BHP Pilbara Strategic Assessment

Jimblebar Optimisation Project Revised Validation Notice

24 August 2023

Document Version

Rev	Description of Amendment	Organisation	Date Validation Notice Finalised	Date Validation Notice Effective From	Date of Validation Notice Expiry
Rev 0	Previous Validation Notice Draft for public consultation	BHP Billiton Iron Ore Pty Ltd	10 March 2020	-	
Rev 1	Final report	BHP Billiton Iron Ore Pty Ltd	8 May 2020	8 June 2020	8 June 2025
Rev 2	Revised Validation Notice Draft for public consultation	BHP Iron Ore Pty Ltd	29 May 2023	-	
Rev 3	Final Revised Validation Notice	BHP Iron Ore Pty Ltd	24 August 2023	25 September 2023	

Glossary and Abbreviations

Term	Meaning
Activity	The activity includes a solar project, enabling works for beneficiation, Train Load Out replacement, Jimblebar communications and Jimblebar East enabling works. (Section 2).
Activity Area	The area which the activity (or activities) will be undertaken within and excludes existing Newman hub operations as described in Section 1.4.
Additional Validation Notice Indicative Footprint	The area in which the additional activities relevant to this Revised Validation Notice are located.
APOP	Assurance Plan and Offset Plan
Approval	The approval of the taking of an action or class of actions granted by the Minister on 19 June 2017 in accordance with the Program given under section 146B of the EPBC Act.
Approval Holder	Any person or persons named in an Approval as an Approval Holder who may take action in accordance with the Program.
Assurance Plan	The plan that provides further detail on the process described in the Program, including management of Program Matters, stakeholder management, reporting and auditing requirements and governance arrangements, as approved by the Minister on 15 May 2023.
BC Act	*Biodiversity Conservation Act 2016* (WA).
BHP	BHP Iron Ore Pty Ltd.
Department, the	The Australian Government Department responsible for the administration of the EPBC Act or successors.
DAWE	Department of Agriculture, Water and the Environment (formerly the Department of Environment and Energy).
DBCA	Department of Biodiversity, Conservation and Attractions (formerly DPaW).
DCCEEW	Department of Climate Change, Energy, the Environment and Water (formerly DAWE)
DJTSI	Department of Jobs, Tourism, Science and Innovation.
DMIRS	Department of Mines, Industry Regulation and Safety.
DoEE	Department of the Environment and Energy.

Term	Meaning
DPaW	Department of Park and Wildlife (now DBCA).
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities.
DWER	Department of Water and Environmental Regulation.
Direct disturbance	The clearing of native vegetation and/or moving of earth as a result of activities undertaken within the Strategic Assessment Area in accordance with the Program.
EPA	Environmental Protection Authority.
EP Act	*Environmental Protection Act 1986* (WA).
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).
Full conceptual development scenario	The conceptual direct disturbance footprint for the development of all current BHP mining tenures within the Strategic Assessment Area. Applied in the Impact Assessment Report.
Impact or impacts	As defined in section 527E of the EPBC Act.
Impact Assessment Report	BHP Billiton Iron Ore Strategic Assessment: Impact Assessment Report (BHP 2016).
Indicative Footprint	The area where the clearing of native vegetation and/or moving of earth as a result of activities is planned to occur. This includes the Previous Validation Notice Indicative Footprint and the Additional Validation Notice Indicative Footprint
IRR	Impact Reconciliation Report
Minister	Minister responsible for administering the EPBC Act (being, at the time of this Validation Notice, the Minister for the Environment).
MNES	Matters of National Environmental Significance.
MS	Ministerial Statement.
New Listings	Any new listed threatened species or existing species that have been included in a higher endangerment category identified in accordance with Section 4.1.2 of the Program.
New Matters	Other matters protected by a controlling provision of Part 3 of the EPBC Act (other than listed threatened species) that may be identified in accordance with Section 4.1.2 of the Program.
NJV hub	Newman Joint Venture Hub.

Term	Meaning
Notifiable Action	An activity that is considered likely to have a relevant impact on a Program Matter based on an assessment of the proposed activity against the thresholds defined for Program Matters in the Assurance Plan. In relation to the voluntary part of the Program, this includes an activity that is considered likely to have a relevant impact on a New Listing or a New Matter.
NVCP	Native Vegetation Clearing Permit.
Offsets Plan	The plan that provides further detail on the processes that will be implemented to identify and deliver offsets associated with a Notifiable Action, as approved by the Minister on 15 May 2023.
OSA	Overburden Storage Area.
Practicable	Reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge.
PEAHR	Project Environmental and Aboriginal Heritage Review - The PEAHR system manages the implementation of environmental, Aboriginal heritage, land tenure and legal commitments prior to and during land disturbance. All ground disturbance activities will meet the requirements of the PEAHR. All personnel carrying out works associated with clearing activities are required to comply with the Sustainable Development Policy, environmental approvals, the PEAHR requirements and conditions and any other relevant legislative and licensing requirements.
PEOF	Pilbara Environmental Offset Fund.
PMO	Program Matter Outcome
Previous Validation Notice Indicative Footprint	The area within which activities related to the Previous Validation Notice (the Jimblebar Optimisation Project Validation Notice) are located.
Program	The BHP Billiton Iron Ore Pilbara Strategic Assessment Program endorsed by the Minister on 11 May 2017. Whilst the Agreement refers to a Plan, it was agreed with the Department that the term Program is a better reflection of the systems and processes to be delivered by BHP.
Program Matters	The listed threatened species Pilbara Leaf-Nosed Bat (*Rhinonicteris aurantius*), Northern Quoll (*Dasyurus hallucatus*), Greater Bilby (*Macrotis lagotis*) Ghost Bat (*Macroderma gigas*), and Pilbara Olive Python (*Liasis olivaceus barroni*).
PMO	Program Matter Outcome.
Program Matter Objective	The defined objective for each Program Matter which should be met within the Strategic Assessment Area.
SEA AER	Strategic Environmental Assessment Annual Environmental Review

Term	Meaning
SPP	Solar Power Plant
Strategic Assessment Area (SAA)	The geographical extent of the assessment and boundaries within which the Program must be implemented, as depicted in Figure 1.1.
Study Area	The geographical extent of a survey's boundaries.
Validation Notice	This Validation Notice under Part C of the endorsed Program.
WA	Western Australia.

Contents

1 Introduction

1.1 Background

BHP Iron Ore Pty Ltd (BHP) currently operates iron ore mines and associated rail and port infrastructure within the Pilbara region of Western Australia (WA). Current mining operations include:

- Newman Joint Venture hub (NJV)- located approximately 2 km west of Newman township and consists of Mount Whaleback, and Orebodies 29, 30 and 35
- Mining Area C – Northern and Southern Flanks - located approximately 100 km northwest of Newman township
- Wheelarra Hill (Jimblebar) Mine, Orebody 18 and Orebody 31 (Jimblebar hub) - located approximately 35 km east of Newman township
- Eastern Ridge hub - located approximately 5 km east of Newman township and consists of Orebodies 23, 24, 25 and 32
- Yandi Mine - located approximately 100 km north northwest of Newman township.

Ore from the NJV hub, Mining Area C – Northern and Southern Flanks, Jimblebar hub, Eastern Ridge hub and the Yandi mine is transported by rail to Port Hedland via the BHP Newman to Port Hedland Mainline (and associated spur lines). Ore is then shipped overseas via Port Hedland at the BHP facilities at Nelson Point and Finucane Island.

This Jimblebar Optimisation Project Revised Validation Notice (Revised Validation Notice) represents a revision (Rev 2) of the *Jimblebar Optimisation Project Validation Notice* (Previous Validation Notice) (published 8 May 2020). The revision has been requested by Department of Climate Change, Energy, the Environment and Water (DCCEEW) in view of progress and agreements made with BHP to the calculation of residual impacts and appropriate offsets and, the recent endorsement of the revised Assurance and Offsets Plan (BHP 2023). Specifically, Reference 31 of *the Recommendation Report: Findings in response to the Five-Year Review (2022) of BHP Billiton Iron Ore's Pilbara Strategic Assessment Program* (DCCEEW 2023a) recommends:

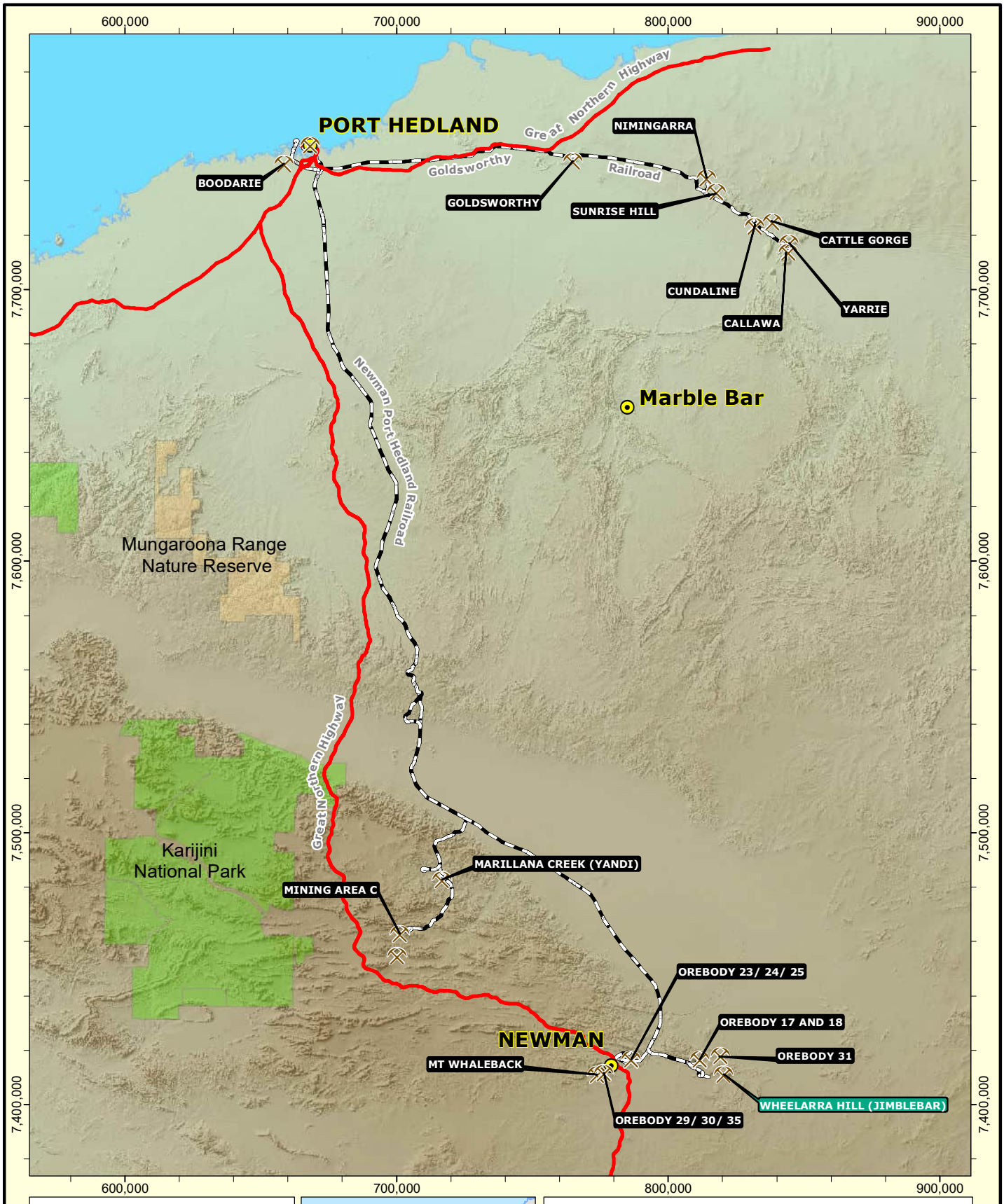
'BHP recalculate residual impact and offsets required for the Jimblebar Optimisation Project, in consultation with the department, by mid-2023'

This Revised Validation Notice includes:

- Ra ecalculation of residual impacts and offsets required for the Activity outlined in the Previous Validation Notice (published 8 May 2020); and
- describes the new Activity (to commence once the revised validation notice becomes effective) as well as avoidance, mitigation and offsetting measures to be implemented for the new Activity.

1.2 Framework

The Program (BHP 2017) was endorsed by the Australian Government Minister for the Environment and Energy on 11 May 2017 and an Approval Decision (the Approval) for taking actions in accordance with the Program was issued on 19 June 2017. The Approval applies to the development of new iron ore mines and associated infrastructure and the expansion of existing iron ore mines and associated infrastructure within a defined Strategic Assessment Area (SAA) (Figure 1.1).

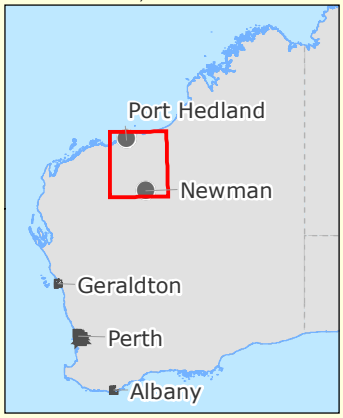


LEGEND

- BHP Operation
- Pilbara Town

N

0 20 40 60 80 km



BHP

BHP IRON ORE

PUBLIC

WESTERN AUSTRALIAN OPERATIONS
BHP IRON ORE - Regional Location

Not to scale	Prepared: SPATIAL DATA	Project No: A949/074 RevB
Date: 16/05/2023		1.1
Datum: GDA 94, Projection: MGA Zone 50		

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_074_E_VN_Locality_RevB.mxd

Key commitments of the endorsed Program and conditions of approval include the preparation and approval of an Assurance Plan (BHP 2018a) and Offsets Plan (BHP 2018b) and undertaking a validation process including preparation of a Validation Notice for each Notifiable Action undertaken in accordance with the Program.

The original versions of the Assurance Plan (BHP 2018a) and Offset Plan (BHP 2018b) have been revised and collated into one document now known as 'the Assurance Plan and Offsets Plan' (APOP) (BHP 2023) and were endorsed by the Minister on 15 May 2023 following a review of the Assurance Plan and the Offset Plan in 2022. This Validation Notice has been drafted in accordance with the APOP, which sets out the current processes and requirements for compliance with the Program.

The APOP defines the environmental objectives, procedures and governance arrangements to ensure that all future activities within the scope of the Program are undertaken in accordance with the endorsed Program and achieve the Program's objectives. The APOP includes Program Matter Outcomes (PMO) which are measurable outcomes that BHP must meet to achieve the objectives developed for each Program Matter. Notifiable Action triggers are set out within the APOP to prompt the requirement for a Validation Notice.

The APOP also ensures that appropriate offset pathways are applied to address residual impact(s) of actions under the Program at an appropriate time.

In accordance with Part C of the Program, BHP has undertaken a validation process for the Jimblebar Optimisation Project, including new areas of proposed disturbance (hereafter referred to as 'the Activity'), to ensure that the PMOs are met across the SAA.

This Activity is considered to require a Validation Notice, as the Activity:

- is within the scope of the Program; and
- meets one or more of the Notifiable Action triggers identified in the APOP.

1.3 Program, Assurance Plan and Offsets Plan Requirements

The endorsed Program and APOP specify the requirements and content of the Validation Notice. A summary of where the specified requirements and contents are addressed in this Validation Notice are provided in Table 1.1.

Table 1.1: Content of Validation Notice

	Strategic Assessment Program Offsets Plan Requirements	Sections which address these Requirements
1	Decision whether a Validation Notice is required for the Activity	2.3
2	BHP authorisation and date the Validation Notice will take effect	Foreword
3	Program Matters and triggers relevant to the Validation Notice	2.3, 4
4	Project description including Activity location and timeframes for the duration of activities	3
5	Stakeholder engagement and public consultation	4
6	Review of baseline and contemporary data with a description of the direct and indirect impacts	5
7	Estimates of disturbance and residual impacts	5
8	Application of the mitigation hierarchy	5

	Strategic Assessment Program Offsets Plan Requirements	Sections which address these Requirements
9	Outline the objective/s of the offset project/s, consistent with the scope of actions to offset impacts stated in the Program and APOP	6
10	Outline how the offset project/s will support the long-term persistence and viability of the relevant Program Matters	6
11	Commitment to measurable offset project milestones	6

1.4 Activity

The Activity assessed by this Revised Validation Notice is located approximately 30 km east of Newman, in the Pilbara region of Western Australia (Figure 1.1). The Activity includes:

- Solar project
- Jimblebar enabling works - beneficiation
- Train Load Out replacement
- Jimblebar communications
- Jimblebar East enabling works.

This Revised Validation Notice does not reassess or change the previous Activity or impacts assessed in the Previous Validation Notice. Further detail on the disturbance required for the Activity is provided in Section 2.

1.5 Previous Validation Notice

The Jimblebar Optimisation Project was referred to the Western Australian Environmental Protection Authority (EPA) under section 38 of the *Environmental Protection Act 1986* (WA) (EP Act) as a Revised Proposal to incorporate the three existing Ministerial Statements for the Jimblebar Mining area. The EPA set the level of assessment for the project as 'Assess - Referral Information'. The Jimblebar Optimisation Project Revised Proposal was approved under Ministerial Statement (MS) 1126 on the 17 March 2020.

The Jimblebar Optimisation Project was also assessed under the Previous Validation Notice and included (Figure 1.2):

- the development and operation of additional Overburden Storage Areas (OSAs)
- the Caramulla Managed Aquifer Recharge (MAR)
- creek discharge area associated with the existing Jimblebar mining operation.

1.6 Activity Area

The Activity Area is the area where the Activity will be undertaken and encompasses a total of 14,582 ha, of which 3,234 ha was disturbed as of Financial Year 2019 when the Previous Validation Notice was submitted (Figure 1.2).

This previous disturbance was undertaken by BHP to implement existing approved activities under Part IV of the EP Act. These are identified below.

- MS683 (16 August 2005) and section 45C to modify proposal (2006) – for clearing of 1,960 ha for the expansion of Wheelarra Hill deposits, overburden storage areas, haul and access roads, upgrade train load out facilities and supporting infrastructure. No EPBC listed species were recorded in the Activity Area.
- MS809 (7 October 2009) – for clearing of a further 580 ha for construction of a new rail spur and loop and train load out facilities and upgrade of power transmission infrastructure. No EPBC listed species recorded in the Activity Area.
- MS857 (18 February 2011) and section 45C to modify proposal (2015) – to clear 2,042 ha expand Wheelarra Hill pits and develop South Jimblebar and Hashimoto deposits, mine pit dewatering and discharge of surplus water to Ophthalmia Dam. No EPBC listed species recorded in the Activity Area.

All of these activities were approved and undertaken prior to the SEA. At the time of proposal, it was determined that each of the activities were not considered to result in significant impacts to MNES, due to a lack of evidence of any MNES occurrence within the relevant Activity Areas. As a result of assessment based on survey data, BHP considered that these activities did not require referral under the EPBC Act. These existing Jimblebar operations within the Activity Area are therefore considered outside the scope of the Program. Note that the total approved extent of clearing pursuant to the above MS has not yet been undertaken.

The Activity Area assessed in this Revised Validation Notice encompasses the Activity Area assessed under the Previous Validation Notice (BHP 2020), which included the Development Envelope under MS1126. The Indicative Footprint includes the Previous Validation Notice, referred to as the 'Previous Validation Notice IF' and the Additional Validation Notice IF relevant to this Revised Validation Notice.

The Activity Area has been expanded from what was in the Previous Validation Notice to cover the following new areas immediately adjacent to the original Activity Area:

- a solar power plant located to the west; and
- a new rail track and track realignment as part of the TLO replacement project located to the north-west.

1.7 Timeframes

This Revised Validation Notice takes effect 20 business days from the date of authorisation (see Forward page). If the Notifiable Action has not substantially commenced within a period of five years from that authorisation, BHP or a subsequent Approval Holder must not implement the Notifiable Action until either:

- DCCEEW authorises commencement of the action by BHP or the Approval Holder; or
- BHP issues a new Validation Notice for the action in accordance with this Program. This process extends the commencement timeframe for another five years.

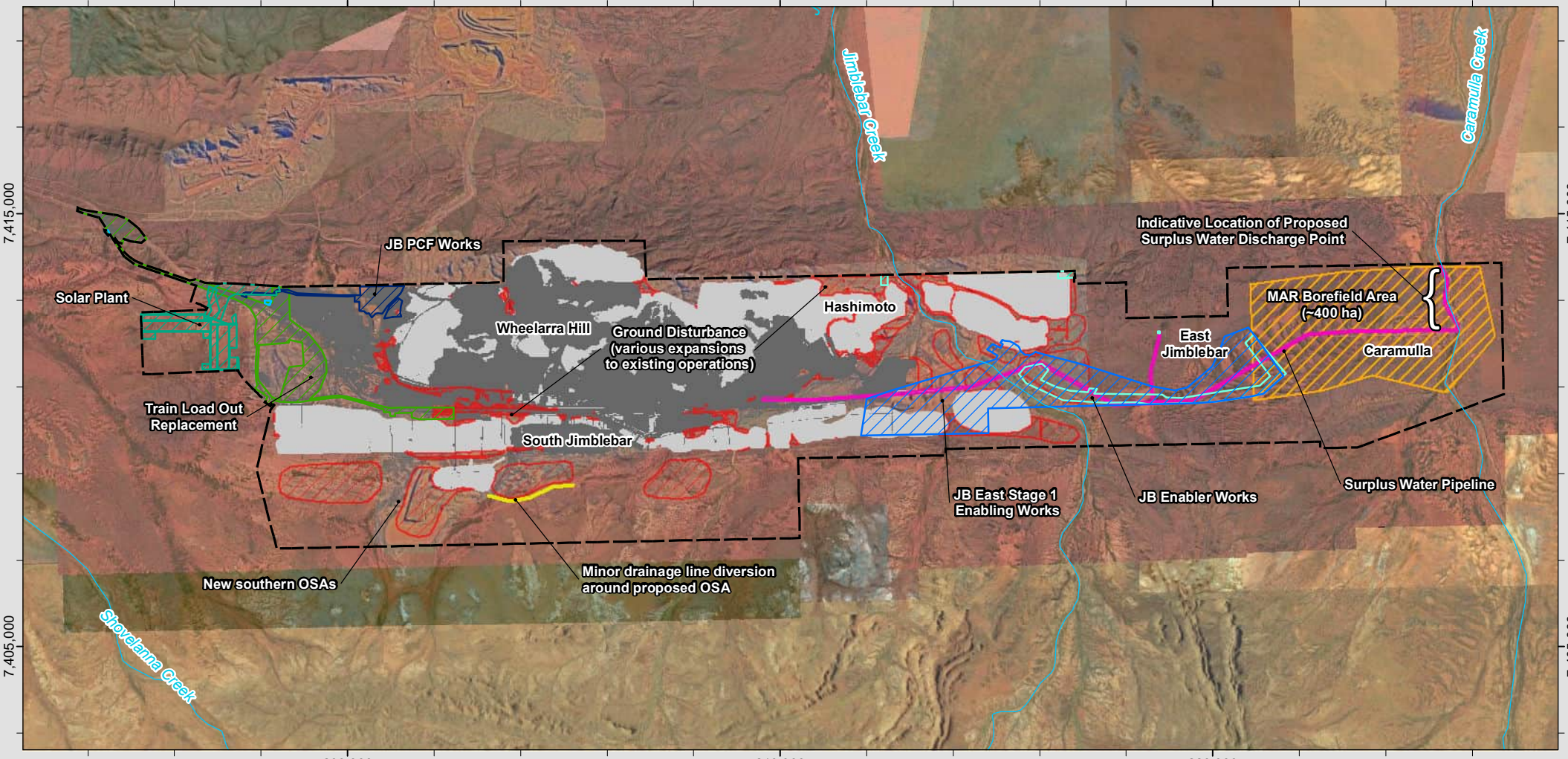
The Notifiable Activity is forecast to be completed within approximately 50 years from the date of this notice as this is the predicted life span of the mine operation including construction, mine operation, rehabilitation and closure.

1.8 Decision for a Validation Notice

A Validation Notice is required for actions that are notifiable, in accordance with Notifiable Action triggers set out in the APOP (BHP 2023) and reproduced in Table 1.2. The Activity is a notifiable action as it fulfils the triggers of the APOP for the Ghost Bat (*Macroderma gigas*). The Revised Validation Notice will demonstrate how the implementation and operation of the Activity will meet each of the PMOs provided for the Ghost Bat in the APOP by undertaking an impact assessment, applying the mitigation hierarchy and assessing residual impacts. This Section of the Revised Validation Notice satisfies the requirements of Section 6.2 of the APOP. This decision for a Validation Notice will also be reported in the Annual Environmental Report.

As the Activity does not fulfil the Notifiable Action triggers for the Greater Bilby (*Macrotis lagotis*), Northern Quoll (*Dasyurus hallucatus*), Pilbara Olive Python (*Liasis olivaceus barroni*), Pilbara Leaf Nosed Bat (*Rhinonicteris aurantia*), Night Parrot (*Pezoporus occidentalis*) or Grey Falcon (*Falco hypoleucos*), these species are not applicable to this Activity (Table 1.2). As such, only general species information, lack of habitats and records will be discussed to expand on information presented in the trigger assessment in Table 1.2. Sections 4.4, 4.5, 4.6, 4.7, 4.8 and 4.9 outline the findings in relation to these species to support this decision.

Amendments to the Threatened Species List effective under the EPBC Act on 15 February 2018 included the delisting of *Lepidium catapycnon*. Under Section 4.1.1 of the Program, BHP is not required to continue to manage any species under the Program Matters that has become delisted. On this basis, no validation of impacts to *Lepidium catapycnon* has been undertaken for the Activity.



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Activity Area

Scale @ A4: 1:130,000	Prepared: SPATIAL TEAM	Project No: A949/073 REV E
Date: 11/07/2023	Checked:	Figure : 1.2
Revision: REV E	Reviewed: ENVIRO. A&I	

- Watercourse
- Activity Area
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)

Previous VN Indicative Footprint

- Drainage Line Diversion
- Surplus Water Pipeline
- MAR Borefield Area
- OSA, various expansions and associated activities

Additional VN Indicative Footprint

- Temporary Construction Offices and Facilities
- JB Enabler Works
- JB East Stage 1 enabling works
- JB PCF works
- Solar Project
- Train Load Out Replacement

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_073_E_VN_ProposedDevelopmentEnvelope_RevE.mxd

Table 1.2: Notifiable Action triggers for the Activity

Program Matter	Notifiable Action trigger	Activity Area Program Matter data	Applicable trigger?
Ghost Bat	Within the Activity Area and or within a 500 m buffer of the Activity boundary, there is: Presence of Ghost Bat critical habitat and or supporting habitat **AND** Presence or sign/s of Ghost Bat colony or residing individuals	Ghost Bat critical roosting habitat, namely Gorge/Gully is present within and immediately adjacent to the Activity Area (GHD 2021a). There are no Category 1 or 2 roosts (Maternity roosts) as per Bat Call WA (2021a) definitions, located within the Activity Area or within 500 m of the boundary. Supporting roosting habitat present within the Activity Area or within 500 m of the boundary includes three Category 3 roosts and seven Category 4 roosts. Two Category 2 roosts with regular occupancy and seven Category 3 roosts with occasional use are located within 5 km of the Activity Area. The habitats which radiate 12 km from these roosts extend into the Activity Area and are considered critical foraging habitat. Ghost Bat supporting foraging habitat is also present within and adjacent to the Activity Area comprising Drainage Area/Floodplain, Major Drainage Line, Minor Drainage Line, and Mulga Woodland (Biologic 2020, 2019 and 2018, Biota 2020, GHD 2021a, 2019a and 2019b). Irregular Ghost Bat records exist at two Category 3 roosts and three Category 4 roosts located within the Activity Area or within 500 m of the boundary. Whilst these records do not suggest presence of a breeding Ghost Bat colony or residing individuals, they reflect more regular use than that expected by transient, infrequent or dispersing individuals. As such, the precautionary principle is being applied.	Yes
	Within the Activity Area there is: Presence of Ghost Bat critical habitat and or supporting habitat **AND**	As above.	Yes

Program Matter	Notifiable Action trigger	Activity Area Program Matter data	Applicable trigger?
	Presence or sign of Ghost Bat transient, infrequent or dispersing individual/s		
Northern Quoll (*Dasyurus hallucatus*)	Within the Activity Area: Presence of Northern Quoll critical habitat and or supporting habitat **AND** Presence or sign/s of Northern Quoll colony or residing individuals	Northern Quoll traditional critical denning habitats have been recorded in the Activity Area including Gorge and Gully and Major Drainage Line (Biologic 2022, 2020a, 2019 and 2018, GHD 2019a and 2019b). Given the lack of records in the area to suggest the area is being used for denning or foraging, these are considered as supporting habitat for the purpose of this Validation Notice. Northern Quoll supporting habitats have been recorded in the Activity Area (Biologic 2022, 2020a, 2019 and 2018, GHD 2019a and 2019b). Hillcrest/Hillslope, Sand Plain, Stony Plain, and Minor Drainage Line habitats present within the Activity Area are supporting habitat for foraging or dispersal. There are no records of a Northern Quoll colony or residing individuals within the Activity Area (Biologic 2022, 2020a and 2018, GHD 2019a and 2019b). The closest record to the Activity Area is 2.5 km north.	No, due no presence or sign/s of Northern Quoll.
	Within the Activity Area: Presence of Northern Quoll critical habitat and or supporting habitat; **AND** Presence or sign of Northern Quoll transient, infrequent or dispersing individual/s.	Critical and supporting habitat - see above. There are no records of Northern Quoll transient, infrequent or dispersing individuals despite recent surveys (Biologic 2022, 2020a, 2019 and 2018, GHD 2019a and 2019b).	No, due to no presence or sign of Northern Quoll.
Greater Bilby (*Macrotis lagotis*)	Within the Activity Area and or within a 500 m buffer of the Activity boundary, there is:	Critical habitats for the Greater Bilby, i.e. Sand Plain, Stony Plain and Drainage Area/Flood Plain habitats, have been recorded within the Activity Area (Biologic 2020a and 2018, Biota 2020, GHD 2021b). Given the lack of records in the area to suggest the	No, due to no presence or sign/s of Greater Bilby.

Program Matter	Notifiable Action trigger	Activity Area Program Matter data	Applicable trigger?
	Presence of Greater Bilby critical habitat and or supporting habitat **AND** Presence or sign/s of Greater Bilby residing individuals	area is being used for denning or foraging, these are considered as supporting habitat for the purpose of this Validation Notice. Supporting habitat types for the Greater Bilby, such as Mulga Woodland, have also been recorded in the Activity Area (Biologic 2020a and 2018, GHD 2021b, GHD 2019a and 2019b). There are no records of Greater Bilby within the Activity Area from survey effort to date (Biologic 2020a and 2018, GHD 2021b, GHD 2019a and 2019b). Nearest records of Greater Bilby to the Activity Area include an inactive burrow 5.5 km east (2018) and 20 km east (2022).	
	Within the Activity Area there is: Presence of Greater Bilby critical habitat and or supporting habitat **AND** Presence or sign of Greater Bilby transient, infrequent or dispersing individual/s	Critical and supporting habitat - see above. There have been no records or sign of transient, infrequent or dispersing Greater Bilby within the Activity Area (Biologic 2020a and 2018, GHD 2021b, GHD 2019a and 2019b).	No, due to no presence or sign of Greater Bilby.
Pilbara Olive Python *(Liasis olivaceus barroni)*	Within the Activity Area and or within a 500 m buffer of the Activity boundary, there is: Presence of Pilbara Olive Python critical habitat and or supporting habitat **AND** Presence or sign/s of a Pilbara Olive Python population or residing individuals	Pilbara Olive Python critical breeding/foraging habitats such as Gorge/Gully and Water holes, have been recorded in the Activity Area (Biologic 2020a and 2018, GHD 2019a and 2019b). Supporting foraging habitat for Pilbara Olive Python has been recorded in the Activity Area and includes Major Drainage Line habitat and Minor Drainage Line habitat (Biologic 2020a, 2019 and 2018, GHD 2019a and 2019b).	No, due to no presence or sign/s of Pilbara Olive Python.

Program Matter	Notifiable Action trigger	Activity Area Program Matter data	Applicable trigger?
		No records of Pilbara Olive Python exist within the Activity Area (Biologic 2020a, 2019 and 2018, Biota 2020, GHD 2019a and 2019b). The nearest record of the species is located approximately 1.5 km north of the Activity (2013).	
	Within the Activity Area there is: Presence of Pilbara Olive Python critical habitat and or supporting habitat **AND** Presence or sign of Pilbara Olive Python transient, infrequent or dispersing individual/s	Critical and supporting habitat - see above. There have been no records or sign of transient, infrequent or dispersing Pilbara Olive Python within the Activity Area (Biologic 2020a, 2019 and 2018, Biota 2020, GHD 2019a and 2019b).	No, due to no presence or sign or of Pilbara Olive Python.
Pilbara Leaf-Nosed Bat *(Rhinonicteris aurantia)*	Within the Activity Area and or within a 500 m buffer of the Activity boundary, there is: Presence of Pilbara Leaf-nosed Bat critical habitat and or supporting habitat **AND** Presence or sign/s of Pilbara Leaf-nosed Bat colony or residing individuals	Pilbara Leaf-nosed Bat critical breeding/foraging habitat has not been recorded within and or within a 500 m buffer of the Activity Area (Biologic 2018, GHD 2019a and 2019b). Supporting habitat which may be used for foraging or dispersal by Pilbara Leaf-nosed Bat is present within the Activity Area and includes Gorge and Gully, Drainage Area Flood Plain, Major Drainage Line, Minor Drainage, Hillcrest/ Hillslope, Sand Plain and water holes (Biologic 2020a, 2018, GHD 2019a and 2019b). There have been no records or sign of residing Pilbara Leaf Nosed Bat or colonies within the Activity Area (Biologic 2020a, 2018, GHD 2019a and 2019b). The nearest record of the species is located approximately 30 km west of the Activity near Cathedral Gorge.	No, due to no presence or sign/s of Pilbara Leaf-nosed Bat.
	Within the Activity Area there is:	Critical and supporting habitat - see above.	No, due to no presence or sign of

Program Matter	Notifiable Action trigger	Activity Area Program Matter data	Applicable trigger?
	Presence of Pilbara Leaf-nosed Bat critical habitat and or supporting habitat **AND** Presence or sign of Pilbara Leaf-nosed Bat transient, infrequent or dispersing individual/s	There have been no records or sign of transient, infrequent or dispersing Pilbara Leaf-nosed Bat individuals within the Activity Area (Biologic 2018, GHD 2019a and 2019b).	Pilbara Leaf-nosed Bat.
Grey Falcon *(Falco hypoleucos)*	Within the Activity Area and or within a 500 m buffer of the Activity boundary, there is: Presence of Grey Falcon critical habitat and or supporting habitat **AND** Presence or sign/s of Grey Falcon residing individuals	Grey Flacon critical breeding/foraging habitat, namely Major Drainage Line, has been recorded in the Activity Area (Biologic 2020a, and 2018, GHD 2019a and 2019b). Supporting habitat for Grey Falcon has been recorded in the Activity Area and includes Drainage Area/Flood Plain, Mulga Woodland, Minor Drainage Line habitat and Hillcrest/Hillslope habitat (foraging and dispersal habitat) (Biologic 2020a and 2018, GHD 2019a and 2019b). There have been no records or sign of resident Grey Falcon within the Activity Area (Biologic 2020a and 2018, GHD 2019a and 2019b).	No, due to no presence or sign/s of Grey Falcon.
	Within the Activity Area there is: Presence of Grey Falcon critical habitat and or supporting habitat **AND** Presence or sign/s of Grey Falcon transient, infrequent or dispersing individual/s	Critical and supporting habitat - see above. There have been no records or sign of transient, infrequent or dispersing Grey Falcon individuals within the Activity Area (Biologic 2020a and 2018, GHD 2019a and 2019b).	No, due to no presence or sign of Grey Falcon.
Night Parrot	Within the Activity Area and or within a 500m buffer of the Activity boundary there is:	There are no critical habitats present within the Activity Area (Biologic 2020a and 2018, GHD 2019a and 2019b).	No, due to no presence or sign/s of Night Parrot.

Program Matter	Notifiable Action trigger	Activity Area Program Matter data	Applicable trigger?
(*Pezoporus occidentalis*)	Presence of Night Parrot critical habitat and or supporting habitat **AND** Presence or sign(s) of Night Parrot population(s) or residing individuals	Supporting habitat for the Night Parrot has been identified within the Activity Area and includes Drainage Area/Flood Plain, Sand Plain and Stony Plain (Biologic 2020a and 2018, Biota 2020, GHD 2019a and 2019b). There have been no records or sign of resident Night Parrot within the Activity Area (Biologic 2020a and 2018, GHD 2019a and 2019b).	
	Within the Activity Area there is: Presence of Night Parrot critical habitat and or supporting habitat **AND** Presence or sign(s) of Night Parrot transient, infrequent or dispersing individual/s	Critical and supporting habitat - see above There have been no records or sign of transient, infrequent or dispersing Night Parrot individuals within the Activity Area (Biologic 2020a and 2018, Biota 2020, GHD 2019a and 2019b).	No, due to no presence or sign of Night Parrot.

2 Project Disturbance and Description

Section 2.1 summarises the proposed disturbance for the Activity. Section 2.2 below documents unchanged project components from the Previous Validation Notice. Section 2.3 documents new project elements. Figure 1.2 illustrates the location of the proposed works comprising the Activity under assessment in this Revised Validation Notice.

2.1 Proposed and Cumulative Disturbance

Disturbance of 1,042 ha will be required for this Revised Validation Notice. This is in addition to the 2,000 ha of disturbance sought under the Previous Validation Notice. Note that the Previous Validation Notice Indicative Footprint covered an area of 2,693 ha; however, BHP committed to clearing no more than 2,000 ha.

Recalculation of total proposed disturbance within the Indicative Footprint is as follows:

- Previous Validation Notice IF – 2,000 ha
- Additional Validation Notice IF - 1,042 ha
- Total Indicative Footprint – 3,042 ha

The disturbance allocated to the SAA upper disturbance limit to date and including as consequence of this Validation Notice is detailed in Table 2.1.

Table 2.1: SAA Program Disturbance Allocation

Project Name	Decision Made	Date Decision Documented	Proposed disturbance (ha)	Overall cumulative program disturbance remaining (ha)
MAC/South Flank	Validation Notice	May 2018	16,000	94,000
Jimblebar OSA1 Stage 1	Not a Notifiable Action	Aug 2018	95	93,905
Western Creek Diversion	Not a Notifiable Action	Feb 2020	15	93,890
MAC Surplus Water	Not a Notifiable Action	Apr 2020	0	93,890
Jimblebar Optimisation Project	Validation Notice	Jun 2020	2,000	91,890
OB31 Stage 1 clearing	Not a Notifiable Action	Dec 2022	5	91,885
Mooka Rail Siding	Validation Notice	April 2023	23	91,862
Revised Jimblebar Optimisation Project	Validation Notice	May 2023	1,042 (in addition to 2,000 ha as provided under the Previous Validation Notice)	90,820

2.2 Previous Validation Notice - Jimblebar Optimisation Project

Mining within the existing Jimblebar mine site is undertaken utilising conventional open-cut mining for iron ore. Mining involves drilling, blasting, and categorisation of blasted material into iron ore or waste rock. The following additional infrastructure was assessed under the Previous Validation Notice and will be constructed and operated at the existing Jimblebar mining operation:

- new OSAs and expansions to existing OSAs
- supporting infrastructure associated with Mine Pits
- new haul roads including across Jimblebar Creek
- new surplus water management options:
    - discharge of surplus mine dewater from Jimblebar mining operations into a new MAR borefield east of Jimblebar (in Caramulla)
    - discharge of surplus mine dewater from Jimblebar mining operations into Caramulla Creek
- a new pipeline from Jimblebar mine to transfer surplus dewater from Jimblebar mining operations to new Caramulla MAR and Caramulla Creek
- a small diversion of a creek tributary to maintain surface water flow to Copper Creek around the proposed new southern OSAs.

2.3 Additional Validation Notice Indicative Footprint

The Activity includes new areas of proposed disturbance that are required for assessment since the publication of the Previous Validation Notice (BHP 2020). These areas originate from projects operating within the Activity Area of the Previous Validation Notice or adjacent to it and have been incorporated into the Activity Area covered by this Revised Validation Notice.

2.3.1 Solar Project

The Solar Project requires clearing of approximately 206 ha for the following:

- construction of a 50 MW Solar Power Plant (SPP)
- infrastructure to connect the SPP to the existing inland power network
    - 2x 33 kV underground power lines connecting the SPP to the Jimblebar Substation
    - Minor upgrades of the Jimblebar Substation
- construction of minor access tracks to connect the SPP to existing rail access track and minor upgrades to the existing rail access track
- construction of a stormwater and drainage system, perimeter fencing, lightning protection and firebreaks
- construction of Temporary Construction Offices and Facilities
- other ancillary facilities to support the above works.

Construction water will be provided via an existing BHP water source with a stand-pipe located no more than 10 km from the construction site.

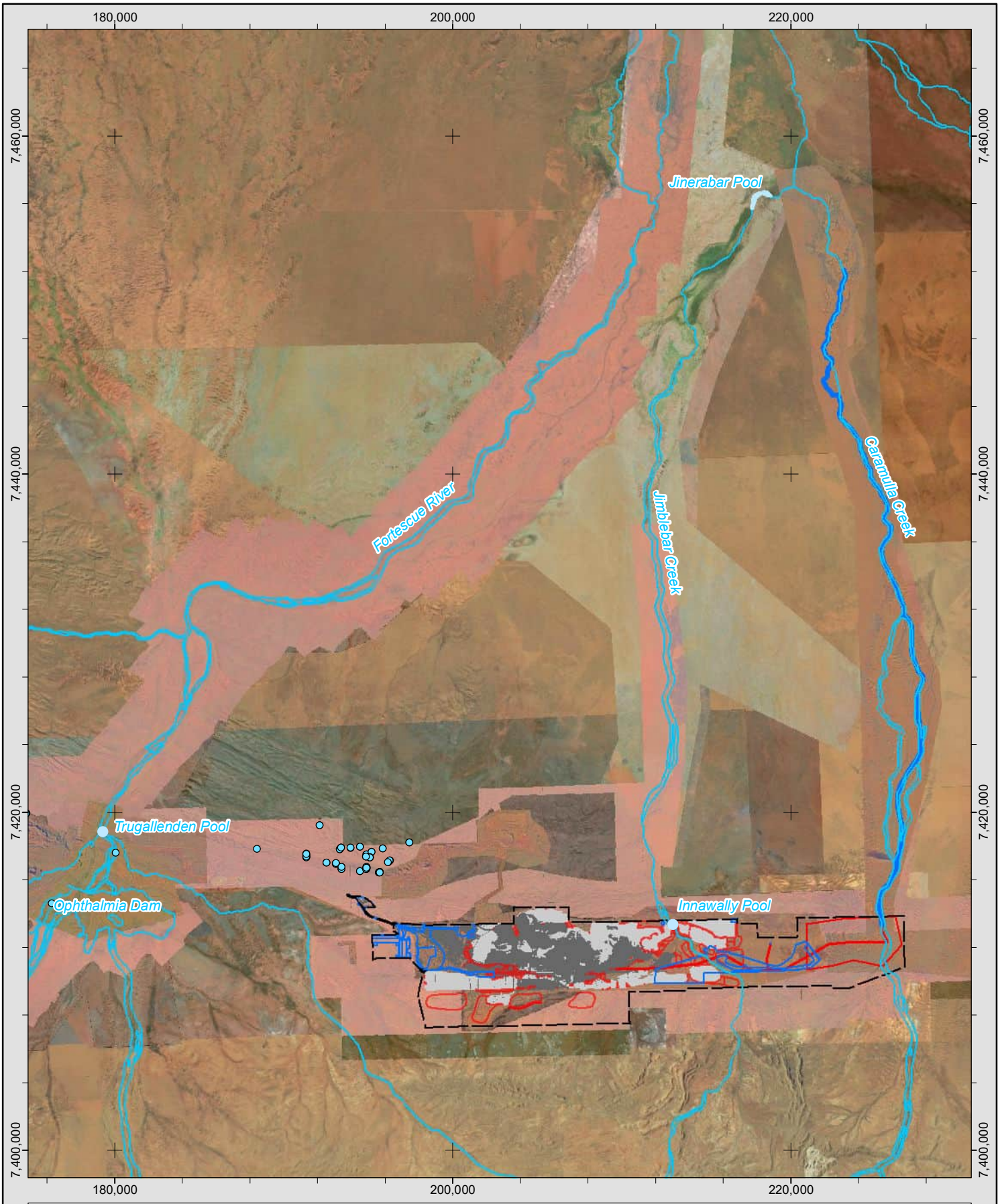
2.3.2 Jimblebar enabling works – beneficiation

The Jimblebar mining hub requires operational activities and the removal of a stockpile to enable future installation of beneficiation facilities. This includes:

- modification of existing roads
- relocation of a dead stockpile
- removal of topsoil
- clearing of grub and levelling of ground for laydown

These are located on predominantly already cleared areas.

Water for construction purposes will be sourced from existing on-site potable and surplus water supplies.



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Surface Water Features

Scale @ A4: 1:300,000	Prepared: SPATIAL DATA	Project No: A949/082 Rev C	
Date: 15/05/2023	Checked:	Figure: 2.1	
Revision: REV C	Reviewed: ENVIRO. A&I		

- Waterholes
- Unnamed Waterhole
- Watercourse
- Estimated Wetting Front Extent
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)

N

0 1 2 3

Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_082_E_VN_WettingFront_RevC.mxd

2.3.3 Train Load Out Replacement

The Jimblebar mining hub has an existing train load out facility (TLO1) which has been experiencing structural fatigue issues since it was commissioned in 2013. A new TLO facility (TLO2) is to be constructed with some minor rail works.

This involves clearing of approximately 339 ha for the following:

- construction of TLO2 and conveyor
- construction of new transfer chute in existing transfer station
- construction of new rail track including realignment of existing rail track totalling up to approximately 4 km in length
- other ancillary facilities and supporting infrastructure to support the above works.

Water for construction purposes will be sourced from existing on-site potable and surplus water supplies.

2.3.4 Jimblebar communications

The existing Jimblebar mine operations requires four additional communication towers to service the mine. This will include:

- clearing for earthworks pads required for installation of communication towers and equipment
- installation of communication towers, communication rooms, Gen-sets and fuel tanks
- constructing access roads or upgrading existing access tracks from existing roads to comms towers.

2.3.5 Jimblebar East enabling works

Jimblebar East enabling works are required to support future mining at Jimblebar. The proposed works include:

- go line (office, crib room, ablutions, laydown, park up light vehicle/heavy vehicle, re-fuel and digger pad)
- extension of existing light vehicle access road
- extension of 33kv Mains power
- construction of a light vehicle washdown facility
- construction of a light vehicle/heavy vehicle standpipe
- stockpiles, topsoil, borrow pits
- construction of or upgrades to minor access tracks
- other ancillary facilities and supporting infrastructure to support the above works.

Construction water will be provided via an existing BHP water source or via a stand-pipe.

2.4 Closure and Decommissioning

A Mine Closure Plan has been developed in consultation with the DMIRS. This document outlines the proposed decommissioning, rehabilitation and closure strategy for existing Jimblebar and proposed mining operations. Recognising the importance of mine planning in facilitating the completion criteria for rehabilitation has been critical in planning and implementing successful rehabilitation practices. Embedding closure and rehabilitation planning in the Life of Asset and 5 Year Planning process for the business has resulted in rehabilitation being included as part of the mining process rather than being considered an add on or separate from mining. This allows identification of areas available for rehabilitation so that plans for executing final landform earthworks and rehabilitation within the subsequent five year timeframe are integrated with mine plans. To allow appropriate landform design, planners now

use waste characterisation information and with site input, model design options to identify the most appropriate rehabilitation plan for any given situation.

BHP revised the Mine Closure Plan for the Jimblebar mining operation, as part of the Jimblebar Optimisation Project Revised Proposal submission for approval through Part IV of the EP Act.

3 Stakeholder Engagement

BHP's commitment to community engagement is articulated in BHP's *Communications, Community and External Engagement Our Requirements* (BHP 2019), which states:

> '*Working openly with the communities in which we operate and with governments contributes to economic and social development and enhancement of BHP's reputation and social licence to operate...*'

To support this commitment, BHP has comprehensive company standards and dedicated resources to ensure its activities are underpinned by continuous community engagement and feedback.

3.1 Stakeholder Consultation

BHP is required to maintain a register of interested parties for the purpose of stakeholder consultation. Interested parties listed on this register have been identified through the formal Strategic Assessment public consultation period or have self-identified after the consultation period. Members of the community and groups are able to self-identify through local stakeholder engagement activities such as Community Consultative Groups in Port Hedland and Newman, and regular meetings with Traditional Owner groups, or through www.bhp.com/contact. The BHP community team will advise on any enquiries or requests to be included in stakeholder engagement activities relating to the Strategic Assessment.

Key regulatory authorities, including the DCCEEW, and target stakeholders were consulted during the development of the draft Validation Notice. Consultation outlined the SAA, proposed submission, including a description of proposed activities of the Notifiable Action, the potential impacts on the Program Matters and the proposed management approach. The stakeholders consulted and level of stakeholder engagement undertaken depended on the location, complexity, size and risk of the particular activity, and the level of stakeholder interest.

Table 3.1 summarises the relevant consultation undertaken by BHP regarding the aspects of this Validation Notice. The consultation undertaken by BHP for the previous Jimblebar Optimisation Project Validation Notice, which is encompassed in this validation notice, is provided in Appendix 1.

3.2 Public Consultation

BHP has made the draft Validation Notice publicly available on its website for a minimum period of 28 days. The public consultation period commenced on the 29 May 2023. Registered stakeholders will be emailed notification that the public consult period has commenced. These stakeholders will include DWER, DBCA, DMIRS and Nyiyaparli Native Title holders.

A summary of the engagement undertaken for the Validation Notice, including the public consultation period, is included in Table 3.1.

Table 3.1: Stakeholder Engagement

Stakeholder	Date	Topics/issues discussed	BHP response and outcome
DCCEEW	11 May 2023	Meeting: in respect of the Revised Jimblebar Optimisation project Validation Notice, which included a review of: • Additional elements added to the Activity and expansion of the Activity Area • Recent survey coverage • Exclusion areas • Key MNES findings and preliminary assessment of impacts • Mitigation Hierarchy • Ghost Bat Monitoring • Proposed offsets	BHP has included all Program Matter management and monitoring activities discussed into Section 4. Offsets discussed have been included in Section 5.0.
	13 Feb 2023	Email: Requesting DCCEEW Offset Rates for critical and supporting habitat for Financial Contributions to the PEOF.	BHP has applied the Offset rates provided by the DCCEEW in the Section 5 Offset Proposal.
	17 August 2022 to the 19 August 2022	Meeting between BHP and DCCEEW: Assurance Plan and Offset Plan Discussion on offset pathways available and examples of where each type of pathway may be applicable.	BHP has proposed contributions to the Pilbara Environmental Offset Fund (PEOF as the most suitable offset pathway for the Activity relevant to the revised Jimblebar Optimisation Project Validation Notice – see Section 5.
	8 April 2022	Email: DAWE (now DCCEEW) provides Interim guidelines for Pilbara MNES critical and supporting habitat characterisation	BHP to consider for inclusion in 5 yearly review of the Assurance Plan and future Validation Notices and Decision Reports

Stakeholder	Date	Topics/issues discussed	BHP response and outcome
	25 February 2022	Meeting between BHP and DAWE: • Update progress on projects and five yearly review • DAWE providing thoughts on exclusion definitions • Impact pathways and offsets	BHP to progress habitat criteria and definitions to include in Assurance Plan and Offsets Plan and future Validation Notices.
KNAC	19 May 2023	Email: Summary document provided to Karlka Nyiyaparli Aboriginal Corporation	Nil
KNAC	29 May 2023	Email: BHP provided the completed draft Revised Validation Notice to KNAC's Environment Advisor for review and comment	Comments received on 17 July 2023. BHP provided response to comments in Final Jimblebar Optimisation Project Revised Validation Notice published on 4 August 2023.
Pilbara Environmental Offsets Fund	20 Mar 2023	Email: Process for providing contributions to the Fund for BHP SEA Validation Notices	Impact Reconciliation Processes are embedded into the revised BHP Assurance and Offset Plan and Activity specific requirements are outlined in Section 5
Local Expertise BatCall WA –Bob Bullen Biologic- Morgan O'Connell, Chris Knuckey Norm MacKenzie	19 August 2019	Meeting: Ghost Bat Workshop: • Update on monitoring and survey methods • What information do we already know • Population definitions – how should they be defined • Limitations of monitoring and surveying • Future areas of research required	Utilise outcomes in the workshop for future BHP projects.

[1] Jimblebar Optimisation Project Revised Validation Notice will also be discussed at the Nyiyaparli Implementation Committee meeting as part of the Pre-read.

4 Validation Process

4.1 Guidance

The most recent Commonwealth guidance considered in the preparation of this Validation Notice include:

- *DCCEEW (2023b) Recovery Plan for Greater Bilby (Macrotis lagotis)*
- *Department of Environment (DoE) (2013) Matters of National Environmental Significance Significant Impact Guidelines 1.1 EPBC Act*
- *DEWHA (2010) Survey guidelines for Australia's threatened bats*
- *DoE (2016) EPBC Act referral guideline for the endangered northern quoll*
- *Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2011a) Survey guidelines for Australia's threatened mammals*
- *DSEWPaC (2011b) Survey guidelines for Australia's threatened reptiles.*

The most recent Western Australian guidance considered included:

- *EPA (2020) Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment.*

Other guidance considered included:

- *Bat Call WA (2021a). A review of ghost bat ecology, threats and survey requirements. DWER*
- *Bat Call WA (2021b). A review of Pilbara leaf-nosed bat ecology, threats and survey requirements. DWER*
- *Southgate et al. (2018). Verifying bilby presence and the systematic sampling of wild populations using sign-based protocols – with notes on aerial and ground-based techniques and asserting absence. Australian Mammalogy*
- *DBCA (2017). Guidelines for surveys to detect the presence of bilbies and assess the importance of habitat in Western Australia. DBCA.*

4.1.1 Important Population

For the purpose of this Validation Notice, and following EPBC Act guidance (DoE 2013), an important population for all Program Matters, with exception of Northern Quoll, is defined as:

'a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- *key source populations either for breeding or dispersal*
- *populations that are necessary for maintaining genetic diversity and/or*
- *populations that are near the limit of the species range.'*

An important population for the long-term survival of the Northern Quoll is specifically defined by DoE (2016) as including:

- *'high density quoll populations, which occur in refuge-rich habitat critical to the survival of the species, including where cane toads are present*
- *occurring in habitat that is free of cane toads and unlikely to support cane toads upon arrival i.e. granite habitats in WA, populations surrounded by desert and without permanent water*

- *subject to ongoing conservation or research actions i.e. populations being monitored by government agencies or universities or subject to reintroductions or translocation.'*

4.1.2 Critical Habitat

Critical habitat is defined by DoE (2013) as '*Habitat critical to the survival of a species or ecological community*' and refers to areas that are necessary:

- *for activities such as foraging, breeding, roosting, or dispersal*
- *for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)*
- *to maintain genetic diversity and long term evolutionary development*
- *for the reintroduction of populations or recovery of the species or ecological community.*

Critical Habitat and Supporting Habitats for the seven Program Matters are defined in Table 12.1 of the APOP (BHP 2023) and are based on relevant published conservation guidance.

4.2 Surveys and Studies

The Contemporary and historical surveys which form the baseline data for the Activity Area are considered adequate for validating impacts to Program Matters in line with the requirements of Section 7.1 (Contemporary Information and Data) of the Program.

4.2.1 Contemporary surveys

Surveys undertaken within the last five years encompassing parts of or all of the Activity Area are presented in Table 4.1 with survey boundaries illustrated on Figure 4.1. Appendix 2 provides these survey reports.

Contemporary surveys have included three targeted surveys and five single-season surveys. Survey methods have included targeted searches, habitat assessments, on-ground systematic trapping, bat acoustic recording, cave searches, nocturnal searches and ornithological searches.

Surveys were undertaken in a manner consistent with the requirements of the Commonwealth and Western Australia guidance for surveys listed in Section 4.1 and fulfil the requirement of Section 7.1 of the Program for contemporary targeted on-ground surveys.

Table 4.1: Terrestrial Fauna – recent studies and surveys

Title	Date	Summary
Biologic (2023) (Appendix 2A)	N/A	A report documenting the results of the Ghost Bat monitoring programme undertaken from 2021-2022. Note this report was provided to DCCEEW towards the end of the public comment period and was not made publicly available during the public comment period.
North Jimblebar Targeted Northern Quoll Assessment (Biologic 2022) (Appendix 2B)	February-June 2022	Targeted survey to assess the presence of Northern Quoll across the northern and central Jimblebar project area. The survey involved a desktop assessment, targeted searches and camera trap transects.
East Jimblebar and Caramulla Targeted Greater Bilby Survey (GHD 2021b) (Appendix 2C)	September 2020	Targeted survey for the Greater Bilby across the Eastern Jimblebar and Caramulla project areas. The targeted survey was undertaken primarily using a 2 ha plot

Title	Date	Summary
		method, which is an evidence-based assessment that records diggings, burrows, scats and prints where observed. A total of 47 plots were searched covering approximately 94 ha.
Jimblebar Greenhouse Gas Abatement Study Basic Vertebrate Fauna Survey (Biologic 2020a) (Appendix 2D)	May 2020	Single-season basic vertebrate fauna survey of a defined area at the western extent of the Jimblebar project area. The survey comprised 95 habitat assessments, targeted searches (i.e. traverses), ultrasonic bat recorders, camera transects, and night parrot acoustic recorders. Six broad fauna habitats were identified.
Jimblebar Targeted Ghost Bat Survey (GHD 2021a) (Appendix 2E)	May 2020	Targeted Ghost Bat survey across the Jimblebar project area. The targeted survey involved habitat and roost assessments, in-situ time lapse video camera surveying, and bat call surveying using full spectrum detectors. A total of 57 locations were investigated.
Caramulla Miscellaneous Licence Level 1 and Targeted Vertebrate Fauna Survey (Biota 2020) (Appendix 2F)	March 2020	Single-season basic and targeted vertebrate fauna survey of Caramulla Creek and surrounding area, north of the Jimblebar project area. This survey conducted targeted searches at 19 sites and over 97 km transects, nocturnal searches, motion cameras sites, ultrasonic bat recorders, night parrot acoustic recorders, avifauna censuses and habitat assessments.
North Jimblebar Fauna Survey (GHD 2019a) (Appendix 2G)	April-May 2019	Single-season detailed vertebrate fauna assessment of the Northern Jimblebar project area. The survey included habitat assessments as well as systematic trapping sites, remote sensor cameras, acoustic recorders (bat and night parrot) and non-systematic survey methods (i.e. nocturnal searches).
Jimblebar East and Caramulla Fauna Survey (GHD 2019b) (Appendix 2H)	April-May 2019	Single-season detailed vertebrate fauna assessment of the Eastern Jimblebar and Caramulla project areas. Habitat assessments were undertaken along with systematic trapping sites, remote sensor cameras, bat and night parrot acoustic recorders, bird censuses, bilby plots and non-systematic survey methods (i.e. nocturnal searches).
Caramulla Level 1 Vertebrate Fauna Assessment (Biologic 2018) (Appendix 2I)	September 2018	A Level 1 Terrestrial Fauna Survey of the eastern portion of the Caramulla exploration mining lease. The field survey included habitat assessments, targeted searches for Greater Bilby, nocturnal searches, ultrasonic recording for bats, acoustic recording for Night Parrot and motion-detecting cameras.

Title	Date	Summary
Shearer's West Targeted Vertebrate and Short-range Endemic Fauna Assessment (Biologic 2019) (Appendix 2J)	April – May 2018	Targeted vertebrate fauna survey of the Shearers West tenement. This included a desktop assessment, a field survey targeting vertebrate fauna of conservation significance and sampling for short-range endemic fauna. Survey methods included habitat assessment, fauna trapping, ultrasonic bat recordings, acoustic recordings for Night Parrot and use of motion cameras.

Pre-clearing targeted surveys for the Greater Bilby were undertaken in 2019 within the eastern portion of and to the east of the proposed Activity Area as a requirement of NVCP 8123/1 for the Caramulla drilling program.

All areas of the Additional IF have been surveyed for the seven program matters in the last five years with exception of the TLO project. Although this project has been covered by the Jimblebar Targeted Ghost Bat Survey (GHD 2020), the remaining survey data is historical and includes the following surveys:

- Outback Ecology (2009a) Wheelara Hill Iron Ore Mine Modification Flora and Fauna Assessment
- Outback Ecology (2009b) Jimblebar Linear Development Terrestrial Vertebrate Fauna Assessment.
- ENV (2009) Jimblebar Rail Spur 2 Fauna Assessment.

Given the area adjacent to the existing rail is degraded and the habitat within the Jimblebar Rail Loop is disconnected from other habitats nearby, and exposed to noise and vibration from rail operation in close proximity, this habitat is considered unlikely to support Program Matters or be of significant habitat value.

4.2.2 Other surveys

An additional seven fauna surveys have been completed within or adjacent to the Activity Area. These include desktop assessment, targeted surveys and detailed surveys. Figure 4.2 shows the location of these surveys.

A regional study to consolidate fauna habitat mapping within BHP's Pilbara tenements has also been undertaken to support the assessment of terrestrial fauna within the Pilbara: Consolidated Fauna Habitat Mapping (Biologic 2017).

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE
Contemporary Fauna Surveys

Scale @ A4: 1:200,000	Prepared: SPATIAL DATA	Project No: A949/117 REV B
Date: 15/05/2023	Checked:	Figure : 4.1
Revision: REV B	Reviewed: ENVIRO. A&I	

- Watercourse
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)

Vertebrate Fauna - Survey Areas

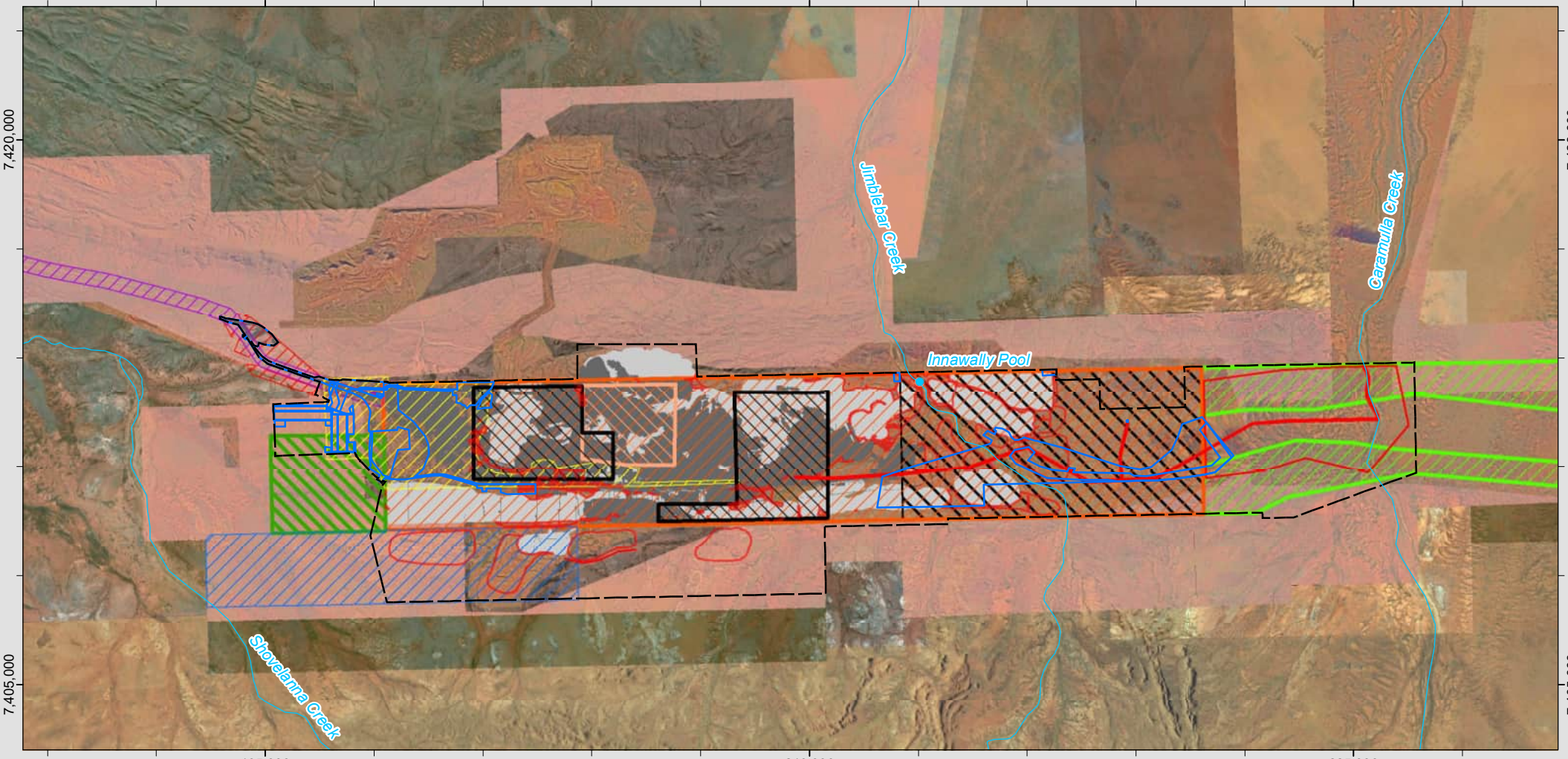
- Caramulla Level 1 Vertebrate Fauna Assessment (2018)
- Caramulla Miscellaneous Licence Level 1 and Targeted Vertebrate Fauna Survey (2020)
- East Jimblebar Vertebrate Fauna Survey (2019)
- East Jimblebar and Caramulla Targeted Bilby Survey 12534733 (2020)
- Jimblebar Greenhouse Gas Abatement Study Level 1 Vertebrate Fauna Survey (2020)
- Jimblebar targeted ghost bat survey (2020)
- North Jimblebar Reconnaissance Flora and Vegetation Survey and Level 1 Vertebrate Fauna Survey (2018)
- North Jimblebar Vertebrate Fauna Survey (2019)
- North Jimblebar: Targeted Northern Quoll Assessment (2022)
- Shearer's West Targeted Vertebrate and Short-range Endemic Invertebrate Fauna Assessment (2019)
- Thirteen & Davidson Creek Targeted Matters of National Environmental Significance Fauna Survey (2022)

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_117_E_VN_VertFaunaSurveys_RevB.mxd



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE
Other Fauna Surveys

Scale @ A4: 1:155,000	Prepared: SPATIAL DATA	Project No: A949/120 REV A
Date: 23/05/2023	Checked:	Figure : 4.2
Revision: REV A	Reviewed: ENVIRO. A&I	

- Watercourse
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Carramulla Exploration Area Flora and Vegetation and Fauna Assessment (2009)
- Hashimoto Terrestrial Vertebrate Fauna Assessment (2006)
- Jimblebar Iron Ore Project Terrestrial Vertebrate Fauna Assessment (2009)
- Jimblebar Linear Development Vertebrate Fauna Assessment (2009)
- Jimblebar Spur 2 Fauna Assessment (2009)
- Jimblebar- Wheelarra Hill 3 Flora and Fauna Assessment (2004)
- Jimblebar- Wheelarra Hill Biological Survey (2004)
- South West Jimblebar Vertebrate Fauna Survey (2013)
- West Jimblebar Lease Fauna Assessment (2007)
- Wheelarra Hill Iron Ore Mine Modification Flora and Fauna Assessment (2009)

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_120_E_VN_OtherFaunaSurveys_RevA.mxd

4.3 Ghost Bat

The following sections provide background information to support the presence of Ghost Bat Notifiable Action triggers. Impacts to the Ghost Bat are discussed and the mitigation hierarchy applied to illustrate that the Program Matter Objective for this species will be met.

4.3.1 General Species Information

The Ghost Bat is listed under the EPBC Act as 'Vulnerable'. It is the largest microbat in Australia and the second largest in the world (TSSC 2016a). In the Pilbara region, the species occurs in all four sub-regions, and was recorded in 21 of the 24 areas surveyed by DPaW during the Pilbara Biological Survey (2002-2007; see McKenzie and Bullen 2009). The Pilbara Ghost Bat population is currently estimated to be approximately 1,850 (350 across the Hamersley Range and 1,500 across the eastern Pilbara) (Bat Call WA 2021a). The largest colonies of Ghost Bats in the Pilbara occur outside the SAA where they mostly roost in abandoned mines. Colonies within the SAA are much smaller, and available data suggests that they likely depend on a number of roosts within their range. Figure 4.3 illustrates the regional records of Ghost Bat.

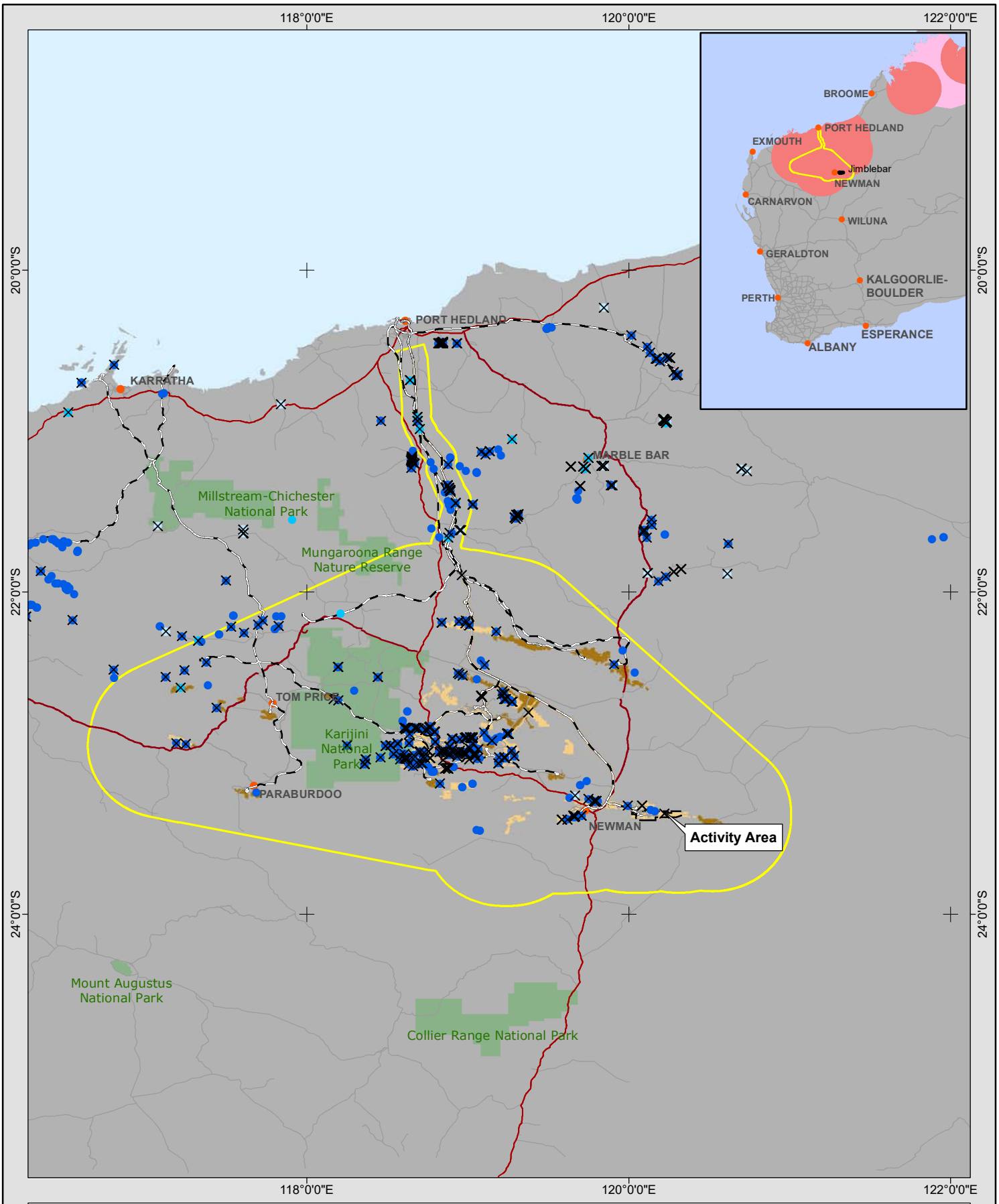
In the Pilbara region, the species roosts in deep, complex caves beneath bluffs of low rounded hills, often composed of Marra Mamba Iron Formation or banded iron formation, granite rock piles and abandoned mines (Armstrong and Anstee 2000). Ghost Bats may move between caves both seasonally and in response to weather changes (van Dyck and Strahan 2008). Highly suitable foraging habitats for the Ghost Bat in the Pilbara include Drainage Area/Floodplain, Gorge/Gully, Major Drainage Line and Mulga Woodland, followed by Stony Plain as a less suitable habitat (Biologic 2020b; unpublished data).

Recent Ghost Bat tracking studies (Augusteyn *et al.* 2018, Biologic 2019 and Bullen 2021) show that ghost bats, both male and female, forage over large areas up to 12 km from their diurnal roost (Augusteyn 2018; Bullen 2021), and occasionally up to 17 km from a roost during foraging bouts (Bullen *et al*. 2023).

4.3.2 Regional Habitat

During the Strategic Environmental Assessment, the Ghost Bat was listed as a 'Vulnerable' species under the EPBC Act on 5 May 2016 and was therefore included as a Program Matter for the Impact Assessment Report. As this species was a late inclusion in the Impact Assessment Report, a regional model was not developed.

The land systems of the Pilbara region documented by van Vreeswyk *et al* (2004) that are found within 25 km of the Activity Area are detailed in Table 4.2 and Figure 4.4. Of these land systems, the Newman, Talga and McKay land systems provide approximately 50,000 ha of preferred Ghost Bat roosting habitat (Gorge/Gully and Breakaway/Cliff habitats) through Hills/Ridges/Breakaways/Cliffs adjacent to the Activity Area.



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE
PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Ghost Bat regional records and distribution

Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No: A949/093 Rev C
Date:	17/05/2023	Checked:	Figure: 4.3
Revision:	REV C	Reviewed: ENVIRO. A&I	

Ghost Bat records
- Records After 2005
- Records Between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Species or species habitat likely to occur
- Species or species habitat may occur

- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area
- BHP LOA Mine Plan disturbance footprint
- Third Party disturbance footprint
- Activity Area

N

0 25 50 75
Kilometres

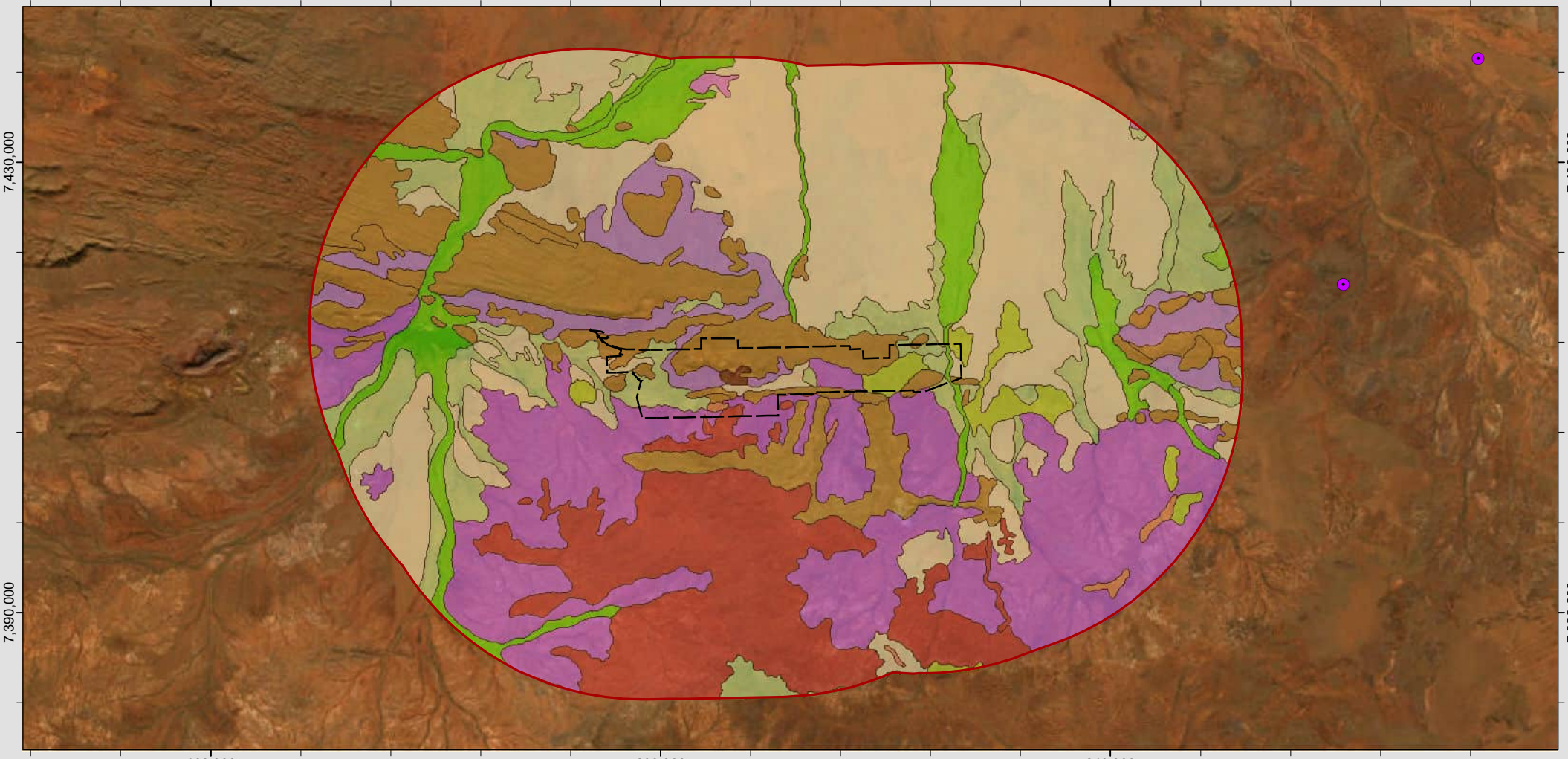
Coordinate System: GCS GDA 1994
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_093_E_VN_SEA_Species_Ghost_Bat_RevC.mxd

Table 4.2: Land Systems within 25 km radius of the Activity Area

Land System	Description	Area (ha)
River	Active flood plains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands.	14,027
Fortescue	Alluvial plains and flood plains supporting patchy grassy woodlands and shrublands and tussock grasslands.	13,974
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	1,888
Charley	Dolerite hills and ridges and restricted plains supporting mulga and cassia shrublands or spinifex grasslands.	442
Spearhole	Gently undulating gravelly hardpan plains and dissected slopes supporting groved mulga shrublands and hard spinifex.	1,890
Prairie	Gently undulating stony plains and granite hills supporting acacia-eremophila-cassia shrublands and minor soft spinifex grasslands.	49,220
Sylvania	Gritty surfaced plains and low rises on granite supporting acacia-eremophila-cassia shrublands.	77,852
Washplain	Hardpan plains supporting groved mulga shrublands.	27,879
Zebra	Hardpan plains with large linear gravelly sand banks supporting acacia shrublands with soft and hard spinifex.	1,222
Cadgie	Hardpan plains with thin sand cover and sandy banks supporting mulga shrublands with soft and hard spinifex.	5,363
Robertson	Hills and ranges of sedimentary rocks supporting hard spinifex grasslands.	2,657
Talga	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands.	10,194
McKay	Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands.	4,735
Table	Low calcrete plateaux, mesas and lower plains supporting mulga and cassia shrublands and minor spinifex grasslands.	785
Laterite	Low lateritic plateaux, mesas, buttes and gravelly rises and plains supporting mulga shrublands and short grass forbs.	211
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	35,261
Divide	Sandplains and occasional dunes supporting shrubby hard spinifex grasslands.	104,580
Balfour	Shale, gravel and clay plains supporting eremophila-cassia shrublands, tussock grasslands, and halophytic shrublands.	317
Jamindie	Stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understorey.	6,931

Land System	Description	Area (ha)
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	18,041
Adrian	Stony plains and low silcrete hills supporting hard spinifex grasslands.	535
Elimunna	Stony plains on basalt supporting sparse acacia and cassia shrublands and patchy tussock grasslands.	2,088
Disturbed Land	Disturbed area, mining activity etc	294
Fan	Washplains and gilgai plains supporting groved mulga shrublands and minor tussock grasslands.	3,422
Total		**383,805**



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE
Regional Land Systems

Scale @ A4: 1:500,000	Prepared: SPATIAL DATA	Project No: A949/81 REV C
Date: 15/05/2023	Checked:	Figure : 4.4
Revision: REV C	Reviewed: ENVIRO. A&I	

Activity Area Buffer 25km
Activity Area

Rangeland Land Systems - WA

- Hills and ranges with acacia shrublands
- Hills and ranges with spinifex grasslands
- Mesas, breakaways and stony plains with acacia or eucalypt woodlands and halophytic shrublands
- Stony plains with acacia shrublands
- Stony plains with acacia shrublands and halophytic shrublands
- Stony plains with spinifex grasslands
- Sandplains and occasional dunes with shrubby spinifex grasslands
- Wash plains on hardpan with mulga shrublands
- Wash plains and sandy banks on hardpan, with mulga shrublands and wanderrie grasses or spinifex
- Alluvial plains with tussock grasslands
- River plains with grassy woodlands and tussock grasslands

N

0 2 4 6
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_081_E_VN_RangelandsLandSystems_RevC.mxd

4.3.3 Local Habitat

Targeted searches have been conducted between 2006 and 2021 within the Activity Area and surrounding areas. Cave search areas, acoustic recording locations and habitat assessment areas for the Ghost Bat are shown in Figure 4.5. The expansion of the Activity Area to include the Additional Validation Notice IF has not added any new habitat types relevant to the Ghost Bat for consideration compared to the Previous Validation Notice IF for the Jimblebar Optimisation Project (BHP 2020).

Critical roosting and supporting habitat are present within the Activity Area or within 500 m of the Activity boundary and is discussed below.

Roosting/Breeding Habitat

Gorge/Gully is a critical roosting habitat for the Ghost Bat, of which less than 1 ha is located in the Previous Validation Notice IF and will be impacted by the Activity (Table 4.3, Figure 4.6). This habitat is considered critical roosting habitat as it may support caves in which Ghost Bat roost and/or are prone to forming important habitat features such as overhangs and caves (GHD 2021a, TSCC 2016a and Bat Call WA 2021a). There are no Category 1, 2 or 3 roosts which fall under the critical roosting habitat as defined in the APOP (BHP 2023) present within the Activity Area or within 500 m of its boundary.

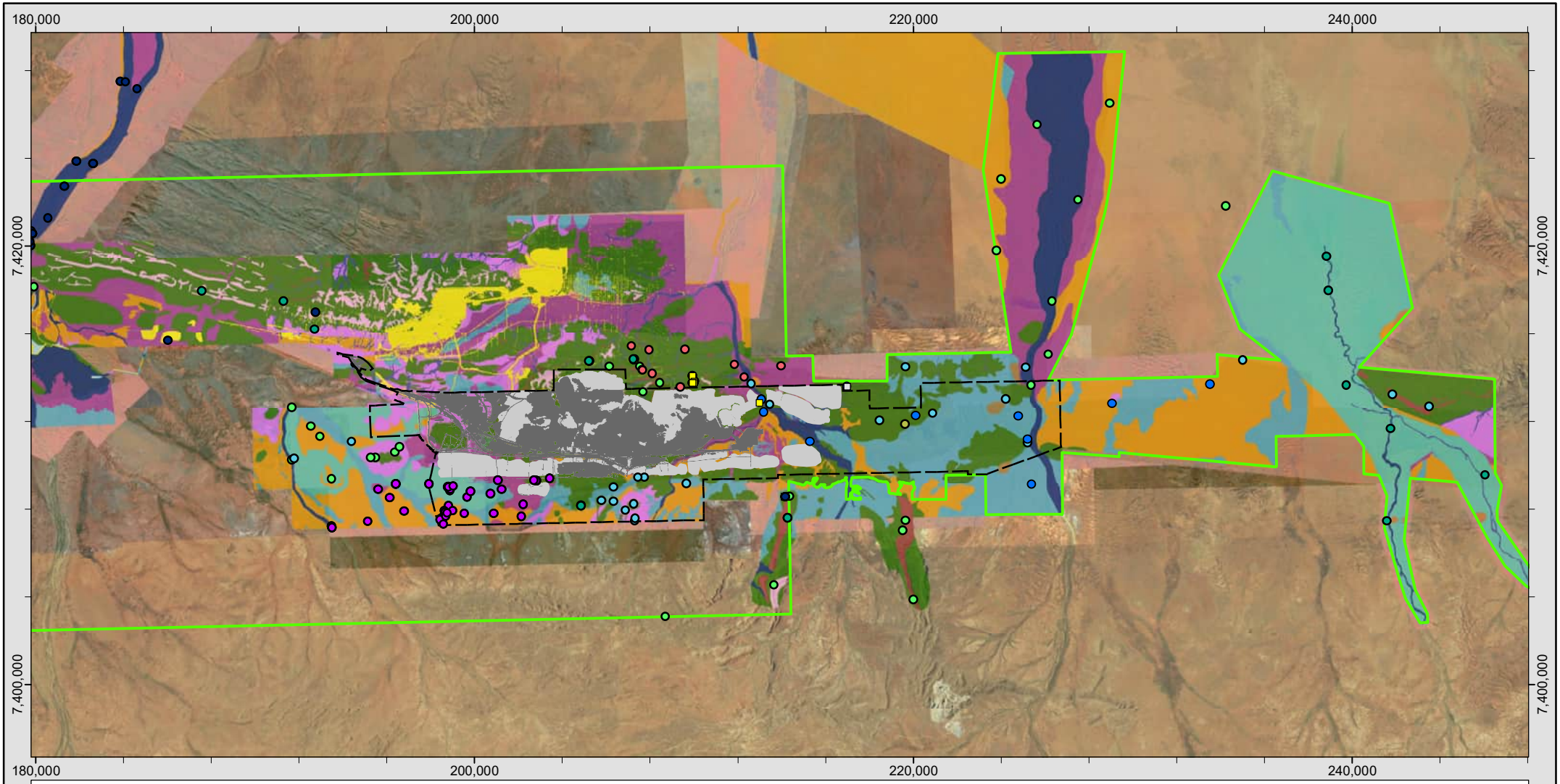
Supporting roosting habitat present within the Activity Area or within 500 m of the boundary includes three Category 3 roosts and six Category 4 roosts (see 'roosts' section below) (Table 4.3, Figure 4.6).

Table 4.3: Ghost Bat Habitat Assessment

Habitat Description	Indicative Footprint			Outside Activity Area within 12 km of Category 2 and 3 roosts[1] (ha)
	Previous Validation Notice (ha)	Additional Areas (ha)	Total (ha)	
Critical roosting habitat				
Gorge/Gully	< 1	0	< 1	1,027.8
Total critical roosting habitat	< 1	0	<1	1,027.8
Critical foraging habitat[2]				
Major Drainage Line	160	73	233	1,866.6
Minor Drainage Line	10	2	12	580.6
Mulga Woodland	1,174	291	1,465	4,575.8
Drainage Area/Flood Plain	204	131	335	6,044.3
Sand Plain	243	164	407	3,301.3
Stony Plain	60	100	160	2,173.9
Total critical foraging habitat	**1,851**	**761**	**2,612**	**18,542.5**
Total critical habitat in Indicative Footprint			**2,613**	**N/A**

[1] Only 32,480 ha of all habitats have been mapped of the 128,542 ha area which falls outside of the Activity Area within 12 km radius of Category 2 or 3 roosts, i.e. 25%. If the remaining area was mapped, the impacts from the Activity would appear relatively less.

2 Given these habitats are within 12 km of critical Ghost Bat roosts, these are considered critical foraging habitats.



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Ghost Bat Survey Coverage

Scale @ A4: 1:250,000	Prepared: SPATIAL DATA	Project No: A949/101 REV D
Date: 24/05/2023	Checked:	Figure : 4.5
Revision: REV D	Reviewed: ENVIRO. A&I	

Targeted Bat Cave Site
- <Null>
- 2018
- 2019

Bat Sample Site
- 2006
- 2013
- 2018
- 2019
- 2020
- 2021
- 2022

- Survey Coverage
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Activity Area

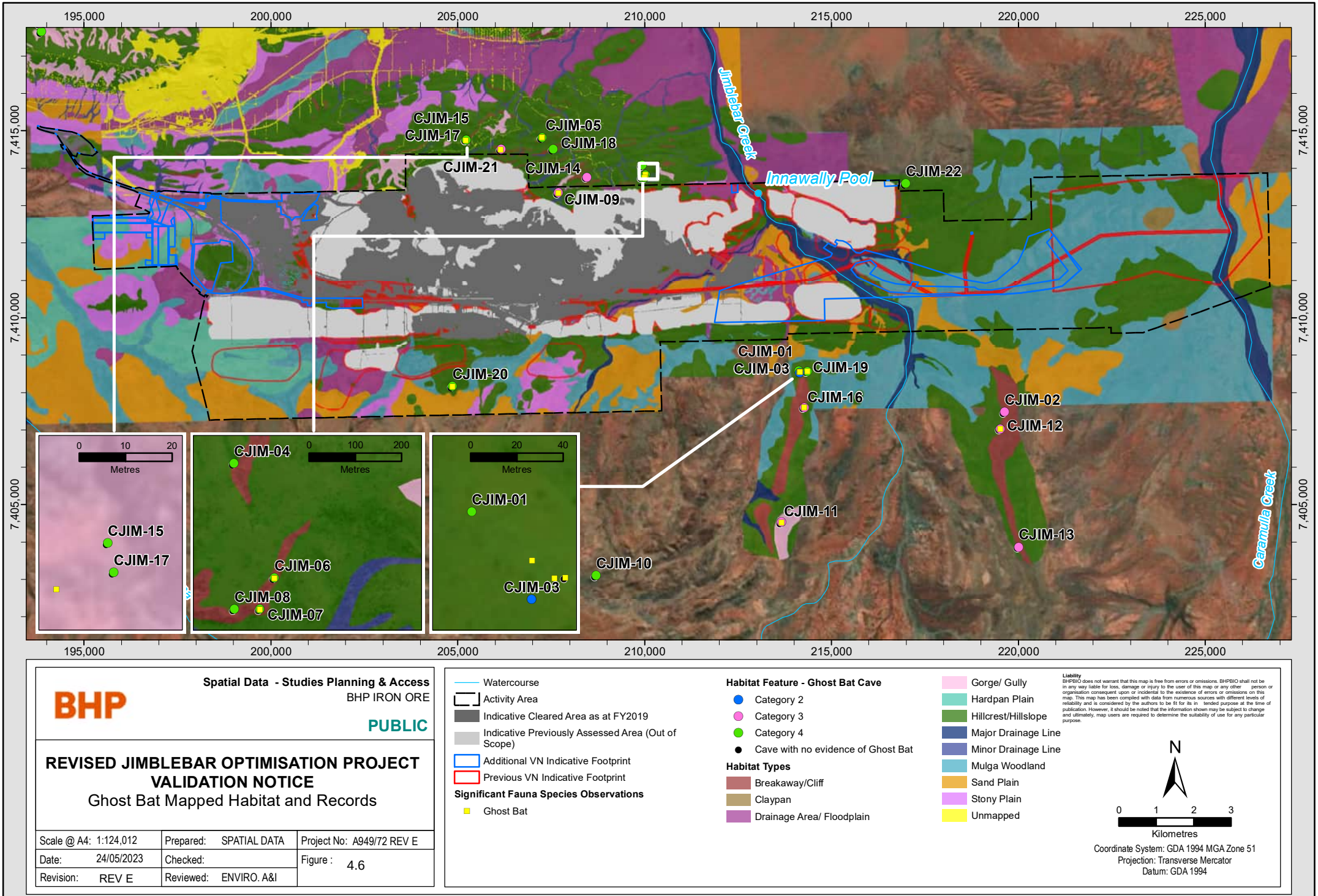
Habitat Types
- Artificial Wetlands
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Undulating Low Hills
- Unmapped

N

0 2 4 6
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_101_E_VN_GhostBat_SurveyCoverage_RevD.mxd



Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Ghost Bat Mapped Habitat and Records

Scale @ A4: 1:124,012	Prepared: SPATIAL DATA	Project No: A949/72 REV E
Date: 24/05/2023	Checked:	Figure : 4.6
Revision: REV E	Reviewed: ENVIRO. A&I	

- Watercourse
- Activity Area
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint

Significant Fauna Species Observations
- Ghost Bat

Habitat Feature - Ghost Bat Cave
- Category 2
- Category 3
- Category 4
- Cave with no evidence of Ghost Bat

Habitat Types
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Unmapped

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_072_E_VN_FaunaHabitatMappingCaveBuffer_RevE.mxd

Foraging Habitat

While no critical roosts are located within the Activity Area or within 500 m of the Activity Area, there are two Category 2 roosts with regular occupancy and seven Category 3 roosts with occasional use are located within 5 km of the Activity Area (Figure 4.7). The foraging habitats which radiate 12 km from these encompass the Indicative Footprint, and are considered critical foraging habitat as per the APOP (BHP 2023) definitions. Therefore 1,851 ha of the Previous Validation Notice IF and 761 ha of the Additional Validation Notice IF are considered critical foraging habitat (Table 4.3 and Figure 4.6 and Figure 4.7). The low hills of the Hillcrest/Hillslope in the proposed Activity Area do not have the vegetation structure to support the species' foraging habits (GHD 2019) are not considered suitable habitat for the Ghost Bat in this Validation Notice.

Roosts

Ghost Bat roost categories follow those defined by Bat Call WA (2021a).

The three Category 3 roosts and six Category 4 roosts located within the Activity Area or within 500 m of the Activity boundary constitute Ghost Bat supporting roosting habitat as per the APOP (BHP 2023) definitions. The infrequent usage of the roosts over time from monitoring data (Biologic 2023, GHD 2021a) suggests a colony or residing individuals may not be present, but that there is evidence of 'usage over time' as stipulated in the Notifiable Action trigger for Ghost Bat (see Section 1.7). These roosts are discussed in further detail below.

The Category 3 roost CJIM -09 is located within the Activity Area but outside of the Previous Validation Notice IF and the additional areas proposed in this revised Validation Notice (Figure 4.6). This roost is located 550 m away from an area of proposed disturbance approved in the Previous Validation Notice which has not yet been cleared (Table 4.4).

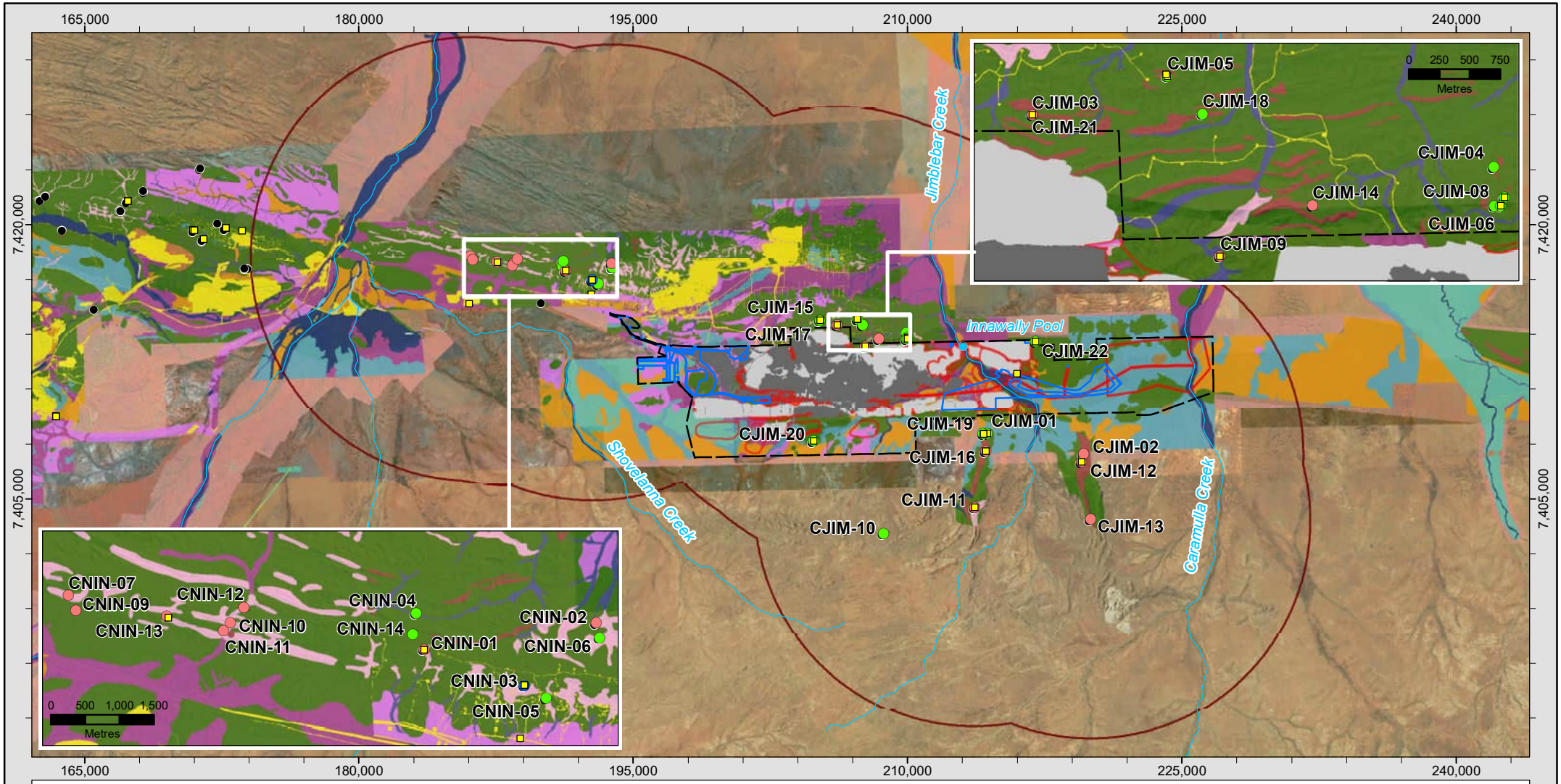
CJIM-09 has evidence of occasional Ghost Bat use, with scats being recorded from this cave during targeted surveying in 2020 and 2021 (Table 4.4, Figure 4.6). Monitoring data suggests this roost is not used regularly by Ghost Bats as large scat piles with recent and historical scat have not been recorded (i.e. evidence of ongoing use) and there has been no evidence of usage during monitoring undertaken in 2022 (GHD 2021a, Biologic 2023). While there has been no evidence of diurnal roosting in the cave, it is moderately deep and considered suitable to support diurnal roosting by Ghost Bat (Biologic 2023).

The Category 4 roost CJIM-20 located within the Activity Area, has had scats recorded recently, although not in previous surveys (Biologic 2023) (Figure 4.6). This roost is located 500 m from the Previous Validation Notice IF (a haul road) which is already cleared (Table 4.4, Figure 4.6).

Within 500 m of the Activity Area are two Category 3 roosts (CJIM-21 and CJIM-14), of which, only one has had potential foraging evidence presumed to be from Ghost Bat (i.e. feathers) (CJIM -21) (Table 4.4, Figure 4.6) (GHD 2021a and 2019b). CJIM- 21 faces south-west and there is an existing haul road present only 160 m from this roost. This roost is located approximately 1.2 km from the Previous Validation Notice IF. CJIM-14, with no record of usage, is located 1.3 km from the Previous validation Notice IF.

There are no Category 3 roosts with occasional occupancy adjacent to a Category 2 roost.

Of the six Category 4 roosts located within 500 m of the Activity Area boundary, only three have records present (Table 4.4).



Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Ghost Bat Critical Foraging Habitat

Scale @ A4: 1:300,000	Prepared: SPATIAL DATA	Project No: A949/72 REV D
Date: 24/05/2023	Checked:	Figure : 4.7
Revision: REV D	Reviewed: ENVIRO. A&I	

- Watercourse
- Activity Area
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint

Significant Fauna Species Observations
- Ghost Bat

Habitat Feature - Ghost Bat Cave
- Category 2
- Category 3
- Category 4
- Cave with no evidence of Ghost Bat
- Ghost Bat foraging range (12km)

Habitat Types
- Artificial Wetlands
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Medium Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Undulating Low Hills
- Unmapped

N

0 2 4 6
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_072_E_VN_FaunaHabitatMappingCaveBuffer_RevD.mxd

Table 4.4: Ghost Bat roosts located within the Activity Area or within 500 m of the Activity Area boundary

Roost Name	Category	Usage	Cave opening orientation	Distance to existing disturbance	Distance to IF
CJIM-06	4	Old scats	South-east	400 m south is mining operations	400 m south (already cleared)
CJIM-07	4	Old scats	South-east	350 m south is mining operations	350 m south (already cleared)
CJIM-08	4	None	South	350 m south is mining operations	350 m south (already cleared)
CJIM-09	3	Scats, individual	South	160 m to the west is an existing track 450 m to the south is a haul road / mining operations	550 m south-west
CJIM-14	3	None	South	280 m to the south is an access track	1.3 km south-west
CJIM-15	4	None	South	220 m south is an access track	> 2 km south-east
CJIM-17	4	None	South	220 m south is an access track	> 2 km south-east
CJIM-20	4	Scats	West	500 m to north-west is a haul road	500 m to north-west (already cleared)
CJIM-21	3	Foraging	South-west	300 m to west is existing track	1.2 km south-east

[1] Potential but unconfirmed feeding evidence (feathers) were located at an overhang approximately 70 m away from this cave (GHD2019)

An additional 25 roosts are located within 5 km of the Activity Area, including two active Category 2 roosts, CJIM-03 and CNIN-03 located more than 1 km and 2 km from the Activity Area, respectively (Table 4.5, Figure 4.7) (GHD 2021a). CJIM-03 is relatively deep (~12 m) cave with a single roosting chamber and is assessed as providing critical diurnal roosting habitat for Ghost Bat (Biologic 2023). The regular presence of Ghost Bat at this cave has been recorded via direct observation of an individual and a large amount of fresh scats (recorded in 2020 and 2021); however, monitoring of this cave undertaken in 2022 did not record any evidence of Ghost Bat occurrence (Biologic 2023).

A second cave feature (CNIN-03) located approximately 3 km west of the Activity Area is classified as a Category 2 roost (Figure 4.7). The cave is relatively large, complex, and moderately deep (~20 m) with three distinct chambers. This well-developed cave is known to support diurnal Ghost Bat roosting, evidenced by ongoing presence of individuals (direct observation and ultrasonic recordings) and large amounts of fresh scats (Biologic 2023).

The remaining roosts located within 5 km of the Activity Area comprise 13 Category 3 roosts, six with evidence of usage, and ten Category 4 roosts, two with evidence of usage (Table 4.5).

Table 4.5: Ghost Bat roosts located beyond 500 m of Activity Area

Roost Name	Category	Usage	Distance to IF (km)
CJIM-01	4	None	>1
CJIM-02	3	None	>2
CJIM-03	2	Scats, individual	>1
CJIM-04	4	None	<1
CJIM-05	4	Old scats	<1
CJIM-10	4	None	>3
CJIM-11	3	Scats	>3
CJIM-12	3	Scats	>2
CJIM-13	3	None	>3
CJIM-16	3	Scats	>2
CJIM-18	4	None	<1
CJIM-19	4	Scats	>1
CNIN-01	3	Scats	>2
CNIN-02	3	None	>2
CNIN-03	2	Scats, Individuals	>2
CNIN-04	4	None	>2
CNIN-05	4	None	>2
CNIN-06	4	None	>2
CNIN-07	3	None	>3
CNIN-09	3	Individuals	>3
CNIN-10	3	None	>3
CNIN-11	3	None	>3
CNIN-12	3	None	>3
CNIN-13	3	Scats	>3
CNIN-14	4	None	>3

4.3.5 Ghost Bat Records

Bat search and acoustic recorder locations are shown in Figure 4.5. The Activity Area is located at the southern extent of the species current distribution, whereby the species or species habitat may occur in the Pilbara region.

Ghost Bat scats have been recorded from a Category 3 roost (CJIM -09) and Category 4 roost (CJIM-20) located within the Activity Area (GHD 2021a, Biologic 2023) (Table 4.4, Figure 4.6). Targeted surveying undertaken in 2020 also recorded bat calls from CJIM-09 (GHD 2021a). The timing and frequency of calls suggests Ghost Bat was not occupying the cave during the day (during the survey period). Scats have also been recorded at one Category 3 roost and two Category 4 roosts located within 500 m of the Activity Area boundary (GHD 2021a, Biologic 2023).

Outside the Activity Area, there are clusters of records of the species located approximately 1 km south, north and north-west of the Activity Area and beyond 2 km to the south and north-west (Figure 4.7). Of note, is the presence of two active Category 2 roosts, CJIM-03 and CNIN-03, located less than 1 km and 2 km from the Activity Area, respectively. Records of Ghost Bat have also been recorded at two Category 4 roosts, CJIM-05 and CJIM-18, up to 1 km away, and eight Category 3 roosts and two Category 4 roosts more than 2 km away (Table 4.5).

The consistent number of records of Ghost Bat within and adjacent to the Activity Area suggest there is an important population, as per the DoE (2013) definition, of Ghost Bat present (Biologic 2020a). Furthermore, the population is located at the south-eastern extent of the species current known distribution.

4.3.6 Impact Assessment

The potential direct and indirect impacts to Ghost Bats from the Activity are outlined below. Loss of critical foraging habitat is considered a residual impact requiring offsetting (see Section 5).

Loss of habitat

Although no roosts will be directly impacted by the Activity, the Activity will result in the direct loss of 2,612 ha of critical foraging habitat (comprising 1,851 ha from the Previous Validation Notice and 761 ha from this Revised Validation Notice) and less than 1 ha of critical roosting habitat (Gorge/Gully).

Habitat fragmentation

Clearing for implementation of the Activity has the potential to fragment Ghost Bat habitats. The risk of habitat fragmentation is considered low as the landscape is already highly fragmented from existing Jimblebar operations and existing rail line. In addition, Ghost Bats are highly mobile and able to fly over and around infrastructure and the species is known to continue occupancy of caves in close proximity to mining including at Process Minerals International's Poondano Iron Ore Project (Process Minerals 2013) and at BHP Goldsworthy operations (Gleeson and Gleeson 2012).

Habitat modification

Fire has the potential to degrade Ghost Bat foraging habitat and reduce prey available to Ghost Bats, which in turn may cause population declines (Duncan *et al*., 1999). Hot work activities on site and the introduction and increased vehicle movements may increase the risk of fire and spread of weeds, respectively, which may degrade potential foraging habitat within the Activity Area. With implementation of standard BHP fire management, the potential for increased risk of fire and impacts to Ghost Bat habitat are considered low.

Light

Artificial light has the potential to indirectly impact Ghost Bats by altering nocturnal foraging behaviours and/or potentially restricting the use of roosts. Where practicable, light installations will be directed into active operational areas and away from caves, in order to minimise potential impact of light spill on caves.

The Category 3 roosts CJIM-09, CJIM-14 and CJIM-21 are considered to be located sufficiently far from the Indicative Footprint (i.e. 500 m to 1 km) to not be impacted by light spill associated with the Activity. These caves are already exposed to larger sources of light spill from the existing Jimblebar operations located to the immediate south.

Category 4 roosts within the Activity Area or within 500 m of the boundary are nocturnal roosts (Bat Call WA 2021a). As clearing and excavation works from the Activity will typically occur during the day, minimal impact is anticipated to the Ghost Bat using this roost, as a result of light spill.

CJIM-20, a westerly-facing Category 4 roost, is located sufficiently far from the IF (i.e. 550 m) that light spill is unlikely to be an issue. The recent record of Ghost Bat (Biologic 2022) suggests light spill has not significantly impacted this cave.

Overall, with the installation of directional lighting and distance of roosts from the IF, the risk of impact to Ghost Bats from light is considered to be low.

Feral animals and Cane Toads

Feral predators, namely cats, may compete with the Ghost Bat for food or may prey on them directly. The Activity may attract feral predators to the Activity Area, with the establishment of water sources, storage of food and waste disposal on site. Evidence of cats was recorded during the 2020 Solar Project fauna survey (Biologic 2020a). Declines in Ghost Bat numbers could be attributable to competition for prey with foxes and feral cats (Duncan *et al.* 1999). With the implementation of standard BHP feral cat management practices, the impact of feral cats on Ghost bat or their prey is considered low. BHP is also investigating options to implement ongoing feral cat monitoring to enhance detection and control.

The future predicted spread of the Cane Toad into the water holes of the Pilbara bioregion, and potentially the Activity Area, may have negative impacts to the Ghost Bat if ingested. Genetic studies have shown that Ghost Bats are unable to tolerate bufotoxins (Shine et al., in review, cited in Armstrong pers. Comm. 2015). The decline in Ghost Bat numbers in parts of Queensland has been attributed to the consumption of Cane Toads (Bullen pers. Comm. 2015). Cane Toads may be introduced to areas via vehicles or equipment (Government of Western Australia 2015). It is considered unlikely that such introduction at Jimblebar Hub will occur as travel to and from high-risk areas such as the Kimberley are not foreseen. In the event that Cane Toad is observed within the Activity Area, BHP will engage with DBCA to identify and implement appropriate monitoring and management. The potential impacts from Cane Toads are therefore considered low.

Noise and Vibration

Noise and vibration are potential indirect impacts to the Ghost Bat. Noise generated from haul trucks, loaders/excavators, service trucks, light vehicles and helicopters has the potential to cause roost abandonment (Bat Call WA 2021a, Bullen Crease 2014). No blasting is proposed in the Activity Area under this assessment. Noise and vibration sources associated with the Activity include those from excavation and earthworks machinery only.

The Category 3 roosts CJIM-09, CJIM-14 and CJIM-21 and are located sufficiently far from the Previous Validation Notice IF (i.e. 500 m to 1 km) to not be impacted by noise and vibration associated with the Activity.

Category 4 roosts within the Activity Area or within 500 m of the boundary are nocturnal visitation roosts (Bat Call WA 2021a). As clearing and excavation works from the Activity will typically occur during the day, minimal impact is anticipated to the Ghost Bat. Furthermore, a number of these roosts have noise-generating existing disturbance already located in their vicinity.

CJIM-20, a westerly-facing cave, has an existing haul road located 550 m to the north-west and has still had a recent record of Ghost Bat (Biologic 2022) suggesting noise and vibration have not significantly impacted this cave.

Overall, given the distance of roosts from potential noise and vibration sources, the risk of impact from noise and vibration is considered low.

Dust

High dust levels potentially can irritate the eyes of Ghost Bats, reduce their visual acuity and the effectiveness of their ability to capture prey (Bat Call WA 2021a). Earthworks associated with the Activity is a potential source of dust which may impact Ghost Bats. With the implementation of standard BHP dust suppression practices, such as the use of water carts, dust is not considered to be a significant impact to Ghost Bats. The Category 3 roosts CJIM-09,

CJIM-14 and CJIM-21 and are located sufficiently far from the Previous Validation Notice IF (i.e. 500 m to 1 km) to not be impacted by dust associated with the Activity.

Category 4 roosts within the Activity Area or within 500 m of the boundary are nocturnal visitation roosts (Bat Call WA 2021a). As clearing and excavation works from the Activity will typically occur during the day, minimal impact is anticipated to the Ghost Bat.

CJIM-20, a westerly-facing cave, is located sufficiently far from the Indicative Footprint (i.e. 550 m) that dust is unlikely to be an issue. The recent record of Ghost Bat (Biologic 2022) suggests dust has not significantly impacted this cave.

Overall, given the distance of roosts from potential dust sources, and with dust suppression practices, the risk of impact on Ghost Bat from dust is considered low.

Infrastructure

Ghost Bats are known to become entangled in barbed wire due to their low elevation flying pattern (Armstrong and Anstee 2000). Barbed wire fencing will be avoided as far as practicable, except where required by legislation, in order to avoid bat interaction. Furthermore, where fencing is required, Ghost Bat-friendly fencing options such as single-strand wire with use of bat deflectors (e.g. see Bullen 2021), will be used within the Activity Area as far as practicable. On this basis, the risk of this impact to Ghost Bats is considered to be low.

Ghost Bats may have the potential to collide with the 150 m tall communication towers that are proposed to be built as part of the Activity. Given this roost has not had any direct evidence of usage by Ghost Bats (only unconfirmed Ghost Bat feeding evidence located 70 m away), it is considered unlikely that Ghost Bats are at risk of colliding with the structure.

Human Disturbance

The Ghost Bat is understood to be easily disturbed and entering caves or minor disturbances on their perimeter, such as that by approaching vehicles or people, can cause the flushing or abandonment of caves and in extreme cases, the loss of pups (Churchill 2008, Armstrong 2010, Bullen and Crease 2014, Woinarski *et al*., 2014 and TSSC 2016a). Monitoring of caves may require access by humans to lay scat sheets or retrieve monitoring equipment and has the potential to flush Ghost Bats from caves. With the proposed monitoring to remain outside of the breeding period for Ghost Bat, and caves to be only visited annually (see Section 4.3.9), the impact to Ghost Bats is considered low.

4.3.7 Mitigation Hierarchy

Avoid

Direct impacts to suitable Ghost Bat habitat will be avoided where practicable through planning and implementing BHP internal land disturbance permits prior to land disturbance to ensure unauthorised clearing does not occur.

The use of barbed wire fencing within and surrounding the Activity Area will be avoided as far as practicable, to avoid mortality or harm to bats from flying into them.

Mitigate

If lighting is required to be installed, potential impacts from light spill will be minimised by directing lighting away from cave openings and inwards towards mine activities. Possible impacts to Ghost Bat foraging areas from fire are to be minimised through hot work management procedures, assigning designated smoking areas and managing fuel loads through weed control programs.

Increased competition for Ghost Bat prey items by feral cats is to be minimised on site through standard feral cat management practices which include reporting opportunistic sightings of feral cats, cage trapping and subsequent euthanasia of feral cats by qualified and licensed Pest Control technicians in accordance with the *Animal Welfare Act* (2002). Implementing correct waste management (e.g. contained waste bins, abiding by Landfill Regulations) will also minimise potential food sources for cats.

In the event the presence of Cane Toads is detected on site, additional management measures will be applied following the guidance of DBCA.

Disturbance of (human visitation at) roosting sites will be minimised through restricting access for monitoring to the months outside of the breeding/pupping season (September through to January).

Offsets

The Activity will result in residual impacts (Section 4.3.8) to Ghost Bat, from the loss of critical roosting and foraging habitats. Offsets will be provided to address these residual impacts (Section 5).

4.3.8 Residual Impact

Residual impacts for the Ghost Bat which will remain after the application of avoidance and mitigation include:

- Less than 1 ha of direct disturbance to critical roosting habitat (Gorge/Gully)
- 2,612 ha of direct disturbance to critical foraging habitats within 12 km of known category 2 and 3 roosts.

BHP will provide offsets for these residual impacts to Ghost Bat.

4.3.9 Review of Program Matter Outcomes

Following the impact assessment (Section 4.5.5 and 4.5.7) and application of the mitigation hierarchy (Section 4.5.6) a review of the Activity against the PMOs was undertaken. Table 4.6 identifies which PMOs are relevant for the Activity and considers further management.

Table 4.6: Review of Program Matter Outcomes (Ghost Bat)

Program Matter Outcome	Applicable Notifiable Action trigger	Assessment
Minimise loss of critical and supporting habitats of the Ghost Bat as a result of Program Activities within the SAA **AND** No loss (or maintain) Ghost Bat colony(s) as a result of program activities.	Within the Activity Area and or within a 500 m buffer of the Activity boundary, there is: Presence of Ghost Bat critical habitat and or supporting habitat **AND** Presence or sign/s of Ghost Bat colony or residing individuals	Loss of less than 1 ha of critical roosting habitat and 2,612 ha of critical foraging habitat represents a residual impact and requires offsetting (see Section 5.0). No roosts are to be directly impacted by the Activity. Roosts within the Activity Area and within 500 m of the boundary will be monitored (pending access restrictions) to demonstrate the Program Matter Outcome is being achieved (see section 4.5.9).
Minimise loss of critical and supporting habitats of the Ghost Bat as a result of Program Activities within the SAA	Within the Activity Area there is: Presence of Ghost Bat critical habitat and or supporting habitat **AND** Presence or sign of Ghost Bat transient, infrequent or dispersing individual/s	Loss of less than 1 ha of critical roosting habitat and 2,612 ha of critical foraging habitat represents a residual impact and requires offsetting (see Section 5.0).

4.3.10 Monitoring

Limited baseline Ghost Bat monitoring data has been collected between 2016 to 2019. BHP commenced a Ghost Bat monitoring program at Jimblebar and the immediate surrounds in 2020 (Biologic 2023). At this stage of monitoring, the few number of records obtained and monitoring trips mean the data collected is insufficient to

generate a Ghost Bat population estimate for Jimblebar. BHP will expand on this through implementation of an ongoing Ghost Bat monitoring program across the region including the avoidance zones and caves at Western Ridge (located approximately 42 km south-south-west).

Existing Ghost Bat monitoring locations within the Activity Area and the Jimblebar region are shown in Figure 4.8. Locations to be monitored are currently under review based on accessibility and Heritage requirements. Some roosts are off tenure or have heritage restrictions and are not proposed to be monitored in the future.

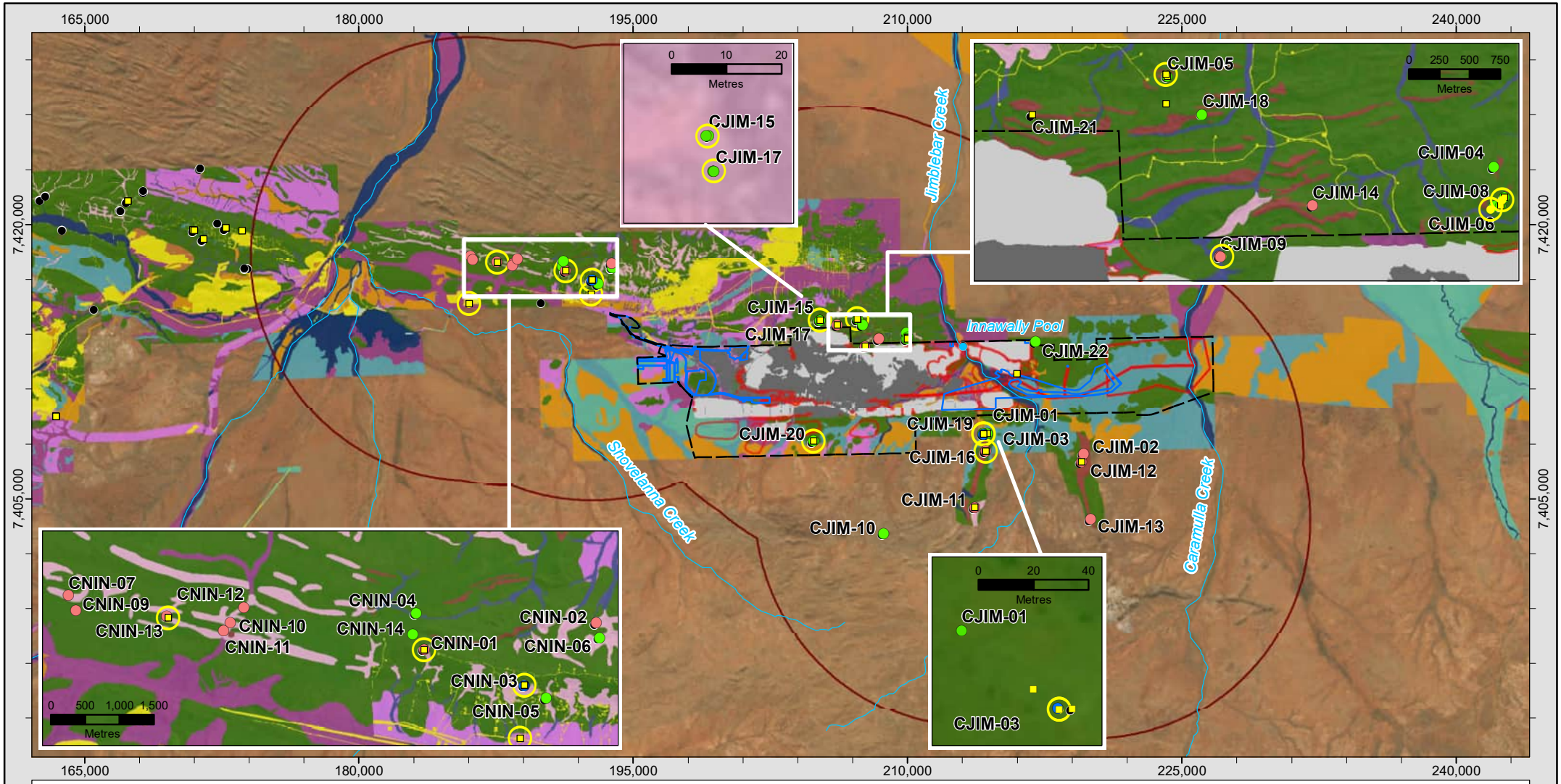
Monitoring for Ghost Bat will utilise scat deposition to infer the usage of caves. The sheet monitoring method allows for a scat deposition rate to be estimated which can be linked to the usage of the cave and therefore importance, i.e. regularly vs. occasionally used. Genetic analysis of scats can provide information on the number of unique individuals using caves, genetic diversity, structure and spatial use of the caves across the local area. Provision of this data is likely to enable BHP to demonstrate in the future if a viable population exists within the Activity Area.

Performance targets have been set based on a two-year period given the low usage of Ghost Bat caves in the Jimblebar area (Biologic 2022). The proposed monitoring methods are detailed in Table 4.7, with the monitoring to be implemented detailed in Table 4.8. Monitoring locations are presented in Figure 4.8.

Table 4.7: Ghost Bat Monitoring Methods

Method	Monitoring parameters
Motion camera footage	Presence (sighting of individuals) Number of individuals
Bat call detection (ultrasonic recordings)	Number of calls
Sheet method[1]	Presence of scats Scat deposition rate/usage Habitat characteristics Local meteorological data
Scat genetic analysis	Number of individuals (based on genotypes) Cave use (multiple or one cave)
Scat hormone analysis	Presence of lactating females
Cave microclimate recording	Temperature Humidity

[1] Entrance into caves will only be permitted for those deemed safe to do so following geotechnical assessment of the cave.



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Ghost Bat Monitoring Locations

Scale @ A4: 1:300,000	Prepared: SPATIAL DATA	Project No: A949/121 REV B
Date: 24/05/2023	Checked:	Figure : 4.8
Revision: REV D	Reviewed: ENVIRO. A&I	

- Watercourse
- Activity Area
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint

Significant Fauna Species Observations

- Ghost Bat
- Monitored sites

Habitat Feature - Ghost Bat Cave

- Category 2
- Category 3
- Category 4
- Cave with no evidence of Ghost Bat
- Ghost Bat foraging range (12km)

Habitat Types

- Artificial Wetlands
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Medium Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Undulating Low Hills
- Unmapped

N

0 2 4 6 8 Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_121_E_VN_GhostBatMonitoringLocations_RevB.mxd

Table 4.8: Ghost Bat Monitoring

Program Matter Objective	To support the long-term persistence and viability of the Ghost Bat within the SAA.		
Notifiable Action trigger	Within the Activity Area and or within a 500 m buffer of the Activity boundary, there is: • Presence of Ghost Bat critical habitat and or supporting habitat **AND** • Presence or sign/s of Ghost Bat colony or residing individuals		
Program Matter Outcomes	• Minimise loss of critical and supporting habitats of the Ghost Bat as a result of Program Activities within the SAA **AND** • No loss (or maintain) Ghost Bat colony(s) as a result of program activities		
Performance Target	**Monitoring and Frequency**	**Corrective and Contingency Actions**	**Reporting**
Presence or evidence of presence of Ghost Bat at one or more Ghost Bat roosts over two years of monitoring	Proposed monitoring is as follows: • Category 2 roosts (CJIM-03 and CNIN-01) at least 6 monthly • Category 3 roosts (CNIN-01, CNIN-13, CJIM-09) at least yearly • Category 4 roosts (CJIM-03, CJIM-05, CJIM-06, CJIM-08, CJIM15, CJIM17, CJIM-20, at least two yearly (all pending safe access, heritage and tenure restrictions). Techniques may include but are not limited to scat monitoring (deposition rate, genetic analyses hormone analyses), ultrasonic recording, cave microclimate monitoring and photo monitoring of caves. Figure 4.8 shows potential monitoring cave locations.	Response actions to performance targets not being met may include, but are not limited to: • investigate potential cause of performance targets not being met • consult with Ghost Bat experts as required in relation to corrective actions • compare changes to results from other Ghost Bat monitoring programs • increase the frequency of the monitoring • expand the monitoring program to other sites.	SEA AER

4.3.11 Summary

BHP considers the Activity will meet the PMO for no loss of Ghost Bat population. No roosts are to be directly impacted by the Activity and an ongoing monitoring programme will check for continued presence of Ghost Bat usage of roosts being currently utilised and appearance of Ghost Bats in roosts currently inactive. The PMO for habitat loss will be achieved as loss of less than 1 ha of critical roosting habitat and 2,612 ha of critical foraging habitat will be offset (see Section 5.0).

4.4 Greater Bilby

The following sections provide background information to support the absence of Greater Bilby Notifiable Action triggers. Impacts to the Greater Bilby are discussed to illustrate that the Program Matter Objective for this species will be met.

4.4.1 General Species Information

The Greater Bilby is listed under the EPBC Act as 'Vulnerable'. Within the Pilbara bioregion, the Greater Bilby exists along the Fortescue River and northeast to Shay Gap (DCCEEW 2023b) (see Figure 4.9). The extent of occurrence for the Greater Bilby is thought to have remained relatively stable over the last 20 years. This mammal was common throughout most of its range until the early 1900s when there was a sudden and widespread collapse (Abbott 2001; Johnson 2008). This collapse and range contraction has been attributed to predation from cats and foxes, habitat destruction from introduced herbivores and changed fire regimes. Feral cats have been linked to the reduced success of reintroduced populations (DCCEEW 2023b).

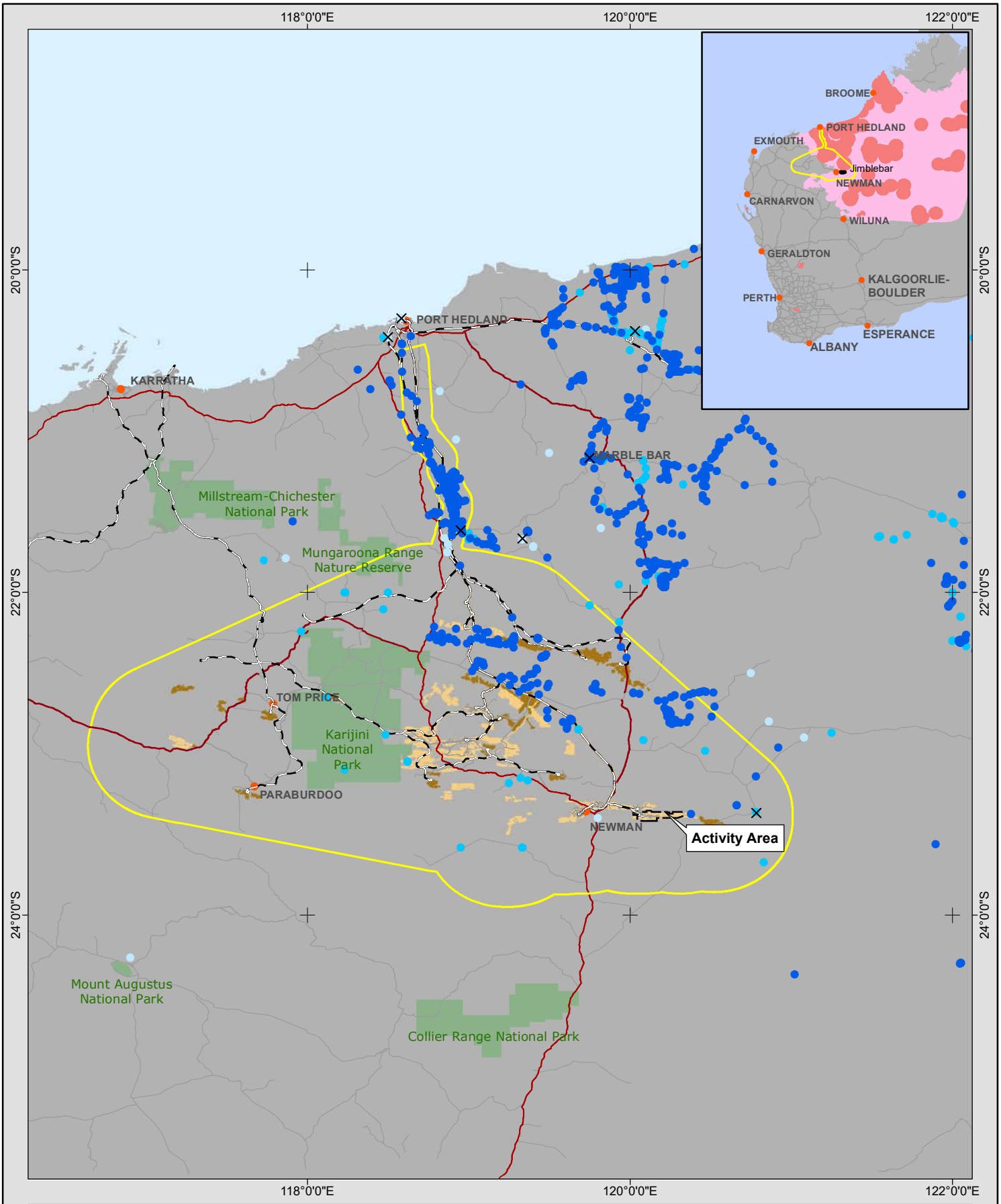
The Greater Bilby is a highly mobile species with home ranges varying between 1 km^2 to 3 km^2 (DCCEEW 2023b). The movement patterns of the Greater Bilby are thought to be influenced by resource availability (Strahan 1995). The species may also persist in areas of low productivity (Southgate and Carthew 2006, Southgate *et al*. 2007 and Southgate *et al*. 2018).

The presence of the Greater Bilby is strongly associated with substrate type as it is generally restricted to areas that contain suitable burrowing habitat, such as sandy loam plains, alluvial creeks, dunes and sand ridges (TSSC 2016b). Within the Pilbara region the species is sparsely distributed, and often associated with level or undulating plains including watercourses and dune systems, composed of cracking clay, soil or sand that allows burrowing, with vegetation consisting of hummock grassland (spinifex), with low shrubland, usually *Acacia* dominated (Dziminski and Carpenter 2017). The Greater Bilby has also been recorded from mulga woodlands and stony plain habitats in the Abydos Plains region further north in the Pilbara. Food sources for the Greater Bilby include, but are not limited to, grass, sedge seeds, ants, fungi, termites, beetles, insect larva and spiders (Dziminski and Carpenter 2017, Southgate *et al*. 2018).

4.4.2 Local Habitat

Multiple targeted searches for the species have been undertaken in the Activity Area from 2005 through to 2022 and no direct or indirect evidence of Greater Bilby has been recorded. Survey coverage for the Greater Bilby is shown in Figure 4.10. The Activity Area falls within the current distribution of the Greater Bilby, whereby the species or species habitat may occur (DoEE 2019b). The expansion of the Activity Area to include the Additional Validation Notice IF has not added any new habitat types relevant to the Greater Bilby for consideration compared to the Previous Validation Notice IF (BHP 2020) (Table 4.9).

Habitats considered critical to the survival of the Greater Bilby, namely Sand Plain and Stony Plain, are present within the Activity Area. The Sand Plain habitat (presented in Figure 4.11) is continuous and extensive to the east of the proposed Activity Area and represents habitat suitable for breeding, burrowing, foraging and dispersal (Biologic 2020a; GHD 2021b, 2019a and 2019b). Biologic (2019) noted that some areas of Sand Plain were associated with particular Acacia spp. that bilbies use for food resources (Dziminski and Carpenter 2017).



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

JIMBLEBAR REVISED VALIDATION NOTICE

Greater Bilby regional records and distribution

Scale @ A4:	1:3,500,000	Prepared: J.VIS	Project No: A949/083 Rev C
Date:	29/03/2023	Checked:	Figure: 4.9
Revision:	REV B	Reviewed: ENVIRO. A&I	

Greater Bilby records

- Records After 2005
- Records between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Species or species habitat likely to occur
- Species or species habitat may occur

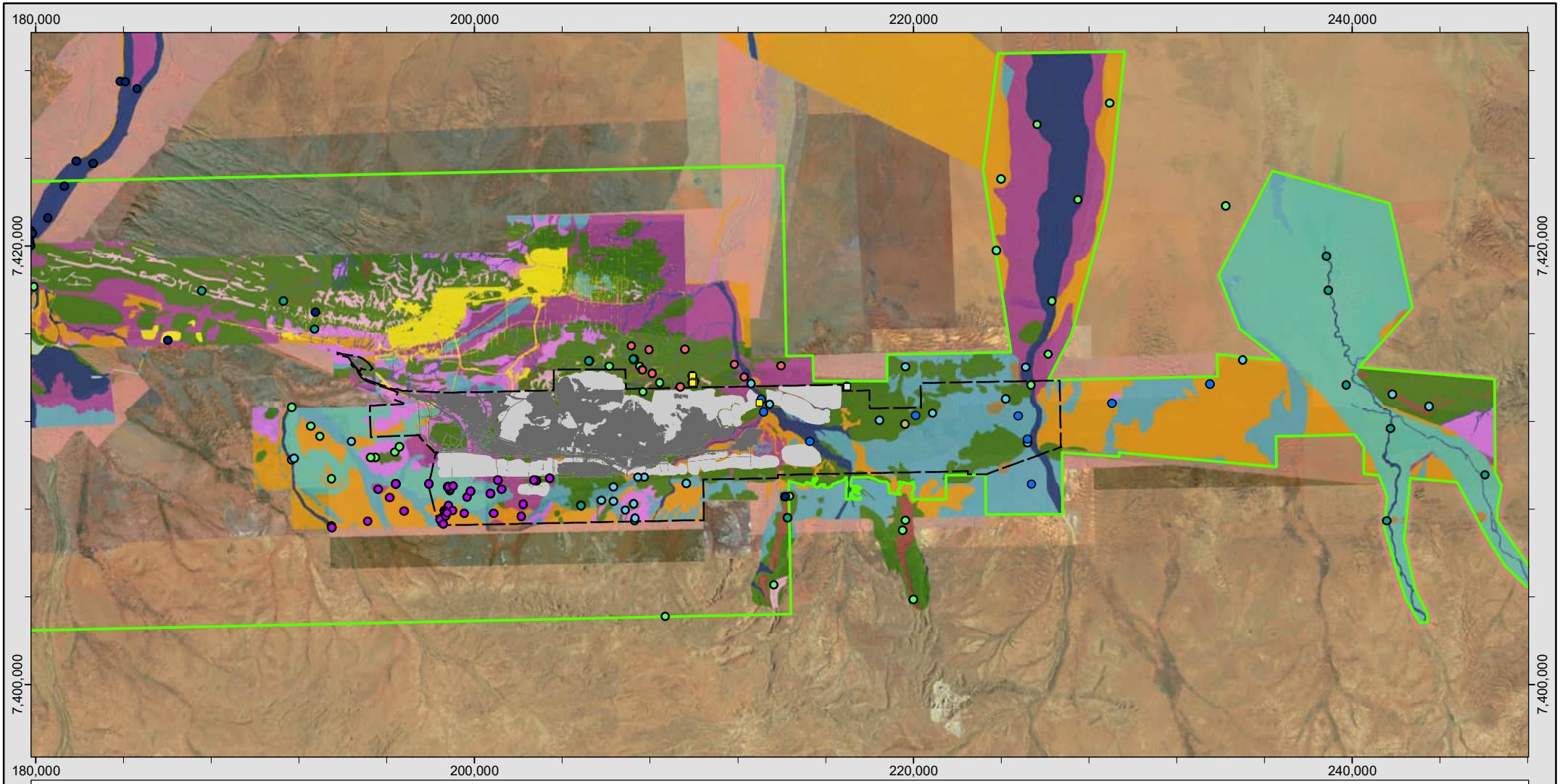
- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area
- BHP LOA Mine Plan disturbance footprint
- Third Party disturbance footprint
- Activity Area

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_083_E_VN_SEA_Species_Bilby_RevC.mxd



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Ghost Bat Survey Coverage

Scale @ A4: 1:250,000	Prepared: SPATIAL DATA	Project No: A949/101 REV D
Date: 24/05/2023	Checked:	Figure : 4.10
Revision: REV D	Reviewed: ENVIRO. A&I	

Targeted Bat Cave Site
- <Null>
- 2018
- 2019

Bat Sample Site
- 2006
- 2013
- 2018
- 2019
- 2020
- 2021
- 2022

- Survey Coverage
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Activity Area

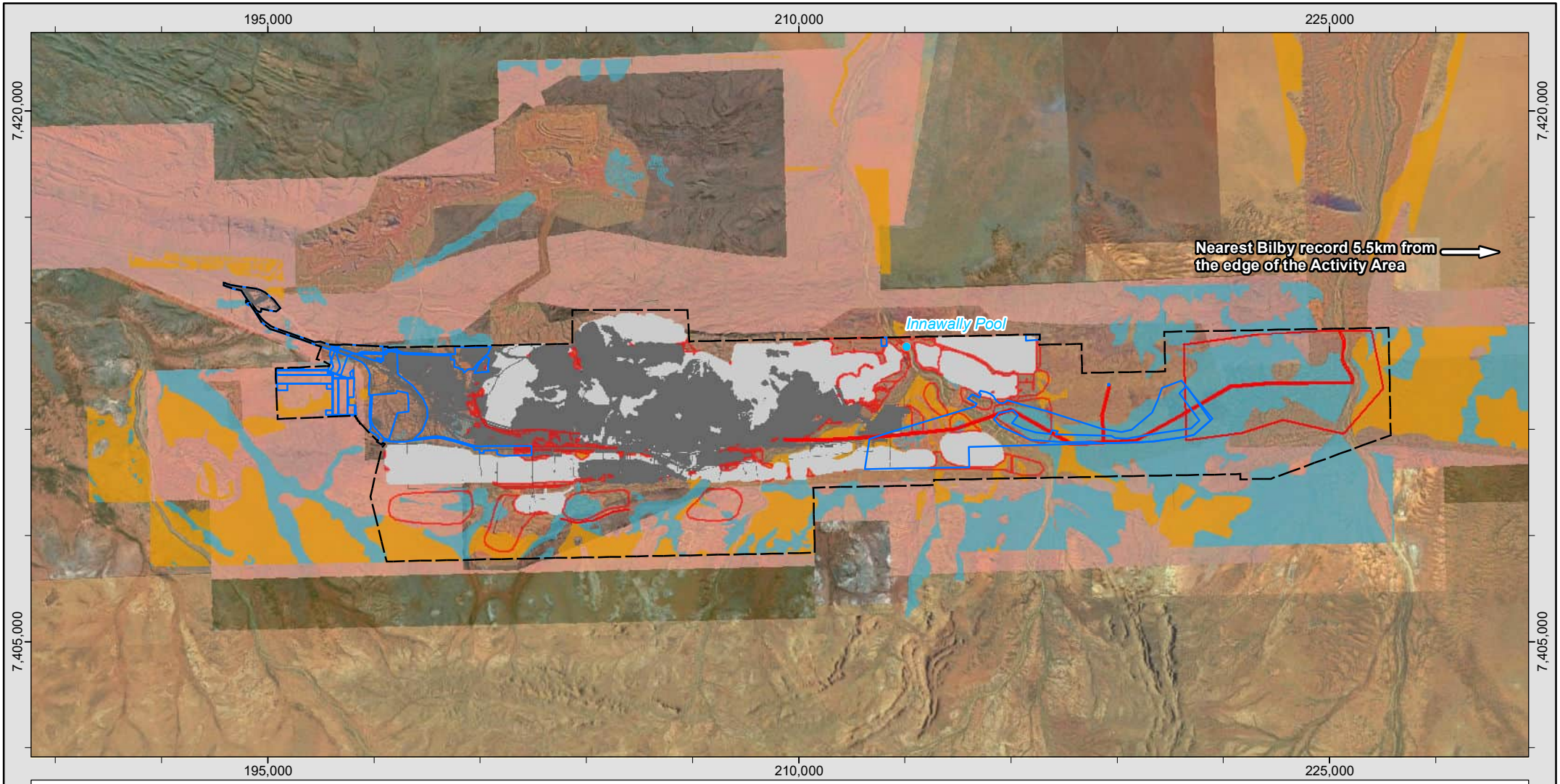
Habitat Types
- Artificial Wetlands
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Undulating Low Hills
- Unmapped

N

0 2 4 6
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_101_E_VN_GhostBat_SurveyCoverage_RevD.mxd



Spatial Data - Studies Planning & Access
BHP IRON ORE

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Greater Bilby Habitat and Records

Scale @ A4: 1:155,000	Prepared: SPATIAL DATA	Project No: A949/75 REV D
Date: 11/05/2023	Checked:	Figure : 4.11
Revision: REV D	Reviewed: ENVIRO. A&I	

- Innawally Pool
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)

Habitat Types
- Mulga Woodland
- Sand Plain

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_075_E_VN_BilbyHabitat_Records_RevD.mxd

Although Stony Plain habitat occurs within the Indicative Footprint, (Table 4.9), this was not identified as criticalhabitat for the Greater Bilby during on-ground surveys, due to presence of hard soils and large rocks (Biologic 2020a, GHD 2021b, 2019a and 2019b) which would make the area unsuitable for burrowing by the species. Given the absence of records within the Activity Area despite extensive survey effort, these habitats are considered as supporting habitats for Greater Bilby.

Mulga Woodland and Drainage –related habitats, which are those known to also be utilised as supporting habitats by the Greater Bilby (TSSC 2016b; DCCEEW 2023), are present within the Activity Area (Table 4.9 Figure 4.11). The Mulga Woodland habitat type extends west and south of the proposed Activity Area and was identified by Biologic (2020a) as secondary breeding or foraging habitat, i,e, only supporting habitat. Mulga woodland, Drainage Area/Flood Plain, Major Drainage Lines, Minor Drainage Lines were identified as suitable for opportunistic dispersal or foraging habitat for the Greater Bilby (Biologic 2020a, GHD 2021b and 2019) however, however due to the grazing pressures in the region these areas are highly disturbed and any Bilby use would be likely irregular and opportunistic.

Table 4.9: Greater Bilby Habitat Assessment

Habitat Description	Indicative Footprint		
	Previous Validation Notice (ha)	Additional Areas (ha)	Total (ha)
Supporting Habitat			
Sand Plain	243	164	407
Mulga Woodland	1,174	291	1,465
Stony Plain	60	100	160
Drainage Area/Floodplain	204	131	335
Major Drainage Line	160	73	233
Minor Drainage Line	10	2	12
Total	**1,851**	**761**	**2,612**

4.4.3 Greater Bilby Records

Although supporting habitat is present within the Activity Area, extensive surveys indicate this species is not currently occupying the area, with no evidence of presence of the species or individuals recorded, during three recent fauna surveys (Biologic 2020a and 2018; GHD 2019a) or pre-clearing surveys (for MAR drilling activities) undertaken as part of the requirements for NVCP 8123/1.

Recent targeted surveys (see Figure 4.10 for details of locations) were undertaken within, and adjacent to, the proposed Activity Area in its preferred habitat (i.e. sand plain and mulga woodland) (Biologic 2020 and 2018; GHD 2021a and 2019). No new or recent evidence of this species was recorded. The nearest record of the Greater Bilby is from an historical inactive burrow located over 5.5 km to the east of the proposed Activity Area (Biologic 2018). The burrow was revisited and re-assessed to determine current use in 2019 and 2021 by GHD. No fresh or current activity was recorded in the burrow area. Additionally, a camera was set on the burrow for eight nights and did not record any Greater Bilby activity. The camera did identify a large Sand Goanna (*Varanus panoptes*) near the burrow (GHD 2019).

Given the lack of evidence of residing individuals and lack of evidence of transient, infrequent or dispersing individuals, the Activity Area is not considered to support the species.

4.4.4 Impact Assessment

The potential direct and indirect impacts to the Greater Bilby from the Activity (see section 2) are considered below. While the Activity will result in habitat loss, given the lack of records this is not considered significant.

Habitat Loss

The key direct impact to the Greater Bilby arising from implementation of the Activity is loss of 2,612 ha of supporting habitat (Sand Plain, Stony Plain Mulga Woodland, Drainage Area/Flood Plain, Major Drainage Line and Minor Drainage Line) (Figure 4.11 and Table 4.7). Given the lack of Greater Bilby records in the Activity Area, and these habitats are contiguous with the surrounding areas, habitat loss will not represent a significant impact to the Greater Bilby.

Habitat fragmentation

Habitat fragmentation could isolate Greater Bilby populations and reduce genetic connectivity across affected areas and local populations.

The TLO and associated rail upgrades, and Solar Project are adjacent to existing disturbance where barriers to dispersal already exist. Biologic (2018, 2019) and GHD (2019) conclude that while apparent suitable habitat was present, the lack of records of the species from the area that the species is unlikely to inhabit the area. As a result, the risk of habitat fragmentation to the Greater Bilby from the Activity is considered to be low.

Habitat modification

Threats such as inappropriate fire regimes (Southgate and Carthew 2006; Southgate and Carthew 2007; Southgate *et al*. 2007; Bradley *et al.* 2015), pastoralism, introduced herbivores ((Southgate 1990a; Pavey 2006; Bradley *et al*. 2015; Department of Environment 2016) and weed encroachment have the potential to degrade Greater Bilby foraging habitat which in turn may cause population declines (Bradley *et al.* 2015). Hot work activities on site and the introduction and increased vehicle movements may increase the risk of fire and spread of weeds, respectively, which may degrade Sandplain, Mulga Woodland and Drainage area/Floodplain habitats within the Activity Area. Further degradation is likely to have been caused through grazing cattle which have been observed in the Activity Area during surveys. However, given the lack of records in the Activity Area, the impact of habitat modification to the Greater Bilby is considered to be very low. With implementation of standard BHP fire management and weed control practices, the potential for increased risk of fire and habitat degradation due to weeds, are considered low.

Feral Predators

Feral predators such as feral cats (*Felis catus*) and foxes (*Vulpes vulpes*), may predate on the Greater Bilby (Bradley *et al.* 2015, Woinarski *et al*. 2014, Pavey 2006). Fauna surveys (e.g. GHD 2019a and 2019b) have recorded the presence of feral cats within the Activity Area and additional feral predators may be attracted to the area with the establishment of water sources. Given the lack of records for Greater Bilby, the impact from feral predators is considered very low.

Vehicle Collisions

Night time vehicle movements have the potential to result in mortality of individual Greater Bilby at a local scale where vehicles operate adjacent to suitable Greater Bilby habitat. Given the lack of records for Greater Bilby in the area, the potential impact of vehicle collisions is considered very low.

4.4.5 Summary

The Greater Bilby Notifiable Action triggers are not applicable as no records of Greater Bilby exist within the Activity Area or within a 500 m buffer of the Activity boundary. The Activity is predicted to achieve the PMO for the Program Matter.

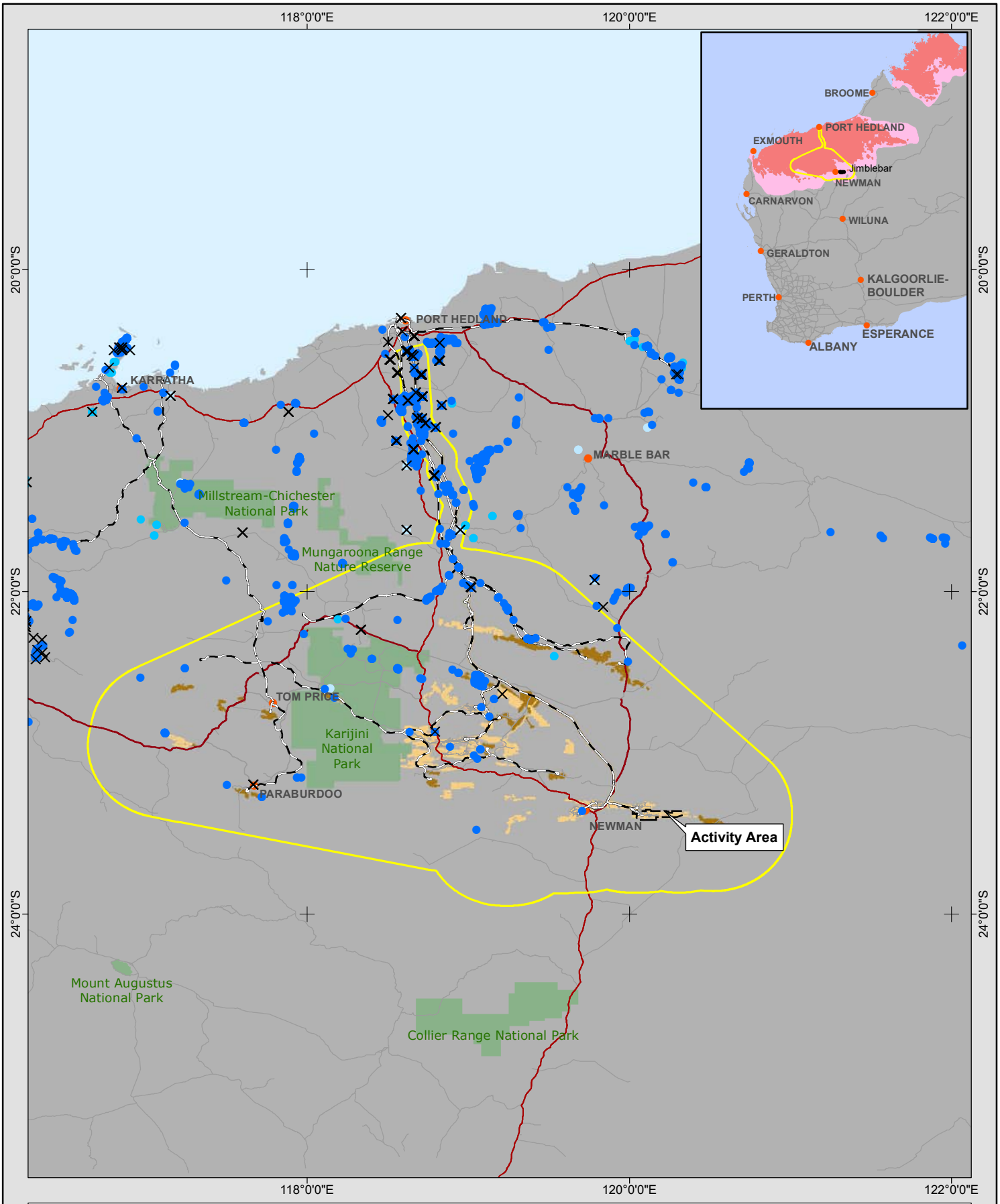
4.5 Northern Quoll

The following sections provide background information to support the absence of Northern Quoll Notifiable Action triggers. Impacts to the Northern Quoll are discussed to illustrate that the Program Matter Objective for this species will be met.

4.5.1 General Species Information

The Northern Quoll is listed under the EPBC Act as 'Endangered'. It is the smallest and most arboreal of the four Australian quoll species (van Dyck and Strahan 2008) and has undergone a dramatic range contraction since European settlement, including a 75% reduction in distribution during the 20th century. In the Pilbara, Northern Quoll distribution is bounded in the north, east and south by the Great Sandy Desert, Gibson Desert and Little Sandy Desert (DotE 2023c). The potential invasion of the Pilbara by the Cane Toad is regarded as the most significant future threat to the persistence of the Northern Quoll in the Pilbara (Cramer *et al.* 2016a).

Northern Quolls mostly favour rocky habitats (e.g. escarpments, mesas, gorges, breakaways and boulder fields), major drainage lines and treed creek lines as denning or shelter habitat, and foraging occurs in the vegetated areas surrounding their dens (DotE 2023c). Higher densities of Northern Quoll are usually found in rocky habitats as they offer protection from predators and are generally more productive in terms of availability of resources (Braithwaite and Griffiths 1994, Oakwood 2002). Figure 4.12 illustrates the regional records and distribution of Northern Quoll.



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE
PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Northern Quoll regional records and distribution

Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No: A949/096 Rev C
Date:	15/05/2023	Checked:	Figure: 4.12
Revision:	REV C	Reviewed: ENVIRO. A&I	

Northern Quoll records
- Records After 2005
- Records between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Species or species habitat likely to occur
- Species or species habitat may occur

- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area
- BHP LOA Mine Plan disturbance footprint
- Third Party disturbance footprint
- Activity Area

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_096_E_VN_SEA_Species_Northern_Quoll_RevC.mxd

The ecology of Northern Quolls is complex as they use habitats in a variety of ways for denning and foraging, and an individual can use multiple den sites. Northern Quolls will den during the day and leave den sites to forage during the night. They are generally considered to be solitary, with females having mutually exclusive denning areas, but can have overlapping foraging areas. Populations fluctuate annually, which is likely to be related to the abundance, dispersion and renewability of food (Oakwood 2002). Both sexes usually change dens every night, with females each using up to 55 dens (Oakwood 2008).

4.5.2 Local Habitat

Multiple targeted surveys for Northern Quoll have been conducted within the Activity Area and surrounding areas between 2005 and 2022. Despite the survey effort, no direct or indirect evidence of Northern Quoll has been recorded. Survey areas and methods used to detect the Northern Quoll in the Activity Area are shown in Figure 4.13 with mapped habitat and records shown in Figure 4.14. The Activity Area falls within the current distribution of the Northern Quoll, whereby the species or species habitat may occur (DoEE 2019b).

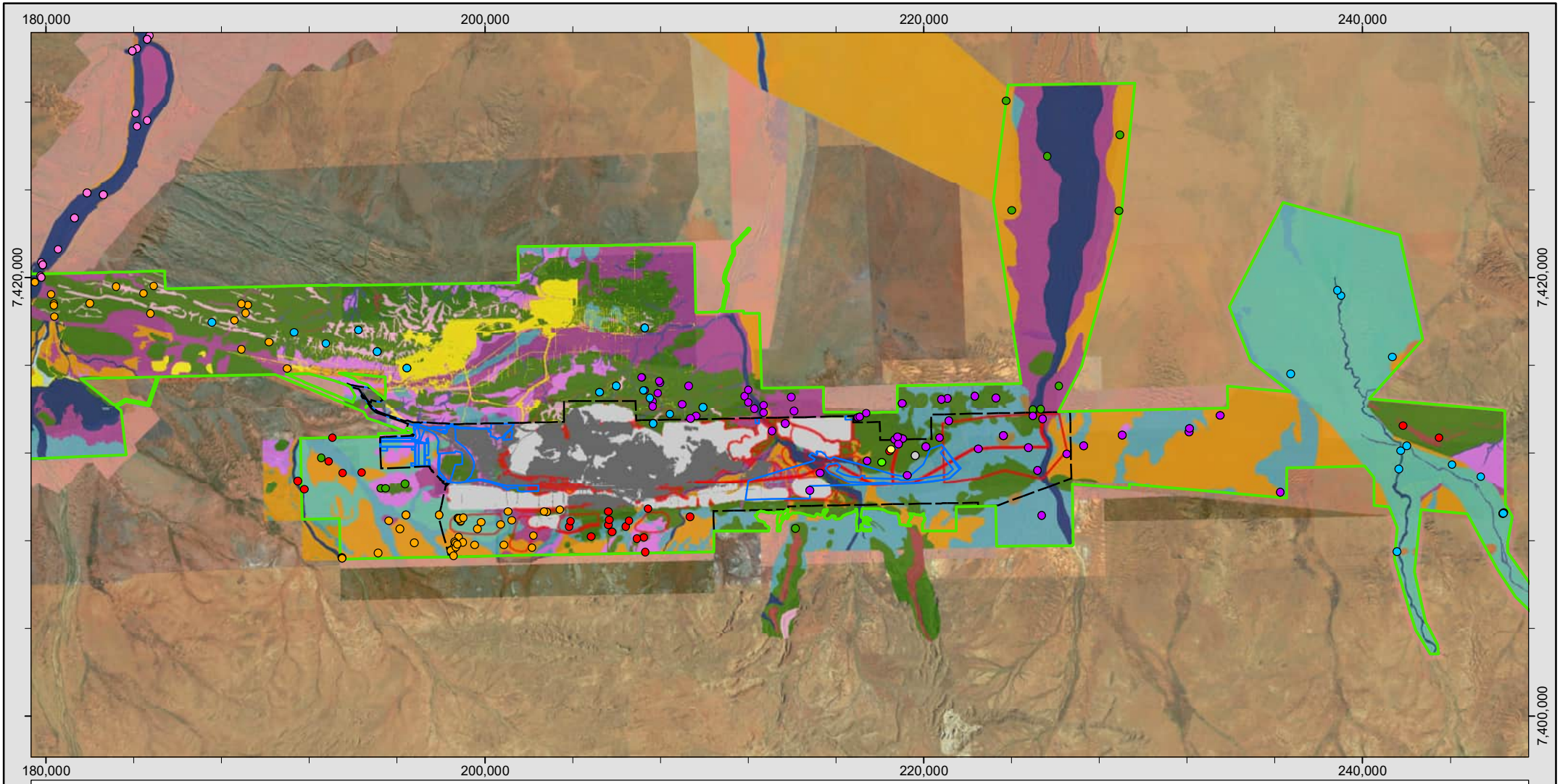
The expansion of the Activity Area to include the Additional Validation Notice IF has not added any new habitat types relevant to the Northern Quoll for consideration compared to the Previous Validation Notice IF for the Previous Validation Notice (Table 4.10).

Northern Quoll critical denning habitats have been recorded in the Indicative Footprint including Gorge and Gully and Major Drainage Line (Biologic 2022, 2020, 2019 and 2018, GHD 2019a and 2019b). As no breeding evidence has been recorded or evidence of a resident population or transient individuals, these habitats are considered as supporting habitats for the purpose of this assessment.

Hillcrest/Hillslope habitats, Minor Drainage Lines, Sand Plain and Stony Plain in the Indicative Footprint represent supporting habitats which may be used for foraging by the species (Biologic 2022, 2020, 2019, 2018, DoE 2016) (Table 4.10). Biologic (2018) noted that the small rocky breakaways present in the Hillcrest/Hillslope habitat were too small in extent and sparsely distributed to provide denning habitat of the Northern Quoll.

Table 4.10: Northern Quoll survey habitat assessment

Habitat Description	Indicative Footprint		
	Previous Validation Notice (ha)	Additional Areas (ha)	Total (ha)
Supporting Habitat			
Gorge/Gully	<1	0	1
Major Drainage Line	160	73	233
Hillcrest/ Hillslope	645	164	809
Sand Plain	243	164	407
Stony Plain	60	100	160
Minor Drainage Line	10	2	12
Total	**1,118**	**503**	**1,621**



Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Northern Quoll Survey Coverage

Scale @ A4: 1:250,000	Prepared: SPATIAL DATA	Project No: A949/102 REV D
Date: 24/05/2023	Checked:	Figure : 4.13
Revision: REV D	Reviewed: ENVIRO. A&I	

Northern Quoll Sample Site
- 2005
- 2006
- 2008
- 2013
- 2018
- 2019
- 2020
- 2021
- 2022
- Survey Coverage

- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint

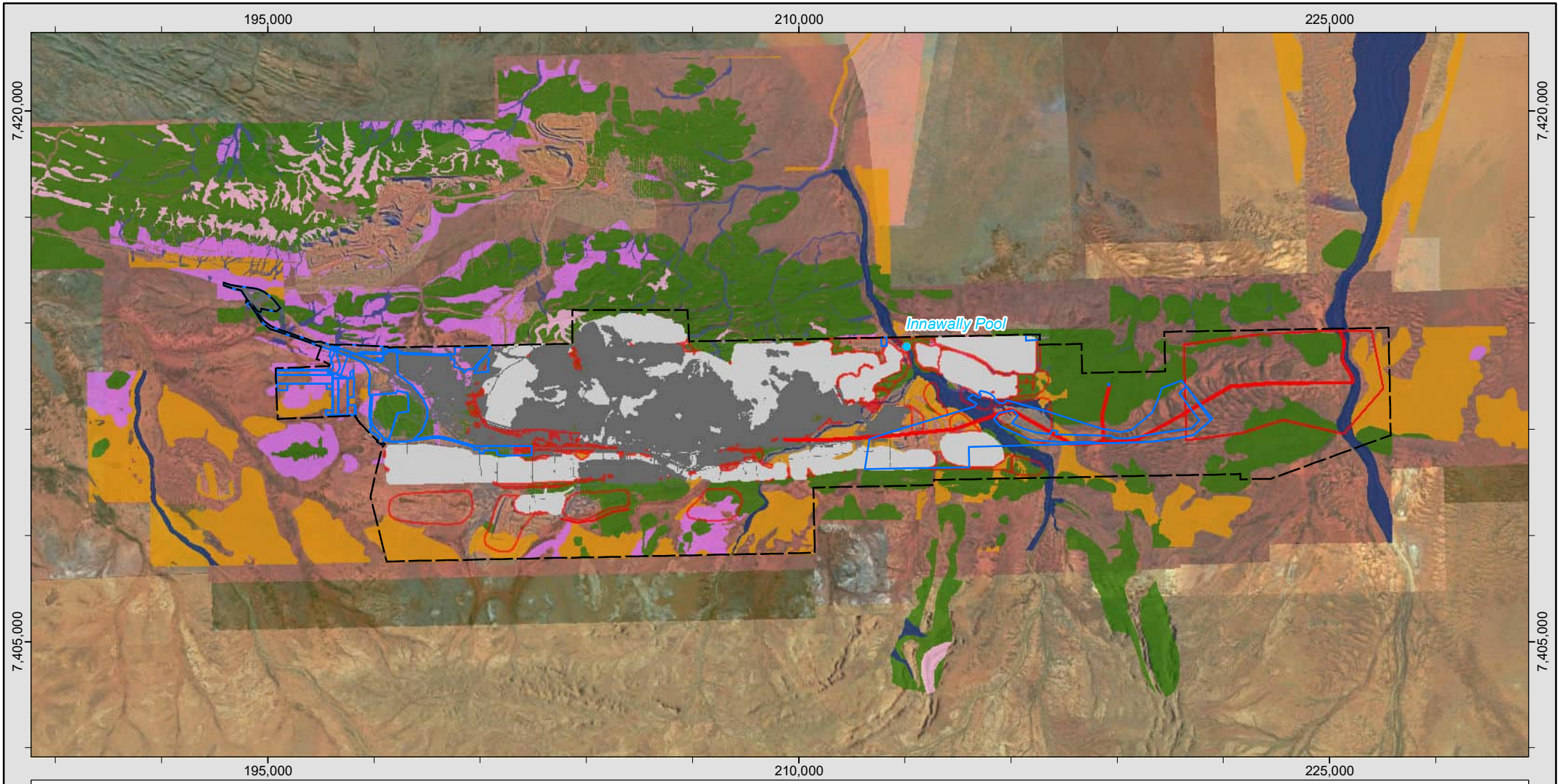
Habitat Types
- Artificial Wetlands
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Undulating Low Hills
- Unmapped

N

0 2 4 6
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_102_E_VN_NorthernQuoll_SurveyCoverage_RevD.mxd



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Northern Quoll Habitat and Records

Scale @ A4: 1:155,000	Prepared: SPATIAL DATA	Project No: A949/78 REV D
Date: 12/07/2023	Checked:	Figure : 4.14
Revision: REV D	Reviewed: ENVIRO. A&I	

- Innawally Pool
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)

Habitat Types

- Gorge/ Gully
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Sand Plain
- Stony Plain

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_078_E_VN_NorthernQuollHabitat_Records_RevD.mxd

4.5.3 Northern Quoll Records

At present, Northern Quolls are relatively common in the northern Pilbara region (generally within 150 km of the coast) but are much less common in southern and south-eastern parts of the region (Cramer *et al*., 2016). The Northern Quoll (*Dasyurus hallucatus*) is known from a single recent (i.e. 2021) record 2.5 km to the north of Activity Area (Figure 4.14). The record (a scat) was collected from a rehabilitated OSA and is considered to represent a dispersing individual (Biologic 2022). There are no records of a Northern Quoll colony or residing individuals within the Activity Area (Biologic 2022 and 2018, GHD 2019a and 2019b).

4.5.4 Impact Assessment

The potential direct and indirect impacts to the Northern Quoll from the Activity (see Section 2) are considered below. While the Activity will result in habitat loss, given the lack of records this is not considered significant.

Habitat Loss and Fragmentation

Approximately 1,621 ha of supporting habitat will be disturbed within the Activity Area. This habitat is considered marginal and is contiguous with the surroundings (Biologic 2019 and GHD 2019a). No den sites have been recorded in the Activity Area or dispersing individuals. Given the lack of records in the Activity Area or within 500 m of the Activity Area, this habitat reduction is not predicted to result in an adverse impact to the species.

Habitat fragmentation could isolate Northern Quoll populations, reduce genetic connectivity across affected areas and increase the risk in reduction of local populations.

The TLO and associated rail upgrades, and Solar Project are adjacent to existing disturbance where barriers to dispersal already exist. Biologic (2018, 2019) and GHD (2019) concluded that while apparent suitable habitat was present, the lack of records of the species from the area indicates that the species is unlikely to inhabit the area. As a result, the risk of habitat fragmentation to the Northern Quoll from the Activity is considered to be very low.

Feral Predators and Cane Toads

Feral predators may compete with the Northern Quoll for food or may prey on it. The Activity may attract feral predators to the Activity Area, with the establishment of water sources, storage of food and waste disposal on site. Evidence of cats was recorded during the 2018 fauna surveys (GHD 2019a and 2019b). With the implementation of standard BHP feral cat management practices, the potential impact of feral cats on the Northern Quoll is considered very low. BHP is also investigating options for ongoing feral cat monitoring to enhance detection and control.

There is the potential for an increased risk of fire in Northern Quoll habitat from the Activity through hot work activities. An increased risk of predation on Northern Quolls can occur after fire a when ground cover is removed making Northern Quolls more vulnerable to dingoes, cats and raptors (Oakwood 2004). With standard BHP fire management practices, the potential for increased risk of fire and impacts to Northern Quoll habitat are considered very low.

The Northern Quoll is vulnerable to lethal toxic ingestion of Cane Toad toxin, and this is considered the main threat to Northern Quoll populations outside the Pilbara (Oakwood 2004; Hill and Ward 2010). The future predicted spread of the Cane toad into the Pilbara bioregion may have comparable negative impacts to the Northern Quoll as observed in other areas of northern Australia. Some models predict that the Cane Toad's distribution will spread to include the Pilbara via the narrow coastal strip but that this spread will be dependent on artificial water bodies in this narrow strip (Tingley *et al*. 2013). Cane Toads may be introduced to areas via vehicles or equipment (Government of Western Australia, 2015). Given there are no records of Northern Quoll in the Activity Area or within 500 m of the Activity Area, the potential impact of Cane Toads on the Northern Quoll is considered very low.

Vehicle Collisions

Vehicle and machinery movements have the potential to result in fauna strike, causing injury or mortality. Northern Quoll are vulnerable to vehicle strike due to being a ground dwelling species and the risk of interaction with vehicles is greatest where roads occur in proximity to suitable habitat for the species.

As there are no records of the species in the Activity Area, the risk of mortality due to vehicle collision is considered very low.

4.5.5 Summary

The Northern Quoll Notifiable Action triggers are not applicable as no records exist within the Activity Area or within 500 m of the Activity Area. a Northern Quoll are not considered significant.

4.6 Pilbara Olive Python

The following sections provide background information to support the absence of Pilbara Olive Python Notifiable Action triggers. Impacts to the Pilbara Olive Python are discussed to illustrate that the Program Matter Objective for this species will be met.

4.6.1 General Species Information

The Pilbara Olive Python is listed under the EPBC Act as 'Vulnerable'. It is restricted to ranges within the Pilbara bioregion, although an isolated population is thought to occur south on Mount Augustus in the Gascoyne region (Bush and Maryan 2011), and additional records exist in the northeastern Carnarvon region. Within the Pilbara bioregion, the species has been recorded from the Hamersley Range, Dampier Archipelago, Pannawonica, Millstream, Tom Price, Burrup Peninsula, and 70 km east of Port Hedland (Pearson 2003). The species is also known from riparian areas along the Fortescue River (Doughty *et al.* 2011).

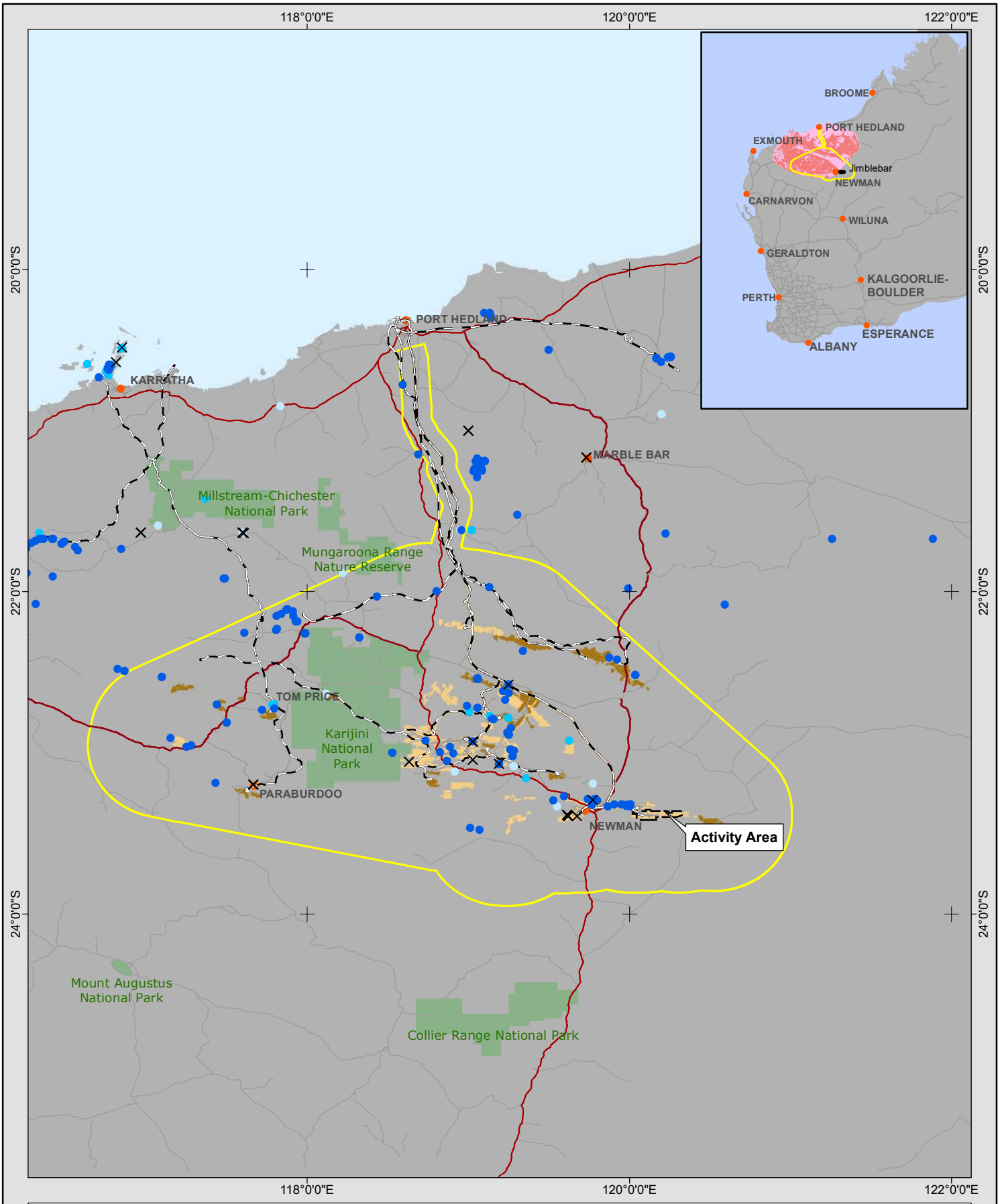
The Pilbara Olive Python commonly inhabits rocky areas in proximity to water such as gorges, rivers, pools and surrounding hills, but can be found in a range of habitats. In the Hamersley region, this species is most often encountered in the vicinity of permanent water features in rocky ranges or among riverine vegetation (Biologic 2020a).

Pilbara Olive Pythons are known to occupy a distinct home range ranging from 85 ha to 450 ha and to move around frequently within their home range (Pearson 2003). Figure 4.15 illustrates the regional records of Pilbara Olive Python.

4.6.2 Local Habitat

Multiple targeted searches for Pilbara Olive Python have been conducted in the Activity Area and surrounding areas between 2005 and 2021. No direct or indirect evidence of Pilbara Olive Python has been recorded. The areas surveyed for Pilbara Olive Python are shown in Figure 4.16.

The expansion of the Activity Area to include the Additional Validation Notice IF has not added any new habitat types relevant to the Pilbara Olive Python for consideration compared to the Previous Validation Notice IF for the previous Validation Notice (Table 4.11).



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE
PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Pilbara Olive Python regional records and distribution

Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No: A949/094 Rev C
Date:	15/05/2023	Checked:	Figure: 4.15
Revision:	REV C	Reviewed: ENVIRO. A&I	

Pilbara Olive Python records

- Records After 2005
- Records Between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Species or species habitat likely to occur
- Species or species habitat may occur

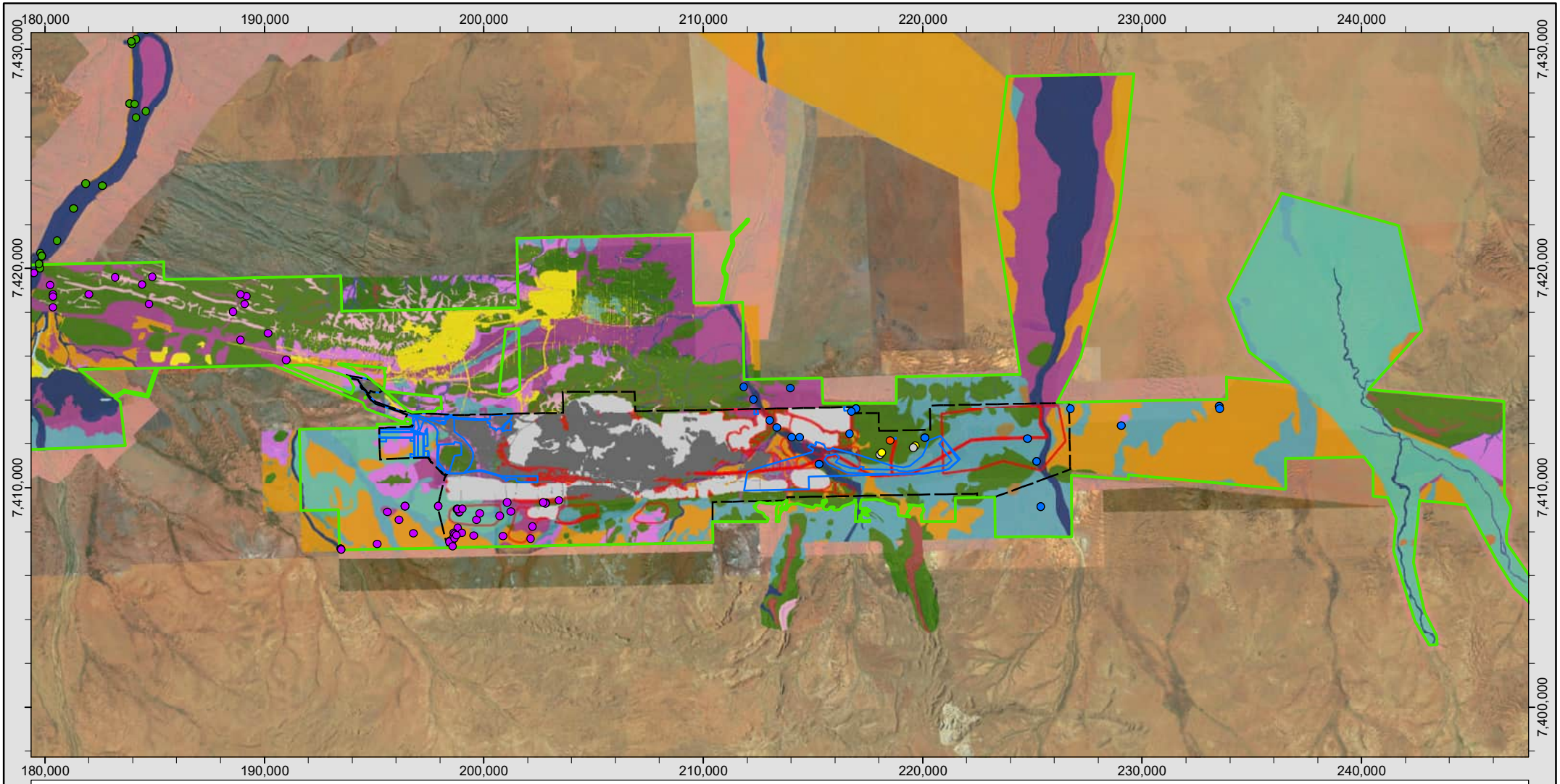
- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area
- BHP LOA Mine Plan disturbance footprint
- Third Party disturbance footprint
- Activity Area

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_094_E_VN_SEA_Species_Pilbara_Olive_Python_RevC.mxd



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Pilbara Olive Python Survey Coverage

Scale @ A4: 1:250,000	Prepared: SPATIAL DATA	Project No: A949/103 REV D
Date: 24/05/2023	Checked:	Figure : 4.16
Revision: REV D	Reviewed: ENVIRO. A&I	

Pilbara Olive Python Sample Site
- 2005
- 2006
- 2008
- 2013
- 2019
- 2021

- Survey Coverage
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint

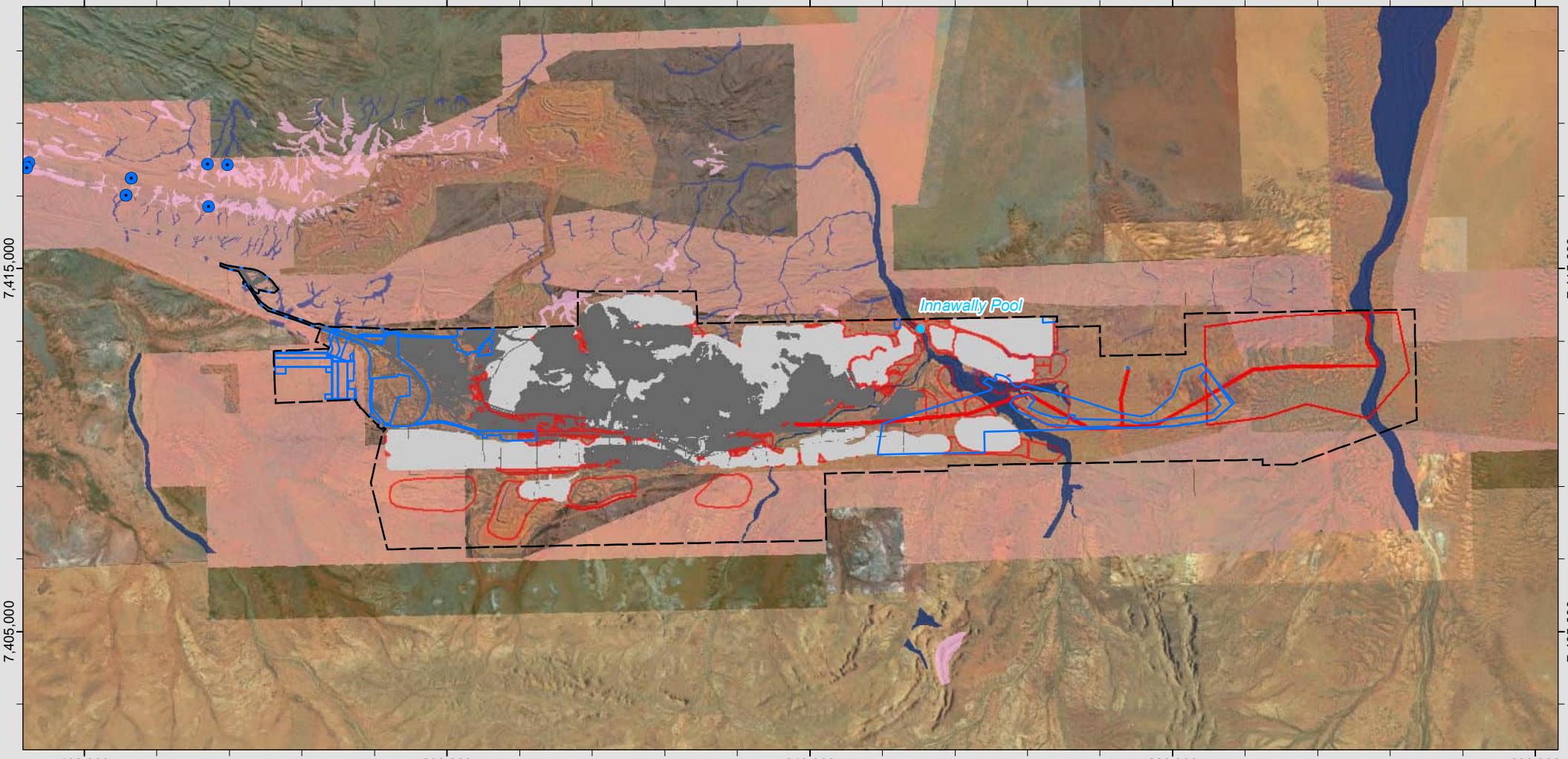
Habitat Types
- Artificial Wetlands
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Undulating Low Hills
- Unmapped

N

0 2 4 6
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_103_E_VN_PilbaraOlivePython_SurveyCoverage_RevD.mxd



Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Pilbara Olive Python Habitat and Records

Scale @ A4: 1:155,000	Prepared: SPATIAL DATA	Project No: A949/76 REV C
Date: 15/05/2023	Checked:	Figure : 4.17
Revision: REV C	Reviewed: ENVIRO. A&I	

- Innawally Pool
- BHPIO Pilbara Olive Python Species Recording
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)

Habitat Types
- Gorge/ Gully
- Major Drainage Line
- Minor Drainage Line

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_076_E_VN_OlivePythonHabitat_Records_RevC.mxd

Gorge/Gully is traditionally known as a critical breeding (and foraging) habitat for the Pilbara Olive Python (TSSC 2008), of which less than 1 ha exists within the Indicative Footprint (Table 4.11, Figure 4.17). The Gorge/ Gully habitat also provides foraging habitat for the species as it is prone to pooling and ponding in areas, which attracts prey items for the Pilbara Olive Python.

One surface water feature named Innawally Pool is present within the Activity Area in Jimblebar Creek (Figure 4.17). No records of Pilbara Olive Python exist at this location.

Up to 245 ha of supporting foraging habitat for Pilbara Olive Python has been recorded in the Indicative Footprint and includes Major Drainage Line habitat and Minor Drainage Line habitat (Biologic 2020 and 2018, GHD 2019a and 2019b) (Table 4.11).

Table 4.11: Pilbara Olive Python survey habitat assessment

	Indicative Footprint		
Habitat Description	**Previous Validation Notice (ha)**	**Additional Areas (ha)**	**Total (ha)**
Critical Habitat			
Gorge/Gully	< 1	0	<1
Supporting Habitat			
Major Drainage Line	160	73	233
Minor Drainage Line	10	2	12
Total Supporting Habitat	**160**	**75**	**245**

4.6.3 Pilbara Olive Python Records

The Activity Area is located at the south-eastern extent of the species current distribution, whereby the species or species habitat may occur (DoEE 2019b). There have been no records to date of Pilbara Olive Python within or adjacent to the Activity Area, despite extensive baseline and targeted surveys in the area, since 2004. Biologic (2020) noted that the species was unlikely to occur as a resident due to the absence of suitable rocky shelter habitat or water sources often utilised by the species.

The nearest records of the species are located over 1.5 km north and 2.5 km west of the Activity Area (Biologic 2014; Eco Logical 2013). These records are associated with water features within Gorge/Gully habitat.

4.6.4 Impact Assessment

The potential direct and indirect impacts to the Pilbara Olive Python from the Activity (see section 2) are considered below. While the Activity will result in habitat loss, given the lack of records this is not considered significant.

Habitat Loss

The Activity will result in the direct loss of up to less than 1 ha of critical denning habitat (Gorge/Gully) and 245 ha of supporting habitats (Major Drainage Line and Minor Drainage Line) for Pilbara Olive Python (Table 4.9). These habitats are contiguous with surrounding areas and are not considered to be uncommon in this part of the Hamersley Range. Given the lack of records in within the Activity Area, this habitat loss is not considered significant.

Innawally Pool, which could be a potential critical foraging habitat, will not be impacted by the Activity.

Habitat fragmentation

Habitat fragmentation could isolate Pilbara Olive python populations, reduce genetic connectivity across affected areas and increase the risk in reduction of local populations.

The TLO and associated rail upgrades, and Solar Project are adjacent to existing disturbance where barriers to dispersal already exist. Given the lack of records of the species from the area, the species is unlikely to inhabit the area. As a result, the risk of habitat fragmentation to the Pilbara Olive Python from the Activity is considered to be very low.

Feral Predators and Cane Toads

Feral predators such as feral cats (*Felis catus*) and foxes (*Vulpes vulpes*), may predate on the Pilbara Olive Python (DEW 2007) and/or compete with the Pilbara Olive Python for food (quolls and rock-wallabies) (Pearson 2006). The Activity may attract feral predators to the Activity Area, with the establishment of water sources. Evidence of cats have been recorded in fauna surveys of the area (Biologic 2020a and 2018; GHD 2019). With standard BHP feral cat management practices in place and the lack of Pilbara Olive Python records in the Activity Area, the impact of feral cats on the Pilbara Olive Python is considered low.

The future predicted spread of the cane toad into the water holes of the Pilbara bioregion, and potentially Jimblebar, may have negative impacts to the Pilbara Olive Python if ingested. Cane Toads may be introduced to areas via vehicles or equipment (DPaW 2015). It is considered unlikely that such introduction at Jimblebar will occur as travel to and from high-risk areas such as the Kimberley are not foreseen. Potential impacts from Cane Toads are therefore considered low.

Vehicle Collisions

Vehicle and machinery movements have the potential to result in fauna strike, causing injury or mortality. Pilbara Olive Python are vulnerable to vehicle strike due to being a ground dwelling species and the risk of interaction with vehicles is greatest where roads occur in proximity to suitable habitat for the species (DotE 2023d). Access roads will be required to support the Activity. As there are no records of Pilbara Olive Python within or adjacent to the Activity Area, the risk of mortality due to vehicle collision is considered very low.

4.6.5 Summary

The Pilbara Olive Python Notifiable Action triggers are not applicable as no records exist within the Activity Area or within a 500 m buffer of the Activity boundary. Direct and indirect impacts to Pilbara Olive Python are not considered significant.

4.7 Pilbara Leaf-nosed Bat

The following sections provide background information to support the absence of Pilbara Leaf-nosed Bat Notifiable Action triggers. Impacts to the Pilbara Leaf-nosed Bat are discussed to illustrate that the Program Matter Objective for this species will be met.

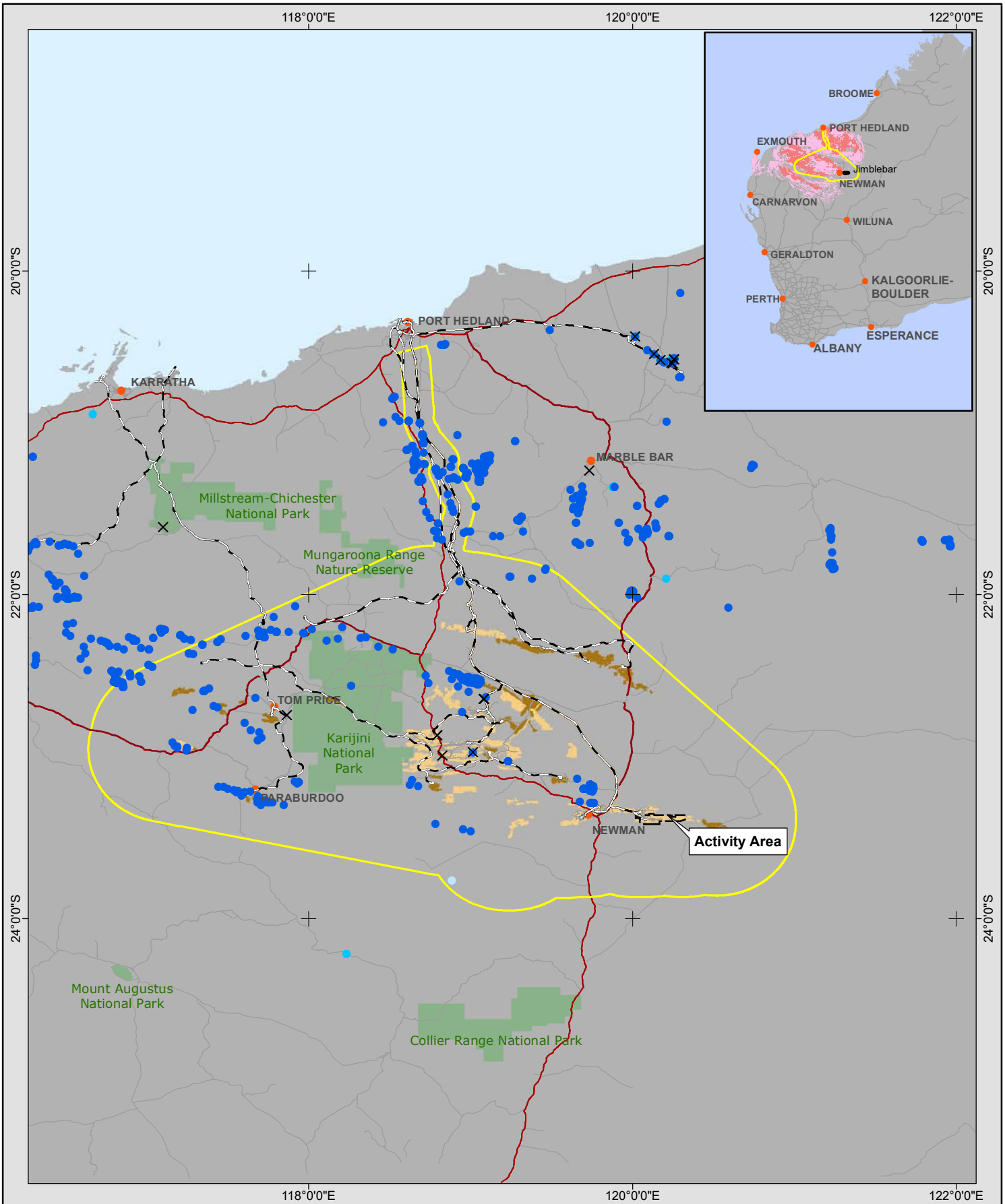
4.7.1 General Species Information

The Pilbara Leaf-nosed Bat is listed as ‘Vulnerable’ under the EPBC Act and occurs over an approximate area of 120 million hectares (Eco Logical 2014b) and is restricted to the Pilbara bioregion of Western Australia. The Pilbara population is regarded as representing a single interbreeding population comprising multiple colonies (TSSC 2016c). Individual colonies vary in size from 10 individuals to 20,000 individuals, although the latter is exceptional (Armstrong 2001; Ecologia Environment 2005, 2006a, 2006b). The size of the Pilbara Leaf-nosed Bat population is currently unknown (TSSC 2016c).

The most updated conservation advice (Bat Call WA 2021b) indicates there are 48 confirmed permanent day roosts (including maternity roosts) with 38 of these in banded iron formations in the Hamersley Ranges and eastern Pilbara,

and six in disused underground gold and copper mines of the eastern Pilbara. Figure 4.18 illustrates the regional records and distribution of Pilbara Leaf-Nosed Bat. The species' area of occupancy in the Pilbara region has been calculated by Woinarski *et al.* (2014) as under 10 km^2.

Pilbara Leaf-nosed Bats roost in undisturbed caves, deep fissures or abandoned mine shafts with a stable warm and humid microclimate because of their poor ability to maintain its heat and water balance (Kulzer et al. 1970; Churchill *et al.* 1988; Jolly 1988; Churchill 1991; Baudinette *et al.* 2000; Armstrong 2001). Caves/abandoned mines with seeps of water, moist wall surfaces and or flooded lower levels are usually of ideal humidity (Bat Call WA 2021b). The species forages within and in the vicinity of roost caves and more broadly along waterbodies with suitable fringing vegetation supporting prey species (TSSC 2016c). Pilbara Leaf-nosed Bats are predicted to travel up to 20 km from roost caves during nightly foraging (Cramer *et al.* 2016); however, seasonal variation is known to occur, with foraging occurring up to 20 km in the dry season and up to 50 km during the wet season (Bullen 2013).



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE
PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Pilbara Leaf-nosed Bat regional records and distribution

Scale @ A4:	1:3,500,000	Prepared:	SPATIAL DATA	Project No:	A949/095 Rev C
Date:	15/05/2023	Checked:		Figure:	4.18
Revision:	REV C	Reviewed:	ENVIRO. A&I		

Pilbara Leaf-nosed Bat records

- Records After 2005
- Records between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Species or species habitat likely to occur
- Species or species habitat may occur
- Activity Area

- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area
- BHP LOA Mine Plan disturbance footprint
- Third Party disturbance footprint

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994

4.7.2 Local Habitat

Multiple targeted searches for Pilbara Leaf-nosed Bat have been undertaken in the Activity Area and surrounding areas between 2006 and 2021. No direct or indirect evidence of the species has been recorded. The survey areas and survey methods used for detecting Pilbara Leaf-nosed Bat Activity are presented in Figure 4.19. The Activity Area is located at the southern extent of the species current distribution, whereby the species or species habitat may occur (DoEE 2019b).

The expansion of the Activity Area to include the Additional Validation Notice IF has not added any new habitat types relevant to the Pilbara Leaf-nosed Bat for consideration compared to the Previous Validation Notice IF for the Jimblebar Optimisation Project (BHP 2020).

Pilbara Leaf-nosed Bat critical breeding/foraging habitat has not been recorded within and or within a 500 m buffer of the Activity Area. No suitable Pilbara Leaf-Nosed Bat diurnal roosting features were recorded within the Activity Area (Biologic 2018 and 2019). No critical roosting habitats for Pilbara Leaf-Nosed Bat as defined by TSCC (2016b) have been recorded within or adjacent to the Activity Area (Biologic 2018, 2019 and GHD 2019a and 2019b).

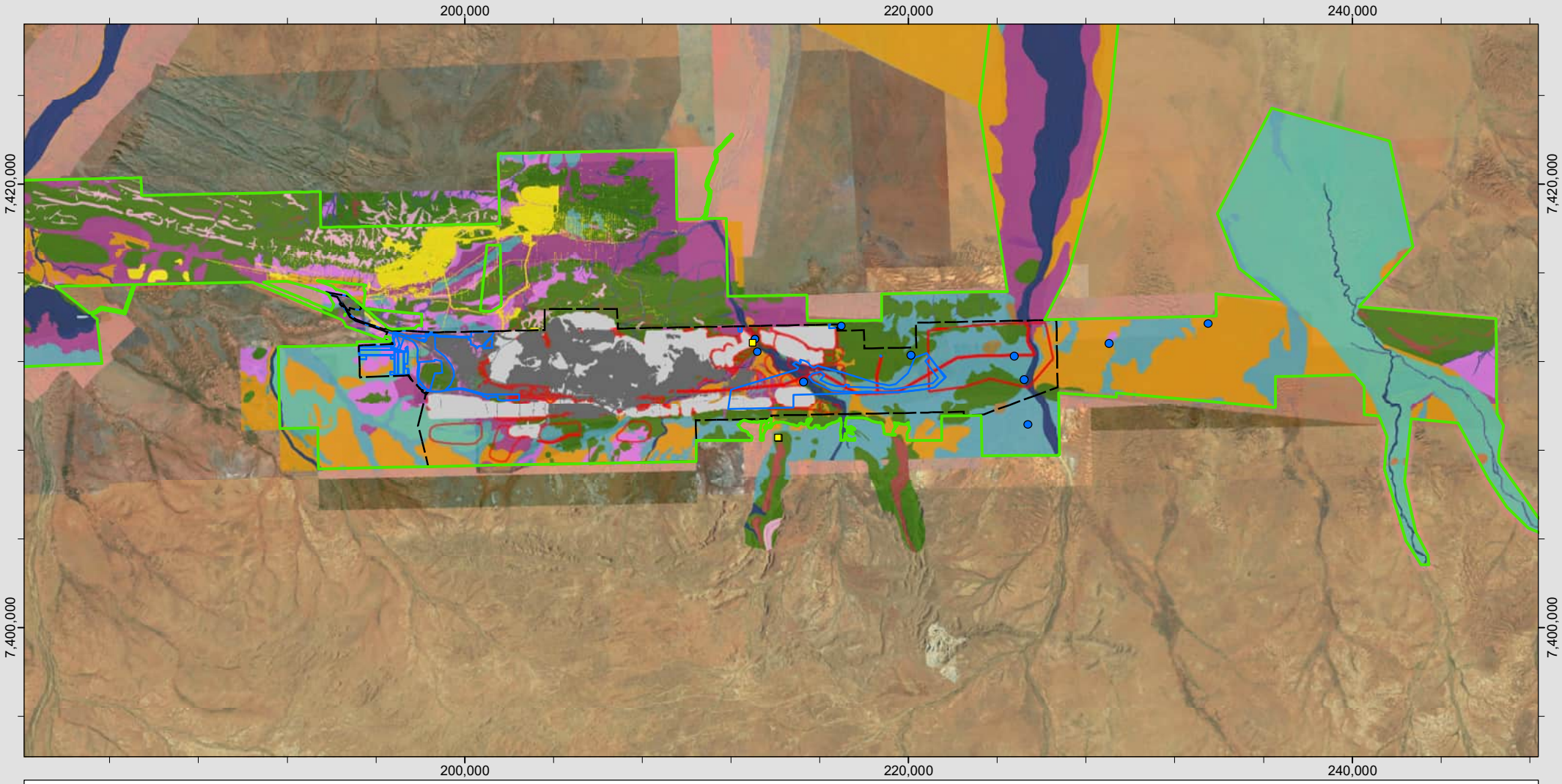
Supporting habitat which may be used for foraging or dispersal by Pilbara Leaf-nosed Bat is present within the Indicative Footprint and includes Gorge and Gully, Drainage Area/Flood Plain, Major Drainage Line, Minor Drainage, Hillcrest/ Hillslope, Sand Plain and water holes (Biologic 2022 and 2018, GHD 2019a and 2019b (Figure 4.20 and Table 4.12).

In addition to the critical foraging habitats listed in Table 4.12, one surface water feature, Innawally Pool, occurs within the Activity Area and may be used by foraging by the Pilbara Leaf-nosed Bat.

Biologic (2018 and 2019) and GHD (2019) identified that while potential foraging habitat was present in the area, the Pilbara Leaf-nosed Bat is unlikely to occur within the Activity Area due to an absence of suitable caves for roosting and foraging distances from known confirmed records of the species. The nearest confirmed record of the species is approximately 29 km to the west. This distance is beyond the typical foraging distance of the species (Biologic 2019).

Table 4.12: Pilbara Leaf-nosed Bat survey habitat assessment

Habitat Description	Indicative Footprint		
	Previous Validation Notice (ha)	Additional Areas (ha)	Total (ha)
Supporting Habitat			
Gorge/Gully	< 1	0	< 1
Drainage Area/Flood Plain	204	131	243
Hillcrest/ Hillslope	645	164	809
Sand Plain	243	164	172
Major Drainage Line	160	73	233
Minor Drainage Line	10	2	12
Total	**1,262**	**534**	**1,796**



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Pilbara Leaf-nosed Bat Survey Coverage

Scale @ A4: 1:250,000	Prepared: SPATIAL DATA	Project No: A949/104 REV D
Date: 25/05/2023	Checked:	Figure : 4.19
Revision: REV D	Reviewed: ENVIRO. A&I	

- Survey Coverage
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint

Habitat Types

- Artificial Wetlands
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Undulating Low Hills
- Unmapped

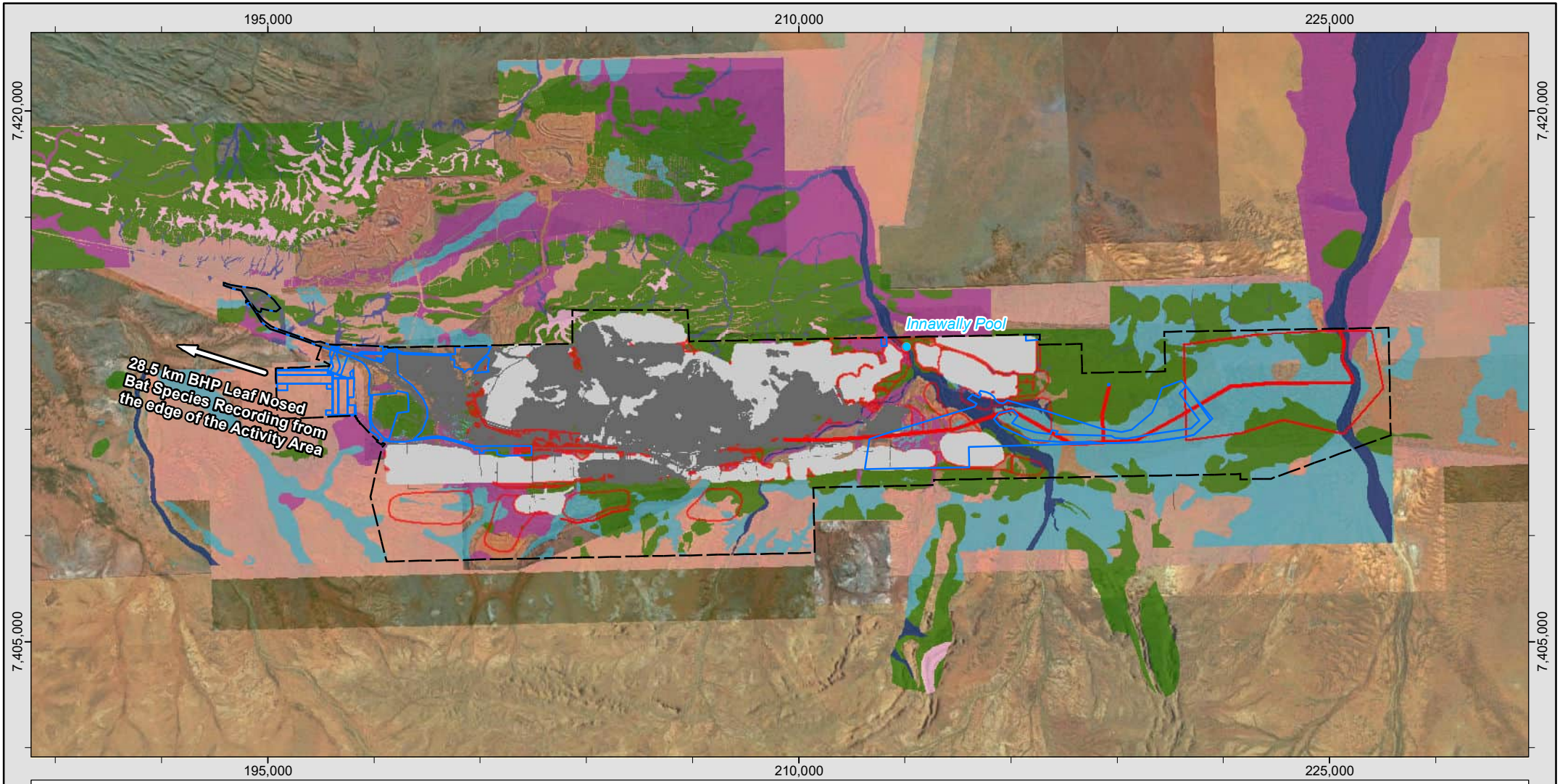
N

0 2 4 6

Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_104_E_VN_PilbaraLeafNosedBat_SurveyCoverage_RevD.mxd



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Pilbara Leaf-nosed Bat Habitat and Records

Scale @ A4: 1:155,000	Prepared: SPATIAL DATA	Project No: A949/77 REV C
Date: 16/05/2023	Checked:	Figure : 4.20
Revision: REV C	Reviewed: ENVIRO. A&I	

- Innawally Pool
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)

Habitat Types

- Drainage Area/ Floodplain
- Gorge/ Gully
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_077_E_VN_LeafNosedBatHabitat_Records_RevC.mxd

4.7.3 Pilbara Leaf-nosed Bat Records

Bat search and acoustic recorder locations are shown in Figure 4.18. There are no records of Pilbara Leaf-Nosed Bat within or adjacent to the Activity Area, despite extensive baseline and targeted surveys for bats in the area, since 2004. There have been no records or sign of residing Pilbara Leaf Nosed Bat or colonies within the Activity Area (Biologic 2022 and 2018, GHD 2019a and 2019b). The nearest record of the species is located approximately 30 km west of the Activity near Cathedral Gorge.

4.7.4 Impact Assessment

The potential direct and indirect impacts to the Pilbara Leaf-nosed Bat from the Activity (see section 2) are considered below. While the Activity will result in habitat loss, given the lack of records this is not considered significant.

Habitat Loss

Approximately 1,796 ha of supporting habitat will be cleared in the Activity Area (Table 4.10). This habitat loss is not considered to be a significant impact to Pilbara Leaf-nosed Bat as there are no critical roosts located in the Activity Area and no records for Pilbara Leaf-nosed Bat within or adjacent to the Activity Area, suggesting the Activity Area is not an important foraging ground for Pilbara Leaf-nosed Bat. Furthermore, the nearest confirmed record of the species is approximately 30 km to the west; a distance beyond the typical foraging distance of the species (Biologic 2019).

Surveys have identified, Gorge/Gully habitat in the Activity Area (Table 4.12), a critical roosting habitat, of which less than 1 ha will be removed. Although a typical critical roosting habitat, there are no critical roosts present within the Activity Area. Gorge/Gully is contiguous with surrounding areas outside of the Activity Area and is not considered to be uncommon in this part of the Hamersley Range. BHP considers that the Activity will not have a significant impact on this species at a local or regional scale.

Noise and Vibration

Noise and vibration are potential indirect impacts to the Pilbara Leaf-nosed Bat. Noise generated from haul trucks, loaders/excavators, service trucks, light vehicles and helicopters has the potential to cause roost abandonment (Bat Call WA 2021b). Given the absence of caves within and adjacent to the Activity Area, potential impacts to Pilbara Leaf-Nosed Bat from increased noise are considered to be unlikely.

Light

Artificial light may indirectly impact fauna through disrupting navigation, causing a barrier to movement, impacting foraging activity, potentially restricting the use of roosts and nests and exposing animals to nocturnal predators (Rich and Longcore 2006). Given the absence of suitable caves and records of the species within the Activity Area or within 500 m of the Activity area, impacts to the Pilbara Leaf Nosed Bat are considered negligible.

Vehicle Strike

As Pilbara Leaf-nosed Bats tend to fly relatively low and display a curiosity for light sources, they are susceptible to vehicle strikes (Armstrong 2001). Given the lack of records in the Activity Area, the risk of impact to the species by vehicle strike is considered very low.

Direct impacts to suitable Pilbara Leaf-nosed Bat foraging habitat will also be avoided where practicable through planning and implementing land disturbance approval processes prior to land disturbance.

4.7.5 Summary

The Pilbara Leaf-nosed Bat Notifiable Action triggers are not applicable as no records exist within the Activity Area or within a 500 m buffer of the Activity Area. Direct and indirect impacts to Pilbara Leaf-nosed Bat habitat are not considered significant.

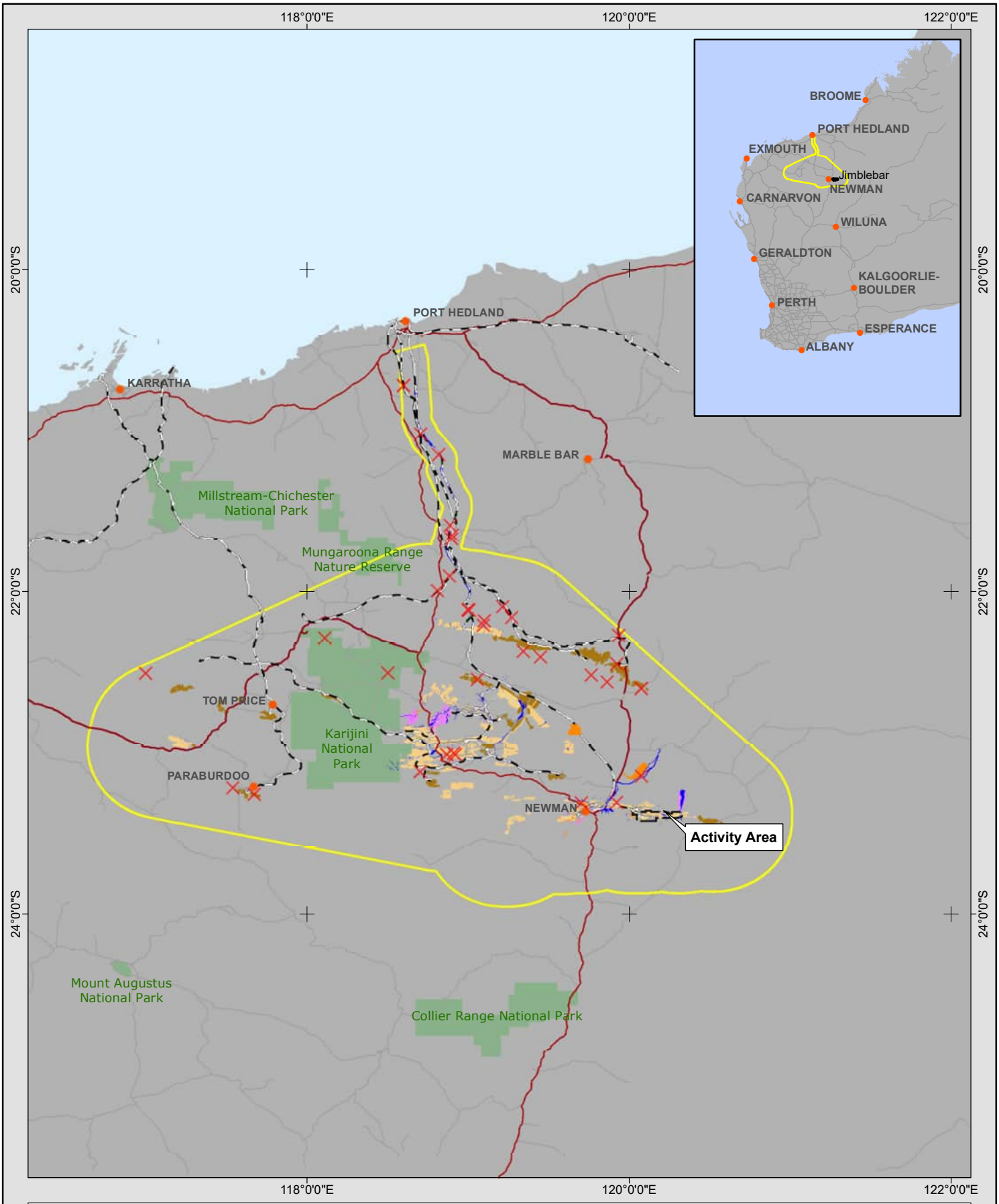
4.8 Grey Falcon

The following sections provide background information to support the absence of a Grey Falcon Notifiable Action trigger. Impacts to the Grey Falcon are discussed to illustrate that the Program Matter Objective for this species will be met.

4.8.1 General Species Information

The Grey Falcon occurs at low densities in arid and semi-arid regions of Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia (Marchant and Higgins 1993 as cited in TSSC 2020). The species is typically confined to the arid and semi-arid zones where annual rainfall is less than 500 mm (Schoenjahn 2018 as cited in TSSC 2020). The species frequents timbered lowland plains, particularly Acacia shrublands that are crossed by tree-lined water courses (Garnett *et al*. 2011; Watson 2011; Schoenjahn 2013, 2018; Janse *et al.* 2015; Ley and Tynan 2016 as cited in TSSC 2020). The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland (Olsen and Olsen 1986; Schoenjahn 2018 as cited in TSSC 2020). Eggs are laid in the old nests of other birds, usually in the tallest trees along watercourses or in telecommunication towers (Marchant and Higgins 1993; Schoenjahn 2013, 2018; Falkenberg 2011 as cited in TSSC 2020) or other similar artificial structures. River Red Gum (*Eucalyptus camaldulensis)* and Coolibah (*E. coolabah*) are favoured nesting trees.

Figure 4.21 illustrates the regional records of Grey Falcon.



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE
PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Grey Falcon regional records and distribution

Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No: A949/114 Rev A
Date:	24/05/2023	Checked:	Figure: 4.21
Revision:	REV A	Reviewed: ENVIRO. A&I	

- Falco hypoleucos (Grey Falcon)
- Town
- Minor/Regional Road
- Major Road
- Rail Centreline

HabitatType

- Major Drainage Line
- Medium Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Waterhole
- Drainage Area/ Floodplain
- Activity Area
- Strategic Assessment Area
- BHP LOA Mine Plan disturbance footprint
- Third Party disturbance footprint

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994

4.8.2 Local Habitat

Multiple fauna surveys including for Grey Falcon, have been conducted in the Activity Area and surrounding areas between 2005 and 2020. No evidence of the species has been recorded. The areas surveyed for Grey Falcon are shown in Figure 4.22.

Major Drainage Line is considered a critical breeding habitat for the Grey Falcon as nests are frequently found in the tall trees which occur in major drainage lines, such as River Red Gun and Coolibah (Marchant and Higgins 1993; Schoenjahn 2013, 2018; Falkenberg 2011). Approximately 233 ha of Major Drainage Line habitat exists within the Indicative Footprint (Table 4.13, Figure 4.23).

Supporting habitat for Grey Falcon has been recorded in the Activity Area and includes Drainage Area/Flood Plain, Mulga Woodland, Sand Plain and Stony Plain (Biologic 2020a and 2018, GHD 2019a and 2019b). Collectively these habitats make up 2,367 ha of the Indicative Footprint.

As there have been no records or sign of resident Grey Falcon within the Activity Area (Biologic 2020a and 2018, GHD 2019a and 2019b) it is unlikely critical or supporting habitats present for Grey Falcon are used on a regular basis.

Table 4.13: Grey Falcon survey habitat assessment

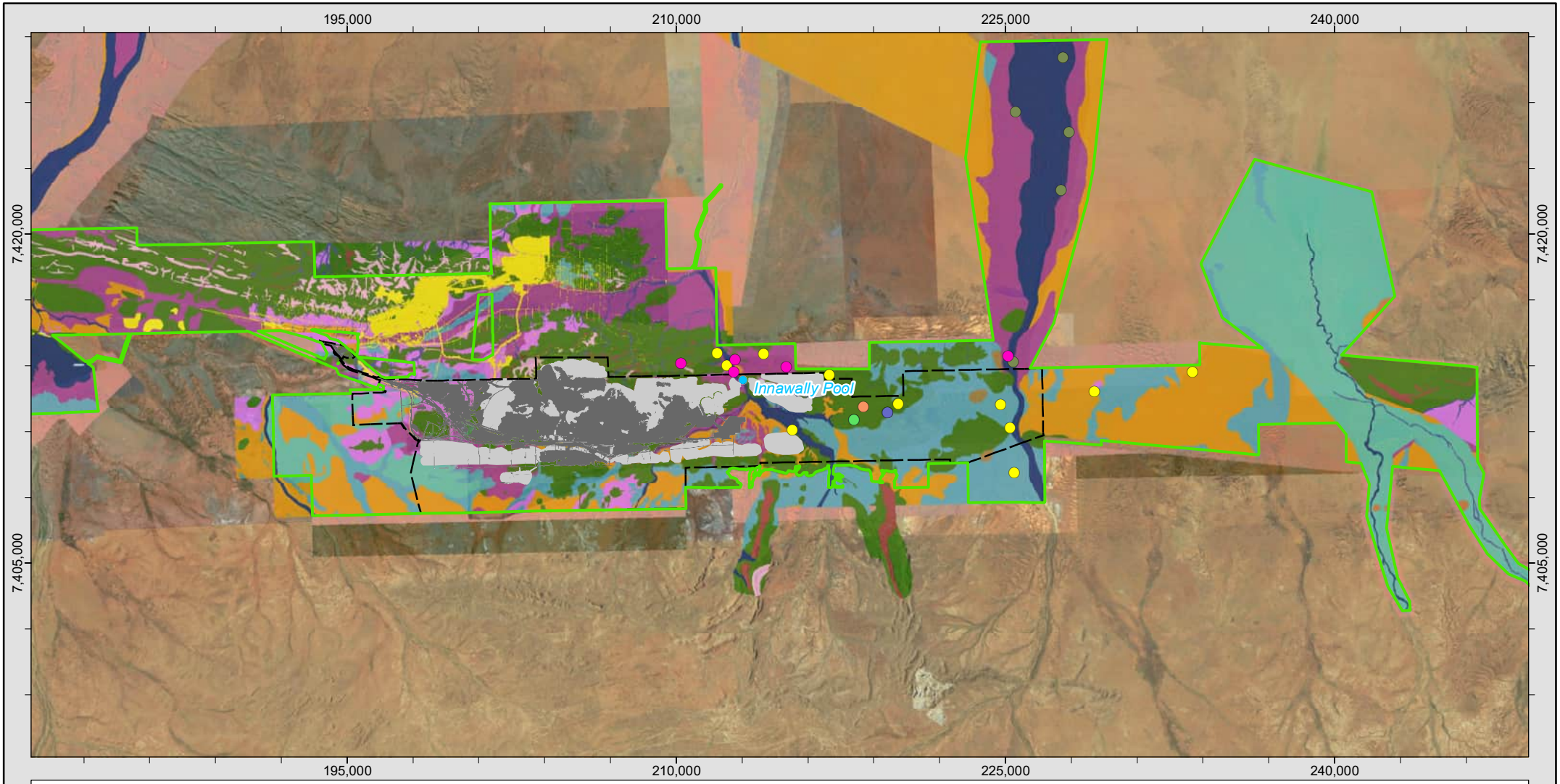
Habitat Description	Indicative Footprint		
	Previous Validation Notice (ha)	Additional Areas (ha)	Total (ha)
Critical roosting habitat			
Major Drainage Line	160	73	233
Supporting Habitat			
Mulga Woodland	1,174	291	1465
Drainage Area/Floodplain	204	131	335
Sand Plain	243	164	407
Stony Plain	60	100	160
Total Supporting Habitat	**1,681**	**686**	**2,367**

4.8.3 Grey Falcon Records

There have been no records or sign of resident Grey Falcon within the Activity Area (Biologic 2020 and 2018, Biota 2020, GHD 2019a and 2019b).

4.8.4 Impact Assessment

The potential direct and indirect impacts to the Grey Falcon from the Activity (see Section 2) are considered below. While the Activity will result in habitat loss, given the lack of records this is not considered significant.



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Grey Falcon Survey Coverage

Scale @ A4: 1:250,000	Prepared: SPATIAL DATA	Project No: A949/119 REV A
Date: 24/05/2023	Checked:	Figure : 4.22
Revision: REV A	Reviewed: ENVIRO. A&I	

Grey Falcon Sample Sites
- 2005
- 2006
- 2008
- 2018
- 2019
- 2020
- Innawally Pool
- Survey Coverage
- Activity Area
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)

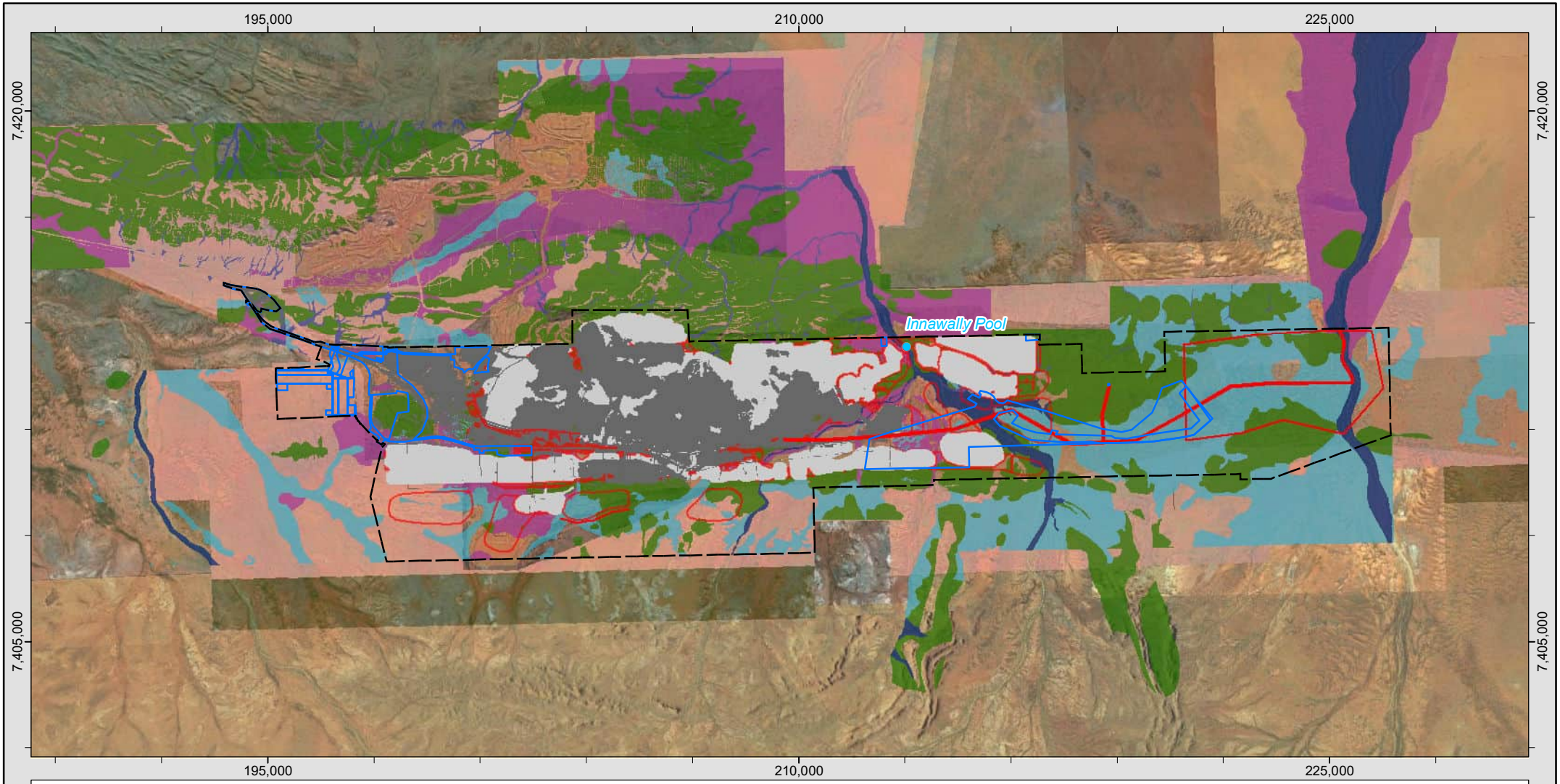
Habitat Types
- Artificial Wetlands
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Undulating Low Hills
- Unmapped

N

0 2 4 6
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_119_E_VN_GreyFalcon_SurveyCoverage_RevA.mxd



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Grey Falcon Habitat and Records

Scale @ A4: 1:155,000	Prepared: SPATIAL DATA	Project No: A949/116 REV B
Date: 17/05/2023	Checked:	Figure : 4.23
Revision: REV B	Reviewed: ENVIRO. A&I	

- Innawally Pool
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)

Habitat Types

- Drainage Area/ Floodplain
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_116_E_VN_GreyFalconHabitat_Records_RevB.mxd

Habitat loss

Land clearing of the semi-arid zone and overgrazing of arid zone rangelands have been identified as possible threats to the availability of nesting trees (Garnett and Crowley 2000; Garnett *et al.* 2011; Schoenjahn 2013, 2018). The Activity will result in the direct loss of up to 233 ha of critical habitat (Major Drainage Line) and 2,367 ha of supporting habitats (Mulga Woodland, Drainage Area/Floodplain, Sand Plain, Stony Plain) for Grey Falcon. Given the lack of sightings or nests of Grey Falcon in the Activity Area, habitat loss associated with the Activity is not considered to be a significant impact.

Feral Predators

Feral predators such as feral cats (*Felis catus*) and foxes (*Vulpes vulpes*), may predate on the Grey Falcon. Schoenjahn (2018) documented that Grey Falcons will roost on the bare open ground and reported Grey Falcon in the gut contents of cats. Chicks may also be vulnerable to cat predation at accessible nests. Evidence of cats has been recorded in fauna surveys of the area (Biologic 2020a and 2018; GHD 2019). With the implementation of standard BHP feral cat management practices and the lack of Grey Falcon records in the Activity Area, the impact of feral cats on the Grey Falcon is considered very low.

4.8.5 Summary

The Grey Falcon Notifiable Action triggers are not applicable as no records exist within the Activity Area or within a 500 m buffer of the Activity boundary. Direct and indirect impacts to Grey Falcon are not considered significant.

4.9 Night Parrot

The following sections provide background information to support the absence of Night Parrot Notifiable Action triggers. Impacts to the Night Parrot are discussed to illustrate that the Program Matter Objective for this species will be met.

4.9.1 General Species Information

The Night Parrot is listed as Endangered under the EPBC Act and Critically Endangered under the BC Act. The Night Parrot has long been considered one of Australia's most mysterious birds. The species was presumed extinct until 2013 when, after more than a century since the last widely accepted sighting of a live individual, a population was discovered in south-west Queensland. Since then, the species has been recorded from isolated populations in south-west Queensland and northern inland Western Australia (TSSC 2016d).

There are two known records of the Night Parrot in the SAA from 1967 (DBCA) and 2005 (Birdlife). The 1967 record is located in the far south-western portion of the SAA. The 2005 record is from Minga Well in the northern portion of the SAA, approximately 2.5 km north of the Fortescue Marsh. Due to confidentiality issues, the location of any other records within the SAA boundary are unable to be sourced from external databases.

The Night Parrot requires access to reliable food sources, shelter for breeding, protection from predators and the elements, and access to either free water or water-rich plant foods (Burbidge 2020). The spatial configuration requirements of Night Parrot habitat features have become increasingly evident through recent records of the species by Paruku Rangers and Birriliburu Rangers and others (Davis and Metcalfe 2008; Jackett *et al*. 2017; Murphy *et al.* 2017; Michelmore and Birch 2020 as cited in Burbidge 2020). The records have occurred at locations where productive feeding habitat (such as ephemeral grasslands, herb-fields or samphire, gilgais, run-on areas, flood plains, or salt lake systems), is interspersed or juxtaposed (at a scale of tens of square kilometres) with old-growth, dense hummock-forming spinifex for roosting/nesting that is broken up into fire-isolated patches by ironstone, rocky bars, salt lakes or samphire flats, within 50 km of free water (Burbidge 2020). The species also appears to rely on roosting/nesting in dense clumps of vegetation that are long-unburnt (TSSC 2016d).

4.9.2 Local Habitat

Survey coverage for the Night Parrot is shown in Figure 4.24.

There are no critical habitats for Night Parrot present within the Activity Area (Biologic 2020a and 2018, GHD 2019a and 2019b). Although larger mature *Triodia* hummocks occur within Stony Plain habitats of the Activity Area, the occurrence of nesting habitat in proximity to primary foraging habitat (defined as low, treeless chenopod shrublands or herb lands with high abundance of annual grasses and herbs) is believed to be a key factor in the species occurrence. As no known suitable primary foraging habitat occurs within 10 km of the Activity Area (furthest distance recorded for a foraging individual; Murphy *et al.,* 2017), occurrence of the species in the Activity Area or within 500 m of the Activity Area is considered unlikely.

Potential supporting habitat for the Night Parrot is present within the Activity Area and comprises 495 ha of the Indicative Footprint (Biologic 2020a and 2018, GHD 2019a and 2019b) (Table 4.14, Figure 4.25).

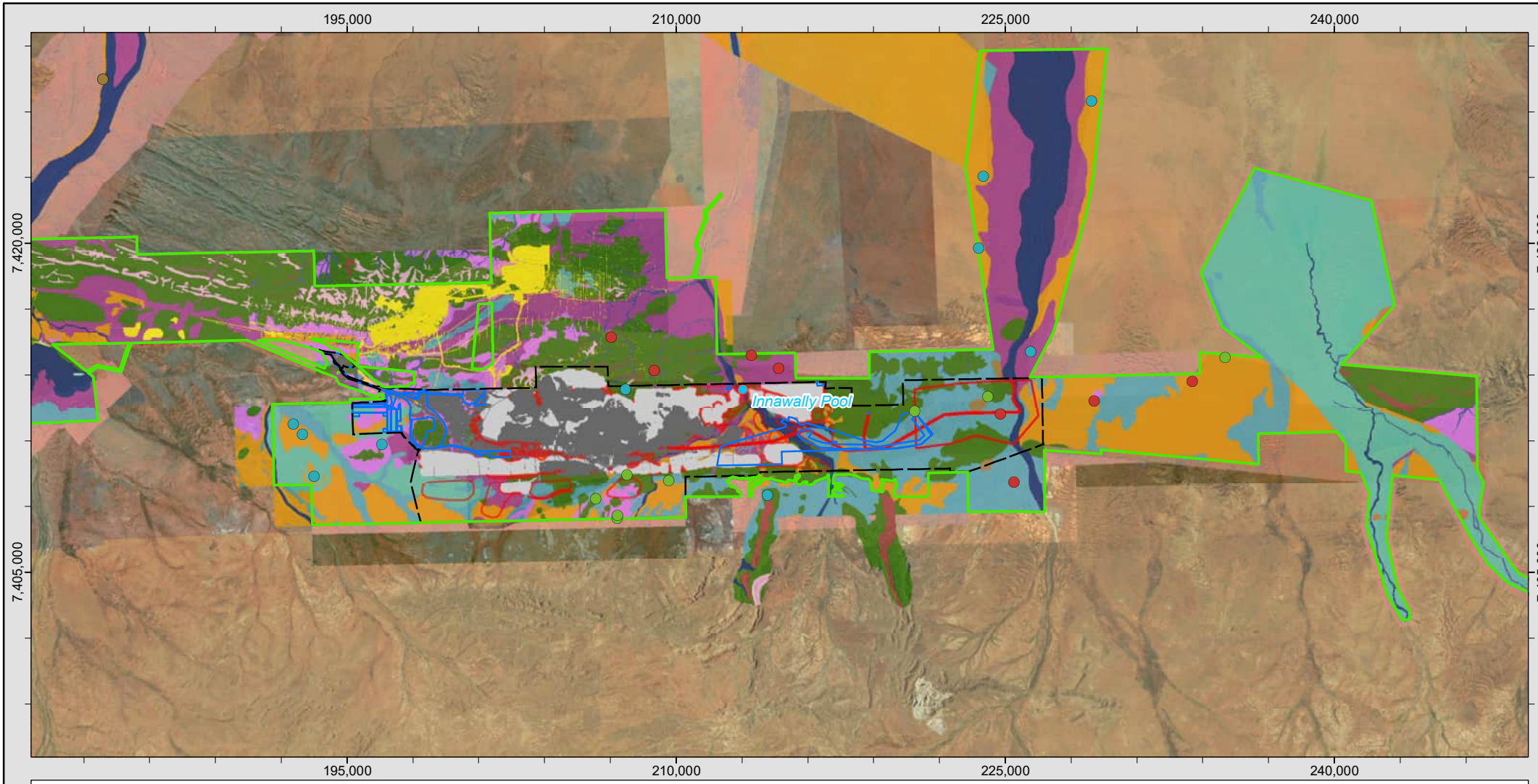
Table 4.14: Night Parrot Habitat Assessment

Habitat Description	Indicative Footprint		
	Previous Validation Notice (ha)	Additional Areas (ha)	Total (ha)
Supporting Habitat			
Drainage Area/Flood Plain	204	131	335
Stony Plain	60	100	160
Total	**264**	**231**	**495**

4.9.3 Night Parrot Records

There have been no records or sign of resident Night Parrot within the Activity Area (Biologic 2020a and 2018, GHD 2019a and 2019b).

Records of Night Parrot within the Pilbara region are scarce, with the nearest contemporary record of the species located approximately 140 km northwest, from April 2005 (Davis and Metcalf, 2008; DBCA, 2020a).



Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Night Parrot Survey Coverage

Scale @ A4: 1:250,000	Prepared: SPATIAL DATA	Project No: A949/118 REV A
Date: 24/05/2023	Checked:	Figure : 4.24
Revision: REV A	Reviewed: ENVIRO. A&I	

Night Parrot Sample Sites
- 2018
- 2019
- 2020
- 2021
- Innawally Pool

Survey Coverage
Activity Area
Indicative Previously Assessed Area (Out of Scope)
Indicative Cleared Area as at FY2019

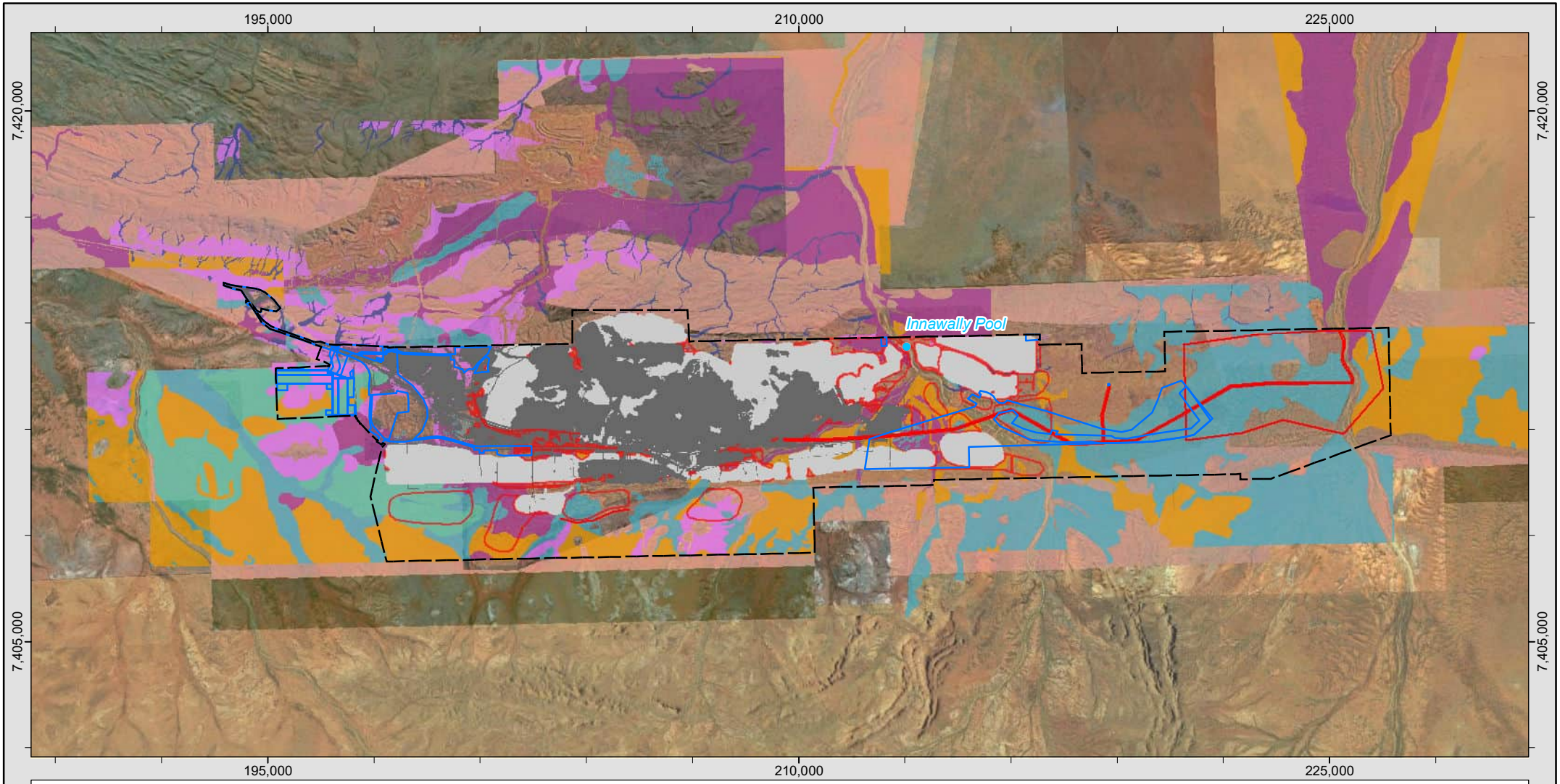
Habitat Types
- Artificial Wetlands
- Breakaway/Cliff
- Claypan
- Drainage Area/ Floodplain
- Gorge/ Gully
- Hardpan Plain
- Hillcrest/Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain
- Undulating Low Hills
- Unmapped

N

0 2 4 6
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_118_E_VN_NightParrot_SurveyCoverage_RevA.mxd



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE

PUBLIC

REVISED JIMBLEBAR OPTIMISATION PROJECT VALIDATION NOTICE

Night Parrot Mapped Habitat

Scale @ A4: 1:155,000	Prepared: SPATIAL DATA	Project No: A949/115 REV B
Date: 16/05/2023	Checked:	Figure : 4.25
Revision: REV B	Reviewed: ENVIRO. A&I	

- Innawally Pool
- Indicative Cleared Area as at FY2019
- Indicative Previously Assessed Area (Out of Scope)
- Activity Area
- Additional VN Indicative Footprint
- Previous VN Indicative Footprint

Habitat Types

- Drainage Area/ Floodplain
- Hardpan Plain
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain

N

0 1 2 3
Kilometres

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Datum: GDA 1994

Document Path: Y:\Jobs\A501_A1000\A949\3Project\A949_115_E_VN_NightParrotHabitat_Records_RevB.mxd

4.9.4 Impact Assessment

The potential direct and indirect impacts to the Night Parrot from the Activity (see section 2) are considered below. While the Activity will result in habitat loss, given the lack of records this is not considered significant.

Habitat loss

The Activity will result in the direct loss of up to 497 ha of potential supporting habitat (Drainage Area/Floodplain and Stony Plain) for Night Parrot. Given the lack of records within the Activity Area or within 500 m of the Activity Area, the potential impact to the species is considered to be low.

Habitat modification

Numerous references indicate that the Night Parrot nests in dense clumps of vegetation that are long-unburnt (TSSC 2016d). The Night Parrot is therefore considered susceptible to the effects of changes in fire regimes or human-induced fire events. Hot work activities on site and the introduction and vehicle movements may increase the risk of fire to Night Parrot supporting habitats within the Activity Area. Further habitat degradation through weed introduction is likely to have been caused through grazing cattle which has been observed in the Activity Area during surveys (Biologic 2020, 2019 and 2018, GHD 2019a and 2019b). Given the lack of records of the species in the Activity Area, the impact of habitat modification to the Night Parrot is considered to be very low. With standard BHP fire management and weed control practices, the potential for increased risk of fire and habitat degradation due to weeds, are considered low.

Feral Predators

The considerable time the Night Parrot spends on the ground with nesting and foraging makes it prone to predation by feral cats and foxes (TSSC 2016d). Fauna surveys (GHD 2019a and 2019b) have recorded the presence of feral cats within the Activity Area. Given the lack of records for Night Parrot, the impact from feral predators is considered very low.

4.9.5 Summary

The Night Parrot Notifiable Action triggers are not applicable as no records exist within the Activity Area or within a 500 m buffer of the Activity Area. Direct and indirect impacts to Night Parrot supporting habitat are not considered significant.

4.10 Validation reporting

BHP will track compliance of this Validation Notice against the Program at an Activity scale to ensure that the PMOs are being achieved.

BHP will produce an Annual Environmental Report for all of its environmental obligations for each notifiable action under the Strategic Assessment Approval. As a minimum, the aspects applicable to this Revised Validation Notice to be included in the Annual Environmental Report are:

- status of implementation (planned start date, action commenced and planned completion date; and action completed) of the Notifiable Action
- offsets implemented for the Notifiable Action
- where applicable, accumulated disturbance against PMO
- disturbance areas associated with all actions, whether material or non-material, implemented since the Approval. Both the annual disturbance and the total disturbance (since the Approval) will be included
- monitoring, management and corrective actions implemented during the reporting period to avoid, mitigate and offset impacts to Program Matters

- attainment of Program Matter Objectives and PMOs
- summary of any exceedances of the PMO relevant to each Notifiable Action, and corrective actions taken
- deviations from the Program or from information and management commitments contained in a Validation Notice for a Notifiable Action.

5 Offset Proposal

5.1 Residual impacts

Residual impacts are the unavoidable impacts that remain after avoidance and mitigation measures have been implemented. The residual impacts of the Activity as described and assessed in this Revised Validation Notice are the loss of critical roosting and foraging habitat and supporting habitat for the Ghost Bat (see Section 4.3.7).

Given residual impacts to critical foraging habitat within a 12 km radius of Category 2 and 3 roosts encompasses supporting habitat habitats to be impacted. Therefore, only residual impacts for critical roosting and foraging habitat will require offsets (Table 5.1).

5.2 Offset requirements

BHP developed the following objective for each of the Program Matters based on *the Standards for Accreditation of Environmental Approvals under the Environment Protection and Biodiversity Conservation Act 1999* and in consultation with the DCCEEW (Section 3.1.1 of the Program):

> *'To support the long-term persistence and viability of the Ghost Bat within the strategic assessment area'.*

Offsets applied by BHP for the loss of <1 ha of critical roosting habitat and 2,612 ha of critical foraging habitat for the Ghost Bat are required to achieve this Program Matter Objective. Furthermore, the PMO relevant to the residual impact must also be achieved, which in this case, is:

'Minimise loss of critical and supporting habitats of the Ghost Bat as a result of Program Activities within the SAA

AND

No loss (or maintain) Ghost Bat colony(s) as a result of program activities'

Table 5.1: Ghost Bat residual impacts for the Revised Jimblebar Optimisation Project Validation Notice requiring offsetting under the SEA

Residual impact	Habitat types to be offset within the Indicative Footprint		Total area to be offset (ha)	Habitat rating	Offset rate ($/ha) excluding GST	Total financial offset ($) excluding GST
	Previous Validation Notice Indicative Footprint	Additional Indicative Footprint				
Direct impacts to critical roosting habitat	< 1 ha Gorge/Gully	Nil	< 1 ha	Critical roosting habitat	3,306	3,306
Direct impacts to critical foraging habitat (including native vegetation which supports foraging within a 12 km radius of Category 2 and 3 roosts.	204 ha of Drainage Area/Flood Plain 1,174 ha of Mulga Woodland 160 ha of Major Drainage 10 ha Minor Drainage 243 ha Sand Plain 60 ha Stony Plain	131 ha of Drainage Area/Flood Plain 291 ha of Mulga Woodland 73 ha of Major Drainage 2 ha Minor Drainage 164 ha Sand Plain 100 ha Stony Plain	2,612 ha	Critical foraging habitat	3,306	8,635,272
Total Amount to be offset						$8,638,578
Initial 10% pre-payment						$863,857.8

5.3 Proposed offset

Typical offset methods available in the Pilbara that BHP may use include, financial, land management and research offsets. The DCCEEW have agreed that contributions to the PEOF will address clearing of critical and supporting habitat. The loss of less than 1 ha of critical roosting habitat and 2,612 ha of critical foraging habitat for the Ghost Bat (refer to Section 5.4 for calculation) is therefore proposed to be offset by a financial contribution to the PEOF.

The offset package will include two components:

- An advance payment of a minimum of 10% of the estimated total contribution to be paid into the PEOF, within one month of the Validation Notice becoming effective.
- A biannual payment for each hectare of clearing of critical foraging habitat for the Ghost Bat.

Financial contributions to the PEOF will achieve the Program Matter Objective and relevant Program Matter Outcome in Section 5.2 through investment into one or more conservation projects relevant to the Ghost Bat conducted at various scales by the PEOF:

- Landscape-scale programs address threats like weeds, feral animals, and inappropriate fire across the landscape.
- Priority area programs build on the landscape-scale outcomes to further improve and protect vegetation and species habitat in identified priority areas.
- Site-specific projects protect and improve specific environmental matters such as Priority Ecological Communities or a particular habitat with unique attributes.

Reporting on the financial contribution to the PEOF will be included in the Annual Environmental Report (see Section 5.7).

5.4 Offset calculation

5.4.1 Baseline Conditions

During the assessment, fauna habitat survey data for each Program Matter is collected. A component of the biological survey information is the identification and mapping of critical and suitable habitats for each Program Matter. As the presence of Ghost Bat has triggered the need for this Validation Notice, the occurrence and category of Ghost Bat Caves (according to Bat Call WA 2021) together with habitat mapping has been reviewed in the determination of offsets.

The following baseline datasets will be provided to the PEOF to assist in determining the offset value to be applied:

- the Activity Area;
- existing disturbance areas (as of FY 2019); and
- fauna habitat mapping and relevant Program Matter records.

5.4.2 Offset Value

The following methodology is used to calculate the direct impacts to the Program Matter values that require offsetting utilising the PEOF:

1) Land disturbance data is captured

   BHP captures and prepares a land disturbance dataset to demonstrate the impacts that have occurred within the reporting period, via the following steps:

- throughout the financial year periodic aerial imagery of the Validation Notice Activity Area is captured
- using the aerial imagery closest to the end and beginning of each financial year, the land disturbance within each reporting period is digitised
- land disturbance data is then categorised and attributed with data according to the standards set out in the Instructions and associated templates
- the land disturbance data further digitised and captured at 1:1,000, meaning that 1 millimetre on the computer screen is equivalent to 1 metre on the ground[2]; this is consistent with the precision of all BHP datasets
- a land disturbance dataset is then available for reconciliation and validation processing.

2) Data reconciliation and validation

   Reconciliation and validation of the land clearing dataset is undertaken to ensure that all land disturbance activities for the reporting period have been streamlined, categorised and attributed according to the Impact Reconciliation Plan, Instructions requirements and from prior feedback from DWER.

3) Processing of datasets

   BHP has developed a methodology which automates the process of comparing the land clearing dataset against the baseline dataset, for calculating the hectares of land disturbance for each area of environmental value (areas subject to offsets), and those with Offset Exclusions.

   The automated methodology ensures the process of deriving the final product is consistent and repeatable, across other approvals and reporting periods.

4) Production of final Impact Reconciliation Report dataset

   An EPBC Act Impact Reconciliation Report (EPBC Act IRR) dataset for each financial year within the reporting period is then developed.

   The EPBC Act IRR dataset will be used for calculating and reporting the total number of hectares with the Program Matter offset requirements within the reporting period and the cumulative totals, in the EPBC Act IRR.

   This EPBC Act IRR dataset and aerial imagery, is submitted to the DWER with the IRR for review and assessment, and will be maintained on record for auditing purposes.

5.4.3 Offset rates

The relevant financial rates to be used per ha of loss of supporting habitat as determined by the DCCEEW are as follows:

- A minimum of $3,306 per ha of Ghost Bat Critical foraging habitat

5.5 Proposed schedule

Key anticipated steps and the schedule for the provision of advanced and biannual payments to the PEOF are outlined in Tables 5.2 and 5.3. This schedule is aligned with the requirements of the APOP.

2 BHP captures baseline land disturbance at 1:1,000 (i.e. +/- 0.5m on the ground) hence any polygon slivers or gaps in the dataset under one square metre are ignored and are considered acceptable in the context of analysing datasets at vastly different scales.

Table 5.2: Offsets Reporting period.

Reporting Period	Action	Timing
1 July to 30 June	Offsets implemented for each Notifiable Action	Annual capture with biannual payment

Table 5.3: PEOF Contributions Schedule

Validation Process Stage	Action	Timing
Consultation on PEOF contributions	Provision of the Validation Notice inclusion of Impact Reconciliation Process and spatial data (Section 5 for Contributions to the PEOF	30 August 2023
Authorisation	Validation Notice becomes effective	25 September 2023
Implementation Advanced Payment	Advanced Payment (10% of the estimated total contribution)	1 October 2023
	BHP to report payment of Advanced Payment in the AER	1 October 2024
Implementation Period 1	First annual reporting period	1 July 2023 to 30 June 2024
	Aerial survey/ground truthing	30 June 2024
	EPBC Impact Reconciliation Report submitted to DWER	30 September 2024
	BHP to report payment of Offset Payment in the AER	1 October 2023
Implementation Period 2 and so forth until final offset contributions are completed	Second annual reporting period	1 July 2024 to 30 June 2025
	Aerial survey/ground truthing	30 June 2025
	EPBC Impact Reconciliation Report submitted to DWER	30 September 2025
	BHP to report payment of Offset Payment in the AER	1 October 2024

5.6 Offsets Reporting

5.6.1 Payment of financial contributions

EPBC IRRs will be submitted biannually to the DWER PEOF administration team and kept on record for auditing purposes**.** In the event this Validation Notice and Offset Proposal are amended and

superseded by a new version, a part-year reconciliation will be undertaken for the superseded approval to coincide with the start of the first reporting period.

The following information will be submitted in the IRR:

- clearing undertaken for each financial year of the reporting period;

- supporting information to validate clearing including the aerial imagery, digitised polygons and ground-truthing surveys (undertaken in accordance with the DWER and the DCCEEW guidance) used to determine clearing in each financial year;
- information regarding exempt clearing, other approvals or reductions to contributions to the fund, where relevant; and
- where applicable, information regarding part-year reconciliations required due to a Validation Notice and SEA Offsets Proposal being superseded.
- a forward estimate of clearing.

5.6.2 Implementation of PEOF Projects

BHP will provide a progress summary of the offsets implemented and achievement of outcomes from the funding provided to the PEOF in the AER. Annual reports, evaluations or other progress reports provided by the PEOF and its delivery agents to BHP will be retained for auditing purposes.

6 Commitments

Key commitments of the Validation Notice are summarised in the following sections. Implementation of each of the commitments will be reported in the SEA AER.

6.1 Monitoring commitments

The monitoring commitments which form part of this Validation Notice are presented in Table 6.1. Additional details for monitoring the Ghost Bat are presented in Section 4.4.9.

Table 6.1: Proposed monitoring commitments – Ghost Bat

Monitoring Commitment	Action	Monitoring and frequency	Reporting
Monitor Ghost Bat population at Jimblebar to verify there is no loss as a result of program activities.	1. Undertake Ghost Bat monitoring at Jimblebar using techniques such as scat analysis, motion camera footage and targeted searches. 2. Review monitoring data two yearly to verify no disappearance of Ghost Bat from the Jimblebar area.	The proposed monitoring methods are detailed in Table 4.7, with the monitoring to be implemented detailed in Table 4.8. Proposed monitoring location are as follows (pending safe access and heritage restrictions): • Category 2 roosts (CJIM-03 and CNIN-01) at least 6 monthly • Category 3 roosts (CNIN-01, CNIN-13, CJIM-09) at least yearly • Category 4 roosts (CJIM-03, CJIM-05, CJIM-06, CJIM-08, CJIM15, CJIM17, CJIM-20, at least two yearly Figure 4.8 shows the current monitoring locations. Additional sites, including regional reference sites, may be added to the program in the future.	SEA AER

6.2 Clearing commitments

The clearing commitments which form part of this Validation Notice, inclusive of proposed clearing allowances for each habitat type, are presented in Table 6.2.

Table 6.2: Proposed clearing commitments – Ghost Bat

Clearing Commitment	Action	Monitoring and frequency	Reporting
Clearing does not exceed areas specified in critical habitats below: • 1 ha Gorge/Gully • 335 ha Drainage Area/ Flood plain • 233 ha Major Drainage Line • 12 ha Minor Drainage Line • 1,465 ha Mulga Woodland • 407 ha Sand Plain • 160 ha Stony Plain	1. Implement BHP's internal PEAHR process prior to all ground disturbance within the Activity Area to ensure clearing does not exceed areas specified.	Annual land disturbance reconciliation (hectares and spatial footprint) for within the Activity Area. Annual review of habitat and habitat features disturbed in relation to limits specified in this Validation Notice.	SEA AER
No clearing of category 3 or 4 roosts within the Activity Area (i.e. CJIM – 09 or CJIM-20)	Implement BHP's internal PEAHR process prior to all ground disturbance within the Activity Area to ensure clearing does not exceed areas specified.	Annual review of habitat and habitat features disturbed in relation to limits specified in this Validation Notice.	SEA AER

6.3 Management commitments

The management commitments which form part of this Validation Notice are presented in Table 6.3.

Table 6.3: Proposed management commitments – Ghost Bat

Management Commitment	Action	Monitoring and Frequency	Reporting
Implement feral cat management	Monitor presence of feral cats through records of opportunistic sightings. Report all cat sightings to the site-environmental specialist. Cage trapping for cats if feral cats are sighted.	All personnel on site to report any opportunistic sightings of feral cats to the Site Environmental Specialist Cage trapping to be undertaken following reports of any cat sightings on site.	SEA AER
Implement fire management	Abide by hot work management procedures Firebreaks are maintained Ensure designated smoking areas are available.	During construction and operation phase	SEA AER
Restrict barbed wire usage	Avoid use of barbed wire fencing within and surrounding the Activity Area far as practicable, except where required by legislation	N/A	Site recording system (EMS) SEA AER
Restrict human access to high value Ghost Bat caves	Monitoring of caves is to occur outside of the Ghost Bat breeding season (September to January).	Annual review of Ghost Bat monitoring report	Site recording system (EMS) SEA AER

6.4 Offset commitments

The offset commitments which form part of this Validation Notice are presented in Table 6.4.

Table 6.4: Proposed offset commitments – Ghost Bat

Offset Commitment	Action	Monitoring and Frequency	Reporting
Payment of financial contribution to PEOF	Advanced payment of 10% of offset amount within one month of the Validation Notice becoming effective.	One of payment within one month of Validation Notice becoming effective.	SEA AER
	Biannual payment for clearing of supporting habitat	Disturbance reported annually EPBC IRR provided biannually	
Provide PEOF funding progress summary	A progress summary of the offsets implemented and achievement of outcomes from the funding provided to the PEOF will be provided in the AER.	Annually	SEA AER

7 References

Abbott, I (2001). 'The bilby *Macrotis lagotis* (Marsupialia: *Peramelidae*) in south-western Australia: original range limits, subsequent decline, and presumed regional extinction', Records of the Western Australian Museum, vol. 20, pp. 271-305.

Armstrong K. (2001). 'The distribution and roost habitat of the orange leaf-nosed bat, *Rhinonicteris aurantius*, in the Pilbara region of Western Australia', Wildlife Research, vol. 28, pp. 95-104.

Armstrong N.K. and Anstee D.S. (2000). The Ghost Bat in the Pilbara: 100 years on. Australian Mammalogy. vol.22 pp. 83-101

Bat Call WA (2021a). *A review of ghost bat ecology, threats and survey requirements*. DWER.

Bat Call WA (2021b). *A review of Pilbara leaf-nosed bat ecology, threats and survey requirements.* DWER.

BHP (2023). *Pilbara Strategic Assessment– Assurance and Offsets Plan. Revision 2.3.* BHP Pty Ltd. Perth, Western Australia.

BHP (2020). *Jimblebar Optimisation Project Validation Notice. Revision 1.* BHP Pty Ltd. Perth, Western Australia.

BHP (2019). *Communications, Community and External Engagement Our Requirements*

BHP (2018a). *BHP Pilbara Strategic Assessment Impact Assessment –Assurance Plan.* BHP Pty Ltd. Perth, Western Australia.

BHP (2018b). *BHP Pilbara Strategic Assessment Impact Assessment –Offsets Plan.* BHP Pty Ltd. Perth, Western Australia.

BHP (2017). *BHP Pilbara Strategic Assessment Impact Assessment –The Program*. BHP Pty Ltd. Perth, Western Australia

Biologic (2023). *Western Ride and Jimblebar Ghost Bat Monitoring Program: 2021-2022.* Unpublished report prepared for BHP.

Biologic (2022). *North Jimblebar Targeted Northern Quoll Assessment*. Unpublished report prepared for BHP.

Biologic (2020a). *Jimblebar Greenhouse Gas Abatement Study Basic Vertebrate Fauna Survey*. Unpublished report prepared for BHP.

Biologic (2020b). *Developments in knowledge of ghost bat home range and foraging areas, and its application at Mining Area C - South Flank*. Unpublished report prepared for BHP Western Australian Iron Ore Biologic Environmental Survey, East Perth, WA

Biologic (2019). *Shearer's West Targeted Vertebrate Fauna and Short-range Endemic Fauna Assessment.* Unpublished report prepared for BHP.

Biologic (2018). *Caramulla Level One Fauna Assessment.* Unpublished report prepared for BHP.

Biologic) (2017). *Consolidation of Regional Fauna Habitat Mapping: BHP Billiton Iron Ore Pilbara Tenure*. Report prepared for BHP Billiton Iron Ore Pty Ltd, 2017, Western Australia.

Biota (2020). *Caramulla Miscellaneous Licence Level 1 and Targeted Vertebrate Fauna Survey*. Unpublished report prepared for BHP.

Bradley, K., Lees, C., Lundie-Jenkins, G., Copley, P., Paltridge, R., Dziminski, M., Southgate, R., Nally, S. and Kemp, L. (2015) 2015 Greater Bilby Conservation Summit and Interim Conservation Plan. An initiative of the Save the Bilby Fund. pp. 17–73.

Braithwaite, R. W., and Griffiths, A. D. (1994). Demographic variation and range contraction in the northern quoll, *Dasyurus hallucatus (Marsupialia: Dasyuridae)*. *Wildlife Research, 21*, 203-217.

Bullen, R. D. (2021). Ghost bats in the Pilbara, *Macroderma gigas*: Summary of current data on distribution, energetics and threats. Presentation made to Curtin University workshop, 2 March 2021.

Bullen B. (2013). Pilbara Leaf-Nosed Bat (PLN) *Rhinonicteris aurantia*: Summary of current data on distribution, energetics, threats, Microsoft PowerPoint presentation prepared by Bob Bullen. Viewed 10 October 2014. Available at: www.sustainable.net.au/pilbara-leaf-nosed-bat/.

Bullen, R. and Creese, S. (2014). A note on the impact on Pilbara leaf-nosed and Ghost Bat activity from cave sound and vibration levels during drilling operations. *The Western Australian Naturalist* 29: 145-154.

Burbidge, A. (2020) 'Night Parrot habitats'. Interim Night Parrot Habitat Statement, Leading Night Parrot Conservation. Available from https://nightparrot.com.au/index.php/2022/04/05/night-parrot-habitats/.

Bush B. and Maryan B. (2011). *Field Guide to Snakes of the Pilbara, Western Australia*. Western Australian Museum. Western Australia, Perth.

Churchill, S. (2008). *Australian Bats* (Second Edition ed.). Crows Nest, NSW: Allen and Unwin.

Cramer, V.A., Dunlop, J., Davis, R., Ellis, R., Barnett, B, Cook, A., Morris, K. and van Leeuwen, S. (2016a). Research priorities for the northern quoll (*Dasyurus hallucatus*) in the Pilbara region of Western Australia. *Australian Mammology* 38(2): 135-148

Cramer, V. A., Armstrong, K. N., Bullen, R. D., Ellis, R., Gibson, L. A., McKenzie, N. L., van Leeuwen, S. (2016b). Research priorities for the Pilbara leaf-nosed bat (*Rhinonicteris aurantia* Pilbara form). *Australian Mammalogy,* 38(2), 149-157.

Davis R.A. and Metcalfe B.M. (2008). The Night Parrot (*Pezoporus occidentalis*) in northern Western Australia: a recent sighting from the Pilbara region. *Emu* 108: 233-236.

DBCA (2021). NatureMap; mapping Western Australia's biodiversity (custom search). from Department of Biodiversity, Conservation and Attractions http://naturemap.dec.wa.gov.au./default.aspx

DBCA (2020). Threatened and priority fauna database custom search from Department of Biodiversity, Conservation and Attractions http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals

DBCA (2017). *Guidelines for surveys to detect the presence of bilbies and assess the importance of habitat in Western Australia*. DBCA

DCCEEW (2023a). Recommendation Report: Findings in response to the Five-Year Review (2022) of BHP Billiton Iron Ore's Pilbara Strategic Assessment Program

DCCEEW (2023b). Recovery Plan for Greater Bilby (*Macrotis lagotis*). DCCEEW, Canberra.

DEWHA. (2010). *Survey guidelines for Australia's threatened bats*. Canberra, Australian Capital Territory: Department of Environment, Water, Heritage and the Arts.

DPaW (2015) Cane Toad Strategy for Western Australia 2014-2019.

DSEWPaC. (2011a). *Survey guidelines for Australia's threatened mammals*. Canberra, Australian Capital Territory: Department of Sustainability, Environment, Water, Population and Communities.

DSEWPaC. (2011b). *Survey guidelines for Australia's threatened reptiles*. Canberra, Australian Capital Territory.

DotE (2023a). *Macroderma gigas* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

DotE (2023b). *Macrotis lagotis* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

DotE (2023c). *Dasyurus hallucatus* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

DotE (2023d). *Liasis olivaceus barroni* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

DotE (2023e). *Rhinonicteris aurantia (Pilbara form)* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

DotE (2023f). *Falco hypoleucos* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

DotE (2023g). *Pezoporus occidentalis* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: https://www.environment.gov.au/sprat.

DotE (2016). *EPBC Act referral guideline for the endangered northern quoll Dasyurus hallucatus*. Canberra, Australian Capital Territory: DoE.

DotE (2013). *Significant Impact Guidelines 1.1: Matters of National Environmental Significance*. DoE, Canberra, Western Australia

ENV (2009.) *Jimblebar Rail Spur 2 Fauna Assessment*. Unpublished report prepared for BHP Billiton Iron Ore.

EPA (2020). *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment.*

Falkenberg, I. D. (2011). Aspects of the ecology of the Grey Falcon *Falco hypoleucos* in the South Australian arid zone. Corella 35: 23–28.

Garnett, S. T. and Crowley, G. M. (2000). *The Action Plan for Australian Birds 2000*. Environment Australia, Canberra.

Garnett, S. T., Szabo, J. K. and Dutson, G. (2011). *The Action Plan for Australian Birds 2010*. CSIRO, Melbourne.

GHD (2021a). Jimblebar Targeted Ghost Bat Survey Unpublished report prepared for BHP.

GHD (2021b). *East Jimblebar and Caramulla Targeted Greater Bilby Survey*. Unpublished report prepared for BHP.

GHD (2019a). *North Jimblebar Fauna Survey*. Unpublished report prepared for BHP.

GHD (2019b). *Jimblebar East and Caramulla Fauna Survey*. Unpublished report prepared for BHP.

Gleeson, J. Gleeson D., (2012). *Reducing the Impacts of Development of Wildlife*. CSIRO Publishing.

Hill, B. and S. Ward (2010). National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*. Department of Natural Resources, Environment, The Arts and Sport, Northern Territory. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/recovery/northern-quoll.html

Jackett N.A., Greatwich B.R., Swann G. and Boyle A. (2017) A nesting record and vocalisations of the Night Parrot 'Pezoporus occidentalis' from the East Murchison, Western Australia. *Australian Field Ornithology* 34: 144-150

Janse, I., Kloecker, U., Roshier, D. and Witte, I. (2015) Breeding diet and behaviour of a pair of Grey Falcons *Falco hypoleucos* and their offspring in north-western New South Wales. *Corella* 39: 46–51.

Johnson, K.A (2008). Bilby, *Macrotis lagotis*. In '*The Mammals of Australia*.' (pp. 191-193) Third edition.

Ley, A. and Tynan, B. (2016). Observations on nesting Grey Falcons*, Falco hypoleucos*. *South Australian Ornithologist* 41: 49–64.

Marchant, S. and Higgins, P. J. (Eds) (1993). *Handbook of Australian, New Zealand & Antarctic Birds*, Vol. 2: Raptors to Lapwings. Oxford University Press, Melbourne.

McKenzie, N.L. and Bullen, R.D. (2009). The echolocation calls, habitat relationships, foraging niches and communities of Pilbara microbats. *Records of the Western Australian Museum*, Supplement 78: 123–155.

Murphy, S.A., Silcock, J., Murphy, R., Reid, J. and Austin, J.J. (2017) Movements and habitat use of the night parrot *Pezoporus occidentalis* in south-western Queensland. Austral Ecology 42: 858-868.

Oakwood, M. (2008). Northern Quoll *Dasyurus hallucatus*. *The Mammals of Australia*. (Ed: R. Strahan). Sydney, Reed New Holland.

Oakwood M. (2004). The effect of cane toads on a marsupial carnivore, the northern quoll, *Dasyurus hallucatus*. Report to Parks Australia.

Oakwood M. (2002). Spatial and social organization of a carnivorous marsupial *Dasyurus hallucatus* (Marsupialia: Dasyuridae). *Journal of Zoology London* 257: 237-248.

Olsen, P. D. and Olsen, J. (1986). Distribution, status, movements and breeding of the Grey Falcon *Falco hypoleucos*. *Emu* 86: 47–51.

Outback Ecology (2009a) *Wheelara Hill iron Ore Mine Modification Flora and Fauna Assessment* Unpublished report prepared for BHP Billiton Iron Ore.

Outback Ecology (2009b) *Jimblebar Linear Development Terrestrial Vertebrate Fauna Assessment.* Unpublished report prepared for BHP Billiton Iron Ore.

Pearson D. (2006). Giant Pythons of the Pilbara, *Landscope*, vol. 19, pp. 32-39.

Process Minerals International, (2013). *Poondano Iron Ore Project: Compliance Assessment Report March 2013*. Cited within Rio Tinto (2017) Referral of Proposed Action Mesa H Proposal. Available at http://epbcnotices.environment.gov.au/_entity/annotation/1b36373a-fc86-e711-994c-005056ba00a8/a71d58ad-4cba-48b6-8dab-f3091fc31cd5?t=1508204283249

Schoenjahn, J. (2018). Adaptations of the rare endemic Grey Falcon *Falco hypoleucos* that enable its permanent residence in the arid zone of Australia. PhD Thesis. University of Queensland

Schoenjahn, J. (2013). A hot environment and one type of prey: investigating why the Grey Falcon (*Falco hypoleucos*) is Australia's rarest falcon. Emu 113: 19–25.

Shine R., Wang S., Madani G., Armstrong K.N., Zhang L., Li Y. (2016). Using genetic data to predict the vulnerability of a native predator to a toxic invader. Endangered Species Research 31: 13-17

Southgate, R. and S. Carthew (2006). Diet of the bilby (Macrotis lagotis) in relation to substrate, fire and rainfall characteristics in the Tanami Desert. Wildlife Research 33, 507-519.

Southgate, R., Paltridge, R., Masters, P., and Carthew, S. (2007). Bilby distribution and fire: a test of alternative models of habitat suitability in the Tanami Desert, Australia. Ecography 30, 759–776.

Southgate, R., Dziminski, M., Partridge, R., Schubert, A., and Gaikhorst, G. (2018). Verifying bilby presence and the systematic sampling of wild populations using sign-based protocols – with notes on aerial and ground based techniques and asserting absence. *Australian Mammalogy*.

Strahan, R. (1995). The Mammals of Australia. Reed New Holland 1995.

TSSC (2008). *Approved conservation advice for Liasis olivaceus barroni (Olive Python – Pilbara subspecies)*. TSSC, Commonwealth of Australia, Canberra.

TSSC (2016a). *Conservation advice: Macroderma gigas, ghost bat*. TSS, Canberra, Australian Capital Territory.

TSSC (2016b). *Conservation advice: Macrotis lagotis Greater Bilby*. TSSC, Canberra, Australian Capital Territory.

TSSC, Threatened Species Scientific Committee (2016c). *Conservation advice: Rhinonicteris aurantia (Pilbara form), Pilbara leaf-nosed bat*. TSSC, Canberra, Australian Capital Territory.

Threatened Species Scientific Committee (2016d). Conservation advice: *Pezoporus occidentalis*, Night Parrot, TSSC, Canberra, Australian Capital Territory.

Threatened Species Scientific Committee (2020). Conservation advice: *Falco hypoleucos*, Grey Falcon. TSSC, Canberra, Australian Capital Territory. Available from: https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=929.

Tidemann, C.R, Priddel, D.M., Nelson, J.E. and Pettigrew, J.D (1985). Foraging behaviour of the Australian Ghost Bat, *Macroderma gigas* (Microchiroptera: Megadermatidae), *Australian Journal of Zoology* 33, 705-713.

Tingley, R., Phillips, B. L., Letnic, M., Brown, G. P., Shine, R., and Baird, S. J. (2013). Identifying optimal barriers to halt the invasion of cane toads *Rhinella marina* in arid Australia. *Journal of Applied Ecology* 50, 129–137.

Watson, C. (2011) A failed breeding attempt by the Grey Falcon *Falco hypoleucos* near Alice Springs, Northern Territory. Australian Field Ornithology 28, 167–179.

Woinarski, J. C. Z., Burbidge, A. A., and Harrison, P. L. (2014). The Action Plan for Australian Mammals 2012. CSIRO Publishing, Collingwood.

van Vreeswyk, A., Leighton, K A. Payne, A L. and Hennig, P. (2004). *An inventory and condition survey of the Pilbara region, Western Australia*. Department of Primary Industries and Regional Development.

van Dyck S. and Strahan R. (2008). *The Mammals of Australia*, ed. 3, Reed New Holland, Sydney.

Appendices

Appendix 1: Stakeholder Consultation undertaken for Previous Validation Notice (BHP 2020)

Table 3.1. from BHP (2020): Stakeholder Engagement

Stakeholder	Date	Topics/issues discussed	BHP response and outcome
DoEE (now Department of Agriculture, Water and the Environment [DAWE])	11 March 2020	BHP invited DAWE to comment on the draft Jimblebar Validation Notice	BHP has included responses to DAWE feedback in Appendix 2 and the final Validation Notice.
	24 February 2020	DAWE provide key points of feedback arising from the review of the validation notice. DAWE feedback is provided in Appendix 2.	BHP has included responses to DAWE feedback in Appendix 2 and in this Validation Notice.
	7 February 2020	Overview of the Jimblebar Optimisation project draft Validation Notice. DoEE requested copies of the fauna surveys completed for the Validation Notice.	BHP provided the fauna surveys and requested final comments on the draft Validation Notice to be provided within 2 weeks.
	13 August 2019	Review of the implementation framework for the SAA. Recommendations of changes and approach to Assurance Plan (PMO review), Offset Plan, Validation Notices and Offsets Proposals. Additional information to be included in the Validation Notices Overview of the Jimblebar Optimisation project. DoEE queried if there was any evidence of Pilbara Olive Python or Northern Quoll detected within the activity area.	Prepare a review of the suitability of the PMO and how compliance against these can be demonstrated. Develop a process for calculating residual impacts. Pending the outcomes of the review and development of residual impact process, a revised Assurance Plan and Offsets Plan may be progressed. Ongoing consultation with the department on the Jimblebar Optimisation Project
DWER – EPA Services	11 March 2020	BHP invited DWER- EPA Services to comment on the draft Jimblebar Validation Notice. EPA provided the following feedback, via email, 'the draft validation looks very comprehensive and links well to the State assessment'.	
	13 August 2019	Presented the Project scope and the assessment outcomes for the preliminary key environmental factors (Inland Waters, Flora and Vegetation and Terrestrial Fauna). BHP confirmed it intended to provide sufficient information at the time of referral for a s38 'Assessment on Referral Information' assessment pathway for a Revised Proposal.	BHP has prepared an Environmental Review Document as a supplementary report with the referral, which provides sufficient information for the EPA's assessment.

Stakeholder	Date	Topics/issues discussed	BHP response and outcome
	13 February 2019	Discussed requirements for 'targeted surveys' as per the Strategic Proposal Recommended Environmental Conditions *Guidelines for submitting a Derived Proposal* – 1(b) and direction on level of survey required for various activities with EPA Services and Terrestrial Ecosystems Branch representatives. Advice was to present information detailing level of survey coverage across the proposed Development Envelope.	Since the decision to prepare a Revised Proposal, BHP has undertaken additional biodiversity surveys to meet the requirements of EPA survey guidance for standard s38 proposals.
	16 November 2018	BHP outlined the scope of the Project. Main points discussed were: • how a proposed Derived Proposal would condition an area also subject to existing Ministerial Statements • level of survey required for various different activities (i.e light infrastructure versus OSAs) and how to define 'targeted survey'.	EPA Services Branch requested BHP present a clear scope and level of survey coverage across the proposed Development Envelope.
DWER – Regulatory Services (Water)	5 June 2019	BHP discussed the surplus water strategy for the Project and presented the MAR modelling results. No specific feedback was received.	BHP finalised the MAR modelling report - *Caramulla MAR Injection Modelling* (BHP, 2019a).
Department of Biodiversity, Conservation and Attractions (DBCA)	11 March 2020	BHP invited DBCA to comment on the draft Jimblebar Validation Notice.	No comments regarding the Validation Notice were received from DBCA.
	16 August 2019	Discussion on the existing DBCA monitoring programs for Pilbara Leaf-Nosed Bat, Pilbara Olive Python and Ghost Bat projects. Opportunities to data share and support project to fill knowledge gaps for these species. Update on current on ground offsets projects for the Pilbara Leaf-Nosed Bat, Pilbara Olive Python and Ghost Bat and effectiveness of these projects to provide outcomes for the species.	BHP will consult with DBCA on the development of relevant monitoring and offset projects, if required
	27 June 2019	Discussed the Le Grange Greater Bilby project monitoring program and outcomes of this. Discussed potential On ground offsets opportunities for the Greater Bilby in the SAA.	Known occurrence of the Greater Bilby overlies the eastern portion of the SAA. BHP will consult with DBCA on the development of relevant monitoring and offset projects, if required

Stakeholder	Date	Topics/issues discussed	BHP response and outcome
	29 April 2019	Discussed BHP's request for a meeting to discuss the Derived Proposal. DBCA confirmed by email that DBCA recommends that all consultation planned for Derived Proposals involves EPA Services (until the process is clear and agreed to). DBCA suggested providing further information, if applicable, on the potential impacts of the Project on matters protected under the *Biodiversity Conservation Act 2016* (BC Act) and/or *Conservation and Land Management Act 1984* (CALM Act).	Following the finalisation of the impact assessment of the biodiversity factors, BHP has concluded that there is unlikely to be a significant impact on BC Act or CALM Act matters. BHP has developed a draft Flora and Vegetation Management Plan that addresses potential impacts to the Priority 1 flora species *Eremophila capricornica*. BHP will consult with DBCA on the development of relevant management plans, if required.
	24 April 2019	Discussed the 2 hectare survey techniques for Greater Bilby. Recent proponents have been requested to undertaken further surveys using this technique in prospective Greater Bilby areas. Discussed potential monitoring approaches for the Greater Bilby and known locations of Greater Bilby near to Jimblebar. Offsets and research opportunities for Greater Bilby, Ghost Bat, Pilbara Olive Python.	BHP included the 2ha survey methodology for Greater Bilby into all fauna survey scopes of works, including Jimblebar Optimisation Project.
	12 February 2019	BHP outlined the scope of this Project and intent to refer it as the first Derived Proposal; also whether DBCA would review a draft application and provide comments ahead of a formal referral. DBCA advised they would consider reviewing a draft application if resources were available at the time. DCBA also indicated their preference for BHP to only provide/highlight those aspects of the Project relevant to matters protected under the *BC Act* and/or *Conservation and Land Management Act 1984*. BHP sought also feedback from DBCA on current approach to management plans and definition of targeted surveys. DBCA advised that they will assess the application based on the approach endorsed by the EPA for management plans and targeted surveys.	Since the decision to prepare a Revised Proposal, BHP has completed additional biodiversity surveys to meet the requirements of EPA survey guidance for standard s38 proposals.
DWER, DBCA, DMIRS	6 March 2019	BHP (together with Syrinx Environmental consultants) presented and discussed the draft BHP WAIO rehabilitation completion criteria related to revegetation, developed as part of the work for the report on	BHP updated the Jimblebar Mine Closure Plan (Version 2), with the new completion criteria.

Stakeholder	Date	Topics/issues discussed	BHP response and outcome
		rehabilitation success required for the Strategic Proposal Recommended Environmental Conditions *Guidelines for submitting a Derived Proposal* – 1(c). Meeting attendees were generally supportive of the approach proposed and the detail. During the meeting, DBCA noted that Buffel Grass (**Cenchrus ciliaris*) will need to be addressed, should it be listed as a Declared Pest.	This is consistent with the EPA's advice (EPA Report 1619, 2018d) on the Strategic Proposal, that information in the report on rehabilitation success should be used to inform the development of mine closure plans.
Department of Jobs, Tourism, Science and Innovation (DJTSI)	29 January 2019	BHP briefed DJTSI on the new water management project at Jimblebar (Caramulla) and advised they would submit one State Agreement Proposal for the Jimblebar South OSAs and Caramulla surplus water project.	BHP advised they would draft the Local Participation Plan (LPP) and Community Development Plan (CDP) "6 month notice of intention" to submit a State Agreement Proposal in April 2019 for DJTSI review. BHP plans to submit the State Agreement Proposal in February 2020 (pending tenure conversion) with approval anticipated in April 2020.
Nyiyaparli Native Title Holders	11 March 2020	BHP invited the Karlka Nyiyaparli Aboriginal Corporation to comment on the draft Jimblebar Validation Notice	No comments from the Karlka Nyiyaparli Aboriginal Corporation were received.
	5 August 2019	BHP provided the Environmental Review Document, the draft Flora and Vegetation Management Plan, the Jimblebar Mine Closure Plan and the draft Water Management Plan in advance of referral of the Project to the EPA for assessment under s38 of the EP Act. In response, the Karlka Nyiyaparli Aboriginal Corporation provided general comments via email on 19 August around the key themes of water, fauna, vegetation and weeds and mine closure.	BHP acknowledges the long-term interest in these issues over the life of any mine and beyond for the Nyiyaparli. The referral documentation has been updated where required and any ongoing concerns can be discussed through the regular Implementation Committee forum. A letter was provided to the Nyiyaparli on 26 August summarising BHP's response to the comments. A site visit has been proposed to further discuss any specific concerns the Nyiyaparli may have with the implementation and the long-term on-ground management of this Project.
	16 April 2019 (Biannual Meeting)	During the meeting, BHP's presentation and discussion included BHP's water management approach and the Project. There was general discussion about the Project but no specific issues were raised.	BHP confirmed that they would provide copies of draft referral documentation prior to submission to allow Nyiyaparli to provide feedback.
	18 October 2018	During the meeting, BHP's presentation and discussion included the following:	BHP has addressed its approach to surplus water for this Project in Section – Inland Waters for the Revised Proposal

Stakeholder	Date	Topics/issues discussed	BHP response and outcome
	(Biannual Meeting)	• BHP's general approach to surplus water management in the Pilbara; and • upcoming environmental approvals (including Jimblebar).	BHP also offered a site visit in 2019. It was agreed at this meeting that BHP would provide further detailed information on the Project scope at the next meeting (April 2019).
	6 April 2018 (Biannual Meeting)	BHP presented the Project including the location, extent and nature of the project. No specific issues were raised. The recent ethno-biological site visit (March 2018) was also presented.	BHP offered further opportunity to discuss the Project on-site to identify if there were any specific environmental issues of interest/concern to the Nyiyaparli. It was proposed that this could occur in conjunction with upcoming Heritage surveys.
	March 2018	BHP's Heritage and Environmental Teams, with four Nyiyaparli representatives and Onshore Environmental consultants, undertook a survey to better understand the bush tucker within the Jimblebar area. A lot of time was spent at Innawally Pool.	
Department of Mines, Industry Regulation and Safety (DMIRS)	11 March 2020	BHP invited DMIRS to comment on the draft Jimblebar Validation Notice	No comments from DMIRS were received.
Local Expertise BatCall WA –Bob Bullen Biologic- Morgan O'Connell, Chris Knuckey Norm Mackenzie	19 August 2019	Ghost Bat Workshop: • Update on monitoring and survey methods • What information do we already know • Population definitions – how should they be defined • Limitations of monitoring and surveying • Future areas of research required	Utilise outcomes in the workshop for future BHP projects.

Appendix 2: Contemporary Terrestrial Fauna Survey Reports

Appendix 3: Response to comments on Revised Validation Notice

Item	DCCEEW comments	BHP response to comments
General comment	We consider the intent of section *7.11 Variation to a Validation Notice* in the Assurance and Offsets Plan is to allow for unforeseen, relatively minor, changes in scope prior to full implementation of the Action described in the original validation notice - rather than large scale expansions or subsequent 'stages' of mine development. We understand the benefits of revising a previous validation notice to include new impacts and commitments (e.g. to combine all commitments relating to a site into one document, and potentially allow stakeholders to more easily understand the proposed 'new actions' in the context of previously approved activities and impacts at the same site). However, we are not sure the concept of 'superceeding' a previous validation notice will work within the current approval framework: primarily because impact assessment, avoidance, mitigation and offsetting commitments are required to be specified before the Activity has commenced. Also, the Program does not anticipate re-assessment of impact and residual impacts from an Activity following a variation to the Assurance Plan and Offsets Plan. Keep the *Jimblebar Optimisation Project Validation Notice* (published 8 May 2020) publicly available on the BHP website. Confirm there are no proposed changes to the scope or impacts of the Activity as described in the *Jimblebar Optimisation Project Validation Notice* (published May 2020). See also comment 1.1.2.	Noted. BHP has ensured the Previous Validation Notice remains published on the BHP website. BHP confirms there are no changes to the scope or impacts of the Activity as described in the previous Validation Notice.
Glossary and Abbreviations	0.1 Unintentional error: for terms 'Activity' and 'Activity Area' (reference to Newman and Western Ridge rather than Jimblebar). 0.2 Update meanings for 'Assurance Plan' and 'Offsets Plan' to: '*as approved on 15 May 2023'.* 0.3 Remove reference to 'delegate of the Minister' in the meaning for 'Minister'. 0.4 Consider removing the following terms in the Glossary and Abbreviations table as they are not found within the validation notice: The Agreement; AW Act; Controlling provision; Full conceptual development scenario; New listings; New matters; WC Act 0.5 Remove or revise the meaning for the term 'commence, commenced or commencement'. This term is used, but not to convey the meaning provided in the glossary.	Amended.
Introduction	1.1.1 Replace all references to 'significant residual impact' with 'residual impact' throughout the validation notice. 1.1.2 More clearly state that this revised validation notice does 2 things: re-calculates residual impacts and offsets required for the Activity outlined in the *Jimblebar Optimisation Project Validation Notice* (published 8 May 2020), and	1.1.1 Amended. 1.1.2 Amended. 1.2.1 Amended. 1.4.1 Amended to approximately 30km east of Newman.

	describes new Activity (to commence once this revised validation notice becomes effective) as well as avoidance, mitigation and offsetting measures to be implemented for this new Activity. The revised Validation Notice does not propose changes to, or re-assess the impact of, the Activity described in *Jimblebar Optimisation Project Validation Notice* (published 8 May 2020). 1.2.1 Correction: *'the Assurance Plan and Offsets Plan' (APOP) (BHP 2023) were approved on 15 May 2023'* 1.4.1 Unintentional error: the Activity is noted as 30 km west of Newman (check distance and direction). 1.4.2 Confirm the use of power generated by the solar power plant i.e. for BHP's operations at Jimblebar, or otherwise? 1.4.3 Not all new actions/areas of disturbance listed in section 1.4 are readily identifiable in Figure 1.2 or described in enough detail to assist the reader to identify potential impacts to program matters (e.g. what are enabling works or JB PCF works?). This could be improved by using the same terms in Figures and text. 1.4.4 Include all parts of the proposed action in the Activity description here i.e. operation and closure actions as at section 1.6. 1.5.1 The Activity Area is stated to encompass 3,234 ha disturbed as of Financial Year 2019. Provide responses to the following questions regarding this 3,234 ha of disturbance: When did this disturbance occur, who by and for what purpose (describe the action)? Was this action referred and/or approved under parts 7-9 of the EPBC Act or subject of a validation notice or decision report under the endorsed program? Was this action exempt from referral assessment and approval under the EPBC Act (include reason for exemption i.e. section 43A or 43B of the Act). If action commenced prior to commencement of the EPBC Act, has the action been varied or extended since then? Was the previous action determined by BHP as not requiring referral under the EPBC Act following a self-assessment of likely significant impact (and was this supported by habitat and fauna surveys prior to clearing)? 1.5.2 Correct or explain the following discrepancy. The Indicative Footprint from the 'Previous Validation Notice' is noted as covering an area of 2,695 ha – however the project description on page 9 of the *Jimblebar Optimisation Project Validation Notice* (published 8 May 2020) notes disturbance of up to 2,000 ha. Note that any change/increase in impact occurring prior to a validation notice may not be compliant with the Program. 1.5.3 Approval granted by a State Minister in accordance with state legislation is not a valid reason for considering the state approved Activities to be out of scope of *BHP Billiton Iron Ore's Pilbara strategic assessment program* (the program)	1.4.2 Solar power plant is intended to supply power to BHP's Western Australian Iron ore operations. 1.4.3 Figure updated to clearly identify components. 1.4.4 Amended. 1.5.1. Additional text provided in Section 2 to describe previous clearing, approval mechanism and internal self-assessment related to MNES. 1.5.2 The Jimblebar Optimisation Project had a total Indicative Footprint of 2,693 ha, however clearing of 2,000 ha was required. Therefore, the Previous Validation Notice indicated an extent of 2,000 ha. 1.5.3 Noted. 1.6.1 The Activity has a life span of approximately 50 years as this is the predicted length of operation for the components which comprise the Activity. 1.7.1 Sentence amended to: The Revised Validation Notice will demonstrate how the implementation and operation of the Activity will meet each of the PMOs provided for the Ghost Bat in the APOP by undertaking an impact assessment, applying the mitigation hierarchy and assessing residual impacts. 1.7.2 Summary of surveys included.

	endorsed by the Commonwealth minister for the environment in May 2017 in accordance with Part 10 of the EPBC Act. 1.6.1 Discuss why the Activity proposed in this validation notice is expected to take 50 years (i.e. is this due expected operation and closure of train load-out facilities, solar power plant and other actions that support iron ore mining operations outside the scope of the Activity in this Validation Notice)? 1.7.1 Missing text: *…The VN will demonstrate how the implementation and operation of the Activity will [achieve/contribute to/not jeopardise achievement of] each of the PMOs provided for the Ghost Bat in the APOP…* 1.7.2 Table 1.2 For all program matters: Good to see inclusion of 'closest known record' of species presence in the wider area (including species home range). For each program matter, include a summary of the purpose and scope of surveys referenced to support claims of no species presence within the Activity area. E.g. for Northern Quoll: *Five surveys to identify evidence of Northern Quoll presence (including camera recordings, scats, tracks and desktop reviews) across the Activity Area between 2018 and 2022 have found no contemporary records or evidence of species presence. On-ground surveys were conducted in accordance with relevant survey guidelines.*	
	2.1.1 See comment 1.5.1 regarding discrepancy between 2,000 ha and 2,695 ha attributed to the previous (2020) impact footprint. 2.1.2 Table 2.1: we recommend showing the proposed disturbance of 2,000 ha documented in the *Jimblebar Optimisation Project Validation Notice* (published May 2020) as subtracted from the overall cumulative program disturbance remaining (ha) column to avoid any doubt as to when this disturbance was assessed and 'approved' to occur (i.e. impact at Jimblebar occurring between July 2020 and July 2023 is likely to be non-compliant with Program requirements if it was not documented in the *Jimblebar Optimisation Project Validation Notice* (published 8 May 2020)). 2.2.1 Clarify in the text at 2.2 whether the Activity description refers to the new activity proposed in this variation to the Validation Notice only or which parts of the Activity are within scope of the previous (2020) Validation Notice and which are new/additional actions now proposed in this revision (2023). 2.2.2 Confirm there are no changes to the activity (indicative footprint, overburden and surplus water management actions) described in the previous (2020) Validation Notice. Assuming there are no changes (as confirmed verbally), the department makes no further comment on this component of the Activity as comments were provided previously in 2020. 2.3.1 Solar project: Confirm the quantity (ha) of direct impact to program matter/s expected from the proposed solar project. Potential impacts of renewable energy projects on matters protected under Part 3 of the EPBC Act were not assessed as part of *BHP Billiton Iron Ore's Pilbara Strategic Assessment - Impact Assessment Report, May 2017*. As a result, the Approval decision made by the Minister for the Environment and Energy on 19 June 2017 for activities within the strategic	2.1.1. As per response above. 2.1.1 Table 2.1 has been revised to deduct 2,000 ha from disturbance remaining. Note that disturbance undertaken was documented in the Jimblebar Optimisation Validation Notice. 2.2.1 Text revised to more clearly distinguish between activities related to the Previous Validation Notice and new activities relevant to the Revised Validation Notice. 2.2.2 Text revised to confirm that there are no changes to the activities or Indicative Footprint related to the Previous Validation Notice. 2.3.1 Extent of clearing required for the Solar Power Plant has been included in the Revised Validation Notice. BHP considers that the Solar Power Plant, which will provide power to BHP's iron ore operations, is associated infrastructure, which is required to support expansion of the existing operations. The potential impacts of the Solar Power Plant relate primarily to clearing and are not different or additional to the nature and scale of impacts assessed in the Strategic Assessment. 2.4 The Jimblebar Mine Closure Plan is publicly available and includes targets, monitoring and reporting. The AER will report on outcomes in relation to Program Matters.

	assessment area may not provide legal certainty that renewable energy projects have been approved under Part 10 of the EPBC Act. 2.4 Closure and decommissioning: Is the mine closure plan publicly available? Does the mine closure plan includes any targets, monitoring or reporting of outcomes which demonstrate how closure and rehabilitation efforts contribute to achievement of Program Matter Outcomes. If not, consider including these in this Validation Notice.	
Stakeholder engagement	3.1.1 Refer to the interim First Nations engagement guidelines on our website for more information on the department's expectations of proponent for engaging with First Nations stakeholders throughout an environmental assessment process.	3.1.1 BHP provided a summary document of the Revised Validation Notice to KNAC in advance of the public comment period for information and review. BHP also provided the draft Revised Validation Notice to KNAC at the commencement of the public comment period, for review. BHP meets with the relevant Traditional Owner group through KNAC three times per year to discuss BHP projects and approvals. This provides the opportunity to receive information, discuss and raise any concerns.
Validation Process - Guidance	4.1.1. unintentional error: *Pre-clearing surveys for Greater Bilby undertaken within the easter portion of [the Jimblebar Optimisation Project footprint]…*	4.1.1 Amended.
Surveys and studies	4.2.1 Include acknowledgement, and rationale, that the Biologic (2023) report documenting results of the Ghost Bat monitoring programme undertaken from 2021-22 was provided to the department towards the end of the public comment period, but not published online as an Appendix to the draft Jimblebar Optimisation Project revised validation notice for comment during the public comment period. 4.2.2 Recommend numbering or lettering of Surveys included as Appendices (e.g. Appendix A to J) to enable ease of referencing in Figures and the body of the validation notice. 4.2.3 Provide quantity of area to be impacted by proposed Train Load Out project which has not been subject to contemporary surveys. We note BHP's consideration that the habitat present is unlikely to support program matters. We recommend a preclearance survey of this area to confirm this assumption and publishing results of this survey alongside subsequent draft or final version of this Validation Notice. Further validation notices are to be supported by survey effort covering all areas within and extending out to a reasonable distance outside the proposed indicative footprint and actvity area to inform future validation processes. 4.2.2. Other surveys (not contemporary): confirm whether results of these surveys have been used to inform any parts of the validation notice (2023 version).	4.2.1 Amended. Note the survey report was not complete at the time of publishing the draft Validation Notice. 4.2.2 Appendices now distinguished by numbering and lettering. 4.2.3 Area to be impacted by train load out included. BHP will undertake a pre-clearance survey prior to ground disturbance. 4.2.2 Other surveys are considered in the validation process including in relation to the presence or absence of records for Program Matters.
Ghost Bat	4.3.1 Figure 4.4 for Greater bilby in wrong section. 4.3.2 Table 4.3: include the units of measurement (ha) in the table header row. 4.3.3 Figure 4.5: The extent of the survey coverage area is limited/close to some sections of the Activity Area and indicative footprint, specifically the N/E and S/E	4.3.1 Figure corrected. 4.3.2 Amended. 4.3.3 Noted. 4.3.4 Noted.

	boundaries of the JB East Stage 1 enabling works. There is potential for Ghost bat roosts and foraging habitat to occur in this unsurveyed area adjacent to the Activity area. Noting the observable distance from the indicative footprint to unsurveyed areas, we estimate any potential Ghost bat roosts would be 1 km or more (BHP to confirm exact distance) from direct disturbance occurring within the Indicative Footprint, and therefore at low risk of sustaining indirect impact from dust, noise, light and vibration. 4.3.4 Make sure reference to critical and supporting habitat here aligns with Section 5.1 Offset proposal (i.e. critical and supporting habitat not to be counted twice). 4.3.5 To determine whether category 3 roosts provide critical habitat for Ghost Bats, it is necessary to understand whether they occur adjacent, or in close proximity to, a category 2 cave. This is necessary even for category 3 caves with no, rare or occasional evidence of roosting. Given CJIM-09 is approximately 8 km and 12 km from the closest surveyed category 2 caves and 7 km from unsurveyed habitats which potentially include unidentified category 2 caves, we consider that category 3 roost CJIM-09 provides habitat of a non-critical nature for the local popuation. However, the potential of CJIM-09 to enable long-distance movement of individuals across the landscape, and contribute to genetic exchange between this important population and neighbouring colonies should be carefully considered. This is the case for all other isolated/ non-critical category 3 Ghost bat caves at BHP impact sites within the strategic assessment area – particularly as impact to, or loss of this function at multiple impact sites may influence achievement of the Program's objective: *to support the long-term persistence and viability of the Ghost Bat within the strategic assessment area.* 4.3.6 For future validation notices: identify the distance between category 2 Ghost bat caves and all category 3 Ghost bat caves within the Activity Area and within 500m of its boundary (to support classification as critical or supporting habitat). 4.3.7 Rectify the discrepency under 4.3.3 regarding the number of Category 4 Ghost Bat roosts located within the Activity Area or within 500 m of the Activity boundary (page 44 states seven caves as per Table 4.4, page 45 states six caves). 4.3.8 Feral animals and cane toads: given the stated duration of this activity, including operation and closure, of 50 years – discuss how future changes in risk of cane toad incursion will be monitored and managed. What preventative measures could BHP adopt to reduce this risk? 4.3.9 Feral animals and cane toads: What are BHP's standard feral cat management practices (are these only one-time trapping of cats following sightings)? How far would these extend from the impact footprint? How long would these practices remain in-place? Noting cats have already been sighted at part of the Activity Area during survey work, has trapping been initiated? Has BHP considered more ongoing feral cat abatement methods? (see further comments at 6.1 below).	4.3.5 Noted and additional text added to clarity. 4.3.6 Noted. 4.3.7 Text corrected to clarify number of Category 4 roosts. 4.3.8 BHP will report any observations of Cane toad to DBCA and identify and implement monitoring in accordance with DBCA guidance. 4.3.9 BHP's standard feral cat management includes reporting opportunistic sightings of feral cats, cage trapping and subsequent euthanasia of feral cats by qualified and licensed Pest Control technicians in accordance with the Animal Welfare Act (2002). Implementing correct waste management (e.g. contained waste bins, abiding by Landfill Regulations) will also minimise potential food sources for cats. 4.3.10 Additional text added. The new activities proposed for the Revised Validation Notice will not alter the frequency of use of heavy vehicles and machinery over and above what has been previously assessed. BHP currently monitors roost CJIM-09 quarterly and considers that this frequency is sufficient to detect potential impacts and to inform management. There are Category 4 roosts within 500 m however, given these roosts are used for nocturnal visitation only, and clearing and excavation will occur predominantly during the day, this is not expected to impact the use of these roosts. 4.3.11 The Revised Validation Notice does not propose additional activities that have the potential to impact groundwater. Text clarified. 4.3.1.2 Error corrected.

	4.3.10 Noise, vibration and light: Conclusion of no significant impact to roosts from noise, vibrations and light from the Action in this validation notice may be justified, but supporting evidence is weak. Which is the Ghost bat roost located within 500m of proposed earthworks, and what category is it? We recommend BHP undertake additional analysis and plan to manage or mitigate potential noise, vibration and light impacts from this type of activity (haul trucks, loaders/excatators, service trucks, light vehicles and helicopters) at similar distances (150 m to 550 m or more) to better inform mitigation of these potential impacts. Given the proximity (550 m) of non-critical category 3 cave CJIM-09 to the indiciative footprint (2020 validation notice) and in lieu of supporting evidence, we recommend continuous monitoring and reporting Ghost bat usage of the category 3 caves within at least 600 m of ground disturbing activity, and noise and vibration levels, at this site over the life of the Jimblear Optimisation Project – to confirm assumptions these activities (2020 validation notice) do not eventuate in impact (see further comments on monitoring and suitable thresholds at 6.1 below). 4.3.11 Ground water changes: our understanding is the managed aquifer recharge (MAR) action and increased groundwater levels at Carmulla are actions for which impacts to program matters were previously assessed as part of the *Jimblebar Optimisation Project Validation Notice* (published 8 May 2020) are these changes a result of the impacts proposed in this version of the validation notice? Or only previous version (2020)? 4.3.12 Unintentional error: The text here dicusses Pilbara leaf-nosed bat rather than Ghost Bat.	
Greater Bilby	4.4.1 Conclusions for Bilby records needs to be on: - the presence or sign/s of residing individuals AND - presence or sign of transient, infrequent or dispersing individual/s. Not on whether or no the Activity Area is considered to support an important population as defined in EPBC Act referral guidelines (check missing reference here to DoE 2016). 4.4.2 Impact Assessment: you conclude that '*Direct and indirect impacts to the Greater Bilby are not considered significant*'. Significance of impact is not the test to be applied here. Instead, you should be considering whether the Activity, as described, will achieve the agreed outcomes: minimise the loss of Greater Bilby habitat and no loss of (or maintain) Greater Bilby population(s). e.g. how has direct (clearing) and indirect impact or loss of habitat for this species been minised? You should also consider how this is being demonstrated in the VN (and will be demonstrated in future 5-yearly reviews) e.g. is population monitoring achievable in this area to inform whether the Activity was undertaken with no resulting loss of population (if not, why not?). Consideration of the described Activity, avoidance, mitigation <u>and</u> offsetting measures must then conclude on whether these measures as a whole (and taken with other past and future validation notices until 2117) are likely to support the	4.4.1 Text amended. 4.4.2 Text amended to remove reference to significance. Monitoring of Greater Bilby is not proposed given the lack of records within the Activity Area or within 500m of the Activity Area.

	overall objective (long-term persistence and viability of the Great Bilby within the SAA). This consideration must include cumulative impacts within the region to the species and it's habitat. Comments 4.4.1 and 4.4.2 apply to all program matters.	
Northern Quoll	4.5.1 Northern Quoll Records: the single recent record considered to be of a dispersing individual 2.5 to the North of (and outside (?)) the Activity appears to be missing from Figure 4.14. There is also inconsistency in the text as to whether there are no, or one, record of Northern Quoll individual/s within the Activity Area. This inconsistency needs to be confirmed (with pinpoint referencing to the supporting survey report/s) as it will inform this Activity meets the notifiable action trigger for this species. 4.5.2. see comment 4.4.1 and 4.4.2	4.5.1 Text amended to clarify that there are no Northern Quoll records within the Activity Area or within 500m of the Activity Area. Therefore, the Notifiable Action triggers are not met.
Pilbara Olive Python	4.6.1. Due to the elusive nature, and difficulty recording of Pilbara Olive Python 4.6.2. see comment 4.4.1 and 4.4.2 4.6.3. Given the difficulty in surveying and recording signs or presence of POP individuals, does BHP consider the 'presence of individual' a suitable trigger for this species?	4.6.1 This comment appears to be incomplete. 4.6.2 Comment addressed. 4.6.3 BHP considers presence a suitable trigger, given that survey techniques now include monitoring for eDNA which broadens the opportunity to detect species presence indirectly in suitable habitats.
Pilbara Leaf-nosed Bat	4.7.1. Unintentional error: Bat search and acoustic recorder locations are showingin Figure 4.19 (not 4.18) 4.7.2. see comment 4.4.1 and 4.4.2	4.7.1 Cross reference amended. 4.7.2 Amended.
Grey Falcon	4.8.1. Unintentional error: reference to Pilbara Olive Python under Habitat loss. 4.8.2 see comment 4.4.1 and 4.4.2 and 4.6.3	4.8.1 Error corrected. 4.8.2 Amended.
Night Parrot	4.9.1. see comment 4.4.1 and 4.4.2 and 4.6.3	4.9.1 Amended.
Offset proposal	5.1 Residual impacts: assumptions stated here look correct. Just confirm that foraging habitat has been calculated as that within 12 km of critical Ghost bat roosts (i.e. Category 2 roosts and Category 3 roosts adjacent/close proximity to Category 2 roosts). 5.2 Table 5.1: remove the term 'significant' as all impact remaining after avoidance and mitigation measures have been applied require offsetting (no test of significance is to be applied under the Program or during validation processes). This approach is consistent with calculation of residual impact for projects assessed under Part 8 of the EPBC Act. Calculations in table look correct. Include note stating Offset rate ($/ha) is GST exclusive. Note CPI is to be applied to subsequent offset payments. 5.3 Proposed offset: DCCEEW has not agreed that financial contributions alone will necessarily address, or offset, impacts to critical and supporting habitat for program matters i.e. funding must still result in real conservation benefits for the impacted species in a timely manner for it to be considered an offset. To ensure real conservation outcomes for Ghost bat populations in the Pilbara are achieved via proposed payments to the Fund, consider and respond to the following: How does PEOF propose to achieve these offsets and what outcomes are expected?	5.1 Offsets have been calculated based on foraging habitats available within 12km of critical Category 2 and 3 roosts. 5.2 Amended. 5.3 Noted. BHP will continue to work with DWER in relation to implementation of offsets. Alternative offsets were not considered as financial contributions to the PEOF are identified as an offset pathway in the revised APOP endorsed in April 2023. 5.6 BHP will report on offset outcomes in the AER.

	What certainty does BHP have that offset outcomes can be achieved via the PEOF prior to or at the same time as impact to this habitat? What corrective action will BHP implement if offsets to compensate for loss of Ghost Bat foraging habitat have not been delivered within a reasonable time i.e. by the first annual reporting period and/or 12 months from payment into the Fund? What alternative offsets were considered when applying the mitigation hierarchy to this Activity? E.g.: Protection and rehabilitation of degraded Major or Minor Drainage Line habitat. Feral cat baiting for the life of the Activity within or outside BHP's tenancy in the Pilbara region and areas known or likely for Ghost Bats to occur. Protection of known Ghost Bat roosts and foraging habitat away from iron ore deposits and areas suitable for future renewable energy or other infrastructure. 5.6 Summaries of offset outcomes included in Annual Environmental Reports are expected to be provided in enough detail for stakeholders to understand whether reasonable conservation outcomes are being achieved for the impacted species/program matter and the time between impact occuring and offset outcomes has been minimised as far as practicable.	
Monitoring commitments	<u>Ghost bat</u> 6.1.1 When will monitoring sites expected to be confirmed? Ideally monitoring will commence as soon as practicable, including to gather or complete baseline information prior to impact – if not already available from pre-commencement surveys. Proposed monitoring frequency at ghost bat roosts outside the breeding period is reasonable if low numbers of individual continue to be recorded. Echolocation and video census is recommended at if numbers increase. 6.1.2 See recommendation at 4.3.10 for additional mitigation and monitoring at isolated/non-critical category 3 Ghost bat roost CJIM-09 and nearby disturbance actions (2020 validation notice) to inform better awareness and management of noise, vibration and light impacts from operation of fixed and/or moving machinery in close proximity this on this isolated category 3 cave. (Continuous monitoring of ghost bat useage is likely to assist for this purpose rather than proposed annual monitoring). - monitoring for noise impacts: management of machinery should aim to keep sound pressure levels to below 70 dB(Z) at the roost entrances. Monitoring (either continuous or during operation within 750 m of this roost) and reporting should include performance results against this threshold and discussion of corrective/preventative action implemented for any exceedance events. - monitoring for vibration impacts: our understanding of the Activity described in this and the previous validation notice (8 May 2020), is that no blasting will occur within the Activity Area (unless this is occurring in area already disturbed as at Financial Year 2019). Monitoring and management of potential vibration impacts will depend on if and when blasting activity is occurring within the vicinity of CJIM-09 but should limit inground vibration to 10 mm/s (to provide for ongoing use of	6.1.1 Monitoring of Ghost Bats has commenced and will continue to occur five times each year in accordance with the monitoring program. Monitoring includes scat counts, genetic and hormone analysis, microclimate analysis, ultrasonic analysis, GPS tracking and camera trap monitoring. 6.1.2 Monitoring of this roost occurs quarterly. BHP will report outcomes of monitoring in the AER. BHP has not undertaken monitoring for noise, vibration and light as the roosts are considered sufficiently far from disturbance and sources of noise, vibration and light. 6.1.3 BHP will report results of Ghost Bat monitoring in the AER. 6.1.4 BHP is currently investigation options to undertake ongoing monitoring of feral cats in areas of critical Ghost Bat habitat, to enhance detection and control.

	this cave over the life of the impact/during any blasting activity near-by), and must not exceed 25 mm/s to 75 mm/s to avoid structural impact and loss of this roosts' ability to provide diurnal roosting habitat for the Ghost bat. - monitoring for light: Refer to Appendix I: Bats, of the National Light Pollution Guidelines for Wildlife (DCCEEW 2023) for mitigation of light impacts, particularly within 500 m of the roost, and monitoring requirements (note - we recommend seeking additional advice from Plnb experts on the suitability of red/amber for other projects' potential impact to Pilbara leaf-nosed bats). 6.1.3 Report results in Annual Environmental Reports from monitoring at CJIM-09 to demonstrate ongoing achievement of avoidance of impact to CJIM-09 (and the assertion that these actions will not impact this habitat). 6.1.4 Reliance on sightings to instigate feral cat trapping may not be adequate to ensuring feral cat numbers are appropriately managed at this site and reduce the risk to local Ghost bats exiting caves within the Activity Area. We encourage BHP to undertake regular feral cat monitoring, such as via motion cameras at key locations, to assist in early identification and ongoing control of feral cats in the area over the life of the impact.	
Clearing commitments	6.2.1 Note – this does not include clearing commitments (or MAR rate limits) for actions described in the 2020 validation notice. This is an example of where 'superceeding' the previous VN may or may not work, depending on what content is included. 6.2.2 commitments to not clear Ghost bat roosts will not necessarily be effective without related commitments to avoid noise/vibration/light/dust impacts as well (i.e. keep below relevant thresholds).	6.2.1 Text amended upfront in the Revised Validation Notice to clarify that this does not alter or reassess previous activities included in the Previous Validation Notice. 6.2.2 Noted. BHP considers the setbacks/buffers applied to Ghost Bat roosts are adequate to protect roosts from potential indirect impacts. In addition, frequent Ghost Bat monitoring is expected to detect potential changes.
Management commitments	6.3.1 refer comments above for additional management commitments (feral cat abatement, light pollution, noise from haul trucks etc – and vibration if blasting).	6.3.1 BHP undertakes feral cat control in response to sightings and is currently investigation options for monitoring in areas of critical habitat, to enhance detection and subsequent control. BHP does not propose light or noise monitoring, based on distance of roosts from Additional Validation Notice IF required for the Revised Validation Notice IF.
Offset commitments	6.4.1 The offset commitment (Payment of financial contribution to PEOF) is not sufficient. Commitment needs to include achievement of conservation outcomes equal to or greater than the impact (e.g. habitat loss). 6.4.2 Reporting needs to include evidence (payment receipt) provided to department of on-time payment into the Fund (minimum 10% within 1 month of validation notice becoming effective), and summary of offset outcomes in Annual Environment Report to the department and public.	6.4.1 BHP is currently investigating options for feral cat monitoring in areas of critical habitat at Jimblebar, in addition to other locations. This may include the deployment of cameras. This will enhance the ability to detect feral cat presence and undertake control measures, to minimise potential impact on native fauna. 6.4.2 BHP will report on offsets within the AER and will provide evidence of payment of 10% of the offset total within one month of the Validation Notice becoming effective.

Page number and document content	KNAC Comments	BHP response
2 Document version table	Rev 2 draft for public comment – update 29 May 2020 to 29 May 2023	Amended.
1.7 Decision for a Validation Notice -	….operation of the Activity will each of the PMOs… Wording needs correcting.	Amended.
16 Table 1.2	What process occurs if evidence of one of the other Program matter species is found within the activity area in the future – does this trigger a revised Validation Notice process?	In the event that monitoring detects additional Program Matters, for which the Notifiable Action trigger was not previously met, BHP would notify DCCEEW and revise the Validation Notice.
22 2.1 Proposed disturbance	Disturbance of up to 2000ha was sought…Previous IF 2695ha. Can you explain the discrepancies between the previous Indicative Footprint and the previous disturbance sought (2000ha) under the previous Validation Notice?	The Indicative Footprint for the Jimblebar Hub Optimisation Project was 2,693 ha; however, only 2000 ha of this required clearing. The Previous Validation Notice therefore sought to disturb 2,000 ha.
30 Stakeholder engagement	Please correct Stakeholder engagement section: The discussion pertaining to the approach to review the Validation Notice was solely carried out with KNAC's environmental advisor and BHP staff, it was not as part of a social surrounds engagement – this is misleading. Please also reword "summary document provided to Nyiyaparli" to "provided to Karlka Nyiyaparli Aboriginal Corporation"	Text amended.
50 Ghost Bat	Category 4 roosts…anticipated to the Ghost Bat form light spill…Spelling error	Corrected.
50 Ghost Bat	Category 3 roosts…located sufficiently far from the Previous Validation Notice IF. Why is the current IF not utilised here?	Text amended. The Category 3 roosts are located sufficiently far from the IF.
50 Impact assessment	Standard dust suppression practices…not considered to be a significant impact to ghost Bats. KNAC have consistently raised the issue of dust within the Nyiyaparli determination area, the standard approach to dust management is not adequate. KNAC request that dedicated research and monitoring in relation to the following is carried out: TSP, impacts of dust on flora, fauna and waterways and alternative management measures.	BHP notes KNAC concerns regarding dust. BHP undertakes dust monitoring at two locations at Jimblebar and BHP implements dust management in accordance with its Dust Management standard. In addition, dust deposition monitoring has been undertaken to monitor dust deposition on vegetation at Jimblebar. Implementation of additional dust suppression projects is currently in progress at Jimblebar to reduce dust generation. These include installation and operation of additional deluge sprays and further dust monitors.
51 Mitigation	Ghost Bat reflectors will be installed where possible. What conditions dictate whether reflectors are/aren't possible? How effective are the reflectors?	If fencing is required to be installed, BHP will avoid the use of barbed wire fencing, except where required by legislation. Bat deflectors are considered effective at deterring bat interaction as they can either reflect light and/or move or flap in the wind, making the fence more visible and thereby deterring bats from approaching or landing.
55 Table 4.8 Monitoring target and corrective	Evidence of the presence of Ghost Bat at one or more roosts over 2 years is an unaspiring target that doesn't address the objective set by the EPBC as this target would not demonstrate that there has been no impact from the activity on	BHP monitors Ghost Bat activity in the Activity Are quarterly. Given ghost Bats are known to utilise multiple caves and presence fluctuates over time, assessing

and contingency actions	Ghost Bats in the area. Corrective actions are also inadequate – what actions are to be carried out to address the decrease in presence should it occur?	activity over a duration of 2 years provides a baseline understanding of the use of an area and whether there is a trend in activity. Text relating to corrective actions has been amended to: 'consult with Ghost bat experts as required in relation to corrective actions'
55 Table 4.8	Pending safe access, heritage…What cultural safety protocols are BHP proposing to facilitate safe access from a heritage perspective?	Ghost Bat monitoring is underway at Jimblebar in accordance with the program outlined in Table 4.8. In the event that cultural safety is identified as a concern, BHP WAIO Environment would seek support from BHP Heritage and KNAC on how to manage.
99 Table 6.3 Fire management	Monitoring and frequency only indicated during construction phase – request this be carried out during the life of the project.	Noted and text amended.