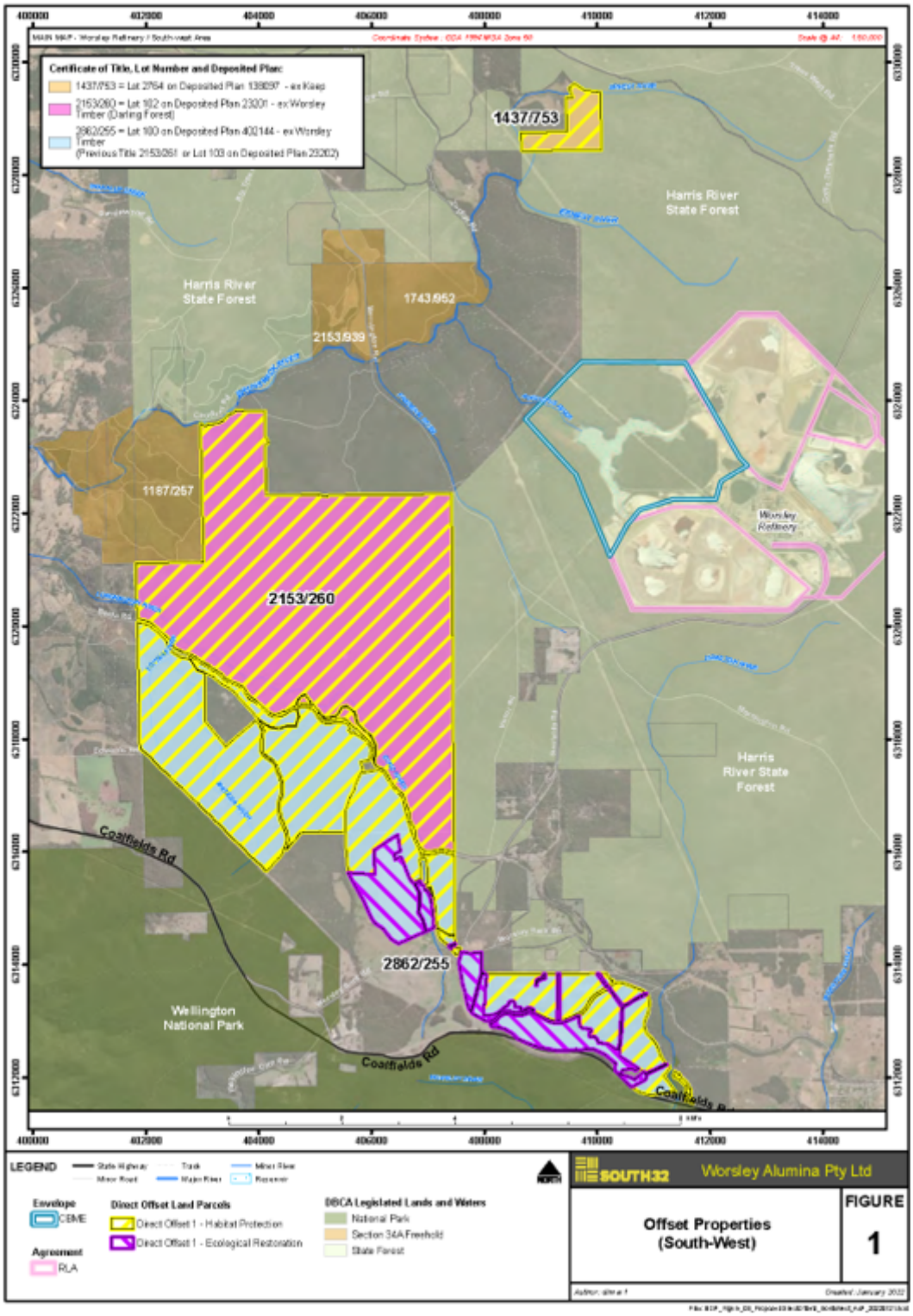

Figure 1 Property lots for the southern portion of Offset 1

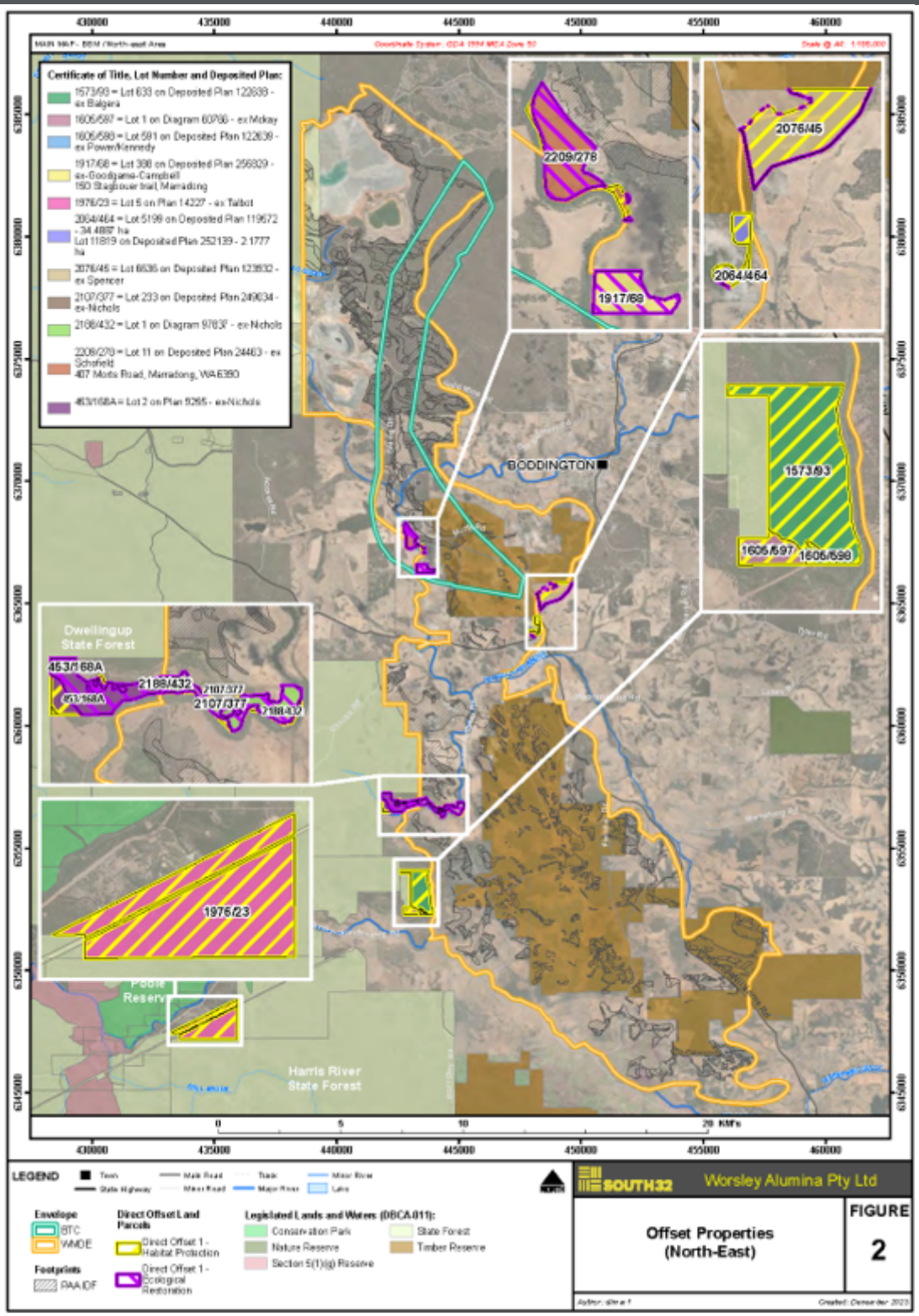

Figure 2 Property lots for the northern portion of Offset 1

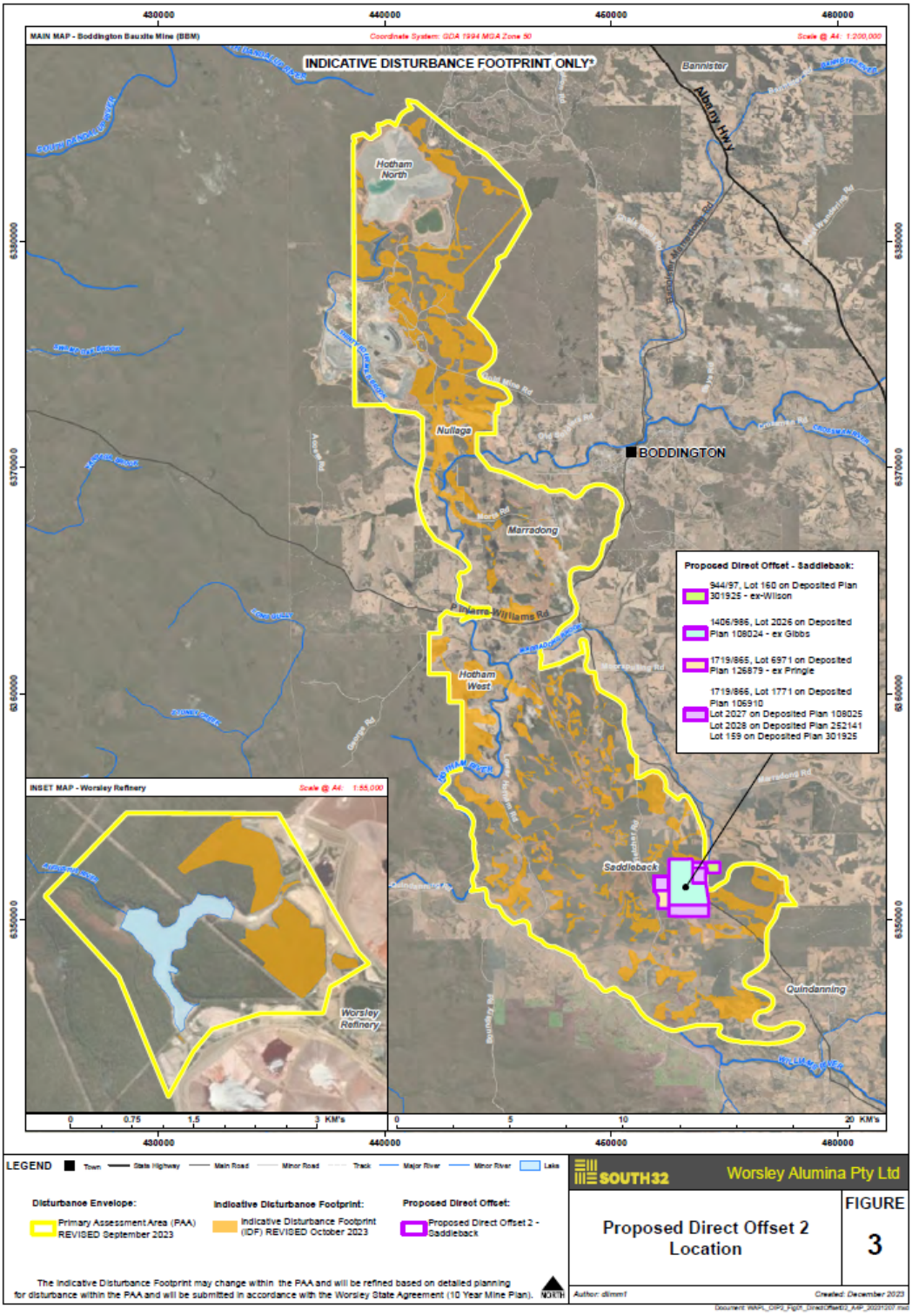

Figure 3 Property Lots for Offset 2

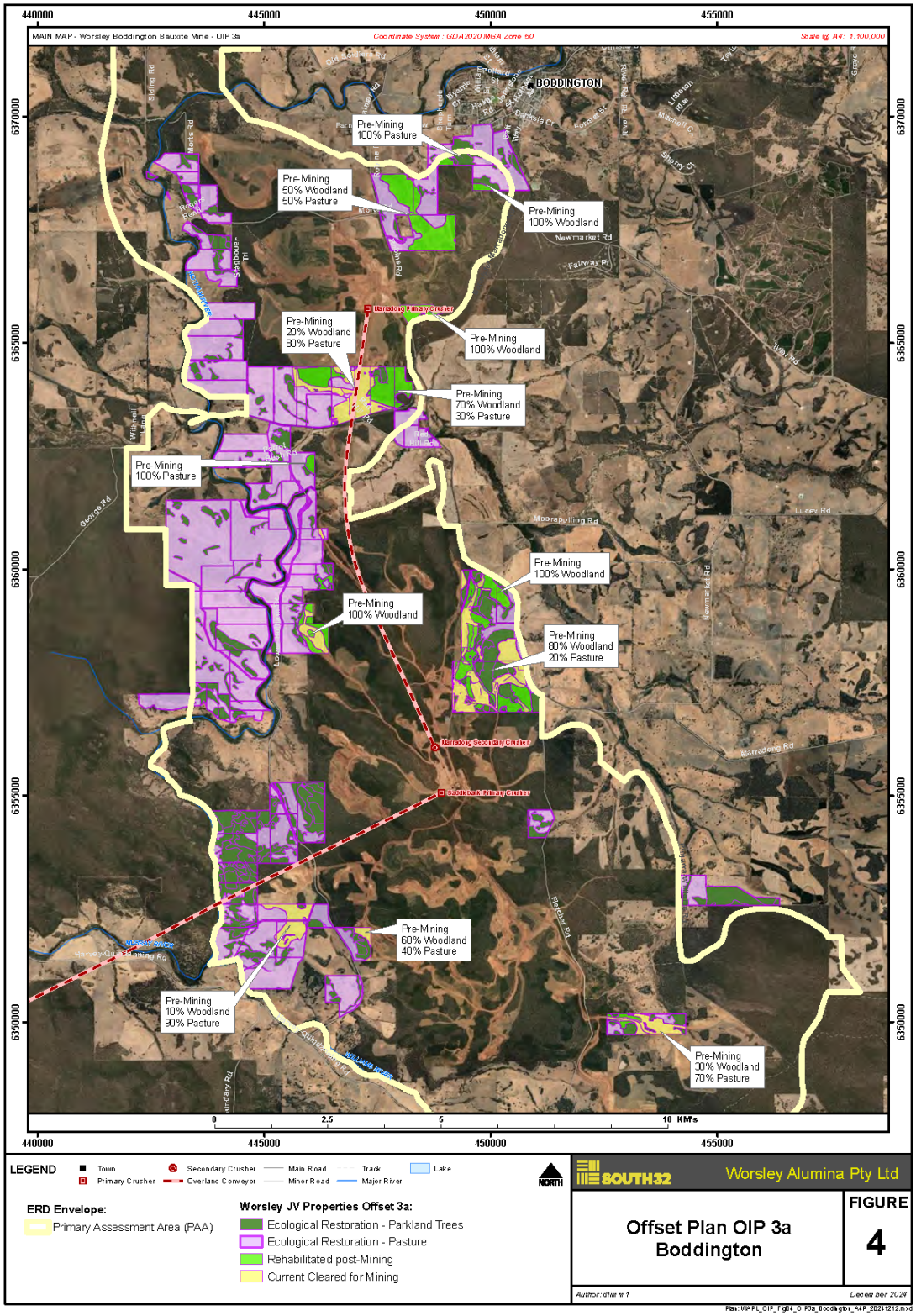

Figure 4 Property Lots for Offset 3A

4.6 SURVEY AND STUDY FINDINGS

Comprehensive fauna and flora studies (to current EPA Guidelines) have been commissioned for a number of offset properties. Further detail is provided below for surveys that have been completed or that are currently underway.

4.6.1 Baseline Surveys

4.6.2 Offset 1 (Lot 100 and Lot 102) Baseline Fauna Assessment

A targeted vertebrate fauna survey of Offset 1 Lot 100 and Lot 102 was undertaken in two phases; Spring (October 2023) and Autumn (May 2024). A total of 57 vertebrate fauna species were recorded across the two phases. This included eight significant species, of which five (western ringtail possum, quokka, Baudin's cockatoo, Carnaby's cockatoo and forest red-tailed black cockatoo) were targeted in accordance with South32's OIP #1. Three non-target significant species were recorded (wambenger brush-tailed phascogale, quenda and western brush wallaby). Seven introduced species were recorded, including black rat, rabbit, feral pig, European cattle (cleared habitat only), black rat, red fox and feral cat.

Three broad fauna habitats were mapped during the desktop assessment and survey, consolidating previous habitat mapping in the Study Area. The most common habitat was Jarrah/ Marri Communities (68.9%), with the remaining habitats Riparian/ Wetland (30.67%) and Cleared (7.60%). Data from the 1,736 potential breeding trees identified (including eight trees possessing at least one suitable hollow for current use), were extrapolated to yield an estimated 111,076 potential breeding trees within the Study Area. Of these, approximately 511 trees are likely to possess hollows to be of current potential use by black cockatoos, although active nesting was not observed during the survey.

Fauna habitats within the Study Area were assessed in accordance with DSEWPaC's offset policy and relevant DCCEEW and draft habitat criteria. The Study Area had an overall habitat quality score of zero for red-tailed phascogale, five for chuditch, numbat and woylie, seven for western ringtail possum and quokka, and eight for Carnaby's cockatoo, Baudin's cockatoo and forest red-tailed black cockatoo. Despite not being recorded during the current survey, it's possible the chuditch, numbat and woylie occur or have the potential to occur within the Study Area. It's highly unlikely the red-tailed phascogale occurs or has the potential to occur in the Study Area due to limited and highly fragmented suitable habitat. Further surveys within the Study Area targeting these species may provide additional context on the occurrence of these species.

In accordance with Condition B15.6(5) this study supports the concept that Lot 100 and Lot 102 provide suitable habitats and will offset a portion of the SRI for the following MNES habitat:

- Baudin's black cockatoo (*Zanda baudinii)*;
- Carnaby's black cockatoo (*Zanda latirostris*);
- Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*);
- Western ringtail possum (*Pseudocheirus occidentalis)*, and
- Quokka (*Setonix brachyurus*).

The study highlights that the habitat could possibly support the following MNES, but they were not observed within the study area during this study:

- woylie (*Bettongia penicillata ogilbyi*);
- chuditch (*Dasyurus geoffroii*), and
- numbat (*Myrmecobius fasciatus*).

The study also highlighted the presence of feral predators in the study area and that this poses a significant risk to the occurrence and survival of significant species in the study area.

4.6.3 Offset 1 (Lot 100 and Lot 102) Baseline Flora Assessment

A detailed two phase flora and vegetation survey has been commissioned with Biologic. The first phase of the Baseline Flora Assessment was completed June 5th – 12th 2024. The second phase was completed from 25th September – 2nd October 2024. This report is currently being finalised by Biologic.

4.6.4 Offset 5 (Woylie Safe Haven) Fenceline Baseline Flora Assessment (930 ha Portion of Lot 102)

A detailed two-phase flora and vegetation survey was completed for the area originally proposed to house a Woylie Safe haven (Offset 5 as described in the Worsley ERD) in August 2023 and October 2023, with a total of 20 person days (Biologic 2024, in RTS Appendix C6). All vegetation types were ground-truthed and sampled with no substantial limitations to the field survey. The survey and reporting were completed in line with EPA guidelines, with survey adequacy being consistent with the level of a detailed survey. Seventeen quadrats,, 22 relevés and 33 vegetation mapping notes were sampled across the survey area, and opportunistic sampling was also carried out.

The key findings of the survey were:

- The area contained 148 confirmed vascular flora taxa from 48 families and 133 genera, comprising 137 native and 11 introduced taxa;
- One Priority listed flora taxon (*Lomandra whicherensis* (P3)) was recorded from 90 point-locations, totalling approximately 206 individuals;
- One introduced taxon identified (**Gomphocarpus fruticosus*) is listed as a declared plant under the BAM Act;
- Five vegetation types were described;
- No TECs or PECs were recognised in the vegetation types;
- Two vegetation types supported a priority flora taxon and are therefore significant in providing suitable habitat for these species, and
- The condition of the vegetation ranged from Excellent to Very Good, with most considered to be in Excellent condition (98.8 %).

4.6.5 Offset 2 (Gibbs Property) Baseline Fauna Assessment

Biologic undertook a desktop assessment and two-phase targeted vertebrate fauna survey of Offset 2 to ascertain the presence of significant species and habitats to assist in determining environmental offset values. Particular focus was placed on the red-tailed phascogale, chuditch, Carnaby's cockatoo, Baudin's cockatoo and forest red-tailed black cockatoo.

A total of 88 vertebrate fauna species were recorded within Offset 2, including three significant species (Baudin's cockatoo, forest red-tailed black cockatoo and peregrine falcon) and six introduced species, including the red fox and feral cat. Seven fauna habitats were identified and mapped, consolidating previous habitat mapping in the vicinity of the study area. Over 59% of the Offset 2 was Cleared or Rehabilitated, with the remaining habitats Jarrah Woodland, Wandoo Woodland, Drainage Area / Drainage Line, Acacia Woodland and Marri Woodland.

Data from the 1,208 potential breeding trees identified across the study area was extrapolated to yield an estimated total of 12,740 potential breeding trees within the study area. Of these, an estimated 84 trees are likely to possess suitable hollows to be of current potential use by black cockatoos although active nesting was not observed during the current survey.

Fauna habitats within the Study Area were assessed in accordance with the EPBC Offset Policy and relevant DCCEEW habitat criteria. The Study Area had an overall score of four for chuditch, five for red-tailed phascogale and Carnaby's cockatoo and six for both Baudin's cockatoo and forest red-tailed black cockatoo. Despite not being recorded during the current survey, it is possible red-tailed phascogale and chuditch occur or have the potential to occur within the Study Area so actions to improve site condition attributes, such as predator control may increase stocking rates for these two species.

In accordance with Condition 15-6(5) this study supports the concept that Offset 2 provides suitable habitat and will assist in offsetting a portion of the SRI for habitat of the following MNES:

- Baudin's black cockatoo (*Zanda baudinii*);
- Carnaby's black cockatoo (*Zanda latirostris*), and
- Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso)*.

The study highlights that the habitat could support the following MNES, but they were not observed within the study area during this study:

- Red-tailed Phascogale (*Phascogale calura*), and
- Chuditch (*Dasyurus geoffroii*).

The study highlighted the requirement for feral predator control across the property to improve site conditions for significant species.

4.6.6 Offset 2 (Gibbs Property) Baseline Flora Assessment

A two-phase detailed flora and vegetation survey of Offset 2 was completed in 2023/2024. The objective of this survey was to describe representative flora and vegetation within the Gibbs Property, focusing on areas of native remnant vegetation. In addition, existing mapping of vegetation type and condition from desktop analysis were ground-truthed and refined, species richness of each vegetation type was calculated, significant and problematic weeds were mapped, and a list of pasture weeds was developed.

The field survey was undertaken over 20 person days by a team of botanists from Biologic. The survey was completed over two sampling events, in September 2023 and May 2024. A total of 17 quadrats, 20 relevés and 53 vegetation mapping notes were sampled across the Survey Area.

A total of 209 confirmed vascular flora taxa from 55 families and 138 genera were recorded from the Survey Area, comprising 149 native taxa and 60 introduced taxa. One priority flora taxon was recorded in the Gibbs Property: *Goodenia katabudjar* (P3). One plant was recorded at one point location. Following the survey, a further four significant flora species were assessed as remaining possible to occur within the Offset property. During the survey sixty confirmed introduced taxa were recorded, with only one (**Gomphocarpus fruticosus*) listed as a Declared Pest.

Six vegetation types and two mapping units were described in the Offset property. The vegetation types described are not considered to be analogous with any known Threatened or Priority Ecological Communities occurring in the Jarrah Forest bioregion. The condition of the vegetation ranged from Very Good to Completely Degraded, with a large portion (58.6%) assessed as Completely Degraded condition. The main disturbances observed were associated with historical pastoral activities, including access tracks, paddock and dams.

4.6.7 Offset 2 (Gibbs Property) Black Cockatoo Artificial Breeding Hollow Assessment

An assessment of the suitability of the Gibbs Property to support the installation of Artificial Breeding Hollows (ABHs) was completed by Ecology Matters (Kristancic et al., 2024). The study concluded there was:

- Known breeding nearby (1.2 km from site);
- Known roost sites at several locations within the site, indicating spatial use by the species and other known nearby roost sites within 6 km;
- Foraging habitat within and surrounding the site;
- Water sources (dams) within the site;
- Presence of an abundance of trees suitable for artificial hollow installation (at least 313 Grade A trees), and
- Relatively low abundance of natural hollows within the site due to previous clearance.

The study assessed 456 potential trees and recorded that 313 would be Grade A trees against guidance provided by DBCA (2023) (Figure 5). Preferred installation locations were refined to 72 locations to ensure the ABHs are spatially spread across the vegetation types (Jarrah, Marri and Wandoo) and differing heights (8m and 18m) (Figure 6).

4.6.8 Offset 2 (Gibbs Property) Restoration Plan

Worsley will develop a site-specific restoration prescription for each offset property, which includes targeted restoration for a stable, productive forest ecosystem to maintain conservation and nominated forest values as appropriate to the soil and landform types of the property.

Biologic Seed completed a conceptual study in 2023 for the restoration of the whole of the Gibbs Property. Biologic Seed (2024) undertook a more detailed assessment for the first 153 ha to be restored. This study used soil mapping and analysis to refine the locations of the various target native vegetation communities. A map from this report, showing the location of these various vegetation communities is provided in Figure 7.

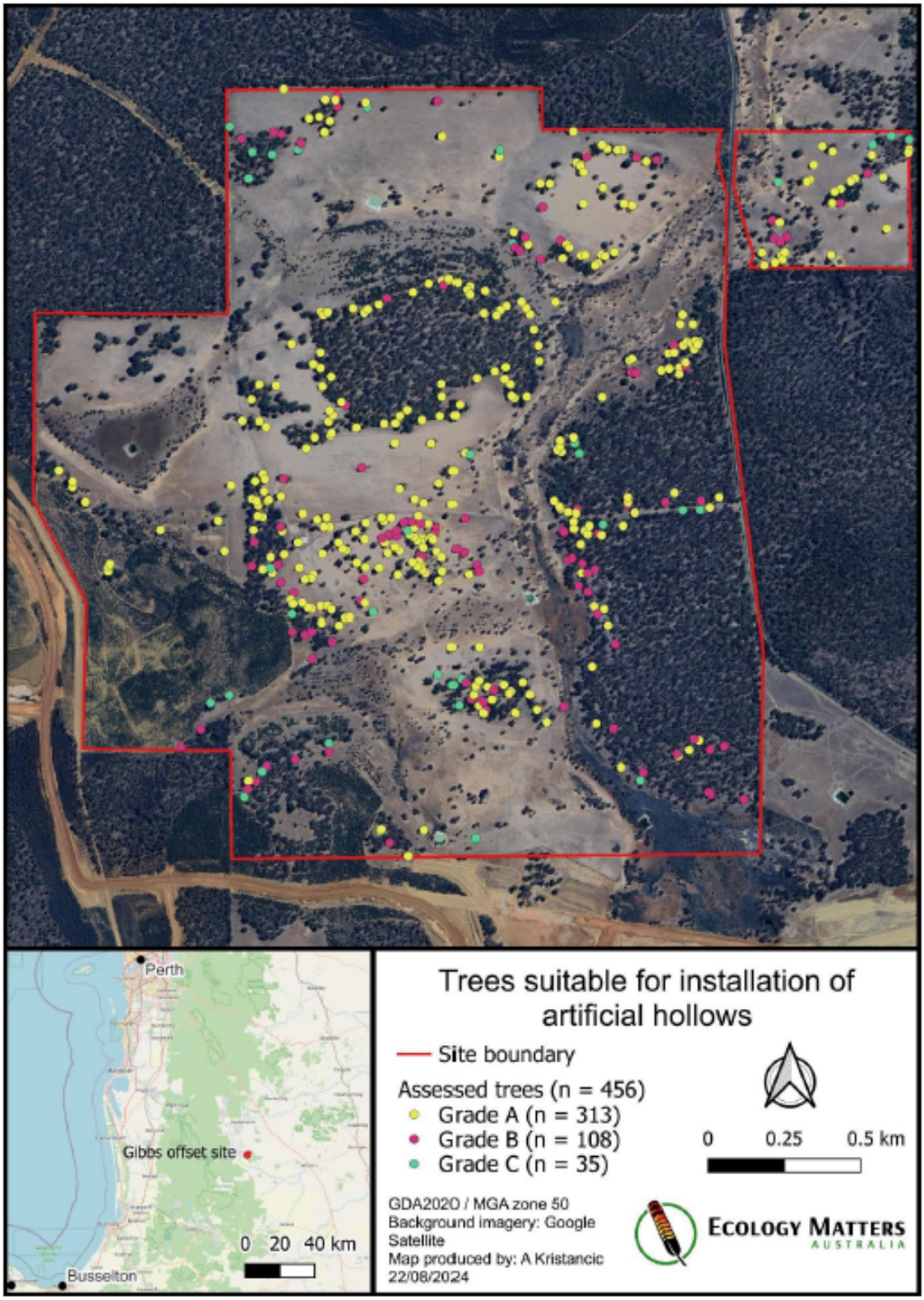

Figure 5 The location of 456 trees that were assessed to determine if they were suitable for the installation of artificial hollows.

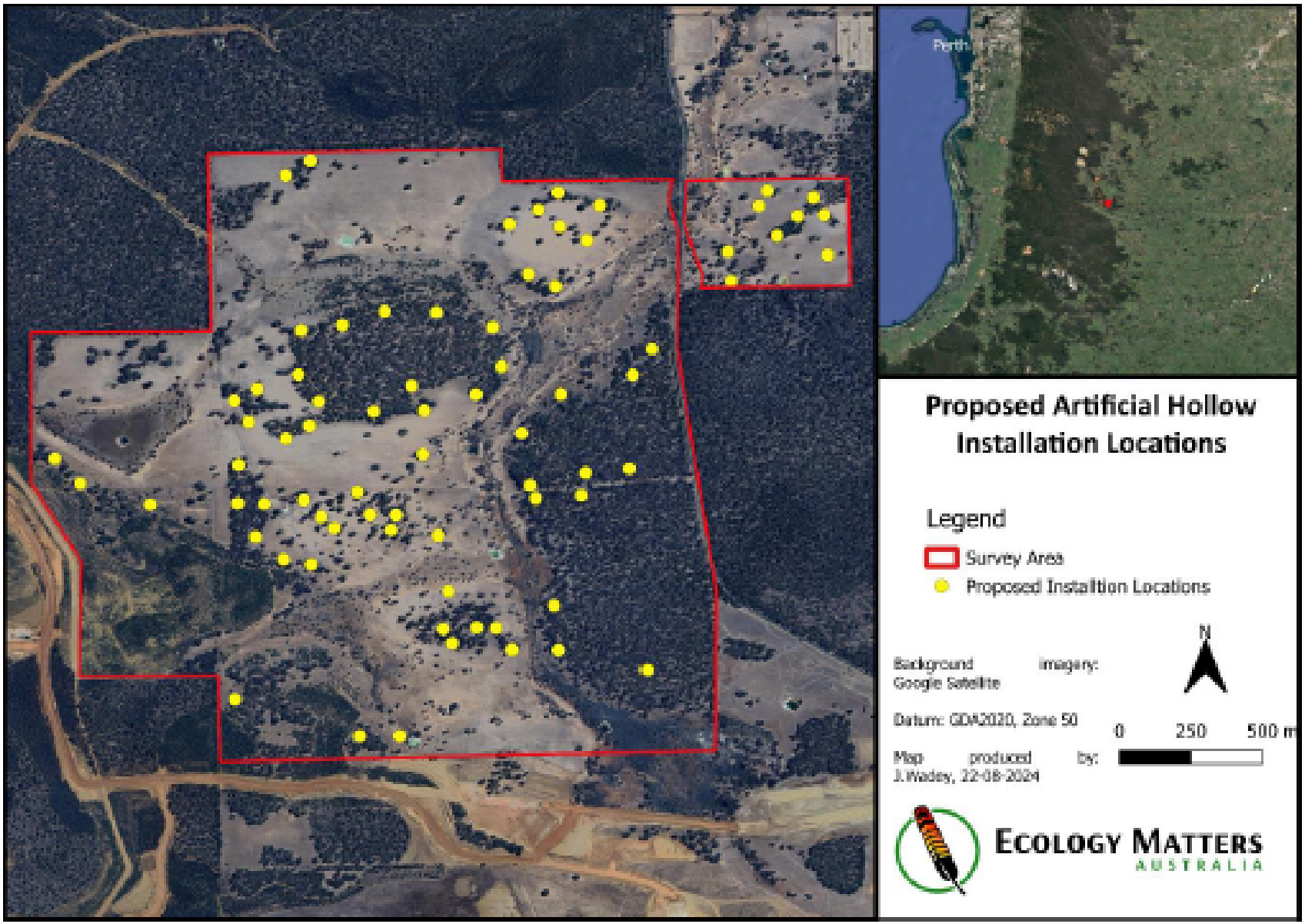

Figure 6: Selected A Class trees to house the required 72 artificial hollows.

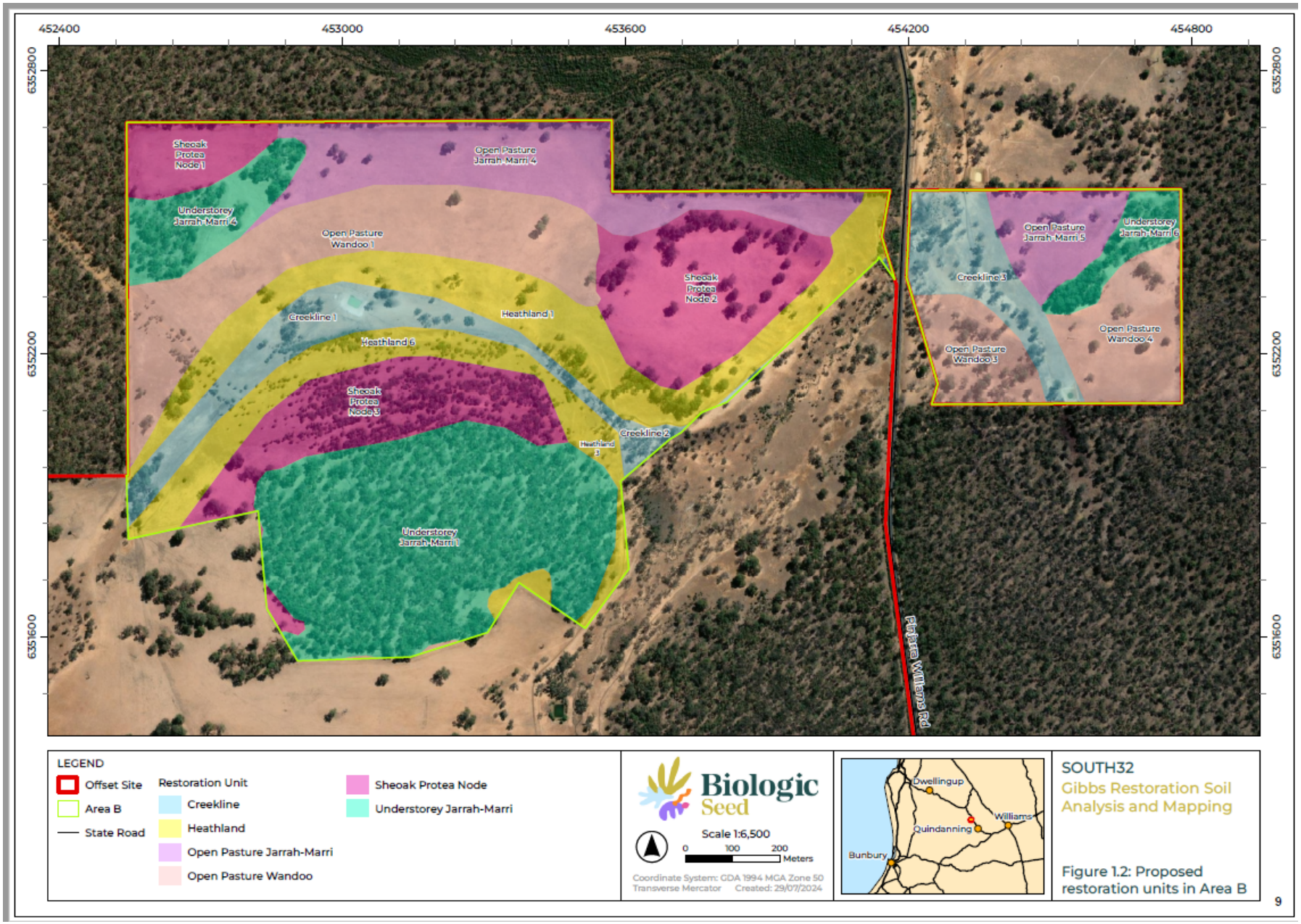

Figure 7 Gibbs Restoration Soil Analysis and Mapping.

4.7 KEY ASSUMPTIONS AND UNCERTAINTIES

- Feral predators are a key threatening process and their control will allow for the recolonisation of the offset areas.
- There is a sufficient population of the required MNES in surrounding areas of state forest, reserves and agricultural land to migrate into the offset properties once feral predators are controlled, and the habitat is improved.
- Control of weed species will allow for the restoration of the required vegetation systems for pasture areas.
- Control of fire in areas of protection will assist in maintaining the habitat of the woylie, chuditch and numbat.
- Cockatube placement directed by a suitably qualified ecologist will result in the positive use of artificial habitats.
- Adequate native seed will be available to restore the required 7,969 ha of farmland required under Offset 1, Offset 2 and Offset 3A.
- The requirement to see the return of the numbat to a number of the smaller offset properties will require extensive predator control and translocation of a viable population.
- Climate change will play an uncertain role in restoration efforts.

4.8 RATIONALE FOR CHOICE OF MANAGEMENT ACTIONS IN AREAS OF PROTECTION

The LOEMP has been prepared in accordance with the following:

- Instructions on "how to prepare *Environmental Protection Act 1986* Part IV Environmental Management Plans (EPA, 2024);
- Environmental Management Plan Guidelines (DCCEEW, 2024); and
- Approval granted through MS1237, specifically conditions under B15-4, B15-5, B15-6, C4-1 and C5-1.

The mitigation hierarchy (enhance, avoid, minimise, rehabilitate, and offset) has been applied in the management of potential impacts from Worsley operations on MNES species.

Worsley has considered the objectives outlined in the relevant Commonwealth Recovery Plans and Threat Abatement Plans for management of MNES species and environmental risks.

Specific MNES management actions for areas of habitat protection areas, were determined by reviewing the following Recovery Plans and Conservation Advice. Recovery plans set out the research and management actions necessary to stop the decline of, and support the recovery of, listed Threatened species or Threatened Ecological Communities. The aim of a recovery plan is to maximise the long-term survival in the wild of a Threatened species or ecological community. Recovery plans should state what must be done to protect and restore important populations of Threatened species and habitat, as well as how to manage and reduce threatening processes. Recovery plans achieve this by providing a planned and logical framework for key interest groups and responsible government agencies to coordinate their work to improve the plight of Threatened species and/or ecological communities.

- Threatened Species Scientific Committee (2018) *Conservation Advice Bettongia penicillate*. Available: 213-Conservation_Advice-01022018 (environment.gov.au)
- Department of Environment and Conservation (2012) National Recovery Plan For Chuditch *Dasyurus geoffroii* (2012) Wildlife Management Program No. 54. Department of Environment and Conservation. Western Australian Government.
- Department of Environment and Conservation (2012) National Recovery Plan for Woylie. *Bettongia penicillate ogilgyi.* Wildlife Management Program No. 51. Department of Environment and Conservation. Western Australian Government. (2012)
- Department of Environment and Conservation (2013) Quokka (*Setonix brachyurus*) Recovery Plan. Western Australian Wildlife Management Program No 56. Western Australian Government.(2013).
- Department of Environment and Conservation (2017) Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan. Wildlife Management Program No 58. Western Australian Government.(2017).
- Department of Parks and Wildlife (2017) Numbat (*Myrmecobius fasciatus*) Recovery Plan (2017). Wildlife Management Program No 60. Western Australian. (2017).
- Department of Environment and Conservation (2008) Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan. (2008) (Forest Black Cockatoo

(Baudin's Cockatoo Calyptorhynchus baudinii and Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso) Recovery Plan (dcceew.gov.au)).

- Department of Parks and Wildlife (DPAW) (2013). Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. Wildlife Management Program No. 52. Western Australia Government (2013).
- DCCEEW Approved Conservation (2013) advice for *Phascogale calura* (red-tailed phascogale) (2013). (Approved Conservation Advice for Phascogale calura (red-tailed phascogale) (environment.gov.au))

The threats listed in each Recovery Plan, and threat abatement plans were consolidated into Table 11 to determine common threats across MNES. These threats were then converted to Management Actions (for example Threat: Predation by Feral Cats = Management Action: Feral Cat Control ie baiting and trapping feral cats) per MNES species and listed in Table 12.

Threat abatement plans provide for the research, management, and any other actions necessary to reduce the impact of a listed key threatening process on native species and ecological communities. Implementing the plan should assist the long-term survival in the wild of affected native species or ecological communities. Relevant threat abatement plans included:

- *Felis catus* (Feral Cat) Threat abatement plan for predation by feral cats, DoE 2015. http://www.environment.gov.au/system/files/resources/78f3dea5-c278-4273-8923-fa0de27aacfb/files/tap-predation-feral-cats-2015.pdf
- *Vulpes vulpes* (European Red Fox): Threat abatement plan for predation by the European red fox, DoEE (DEWHA) 2008. http://www.environment.gov.au/system/files/resources/1846b741-4f68-4bda-a663-94418438d4e6/files/tap-fox-report.pdf
- *Phytophthora* Dieback Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi,* DoAWE (DoEE) 2018. http://www.environment.gov.au/system/files/resources/ee1f3b9f-6e2e-4a01-86f3-6abb167fb443/files/tap-phytophthora-cinnamomi-2018.pdf

Table 11: Summary of MNES Threatening Processes taken from various MNES Recovery Plans (Wildlife Management Plans) and Conservation Advice.

Threat No.	Threatening Process	Woylie	Chuditch	Numbat	Red-tailed Phascogale	Ringtail Possum	Quokka	Carnaby's Cockatoo	Forest Black Cockatoos	Baudins Cockatoo
1	Fox Predation	X	X	X	X	X	X			
2	Cat Predation	X	X	X	X	X	X			
3	Spread of phytophthora changes to habitat and food sources	X				X	X	X		
4	Feral pig's activity changes to habitat						X			
5	Habitat Alteration	X	X	X	X	X	X			
6	Loss of Breeding habitat (agriculture/mining)							X	X	X
7	Climate Change	X		X	X	X	X	X		
8	Altered Fire Regimes	X	X	X	X	X	X			
9	Human Mortality (road kill, poison, trapping, shooting illegal, collection)		X			X		X	X	X
10	Disease	X		X			X	X		
11	Control of fire to maintain tree hollows or on ground logs		X	X	X	X			X	X
12	Native Predators	X								
13	Feral Honey Bees								X	X
14	Nest Hollow Competition							X	X	X
15	Loss of Non Breeding Foraging and Night Roost Habitat							X		

Table 12: Corresponding Management Actions to reduce identified threats for the various MNES species in relation to specific Offset Implementation Plans.

Corresponding Threatening Process No	ON-GROUND MANAGEMENT ACTIONS	EPA Outcome Values [1.]	Woylie	Chuditch	Numbat	Red-tailed Phascogale	Ringtail Possum	Quokka	Carnaby's	Forest Black Cockatoo's	Baudins Cockatoo
1	Control fox population	Enhance	5	1,2,3	1,2,3	2,3	1	1			
2	Control the feral cat population	Enhance	5	1,2,3	1,2,3	2,3	1	1			
3	Control the spread of phytophthora to maintain habitat and food sources	Maintain	5				1	1			
4	Control the feral pig population	Enhance	5					1			
5	Preserve continuous habitat	Maintain	1	1,2,3	1,2,3	2,3	1	1	1,2	1,2	1,2
7	Net Zero by 2050 (Worsley Operations)	Enhance	#		#	#	#	#			
8	Control of fire to manage habitat	Maintain	1	1,2,3	1,2,3	2,3	1	1			
6	Restoration of Areas of Pasture to Target Native Ecosystems	Restore		1,2,3	1,2,3	1,2,3	1	1	1,2	1,2	1,2
9	Restrict Public Access to Offset Properties	Enhance		X			X		1,2	1,2	1,2
1,2,DoE (2015)	Safe Havens (Insurance Populations Against Cat Predation)*	Enhance	5	X	X		X				
10	Monitor Genetics across the Safe Haven MNES Populations	Enhance	5		X			X			
8	Control of fire to maintain tree hollows or on-ground logs	Maintain		1,2,3	1,2,3	2,3	1			1,2	1,2
5	Install artificial breeding hollows	Restore		1,2,3	1,2,3	1,2,3	1,2,3		4	4	4
13/14	Annual maintenance of artificial breeding hollows	Enhance							4	4	4
8	Loss of Non Breeding Foraging and Night Roosts	Maintain							1,2	1,2	1,2

KEY

1. EPA Report 1768 Condition 15-6(5)
Included in offset implementation plan (number denotes which plan)
Management action not included in the Species Recovery/Conservation Plan
Management action included but not incorporated into Worsley Offsets
\# See GHGMP (appendix B8 of the RTS)
* Department of Environment's (2015) Threat abatement plan for feral cat predation.

4.9 RATIONALE FOR CHOICE OF INDICATORS

4.9.1.1 Potential impacts

The environmental outcomes addressed by this LOEMP reflect the provision of effective offsets to address the assessed SRI associated with implementation of the Revised Proposal for conservation significant flora and fauna. The outcomes addressed are included under Condition B15 of MS1237.

4.9.1.2 External Contributing Factors

The Region within which Worsley operates is large with many contributing factors that must be factored into an assessment of impacts. Of highest relevance are:

- Drying Climate: the drying climate has led to a regional decline in groundwater levels and reduced surface water flows. An increase in the frequency of extreme weather events must also be considered.
- Historic land use: areas surrounding the Worsley operation proposed for restoration are largely used for agricultural purposes with most native vegetation historically removed. These areas may have high weed loads and modified soil chemistry (e.g., nutrients, carbon etc) which need to be considered during restoration activities.

4.9.1.3 Selected Indicators

A summary table of the indicators selected to ensure compliance with each environmental outcome and the rationale for their selection are included in Table 13.

Table 13: Indicators selected for ensuring compliance with environmental outcomes

Environmental Outcome	Selected Indicators	Monitoring Program	Justification and Trigger Level	Ref
1. Protection and enhancement of no less than 4,384 ha of remnant vegetation in perpetuity.	Area under Conservation Covenant (ha)	N/A	The protection of land in perpetuity will be achieved through the placement of a conservation covenant over the land. The area of land protected will be in accordance with the surveyed boundary associated with the Conservation Covenant and will exclude fencelines and boundaries/tracks required for access and fire management. Worsley will be conducting significant enhancement works within a minority of the Protection Areas which will mean a conservation covenant cannot be immediately applied to these areas. The trigger and threshold values have been set taking this factor into account. The trigger associated with this outcome is the requirement to achieve at least 75% of the required areas within conservation covenants within 12 months of receipt of the Ministerial Statement. The threshold for this indicator represents less than 100% of required protection areas being under conservation covenant within the first mining tranche (5 years from issue of Ministerial Statement).	Table 17
	Number of feral pigs trapped per annum Number of 1080 baits taken	Feral animal baiting and trapping programs	Presence and abundance of feral animals within offset properties represents one of the critical limitations for use by the target conservation significant species as detailed within MNES Recovery Plans. Worsley will implement targeted feral animal control programs to reduce the number of foxes, cats and pigs present on the offset properties. To assess the effectiveness of these control programs the number of feral pigs captured and the number of 1080 baits taken will be assessed for each offset area each year. The first year of baiting/trapping will form the baseline for subsequent comparison. The triggers for these indicators will be as follows: • The number of pigs captured during a given trapping year is not less than the amount trapped during the baseline trapping period within a given offset property. • The uptake of fox baits during a given trapping period is not less than the uptake recorded during the baseline baiting period within a given offset property. These indicators provide a measure of abundance of feral animals within the offset properties with declining captures / bait uptake for repetitive programs indicating that the baiting programs have been successful in reducing the targeted feral animals present within the areas. The reduction in feral animal presence represents an enhancement in the quality of the remnant habitat for use by the target conservation significant species. Should no decline be observed modifications to control programs will be required to achieve the required outcome. The threshold for this indicator is where the reduction in captures and bait uptakes at 20 years is less than 50% lower than the recorded baseline levels. A 50% decline in bait uptake / trapping captures reflects a significant measurable decline in abundance of the targeted feral animals that verifies the achievement of enhancement for the offset areas.	Table 17 4.11 4.10.1

Environmental Outcome	Selected Indicators	Monitoring Program	Justification and Trigger Level	Ref
2. Ecological restoration and protection in perpetuity of no less than 4,962 ha of agricultural land to obtain a net-gain in numbat, black cockatoo, chuditch, western ringtail possum, quokka and red-tailed phascogale habitat.	Verified spatial data for restoration	Annual Survey	The boundaries of ecologically restored land will be surveyed on an annual basis. Worsley has committed to complete 700 ha of ecological restoration within the first 5 years of operations. The trigger for this selected indicator is where the planned 5 yearly ecological restoration is less than 700 ha (for the first 5 year period) or less than the total area planned for clearing within any subsequent 5-year period. This allows for modification of planned clearing and or restoration to ensure Thresholds are achieved. The threshold for this selected indicator is where the area of ecological restoration for the first 5 year period is <700 ha or the restoration within the subsequent two 5 year periods is less than the clearing of native vegetation in that same 5-year period. This represents a non-compliance with MS1237.	Table 17
	Area under Conservation Covenant	N/A	Ecological restoration areas must be placed under conservation covenant to ensure protection in perpetuity. Covenants will be applied to areas of Ecological Restoration provided these do not restrict restoration activities. The trigger criteria for this indicator is yet to be defined and is pending consultation with the Department of Primary Industry and Regional Development to understand management activities that will be allowed following application of a covenant. Once this is known a trigger can be set to ensure Protection in Perpetuity is on track to prevent Threshold exceedance. The threshold for this criteria is the establishment of conservation covenants over the entire 4,962 ha of ecological restoration.	Table 17
	Achievement of Progressive Completion Criteria	Restoration Flora and Vegetation monitoring program Restoration Fauna Monitoring Program	The vegetation established within the ecological restoration areas will be assessed at 18 months, 5, 10, 15, 20 and every 10 years of age. Interim completion criteria have been defined as outlined in Table 14. The interim completion criteria, as provided, is largely aligned with draft completion criteria for forest rehabilitation (Table 14). The suitability of this criteria will be assessed during the first 3 years of operations following detailed trials taking into consideration the specific requirements of each target fauna species and the limitations associated with ecological restoration on agricultural land (i.e. lack of woody debris, high weed load, altered nutrient load etc). Any changes to completion criteria will be incorporated through adaptive management during 3 yearly reviews of this LEOMP in consultation with key stakeholders. The trigger for this criteria is failure to achieve the progressive completion criteria defined for ecological restoration during a given monitoring period. The completion criteria represent progressive targeted performance metrics for areas of ecological restoration to ensure it is on the correct trajectory to achieve the required outcome. This trigger allows for the assessment and implementation of any required maintenance activities to improve performance of restoration areas on at least four occasions prior to reaching 20 years of age.	Table 17 4.10.5

Environmental Outcome	Selected Indicators	Monitoring Program	Justification and Trigger Level	Ref
			The threshold for this selected criteria is failure to achieve the required habitat structure completion criteria at age 20 years.	
	Achievement of Ecological Restoration Targets	Restoration Flora Monitoring program Restoration Fauna Monitoring Program	The vertebrate fauna monitoring program within ecological restoration areas will be completed on a 3 yearly basis to understand changes in fauna assemblage as vegetation establishes. Monitoring programs will be designed to allow assessment of the targeted species for each Offset area noting that not all target species are expected to return to all ecological restoration offsets. Each area has been assigned a set of targets for different species that will demonstrate that the ecological restoration has met its desired intent to offset the SRI associated with the revised proposal. A set of targets has been defined in Table 15 including a description of which Offset Areas these apply to. Trigger criteria have been determined for each Target with appropriate response actions assigned (Table 17). The trigger criteria for this indicator is the failure of any given Ecological Restoration area to achieve one or more of the relevant interim targets. The threshold for this indicator is failure of any given Ecological Restoration area to achieve the relevant targets at age 20 years. When assessing performance against these metrics external contributing factors will need to be considered through monitoring of populations of target species within the Region (i.e., if populations of target species are not present within forested areas within a reasonable proximity, then they will not be expected to be present within the offset property).	Table 17 4.10.6
3. Installation of three artificial breeding hollows for every tree cleared that is being used, or that has evidence of use, by black cockatoos for breeding, where that clearing is authorised by the CEO under condition B13-1(1)(e);	Number of artificial hollows installed	Annual Artificial Hollow Review	Artificial hollows must be installed at a rate of 3:1 for any cleared black cockatoo hollow that has evidence of use for breeding in accordance with condition B13-1 (1)(e). The number of hollows installed is the selected criteria to allow verification of this required outcome. The trigger for this selection criteria is where planning identifies the requirement to clear a tree that is being used, or that has evidence of use, by black cockatoos for breeding. This will then require management activities to ensure the required artificial hollows are installed prior to clearing. The threshold for this selection criteria is where the number of artificial hollows is not equal to 3 times the number of black cockatoo hollows cleared at the end of a given financial year.	Table 17 6.5

4.10 MANAGEMENT MEASURES

4.10.1 Conservation Covenants

Conservation covenants will be used to ensure protection in perpetuity of Protection Offsets and Ecological Restoration Offsets. All conservation covenants will be lodged under Part IV(A) of *The Soil Conservation Act 1945* (WA). Conservation covenant's will only be applied for as the Mining Tranche requires the offset (see section 4.4).

4.10.1.1 Habitat protection areas

Worsley commits to seek conservation covenants for 75% of the habitat protection properties within 12 months of receipt of MS1237. This will increase to 100% of the properties within 5 years of issue of MS1237. Noting that the conservation covenants will exclude firebreaks, access tracks, fence lines and any other areas required for ongoing maintenance/monitoring of the property and required for supporting the outcomes of the offset.

4.10.1.2 Ecological restoration areas

Worsley commits to seek conservation covenants for the properties which will be ecologically restored. Consultation with DPLH is required to ensure the covenant does not restrict activity on the property while ecological restoration is taking place, however Worsley has committed to having the covenants in place for all properties within 20 years. This allows for ongoing restoration. The conservation covenants will exclude firebreaks, access tracks, fence lines and any other areas required for ongoing maintenance/monitoring of the property and required for supporting the outcomes of the offset.

4.10.2 Feral Animal Control

Worsley will implement feral animal control measures within Protection and Restoration Offsets to reduce the abundance of foxes, cats and pigs. This will include:

- A feral predator control program using 1080 baiting consistent with DBCA's existing Western Shield Program;
- Targeted trapping for pigs, initially on a 2 monthly basis, and
- Targeted trapping for cats (i.e. trapping in locations where cats have been observed).

Effectiveness of control measures will be assessed through monitoring of captures in trapping programs and uptake of baits for baiting programs.

Worsley will continue to monitor the development of new technology for feral animal control (e.g., Felixer Grooming Trap) and conduct trials as appropriate to determine effectiveness and potential for inclusion in the feral animal control program.

4.10.3 Weed Management

A Baseline Flora and Vegetation survey will be undertaken to determine the presence of noxious and declared weeds at each Offset. This will be used to develop a weed map and subsequent weed management activities if required (noting baseline flora surveys completed to date have not detected a high presence of noxious weeds).

Targeted weed management activities may include spot spraying with herbicides, broadacre spraying or removal by hand (pending species present and density). Following weed management activities, areas will be assessed to verify the effectiveness of treatments applied. If weed issues persist an agronomist may be consulted for weed specific herbicide control advice.

In ecological restoration areas the weed load in topsoil is high. Targeted trials are underway to determine the best approach for weed management, including an assessment of multiple options for topsoil treatment to ensure that weed establishment during ecological restoration and associated impacts on native vegetation establishment is minimised. Weed control measures will be modified over time through adaptive management processes as results from trials and / or new control options become available.

Weed presence will also be reviewed on a regular basis through the data collected within the Flora and Vegetation Establishment monitoring program with maintenance activities conducted as required.

4.10.4 Fencing and Signage

Offset properties are located within agricultural areas and have a history of grazing and the potential to experience grazing from neighbouring stock. All offsets will be destocked and boundary fencing will be inspected and improved/replaced as required to prevent stock entering the area from adjacent properties.

Signs will be placed on all access gates and at strategic locations on boundary fences to indicate the property is being managed for conservation purposes.

Inspections of boundary fence lines will be completed on an annual basis with any identified maintenance requirements being planned and completed to maintain the integrity of the boundary.

4.10.5 Ecological Restoration (Completion Criteria)

The vegetation community that will be returned to areas that are currently pasture or parkland trees will be determined by developing an ecological restoration plan for the area. This plan will assess surrounding native target ecosystems recording vegetation structure, species diversity, soil type and position in landscape. An assessment of open pasture areas or parkland trees will then be undertaken, and collected data will be analysed to determine where different vegetation boundaries should be returned across the area.

The first of these restoration plans has been completed for the northern portion (154 ha) of the Gibbs Property (South32 Gibbs Offset Property Soil Mapping Report (Biologic 2024)).

Worsley proposes to use the DRAFT Worsley BBM State Forest Rehabilitation Completion Criteria (Jan 2022) as the basis for Ecological Restoration Completion Criteria. These indicators have been presented to and reviewed by DBCA but have yet to be formally ratified. Worsley recognises that a difference exists between rehabilitation of State forest and restoration of farmland (i.e. high pasture weed load and a lack of native seed within topsoil). Given these differences, the weed, species diversity and foliar cover completion criteria metrics presented in Table 14 have been adjusted from the draft Completion Criteria for State forest to reflect more realistic metrics for Ecological Restoration. Worsley commits to using adaptive management to refine these completion criteria using data collected during the Restoration Flora and Vegetation Establishment – Restoration Offsets monitoring program (see section 4.11.3).

Completion criteria have been defined in Table 14 to capture periods representative of:

- Initial Establishment (<2 years);
- Ecosystem Development (2 to 10 years), and
- Ecosystem Resilience (> 10 years).

Mattiske (2016) reviewed the previously collected mine rehabilitation data back to 1985 to develop the DRAFT Completion Criteria currently under review and were also consulted when developing the Ecological Restoration Completion Criteria in Table 14. During 2021 the DRAFT Completion Criteria and metrics were assessed for their relevance against the Western Australian Biodiversity and Science Institute (WABSI) Completion Criteria Framework (2021) as endorsed by the WA Department of Mines, Industry Regulation and Safety (DMIRS) (Young, et al., 2019). The report considered the key components and principles of the WABSI Framework in relation to the DRAFT Completion Criteria. The review identified strong links to the Framework with principles and objectives linked to already agreed stakeholder-reviewed documents and standards. Apart from specific examples for improvements within the metrics of the draft criteria, 'the Worsley completion criteria appear to be suitable and to generally align well with the Framework (Stantec, 2021).

The completion criteria and management actions required should criteria not be achieved are provided in Table 14.

Photo monitoring points will be established to monitor restoration works as well as remnant vegetation areas, photos will be taken annually to provide baseline and ongoing imagery, including:

- GPS location of the photo point;
- Date, time and number of the photo, and
- Direction in which the photo was taken.

Data collected from ecological restoration areas will be compared with data collected from the target native vegetation plots. These target plots will be identified when developing the Restoration Plans for the area. All scientific data will be managed in an internally managed data management system. Relevant monitoring data will be provided to IBSA and observations of MNES will be reported to DBCA.

Qualified biological consultants will undertake monitoring and all data will be reported to the WEMLG every 5 years. Failure to achieve any completion criteria will be reported to the appropriate authorities (DBCA, EPA and DCCEEW) via the Annual Biodiversity Offset Report as detailed in Table 17.

Table 14: Draft Completion Criteria - Ecological Restoration

Completion Criteria	Response Actions if Completion Criteria is not met	Indicator	Monitoring Program	Reporting
Initial Establishment (<2 years),				
≥1 native legumes per m^2	1. Complete localised supplementary seeding or planting 2. Verify effectiveness of actions through monitoring at next available opportunity	Native Legume Density (# per $10m^2$)	Ecological Restoration Flora Monitoring – 15-18 months	Reported in the Annual Biodiversity Offset Report
500 - 700 tree stems per ha	1. For areas with low establishment undertake supplementary tube stock planting 2. For areas with excessive establishment undertake thinning of trees 3. Verify effectiveness of actions through monitoring at next available opportunity	Tree stems per ha		
≥1 native non-legume per m^2	1. Undertake localised supplementary planting or sowing in affected areas 2. Identify limiting conditions if localised (e.g., pH, nutrients etc) 3. Verify effectiveness of actions through monitoring at next available opportunity	Native Non Legume density (# per m^2)		
≥3 native plants per m^2	1. Assess extent of decreased density across the restoration area (localised vs extensive) 2. Where cause of impacts is unknown, assess other limiting conditions (e.g., nutrients, pH) to determine potential cause of decreased density and apply additional management measures as appropriate. 3. Undertake localised supplementary planting or sowing in affected areas 4. Monitor to verify the effectiveness of actions	Average native plant density (native plants per m^2)		
No Weeds of National Significance or Declared Weeds No new weed species	1. Assess extent of weed infestation within restoration area 2. Undertake targeted weed management for the area of infestation 3. Monitor to verify the effectiveness of weed management actions	Weed species present		
Ecosystem Development (2 - 10 Years)				
No Weeds of National Significance or Declared Weeds No new weed species	1. Undertake localised supplementary planting or sowing in affected areas 2. Identify limiting conditions if localised (e.g., pH, nutrients etc) 3. Verify effectiveness of actions through monitoring at next available opportunity	Weed species present	Ecological Restoration Flora Monitoring - 5 & 10 Year Monitoring	Reported in the Annual Biodiversity Offset Report
No areas greater than 0.1 ha **with less than 1 native plants per m^2**				
>35 native plant species per 80 m^2		Native Plant Species Richness		
>35% native foliar cover per 80 m^2		Native Plant Foliar Cover		
>200 tree stems per ha		Overstorey Density		

Completion Criteria	Response Actions if Completion Criteria is not met	Indicator	Monitoring Program	Reporting
Ecosystem Consolidation (>10 Years)				
No Weeds of National Significance or Declared Weeds	1. Undertake targeted weed management for the areas of infestation. 2. Verify effectiveness of actions through monitoring at next available opportunity. 3. If weed issues persist following monitoring consult an agronomist for weed specific herbicide control advice and repeat steps 1 and 2.	Declared Weeds	Ecological Restoration Flora Monitoring -15 & 20 Year Monitoring	Reported in the Annual Biodiversity Offset Report
<4% average weed foliar cover	1. Undertake targeted weed management for the areas of infestation. 2. Verify effectiveness of actions through monitoring at next available opportunity **3.** If weed issues persist following monitoring consult an agronomist for weed specific herbicide control advice and repeat steps 1 and 2.	Average Weed Foliar Cover		
>30% understorey foliar cover	1. Undertake localised tube stock planting in the following winter 2. Identify limiting conditions if localised (e.g., pH, nutrients etc) and address through management actions as required. 3. Verify effectiveness of actions through monitoring at next available opportunity	Understorey Foliar Cover		
>200 mature tree stems / ha	1. Undertake localised tube stock planting in the following winter **2.** Verify effectiveness of actions through monitoring at next available opportunity	Overstorey Density		

4.10.6 Offset Performance Targets -MNES

Targets have been developed to assess the effectiveness of management measures to achieve the required outcomes for Protection and Restoration offsets. The age at which ecological restoration becomes suitable as habitat for each MNES species varies and as such targets are set by MNES species. Once a species is confirmed to be present within an Offset property further targeted surveys may be completed to understand abundance and distribution within the offset to allow adaptive management to be applied to ecological restoration activities. These targets form the basis of an outcome-based provision as outlined under Trigger and Threshold Criteria 5 included in Table 17. The targets included in Table 15 are consistent with the requirements of condition B15-6 (9) (a) of MS1237. Targets may be modified or expanded through adaptive management as ecological restoration activities progress.

Table 15: Offset Performance Targets - MNES

Target	Trigger Criteria	Response Actions	Indicator	Monitoring Program	Frequency/Timing	Reporting	Relevant Offsets
Chuditch present within Ecological Restoration areas within 10 years of establishment	No Chuditch recorded within Ecological Restoration within 6 years of establishment	Investigate potential contributing factors for lack of presence of Chuditch within the area (i.e. feeder population, lack of critical habitat features, feral predator densities etc.) Implement management actions to address any identified deficiency within the Offset.	Number of Chuditch recorded	Vertebrate Fauna Monitoring Program	Triennial	Reported in the Annual Biodiversity Offset Report	Offset 1 Offset 2 Offset 3A
Western Ringtail Possum observed within Ecological Restoration Areas within 10 years establishment	No Western Ringtail Possum observed within Ecological Restoration areas within 8 years of establishment	Investigate potential contributing factors for lack of Western Ringtail Possum presence within the area (e.g., habitat quality, presence of preferred tree species, feral predator densities etc) Implement management actions to address any identified deficiency within the Offset.	Number of Western Ringtail Possum recorded	Vertebrate Fauna Monitoring Program	Triennial	Reported in the Annual Biodiversity Offset Report	Offset 1 (Lot 100)
Quokka observed within Ecological Restoration areas within 10 years of establishment	No Quokka observed within Ecological Restoration areas within 8 years of establishment	Investigate potential contributing factors for lack of presence within the area (e.g. presence of thick understory, fire history, feral predator densities etc.) Implement management actions to address any identified deficiency within the Offset.	Number of Quokka recorded	Vertebrate Fauna Monitoring Program	Triennial	Reported in the Annual Biodiversity Offset Report	Offset 1 (Lot 100)
Numbat observed within Ecological Restoration within 20 years of establishment (if a population is found to exist within a reasonable dispersal distance through targeted baseline surveys)	No evidence of Numbat within expected Ecological Restoration areas within 15 years	Investigate potential contributing factors for lack of presence within the area (e.g. habitat quality, log habitat structures, termite presence, feral predator density etc) Implement management actions to address any identified deficiency within the Offset.	Number of Numbat recorded	Vertebrate Fauna Monitoring Program	Triennial	Reported in the Annual Biodiversity Offset Report	Yet to be determined
Red-tailed Phascogale	No Red-tailed Phascogale	Investigate potential contributing factors for lack of presence of Red-tailed Phascogale	Number of Redtail	Vertebrate Fauna	Triennial	Reported in the Annual	Offset 2

Target	Trigger Criteria	Response Actions	Indicator	Monitoring Program	Frequency/Timing	Reporting	Relevant Offsets
observed within Ecological Restoration Areas within 20 years	observed within Ecological Restoration areas within 15 years of establishment	within the area (e.g. habitat quality, nest box utilisation/condition, feral predator density etc) Implement management actions to address any identified deficiency within the Offset.	Phascogale recorded	Monitoring Program		Biodiversity Offset Report	
Black Cockatoo spp. foraging in Ecological Restoration areas within 8 years of establishment.	No observations of Black Cockatoo foraging in Ecological Restoration areas within 5 years of establishment	Undertake a botanical survey of restored areas for Black Cockatoo food plants and evidence of seeding. If the number of food plants is deficient, undertake supplementary tube stock planting.	Black Cockatoo spp foraging observed	Vertebrate Fauna Monitoring Program	Triennial starting year 3	Reported in the Annual Biodiversity Offset Report	Offset 1 Offset 2 Offset 3A
Number of artificial hollows utilised by Black cockatoos ≥ the number of Black Cockatoo trees with evidence of breeding cleared by the operation	<10 artificial breeding hollows utilised within 5 years of installation	Review recent evolution in artificial hollow design options and installation success at other locations. Undertake an ecological assessment of alternative placement locations for artificial hollows. Develop a response plan taking into consideration available designs and locations to maximise potential uptake of hollows.	Number of artificial hollow used by black cockatoo species	Black Cockatoo Artificial Hollow Monitoring Program	Annual (Breeding season)	Reported in the Annual Biodiversity Offset Report	Offset 4

4.10.7 Fire Control

All Offset properties will have firebreaks established to minimise the risk of wildfire. These will be inspected and maintained as required on an annual basis.

Cool season mosaic burns guided by ecological advice may be completed within the Protection Offsets to manage the vegetation to support target MNES species.

4.10.8 Forest Hygiene Management

All Offset properties will be interpreted for the presence of *Phytophthora* dieback noting that areas of agricultural land will likely be classified as uninterpretable given the lack of indicator species present. Following interpretation, within Protection Offsets, boundaries will be mapped and signposted on access tracks in the field to ensure awareness of forest disease boundaries by all persons accessing the property. Forest hygiene training will be mandated for all employees and contractors accessing the Protection Offset properties.

Where access through infested areas is required, a forest hygiene management plan must be developed for the proposed work and implemented to ensure appropriate control measures are in place to prevent the spread of forest disease. Infested boundaries will be reassessed every 5 years with signage, mapping and hygiene management plans adjusted as required to ensure controls remain effective for the management of forest disease.

To minimise the risk of spread of forest disease through vehicle movement, access to Offset properties will be generally restricted through the installation and maintenance of boundary fencing and signage. Further access restrictions may also be applied internally for high risk areas such as:

- Access restricted to dry soil conditions only; and / or
- Access restricted to essential personnel only.

4.10.9 Protection of Habitat Trees

Any potential habitat trees (PHTs) with evidence of use by Black Cockatoo species identified during baseline fauna surveys of offset properties will be protected. Locations of identified PHTs will be included in spatial data for planning purposes and will be monitored during the triennial Vertebrate Fauna monitoring program.

4.10.10 Provision of Critical Habitat Features

Within offset properties critical habitat features for MNES will be installed to support recolonisation by target species. Installations will vary between offsets and may change over time through application of adaptive management following completion of trials. At this time trials are being completed within the Protection areas of the Gibbs Offset Property for:

- Artificial Chuditch dens, and
- Installation of hollows in trees using the Hollow Hog tool (targeting red-tailed phascogale).

In addition, the following may be included in Ecological Restoration Areas:

- Installation of nesting boxes targeting red-tailed phascogale (pending availability of suitable trees for installation), and
- Creation of log pile habitats (pending availability of sufficient woody debris).

4.11 LOCAL OFFSET MONITORING PROGRAMS

A series of biological monitoring programs have been designed and implemented to assess performance of Ecological Restoration and Protection Offsets. The purpose, locations and frequencies of each monitoring program are outlined in Table 16. Monitoring programs are designed to allow assessment of outcomes and objectives as outlined in Section 5. Survey methodologies are determined by independent qualified third parties and comply with applicable EPA and DCCEEW guidelines. Monitoring programs will be modified in consultation with regulators through adaptive management measures.

Table 16: Summary of Local Offset Monitoring Programs

Monitoring Program	Frequency	Location(s)	Purpose	Offset
Vertebrate Fauna –Offsets	3 yearly	Restoration Offsets (>5 years of age) Protection Offsets Forest Control plots	Monitor recolonisation of restoration areas with vertebrate fauna. Identify changes in fauna assemblage within Protection Offsets over time Identify presence of target fauna species (MNES) Compare vertebrate fauna assemblage with forest control sites Compare vertebrate fauna assemblage to forest rehabilitation sites as assessed under the Vertebrate fauna - Rehabilitation monitoring program.	Offset 1 Offset 2 Offset 3A
Targeted Fauna Monitoring Programs	Variable	Protection Offsets Restoration Offsets Forest Control Sites	Assess the presence and abundance of targeted fauna (e.g. selected threatened fauna species, feral predators etc) Assess performance against targets as outlined in Table 15.	Offset 1 Offset 2 Offset 3A
Artificial Hollow Maintenance Inspections	Annual (pre breeding season)	Black Cockatoo Artificial Hollows (Offset 2)	Assess condition and maintenance requirements. Identify evidence of use. Remove hollow competitors (e.g. bees and possums).	Offset 4
Artificial Hollow utilisation monitoring	Annual (black cockatoo breeding season)	Black Cockatoo Artificial Hollows (Offset 2)	Assess utilisation of artificial hollows by black cockatoo species Assess utilisation of artificial hollows by other species	Offset 4
Flora and Vegetation Establishment – Restoration	At age 18 months, 5, 10, and every subsequent 10 years	Restoration areas Forest control plots	Monitor establishment of vegetation and compare progress to completion criteria. Identify areas requiring management activities. Compare performance against forest rehabilitation as assessed under the Flora and Vegetation Establishment – Rehabilitation monitoring program. Compare performance against forest control plots.	Offset 1 Offset 2 Offset 3A
Forest Hygiene Mapping	Baseline assessment 5 yearly boundary verification	Protection Offsets Known and suspected infestations	Assess presence and spread of *Phytophthora cinnamomi* and *A. luteobubalina* within Protection offsets.	Offset 1 Offset 2 Offset 3A
Feral Pig Trapping Program	2 Monthly	Protection Offsets Restoration Offsets	Control feral pig population within Offset properties. Assess continued presence and relative abundance of feral pigs within offset properties.	Offset 1 Offset 2 Offset 3A
1080 Baiting Program	2 Monthly	Protection Offsets Restoration Offsets	Control fox population within Offset properties Monitor uptake of baits to assess continued presence and relative abundance of foxes within offset properties.	Offset 1 Offset 2 Offset 3A
Firebreak Inspections	Annual		Assess adequacy and maintenance requirements for firebreaks.	Offset 1 Offset 2 Offset 3A

Additional monitoring programs may be initiated on recommendation from independent qualified third parties, at the request of relevant Regulators, or as a result of applying adaptive management processes to achieve the required outcomes and objectives of this LOEMP.

4.11.1 Triennial Vertebrate Fauna Monitoring - Offsets

Baseline vertebrate fauna monitoring (including feral species) will be undertaken for each offset property and within existing or newly established forest control plots. Baseline surveys on some offset properties have already been completed, with forest control plots currently being identified (see section 6). Baseline fauna monitoring will be completed in accordance with the applicable EPA Technical guidance for Terrestrial Vertebrate Fauna surveys at the time of survey.
Following determination of baseline conditions, detailed fauna monitoring will be completed every 3 years to assess changes in fauna assemblage, allow comparison with forest control sites and identify any need for further targeted surveys.

The current Vertebrate Fauna monitoring program at Worsley includes surveys of both rehabilitation and forest control monitoring plots within and adjacent to the mining areas, over three seasons on a three-yearly rotation. This monitoring program has been ongoing since 2002 and since this time has provided detailed information about the recolonisation of rehabilitation by vertebrate fauna through development stages. The monitoring program is consistent with the EPA Technical Guidance for Terrestrial Vertebrate Fauna Surveys for EIA (2020) and is conducted by qualified external consultants.

The Vertebrate Fauna - Offsets monitoring program will mirror the Rehabilitation monitoring program allowing comparison of Restoration Offset performance with forest rehabilitation performance, forest control plots and Protection Offsets. Monitoring will be completed on a 3 yearly basis to monitor recolonisation of restoration areas and assess utilisation by MNES species. Monitoring within Ecological Restoration areas will commence at age 5 years. The current monitoring program includes an array of survey techniques including but not limited to camera trapping, traplines (pit fall traps, cage traps, box traps, funnel traps), targeted searches, acoustic recording (bats and birds), bird surveys, foraging assessments and opportunistic observations. These survey techniques may be modified over time with technology improvements, in consultation with regulators, through application of adaptive management.

4.11.2 Targeted Fauna Monitoring Programs

Targeted fauna monitoring programs will be initiated where required to address critical knowledge gaps for MNES. This may include surveys to determine distribution and abundance. Targeted surveys may be triggered by management targets, regulator requirement or to assess effectiveness of management techniques.

4.11.3 Flora and Vegetation Establishment - Restoration Offsets

Worsley has an extensive ongoing flora monitoring program to assess the progress of rehabilitation establishment. The monitoring program will be extended to include Ecological Restoration areas. Permanent vegetation plots will be established initially at a rate of 1 plot per 5 ha in the restoration areas to assess the establishment of trees and understorey at 15-18 months of age. For each year of restoration, a range of plots will be repeatedly assessed for trees and understorey when the restoration reaches 5, 10, and every subsequent 10 years of age (6 plots per age group). The frequency and intensity of monitoring may alter if any significant vegetation anomalies are identified. During surveys floristic assessments are undertaken during spring, to assess the number of individuals and percentage cover of each species, whilst the tree component is assessed during winter (to avoid the spring floristic workload). These survey techniques may be modified over time with technology improvements, in consultation with regulators, through application of adaptive management.

4.11.4 Flora and Vegetation – Protection Offsets

4.11.5 Baseline flora and vegetation monitoring (including weed species) will be undertaken for each offset property and within existing or newly established forest control plots. Baseline surveys on some offset properties have already been completed (see section 4.5), with forest control plots currently being identified (see section 6). Baseline flora and vegetation monitoring will be completed in accordance with the applicable EPA Technical guidance at the time of survey. Forest control plots may be selected from within Protection offsets to support other monitoring programs. These will be monitored on a 5 yearly basis. Black Cockatoo Artificial Hollow Monitoring Program

Black Cockatoo artificial hollows will be monitored annually to assess condition and evidence of use. This monitoring program will be completed in the non-breeding season and will be supported by a maintenance program to ensure artificial hollows remain in good condition. During the inspection key checks will include:

- ensuring the floor materials are adequate,
- determining whether chew posts need replacement, and
- ensuring anchor points are in good condition.

If hollow competitors are found to be present (e.g. bees, possums etc) these will be removed.

A separate monitoring program will be conducted during the breeding season to assess utilisation of artificial hollows by Black Cockatoo species. Active artificial hollows will continue to be monitored to record the outcome of any observed breeding attempt.

4.12 OTHER APPLICABLE MONITORING PROGRAMS

4.12.1 Regional Vegetation Condition Assessment

Regional vegetation condition will be assessed on a 5 yearly basis using remote sensing technologies. Relative condition of vegetation within and adjacent to the PAA will be compared with areas of comparable vegetation types outside the potential impact area to identify any potential areas of vegetation decline associated with the Worsley operations. If areas of concern are identified during the desktop survey, additional targeted surveys will be initiated to verify the findings and, where verified, further investigations will be conducted to determine the contributing factors for the decline in vegetation condition. Offset Areas will be included in this Regional Vegetation Condition Assessment program.

5 LOCAL OFFSET MANAGEMENT PROVISIONS

This section describes the provisions, which when implemented, will achieve the environmental outcomes and objectives addressed by this LOEMP. These measures also ensure that the requirements established by the ministerial conditions and other legislative instruments, as outlined in Section 3.3 are met. These are based on the approach described in Section 4.

5.1.1 LEOMP Outcome Based Provisions

The outcome based provisions for the LEOMP are documented in Table 17.

Table 17: Outcome-based provisions for Local Offsets

EPA factor/s and objective/s: Terrestrial Fauna, Flora and Vegetation

Outcome/s:

1. **Protection and enhancement of no less than 4,384 ha of remnant vegetation in perpetuity.**
2. **Ecological restoration and protection in perpetuity of no less than 4,962 ha of agricultural land to obtain a net-gain in numbat, black cockatoo, chuditch, western ringtail possum, quokka and red-tailed phascogale habitat.**
3. **Installation of three artificial breeding hollows for every tree cleared that is being used, or that has evidence of use, by black cockatoos for breeding, where that clearing is authorised by the CEO under condition B13-1(1)(e).**

Key environmental values: Conservation significant fauna, fauna habitat

Key impacts and risks: Loss of fauna habitat

Relevant outcome(s)	Trigger & Threshold Criteria	Response Actions	Monitoring	Timing / frequency of monitoring	Reporting
Outcome 1	**Trigger Criteria:** <3,288 ha (equal to 75%) of required protection offsets under Conservation Covenant within 12 months of receipt of Ministerial Statement.	**Trigger Level Actions:** • Review current systems and processes and determine cause(s) for delays. • Implement management measures to improve processes for conversion of land into conservation covenants to ensure all required land is under conservation covenants within 24 months of receipt of Ministerial Statement.	**Indicator:** *Area under Conservation Covenant (ha),* Annual review of offset areas under conservation covenant	Annual (July)	Annual Biodiversity Offset Report Compliance Assessment Report Annual Environmental Report
	Threshold Criteria: <4,384 ha (equal to 100%) of required protection offsets under Conservation Covenant within the first mining tranche (5 years from date of issue of MS1237).*	**Threshold Contingency Actions:** Report threshold exceedance to Regulator. • Conduct an investigation to determine cause(s) for delay. • Implement management measures to ensure processing of conservation covenants is completed as soon as reasonably possible.			

Relevant outcome(s)	Trigger & Threshold Criteria	Response Actions	Monitoring	Timing / frequency of monitoring	Reporting
Outcome 1	**Trigger Criteria 1:** No decline from baseline number of pigs captured during targeted trapping programs at any given offset property during a subsequent trapping program (annualised).	**Trigger Level Actions:** • Investigate potential contributing factors to the continued presence and abundance of feral pigs within the area. • Modify existing trapping/baiting program as required through adaptive management to increase effectiveness at reducing abundance of pigs within the offset property. • Monitor effectiveness of changes to trapping and baiting programs (noting that a decrease may not be observed immediately if the program is modified).	**Indicator:** *# of pigs trapped at a given offset property* Pig baiting and trapping program	2 Monthly	Annual Biodiversity Offset Report Compliance Assessment Report Annual Environmental Report Threshold exceedance reports to Regulator (as required).
	Threshold Criteria 1: <50% decline from baseline number of pigs captured during targeted trapping programs at any given offset property at 20 years post commencement of trapping program (annualised).* *Note: At least 6 pigs must have been captured at a given property during the initial year of trapping for this Threshold Criteria to be applied.*	**Threshold Contingency Actions:** • Report threshold exceedance to Regulator. • Conduct an investigation to understand the potential causes for ongoing presence of feral pigs in the area. • Identify proposed management measures / response actions to improve reduction in feral pig numbers. • Implement agreed management measures following consultation with Regulators.			
Outcome 1	**Trigger Criteria 2:** No decline from baseline in uptake of fox baits at any given offset property during a subsequent trapping program (annualised).	**Trigger Level Actions:** • Investigate potential contributing factors to the continued presence and abundance of foxes within the area. • Conduct an investigation to understand the potential causes for the continued high uptake of baits (e.g., camera trapping to assess whether taken by other species etc). • Monitor effectiveness of changes to baiting programs (noting that a decrease in uptake may not be observed immediately if the program is modified).	**Indicator:** *# of 1080 baits taken at a given offset property* Fox baiting program	Every two Months	Annual Biodiversity Offset Report Compliance Assessment Report Annual Environmental Report Threshold exceedance reports to Regulator (as required).
	Threshold Criteria 2: <50% decline from baseline in uptake of fox baits during targeted baiting programs at any given offset property at year 20 (annualised).	**Threshold Contingency Actions:** • Report threshold exceedance to Regulator. • Investigate the reason for the lack of decline in uptake of baits.			

Relevant outcome(s)	Trigger & Threshold Criteria	Response Actions	Monitoring	Timing / frequency of monitoring	Reporting
	Note: At least 6 baits must have been taken at a given property during the initial baiting program for this Threshold Criteria to be applied.	• Identify proposed management measures / response actions to improve baiting for foxes. • Implement agreed management measures following consultation with Regulators.			
Outcome 2	**Trigger Criteria 3:** Planned area of Ecological Restoration within mining tranche 1 is <700 ha (for the first mining tranche) **OR** Planned Ecological Restoration is less than the total area planned for clearing within any subsequent mining tranche.	**Trigger Level Actions:** • Review draft 10 year Mine Plan with Manager Production Planning. • Revise Plan as required to ensure required criteria are met (e.g., reduce clearing areas or increase Ecological Restoration areas).	**Indicator:** *Spatial data (ha)* 10 Year Mine Plan Survey of clearing boundaries Survey of restoration boundaries	Annual Monthly Annual	Annual Biodiversity Offset Report Compliance Assessment Report Annual Environmental Report Threshold exceedance reports to Regulator (as required).
	Threshold Criteria 3: Ecological Restoration for the first 5 year period <700 ha **OR** 5 yearly Ecological Restoration is less than the total area cleared within any subsequent 5-year mining tranche. **OR** <4,962 ha of Ecological Restoration conducted at completion of Revised Proposal.	**Threshold Contingency Actions:** • Report threshold exceedance to Regulator. • Conduct an investigation to determine the cause(s) of the non-compliance. • Review following year's 10 year Mine Plan and adjust as required to ensure the gap in areas of ecological restoration is closed. • Implement management measures to reduce the risk of future non-compliances.			
Outcome 2	**Trigger Criteria 4:** Failure to achieve the applicable completion criteria defined for Ecological Restoration (see Table 14Table 12) during a given monitoring period (up to 20 years of age).	**Trigger Level Actions:** • Implement response actions for applicable completion criteria in accordance with Table 12.	**Indicator:** *Achievement of completion criteria (variable)* Flora and Vegetation Establishment – Restoration monitoring program Trigger Response follow up monitoring	At ecological restoration age 18 months, 5 years, 10 years & 20 years. Variable (following management actions).	Annual Biodiversity Offset Report Compliance Assessment Report Annual Environmental Report Threshold exceedance reports to Regulator (as required).
	Threshold Criteria 4: Failure to achieve the applicable completion criteria defined for ecological restoration (see Table 14, Table 12) at >20 years of age.	**Threshold Contingency Actions:** • Report threshold exceedance to Regulator. • Conduct an investigation to determine contributing factors that led to failure to meet applicable completion criteria Threshold. • Implement agreed management measures following consultation with Regulators.			

Relevant outcome(s)	Trigger & Threshold Criteria	Response Actions	Monitoring	Timing / frequency of monitoring	Reporting
Outcome 1 **Outcome 2**	**Trigger Criteria 5:** Trigger levels are reached for one or more of the Offset Performance Targets, as defined in Table 15Table 13.	**Trigger Level Actions:** Implement response actions for applicable completion criteria in accordance with Table 13.	Indicator: Achievement of set targets (variable) Vertebrate Fauna – Offsets Monitoring Program	3 yearly	Annual Biodiversity Offset Report Compliance Assessment Report Annual Environmental Report Threshold exceedance reports to Regulator (as required).
	Threshold Criteria 5: Failure to achieve one or more of the defined Offset Performance Targets (see Table 15Table 13) at >20 years of age.	**Threshold Contingency Actions:** • Report failure to achieve target to Regulator. • Investigate potential causes for failure to meet target including management measures and external contributing factors (e.g., climate change, changes in distribution and abundance of target fauna). • Identify management actions to be applied and potential modifications to targets for consideration by regulators following completion of investigations. • Implement agreed management actions / changes to targets following consultation with Regulators.			
Outcome 2	**Trigger Criteria 6:** Yet to be defined – pending consultation with DPIRD	**Trigger Level Actions:** • TBD	**Indicator:** *Area under Conservation Covenant (ha),* Annual review of offset areas under conservation covenant	Annual (July)	Annual Biodiversity Offset Report Compliance Assessment Report Annual Environmental Report
	Threshold Criteria 6: <4,962 ha (equal to 100%) of required Ecological Restoration offsets under Conservation Covenant within 20 years of receipt of MS1237.*	**Threshold Contingency Actions:** • Report threshold exceedance to Regulator. • Conduct an investigation to determine cause(s) for delay. • Implement management measures to ensure processing of conservation covenants is completed as soon as reasonably possible.			
Outcome 3	**Trigger Criteria 7:** 10 Year Mine Plan identifies the requirement to clear a tree that is being used, or that has evidence of use, by Black Cockatoo species for breeding.	**Trigger Level Actions:** • Review current number of artificial hollow installations against required number given cumulative clearing of applicable hollows to date (3:1).	**Indicator:** *Ratio of artificial hollows installed to removed Black Cockatoo hollows with evidence of use.*		Annual Biodiversity Offset Report Compliance Assessment Report

Relevant outcome(s)	Trigger & Threshold Criteria	Response Actions	Monitoring	Timing / frequency of monitoring	Reporting
		• If insufficient hollows have been installed, initiate installation of required additional hollows prior to clearing of tree.	Black Cockatoo artificial hollow installation review	Annual	Annual Environmental Report Threshold exceedance reports to Regulator (as required).
	Threshold Criteria 7: Number of artificial hollows installed is not ≥ 3 times the number of Black Cockatoo breeding trees cleared at the end of a given financial year (i.e. trees that are being used, or that have evidence of use, by Black Cockatoo species).	**Threshold Contingency Actions:** • Report threshold exceedance to Regulator. • Complete installation of required artificial hollows within 6 months of identification of shortfall. Ensure installation includes at least 3 additional artificial hollows as a buffer (unless all 72 artificial hollows are already installed).	10 Year Mine Plan Cockatube assessment for activity prior to breeding season	Annual Annual	

*** Conservation** covenants **applied for will exclude fence lines, access tracks and other areas required for ongoing maintenance** / monitoring **of the property** and supporting the outcomes of the offset

5.1.2 LEOMP Objective Based Provisions

Table 18 provides a summary of the objective based provisions and associated management actions for Local Offsets.

Table 18: Objective-based provisions for Local Offsets

EPA factor/s and objective/s: Vertebrate Fauna

Objectives:

1. **Minimise risk of uncontrolled fire** within offset properties.
2. **Minimise risk of spread of *Phytophthora* dieback** within offset properties.
3. **Minimise unauthorised access to** Offset **proper**ties.
4. **Maximise potential for utilisation of Black Cockatoo Artificial Breeding Hollows** (ABH).

Key environmental values: Threatened fauna

Key risks: Loss of Threatened fauna habitat, decrease in quality of Threatened Fauna habitat, loss of critical habitat features

Management Targets	Management Actions	Monitoring	Reporting
Minimise risk of uncontrolled fire events within offset properties	• Inspect and maintain firebreaks on an annual basis. • If required, implement cool mosaic burns within offset properties to maintain habitat for Threatened fauna and prevent uncontrolled fire events. • Install appropriate fencing and signage to prevent unauthorised access which could result in lighting of fires (e.g. camping). • Comply with fire and movement bans applied by the relevant Shire.	• Annual firebreak inspection • Annual boundary fence inspections	• Reporting on any uncontrolled burns within offset properties within Annual Biodiversity Offsets Report. • Report on planned and completed controlled burns within Annual Biodiversity Report.

Management Targets	Management Actions	Monitoring	Reporting
	• Emergency response personnel and equipment maintained onsite to support response to uncontrolled fires.		
Minimise risk of spread of *Phytophthora* dieback within offset properties	• Complete baseline dieback interpretation of offset properties. • boundaries will be mapped and signposted on access tracks in the field. • Forest hygiene training will be mandated for all employees and contractors accessing the Protection Offset properties. • Forest hygiene management plans will be developed for work within dieback infested areas. • Infested boundaries will be reassessed every 5 years with signage, mapping and hygiene management plans updated as required. • Access to Offset properties will be restricted through the installation and maintenance of boundary fencing and signage. • Further access restrictions may also be applied for high risk areas such as dry soil conditions only.	• Dieback Interpretation (Baseline and 5 yearly boundary verification)	• Dieback interpretation reports to be provided to DBCA. • Reporting on results from dieback interpretation to be included in Annual Biodiversity Offsets Report
Minimise unauthorised access to Offset Properties	• Install appropriate fencing and signage on offset boundaries. • Conduct annual inspection of fencing to identify maintenance requirements or additional security requirements. • Report unauthorised access to relevant authority.	• Annual boundary fence inspections	• Unauthorised access/vandalism to be reported to Police.

Maximise potential for utilisation of Black Cockatoo Artificial Breeding Hollows	• Implement OIP 4 (see section 6.5) including application of the following:
	  ○ Ensure selected installation sites meet detailed site selection criteria.
	  ○ Ensure appropriate installation methodology and security of ABH.
	  ○ Conduct annual monitoring and maintenance program in accordance with section 4.11.5.
	  ○ Trial new or innovative hollow designs where practicable.
		• Black Cockatoo Artificial Hollow Monitoring Program	• Reporting of annual maintenance activities and utilisation/success within Annual Biodiversity Offset Report.

6 EMP COMPONENTS: OFFSET IMPLEMENTATION PLANS

6.1 BODY RESPONSIBLE FOR ONGOING CONSERVATION MANAGEMENT OF THE OFFSETS

Worsley accepts full responsibility for all aspects of the management of the offset properties for the 20-year period required under EPA Report 1768.

6.2 OFFSET IMPLEMENTATION PLAN ONE

6.2.1 Outcome

Offset Implementation Plan One will see the Protection and Enhancement of no less than 4165.4 ha of native vegetation and the Restoration of no less than 432.2 ha of agricultural land. The land forms part of the total required by conditions B15-2(1) and B15-2(2) of MS1237.

Table 19 Offset 1 EPA Condition Number and Outcome

Condition	Outcome	Offset 1 Contribution
B15-2(1)	Protection and enhancement of 4,384 ha of remnant vegetation in perpetuity.	4,165.4 ha (Black cockatoo, WRP, quokka, numbat, chuditch)
B15-2(2)	Ecological restoration of 4,962 ha agricultural land and protection in perpetuity to ensure a net-gain in numbat, black cockatoo, chuditch, WRP, quokka and red-tailed phascogale habitat.	432.2 ha (Black cockatoo, WRT, quokka, numbat, chuditch)

6.2.2 Management Measures to see the Return of MNES

Management measures proposed as part of the offset proposal are guided by and intend to contribute to the implementation of species Recovery Plan actions for the relevant MNES. It is understood that Recovery Plans are high level strategic documents at varying levels of implementation and progress. To address this, consultation with DBCA and DCCEEW has been undertaken in the development of this LEOMP so that management measures applied remain consistent with the identified needs for the target MNES species.

6.2.2.1 Management Actions for areas of Habitat Protection

The actions detailed below will help to maintain and improve the existing habitat for the listed MNES:

- Ecological restoration as required to improve the habitat (see section 4.10.5)
- Protection of existing habitat trees (see section 4.10.9);
- Feral predator control across offset area (see section 4.10.1);
- Feral pig control across the offset area (see section 4.10.1);
- Fire management across the offset area to protect the habitat (e.g., fire breaks, cool season mosaic burns) (see section 4.10.7);
- Weed control across the offset area (see section 4.10.3), and
- Management of forest disease (see section 4.10.8).

6.2.2.2 Management Actions for areas of Ecological Restoration

Different species will be encouraged to return to the offset via different management actions as outlined below.

Worsley is targeting the return of foraging Black Cockatoos within eight years. This will be achieved through implementation of the following management measures, consistent with the relevant species fauna profiles (Baudin's DBCA, 2017), (Carnaby's DBCA, 2017), (Forest Red-tailed DBCA, 2017):

- Ecological restoration of pasture with a known food source tree species (eg *Corymbia calophylla*) (see section 4.10.5);
- Protection of existing habitat trees (see section 4.10.9); and
- Fire management across the offset area to protect the habitat (see section 4.10.7).

Worsley is targeting the improvement/stabilisation of populations of Quokka (2013) and Western Ringtail Possum (2017) this will be achieved through implementation of management measures consistent with the objectives of the relevant Recovery Plans. This includes:

- Feral predator control (see section 4.10.1);
- Feral pig control (see section 4.10.1), and
- Fire management across the offset area to protect the habitat (see section 4.10.7).

Worsley is targeting the return of Chuditch (2012), and Numbat (2017) this will be achieved through the implementation of management measures consistent with the objectives of the relevant Recovery Plans. This includes:

- Ecological restoration of remnant vegetation (establishment of lower and mid-storey vegetation under existing remnant trees) (see section 4.10.5);
- Ecological restoration of areas of pasture (establishment of a continuous canopy of native plant lower, mid and canopy species across the offset) (see section 4.10.5);
- Provision of habitat log piles (see section 4.10.10);
- Weed control across offset area (see section 4.10.3);
- Feral predator control (see section 4.10.1);
- Feral pig control (see section 4.10.1), and
- Fire management across the offset area to protect the habitat (see section 4.10.7).

6.2.3 Action Plan

Management actions proposed for this offset have been developed after consulting the National Recovery Plans for the various MNES. A summary of the applicable Recovery Plans is discussed in section 4.8. The following land management and restoration activities will be undertaken to suitably prepare the property and confirm restoration will improve the habitat values for the species identified to benefit from this proposed offset.

6.2.3.1 Management Actions Completed

To support the continued development of the Offset Implementation Plans prior to the commencement of disturbance, the following actions have been completed for Offset 1:

- Aerial baiting of Lot 102 under contract through DBCA Western Shield Program;
- Lot 100 and Lot 102 Baseline Fauna Assessment (Biologic, 2024), and
- Lot 100 and Lot 102 Baseline Flora Survey (Biologic, 2024).

6.2.3.2 Land Management Activities

The following activities will be undertaken within 12 months of approval of this LOEMP:

- Destocking – removal of all livestock from the property allowing for access agreements to expire;
- Improvement/replacement of boundary fencing to prevent stock from entering from adjacent properties.
- Signs will be placed on all access gates and at strategic locations on the boundary fence to indicate the property is being managed for conservation;
- Maintenance/construction of fire breaks;
- Identification of any contaminated sites and planning for appropriate removal or restoration;
- Weed management (for land preparation and fire risk minimisation) – a weed survey will be undertaken to determine the presence of noxious and declared weeds, resulting in appropriate mapping and weed management activities (noting baseline flora surveys have not detected a high presence of noxious weeds);
- Disease mapping and development of a hygiene management plan (as required), and
- Triennial vertebrate fauna monitoring including existing (or newly established) forest control plots.

6.2.3.3 Restoration and Revegetation Planning and Design

Once land management activities and all required baseline surveys have been completed, land assessment and mapping of restoration units (including remnant vegetation) will be undertaken. The definition of the restoration units will assist in determining

species composition, seed/seedling rates, and any specific management actions associated with establishing the required vegetation and habitat. Seed and seedlings for this work will be sourced from within the Worsley DBCA provenance zone and will be consistent with regional vegetation.

Restoration activities will commence two to five years post-approval and will include:

- Targeted restoration within stands of remnant vegetation through natural regeneration following destocking (initially spontaneous regeneration). Where regeneration is not successful in line with established criteria for understory, supplementary seeding or planting (facilitated regeneration) will be carried out;
- Installation of appropriate structures to improve habitat value (including but not limited to nest boxes and habitat piles); will be determined as per the Worsley Biodiversity and Forest Management Plan, and
- Any required restoration earthworks and planting will be undertaken by suitably experienced restoration contractors and supervised appropriately by Worsley or a select third-party contractor/consultant. Work timing will depend on seasonal requirements and will be completed in line with existing, well-proven techniques currently employed at BBM.

Restoration activities in areas of open pasture will commence in a similar time period and will be primarily based on mine rehabilitation techniques currently employed at BBM including:

- Targeted weed control;
- Fire Management;
- Feral Species Management;
- Disease Management;
- Installation of habitat structures as required;
- Preparation of area for seeding and planting, and
- Seeding and planting.

Worsley will develop a site-specific restoration prescription, which includes targeted restoration for a stable productive forest ecosystem, to maintain conservation and nominated forest values as is appropriate to the soil and landform types of the property, prior to commencing any ecological restoration works.

6.2.4 Completion Criteria, Targets and Objectives

Draft completion criteria have been developed for Ecological Restoration areas (see section 4.10.5). These Draft Completion Criteria largely align with the draft forest rehabilitation completion criteria which are currently under review by DBCA. These metrics may be adjusted over time through adaptive management following the agreement of final completion criteria and as restoration activities progress and restoration methodologies are adapted. It should be noted that ecological restoration differs from rehabilitation given the differences in historic land use and associated changes in soil chemistry and vegetation present (i.e. high pasture weed load, lack of fresh topsoil).

To support the completion criteria which are largely focused on flora and vegetation metrics, a number of targets related to fauna have been developed as outlined in Table 15.

Finally, Objective-based outcomes have been developed for the Ecological Protection and Restoration areas (Table 18). These objectives address the management of threatening processes for MNES as outlined within National Recovery Plans.

6.2.5 Monitoring

Specialist biological consultants will undertake the required monitoring as outlined in Table 16 following the intent of the relevant EPA Technical Guidance. A summary of monitoring effort and results will be reported to the WEMLG in the AER following receipt of the report for each monitoring event. Exceedances of trigger levels will be reported to the relevant authorities (DBCA, EPA and DCCEEW) via the Annual Biodiversity Offset Report in accordance with Table 17.

- Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment. Environmental Protection Authority December 2016.
- Technical Guidance – Terrestrial vertebrate fauna surveys for Environmental Impact Assessment. Environmental Protection Authority December June 2020

6.2.6 Adaptive Management

Please refer to Section 7.2 for Worsley's approach to adaptive management and review in relation to the Offsets.

6.2.7 Reporting

Refer to section 7.3 for Worsley's reporting process in relation to the offsets.

6.3 OFFSET IMPLEMENTATION PLAN TWO

6.3.1 Outcome

Offset Implement Plan Two will see the Protection and Enhancement of no less than 218.6 ha of native vegetation and the Restoration of no less than 299.8 ha of agricultural land as per conditions B15-2(1) and B15-2(2) of MS1237.

Table 20: Offset 2 - Relevant EPA Condition

Condition	Outcome	Offset 2 Contribution
B15-2(1)	Protection and enhancement of 4,384 ha of remnant vegetation in perpetuity.	218.6 ha
B15-2(2)	Ecological restoration of 4,962 ha agricultural land and protection in perpetuity to ensure a net-gain in numbat, black cockatoo, chuditch, WRP, quokka and red-tailed phascogale habitat.	299.8 ha (Black cockatoo, Red-tailed phascogale, chuditch)

6.3.2 Management Measures to see the Return of MNES

Management measures proposed as part of the offset proposal are guided by and intend to contribute to the implementation of species Recovery Plan actions for the relevant MNES. It is understood that Recovery Plans are high level strategic documents at varying levels of implementation and progress. To address this, consultation with DBCA and DCCEEW has been undertaken in the development of this LEOMP so that management measures applied remain consistent with the identified needs for the target MNES species.

6.3.2.1 Management Actions for areas of Habitat Protection

The various actions below will help to maintain and improve the existing habitat for the listed MNES:

- Ecological restoration as required to improve the habitat (see section 4.10.5);
- Protection of existing habitat trees (see section 4.10.9);
- Feral predator control across offset area (see section 4.10.1);
- Feral pig control across the offset area (see section 4.10.1);
- Fire management across the offset area to protect the habitat (fire breaks, cool season mosaic burns) (see section 4.10.7);
- Weed Control across the offset area (see section 4.10.3), and
- Management of forest disease (see section 4.10.8).

6.3.2.2 *Management Actions for areas of Ecological Restoration*

Different species will be encouraged to return to the offset via different management actions.

Worsley is targeting the return of the red-tailed phascogale within 20 years through the following management actions (consistent with DEC, 2012):

- Ecological restoration of remanent vegetation (establish lower and mid-storey vegetation under existing remanent trees) (see section 4.10.5);
- Ecological restoration of areas of pasture (establish a continuous canopy of native plant lower, mid and canopy species across the offset) (see section 4.10.5);
- Planting specific habitat species (i.e. thickets of *Allocasuarina huegeliana* in drainage lines) (see section 4.10.5);
- Installation of breeding hollows in existing trees (for example, traditional boxes and experimental use of other options such as Hollow Hog (see section 4.10.10);
- Feral animal control across offset area (see section 4.10.1), and
- Provide fire management across the offset area to protect the habitat (see section 4.10.7).

Worsley is targeting the return of the chuditch within ten years through the following actions (consistent with DBCA, 2017):

- Ecological restoration of remnant vegetation (establish lower and mid-storey vegetation under existing remnant trees) (see section 4.10.5);
- Ecological restoration of areas of pasture (establish a continuous canopy of native plant lower, mid and canopy species across the offset) (see section 4.10.5);
- Provision of potential den locations in habitat log piles (see section 4.10.10);
- Feral animal control across offset areas (see section 4.10.1), and
- Provide fire management across the offset area to protect the habitat (see section 4.10.7).

Worsley is targeting the return of black cockatoo species foraging within eight years. This will be achieved through implementation of the following management measures, consistent with the relevant species fauna profiles (Baudin's DBCA, 2017), (Carnaby's DBCA, 2017), (Forest Red-tailed DBCA, 2017):

- Ecological restoration of pasture with a known food source tree species (eg *Corymbia calophylla*) (see section 4.10.5);
- Protection of existing habitat trees (see section 4.10.9), and
- Installation of artificial breeding hollows (see Section 4.10.10).

These management actions will create an ecological linkage between the existing Saddleback and Quindanning Timber Reserves.

6.3.3 Action Plan

6.3.3.1 *Management Actions Completed*

To support the continued development of the Offset Implementation Plans prior to commencement of disturbance activities the following actions have been completed for Offset 2:

- Destocking of approximately 80ha of parkland trees on the eastern boundary of the property in 2022;
- Twelve months of monthly pig trapping and fox baiting with Canid Pest Ejectors (1080);
- Spray topping of pasture grasses across the northern portion of the Gibbs Property;
- Installation of log habitat piles across the northern portion of the Gibbs Property;
- Baseline flora survey (Biologic, 2024);
- Baseline fauna survey (Biologic, 2024);
- Conceptual Restoration Plan for pasture areas on Gibbs (Biologic, 2023);

- Trial restoration area implemented in northern corner of the property to determine most effective ground preparation technique for vegetation restoration;
- Spiny rush control along the creek line (ongoing);
- 11,000 seedlings have been planted by Danju Rangers along the creek line; and
- Installation of a kangaroo and pig fence around the northern portion of the Gibbs Property in preparation for ecological restoration seeding.

6.3.3.2 Land Management Activities

The following land management and restoration activities will be undertaken to ensure the property is suitably prepared, and that restoration will provide an improvement to the habitat values for the species identified to benefit from this proposed offset.

The following activities will be undertaken within 12 months of approval of this LOEMP:

- Destocking – removal of all livestock from the property allowing for access agreements to expire;
- Improvement/replacement of boundary fencing to prevent stock from entering from adjacent properties. Signs will be placed on all access gates and at strategic locations on the boundary fence to indicate the property is being managed for conservation;
- Maintenance/construction of fire breaks;
- Identification of any contaminated sites and planning for appropriate removal or restoration;
- Weed management (for land preparation and fire risk minimisation) – a weed survey will be undertaken to determine the presence of noxious weeds, resulting in appropriate mapping and weed management activities;
- Disease mapping and development of a hygiene management plan (as required);
- Vertebrate fauna monitoring (including feral species) will be undertaken in accordance with section 4.11.1 , and
- Feral animal control in accordance with section 4.10.1.

6.3.3.3 Restoration and Revegetation Planning and Design

Once land management activities and required baseline surveys have been completed, land assessment and mapping of restoration units (including remnant vegetation) will be undertaken (in accordance with Section 6.3.3.1 activities have already commenced, and trials have been undertaken to determine the most effective method of seeding). The definition of the restoration units assists with determining species composition, seed/seedling rates, and any specific management actions associated with establishing the required vegetation and habitat. Seed and seedlings for this work will be sourced from within the Worsley DBCA provenance zone and will be consistent with regional vegetation.

Restoration activities will commence two to five years post-approval (based on seasonal timing of approval) and will include:

- Targeted restoration within stands of remnant vegetation through natural regeneration following destocking (initially spontaneous regeneration). Where regeneration is not successful in line with established criteria for understory supplementary seeding or planting (facilitated regeneration) will be carried out; and
- Installation of appropriate structures to improve habitat value (including but not limited to nest boxes and habitat piles);Any required restoration earthworks and planting will be undertaken by suitably experienced restoration contractors and will be supervised by Worsley or a select third-party contractor / consultant.

The timing of works will be dependent on seasonal requirements and will be completed in line with existing, well-proven techniques currently employed at the BBM.

Restoration activities, in areas of open pasture, will commence in a similar time period and will be primarily based on mine rehabilitation techniques currently employed at the BBM are documented in the Rehabilitation Performance Report required under Condition B14-2 of MS1237:

- Targeted weed control;
- Installation of habitat structures as required;
- Preparation of area for seeding and planting, and
- Seeding and planting.

6.3.3.4 Indicators, Trigger Criteria, Threshold Criteria and Response Actions

Indicators (trigger criteria and threshold criteria) and Response Actions (trigger level actions and threshold contingency actions) are as stated in Table 17.

6.3.4 Monitoring

Specialist biological consultants will undertake the monitoring as outlined in section 4.11 following the intent of the relevant EPA Technical Guidance. A summary of results from each monitoring program will be reported to the WEMLG in the AER following receipt of the final report. Exceedances of trigger levels will be reported to the relevant authorities (DBCA, EPA and DCCEEW) via the Annual Biodiversity Offset Report.

- Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment. Environmental Protection Authority December 2016.
- Technical Guidance – Terrestrial vertebrate fauna surveys for Environmental Impact Assessment. Environmental Protection Authority December June 2020.

6.3.5 Adaptive Management

Please refer to Section 7.2 for Worsley's approach to adaptive management and review in relation to the Offsets.

6.3.6 Reporting

Refer to section 7.3 for Worsley's reporting process in relation to the offsets.

6.4 OFFSET IMPLEMENTATION PLAN THREE A

6.4.1 Outcome

Offset Implement Plan Three A will see the Restoration of 4,229 ha of agricultural land as per Commitment B15-2(2) and will be provided in accordance with the timing outlined in Section 4.4.

Table 21 Offset 3A – Relevant EPA Condition

Condition No	Outcome	Offset 3A Contribution
B15-2(2)	Ecological restoration of 4,962 ha agricultural land and protection in perpetuity to ensure a net-gain in numbat, black cockatoo, chuditch, WRP, quokka and red-tailed phascogale habitat.	4,229 ha (Black cockatoo, chuditch & numbat)

6.4.2 Management Measures to see the Return of MNES

Management measures proposed as part of the offset proposal are guided by and intend to contribute to the implementation of species Recovery Plan actions for the relevant MNES. It is understood that Recovery Plans are high level strategic documents at varying levels of implementation and progress. To address this, consultation with DBCA and DCCEEW has been undertaken in the development of this LEOMP so that management measures applied remain consistent with the identified needs for the target MNES species.

Different species will be encouraged to return to the offset via different management actions as outlined below.

Worsley is targeting the return of chuditch within ten years through the following actions (consistent with DBCA, 2017):

- Ecological restoration of remnant vegetation (establish lower and mid-storey vegetation under existing remnant trees) (see section 4.10.5);
- Ecological restoration of areas of pasture (establish a continuous canopy of native plant lower, mid and canopy species across the offset) (see section 4.10.5);
- Provision of potential den locations in habitat log piles (see section 4.10.10);

- Feral animal control across offset areas (see section 4.10.1), and
- Provide fire management across the offset area to protect the habitat (see section 4.10.7).

Worsley is targeting the return of foraging Black Cockatoos within eight years. This will be achieved through implementation of the following management measures, consistent with the relevant species fauna profiles (Baudin's DBCA, 2017), (Carnaby's DBCA, 2017), (Forest Red-tailed DBCA, 2017):

- Ecological restoration of pasture with a known food source tree species (eg *Corymbia calophylla*) (see section 4.10.5);
- Protection of existing habitat trees (see section 4.10.9), and
- Installation of artificial breeding hollows (see Section 6.5).

6.4.3 Action Plan

6.4.3.1 Land Management Activities

In line with other proposed offsets, the following land management and restoration activities will be undertaken to ensure the property is suitably prepared, and that restoration will provide an improvement to the habitat values for the species identified to benefit from this proposed offset.

The following activities will be undertaken in line with the planning of Mining Tranche Two and Three:

- Destocking – removal of all livestock from the property allowing for access agreements to expire;
- Improvement/replacement of boundary fencing to prevent stock from entering from adjacent properties. Signs will be placed on all access gates and at strategic locations on the boundary fence to indicate the property is being managed for conservation;
- Maintenance/construction of fire breaks;
- Identification of any contaminated sites and planning for appropriate removal or restoration;
- Weed management (for land preparation and fire risk minimisation) – a weed survey will be undertaken to determine the presence of noxious weeds, resulting in appropriate mapping and weed management activities;
- Disease mapping and development of a hygiene management plan;
- Baseline fauna and feral species monitoring will be undertaken and repeated in accordance with the vertebrate Fauna monitoring program (see section 4.11.1), and
- Feral animal control will be completed in accordance with section 4.10.1.

6.4.3.2 Restoration and Revegetation Planning and Design

Once land management activities and required baseline surveys have been completed, land assessment and mapping of restoration units (including remnant vegetation) will be undertaken. The definition of the restoration units will assist in determining species composition, seed / seedling rates, and any specific management actions associated with establishing the required vegetation and habitat. Seed and seedlings for this work will be sourced from the relevant provenance zone and will be consistent with regional vegetation.

Restoration activities will commence in line with the disturbance from Mining Tranche Two and Three and will likely include:

- Targeted restoration within stands of remnant vegetation through natural regeneration following destocking (initially spontaneous regeneration). Where regeneration is not successful in line with established criteria for understory supplementary seeding or planting (facilitated regeneration) will be carried out; and
- Installation of appropriate structures to improve habitat value (including but not limited to nest boxes and habitat piles).

Any required restoration earthworks and planting will be undertaken by suitably experienced restoration contractors and supervised by Worsley or a select third-party contractor/consultant. The timing of works will be dependent on seasonal requirements and will be completed in line with existing, well-proven techniques currently employed at BBM.

Restoration activities, in areas of open pasture, will commence in a similar time period and will be primarily based on mine rehabilitation techniques currently employed at the BBM. These are documented in the Rehabilitation Performance Report required under Condition B14-2 of MS1237:

- Targeted weed control;
- Installation of habitat structures as required;

- Preparation of area for seeding and planting, and
- Seeding and planting.

Worsley will develop a site-specific restoration prescription which includes targeted restoration for a stable productive forest ecosystem, to maintain conservation and nominated forest values as is appropriate to the soil and landform types of the property, prior to commencing any ecological restoration works.

6.4.4 Indicators, Trigger Criteria, Threshold Criteria and Response Actions

Indicators (trigger criteria and threshold criteria) and Response Actions (trigger level actions and threshold contingency actions) are as stated in Table 12 and Table 17.

6.4.5 Monitoring

Specialist biological consultants will undertake the monitoring as outlined in section 4.11 following the intent of the relevant EPA Technical Guidance. A summary of results from each monitoring program will be reported to the ELMG in the AER following receipt of the final report. Exceedances of trigger levels will be reported to the relevant authorities (DBCA, EPA and DCCEEW) via the Annual Biodiversity Offset Report.

- Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment. Environmental Protection Authority December 2016.
- Technical Guidance – Terrestrial vertebrate fauna surveys for Environmental Impact Assessment. Environmental Protection Authority December June 2020.

6.4.6 Adaptive Management

Please refer to Section 7.2 for Worsley's approach to adaptive management and review in relation to the Offsets.

6.4.7 Reporting

Refer to section 7.3 for Worsley's reporting process in relation to the offsets.

6.5 OFFSET IMPLEMENTATION PLAN FOUR

6.5.1 Outcome

Offset Implement Plan Four will see the installation of 72 artificial breeding hollows to offset the loss of 24 high potential black cockatoo breeding trees as required by condition B15-2(4) of MS1237.

Table 22 Offset 4 – Relevant EPA Condition and Contribution

Condition	Outcome	Offset 4 Contribution
B15-2(4)	Installation of three artificial breeding hollows for every tree cleared that is being used, or that has evidence of use by black cockatoos for breeding.	72 artificial hollow installations (100%)

6.5.2 Management Measures to see the Return of MNES

The installation of artificial breeding hollows (ABH) is planned to be undertaken to replace those habitat trees lost from the area of disturbance (EPA, 2019). The installation will follow guidance documentation from DBCA (DPAW), EPA and National Recovery Plans. Consultation with black cockatoo experts has determined that ABH must be placed in areas:

- With proximal location to existing breeding habitat but in areas where the number of hollows is limited (DPAW, 2015a);
- Within 7 km of food and water resource (Saunders 1982, Saunders 1990);
- With sufficient access to drinking water near roosts and or breeding sites (EPA 2019), and
- Enabling annual maintenance inspection - undertaken prior to the start of the breeding season, to ensure the floor materials are adequate, chew posts do not need to be replaced, and anchor points are in good condition (DPAW, 2015c).

To ensure the ABH remain available for use by black cockatoo species the following monitoring/maintenance will occur:

- The ABH will be inspected for feral bee activity, prior to the breeding season. Any bee colony found to be present will be removed (DPAW, 2015c), and
- The ABH will be inspected to determine utilisation by other species (e.g., galah, corella, brush-tail possum etc) (DPAW, 2015c). Where present these will be removed, with the exception of Conservation Significant Fauna.
- In addition to the above, appropriate food species will be planted when undertaking ecological restoration work in the adjoining areas (EPA, 2019) to support black cockatoo return to the post mining landscape (see section 6.3).

Breeding success in each ABH will be monitored annually to determine success and support modifications to the program through adaptive management.

6.5.3 Action Plan

To ensure the successful installation of ABH the following will be completed:

- Within 12 months of the receipt of MS1237 Worsley will engage a subject matter expert to determine the best locations for installing the ABH.
- ABH will be installed in identified suitable locations in advance of clearing of black cockatoo trees (as defined by condition B15-2(4)).
- ABH will be monitored and maintained on an annual basis.

6.5.3.1 Actions Completed

To support the continued development of the Offset Implementation Plans prior to disturbance, the following actions have been completed for Offset 4:

- 50 cockatubes have been purchased and are stockpiled at BBM
- Initial discussions about placement of cockatubes were undertaken with Rick Dawson (Black Cockatoo Specialists), and
- An assessment of the suitability of the Gibbs Property (Offset 2) to support installation of ABH was completed by Ecology Matters (Kristancic et al, 2024).

6.5.3.2 Installation

Installation of the expected quantum of ABH will occur prior to the commencement of mining activities. Appropriately trained personnel will install the ABH following suitable guidelines (such as DPaW 2015b). Installation of the first round of ABH will occur prior to the first breeding season after receipt of MS1237. Any further installation of required ABH will be installed one year prior to breeding tree removal.

When installing an ABH the following will occur:

- The host tree will be tagged and its GPS location recorded;
- The height and aspect of the hollow will be recorded;
- A permanent photographic point will be set up to observe the ABH, and
- Details of each hollow location will be reported in the Annual Environmental Report.

6.5.4 Indicators, Trigger Criteria, Threshold Criteria and Response Actions

Indicators (trigger criteria and threshold criteria) and Response Actions (trigger level actions and threshold contingency actions) are as stated in Table 17.

6.5.5 Monitoring

Specialist biological consultants will undertake monitoring as outlined in section 4.11 following the intent of the relevant guidelines (DBCA Fauna Notes: Artificial Hollows for Black Cockatoo. (2023)). The consultant will also contact the DBCA Wildlife Licensing Section to determine if a lawful authority is required.

A summary of results from each monitoring program will be reported to the WELMG in the AER following receipt of the final report.

Exceedances of trigger levels or threshold criteria will be reported to the relevant authorities (DBCA, EPA and DCCEEW) via the Annual Biodiversity Offset Report.

6.5.6 Adaptive Management

Please refer to Section 7.2 for Worsley's approach to adaptive management and review in relation to the Offsets.

6.5.7 Reporting

Refer to section 7.3 for Worsley's reporting process in relation to the offsets.

7 ADAPTIVE MANAGEMENT AND REVIEW

7.1 COMPLIANCE AUDITING

In accordance with Condition D-2 of MS1237 Worsley will provide an annual Compliance Assessment report for the purpose of determining whether the implementation conditions are being complied with. This will include an assessment of each offset to determine if the offset is being implemented in accordance with the LOEMP requirements provided in Sections 6.2 to 6.5.

7.2 ADAPTIVE MANAGEMENT AND REVIEW

This LOEMP will be reviewed by Worsley on a five yearly basis to assess effectiveness, ongoing relevance and incorporate improved management strategies derived from assessment of monitoring, research and positive corrective actions from incident investigations.

The five yearly review of this plan will consider:

- Surveying and monitoring program outcomes;
- Specialist advice and stakeholder consultation;
- Implementation and effectiveness of control measures;
- Performance indicators and any corrective actions;
- Changes to operational activities leading to changes in the risk; and
- Changes to relevant legislation, policy, guidelines, guidance material and industry practices.

Worsley will continue to provide offset forecasting and reporting through the AER and annual Plan of Bauxite Operations (10 year Mine Plan) to ensure it is clear that offsets are being implemented as clearing progresses (see Section 4.4).

7.3 REPORTING

Data collected from the Offset Monitoring Program will be incorporated into the Annual Environmental Report (AER) and presented to the WEMLG. This reporting will be provided as an Appendix to the AER and be an “Annual Biodiversity Offsets Report” (ABOR).

The WEMLG has been established under the Agreement Act and formalised under MS423 and MS719. The group has representatives from the DBCA, DWER, DPIRD, and the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS). The WEMLG currently meets annually to review Worsley's mining plans and environmental performance in general. As required this information will also be provided to DCCEEW.

In accordance with condition B15-6 (7) the ongoing performance of the offset measures and the progress towards achieving the outcomes will be made publicly available – this will occur on a 5 yearly basis to allow for implementation of actions, alignment with monitoring regimes and is in accordance with Section 7.2.

8 ROLES AND RESPONSIBILITIES

Role	Responsibility
Principal – Environmental Offsets	• Development and implementation of Offset Plans. • Commission Offset confirmation surveys. • Reporting
Manager Environment, Heritage & Approvals	• Budgeting and support for implementation of the LOEMP
Vice President Operations Worsley	• Provision of financial support for delivery of the LOEMP

9 STAKEHOLDER CONSULTATION

9.1 WORSLEY ENVIRONMENTAL MANAGEMENT LIAISON GROUP (WEMLG)

The WEMLG (previously known as the EMLG) was established under the Worsley State Agreement and formalised under MS423 and MS719. The group has representatives from the DBCA, DWER, DPIRD, and the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS). The WEMLG currently meets annually to review Worsley's mining plans and environmental performance in general. .

9.2 DBCA

The LOEMP is required to be prepared in consultation with DBCA (condition B15-6(3)). In preparation for the development of the Biodiversity Offsets Plan (BOP, Appendix L01 of the Worsley Environmental Review Document (Worsley, 2024) DBCA was consulted regarding the suitability of the offsets for inclusion as outlined in Table 23.

Table 23 DBCA Consultation Regarding Development of Offsets

Date	Discussion	Outcome
2 Dec 2019	Presentation of the Biodiversity Offset Strategy (DBCA and EPA-S)	Worsley to arrange a follow up meeting with the SW Branch to review proposal and Biodiversity Offset plan
22 Dec 2019	Meeting proposed to discuss BOS/BOP, specifically DBCA position for the inclusion of Worsley JV land and the potential for incorporation into the DBCA conservation estate	Follow up email and phone call (23/01/20 and 05/02/2020)
11 Mar 2020	Phone Call – Update status of SRI /Offset quantum. Support requested to align BOP with DBCA priorities. Advised the process dictates that SRI/Offset quantum discussions to be complete prior to DBCA discussing any detail	
14 July 2020	Email – including figure from the BOP	Follow up meeting to be arranged
12 Aug 2020	Phone call – Woylie Recovery team – Discussed Woylie recovery program, including Worsley current research priority (ferals, eradicat and felixir)	
12 Aug 2020	Email – DBCA - Request for support to align biodiversity offset plan, future offsets projects and proposals with DBCA priorities	Email response received 11/12/20 and discussion set up for 14/12/20
08 Sept 2020	Biodiversity Offsets review and general Revised Proposal clarification (DBCA & EPA-S)	Further discussion recommended with DAWE (now DCCEEW) regarding offsets
11 Sept 2020	Teams meeting with Greening Australia, discussion regarding options for land transfer of offset properties including Worsley JV land for restoration and habitat protection (DBCA & EPA-S)	
12 Sept 2020	Phone call – DBCA – Discussed priorities associated with DBCA feral management programs in particular Western Shield. Offset discussion deferred by participant to alternative DBCA team member	
04 Nov2020	Phone call – Follow up on email sent 14/7/20. General view from DBCA was that Worsley was more advanced than many proponents who leave offsets to the last moment. DBCA stated most DBCA engagement occurs in the 12 month period often given to proponents to develop offsets and were satisfied with the level of engagement given the position we were at with offsets. Requested feedback from DBCA if they have specific land acquisition priorities in the local region.	Continue refinement of offset options and integrate into execution planning.
13 Nov 2020	Teams meeting – Clarifications on biodiversity offsets and land tenure (DBCA & EPA-S)	Continue refinement of offset options and integrate into execution planning.
13 Nov 2020	Phone Call – Support requested to align BOP with DBCA priorities specifically with respect to Woylie and Red Tailed Phascogale. DBCA advised that conversation regarding research possible, however	DBCA advise to speak with the Woylie recovery Branch

Date	Discussion	Outcome
	advised the process dictates that SRI/offset quantum discussion to be complete prior to DBCA discussing in offsets in detail	
20 Nov 2020	Phone Call – Regional priorities for land discussed and nothing available in Swan and Wheatbelt regional manager was not available to comment. No particular land parcels identified as priority that DBCA could recommend at this point. JV land – on face value JV lands are favourable. DBCA look favourably on properties with veg complexes that are under-represented in the reserve system. Woylie Quantum of Offset - translocations considered high risk, not preferred option. Redirect to regulators DAWE/EPA - advised that DBCA are at the back of the process for offsets. Refer to State offsets strategy guidelines	
17 Dec 2020	Phone call – DBCA – investigating DBCA position regarding Woylie offset, enhancing existing programs and threat abatement. Recommended in the short term to follow previous guidance in aligning with principles associated with the Species Recovery Plans for Wylie and other threatened species.	
7 & 11 Jan 2021	Emails – DBCA – following up on conversation from 17/12 regarding information on DBCA subject matter experts and also land tenure security for offsets properties.	
4 Feb 2021	Phone Call – DBCA – Discussion regarding EPA-S recommendation to work closely with DBCA to develop an offsets framework, overarching approach and consultation with DBCA. DBCA highlighted that they would like to undertake a review of the offset properties in the next few months, particularly Lot102 with a focus on operational management. Worsley awaiting DBCA Woylie monitoring data and info	Arrange site visit to offset properties with DBCA
8 April 2021	Teams meeting – DBCA, DAWE & EPA-S. Follow up on regulatory comments received in March 21 regarding offsets and application of the mitigation hierarchy	Awaiting feedback from regulators
13 May 2021	Letter – DBCA District Manager to Worsley – highlighting Worsley JV properties that may be of interest (ranked in order of priority) – following recent site visit. Noting that forest burning considerations make Lot 102 unattractive to DBCA.	Priority 1 and 5 areas added to proposed offset package
10 Aug 2021	Meeting – DBCA & Conservation & Parks Commission. Worsley proposal overview including presentation of offsets	
18 Aug 2021	Letter – Letter to DBCA identify Lot 102 as a potential offset property candidate and response to initial correspondence received from DBCA re properties	
25 Aug 2021	Teams meeting – DBCA, EPA-S, DAWE. Biodiversity offsets fortnightly meeting established to support ERD submission	
31 Aug 2021	Meeting -DBCA, Greening Australia – further discussion on each proposed Offset Property and way forward	Include properties in the updated ERD
15 Sept 2021	Teams meeting – DBCA, EPA0S & DAWE. Follow up on regulatory comments received regarding biodiversity offsets (SRI & Offset quantum). Presentation & discussion on updated SRI & Offset calcs, including application of mitigation hierarchy and biodiversity management	Awaiting feedback from regulators
22 July 2022	Meeting – DBCA & Conservation & Parks Commission. Update on proposal (public review) including offsets	
21 Sept 2022	Meeting -DBCA. Discuss detail of DBCA response during the public review period	
6 Oct 2022	Email – DBCA. Request to set up a time with DBCA's offset team or those that will be involved in the consultation regarding the suitability of the proposed offsets	Followed up 12/10

Date	Discussion	Outcome
4 April 2023	Email – DBCA. Request to provide DBCA further clarity on RtS document to assist their response and to discuss potential offset opportunity in QTR	DBCA request delaying discussions until the RTS has been received
29 May 2023	Email – DBCA. Further details provided regarding potential offset opportunity in QTR	DBCA provide a response, suggesting that in principle, DBCA are supportive of increased protection for the values of lands vested in the Conservation & Parks Commission and managed by DBCA. Noting that advice regarding offsets relevant to the Worsley Mine Expansion Revised proposal currently under assessment should be directed to DWER & DCCEEW in the first instance.
23 July 2024	Email – DBCA. Request to set up a time to commence consultation on the LOEMP in accordance with condition B15-6(3)	Meeting scheduled with DBCA 6th Aug. Noting DBCA raised concerns that acting too quickly regarding this matter could be seen to be undermining the appeals process, however agreeing to undertake preliminary discussions noting no decisions or agreements should be made.
14 Aug 2024	Teams Meeting- DBCA. Discussion regarding the LOEMP layout, including way of incorporating the Woylie Offset. DBCA indicate they don't agree with the Woylie offset location and have concerns with the exclosure.	Worsley indicate the Woylie exclosure meets the requirements of DCCEEW and the recovery plan and will likely be included in the LOEMP. Worsley committed to send DBCA (as well as EPA-S and DCCEEW) a draft copy of the LOEMP for consideration/consultation.
22 Oct 2024	Meeting with DBCA, EPA and DCCEEW to discuss DBCA objection to the Woylie Offset Plan.	DBCA said they could not provide formal advice until after the Appeals process had been completed and a Ministerial Statement had been issued. DBCA stated that the Recovery Plan for the woylie is out of date and cannot be used. DCCEEW stated they can only condition in accordance with the Woylie Recovery Plan. EPA, DBCA and DCCEEW agreed to meet r to determine the best way forward for the agencies, and advice would be provided to Worsley. This advice has since been provided and the Offset related to the Woylie has been removed
18 Nov 2024	DBCA provided five high level comments regarding the LOEMP	Comments considered in review of the LOEMP and implemented as appropriate.

9.3 COMMUNITY LIAISON COMMITTEE

Mine and a Refinery Community Liaison Committees (CLCs) have been formed to provide for open and accurate communication and for the provision of information between Worsley and the wider community. Members of the CLCs are encouraged to represent the opinions of the wider community, as well as the community or group that they represent. The role of the CLCs provides the members with the opportunity to contribute to shared goals addressing environmental, social and economic issues in a proactive, timely and open manner. The CLCs are chaired independently and include representatives from local shires, conservation groups and other interested parties from within the local Boddington and Collie Communities.

These committees provide a substantial avenue for communication with the local community on issues including those relating to Worsley's Offset management. The committee helps in the development of communications with stakeholders.

10 DEFINITIONS, TERMS AND ABBREVIATIONS

Term	Definition
10 year Mine Plan	Annual Plan of Bauxite Operations
ABH	Artificial Breeding Hollow
ABOR	Annual Biodiversity Offset Report
AER	Annual Environmental Report
BC Act	*Biodiversity Conservation Act 2016* (WA)
BBM	Boddington Bauxite Mine
BOP	Biodiversity Offset Plan
BTC	Bauxite Transport Corridor
CBME	Contingency Bauxite Mining Envelope
CLC	Community Liaison Committee
DAWE	Department of Agriculture Water and Environment (now DCCEEW)
DBCA	Department of Biodiversity, Conservation and Attractions (WA)
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEMIRS	Department of Energy, Mining, Industrial Regulation and Safety
DoEE	Department of the Environment and Energy
DPaW	Department of Parks and Wildlife (now DBCA)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DCCEEW)
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EPA	*Environmental Protection Authority* (WA)
EPA-S	Environmental Protection Authority Services
EP Act	*Environmental Protection Act 1986* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
ERD	Environmental Review Document
FPFA	Feral Predator Free Area
LOEMP	Local Offset Environmental Management Plan
LoOP	Life of Operations Plan
MNES	Matters of National Environmental Significance

Term	Definition
MS	Ministerial Statement
Mtpa	Million tonnes per annum
OIP	Offset Implementation Plan
PAA	Primary Assessment Area
PEC	Priority Ecological Community
PRML	Previously Rehabilitated Mined Land
Revised Proposal	Worsley Mine Expansion Revised Proposal
RSI	Residual Significant Impact
SDG	Sustainable Development Goals
TEC	Threatened Ecological Community
WABSI	Western Australian Biodiversity and Science Institute
WMDE	Worsley Mining Development Envelope
Worsley	South32 Worsley Alumina Pty Ltd
Worsley State Agreement	*Alumina Refinery (Worsley) Agreement Act 1973* (WA)

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12 DOCUMENT CONTROL

Version Control

Version	Change	Date
0.1	Initial version prepared in accordance with Condition B15-6 of EPA Report 1768.	07/09/2024
0.2	Internal review only. Document reformatted to meet Worsley internal template standard.	18/11/2024
0.3	Revision of document content to address EPA and DCCEEW comments received on version 0.1. Removal of Offset Implementation Plan 5. Restructure of document to align with EPA guidance and templates.	12/12/2024
0.4	Updated Ministerial Statement references and condition numbers throughout document, added internal document reference numbers and revised internal signatories.	15/01/2025
1.0	Internal signatures applied. Final as submitted under MS1237.	16/01/2025

Reviewer Circulation

Role	Name	Endorsed	Date
Manager Environment, Heritage & Approvals	Claire Reid	✓	16.01.2025
Manager Planning	Cameron McKean	✓	16.01.2025
General Manager Development	Michelle Elvy	✓	16.01.2025

Approval Circulation

Role	Name	Approved	Date
Vice President Operations	Pine Pienaar	✓	16.01.2025

13 APPENDIX A – RISK ASSESSMENT

Risk Identification			Risk Evaluation and Control Effectiveness Assessment			
Risk Event	**Causes (Direct & Contributing)**	**Expected Impact / Consequences**	**Controls (preventative and mitigating)**	**Severity**	**Likelihood**	**Risk Rating**
Unauthorised clearing within an Offset Area	Insufficient signage Mapping layers not maintained Operator error Escaped Fire	Loss of native vegetation within Offset area Increased fragmentation of fauna habitat Potential loss of Threatened or Priority flora species Non-compliance with legal requirements	Clearing Planning process Sign off of Clearing Plans Clearing Permit System (non-production related clearing) Protected Areas Plan Protected Areas Implementation and Management Procedure GPS systems in SME Site GIS layers for Protected Areas and Protection Commitments included on all Clearing Plans Clearing boundaries surveyed and inspected Sign posting or flagging of Protected Areas when clearing is occurring adjacent BBM Clearing and Burning Operations manual	Moderate	Unlikely	Low
Spread of weeds leading to additional competition and decreased habitat quality	Poor topsoil management Failed soil hygiene management	Increase in weeds Loss of native flora	Weed Management Procedure (111791) Forest Hygiene Management Procedure (101046) Weed spraying or removal (as required) Topsoil and Gravel Handling Specification (113212)	Minor	Likely	Low
Injury, mortality or displacement of fauna from ecological restoration activitities	Vehicle interaction Mobile equipment interaction	Individual fauna deaths through vehicle strike	Speed restrictions Fauna Management – Animal Handling Procedure (00113130)	Minor	Likely	Low
Spread of Forest Disease: Dieback (Phytophthora) or Armillaria leading to decreased habitat quality	Breach of Soil Hygiene Management Plan Working in an area of unknown soil hygiene status Non-compliance with Forest Hygiene Management Procedure Lack of signage Poor drainage design	Spread of Dieback and/or Armillaria Loss of biodiversity Decline in susceptible species Spread between mine/OBC and public areas	Forest Hygiene Training Wash down facilities Forest Hygiene Management Procedure (0101046) Any drains and sumps cleared during summer Signage Flora and Vegetation Management Plan (200001092) Vehicle clean down requirements Operate in dry conditions required for some activities Dieback surveys and mapping Restricted access Property specific soil hygiene management plans Site Drainage Standard (01020749) Regular review of best practice dieback management for adaptive management	High	Rare	Low
Competition or predation by introduced (feral) animals on Threatened species	High abundance of feral animals within Offset properties	Increased predation from feral animals Increased competition from feral animals	Feral animal management programs (Foxes, cats and pigs) Conservation Significant Fauna Management Plan (200001092) Research program (adaptive management)	Minor	Likely	Low

Risk Identification			Risk Evaluation and Control Effectiveness Assessment			
Risk Event	**Causes (Direct & Contributing)**	**Expected Impact / Consequences**	**Controls (preventative and mitigating)**	**Severity**	**Likelihood**	**Risk Rating**
Ecological Restoration fails to meet completion criteria	High grazing (kangaroos, rabbits) Insufficient management Extreme weather event Non-compliance with procedures Lack of seed supply	Restoration area requires additional management (i.e. thinning, replanting, weed management, drainage etc) Restoration area takes longer than expected to provide habitat values for MNES	Rehabilitation Standard STA-021 (01013575) Flora and Vegetation Management Plan (200001092) Rehabilitation Performance Review BBM Revegetation Management Procedure (00111496) Site Drainage – BBM Standard STA-402 (01020749) Topsoil and Gravel Handling Specification (00113212) Fauna Habitat Construction Standard (00111927) Completion Criteria and targets for early stage rehabilitation Restoration establishment monitoring program Research program (adaptive management) Weed Management Procedure (111791) Mine Rehabilitation Maintenance Procedure (00100865) BBM Provenance Area – Seeds and Cuttings Specification (00113643) Seed store	Moderate	Possible	Medium

Risk Reference Tables:

Qualitative measure of likelihood (after controls are in place)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Qualitative measure of consequence (with controls in place)	
Minor	Minor incident of environmental damage that can be reversed
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental amenity and real danger of continuing
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage

	Consequence				
	Minor	**Moderate**	**High**	**Major**	**Critical**
Highly Likely	**Medium**	**High**	**High**	**Severe**	**Severe**
Likely	**Low**	**Medium**	**High**	**High**	**Severe**
Possible	**Low**	**Medium**	**Medium**	**High**	**Severe**
Unlikely	**Low**	**Low**	**Medium**	**High**	**High**
Rare	**Low**	**Low**	**Low**	**Medium**	**High**