BHP Pilbara Strategic Assessment

East Pilbara Surplus Water Drilling Validation Notice

16 October 2024

Forward

Document Version

Rev	Description Of Amendment	Organisation	Date Validation Notice Finalised	Date Validation Notice Effective From
Rev 0	N/A	BHP Iron Ore Pty Ltd		
Rev 1	Updated in response to DCCEEW comments	BHP Iron Ore Pty Ltd	16 October 2024	13 November 2024

Glossary and Abbreviations

Term	Meaning
Activity	The Activity refers to the East Pilbara Surplus Water Drilling Program being undertaken in the Thirteen Creek and Caramulla Creek area, as described in Sections 1.4 and 2.2.
Activity Area	The area in which the Activity will be undertaken within as described in Section 1.5.
AER	Annual Environmental Reporting
APOP	Pilbara Strategic Assessment and Assurance Plan and Offsets Plan, Revision 2.3. Published April 2023. Supersedes BHP (2018a and 2018b) versions.
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.
BHP	BHP Iron Ore Pty Ltd
Conceptual Clearing Extent	Areas within the Indicative Footprint where clearing of native vegetation and/or moving of earth is predicted to occur for the Activity. The exact location of the Conceptual Clearing Extent is subject to change pending in-field site selection; however, will remain within the Indicative Footprint and total clearing limit.
DCCEEW	Department of Climate Change, Energy, the Environment and Water (formerly DAWE)
Department, the	The Australian Government Department responsible for the administration of the EPBC Act or successors.
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.
DMIRS	Department of Mines, Industry Regulation and Safety
DoE	Department of the Environment
DWER	Department of Water and Environment Regulation
EPA	Environmental Protection Authority
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*

Term	Meaning
Impact or impacts	As defined in section 527E of the EPBC Act.
Important population	A population that is necessary for a species' long-term survival and recover (N.B. variations of this definition may exist for the Program Matters - See Section 4.1.1).
Indicative Footprint	Represents the planned maximum extent of where the Conceptual Clearing Extent may be located within the Activity Area. The exact location [and size] of the Indicative Footprint is subject to change pending detailed design and investigations/studies; however, will remain within the Activity Area.
IRR	Impact Reconciliation Report
m bgl	Metres below ground level
MAR	Managed aquifer recharge
Minister	Minister responsible for administering the EPBC Act (being, at the date of this Validation Notice, the Minister for the Environment).
MNES	Matters of National Environmental Significance
MS	Ministerial Statement
NJV	Newman Joint Venture
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 and Offset 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. Supersedes BHP (2018b) version.
PEOF	Pilbara Environmental Offset Fund
PMO	Program Matter Outcomes
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.

Term	Meaning
Program Matters	The listed threatened species Pilbara Leaf-nosed Bat (*Rhinonicteris aurantius*), Northern Quoll (*Dasyurus hallucatus*), Greater Bilby (*Macrotis lagotis*), Ghost Bat (*Macroderma gigas*), Pilbara Olive Python (*Liasis olivaceus barroni*), Night Parrot (*Pezoporus occidentalis*), and Grey Falcon (*Falco hypoleucos*), as detailed in the Pilbara Strategic Assessment Assurance Plan and Offsets Plan (BHP 2023).
SAA	Strategic Assessment Area: The geographical extent of the assessment and boundaries within which the Program must be implemented, as depicted in Appendix 1.
SEA	Strategic Environmental Approval
SM4	Song Meter 4 (acoustic recording device)
Study Area	The geographical extent of a survey's boundaries.
Triggers	Species-specific decision-making criteria which initiate the requirement for a specific Validation Action (i.e. Validation Notice or Decision Report) when met. Requirements of the Validation Action are dictated by which triggers have been met.
TSS	Total suspended solids
TSSC	Threatened Species Scientific Community
Validation Notice	This Validation Notice under Part C of the endorsed program.
WA	Western Australia

Contents

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Figures

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 north-west 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 north-west of Newman township.

Ore from the above mining operations 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.

BHP proposes to implement the East Pilbara Regional Surplus Water drilling program (the Activity) including drilling and installation of bores at Caramulla and Thirteen Creek, to test suitability of groundwater aquifers to receive surplus water via Managed Aquifer Recharge (MAR). This Validation Notice has been prepared to document the validation process for the Activity required under the *BHP Billiton Iron Ore Pilbara Strategic Assessment Program* (the Program) (BHP 2017).

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).

BHP operations
Great Northern Highway
BHP rail
Activity Area
National park
Nature reserve

N

0 25 50 75 100
KILOMETRES

GDA 1994 MGA ZONE 50

BHP

PUBLIC

EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Regional Location

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:2,000,000	PREPARED:	GEOMATICS	FIGURE:	1.1
DATE:	17/05/2024	REQUESTOR:	ENV APPROVALS	NO:	A1252/026A

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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 Activity, including new areas of proposed disturbance, 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	1.7
2	BHP authorisation and date the Validation Notice will take effect	Foreword
3	Program Matters and triggers relevant to the Validation Notice	Table 1-2 and 5
4	Project description including Activity location and timeframes for the duration of activities	2
5	Stakeholder engagement and public consultation	3
6	Review of baseline and contemporary data with a description of the direct and indirect impacts	5
7	Estimates of disturbance and residual impacts	2 and 5.2.5

	Strategic Assessment Program Offsets Plan Requirements	Sections which address these Requirements
8	Application of the mitigation hierarchy	5.2.6
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 and 7
10	Outline how the offset project/s will support the long-term persistence and viability of the relevant Program Matters	6 and 7
11	Commitment to measurable offset project milestones	7

1.4 Activity Overview

The proposed Activity is located 62 km east of Newman and 16 km east of Jimblebar Mine, in the Pilbara Region of Western Australia (Activity Area). The proposed Activity is included in the SAA of the Program endorsed by the Minister responsible for administering the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) on 11 May 2017.

The Activity is required to support the future management of surplus water which has been abstracted to allow mining below the water table at BHP's existing and proposed future eastern Pilbara hub iron ore operations. The aquifer testing that comprises the proposed Activity will inform the selection of the proposed future surplus water management infrastructure and design which will be the subject of future environmental approvals.

The Activity consists of a staged hydrogeological drilling and assessment program, for the purpose of assessing location suitability for potential water reinjection bores and discharge as part of the Eastern Pilbara Regional Surplus Water Project and Managed Aquifer Recharge (MAR) borefield. The hydraulic assessment will include progressive test pumping and injection testing of up to 84 investigatory bores across 15 potential MAR locations. The post-drilling assessment method will include the abstraction of and re-injection of groundwater into the target aquifer.

To enable the hydraulic assessment in the Activity Area, the following works will be undertaken:

- clearing of up to 45 ha of native vegetation for drill pads and access tracks.
- construction of access tracks including maintenance of existing tracks and vegetation clearing and grading for new tracks.
- establishment of drill pads which will include clearing and stockpiling of vegetation and topsoil, and the installation of sumps to contain purged groundwater. Two sizes of drill pads are planned: 60 m by 60 m for deep bores (bores up to 200 metres below ground level (m bgl)), and 20 m by 20 m for shallow bores (bores up to 25 m bgl).
- drilling and establishment of 84 groundwater bores, comprising up to 60 deep bores to assess the target aquifer, and up to 24 shallow monitoring bores to assess the potential impacts of MAR to Caramulla Creek and Thirteen Creek.
- hydrogeological testing of bores including test pumping and reinjection testing.
- progressive decommissioning and rehabilitation of redundant bores and drill pads.

Further detail is provided in Section 2.

1.5 Activity Area

The Activity Area (Figure 1-2) is the area where the Activity will be undertaken and encompasses a total of 7,231.2 ha, spanning portions of Thirteen Creek and Caramulla Creek. The Activity Area consists primarily of native vegetation with some existing disturbed/cleared areas for monitoring bores and access tracks totalling 114 ha.

Up to 45 ha of native vegetation will be cleared within the current predicted Conceptual Clearing Extent, for the establishment of drill pads and access tracks within a 5,393 ha Indicative Footprint. Final sites will be confirmed through in-field assessment. The Indicative Footprint is wholly within the Activity Area (Figure 1-2).

An existing Native Vegetation Clearing Permit (NVCP) 8123/2 is in place across the western portion of the Activity Area, which allows up to 200 ha of native vegetation clearing for the purpose of exploration, geological and hydrological investigations. Other activities for which clearing is approved for under this permit include construction and maintenance of access roads, pipelines, water bores, monitoring equipment and associated activities.

A Decision Report (under the EPBC Pilbara Strategic Program) for the Thirteen Creek Drilling Program was prepared and finalised in September 2023. This is also in accordance with NVCP 8123/2), with activities occurring after finalisation of the Decision Report.

1.6 Timeframes

This 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:

- The Department of Climate Change, Energy, the Environment and Water (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 three years from the date of this notice as this is the predicted life span of the Activity including construction, rehabilitation and closure with the exception of select bores which may be included in the future MAR project. Rehabilitation of redundant bores and drill pads will be undertaken upon completion of the Activity.

1.7 Decision for a Validation Notice

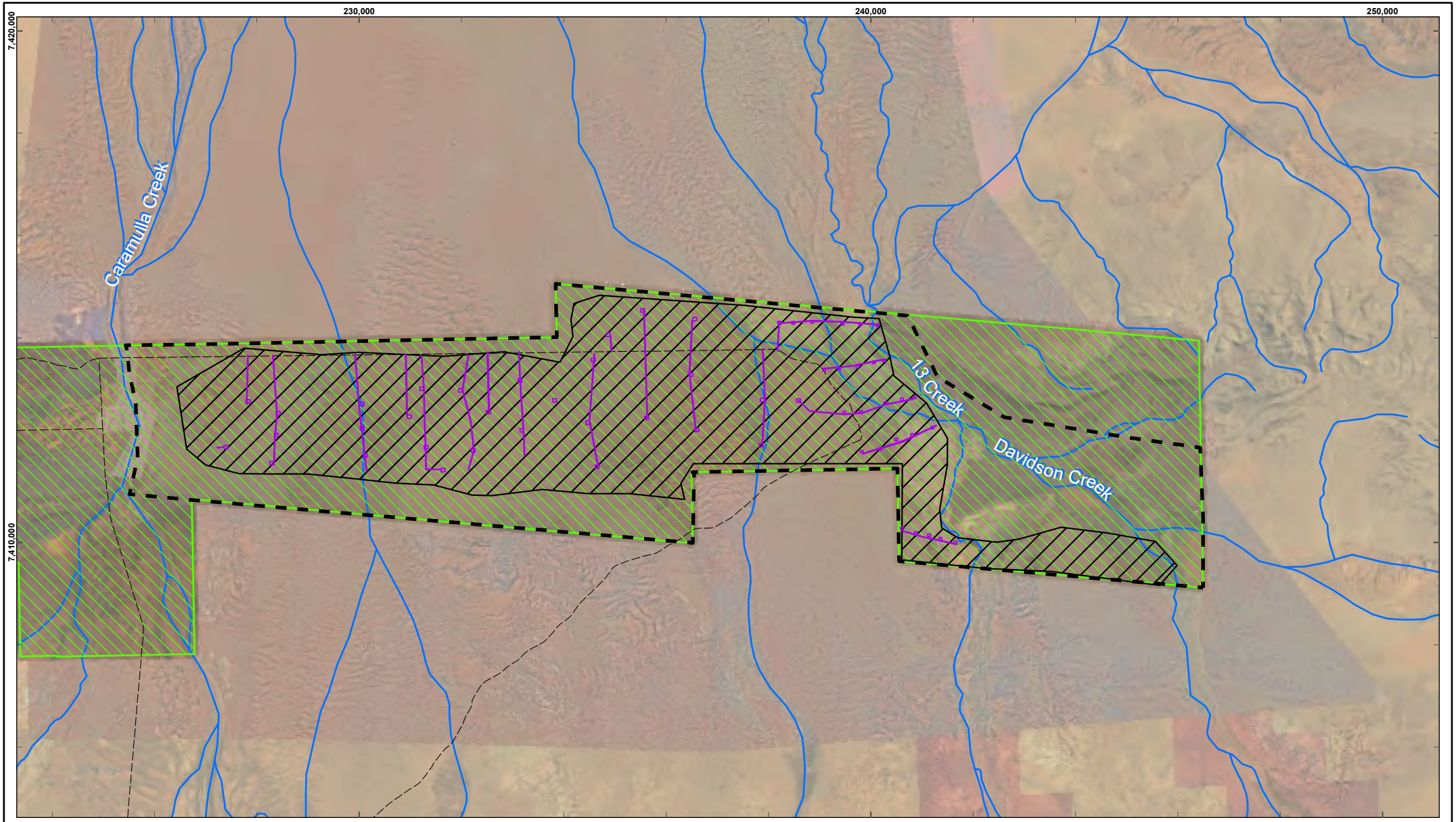
A Validation Notice is required for actions that are notifiable, in accordance with Notifiable Action Triggers set out in the APOP (BHP 2023) and reproduced in Table 1-2. The Activity is a notifiable action as it fulfils the triggers of the APOP for the Greater Bilby (*Macrotis lagotis)* Program Matter(s). The Validation Notice will demonstrate how the implementation and operation of the Activity will meet each of the PMOs provided for the Greater Bilby – *Macrotis lagotis* Program Matter(s) in the APOP by undertaking an impact assessment, applying the mitigation hierarchy, and assessing residual impacts. This Section of the 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 (AER).

As the Activity does not fulfil the Notifiable Action Triggers for the Ghost Bat (*Macroderma gigas*), the Pilbara Olive Python (*Liasis olivaceus barroni*), the Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*), the Northern Quoll (*Dasyurus hallucatus*), the Grey Falcon (*Falco hypoleucos*) and the Night Parrot (*Pezoporus occidentalis*) Program Matter(s), 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 5.2, 5.3, 5.4, 5.5, 5.6, 5.7 and 5.8 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.

The Activity Area has undergone full and extensive contemporary survey effort. Portions of the 500 m buffer zone around the Activity Area have been subject to contemporary survey efforts; however, for clarity the full extent of the 500 m buffer around the Activity Area has not been subject to contemporary surveys. The contemporary biodiversity surveys commissioned to support the Activity were scoped and undertaken prior to a change to the APOP which came into effect in April 2023. The revised APOP included an amendment to the spatial threshold of the Notifiable Action Triggers which changed from 'the Activity Area and surrounds' to 'the Activity Area and within a 500 m buffer of the Activity Area'. The survey effort to support the Activity is extensive and robust, and the portions of the buffer which were either not surveyed or not subject to contemporary surveys are likely to be of analogous habitat, condition and MNES distribution to the portions that were subject to contemporary survey. Contemporary Survey effort is detailed in Section 4.2.



- Watercourse
- Existing Tracks
- Activity Area
- NVCP 8123/2
- Indicative Footprint
- Conceptual Clearing Extent

N

0 1 2 3 4 5

KILOMETRES

GDA 1994 MGA ZONE 51

BHP

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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Activity Area and Indicative Footprint

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:100,000	PREPARED:	GEOMATICS	FIGURE:	1.2
DATE:	28/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	A1252/025C

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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	The Activity Area is located within the current distribution of the Ghost Bat, whereby the species or species habitat is likely to occur (DCCEEW 2024a). Ghost Bat critical habitat, which is comprised of Caves, Gorge/Gully, and Breakaway/Cliff is not recorded to exist within the Activity Area or within a 500 m buffer (where surveyed) of the Activity Area. Category 1, 2 or 3 caves are not present within the Activity Area, or within a 500 m buffer (where surveyed) of the Activity Area. The nearest Category 2 cave is located 12.66 km from the south-western extent of the Activity Area. Habitat suitable for Ghost Bat foraging is present within and adjacent to the Activity Area comprising Sand Plain, Stony Plain, Drainage Area/Flood Plain, Major Drainage Line, Minor Drainage Line, and Mulga Woodland (Biologic 2018, GHD 2022, Astron 2022, Astron 2023). Foraging habitat within 12 km of the identified Category 2 cave should be considered as critical habitat for the Ghost Bat (Bat Call WA 2021). The 12 km buffer of the nearest Category 2 cave does not extend into the Activity	**No.** No critical roosting habitat is present within the Activity Area or within 500 m (where surveyed) of the Activity Area. No critical foraging habitat within 12 km of a Category 2 Cave intersects the Activity Area or a 500 m buffer (where surveyed) of the Activity Area. Ghost Bat supporting habitat is present within the Activity Area. However, targeted fauna surveys (Astron 2022, Astron 2023, GHD 2021b, GHD 2019) have not identified the presence or sign/s of a Ghost Bat colony or residing, transient, infrequent or dispersing individual/s within the Activity Area or within 500 m of the Activity Area (where surveyed), despite extensive survey effort. The necessary conditions required to trigger a Notifiable Action have not been met.

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
		Area or within 500 m (where surveyed) of the Activity Area boundary. No records exist within the Activity Area or within a 500 m buffer (where surveyed) that indicate the presence or sign/s Ghost Bat colony or residing individual/s.	
	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	The Activity Area is located within the current distribution of the Ghost Bat, whereby the species or species habitat is likely to occur (DCCEEW 2024a). Ghost Bat critical habitat, which is comprised of Caves, Gorge/Gully, and Breakaway/Cliff is not recorded to exist within the Activity Area or within a 500 m buffer (where surveyed) of the Activity Area. Category 1, 2 or 3 caves are not present within the Activity Area, or within a 500 m buffer (where surveyed) of the Activity Area. The nearest Category 2 cave is located 12.66 km from the south-western extent of the Activity Area. Ghost Bat supporting foraging habitat is present within and adjacent to the Activity Area comprising Sand Plain, Stony Plain, Drainage Area/Flood Plain, Major Drainage Line, Minor Drainage Line, and Mulga Woodland (Biologic 2018, Astron 2022, Astron 2023).	**No.** No critical roosting habitat is present within the Activity Area or within 500 m (where surveyed) of the Activity Area. No critical foraging habitat within 12 km of a Category 2 Cave intersects the Activity Area or a 500 m buffer (where surveyed) of the Activity Area. Ghost Bat supporting habitat is present within the Activity Area. However, targeted fauna surveys have not identified the presence or sign/s of a Ghost Bat colony or residing, transient, infrequent, or dispersing individual/s within the Activity Area or within 500 m (where surveyed) of the Activity Area despite extensive survey effort. The necessary conditions required to trigger a Notifiable Action have not been met.

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
		Foraging habitat within 12 km of the identified Category 2 cave should be considered as critical habitat for the Ghost Bat (Bat Call WA 2021). The 12 km buffer of the nearest Category 2 cave does not extend into the Activity Area or within 500 m (where surveyed) of the Activity Area boundary. No records exist within the Activity Area or within a 500 m buffer (where surveyed) that indicate the presence or sign/s Ghost Bat transient, infrequent or dispersing individual/s.	
Northern Quoll (*Dasyurus hallucatus*)	Within the Activity Area or within a 500 m buffer of the Activity boundary there is: Presence of Northern Quoll critical habitat and or supporting habitat **AND** Presence or sign/s of Northern Quoll colony or residing individuals	The Activity Area falls within the current distribution of the Northern Quoll, whereby the species habitat may occur (DCCEEW 2024b). Northern Quoll critical habitat is not present within the Activity Area (Biologic 2018, Astron 2022, Astron 2023). Habitat that potentially supports foraging for the Northern Quoll (Sand Plain, Stony Plain and Hill Crest/Hill Slope) is present within the Activity Area, (Biologic 2018, Astron 2022, Astron 2023). The potentially supporting habitat does not offer any connectivity to critical habitat within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary.	**No.** Critical habitat for the Northern Quoll is not present within the Activity Area. No recordings or observations have been made within or proximal to the Activity Area, with the nearest recording being more than 32 km from the Activity Area. Supporting habitat is present within the Activity Area with no connectivity to critical habitat. No evidence exists which is suggestive of a Northern Quoll colony, or residing, individual/s within the Activity Area or within 500 m (where surveyed) of the Activity Area

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
		There have been no observations or indicators of the Northern Quoll during the fauna surveys of the Activity Area (Biologic 2018, Astron 2022, Astron 2023). The nearest recording of the Northern Quoll is located more than 32 km from the Activity Area (recorded by Biota during the Orebody 32 Surplus Water Targeted MNES Vertebrate Fauna Survey) (Biota 2022). There is no evidence to indicate the presence of a Northern Quoll colony or residing individuals within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary.	The Notifiable Action Triggers have not been met, due to the absence of the species within and proximal to the Activity Area.
	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.	The Activity Area falls within the current distribution of the Northern Quoll, whereby the species habitat may occur (DCCEEW 2024b). Northern Quoll critical habitat is not present within the Activity Area, due to a lack of records of Northern Quoll in the Activity Area despite extensive survey effort (Biologic 2018, Astron 2022, Astron 2023). Habitat that potentially supports foraging for the Northern Quoll (Sand Plain, Stony Plain and Hill Crest/Hill Slope) is present within the Activity Area, (Biologic 2018, Astron 2022, Astron 2023). The potentially supporting habitat does not offer any connectivity to critical habitat within	**No.** Critical habitat for the Northern Quoll is not present within the Activity Area. No recordings or observations have been made within or proximal to the Activity Area, with the nearest recording being more than 32 km from the Activity Area. Supporting habitat is present within the Activity Area with no connectivity to Critical Habitat. No evidence exists which is suggestive of Northern Quoll transient, infrequent or dispersing individual/s within the Activity Area or within 500 m (where surveyed) of the Activity Area.

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
		the Activity Area or within 500 m (where surveyed) of the Activity Area boundary. There have been no observations or indicators of the Northern Quoll during the fauna surveys of the Activity Area (Biologic 2018, Astron 2022, Astron 2023). The nearest recording of the Northern Quoll is located more than 32 km from the Activity Area. There is no evidence to indicate the presence of Northern Quoll transient, infrequent or dispersing individuals within the Activity Area or within 500 m (where surveyed) of the boundary of the Activity Area.	The Notifiable Action Triggers have not been met, due to the absence of the species within and proximal to the Activity Area.
Greater Bilby (*Macrotis lagotis*)	Within the Activity Area and or within a 500 m buffer of the Activity boundary, there is: Presence of Greater Bilby critical habitat and or supporting habitat **AND** Presence or sign/s of Greater Bilby residing individuals	The Activity Area falls within the current distribution of the Greater Bilby, whereby the species or species habitat may occur (DCCEEW 2024c). BHP has commissioned a series of Targeted Fauna Surveys, which have confirmed that Greater Bilby supporting habitat exists within the Activity Area and is comprised of Sand Plain, Mulga Woodland, Drainage Area/Flood Plain and Stony Plain (Biologic 2018, Astron 2022, Aston 2023, and Astron 2024). Greater Bilby recordings within the area comprise potential historical burrows, one potential unconfirmed recent digging[1] and potentially degraded Greater Bilby	**No.** Greater Bilby supporting habitat has been recorded within the Activity Area as detailed in Section 5. Targeted Fauna Surveys (Astron 2023, Astron 2024, BHP 2022 and GHD 2021a) have identified evidence of infrequent or transient individuals, however there is no evidence of Greater Bilby residing individuals despite extensive survey effort. A resident population or individuals are not considered to currently occur in the Activity Area or immediate

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
		scat from a historical digging (the sample was morphologically confirmed as Greater Bilby, however, was too aged/degraded for DNA confirmation). Whilst there are signs of Greater Bilby presence within the Activity Area, they do not provide evidence of individuals currently residing within the Activity Area or within 500 m (where surveyed) of the boundary of the Activity Area. The Activity Area has undergone an extensive survey effort (detailed in Section 4.2 below), which have served to confirm that there are no indicators of the presence or sign/s of currently residing Greater Bilby individuals.	surrounds based upon the contemporary and historical survey data.
	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	The Activity Area falls within the current distribution of the Greater Bilby, whereby the species or species habitat may occur (DCCEEW 2024c). BHP has commissioned a series of Targeted Fauna Surveys, which have confirmed that Greater Bilby supporting habitat exists within the Activity Area and is comprised of Sand Plain, Stony Plain, Drainage Area/Flood Plain and Mulga Woodland (Biologic 2018, Astron 2022, Aston 2023, and Astron 2024). BHP have commissioned a series of Targeted Fauna Surveys which have identified sign/s of Greater Bilby infrequent or transient individual/s.	**Yes.** Greater Bilby supporting habitat has been recorded within the Activity Area. Within these habitat types, Greater Bilby sign has been identified in ten locations across multiple targeted surveys (detailed Table 5-4). The targeted assessments have concluded that the Greater Bilby records within the Activity Area are likely attributed to a small number of transient individuals, and that resident population/individuals are not considered to currently occur in the Activity Area or immediate surrounds.

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
		Bilby recordings within the area comprise potential historical burrows, one potential unconfirmed recent digging[1], and potentially degraded Greater Bilby scat from a historical digging (the sample was morphologically confirmed as Bilby, however, was too aged/degraded for DNA confirmation).	
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	The Activity Area is located within the current distribution of the Pilbara Olive Python (DCCEEW 2024d). Critical habitat for the Pilbara Olive Python has not been recorded within the Activity Area. The nearest recorded potential critical habitat for the species is Breakaway/Cliff located approximately 100 m to the north-east of the Activity Area (Biologic 2018). Pilbara Olive Python potentially supporting foraging habitats are present within the Activity Area comprising Major Drainage Line and Minor Drainage Line (Biologic 2018, Astron 2022, Astron 2023). The closest recording of the Pilbara Olive Python is located more than 34 km from the Activity Area (recorded by Biologic during the *Orebody 19 Level 2 Vertebrate Fauna Survey*) (Biologic 2014).	**No.** Supporting habitat is present in the Activity Area. The Activity Area has been subject to extensive vertebrate fauna survey effort which have not observed the Pilbara Olive Python within the Activity Area or within 500 m (where surveyed) of the Activity Area. The nearest observations of the Pilbara Olive Python are located more than 34 km to the west of the planned Activity.

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
		There is no evidence of Pilbara Olive Python population or residing individuals within the Activity Area or within 500 m (where surveyed) of the Activity Area.	
	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	The Activity Area is located within the current distribution of the Pilbara Olive Python (DCCEEW 2024d). Critical habitat for the Pilbara Olive Python has not been recorded within the Activity Area. The nearest recorded potential critical habitat for the species is Breakaway/Cliff located approximately 100 m to the north-east of the Activity Area (Biologic 2018). Pilbara Olive Python supporting habitats are present within the Activity Area comprising Major Drainage Line and Minor Drainage Line (Biologic 2018, Astron 2022, Astron 2023). The closest recording of the Pilbara Olive Python is located more than 34 km from the Activity Area (recorded by Biologic during the *Orebody 19 Level 2 Vertebrate Fauna Survey)* (Biologic 2014). There is no evidence of Pilbara Olive Python transient, infrequent or dispersing individual/s present within the Activity Area or within 500 m (where surveyed) of the Activity Area.	**No.** Supporting habitat is present in the Activity Area. The Activity Area has been subject to extensive vertebrate fauna survey effort, which have not observed the Pilbara Olive Python within the Activity Area or within 500 m (where surveyed) of the Activity Area. The nearest observations of the Pilbara Olive Python are located more than 34 km to the west of the planned Activity.

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
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	The Activity Area is not located within the current distribution of the Pilbara Leaf-nosed Bat (DCCEEW 2024e). No critical habitat for the Pilbara Leaf-nosed Bat is present within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary (Biologic 2018, Astron 2022, Astron 2023). Supporting habitat for the Pilbara leaf-nosed Bat is present within the Activity Area (Sand Plain, Major Drainage Line, Minor Drainage Line, Drainage Area/Flood Plain, and Hillcrest/Hillslope) (Biologic 2018, Astron 2022, Astron 2023). Pilbara Leaf-nosed Bats have not been detected within the Activity Area or within 500 m (where surveyed) of the Activity Area, during fauna surveys (Biologic 2018, Astron 2022, Astron 2023). The nearest recorded Pilbara Leaf-nosed Bat Category 2 cave has been recorded more than 40 km to the west of the Activity Area (BHP 2024 monitoring program [report in preparation]).	**No.** Critical roosting or foraging habitat for the Pilbara Leaf-nosed Bat is not present within Activity Area or within 500 m (where surveyed) of the Activity Area boundary. Surveys have identified habitat which could support (supporting habitat) the Pilbara Leaf-nosed Bat; however, the nearest-recorded Category 2 cave is located 40 km from the Activity Area (BHP 2024 monitoring program [in prep.]). There is no evidence of a Pilbara Leaf-nosed Bat colony or residing individual/s in or adjacent (within 500 m where surveyed) to the Activity Area.

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
	Within the Activity Area there is: 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	The Activity Area is not located within the current distribution of the Pilbara Leaf-nosed Bat (DCCEEW 2024e). No critical habitat for the Pilbara Leaf-nosed Bat is present within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary (Biologic 2018, Astron 2022, Astron 2023). Supporting habitat for the Pilbara Leaf-nosed Bat is present within the Activity Area (Sand Plain, Major Drainage Line, Minor Drainage Line, Drainage Area/Flood Plain, and Hillcrest/Hillslope) (Biologic 2018, Astron 2022, Astron 2023). Pilbara Leaf-nosed Bats have not been detected within the Activity Area or within 500 m (where surveyed) of the Activity Area, during fauna surveys (Biologic 2018, Astron 2022, Astron 2023). The nearest recorded Pilbara Leaf-nosed Bat Category 2 cave has been recorded more than 40 km to the west of the Activity Area (Eco Logical 2013).	**No.** Critical habitat for the Pilbara Leaf-nosed Bat is not present within Activity Area. Surveys have identified habitat which could support (supporting habitat) the Pilbara Leaf-nosed Bat; however, the nearest-recorded Category 2 cave is located 40 km form the Activity Area (BHP 2024 monitoring program [in prep.]). There is no evidence of Pilbara Leaf-nosed Bat transient, infrequent or dispersing individual/s in or adjacent (within 500 m where surveyed) to the Activity Area.
Grey Falcon	Within the Activity Area and or within a 500 m buffer of the Activity boundary, there is:	The Activity Area falls within the current distribution of the Grey Falcon, whereby the species or species habitat may occur (DCCEEW 2024f).	**No**. Whilst critical and supporting habitat are present within the Activity Area, the closest evidence of the Grey

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
(Falco hypoleucos)	Presence of Grey Falcon critical habitat and or supporting habitat **AND** Presence or sign/s of Grey Falcon residing individuals	Major Drainage Line is present in the eastern portion of the Activity Area which is considered to be critical habitat for the Grey Falcon (Biologic 2018, Astron 2022, Astron 2023). Supporting habitat for the Grey Falcon has been recorded within the Activity Area, comprising Sand Plain, Hardpan Plain, Drainage Area/Flood Plain, Mulga Woodland, and Minor Drainage Line (Biologic 2018, Astron 2022, Astron 2023). No observations or signs of the Grey Falcon have been recorded within the Activity Area or within 500 m (where surveyed) of the Activity Area (Biologic 2018, Astron 2022, Astron 2023). The nearest recorded observation of the Grey Falcon is located more than 40 km to the west of the Activity Area (Eco Logical 2013).	Falcon is located greater than 40 km from the Activity Area (Eco Logical 2013). There is no evidence to indicate that a Grey Falcon residing individual/s are present in or within 500 m (where surveyed) of the Activity Area.
	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	The Activity Area falls within the current distribution of the Grey Falcon, whereby the species or species habitat may occur (DCCEEW 2024f). Major Drainage Line is present in the eastern portion of the Activity Area which is considered to be critical habitat for the Grey Falcon (Astron 2023). Supporting habitat for the Grey Falcon has been recorded within the Activity Area, comprising Sand Plain, Hardpan Plain, Drainage Area/Flood Plain, Mulga Woodland and Minor Drainage Line (Biologic 2018, Astron 2022, Astron 2023).	**No.** Whilst critical and supporting habitat are present within the Activity Area, the closest evidence of the Grey Falcon is located greater than 40 km from the Activity Area (Eco Logical 2013). There is no evidence to indicate that Grey Falcon transient, infrequent or dispersing individual/s are present in or within 500 m (where surveyed) of the Activity Area.

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
		No observations or signs of the Grey Falcon have been recorded within the Activity Area or within 500 m (where surveyed) of the Activity Area (Biologic 2018, Astron 2022, Astron 2023). The nearest recorded observation of the Grey Falcon is located more than 40 km to the west of the Activity Area (Eco Logical 2013).	
Night Parrot (*Pezoporus occidentalis*)	Within the Activity Area and or within a 500 m buffer of the Activity boundary there is: Presence of Night Parrot critical habitat and or supporting habitat **AND** Presence or sign(s) of Night Parrot population(s) or residing individuals	The Activity Area is located within the current distribution of the Night Parrot, whereby the species or species habitat may occur (DCCEEW 2024g). Night Parrot critical habitat has not been recorded within the Activity Area (Biologic 2018, Astron 2022, Astron 2023). Potentially supporting habitat for the Night Parrot has been identified within the Activity Area and includes Minor Drainage Line, Drainage Area/Flood Plain, Sand Plain and Hardpan Plain (Biologic 2018, Astron 2022, Astron 2023). No observations or signs of the Night Parrot have been recorded within the Activity Area (Biologic 2018, Astron 2022, Astron 2023). Due to the absence of the species within the Activity Area or within 500 m (where surveyed) from the Activity Area, there is no critical nesting or	**No.** Whilst supporting habitat is present within the Activity Area, no observations or signs of the Night Parrot have been made in the Activity Area. No critical Night Parrot habitat is present with the Activity Area or within 500 m (where surveyed) of the Activity Area. There is no evidence to indicate that a Night Parrot population or residing individual/s are present in or within 500 m (where surveyed) of the Activity Area.

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
		foraging habitat present within the Activity Area or within a 500 m buffer (where surveyed).	
	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	The Activity Area is located within the current distribution of the Night Parrot, whereby the species or species habitat may occur (DCCEEW 2024g). Night Parrot critical habitat has not been recorded within the Activity Area (Biologic 2018, Astron 2022, Astron 2023). Potentially supporting habitat for the Night Parrot has been identified within the Activity Area and includes Minor Drainage Line, Drainage Area/Flood Plain, Sand Plain and Hardpan Plain (Biologic 2018, Astron 2022, Astron 2023). No observations or signs of the Night Parrot have been recorded within the Activity Area (Biologic 2018, Astron 2022, Astron 2023). Due to the absence of the species within the Activity Area or within 500 m (where surveyed) from the Activity Area, there is no critical nesting or foraging habitat present within the Activity Area or within a 500 m buffer (where surveyed).	**No.** Whilst supporting habitat is present within the Activity Area, no observations or signs of the Night Parrot have been made in the Activity Area. No critical Night Parrot habitat is present with the Activity Area or within 500 m (where surveyed) of the Activity Area. There is no evidence to indicate that Night Parrot transient, infrequent or dispersing individual/s are present in or within 500 m (where surveyed) of the Activity Area.

[1] The potential unconfirmed recent digging was recorded in 2023 (Astron 2023) and was subject to the following description by Astron:

Program Matter	Notifiable Action Trigger	Activity Area Program Matter Data	Applicable Trigger?
The potential recent digging observed was characteristic in size and shape of typical bilby diggings (David Keirle pers. obs.); however, monitor lizard tail marks were observed nearby, and no other bilby sign was observed in the vicinity. A camera was set on the digging and did not record any bilby activity. As such, the digging may represent bilby or, alternatively (more likely), an atypically shaped monitor lizard digging. Whilst unlikely that this particular digging is attributable to the Greater Bilby, for the purposes of this Validation Notice BHP has adopted a conservative approach and has treated the digging as an unconfirmed Greater Bilby digging.			

2 Project Disturbance and Description

Section 2.1 summarises the proposed disturbance for the Activity. Section 2.2 below describes the Activity in detail. Figure 1-2 illustrates the location of the proposed works comprising the Activity under assessment in this Validation Notice.

2.1 Proposed Disturbance

The proposed Activity will result in the disturbance of native vegetation, restricted to an upper limit of 45 ha within the boundaries of the Indicative Footprint as defined in Figure 1-2.

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 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
Western Ridge	Validation Notice	Jul-23	4,266	86,554
Yeerabiddy Rail Works	Validation Notice	Aug-23	60	86,494
Thirteen Creek Drilling Program	Not a Notifiable Action	Aug-23	11	86,483

Rail decarbonisation electrification Project	Not a Notifiable Action	Aug-23	0	86,482.98
Orebody 32 Below Water Table	Not a Notifiable Action	Sep-23	224	86,259
Newman West (Mount Whaleback Mine)	Not a Notifiable Action	Nov-23	155	86,104
Newman Water Treatment Plant Tank Replacement and Upgrades	Not a Notifiable Action	Nov-23	7	86,097
Jimblebar Met Mast Decision Report	Not a Notifiable Action	Nov-23	2	86,095
Jimblebar Validation Notice	Validation Notice	Feb-24	2067	84,028
East Pilbara Surplus Water Drilling Validation Notice	Validation Notice	May-24	45	83,983

2.2 Activity Description

The proposed Activity is located 62 km to the east of Newman and 16 km to the east of BHP's Jimblebar Mine. The proposed Activity is included in the SAA of the Program endorsed by the Minister responsible for administering the EPBC Act on 11 May 2017.

The Activity will consist of a staged hydrogeological drilling and assessment program, being undertaken for the purpose of assessing location suitability for potential water reinjection bores and discharge linked to the Eastern Pilbara Regional Surplus Water Project and MAR borefield. The East Pilbara Regional Surplus Water Project and MAR borefield will be subject to future approvals under the Environmental Protection Act 1986 (WA) and potential further Decision Report or Validation Notice if further disturbance is required, and is not included in the Activity the subject of this Validation Notice.

To support the Activity subject of this Validation Notice, BHP will seek secondary approval pursuant to Part V of *the EP Act 1986.*

The hydraulic assessment will include test pumping and injection testing of up to 84 investigatory bores across 15 potential MAR locations. The post-drilling assessment method will include the abstraction of and re-injection of the abstracted groundwater into the target aquifer. To enable the hydraulic assessment in the Activity Area, the below listed works will be undertaken:

- Disturbance of up to 45 ha of native vegetation to support the establishment of drill pads and access tracks.
- Construction of access tracks including maintenance of existing tracks, and vegetation clearing and grading for new tracks.

- Establishment of drill pads which will include clearing and stockpiling of vegetation and topsoil, and development of sumps to contain purged groundwater. Two sizes of drill pads are planned 60 m by 60 m for deep bores (up to 200 m bgl), and 20 m by 20 m for shallow bores (target up to 25 m bgl).
- Drilling and establishment of 84 groundwater bores, comprising up to 60 deep bores to assess the target aquifer, and up to 24 shallow monitoring bores to assess the potential impacts of MAR to Caramulla Creek and Thirteen Creek.
- Abstraction of groundwater from the target aquifer for the purpose of re-injection testing and test-pumping. Abstraction volume upper limit of 1,410 ML annually and 4,230 ML over three years.
- Hydrogeological testing of bores including test pumping (at a rate of approximately 50 L/s) and reinjection testing.
- Reinjection of abstracted water to select test bores, or discharged as surface water (further detail in Section 2.2.2).

2.2.1 Clearing and ground disturbance

To support the hydrogeological testing of the target aquifer, ground disturbance and clearing will be undertaken to establish drill pads and access tracks, and to maintain existing access tracks. Clearing activities will be undertaken in accordance with BHP's internal Project Environmental and Aboriginal Heritage Review (PEAHR) process. Disturbance details will be reported in the corresponding AER (detailed in Section 7).

Prior to ground disturbance activities, the area to be cleared will be subject to a Greater Bilby pre-clearance survey to ensure locations of historical Greater Bilby activity including inactive burrows, or potential new findings, are not disturbed. In the event that a previously unrecorded Greater Bilby burrow is recorded, a buffer of 50 m will be applied in which no ground disturbance can occur. This will ensure that there is no impact to any Greater Bilby individual that may be present.

Clearing for the Activity comprises numerous small extents (Conceptual Clearing Extent) distributed across the Indicative Footprint so as not to fragment Greater Bilby supporting habitat. An upper clearing limit of 45 ha will apply, with sub-limits for Greater Bilby supporting habitat (Table 5-3).

2.2.2 Hydrogeological testing and discharge

The target aquifer for the proposed future MAR borefield and for the Activity is an extensive unit which ranges in depth from >35 m bgl to >90 m bgl, with an average depth to groundwater level of 50 to 60 m bgl expected in the Activity Area. The target aquifer comprises Paraburdoo Dolomite and vuggy breccia, and is overlain by confining clays with limited connectivity to the overlying superficial sandy alluvial unit (0 to 35 m bgl). Hydrogeological assessment will also be conducted in the shallow alluvial unit to understand the potential impacts to Caramulla and Thirteen Creeks.

Aquifer testing will occur to assess and locate optimal sites for injection and will include the drilling and establishment of 60 deep bores (up to 200 m bgl) to target the deep aquifer, and no more than 24 shallow bores to assess impact and response by Caramulla Creek and Thirteen Creek to the aquifer testing and associated discharge. Hydrogeological activities will include production bore hydraulic testing, Step Rate and Continuous Constant Rate tests, aquifer characterisation and reinjection hydraulic testing.

The testing at each injection bore is expected to occur for up to 20 days, and groundwater derived from source production bores will be directly re-injected into proximal test injection bores or discharged into nearby creeks (Caramulla Creek and Thirteen Creek). Discharge management will take place under BHP internal risk assessment informed by wetting front modelling, which has indicated a wetting front of 0.6 to 1.1 km when water is discharged to the ground surface when bore locations are away from main Creeklines, and 0.9 to 3.7 km when excess abstracted water is discharged into existing Creeklines (Thirteen Creek). Where excess abstracted water is not re-injected to the target aquifer for re-injection testing, discharge will occur at an upper limit volume of 7.7 M/L per day. Discharge of abstracted water to the ephemeral Thirteen Creek will be intermittent and will not alter the permanency or water

quality of the drainage line. Excess abstraction water will be subject to testing of water quality parameters prior to discharge to the surface and will be discharged in accordance with a Discharge Management Plan (Appendix 5).

Groundwater drawdown and rise will be monitored in the test bores during test pumping and injection activities, in both the test bore and observation bores. Monitoring will include:

- Field assessment of pumping water quality (continuous measurements of pH, electrical conductivity, temperature and total suspended solids (TSS))
- Continuous measurement of groundwater levels in pumping bores and a wide network of monitoring bores
- Continuous measurement of pumping and injection rates
- Comprehensive groundwater quality analysis at the conclusion of Constant rate Tests

2.2.3 Closure and Decommissioning

Decommissioning and rehabilitation will be conducted progressively at the locations that are least favourable for the surplus water re-injection and groundwater monitoring. These activities will include rehabilitation of access tracks and redundant drill pads linked to the unsuitable locations. Rehabilitation will be progressed with topsoil retained within the disturbance area (drill pad) and re-spread following determination that the location is not suitable for retention, and will be subject to rehabilitation monitoring). The potential surplus water re-injection will support current and future mining operations at Jimblebar and will be subject to further environmental approvals. The Jimblebar Mine Closure Plan will be amended to incorporate surplus water reinjection, should the future East Pilbara Surplus Water project be approved under relevant legislation.

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.

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 17 July 2024. Registered stakeholders were emailed notification that the public consultation period had commenced. These stakeholders included DBCA, DCCEEW, DEMIRS, DWER and KNAC.

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 to date

Stakeholder	Date	Topics/Issues Discussed	BHP Response and Outcome
Nyiyaparli Implementation Committee Meeting	25 June 2024	Brief introduction of BHP's water management strategy to include additional managed aquifer recharge to manage surplus water.	
DCCEEW	1 July 2024	High level presentation of the proposed Activity and Program Matter(s) subject of this Validation Notice. Discussion of direct and indirect impacts, avoidance and mitigation measures, and residual impacts associated with the proposed Activity.	DCCEEW requested that advice on the hydrological values in the Activity Area be described in the Validation Notice.
Key external stakeholders including KNAC, DEMIRS, PEOF, DWER, DBCA	16 July 2024	BHP published the draft Validation Notice for 28 day public comment period.	No comments received.

Stakeholder	Date	Topics/Issues Discussed	BHP Response and Outcome
DCCEEW	23 July 2024	BHP informed DCCEEW that the Validation Notice published for public comment until 20 August.	BHP received comments from DCCEEW on 21 August 2024 and provided written responses on 21 August 2024.

4 Validation Process

4.1 Guidance

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

- DCCEEW (2023). Recovery Plan for the Greater Bilby (Macrotis lagotis)
- DotE (2016) EPBC Act referral guideline for the endangered Northern Quoll
- DotE (2015). Threat abatement plan for predation by feral cats
- DotE (2013) Matters of National Environmental Significance Significant Impact Guidelines 1.1 EPBC Act
- Department of the Environment, Water, Heritage and the Arts (DEWHA) (2010) Survey guidelines for Australia's threatened bats
- DEWHA (2008a). Threat abatement plan for predation by the European red fox
- DEWHA (2008b). Approved Conservation Advice for Liasis olivaceus barroni (Olive Python – Pilbara subspecies)
- 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
- DSEWPaC (2011c). Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads
- Threatened Species Scientific Committee (TSSC) (2020). Conservation Advice Falco hypoleucos Grey Falcon
- TSSC (2016a). Conservation Advice *Macrotis lagotis* Greater Bilby
- TSSC (2016b). Conservation Advice *Pezoporus occidentalis* Night Parrot
- TSSC (2016c). Conservation Advice *Macroderma gigas* Ghost Bat
- TSSC (2016d). Conservation Advice *Rhinonicteris aurantia* (Pilbara form) (Pilbara Leaf-nosed Bat)
- TSSC (2005e). Commonwealth Listing Advice on Northern Quoll (*Dasyurus hallucatus*).

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 to inform assessment of the Activity Area are presented in Table 4-1 with survey boundaries illustrated on Figure 4-1: Contemporary vertebrate fauna surveys undertaken in the Activity Area

Appendix 2 provides these survey reports and Figure 4-2 shows complete survey coverage (historical and contemporary).

Surveys were undertaken in a manner consistent with the requirements of the Commonwealth and Western Australia guidance for surveys listed 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	Survey type	Summary
East Caramulla Targeted Bilby Survey (Astron 2024)	November 2023	Targeted Greater Bilby Survey within Activity Area (full extent of Activity Area)	Targeted Greater Bilby Assessment included: desktop assessment, two periods of field works, 16 2 ha plot searches, habitat assessment and 276 camera trap nights (five locations). The survey identified six unconfirmed burrows and one potential Greater Bilby scat (morphologically confirmed, DNA not achievable due to sample age and degradation). The camera trapping did not result in the confirmation of Greater Bilby. The assessment concluded that the distribution of Greater Bilby recordings is not indicative of a resident Greater Bilby individual or population within or adjacent to the Activity Area, and that the findings were more likely to suggest a low-density distribution of transient individuals which may utilise the area when foraging conditions are favourable. Program Matters fauna species recorded: **Greater Bilby** (*Macrotis lagotis*) One aged (greater than five years) scat which was confirmed via morphological examination and recorded in Mulga Woodland near previously identified potential diggings at the base of an *Acacia* stand, four historical unconfirmed diggings located in Sand Plain habitat, one historical digging recorded in Mulga Woodland, and four previously recorded historical potential diggings/burrows. Refer Table 5-4 and Figure 5-5.
East Caramulla and Thirteen Creek Fauna Assessment (Astron 2023)	April 2023	Targeted significant vertebrate fauna survey within Activity Area (western portion of the Activity Area)	Targeted significant fauna assessment, specifically aimed at confirming presence/absence of MNES species. The assessment comprised a desktop study and a seven-night field survey. The survey comprised 64 habitat assessments, 36 camera trap nights at 10 locations, 18 recording nights (bats) at five locations, 30 passive recording nights at six locations targeting the Night Parrot, 24 targeted Greater Bilby Plot Searches, and targeted searches for other MNES species. Program Matters fauna species recorded: **Greater Bilby** (*Macrotis lagotis*) One known historical unconfirmed digging in Sand Plain habitat, one new unconfirmed historical digging in Mulga Woodland habitat and one new unconfirmed potentially recent digging in Sand

Title	Date	Survey type	Summary
			Plain habitat with Monitor Lizard tail marks observed nearby leading to uncertainty whether the record was attributable to the Greater Bilby or Monitor Lizard. Refer Table 5-4and Figure 5-5.
Thirteen Creek and Davidson Creek – Additional Targeted Greater Bilby Assessment (BHP 2022)	April through October 2022	Targeted Greater Bilby survey within Activity Area (south-eastern portion of Activity Area)	Targeted Greater Bilby Assessment comprising five unbaited cameras spanning 180 trap nights from 27th April 2022 to 18th October 2022. The motion cameras were installed at five historical Greater Bilby digging locations. The survey did not record any bilbies for the duration of the survey, however recorded 31 non-target vertebrate fauna. Significant vertebrate fauna recorded: **None recorded.**
Thirteen Creek and Davidson Creek Targeted Fauna Assessment (Astron 2022)	March 2022	Targeted Matters of National Environmental Significance (MNES) and significant fauna survey, across the eastern portion of the Activity Area	Targeted Greater Bilby methods comprised 16 2 ha plot searches. Motion sensitive cameras were set at 11 locations for a total of 57 camera trap nights. Habitat assessments, avifauna census and searches for secondary evidence (scat, diggings, burrows, nests) were also completed to target MNES fauna species. Song Meter 4 (SM4) acoustic recorders were set to detect presence of significant bat species and passive acoustic surveys were undertaken to target Night Parrot. Significant vertebrate fauna recorded: **Greater Bilby** (*Macrotis lagotis)* (unconfirmed diggings). One recording which was comprised of ten potential unconfirmed diggings within a 10 m radius from the base of an *Acacia* shrub within Hardpan Plain habitat in the south-eastern portion of the Activity Area near Thirteen and Davidson Creeks. Refer Table 5-4 and Figure 5-5: Greater Bilby mapped habitat and records
North Jimblebar: Targeted Northern Quoll Assessment (Biologic 2022)	February and June 2022	Targeted Northern Quoll survey 12 km to the west of the Activity Area	Two field surveys, including 15 habitat assessments, 52.2 hours of targeted searches and 5,390 camera trap nights across five camera trap transects. Significant vertebrate fauna recorded: **None recorded.**

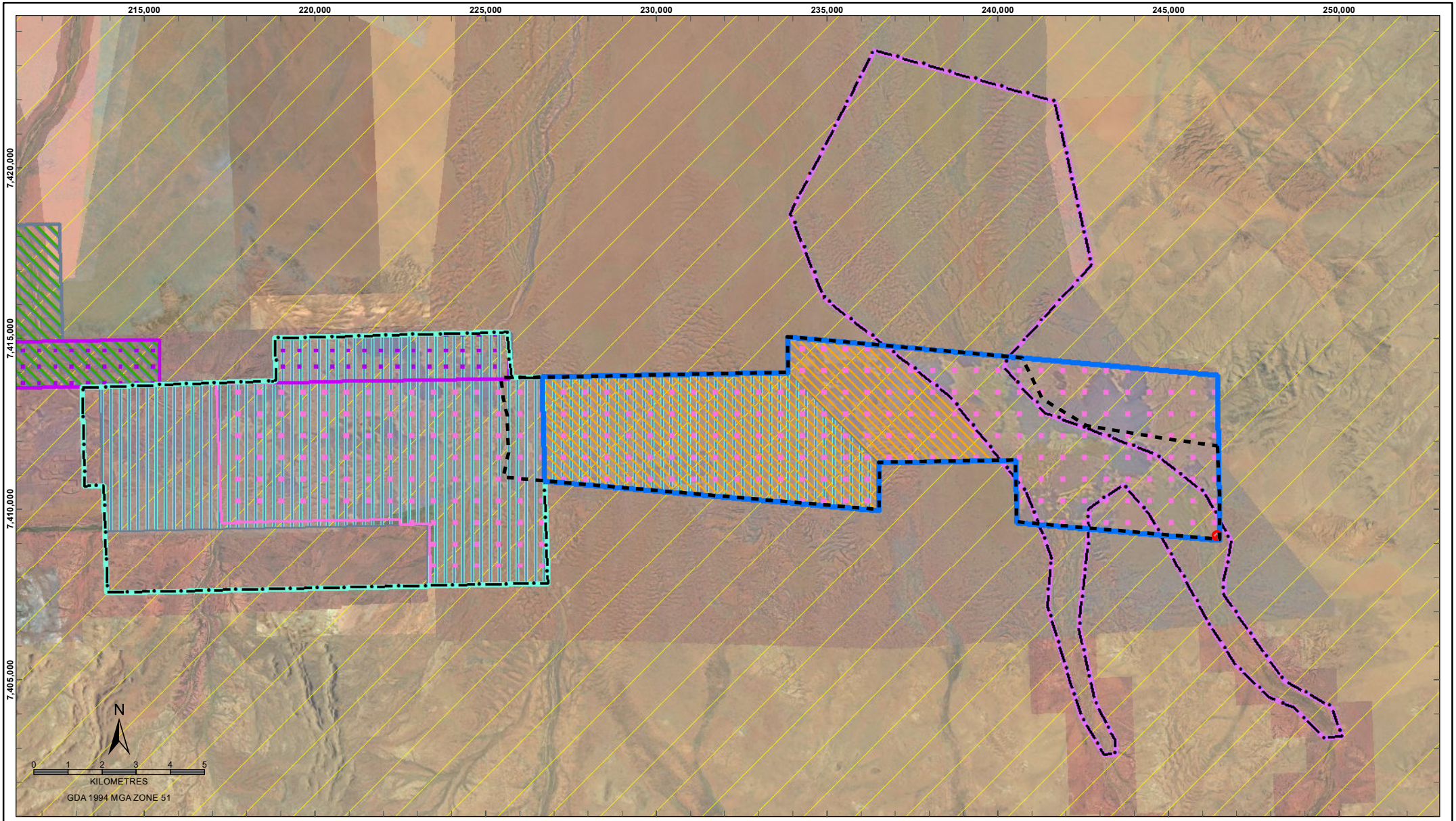
Title	Date	Survey type	Summary
East Jimblebar and Caramulla Targeted Greater Bilby Survey (GHD 2021a)	September 2020	Targeted Greater Bilby survey intersecting the western portion of the Activity Area	Greater Bilby habitat and targeted survey by recording diggings, burrows, scats and prints observed within 47 2 ha plots. Significant vertebrate fauna records: **None Recorded**
Jimblebar Targeted Ghost Bat Survey (GHD 2021b)	May 2020	Targeted Ghost Bat survey in the Activity Area and surrounds	Habitat and roost assessments, in-situ time lapse infrared video camera surveys and Song Meter 4 (SM4) echolocation recorders. Significant vertebrate fauna recorded outside of the Activity Area and more than 500 m from the Activity Area: **Ghost bat** (*Macroderma gigas*), **Pilbara Olive Python** (*Liasis olivaceus barroni*) (scats)
Jimblebar East and Caramulla Fauna Survey (GHD 2019)	April/May 2019	Detailed fauna survey (single phase) intersecting the western (Caramulla) portion of the Activity Area	Eight trapping sites comprising of pitfalls (PVC pipes and 20 L buckets), cage traps, funnel traps, and Elliott traps. Avifauna census and active foraging at each trapping site. Motion sensitive cameras, SM4 echolocation and acoustic recorders to detect presence of significant species. Target Greater Bilby plot assessments and targeted vertebrate fauna searches. Significant Vertebrate fauna recorded 7.8 km west of the Activity Area: **Ghost Bat** (*Macroderma gigas*)
Jimblebar North Level 1 Vertebrate Fauna Survey (Onshore Environmental 2019)	September 2018	Basic fauna survey adjacent (north-west) to the Activity Area	Habitat assessments, avifauna census, targeted and opportunistic searches of significant species, including the use of SM4 echolocation recorders, and active hand foraging for other vertebrates. Significant vertebrate fauna recorded: **None recorded.**
Caramulla Level 1 Vertebrate fauna Assessment (Biologic 2018)	February 2018	Basic fauna survey encompassing the Activity Area and surrounds	Habitat assessments, targeted vertebrate fauna searches and motion sensitive cameras. Remotely piloted aircraft searches for suitable Greater Bilby and brush-tailed mulgara (*Dasycercus blythi*) habitat, followed by on-ground follow-up targeted searches. SM4 echolocation and acoustic recorders to detect presence of significant species. Significant vertebrate fauna recorded: **Greater Bilby** (*Macrotis lagotis*)

Title	Date	Survey type	Summary
			Unconfirmed inactive burrow (greater than three years old) located in Sand Plain habitat in the Caramulla Creek portion of the Activity Area. Refer Table 5-4 and Figure 5-5.

4.2.2 Other Surveys

Table 4-2: Other surveys

Title	Date	Survey type	Summary
Caramulla Exploration Area Flora and Vegetation and Fauna Assessment (GHD 2009)	December 2009	Basic fauna survey in conjunction with flora and vegetation survey	Habitat assessments, and opportunistic surveying. Significant vertebrate fauna recorded: **None recorded.**
East Jimblebar Exploration Project Biological Survey (Ecologia Environmental 2005)	August 2005	Targeted significant vertebrate fauna survey	Habitat assessments, avifauna census, active hand foraging, and spotlighting for other vertebrates. Searches for secondary evidence (scat, diggings, burrows, nests). Anabat echolocation recorders to detect presence of significant bat species. Significant vertebrate fauna recorded: **None recorded**



Activity Area

Contemporary Vertebrate Fauna Surveys

- East Caramulla Targeted Bilby Survey (Astron Environmental Services 2024)
- East Caramulla and Thirteen Creek Fauna Assessment (Astron Environmental Services 2023)
- Thirteen Creek and Davidson Creek – Additional Targeted Greater Bilby Assessment (BHP 2022)
- Thirteen Creek and Davidson Creek Targeted Fauna Assessment (Astron Environmental Services 2022)
- North Jimblebar: Targeted Northern Quoll Assessment (Biologic 2022)
- East Jimblebar and Caramulla Targeted Greater Bilby Survey (GHD 2021)
- Jimblebar Targeted Ghost Bat Survey (GHD 2021)
- Jimblebar East and Caramulla Fauna Survey (GHD 2019)
- Jimblebar North Level 1 Vertebrate Fauna Survey (Onshore Environmental 2019)
- Caramulla Level 1 Vertebrate fauna Assessment (Biologic 2018)

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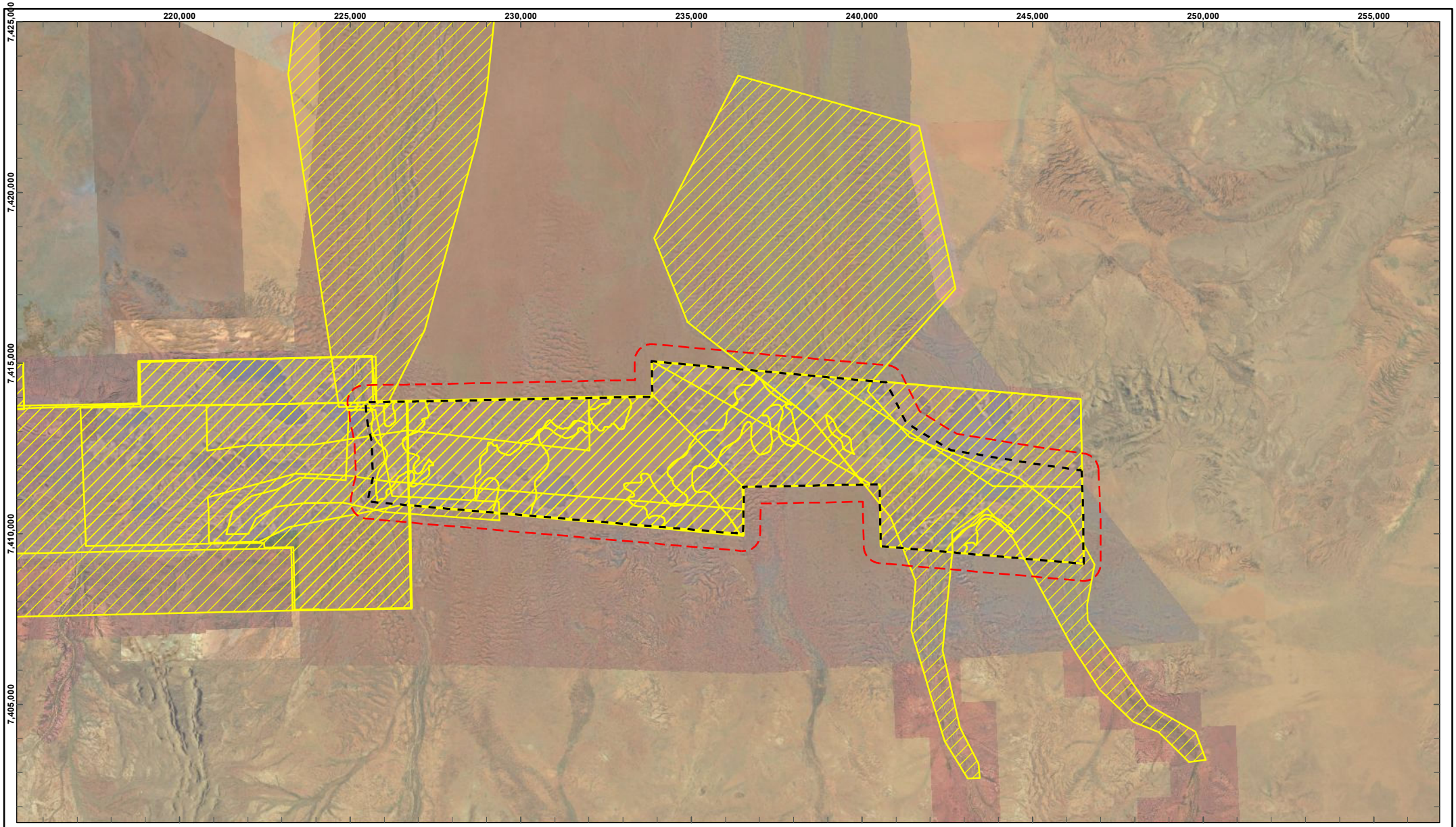
Contemporary Vertebrate Fauna Surveys

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:150,000	PREPARED:	GEOMATICS	FIGURE:	4.1
DATE:	20/05/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/002A

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_002_E_EastPilbaraSWD_VN_ContemporaryVertSurveys_RevA.mxd



Activity Area
500m Buffer
Survey Coverage

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KILOMETRES

GDA 1994 MGA ZONE 51

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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Historical vertebrate fauna surveys in the Activity Area

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:150,000	PREPARED:	SPATIAL DATA	FIGURE:	4.2
DATE:	11/06/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/024A

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_024_E_EastPilbaraSWD_VN_HistoricVertSurveys_RevA.mxd

5 Existing environmental values

5.1 Fauna habitats

Detailed fauna habitat mapping of the Activity Area has been completed as part of numerous surveys undertaken for the Activity. Previous habitat mapping was reviewed and consolidated across BHP tenements, with habitat descriptions aligned between surveys undertaken across the Pilbara (Biologic 2014a). This consolidated mapping has been regularly revised and updated as new survey data became available.

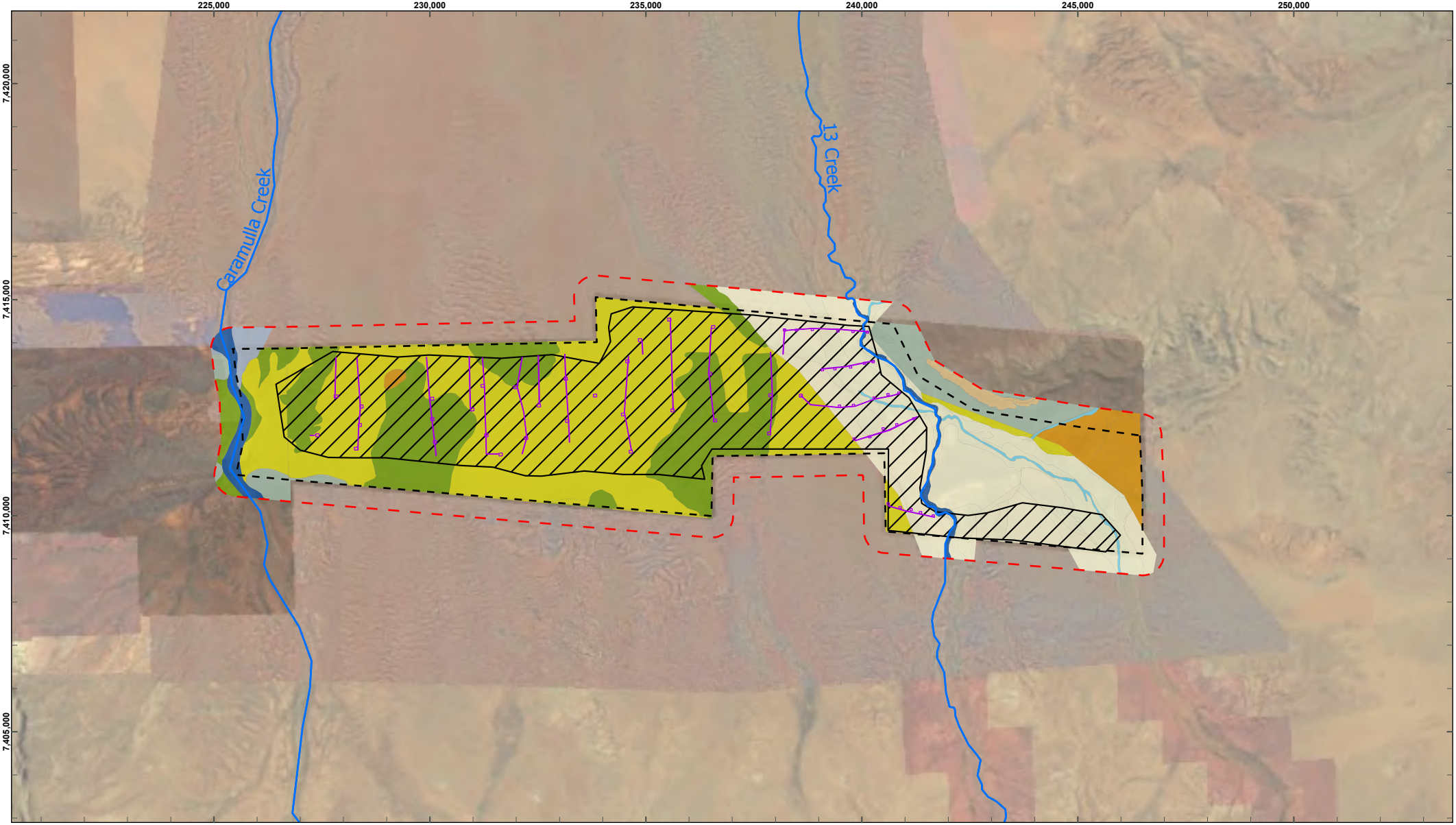
Based on this consolidated mapping, and subsequent surveys, eight fauna habitat types have been mapped within the Activity Area (Table 5-1 and Figure 5-1).

Table 5-1: Fauna habitats in the Activity Area

Habitat Type	Description	Extent within Activity Area	Extent within Indicative Footprint[1] (to be cleared)
Sand Plain	Sand Plain habitat type is characterised by relatively deep sandy soils supporting dense spinifex grasslands, sparse shrubs and scattered *Corymbia* and *Acacia* trees. This habitat transitions into patches of Mulga in places. This habitat often occurs as terraces along drainage lines and extensive plains.	3,295.6 ha (45.6%)	Up to 29 ha
Hardpan Plain	Hardpan Plain habitat type is associated with lower lying plain often sparsely vegetated or with scattered Mulga, occurring on heavy clay substrates often with a stony or gravelly surface. Characterised by large open areas often void of vegetation.	1,881.8 ha (26%)	0
Mulga Woodland	The Mulga Woodland habitat type includes woodlands and other ecosystems in which Mulga (*Acacia aneura* and close relatives) is dominant, either as the principal *Acacia* species or mixed with others. It consists of broad groves on stony or sandy soils, with little undergrowth.	1,496.7 ha (20.7%)	Up to 15 ha
Stony Plain	The Stony Plain habitat type is characterised by erosional surfaces of gently undulating plains, ridges and associated footslopes. Mainly support hard spinifex (and occasionally soft spinifex) with mixed *Acacia*, *Hakea* and *Senna* species open shrubland with a mantle of gravel and pebbles.	242.6 ha (3.35%)	Up to 1 ha
Hillcrest/ Hillslope	The Hillcrest/Hillslope habitat type tends to be more open and structurally simple due to their position in the landscape compared to other habitats, and are dominated by varying species of spinifex. The vegetation is variable and may contain *Eucalyptus* trees, *Acacia* and *Grevillea* scrublands over hummock grasslands. A common feature of these habitats is a rocky substrate, often with exposed bedrock, and skeletal red soils.	162.1 ha (2.2%)	0
Major Drainage Line	Major Drainage Lines comprise mature *River Red Gum* and *Coolibah* trees over dry river pools. The riverbeds of this habitat type are generally open, sandy or gravelly. In non-grazed areas, the vegetation adjacent to the main channel or channels is denser, taller and more diverse than adjacent terrain.	80.4 ha (1.1%)	0

[1] The Indicative Footprint is located wholly within the Activity Area.

Minor Drainage Line	Located within the minor gullies and depressions, generally through the Hillcrest/ Hillslope or Drainage Area/ Flood Plain habitat types. Consists primarily of *Acacia* low shrubland with occasional scattered *Corymbia* trees. The understorey generally lacks density and often consists solely of sparse tussock grassland, often including the weed Buffel Grass *(*Cenchrus ciliaris*) where it has been introduced. The substrate can be sandy in places but generally consists of a skeletal loam gravel or stone.	45.9 ha (0.7%)	0
Drainage Area/ Flood Plain	The Drainage Area/Flood Plain habitat type is low in relief, generally located adjacent drainage lines, and has been shaped by the presence of water and surface water movement. This habitat is characterised by a low woodland over broad-leafed Acacia shrubland on sandy loam soils, sometimes with exposed rocky areas. These can have high vegetation density, complexity and diversity, and because they tend to occur on depositional areas, often have deeper and richer soils than other fauna habitat types. Grasses tend to be dominated by tussock grasses rather than *spinifex*.	22.6 ha (0.3%)	0
Unmapped		3.3 ha (0.05%)	0
Sub-total		7231.18	45 ha
Total		**7231.18**	**45 ha**



- Watercourse
- Activity Area
- Indicative Footprint
- Conceptual Clearing Extent
- 500m Buffer

- Breakaway/ Cliff
- Drainage Area/ Floodplain
- Hardpan Plain
- Hillcrest/ Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain

N

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GDA 1994 MGA ZONE 51

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Fauna habitat within Activity Area

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:120,000	PREPARED:	GEOMATICS	FIGURE:	5.1
DATE:	28/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/027B

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5.2 Greater Bilby

The following sections provide background information to demonstrate that Notifiable Action Triggers for Greater Bilby are met. Impacts to the Greater Bilby are discussed and the mitigation hierarchy applied to illustrate that the Program Matter Objective for this species will be met.

5.2.1 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 north-east to Shay Gap (DCCEEW 2023b) (see Figure 5-2). 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).

5.2.2 Regional Habitat

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 Figure 5-3 and Table 5-2

Dziminski *et al.* (2020) have collated records of the Greater Bilby in the Pilbara to provide an accurate range for the species. The key findings were:

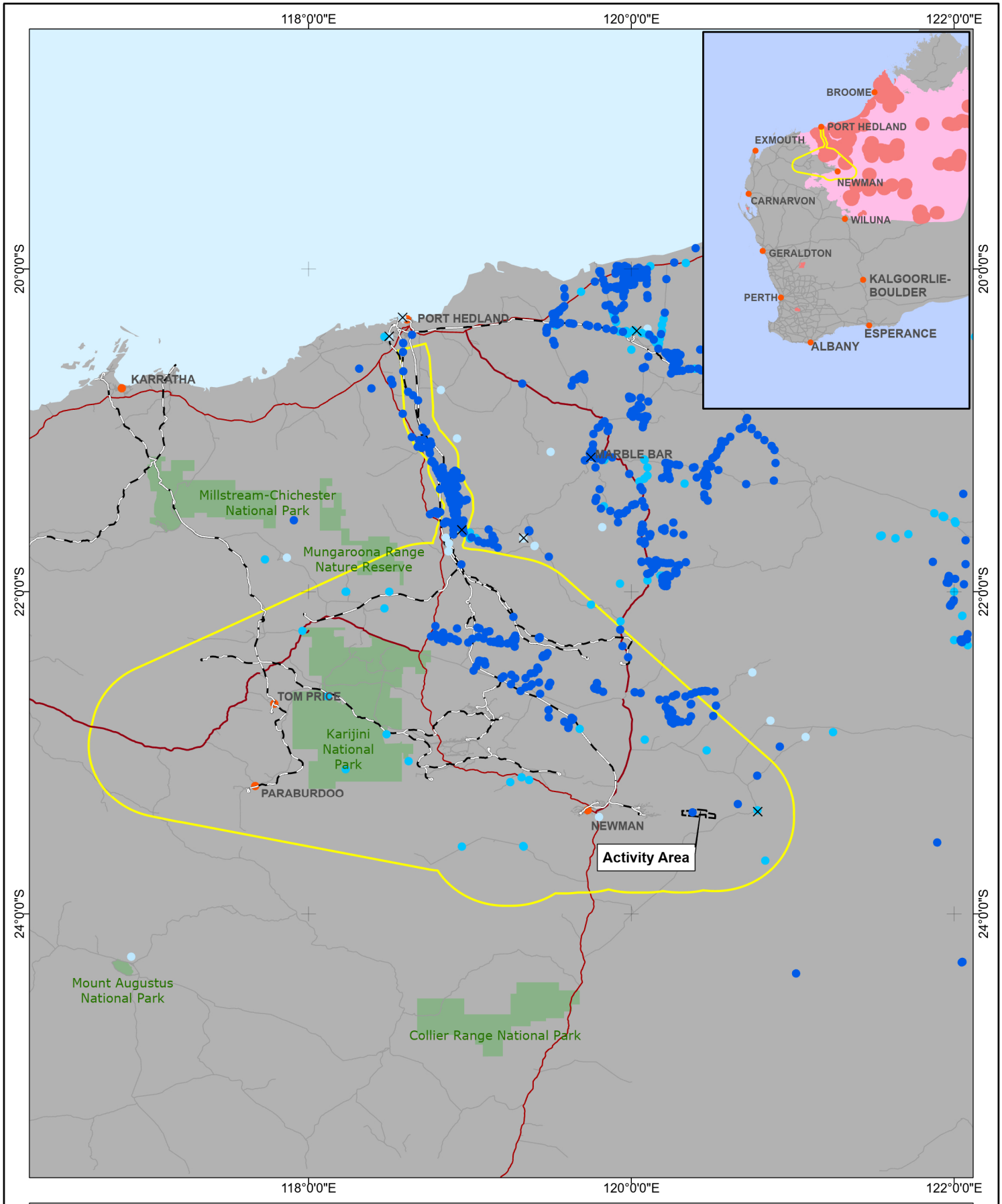
- The western boundary of their range stretches south-east from approximately 50 km west of Port Hedland to about 350 km beyond Newman.
- Their range extends east and south-east into the Great Sandy, Little Sandy and Gibson Deserts, as well as northwards into the Kimberley.
- Areas to the west and south-west of the confirmed range have unreliable or older records of Greater Bilbies and require further targeted surveys to confirm their absence in these areas. This study provides an accurate range for impact assessment and management decisions within the SEA by confirming the geographic range of the Greater Bilby (BHP 2022b).

Table 5-2: WA Rangeland systems within 25 km of the Activity Area

Land System	Description	Habitats	Area (ha)
Adrian	Stony plains and low silcrete hills supporting hard spinifex grasslands.	Stony Plain	9,056.50
Balfour	Shale, gravel and clay plains supporting *eremophila-cassia* shrublands, tussock grasslands, and halophytic shrublands.	Stony Plain	6,033.15
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	Stony Plain Mulga Woodland	11,189.98
Cadgie	Dolerite hills and ridges and restricted plains supporting mulga and cassia shrublands or spinifex grasslands.	Drainage Area/Flood Plain Major Drainage Line Mulga Woodland	6,630.70
Charley	Hardpan plains with thin sand cover and sandy banks supporting mulga shrublands with soft and hard spinifex.	Hillcrest/Hillslope Gorge/Gully Breakaway/Cliff Drainage Area/Flood Plain Major/Minor Drainage Lines	441.48
Collier	Undulating stony uplands, low hills and ridges and stony plains supporting mulga shrublands.	Hillcrest/Hillslope Stony Plain Mulga Woodland	1,809.98
Disturbed Land	Area of mining disturbance	N/A	293.77
Divide	Sandplains and occasional dunes supporting shrubby hard spinifex grasslands	Sand Plains Sand Dunes	97,257.82
Fortescue	Alluvial plains and flood plains supporting patchy grassy woodlands and shrublands and tussock grasslands.	Drainage Area/Flood Plain Mulga Woodland	8,547.33
Jamindie	Stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understorey.	Drainage Area/Flood Plain Stony Plain Mulga Woodland	16,843.97

Land System	Description	Habitats	Area (ha)
Jigalong	Alluvial plains and flood plains supporting grassy shrublands and woodlands and halophytic shrublands.	Drainage Area/Flood Plain Mulga Woodland	4,949.42
Laterite	Low lateritic plateaux, mesas, buttes and gravelly rises and plains supporting mulga shrublands and short grass forbs.	Breakaway/Cliff Stony Plain Mulga Woodland	1,383.17
McKay	Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands.	Hillcrest/Hillslope Breakaway/Cliff	2,374.62
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands	Hillcrest/Hillslope Breakaway/Cliff	12,737.45
Prairie	Gently undulating stony plains and granite hills supporting *acacia-eremophila-cassia* shrublands and minor soft spinifex grasslands.	Stony Plain	22,220.31
River	Active flood plains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands.	Major/Minor Drainage Lines Drainage Area/Flood Plain	2,258.66
Robertson	Hills and ranges of sedimentary rocks supporting hard spinifex grasslands.	Hillcrest/Hillslope	17,079.26
Spearhole	Gently undulating gravelly hardpan plains and dissected slopes supporting groved mulga shrublands and hard spinifex.	Drainage Area/Flood Plain Stony Plain Mulga Woodland	4,212.63
Sylvania	Active flood plains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands.	Stony Plain	61,814.64
Table	Hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands (and occasionally eucalypt woodlands).	Hill/Ridges/Breakaways Major/Minor Drainage Lines Drainage Area/Flood Plain Mulga Woodland	732.34
Talga	Low calcrete platforms and plains supporting mulga and cassia shrublands and minor halophytic low shrublands	Hillcrest/Hillslope	9,404.05
Wannamunna	Hardpan plains supporting groved mulga shrublands.	Hardpan Plain	647.04

Land System	Description	Habitats	Area (ha)
		Mulga Woodland	
Warri	Low calcrete platforms and plains supporting mulga and cassia shrublands and minor halophytic low shrublands	Hardpan Plain Mulga Woodland	1,846.67
Washplain	Hardpan plains supporting groved mulga shrublands	Mulga Woodland Stony Plain	23,050.99
Zebra	Hardpan plains with large linear gravelly sand banks supporting acacia shrublands with soft and hard spinifex.	Mulga Woodland Sand Plain Hillcrest/Hillslope	2,606.63



BHP

Spatial Data - Studies Planning & Access
BHP IRON ORE
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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Greater Bilby regional records and distribution

Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No: A1252-019
Date:	11/06/2024	Checked:	Figure: 5.2
Revision:	REV B	Reviewed: ENVIRO. A&I	

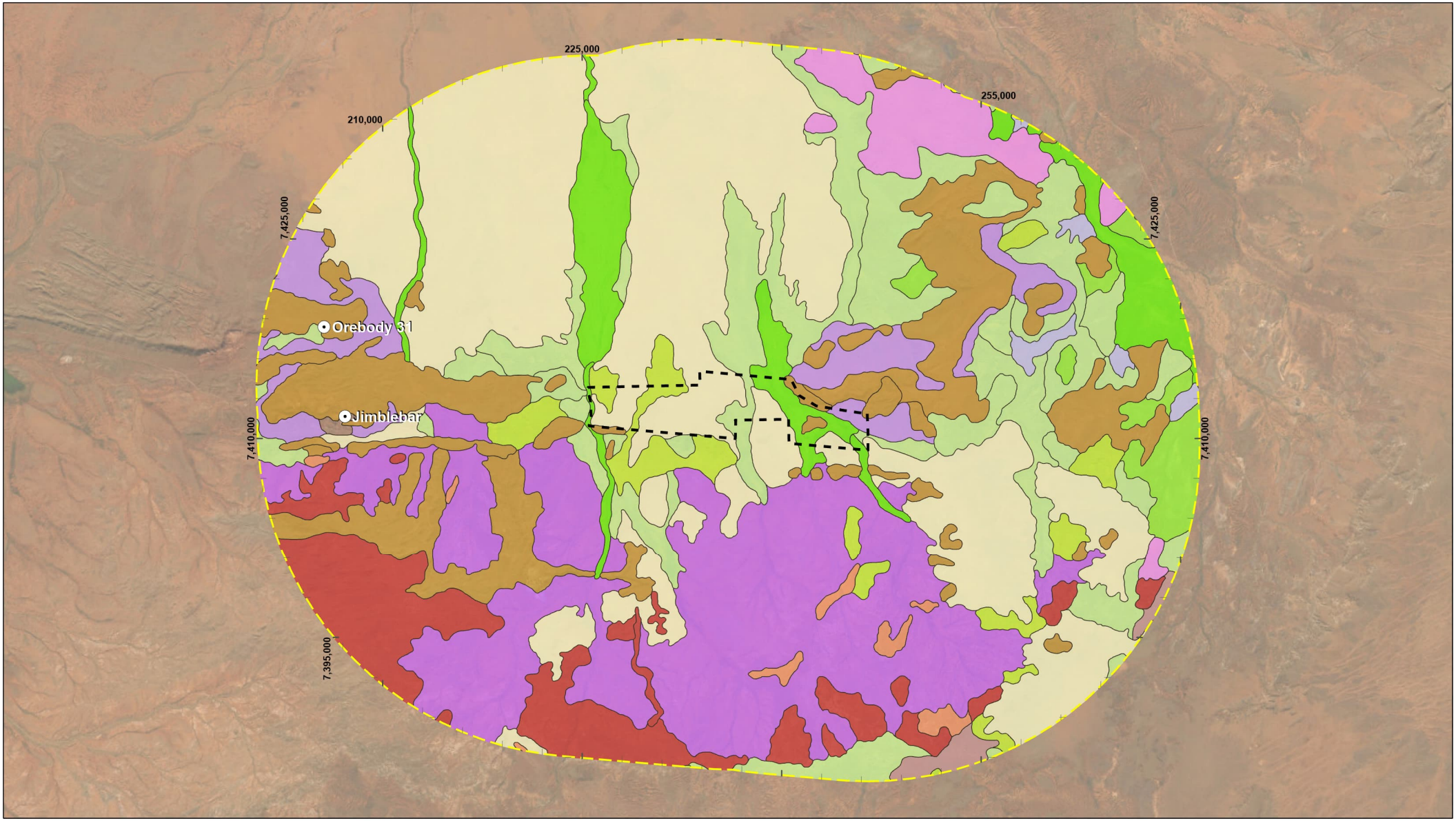
Greater Bilby records

- Records After 2005
- Records between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Activity Area
- Species or species habitat likely to occur
- Species or species habitat may occur
- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994



- BHP operations
- Activity Area
- Activity Area 25km Buffer

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
- Low hills and stony plains with acacia 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
- Calcrete plains with acacia shrublands
- River plains with grassy woodlands and tussock grasslands

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GDA 1994 MGA ZONE 51

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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Regional Land Systems

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:392,000	PREPARED:	R.LOFTHOUSE	FIGURE:	5.3
DATE:	4/07/2024	REQUESTOR:	ENV. APPROVALS	NO:	A1252/001B

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5.2.3 Local Habitat

The Activity Area falls within the current distribution of the Greater Bilby, whereby the species or species habitat may occur (Figure 5-2). Survey coverage for the Greater Bilby is shown in Figure 5-4, with local habitat and nearest record presented in Figure 5-5.

Survey areas and methods used to detect the presence of the Greater Bilby in the Activity Area are shown in Figure 5-4, with mapped habitat and records shown in Figure 5-5. The Activity Area falls within the current distribution of the Greater Bilby whereby the species or species habitat may occur.

The Activity Area has been subject to extensive contemporary surveys which have provided a sound understanding of the present state of habitat types, condition and suitability to MNES that occupy the Activity Area and surrounds (within 500 m of the Activity Area where surveyed). The most recent of the contemporary surveys was the *Targeted Bilby Fauna Assessment* which encompassed the entire Activity Area, conducted by Astron in November 2023 (Astron 2024). This targeted Greater Bilby assessment by Astron (2024) was supported by previous contemporary surveys which covered or intersected the Activity Area including: Biologic Environmental Survey (2018), GHD Pty Ltd (2019), Onshore Environmental Consultants Pty Ltd (2019), GHD Pty Ltd (2021a), Astron (2022), and Astron (2023).

When considering the records of Greater Bilby identified within the Activity Area and 500 m of the Activity Area (where surveyed), supporting habitat for the Greater Bilby encompasses 70% of the Activity Area and comprises predominantly Sand Plain habitat. The habitat present was observed to support soft soils and contained termite mounds, spinifex hummocks and *Acacia* roots, suited to Greater Bilby denning, burrowing and foraging (Astron 2023, Astron 2024). The results of the survey indicated that the habitat is well connected throughout the Activity Area and into surrounding habitats, providing opportunity for Greater Bilby dispersal pathways (Astron 2024).

Mulga Woodland accounts for 21% of the habitat within the survey area, which is considered a supporting habitat for the Greater Bilby, presenting some opportunity for foraging by way of soft sandy soils and the presence of *Acacia* flora species (Astron 2023, Astron 2024). Sand Plain is preferred over Mulga Woodland for this species as it provides more opportunities for open foraging and sheltered habitat. Foraging within Mulga Woodland is generally undertaken whilst Greater Bilby individual/s are transitioning to preferred/critical habitat (Astron 2024). Greater Bilby supporting habitat represents 70% (5,057.59 ha) of the habitat available within the Activity Area; 3,456.71 ha of which is located within the Indicative Footprint of the proposed Activity (detailed in Table 5-3). No more than 45 ha of supporting habitat will be subject to disturbance associated with the Activity (as shown in the Conceptual Clearing Extent) and will be limited to within the Indicative Footprint.

The habitat comprising the remainder of the survey area presents fewer microhabitat opportunities for the species and are widespread throughout the region and are not restricted at the local or sub-regional scale (Astron 2024). These habitat types are presented in Figure 5-5.

Table 5-3: Greater Bilby critical and supporting habitat within Activity Area, Indicative footprint and Proposed Clearing Extent (upper limits)

Habitat Description	Within Activity Area (ha)	Within Indicative Footprint (ha)	Proposed clearing extent (ha)
Supporting Habitat			
Mulga Woodland	1,496.70	1,106.94	15
Sand Plain	3,295.65	2,341.54	29
Drainage Area/Flood Plain	22.60	0	0

Stony Plain	242.64	17.23	1
Total	**5,057.59**	**3,465.71**	**45**

5.2.4 Greater Bilby Records

In a broader regional context, Greater Bilby records nearest to the Activity Area are located 18 km to the east (DBCA 2022, observed 2010), and over 99 km to north-west (GHD 2020).

The Activity Area and surrounds have undergone extensive fauna, vegetation and habitat survey (see Section 4.2), with seven field surveys recording potential Greater Bilby signs (Biologic Environmental Survey 2018; GHD 2019; GHD 2021a; Astron 2022; BHP 2022; Astron 2023; Astron 2024). The survey effort and method are summarised in Section 4.2. The *East Caramulla Targeted Bilby Fauna Assessment* (Astron 2024) was commissioned to better understand the field records indicating potential Greater Bilby presence within the Activity Area and broader local region.

Ten records of potential Greater Bilby sign have been made since 2018 across the Activity Area, comprising eight inactive/historical burrows, one unconfirmed recent potential digging, and one likely Greater Bilby scat (confirmed by morphological analysis, the sample was in a degraded condition due to age which prevented DNA confirmation). Details of the Greater Bilby records in the Activity Area are presented in Table 5-4 below and Figure 5-2: Greater Bilby regional records and distribution Unconfirmed Greater Bilby diggings/burrows were observed within Sand Plain habitat (six records), Mulga Woodland (three records) and Hardpan Plain (one record). The presence of Greater Bilby individuals at the unconfirmed burrows/diggings and within the Activity Area have not been confirmed by long-term camera trapping (BHP 2022) or field survey camera-trapping (Astron 2022; Astron 2023, and Astron 2024). Of the Greater Bilby records within and proximal to the Activity Area, all have been deemed to be historical due to a lack of fresh digging, lack of fresh Greater Bilby sign, and the presence of vegetation overgrowth at the digging sites (Astron 2022; Astron 2023, and Astron 2024), with the exception of the one unconfirmed recent potential digging (ambiguity as to whether this record is attributable to the Greater Bilby or Monitor Lizard, see Table 5-4 for further detail) (Astron 2024).

The *East Caramulla Targeted Bilby Fauna Assessment* (Astron 2024) concluded that the distribution of the Greater Bilby recordings is not indicative of a resident Greater Bilby population within the Activity Area or within 500 m of the Activity Area (where surveyed), and that the findings were suggestive of a low-density distribution of transient individuals which may utilise the area intermittently when foraging conditions are favourable. This conclusion is consistent with known Greater Bilby behaviour as Bilbies are known to move in response to foraging opportunities (Southgate *et al.* 2007, Southgate and Carthew 2008). With the absence of contemporary (confirmed) records within the survey area and surrounds, usage within the survey area would likely be highly irregular and opportunistic (Astron 2023). The conclusion was underpinned by the pattern, distribution, and age of the Greater Bilby signs within and proximal to the Activity Area, and lack of recent Greater Bilby sign or Greater Bilby confirmation recorded, despite repeated and extensive survey effort conducted in accordance with best practice method (per Southgate *et al.* 2018)

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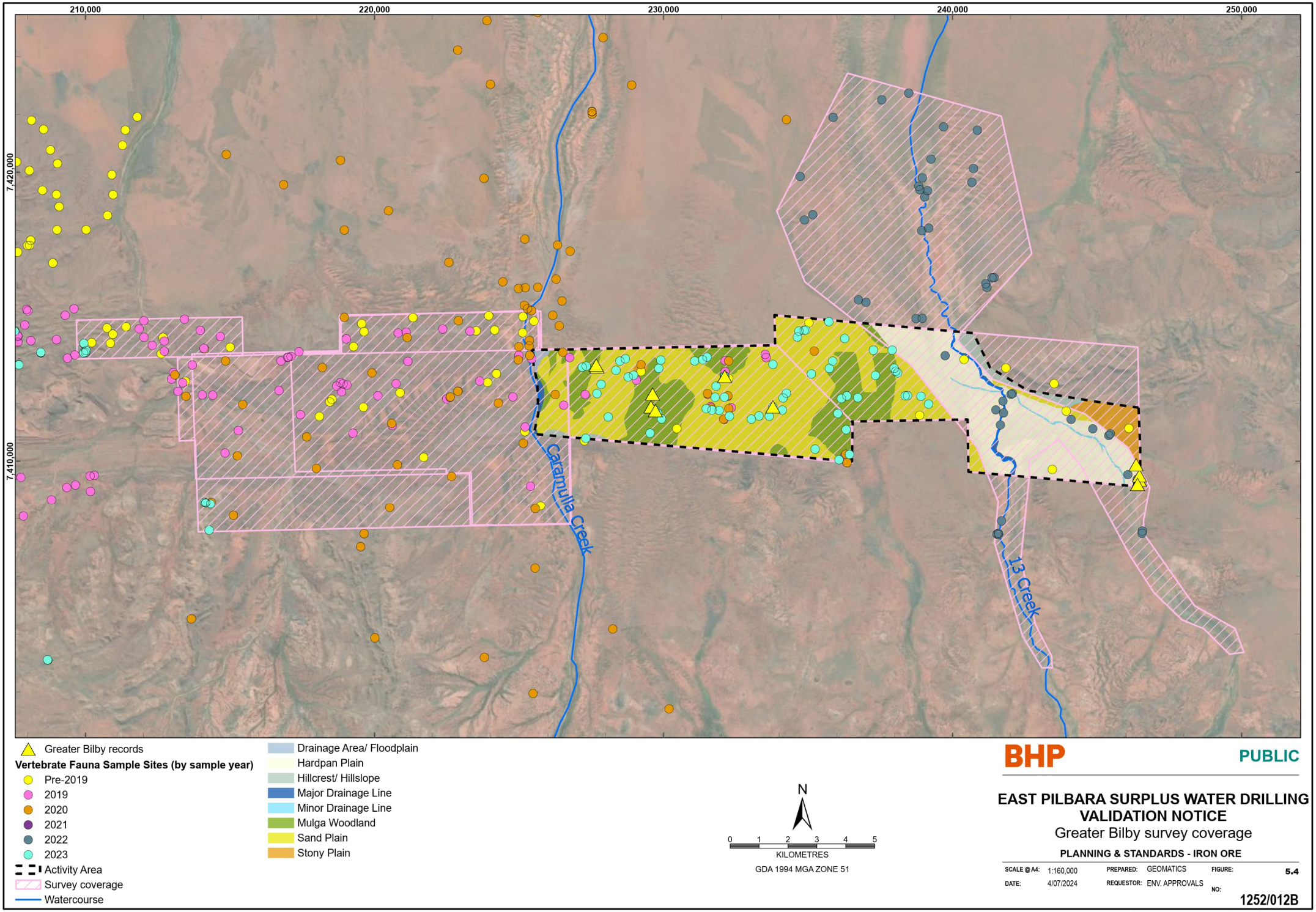
Table 5-4: Records of Greater Bilby within the Activity Area

Greater Bilby Sign	Confirmation	Notes	Report
Burrow 10160_09_00283	Potential/ unconfirmed	Inactive/historical unconfirmed burrow in Sand Plain habitat. No current signs of the Greater Bilby, however current and continued monitor lizard occupation was recorded. Camera trapping at this location did not record the Greater Bilby.	Biologic 2018, GHD 2019 and GHD 2021
Digging 10405_09_00078	Potential/ unconfirmed	Inactive/historical digging within Hardpan Plain habitat. Series of 10 diggings observed within 10 from the base of an Acacia, with no burrows, tracks or scats present.	Astron 2022
Residual burrow 10494_09_00011	Unconfirmed	Inactive/historical burrow. Monitor lizard occupation, no current Greater Bilby sign, sandy soil in low sandy rise in Mulga Woodland, several other burrows and mounds (burrow spoil present). Camera trapping has not recorded sign/s of Greater Bilby.	Astron 2023
Digging 10494_09_00017	Recent, unconfirmed	Unconfirmed digging in Sand Plain habitat. Monitor lizard tail marks present. No Greater Bilby sign, possibly recent digging. Camera trapping at this location did not record the Greater Bilby. Astron (2023) described the digging as: *"digging may represent bilby or, alternatively (more likely), an atypically shaped monitor lizard digging."* Whilst more likely that this digging is attributable to a monitor lizard, for the purposes of this Validation Notice BHP has adopted a conservative approach and has treated the digging as an unconfirmed Greater Bilby digging.	Astron 2023
Scat 13,397,850.13 E 2,677,603.83 N	Historical, degraded, morphological confirmation	Historical and degraded scat (estimated to be >5 years old) identified in Mulga Woodland habitat, recorded and collected in historical digging. Confirmed morphologically, too degraded for eDNA analysis.	Astron 2024
Digging 13,397,779.29 E 2,678,086.37 N	Historical, unconfirmed	Inactive/historical unconfirmed digging in Mulga Woodland habitat. No current Greater Bilby signs.	Astron 2024
Digging 13,395,748.45 E	Historical, unconfirmed	Inactive/historical unconfirmed digging in Sand Plain habitat. No current Greater Bilby signs.	Astron 2024

Greater Bilby Sign	Confirmation	Notes	Report
2,676,468.15 N			
Digging 13,416,129.42 E 2,681,193.12 N	Historical, unconfirmed	Inactive/historical unconfirmed digging in Sand Plain habitat. No current Greater Bilby signs.	Astron 2024
Digging 13,416,127.99 E 2,681,022.28 N	Historical, unconfirmed	Inactive/historical unconfirmed digging in Sand Plain habitat. No current Greater Bilby signs.	Astron 2024
Digging 13,416,009.93 E 2,680,604.14 N	Historical, unconfirmed	Inactive/historical unconfirmed digging in Sand Plain habitat. No current Greater Bilby signs.	Astron 2024



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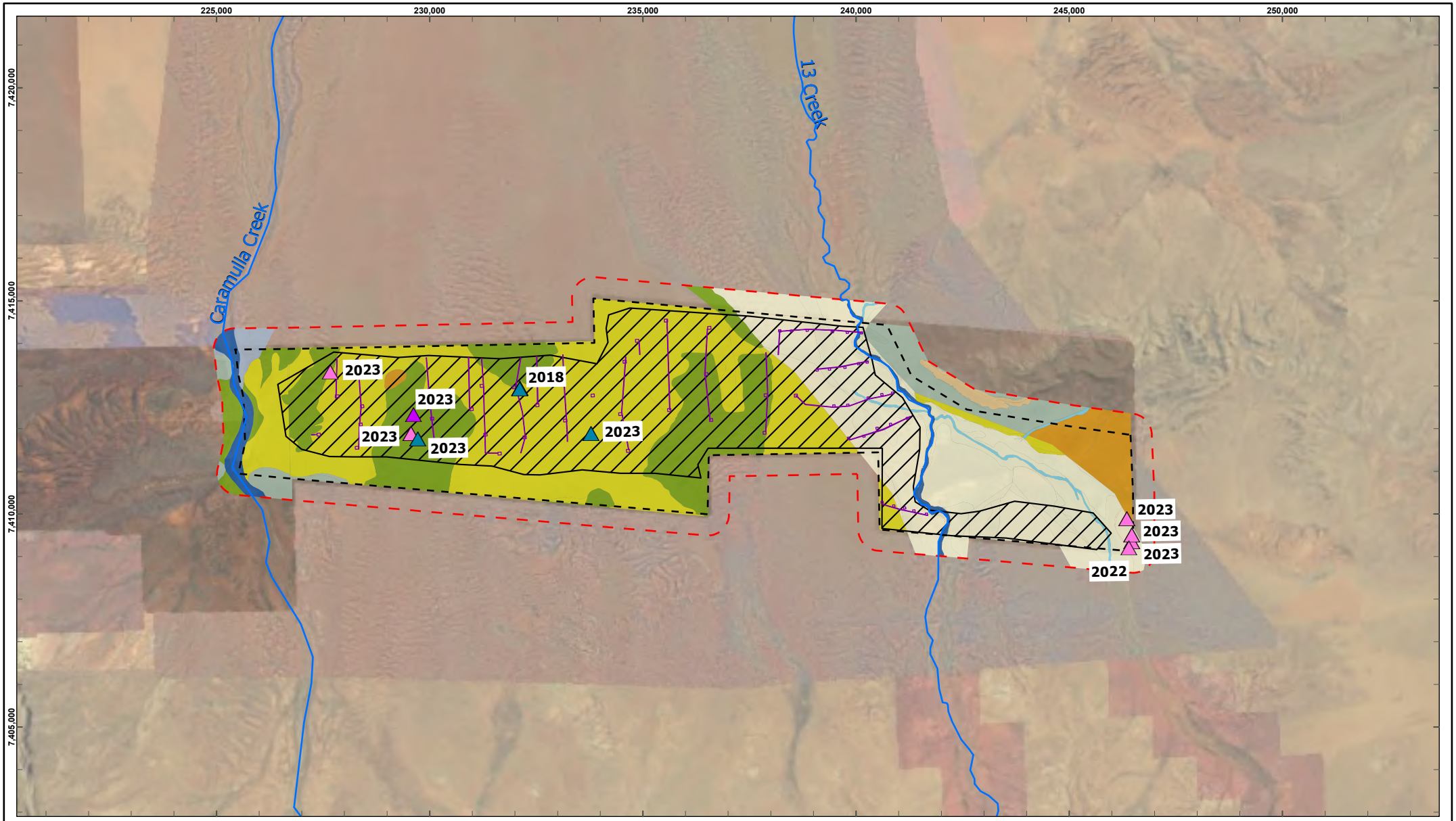
EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Greater Bilby survey coverage

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:160,000	PREPARED:	GEOMATICS	FIGURE:	5.4
DATE:	4/07/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/012B

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_012_E_EastPilbaraSWD_VN_BilbySurveys_RevB.aprx



- Digging
- Scat
- Burrow (inactive)
- Watercourse
- Activity Area
- Indicative Footprint
- Conceptual Clearing Extent
- 500m Buffer

- Breakaway/ Cliff
- Drainage Area/ Floodplain
- Hardpan Plain
- Hillcrest/ Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain

N

0 1 2 3 4 5

KILOMETRES

GDA 1994 MGA ZONE 51

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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Greater Bilby
habitat and records

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:120,000	PREPARED:	GEOMATICS	FIGURE:	5.5
DATE:	30/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/005C

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_005_E_EastPilbaraSWD_VN_BilbyHabitatsAndRecords_RevC.aprx

5.2.5 Impact Assessment

The potential direct and indirect impacts to the Greater Bilby from the Activity (see Section 2) are considered below.

The proposed Activity within the Activity Area will result in some habitat loss and potential for habitat degradation from fire risk, introduction of weeds, and increased airborne particulate matter. The Activity is not likely to attract or increase the presence of feral predators such as feral cats (*Felis catus*) or foxes (*Vulpes vulpes*) which are already present within the Activity Area (Biologic 2018, Astron 2022, BHP 2022, Astron 2023). The Activity is unlikely to result in significant alteration to surface water flow regime and will not cause fragmentation of habitat.

Habitat Loss

The Activity will result in the direct loss of up to 45 ha of supporting Greater Bilby habitat as defined by the APOP (BHP 2022), including 29 ha of Sand Plain, 15 ha Mulga Woodland and 1 ha Stony Plain. No Greater Bilby critical habitat will be disturbed as a result of the Activity, due to the absence of Greater Bilby critical habitat. Although there are habitat types that may support denning for the Greater Bilby within the Activity Area, the habitat is not classified as critical habitat in accordance with the *Assurance Plan and Offsets Plan Revision 2.3* Table 5.1 *Greater Bilby Critical and Supporting Habitats* as there is no 'home range' due to no presence or sign of a residing individual/s. Clearing associated with the Activity is attributed to drill pads and access tracks which are sparsely distributed throughout the Activity Area and do not present risk of habitat fragmentation and will be progressed sequentially over a period of two to three years (see Figure 5-5).

The supporting habitat within the Activity Area presents foraging, denning and dispersal opportunities for the Greater Bilby within the Activity Area, which is demonstrated by the presence of ten Greater Bilby unconfirmed historical recordings observed over multiple survey efforts (Biologic Environmental Survey 2018, GHD Pty Ltd 2019, Onshore Environmental Consultants Pty Ltd 2019, GHD Pty Ltd 2021a, Astron 2022, and Astron 2023, and Astron 2024). The arrangement, quality and age of these recordings are indicative of a low-density transient distribution of Greater Bilby individuals which likely transit the Activity Area when foraging opportunities are optimal (Astron 2024). The habitat assessments undertaken in conjunction with the Greater Bilby recordings noted that supporting habitat observed within the Activity Area was widespread throughout the region, and is not locally restricted (Astron 2022, Astron 2023, and Astron 2024). The direct loss of up to 45 ha of Greater Bilby supporting habitat represents 0.89% of Greater Bilby supporting habitat present within the Activity Area. The potential impact to Greater Bilby resulting from the loss of supporting habitat in the Activity Area is considered to be low due to the historic and sporadic nature of the Greater Bilby records, and the proportion of Greater Bilby supporting habitat remaining undisturbed and non-fragmented within the Activity Area by the Activity equating to greater than 99%.

Habitat degradation from alteration of groundwater

Greater Bilby supporting and critical habitat can be sensitive to changes to the groundwater regime, specifically drainage systems and riparian vegetation. Riparian vegetation and groundwater dependent vegetation can be prone to alteration when exposed to mounding or depression, associated with extraction and injection of water to the source aquifer. Riparian vegetation, in particular facultative phreatophyte species (i.e. *Eucalyptus victrix* and *E. camaldulensis,* both present within the Activity Area) access water from both the surface and groundwater from depths up to 21 m bgl.

Alteration of groundwater characteristics during pump testing and bore establishment may have temporary effects on groundwater levels within the target aquifer. The target aquifer for test pumping and bore installation is a confined aquifer (Paraburdoo Dolomite overlain with vuggy breccia) overlain by a confining clay layer. Groundwater is typically encountered immediately below the confining clay in the Paraburdoo Dolomite, with static groundwater levels encountered at/observed to rise to 50 to 60 m bgl due to the confined pressure of the target aquifer. The overlying aquifer has shallow sandy stratigraphy (0 to 35 m bgl) which is subject to recharge via rainfall, with limited hydraulic connection to the target aquifer. Borefield monitoring data at nearby Caramulla MAR suggests that relatively short-

term planned pumping activities are unlikely to result in detrimental values of drawdown or mounding in the deep aquifer.

Whilst the superficial stratigraphy will not be impacted (and potential groundwater dependent riparian vegetation) by the short-term mounding and drawdown of the Activity, there may be some minor impacts in the deeper disconnected target aquifer.

The residual risk is considered to be low, with low to negligible potential of risk to the shallow aquifer which may support groundwater-dependent vegetation, and minor short-term impact to the deep aquifer expected, which will not impact availability of water for riparian vegetation. As a result, changes to the groundwater regime arising from the Activity are not predicted to result in residual impact to Greater Bilby.

Habitat degradation from alteration of surface water

Alteration to surface water regimes has been considered as a potential impact to the Greater Bilby. Increased run-off, sedimentation or other discharges can impact habitat that supports the denning and foraging of the Greater Bilby. This includes the change to the permanency, level or water quality of ephemeral creeks due to excess surface water run-off, alteration to topsoil condition, and other discharges (i.e. abstracted groundwater) from the proposed Activity. The impact to local habitat is considered to present negligible potential for risk to the species given the short-term and intermittent nature of the Activity. In some instances, excess water will be discharged to Thirteen Creek or held temporarily in sumps; these activities have been assessed as low impact due to the high permeability of the surface geology (sand and gravel) which supports fast infiltration to the underlying superficial aquifer. The water that may be released has been assessed as high quality, low salinity with low total suspended solids (TSS).

Thirteen Creek and Caramulla Creek are ephemeral in nature, and temporarily hold large volumes of surface water following significant rainfall events during the wet season. The Activity proposes to discharge excess abstracted groundwater water to the creek, which will occur intermittently and at volumes many orders of magnitude smaller than the volumes received by the creek at a baseline state. Modelling has indicated that water discharged at a volume of 7.7 M/L per day into Thirteen Creek may have a wetting front that extends from 0.9 to 3.7 km. The small and intermittent volumes of water discharged to Thirteen Creek are considered to have low potential to impact Greater Bilby supporting habitat given the sporadic nature of the discharge, the fast infiltration of surface geology and the capacity of the creek being many orders of magnitude higher than the proposed discharge. The intermittent flows will not be of a magnitude or frequency to alter the ephemeral nature of Thirteen Creek.

Potential surface water changes associated with the Activity present a low potential risk of impact, given the high permeability of the surface geology, the quality of the discharge water, continuous monitoring of water quality, and the short term and intermittent nature of the Activity. As a result, surface water changes are not predicted to result in residual impact to Greater Bilby.

Habitat degradation from fire and weeds

Fire and weed encroachment have the potential to degrade Greater Bilby foraging habitat, which can result in population decline (Bradley *et al.* 2015). The introduction of machinery for drilling, and vehicle movements associated with these activities may increase the risk of fire and the spread of weeds, which may result in the degradation of Sand Plain, Hardpan Plain and Mulga Woodland habitats within the Activity Area. The Activity will be conducted in adherence to BHP's internal procedures which will serve to minimise risk associated with the introduction of weeds and risk of fire. Habitat degradation from fire and weeds associated with the Activity is considered to have a low potential for impact due to the implementation of BHP's internal weed management practices and is not predicted to result in residual impact to Greater Bilby.

Habitat degradation from dust

Vegetation clearing and vehicle movements may result in increased airborne particulate matter, which may indirectly affect fauna by depositing on native vegetation and causing degradation to habitat. Degradation of habitat value

associated with suspended and deposited dust is considered to have a low potential for risk given the scale of the Activity and the low density of the proposed clearing footprint. The access tracks will be of a grade sufficient only for the proposed Activity and will not support vehicle speeds above 40 km/hour and will be subject to intermittent vehicle use, limiting the level of airborne particulates to those associated with the Activity and proposed clearing. Dust generation from the Activity is not predicted to result in residual impact to Greater Bilby.

Injury or mortality of fauna from vehicle strike

Greater Bilby are susceptible to being killed through vehicle strikes (Bradley *et al*. 2015), and the Activity will result in an increase of vehicles to the Activity Area, presenting a potential increased risk of vehicle strike to the Greater Bilby. The material risk of vehicle strike to the Greater Bilby is low given the intermittent nature of Greater Bilby individuals to the Activity Area. To mitigate potential vehicle strike to Greater Bilby individuals speed limits will be implemented as a precautionary measure (40 km/hour) to access tracks within the Activity Area. The Activity is not predicted to result in residual impact to the Greater Bilby as a result of vehicle strike.

Feral Predators

Feral predators such as feral cats (*Felis catus*) or foxes (*Vulpes vulpes*) are already present within the Activity Area (Biologic 2018, Astron 2022, BHP 2022, Astron 2023). The increase of human activity within the Activity Area is not likely to increase the presence of feral predators as the Activity will be progressive and mobile, with a limited drilling contingent of two teams of approximately five people. The Activity is not permanent, and no camps will be established to support the Activity. As such, the potential for risk of an increase to the presence of feral predators in the Activity is likely to be very low. All feral predator sightings will be reported to the Site Environmental Specialist and BHP's standard procedures will be implemented accordingly.

5.2.6 Mitigation Hierarchy

Avoid

Direct impacts to historical and potential new sites of Greater Bilby sign (diggings, burrows) will be mitigated by avoidance through design and planning of the Activity, and implementation of BHP's land disturbance approval processes prior to land disturbance. A progressive pre-works clearance prior to disturbance will be conducted to check for potential new Greater Bilby sign by the field team prior to ground disturbing activities. If an active Greater Bilby burrow is identified through the Greater Bilby clearance procedure, a buffer of 50 m will be applied to the burrow in which no disturbance/clearing will occur.

The PEAHR procedure is BHP WAIO's internal land clearing/disturbance review process to ensure that a proposed clearing area meets BHP's internal standards, legal obligations, and minimises impacts to Aboriginal Heritage, the Environment and Land Tenure. Prior to implementation of clearing, areas proposed for disturbance undergo a review by BHP Environment, Land Tenure and Aboriginal Heritage specialists to ensure that the proposed disturbance adheres to legal and other obligations.

To prevent vehicle strike to Greater Bilby individuals, speed limits of 40 km/hour will be implemented on access tracks within the Activity Area as a precautionary measure.

Mitigate

Implementation of BHP's weed hygiene, management and monitoring programs will occur for the duration of the Activity, which will serve to minimise the risk of introduction of weeds and the associated increased fire risk.

BHP's fire management procedures will be implemented for the duration of the Activity which aims to reduce the risk of fire to supporting Greater Bilby habitat.

BHP's dust management practices will be implemented to mitigate the impact of airborne particulates to the Greater Bilby and supporting habitat. The limited clearing, progressive rehabilitation and gazetted speed limits within the Activity Area will further mitigate the impact of dust to the Greater Bilby and supporting habitat within the Activity Area.

Monitoring of groundwater parameters and a Discharge Management Plan (example in Appendix 5, noting a specific management plan will be developed progressively for each drilling site) will be implemented at each drilling site within the Activity Area to mitigate potential adverse impacts associated with the discharge of water.

The mitigation hierarchy management measures which underpin the design of the Activity are detailed in Table 5-5, with monitoring and reporting commitments detailed in Section 7.

Table 5-5: Avoidance/Mitigation management summary for identified direct and indirect impacts

Management Measures		Avoidance/Mitigation
Direct Impact: Habitat Loss		
Design	Program designed to avoid direct impact to Greater Bilby historical records	Avoidance
Design	Program designed at intermittent spacing and staged so as not to fragment Greater Bilby supporting habitat	Avoidance
Implement	Greater Bilby pre-clearance surveys conducted prior to any ground-disturbance to avoid Greater Bilby and Greater Bilby records	Avoidance
Indirect Impact: Habitat Degradation - Groundwater		
Implement	Continuous monitoring of groundwater quality parameters during test pumping	Avoidance
Indirect Impact: Habitat Degradation - Surface Water		
Design and implement	Discharge Management Plan (Appendix 5)	Avoidance/Mitigation
Indirect Impact: Habitat Degradation - Fire and Weeds		
Implement	Implementation of BHP's internal weed management and monitoring practices	Avoidance/Mitigation
Indirect Impact: Habitat Degradation - Dust		
Implement	Implementation of BHP's internal dust management practices	Avoidance/Mitigation
Implement	Speed limits within the Activity Area gazetted to 40 km/hour and monitored by BHP's IVMS	Mitigation
Direct Impact: Injury/Mortality from Vehicle Strike		
Implement	Speed limits within the Activity Area gazetted to 40 km/hour and monitored by BHP's IVMS	Mitigation

5.2.7 Residual Impact

Residual impacts for the Greater Bilby include the direct disturbance of the following habitats:

- 45 ha of supporting habitats (Sand Plain, Mulga Woodland, and Stony Plain)

Offsets will be provided for these residual impacts (Section 6).

5.2.8 Review of Program Matter Outcomes

Following the impact assessment (Section 5.2.5) and application of the mitigation hierarchy (Section 5.2.6) a review of the Activity against the PMOs was undertaken. Table 5-6 identifies which PMOs are relevant for the Activity and considers further management.

Table 5-6: Review of Program Matter Outcomes (Greater Bilby)

Program Matter Outcome	Applicable Notifiable Action Trigger	Assessment
Minimise loss of critical and supporting habitats of the Greater Bilby as a result of Program Activities within the SAA	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	The loss of up to 45 ha of supporting habitat represents a residual impact and requires offsetting (see Section 6). No loss of critical habitat is associated with the Activity. The Activity is not predicted to result in any loss of population, given that there are no recent confirmed records within the Activity Area.

5.2.9 Monitoring

There is no evidence of a residing Greater Bilby population or individuals despite extensive survey effort within and surrounding the Activity Area, with historical records indicating Greater Bilby presence within the Activity Area are likely limited to transient individuals. Due to the absence of residing Greater Bilby individuals or population, monitoring is not considered to be required for the Activity.

Management commitments and clearing commitments for the Greater Bilby are detailed in Section 7, Table 7-1 and Table 7-2.

Summary

BHP considers that the Activity will meet the PMO to minimise loss of critical and supporting habitats given that habitat loss has been avoided as far as practicable, the Activity has a small and intermittent footprint, upper limits have been placed on clearing of supporting habitat to minimise loss of habitat, and the loss of supporting habitats will be offset (see Section 7).

5.3 Ghost Bat

The following sections provide background information to demonstrate that Notifiable Action Triggers for Ghost Bat are not met. Impacts to the Ghost Bat are discussed to illustrate that the Program Matter Objective for this species will be met.

5.3.1 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 5-6 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/Flood Plain, 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 *et al.* 2018; Bullen 2021), and occasionally up to 17 km from a roost during foraging bouts (Bullen *et al*. 2023).

5.3.2 Local Habitat

The Activity Area falls within the current distribution of the Ghost Bat, whereby the species or species habitat may occur (Figure 5-6). Survey coverage for the Ghost Bat is shown in Figure 5-7, with local habitat and nearest record presented in Figure 5-8.

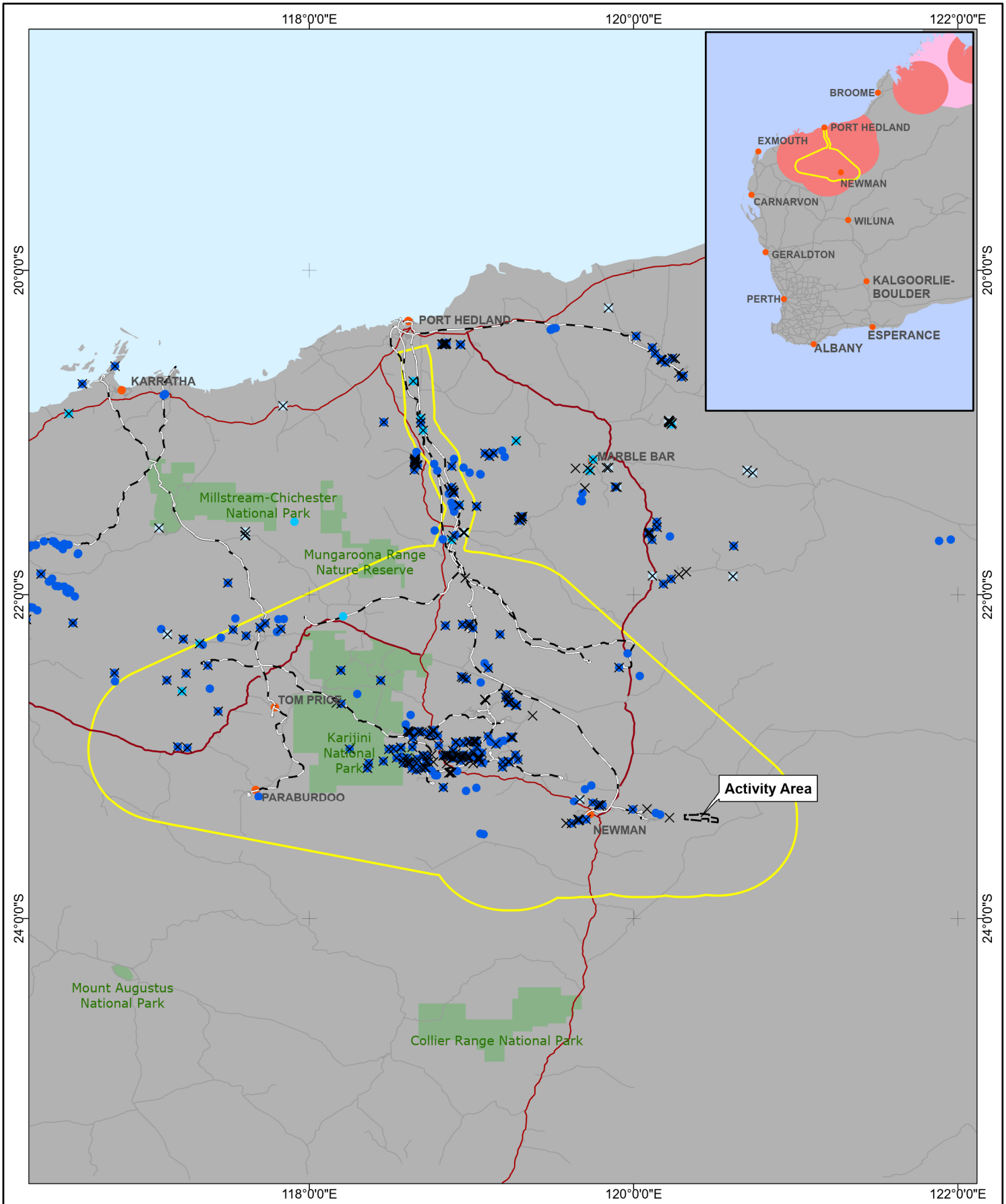
Ghost Bats roost in deep, complex caves beneath bluffs of low, rounded hills, granite rock piles and abandoned mines (Armstrong & Anstee 2000). These features often occur within habitats including gorge/gully, hill crest/hill slope and low hills (Armstrong & Anstee 2000). Natural caves in Gorge/Gully habitat and drainage lines are important for this species as are productive plain areas with thin mature woodland over patchy or clumped tussock or hummock grass (*Triodia.* spp) on Sand or Stony Grounds (Bullen 2021).

The current distribution of Ghost Bats within the region are Shown on Figure 5-6. There are no Category 1 or Category 2 caves within the proposed Activity Area, with the closest known critical cave (Category 2) being located 12.66 km to the south-west of the nearest Activity Area boundary.

Within the proposed footprint of the Activity Area, there is no presence of Gorge/Gully or Breakaway/Cliff habitat (Biologic 2018, Astron 2022, Astron 2023, Astron 2024). Habitat supportive for foraging is present within the Activity Area (Sand Plain, Stony Plain, Mulga Woodland, Major Drainage Line, and Minor Drainage Line), however is widespread throughout the region and the species is unlikely to be dependent on the habitat within the Activity Area (Biologic 2018), particularly with the distance between the Activity Area and the nearest Category 2 Cave 12.66 km to the west (Biologic 2023).

5.3.3 Ghost Bat Records

There are no records of Ghost Bat within the Activity Area or within a 500 m (where surveyed) of the Activity boundary (Biologic 2018, GHD 2019, GHD 2020, Astron 2022, and Astron 2023). The area has undergone extensive survey effort as detailed in Table 4-1. Records of the Ghost Bat are located to the west of the Activity Area, more than 7.8 km at the nearest point, with the closest Category 2 cave being located over 12.66 km to the south-west. Despite potential supporting foraging habitat being present within the Activity Area, the presence of the Ghost Bat is not expected due to the prevailing distance to the nearest critical habitat and critical cave (GHD 2019, GHD 2020, Astron 2022).



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Spatial Data - Studies Planning & Access
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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Ghost Bat regional records and distribution

Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No: A1252-018
Date:	11/06/2024	Checked:	Figure: 5.6
Revision:	REV A	Reviewed: ENV.APPROVALS	

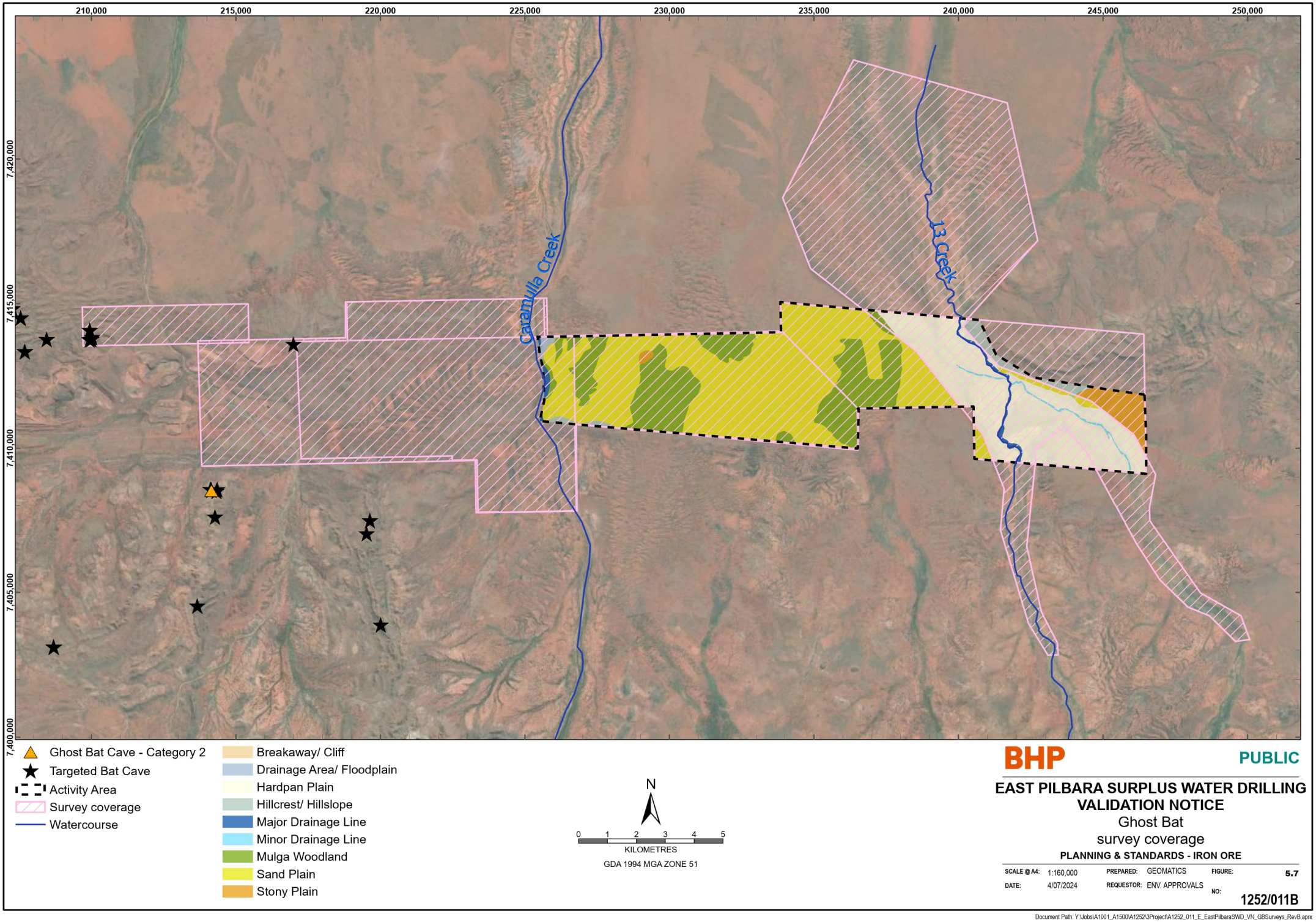
Ghost Bat records
- Records After 2005
- Records Between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Activity Area

- Species or species habitat likely to occur
- Species or species habitat may occur
- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994



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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

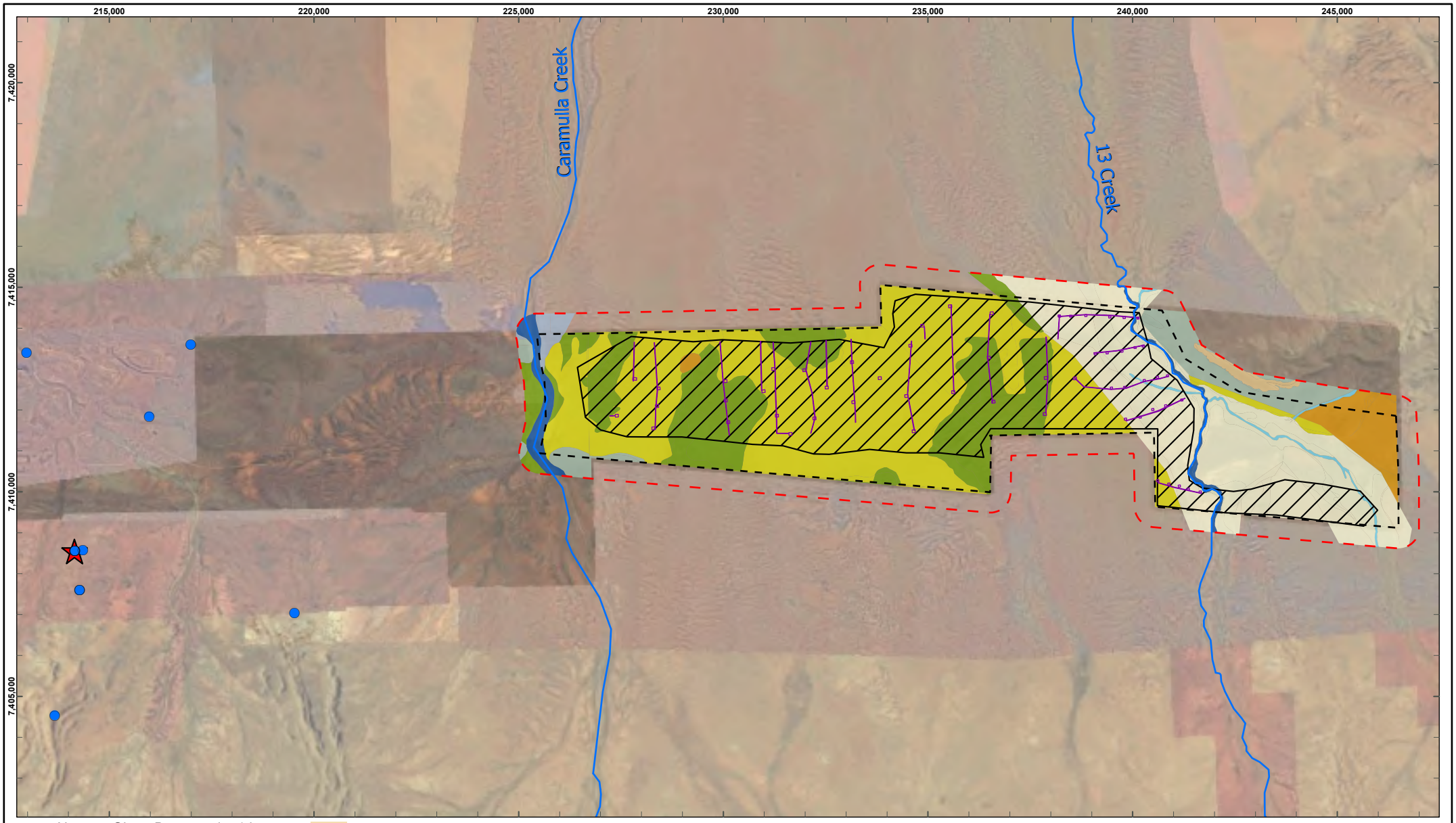
Ghost Bat

survey coverage

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:160,000	PREPARED:	GEOMATICS	FIGURE:	5.7
DATE:	4/07/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/011B

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_011_E_EastPilbaraSWD_VN_GBSurveys_RevB.aprx



- Nearest Ghost Bat record 7.1 km south-west of Activity Area
- Nearest Category 2 Ghost Bat cave 11.6 km south-west of Activity Area
- Watercourse
- Activity Area
- Indicative Footprint
- Conceptual Clearing Extent
- 500m Buffer

- Breakaway/ Cliff
- Drainage Area/ Floodplain
- Hardpan Plain
- Hillcrest/ Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain

N

0 1 2 3 4 5
KILOMETRES

GDA 1994 MGA ZONE 51

BHP

PUBLIC

EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Ghost Bat roosts, habitat and records

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:125,000	PREPARED:	GEOMATICS	FIGURE:	5.8
DATE:	30/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/004C

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_004_E_EastPilbaraSWD_VN_GBHabitatsAndRecords_RevC.aprx

5.3.4 Impact Assessment

The potential direct and indirect impacts to the Ghost Bat from the Activity (see Section 2) are considered below.

Habitat Loss

Clearing of native vegetation and loss of habitat has been identified as a possible threat to Ghost Bat populations. The Activity will result in the loss of approximately 45 ha of potentially supporting habitat including Sand Plain, Mulga Woodland and Stony Plain. Given the lack of records in the Activity Area or within 500 m (where surveyed) of the Activity Area, and the distance between the potential supporting habitat, and the nearest Category 2 cave being more than 12 km, habitat loss associated with this Activity does not fulfil the Notifiable Action Triggers for this Program Matter and is not considered to be a residual impact for the species.

Habitat degradation from alteration of groundwater

Degradation and alteration to potential groundwater-dependent Ghost Bat foraging habitat (Major Drainage Line) has been considered as a potential impact to Ghost Bat populations. Riparian vegetation and groundwater dependent vegetation can be prone to alteration when exposed to mounding or depression, associated with extraction and injection of water to the source aquifer. Riparian vegetation, in particular facultative phreatophyte species (i.e. *Eucalyptus victrix* and *E. camaldulensis,* both present within the Activity Area) access water from both the surface and groundwater from depths up to 21 m bgl

Alteration to vegetation resulting from short term groundwater mounding and drawdown associated with aquifer testing is considered to be unlikely due to the characteristics of the aquifer and prevailing distance between groundwater dependant native vegetation (drawing from up to 21 m bgl) and the target aquifer (groundwater encountered between 50 to 60 m bgl). Riparian vegetation in the Caramulla Creek and Thirteen creek area is not dependant on groundwater supply from the deep, confined aquifer and unlikely to be impacted by the short-term testing. A potential drawdown of 1.0 m for a radius of approximately 2 km has been modelled for the target aquifer.

Whilst the superficial stratigraphy will not be impacted (and potential groundwater dependent riparian vegetation) by the short-term mounding and drawdown of the Activity, there may be some minor impacts in the deeper disconnected target aquifer. The residual risk is considered to be low, with negligible potential of risk to the shallow aquifer which may support groundwater-dependent vegetation in the phreatic zone, and minor short-term impact to the deep aquifer expected, which will not impact availability of water for riparian vegetation. As a result, changes to the groundwater regime arising from the Activity are not predicted to result in residual impact to Ghost Bat.

Habitat degradation from alteration of surface water

Alteration to surface water regimes has been considered as a potential impact to the Ghost Bat. Increased run-off, sedimentation or pollution can impact habitat that supports the foraging of the Ghost Bat. This includes the change to the permanency, level or water quality of ephemeral creeks due to excess surface water run-off, alteration to topsoil condition, and other discharges from the proposed Activity. Planned groundwater abstraction, surface discharge and reinjection testing will be conducted at select bores for a duration of up to thirty days per location. Discharge water quality will be of low salinity, low total suspended solids (TSS) and expected to infiltrate rapidly. No permanent pools are currently present in the creeks. Implementation of Discharge Management Plan and continuous monitoring during test pumping and bore development and intermittent surface discharge will minimise any changes to surface water drainage.

Potential surface water changes associated with the Activity present a low potential risk of impact, given the high permeability of the surface geology, the quality of the discharge water, continuous monitoring of water quality, and the short term and intermittent nature of the Activity. As a result, surface water changes are not predicted to result in residual impact to Ghost Bat.

Habitat degradation from dust

Vegetation clearing and vehicle movements may result in a temporary increase in airborne particulate matter. Dust can indirectly affect fauna by altering the structure and composition of native vegetation and causing habitat degradation. Degradation of habitat value due to dust emissions is considered to present a low potential for risk due to the scale and temporary nature of the works and implementation of dust monitoring and management measures within the Activity Area. Dust generation from the Activity is not predicted to result in residual impact to Ghost Bat.

Feral Predators

Feral predators such as feral cats (*Felis catus*) and foxes (*Vulpes vulpes*), may predate on the Ghost Bat. The Activity is not likely to attract or increase the presence of feral predators such as feral cats or foxes which are already present within the Activity Area (Biologic 2018, Astron 2022, BHP 2022, Astron 2023). With standard BHP feral animal management practices in place and the lack of Ghost Bat records in the Activity Area, there is a low potential for risk of feral predators to impact the Ghost Bat as a result of the Activity, and is not predicted to result in residual impact to Ghost Bat.

5.3.5 Summary

The Ghost Bat Notifiable Action Triggers are not applicable as no records exist within the Activity Area or within 500 m (where surveyed) of the Activity boundary, despite sufficient survey effort. Direct and Indirect impacts to Ghost Bat are considered to present a negligible potential risk to the species, and will not result in a residual impact.

5.4 Northern Quoll

The following sections provide background information to demonstrate that Notifiable Action Triggers for Northern Quoll are not met. Impacts to the Northern Quoll are discussed to illustrate that the Program Matter Objective for this species will be met.

5.4.1 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 5-9 illustrates the regional records and distribution of Northern Quoll.

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).

5.4.2 Local Habitat

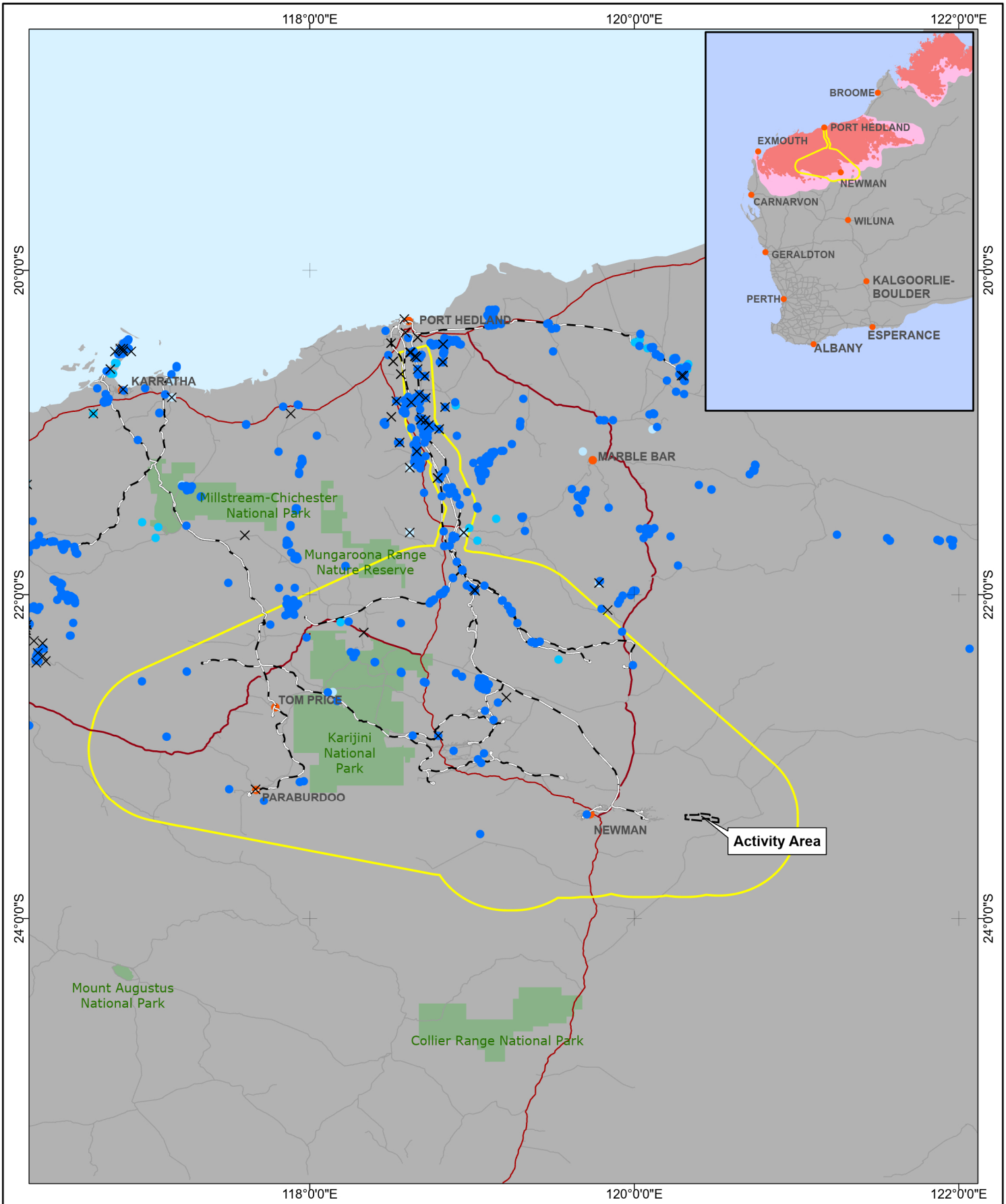
The Activity Area falls within the current distribution of the Northern Quoll, whereby the species or species habitat may occur (Figure 5-9). Survey coverage for the Northern Quoll is shown in Figure 5-19, with local habitat and nearest record presented in Figure 5-11.

The areas surveyed for Northern Quoll are shown in Figure 5-10**.** Sand Plain habitat is dominant across the Activity Area with intermittent parcels of Mulga Woodland and Stony Plain (Biologic 2018, Astron 2022, Astron 2023, Astron 2024). These habitats broadly support foraging for the Northern Quoll, however given the lack of connectivity to Gorge/Gully and Breakaway/Cliff habitat (Biologic 2018, Astron 2022, Astron 2023), and lack of Northern Quoll records, the presence of the species within the Activity Area is unlikely. No critical habitat is present within the Activity Area or within 500 m from the boundary of the Activity Area (where surveyed).

5.4.3 Northern Quoll Records

There are no records of Northern Quoll within the Activity Area or within a 500 m (where surveyed) of the Activity boundary (Biologic 2018; Astron 2022, Astron 2023, Astron 2024). The nearest recording of the Northern Quoll is located more than 32 km from the Activity Area (recorded at OB18 waste dump during rehabilitation monitoring).

Given the absence of records within or adjacent to the Activity Area despite extensive survey effort, and lack of critical habitat to support the species, it is considered unlikely that the Northern Quoll occurs within the Activity Area. The Activity Area does not support an important population for the long-term survival of the Northern Quoll as defined by DotE (2016).



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Northern Quoll regional records and distribution

Scale @ A4:	1:3,500,000	Prepared:	SPATIAL DATA	Project No:	A1252-017
Date:	11/06/2024	Checked:		Figure:	5.9
Revision:	REV B	Reviewed:	ENV.APPROVALS		

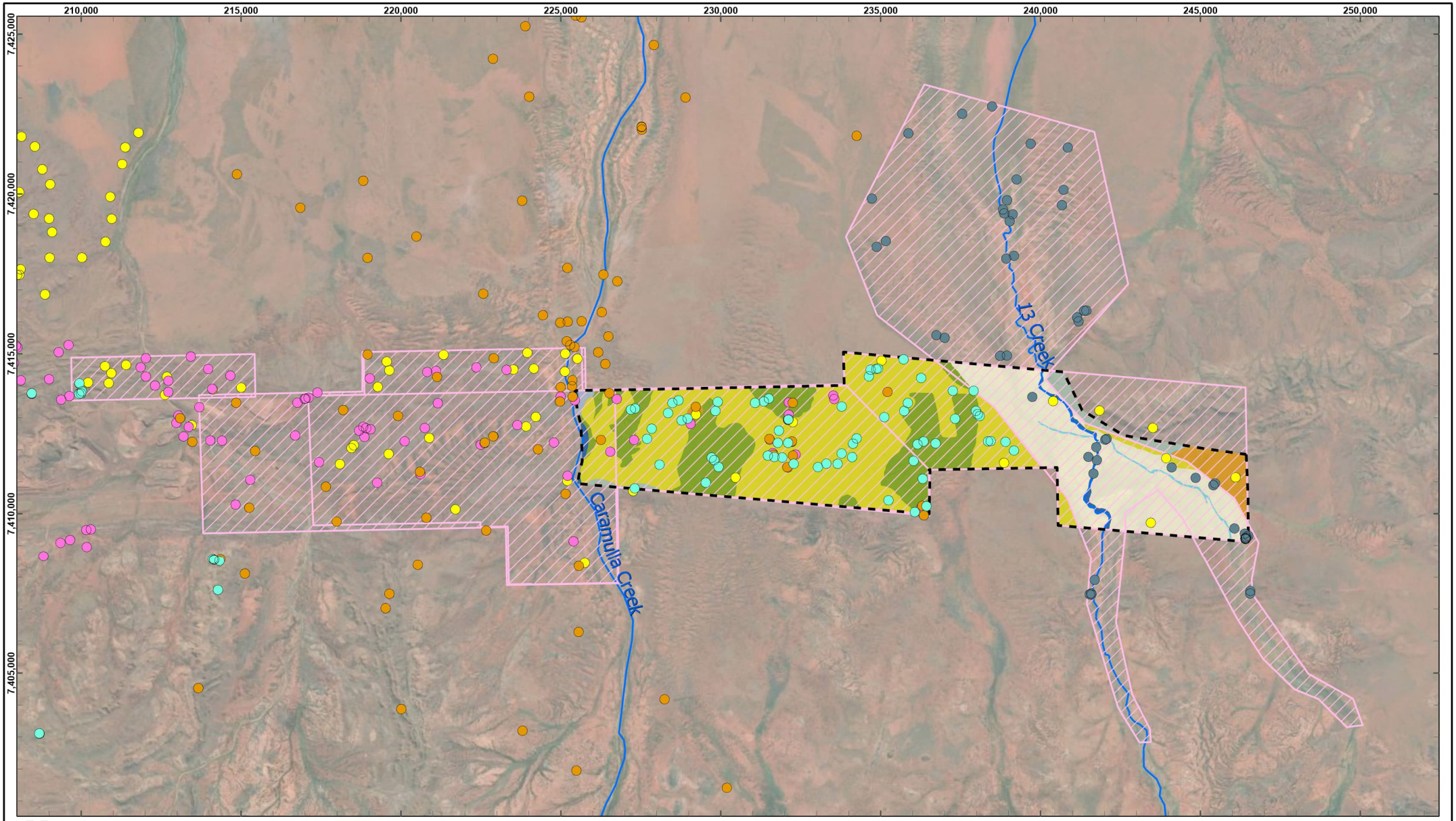
Northern Quoll records
- Records After 2005
- Records between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Activity Area

- Species or species habitat likely to occur
- Species or species habitat may occur
- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994



Activity Area
Survey coverage

Vertebrate Fauna Sample Sites (by sample year)

- Pre-2019
- 2019
- 2020
- 2022
- 2023

Watercourses

- Breakaway/ Cliff
- Drainage Area/ Floodplain
- Hardpan Plain
- Hillcrest/ Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain

N

0 1 2 3 4 5

KILOMETRES

GDA 1994 MGA ZONE 51

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Northern Quoll survey coverage

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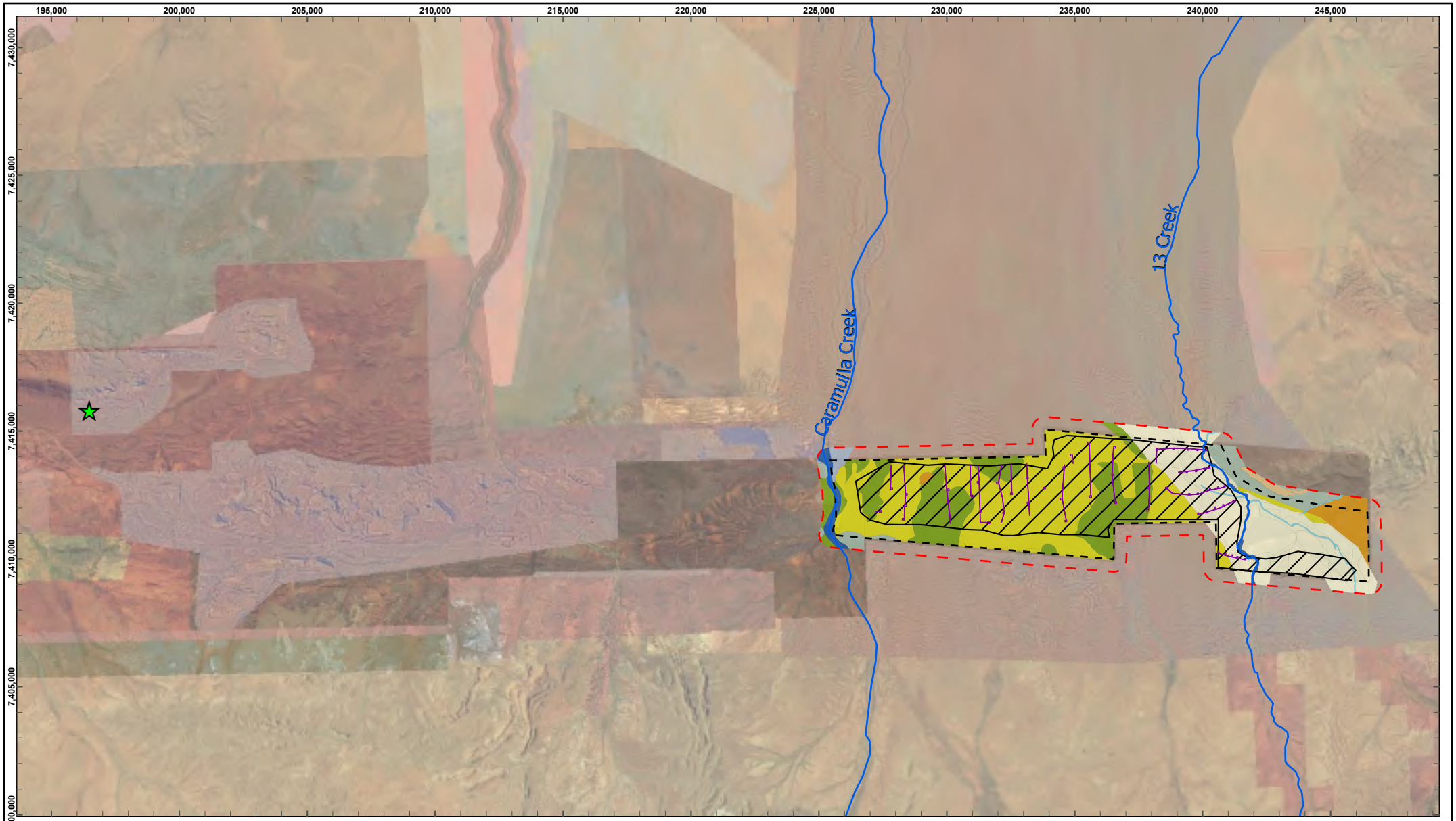
SCALE @ A4:	1:160,000	PREPARED:	GEOMATICS	FIGURE:	5.10
DATE:	4/07/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/010B

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_010_E_EastPilbaraSWD_VN_NQSurveys_RevB.aprx



Nearest Northern Quoll record 29 km east of the Activity Area
Watercourses
Activity Area
Indicative Footprint
Conceptual Clearing Extent
500m Buffer

Breakaway/ Cliff
Drainage Area/ Floodplain
Hardpan Plain
Hillcrest/ Hillslope
Major Drainage Line
Minor Drainage Line
Mulga Woodland
Sand Plain
Stony Plain

N

0 1 2 3 4 5
KILOMETRES

GDA 1994 MGA ZONE 51

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Northern Quoll
habitat and records

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:200,000	PREPARED:	SPATIAL DATA	FIGURE:	5.11
DATE:	30/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/003C

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_003_E_EastPilbaraSWD_VN_NQHabitatsAndRecords_RevC.aprx

5.4.4 Impact Assessment

The potential direct and indirect impacts to the Northern Quoll from the Activity (see Section 2) are considered below.

Habitat Loss and fragmentation

Clearing of native vegetation and loss of habitat has been considered as a possible threat to the Northern Quoll given the presence of critical habitat to the north-eastern portion of the Activity Area, within the 500 m buffer. The Activity will not result in the direct loss of critical habitat for the species or fragment Northern Quoll habitat as there is no presence of critical habitat for Northern Quoll within the Activity Area. Furthermore, as the prevailing distance between the potential supporting habitat and the nearest recording of the Northern Quoll is 32 km, habitat loss associated with this Activity does not fulfil the Notifiable Action Triggers for this Program Matter and is not considered to be a residual impact to the species.

Habitat degradation from alteration of groundwater

Northern Quoll critical and supporting habitat may be dependent on groundwater systems, with Major Drainage Line habitat potentially sensitive to alterations to the groundwater regime where vegetation includes phreatophyte species. Alteration to vegetation resulting from short term groundwater mounding and drawdown associated with aquifer testing is considered to be unlikely due to the characteristics of the aquifer and prevailing distance between potentially groundwater dependant native vegetation and the target aquifer. Riparian vegetation in the Caramulla Creek and Thirteen Creek area is not dependant on groundwater supply from the deep, confined aquifer (depth to groundwater is greater than 50 m bgl) and is unlikely to be impacted by the short-term testing. A potential drawdown of 1.0 m for a radius of approximately 2 km has been modelled for the target aquifer.

Whilst the superficial stratigraphy will not be impacted (and potential groundwater dependent riparian vegetation) by the short-term mounding and drawdown of the Activity, there may be some minor impacts in the deeper disconnected target aquifer.

The residual risk is considered to be low, with negligible potential of risk to the shallow aquifer which may support groundwater-dependent vegetation in the phreatic zone, and minor short-term impact to the deep aquifer expected, which will not impact availability of water for riparian vegetation. As a result, changes to the groundwater regime arising from the Activity are not predicted to result in residual impact to Northern Quoll.

Habitat degradation from alteration of surface water

Alteration to surface water regimes has been considered as a potential impact to the Northern Quoll. Increased run-off, sedimentation or pollution can impact habitat that supports the denning and foraging of the Northern Quoll. This includes the change to the permanency, level or water quality of ephemeral creeks due to excess surface water run-off, alteration to topsoil condition, and other discharges from the proposed Activity. The impact to local habitat presents a low potential for risk given the short-term and intermittent nature of the Activity. Planned groundwater abstraction, surface discharge and reinjection testing will be conducted at select bores for a duration of up to thirty days per location. Discharge water quality will be of low salinity, low TSS and expected to infiltrate rapidly. No permanent pools are currently present in the creeks. Implementation of a Discharge Management Plan and continuous monitoring during test pumping and bore development will minimise any changes to surface water drainage.

Potential surface water changes associated with the Activity present a low potential risk of impact, given the high permeability of the surface geology, the quality of the discharge water, continuous monitoring of water quality, and the short term and intermittent nature of the Activity. As a result, surface water changes are not predicted to result in residual impact to Northern Quoll.

Habitat degradation from fire and weeds

The increased presence of vehicles and drilling machinery may increase the risk of fire to Northern Quoll supporting habitats within the Activity Area, by introducing ignition sources and weeds. Given the lack of records of the Northern Quoll within the Activity Area, the potential risk of habitat modification to the Northern Quoll is considered to be very low. The Activity will be conducted in adherence to BHP's internal procedures which will serve to minimise risk associated with the introduction of weeds and risk of fire. Habitat degradation from fire and weeds associated with the Activity is considered to have a low potential for impact due to the implementation of BHP's internal weed management practices and is not predicted to result in residual impact to Northern Quoll.

Habitat degradation from dust

Vegetation clearing and vehicle movements may result in an increase in airborne particulate matter. Dust can indirectly affect fauna by altering the structure and composition of native vegetation and causing habitat degradation. Degradation of habitat value due to dust emissions is considered to be of low risk given the short term and intermittent nature of the Activity and the implementation of dust management practices for the duration of the Activity. Dust generation from the Activity is not predicted to result in residual impact to Northern Quoll.

Feral Predators

Feral predators such as feral cats (*Felis catus*), may prey on the Northern Quoll and/or compete with the Northern Quoll for food. The Activity is not likely to attract or increase the presence of feral predators such as feral cats or foxes which are already present within the Activity Area (Biologic 2018, Astron 2022, BHP 2022, Astron 2023). With standard BHP feral animal management practices and the lack of Northern Quoll records within or proximal to the Activity Area, the impact of feral animals on the Northern Quoll associated with the Activity is considered to present a low potential for risk, and is not predicted to result in residual impact to Northern Quoll.

The future predicted spread of the cane toad into the waterholes of the Pilbara bioregion may have negative impacts to the Northern Quoll. Northern Quoll are understood to be vulnerable to the toxins produced by Cane Toads. Cane Toads may be introduced to areas via vehicles and equipment (DpaW 2015). It is considered unlikely that such introduction to the Activity Area will occur as travel to and from high-risk areas such as the Kimberley are not foreseen. Impacts from the Cane Toad to the Northern Quoll associated with the Activity are considered to present a low potential for risk, and is not predicted to result in residual impact to Northern Quoll.

Injury or mortality of fauna from vehicle strike

The Activity will result in an increase in vehicles to the Activity Area, limited to vehicles associated with the Activity. The material risk of vehicle strike to the Northern Quoll is considered to be very low given the lack of records in or proximal to the Activity Area, and limited presence of Northern Quoll supporting habitat. The Activity is not predicted to result in residual impact to the Northern Quoll as a result of vehicle strike.

5.4.5 Summary

The Northern Quoll Notifiable Action Triggers are not applicable as no records exist within the Activity Area or within 500 m (where surveyed) of the Activity boundary, despite sufficient survey effort. Direct and indirect impacts associated with the Activity to Northern Quoll are considered to present a negligible potential risk to the species.

5.5 Pilbara Olive Python

The following sections provide background information to demonstrate that Notifiable Action Triggers for Pilbara Olive Python are not met. Impacts to the Pilbara Olive Python are discussed to illustrate that the Program Matter Objective for this species will be met.

5.5.1 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 north-eastern 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 5-12 illustrates the regional records of Pilbara Olive Python.

5.5.2 Local Habitat

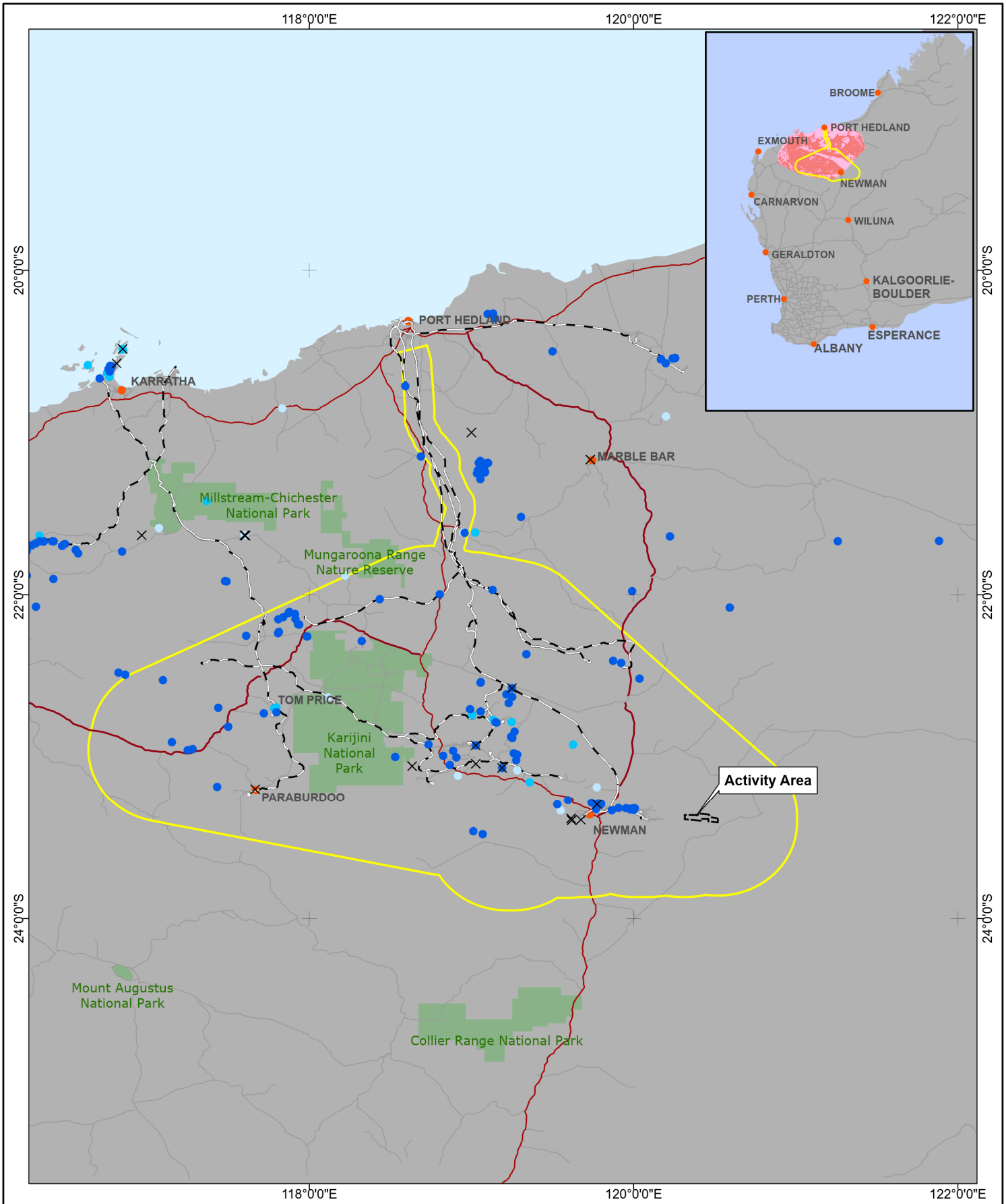
The Activity Area falls within the current distribution of the Pilbara Olive Python (Figure 5-12) whereby the species or species habitat may occur. Survey coverage for the Pilbara Olive Python is shown in Figure 5-13, with local habitat and nearest record presented in Figure 5-14.

The areas surveyed for Pilbara Olive Python are shown in Figure 5-13 Sand Plain habitat is dominant across the Activity Area with intermittent parcels of Mulga Woodland and Stony Plain (Biologic 2018, Astron 2022, Astron 2023, Astron 2024). These habitats do not support Pilbara Olive Python breeding and foraging and are considered unlikely to support the species. Major Drainage Line habitat and Drainage Area/Flood Plain encompass the eastern-most third of the Activity Area accompanied by some Hillcrest/Hillslope and Hardpan Plain (Astron 2022, Astron 2023, Astron 2024).

Habitat supporting foraging for the species is limited to the Drainage Line habitats in the eastern portion of the Activity Area (Biologic 2018). Critical Breakaway/Cliff habitat is located outside of the Activity Area, approximately 100 m to the north-east with some connectivity to the Hillcrest/Hillslope habitat intersecting the Activity Area (Biologic 2018).

5.5.3 Pilbara Olive Python Records

There are no records of Pilbara Olive Python within the Activity Area or within 500 m (where surveyed) of the Activity boundary (Biologic 2018; Astron 2022, Astron 2023, Astron 2024). The nearest record of the Pilbara Olive Python is located more than 34.4 km to the west of the Activity Area. Whilst the Activity Area falls within the current distribution of the Pilbara Olive Python, the lack of records within or proximal to the Activity Area despite extensive survey effort, coupled with the limited suitable habitat present within the Activity Area to support Pilbara Olive Pythons indicates that the species is not present within the Activity Area.



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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Pilbara Olive Python regional records and distribution

Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No: A1252-020
Date:	11/06/2024	Checked:	Figure: 5.12
Revision:	REV B	Reviewed: ENVIRO. A&I	

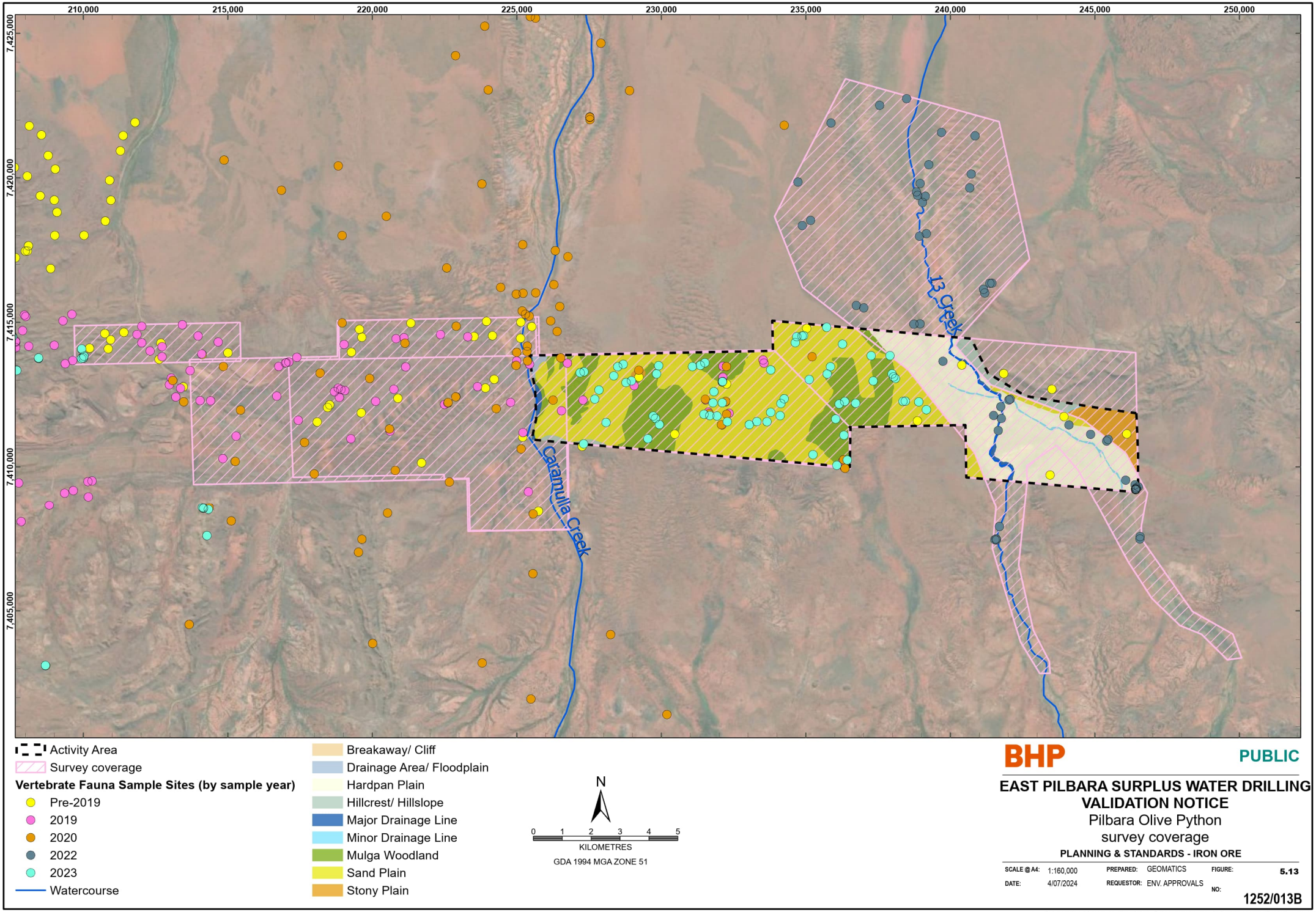
Pilbara Olive Python records

- Records After 2005
- Records Between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Activity Area
- Species or species habitat likely to occur
- Species or species habitat may occur
- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994



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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Pilbara Olive Python survey coverage

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SCALE @ A4:	1:160,000	PREPARED:	GEOMATICS	FIGURE:	5.13
DATE:	4/07/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/013B

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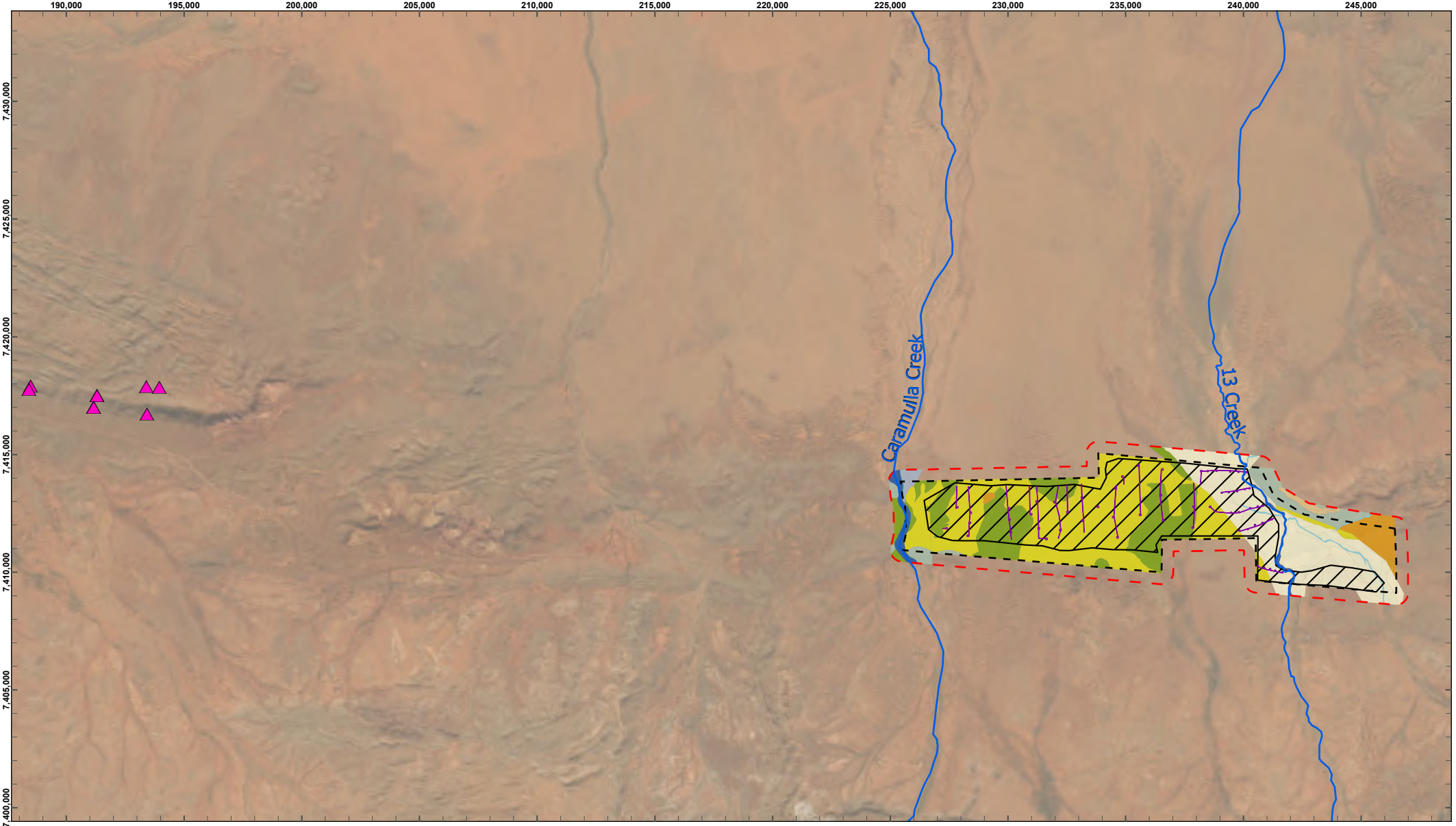

Nearest Pilbara Olive Python record 31.7 km West of Activity Area
Watercourse
Activity Area
500m Buffer
Indicative Footprint
Conceptual Clearing Extent

Breakaway/ Cliff
Drainage Area/ Floodplain
Hardpan Plain
Hillcrest/ Hillslope
Major Drainage Line
Minor Drainage Line
Mulga Woodland
Sand Plain
Stony Plain

N

0 1 2 3 4 5
KILOMETRES

GDA 1994 MGA ZONE 51

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EAST PILBARA SUPLUS WATER DRILLING VALIDATION NOTICE

Pilbara Olive Python habitat and records

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SCALE @ A4:	1:220,000	PREPARED:	GEOMATICS	FIGURE:	5.14
DATE:	30/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/006C

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_006_E_EastPilbaraSWD_VN_POPHabitatsAndRecords_RevC.aprx

5.5.4 Impact Assessment

The potential direct and indirect impacts to the Pilbara Olive Python from the Activity (Section 2) are considered below.

Habitat Loss and fragmentation

Clearing of native vegetation and loss of habitat has been considered as a possible threat to the Pilbara Olive Python given the presence of supporting habitat in the north-eastern portion of the Activity Area. The Activity will not result in the loss of or fragmentation of habitat for the species as there is no presence of Pilbara Olive Python critical or supporting habitat in the Activity Area. Furthermore, as the distance between the potential supporting habitat and the recording of the Pilbara Olive Python is 34.4 km, habitat loss associated with this Activity does not fulfil the Notifiable Action Triggers for this Program Matter and is considered to present a negligible risk of impact for the species.

Habitat degradation from alteration of groundwater

Degradation and alteration to potential groundwater-dependent Pilbara Olive Python foraging habitat has been considered as a potential impact to Pilbara Olive Python populations. Riparian vegetation and potential groundwater dependent vegetation can be prone to alteration when exposed to mounding or depression, associated with extraction and injection of water to the source aquifer. Riparian vegetation, in particular facultative phreatophyte species (i.e. *Eucalyptus victrix* and *E. camaldulensis,* both present within the Activity Area) are estimated to be able to access groundwater from depths up to 21 m bgl.

Alteration to vegetation resulting from short term groundwater mounding and drawdown associated with aquifer testing is considered to be unlikely due to the characteristics of the aquifer and prevailing distance between groundwater dependant native vegetation (drawing from up to 21 m bgl) and the target aquifer (approximately 50 m bgl). Riparian vegetation in the Caramulla Creek, and Thirteen Creek area is not dependant on groundwater supply from the deep, confined aquifer and unlikely to be impacted by the short-term testing. A potential drawdown of 1.0 m for a radius of approximately 2 km has been modelled for the target aquifer.

Whilst the superficial stratigraphy will not be impacted (and potential groundwater dependent riparian vegetation) by the short-term mounding and drawdown of the Activity, there may be some minor impacts in the deeper disconnected target aquifer.

The residual risk is considered to be low, with negligible potential of risk to the shallow aquifer which may support groundwater-dependent vegetation in the phreatic zone, and minor short-term impact to the deep aquifer expected, which will not impact availability of water for riparian vegetation. As a result, changes to the groundwater regime arising from the Activity are not predicted to result in residual impact to Pilbara Olive Python.

Habitat degradation from alteration of surface water

Alteration to surface water regimes has been considered as a potential impact to the Pilbara Olive Python. Increased run-off, sedimentation or other discharges can impact Pilbara Olive Python foraging habitat. This includes the change to the permanency, level or water quality of ephemeral creeks due to excess surface water run-off from the proposed Activity. The impact to local habitat is not likely to present potential risk given the short-term and intermittent nature of the Activity.

Planned groundwater abstraction, surface discharge and reinjection testing will be conducted at select bores for a duration of up to thirty days per location. Discharge water quality will be of low salinity, low TSS and expected to infiltrate rapidly. No permanent pools are currently present in the creeks. In some instances, excess water will be discharged to surface water bodies or held temporarily in sumps; these activities have been assessed as low impact due to the high permeability of the surface geology (sand and gravel) which supports fast infiltration to the underlying superficial aquifer. Implementation of a Discharge Management Plan and continuous monitoring during

test pumping and bore development will minimise any changes to surface water drainage. The water that may be released has been assessed as high quality, low salinity with low TSS.

Potential surface water changes associated with the Activity present a low potential risk of impact, given the high permeability of the surface geology, the quality of the discharge water, continuous monitoring of water quality, and the short term and intermittent nature of the Activity. As a result, surface water changes are not predicted to result in residual impact to Pilbara Olive Python.

Habitat degradation from fire and weeds

The increased presence of vehicles and drilling machinery may increase the risk of fire to Pilbara Olive Python supporting habitats within the Activity Area, by introducing ignition sources and weeds. Given the lack of records of the Pilbara Olive Python within the Activity Area, the impact of habitat modification to the Pilbara Olive Python is considered to be very low. The Activity will be conducted in adherence to BHP's internal procedures which will serve to minimise risk associated with the introduction of weeds and risk of fire. Habitat degradation from fire and weeds associated with the Activity is considered to have a low potential for impact due to the implementation of BHP's internal weed management practices and is not predicted to result in residual impact to Pilbara Olive Python.

Habitat degradation from dust

Vegetation clearing and vehicle movements may result in an increase in airborne particulate matter. Dust can indirectly affect fauna by altering the structure and composition of native vegetation and causing habitat degradation. Degradation of habitat value due to dust emissions is considered unlikely due to the short term and intermittent nature of the Activity and the implementation of dust management practices throughout the Activity. Dust generation from the Activity is not predicted to result in residual impact to Pilbara Olive Python.

Feral Predators

Feral predators such as feral cats (*Felis catus*) and foxes (*Vulpes vulpes*), may prey on the Pilbara Olive Python (TSSC 2008) and/or compete with the Pilbara Olive Python for food (Pearson 2006). The Activity is not likely to attract or increase the presence of feral predators such as feral cats or foxes which are already present within the Activity Area (Biologic 2018, Astron 2022, BHP 2022, Astron 2023). With standard BHP feral animal management practices and the lack of Pilbara Olive Python records within or proximal to the Activity Area, the impact of feral cats on the Pilbara Olive Python associated with the Activity is considered to be negligible, and is not predicted to result in residual impact to Pilbara Olive Python.

The future predicted spread of the cane toad into the waterholes of the Pilbara bioregion may have negative impacts to the Pilbara Olive Python. Pilbara Olive Python are understood to be vulnerable to the toxins produced by Cane Toads. Cane Toads may be introduced to areas via vehicles and equipment (DpaW 2015). It is considered unlikely that such introduction to the Activity Area will occur as travel to and from high-risk areas such as the Kimberley are not foreseen. Potential impacts from the Cane Toad to the Pilbara Olive Python associated with the Activity are considered to be very low, and is not predicted to result in residual impact to Pilbara Olive Python.

Injury or mortality of fauna from vehicle strike

The Activity will result in an increase in vehicles to the Activity Area. The risk of vehicle strike to the Pilbara Olive Python is considered to be very low given the lack of records in or proximal to the Activity Area, and limited presence of Pilbara Olive Python supporting habitat. The Activity is not predicted to result in residual impact to the Pilbara Olive Python as a result of vehicle strike.

5.5.5 Summary

The Pilbara Olive Python Notifiable Action Triggers are not applicable as there are no records of the Pilbara Olive Python in the Activity Area or within 500 m (where surveyed) of the Activity Area boundary, with the nearest record

being 34.4 km to the west. Direct and indirect impacts to the Pilbara Olive Python supporting habitat within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary are considered to present negligible potential of risk to the species.

5.6 Pilbara Leaf-nosed Bat

The following sections provide background information to demonstrate that Notifiable Action Triggers for Pilbara Leaf-nosed Bat are not met. Impacts to the Pilbara Leaf-nosed Bat are discussed to illustrate that the Program Matter Objective for this species will be met.

5.6.1 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, Ecologia Environment 2006a, Ecologia Environment 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 5-15 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 110,000 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).

5.6.2 Local Habitat

Survey coverage for the Pilbara Leaf-nosed Bat is shown in Figure 5-16, with local habitat and nearest record presented in Figure 5-17. The Activity Area falls within the current distribution of the Pilbara Leaf-nosed Bat whereby the species or species habitat may occur (Figure 5-15).

The Pilbara Leaf-nosed Bat roosts within caves and abandoned mines with high humidity and temperature (Armstrong 2001), and forage in caves and along waterbodies with fringing vegetation typically with those foraging habitats within 10 km of a roost/Category 1-3 cave being critical to supporting individuals/populations.

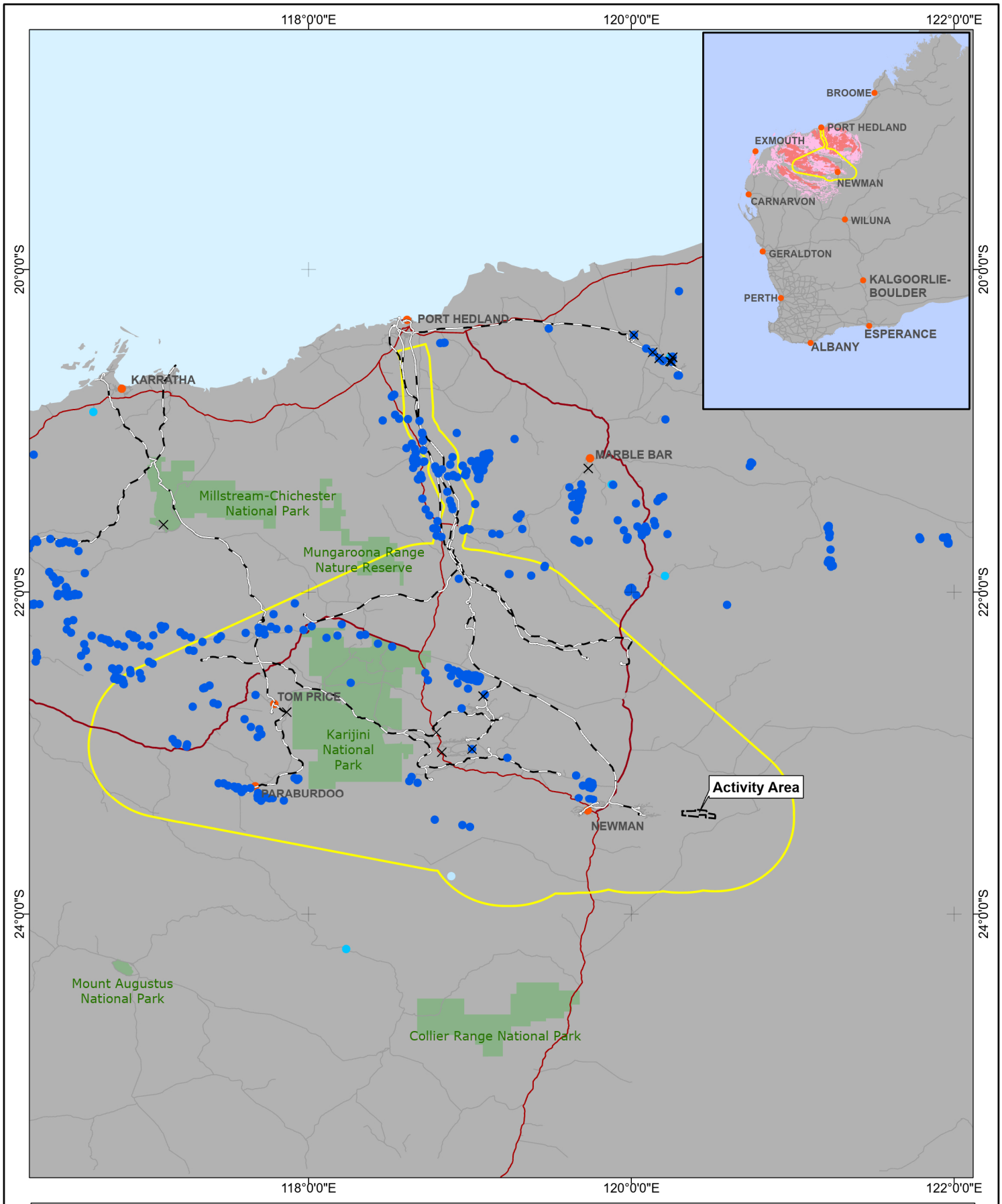
The Activity Area has been subject to extensive contemporary surveys which have identified habitat types, condition and suitability to MNES that occupy the Activity Area and surrounds (to 500 m where surveyed). The most recent of the contemporary surveys was the *Targeted Bilby Fauna Assessment* which encompassed the entire Activity Area, conducted by Astron in November 2023 (Astron 2024), and targeted the Greater Bilby and other MNES species including the Pilbara Leaf-nosed Bat. The habitat assessment by Astron (2024) was supported by previous contemporary surveys which encompassed or intersected the Activity Area including: Biologic Environmental Survey (2018), GHD Pty Ltd (2019), Onshore Environmental Consultants Pty Ltd (2019), GHD Pty Ltd (2021a), Astron (2022), and Astron (2023). The survey and assessment conducted by Biologic (2018) indicated that it was unlikely

that critical habitat or roosts would be present within the survey area, however there was some possibility of suitable foraging habitat being present.

Critical habitat for the Pilbara Leaf-nosed Bat has not been recorded in the Activity Area or within 500 m (where surveyed) of the Activity Area. Supporting foraging habitat encompasses 25% of the Activity Area, and comprises Drainage Area/Flood Plain, Major Drainage Line, Minor Drainage Line, Mulga Woodland, and Hillcrest/Hillslope habitats. There are no recorded Pilbara Leaf-nosed Bat caves within 10 km of the Activity Area with the nearest record of the Pilbara Leaf-nosed Bat being located more than 36 km to the west and the nearest Category 2 Cave located 40 km to the west. Foraging habitat within the Activity Area has not been ascribed critical habitat as the there are no Category 1-3 roosts within 10 km of the Activity boundary.

5.6.3 Pilbara Leaf-nosed Bat Records

There are no records of Pilbara Leaf-nosed Bat within the Activity Area or within 500 m (where surveyed) of the Activity Area. The area has undergone extensive survey effort as detailed in Table 4-1. Records of the Pilbara Leaf-nosed Bat are located to the west of the Activity Area, more than 36 km at the nearest point, with the closest Category 2 roost being located over 40 km to the west. Despite potential supporting foraging habitat being present within the Activity Area, the presence of the Pilbara Leaf-nosed Bat is not expected due to the prevailing distance to the nearest critical habitat and critical cave (GHD 2019, GHD 2020, Astron 2022).



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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Pilbara Leaf-nosed Bat regional records and distribution

Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No:A1252-021
Date:	11/06/2024	Checked:	Figure: 5.15
Revision:	REV B	Reviewed: ENVIRO. A&I	

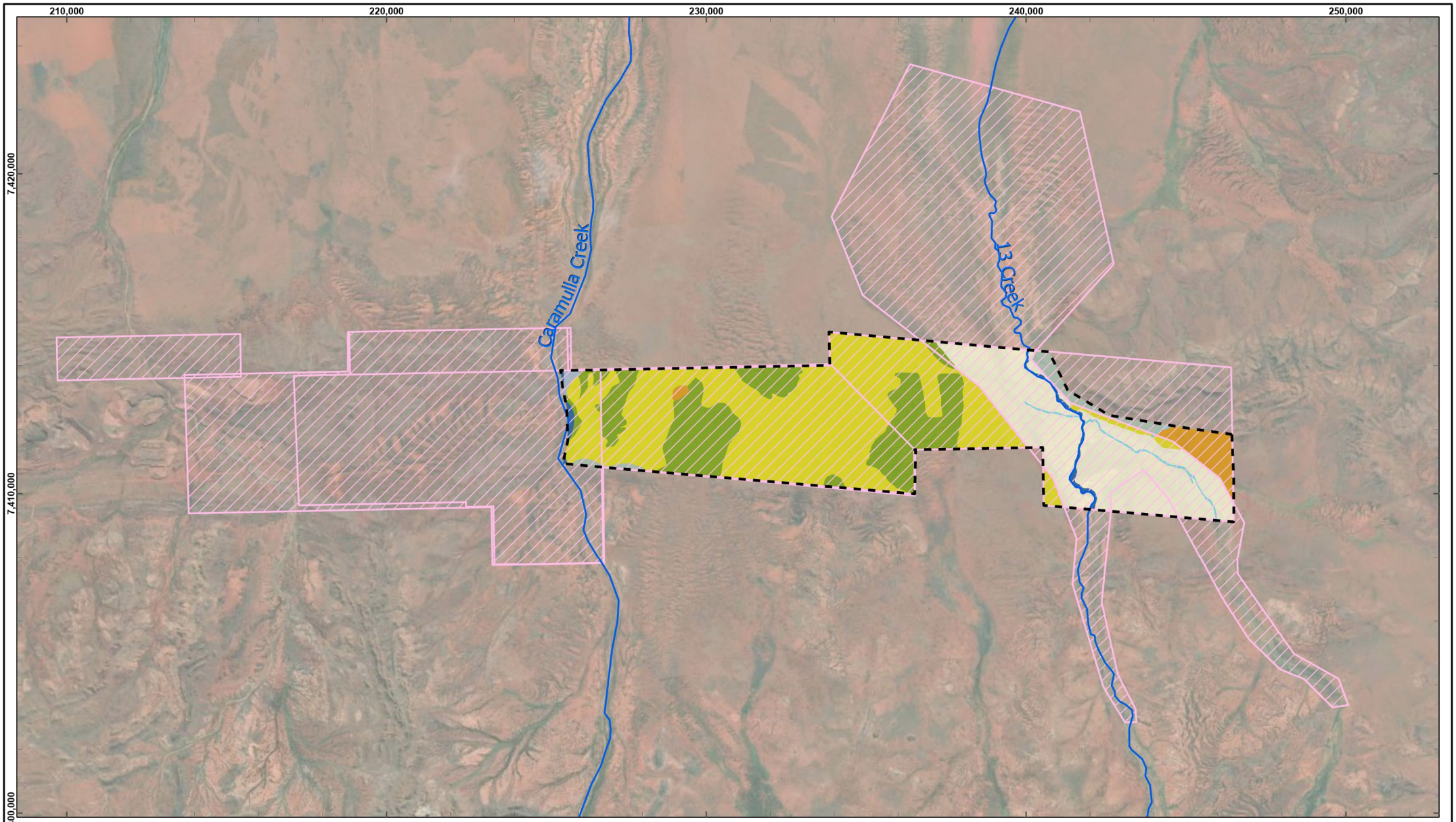
Pilbara Leaf-nosed Bat records
- Records After 2005
- Records between 1980 - 2004
- Records Prior 1979
- Records Missing Date
- Town
- Activity Area

- Species or species habitat likely to occur
- Species or species habitat may occur
- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994



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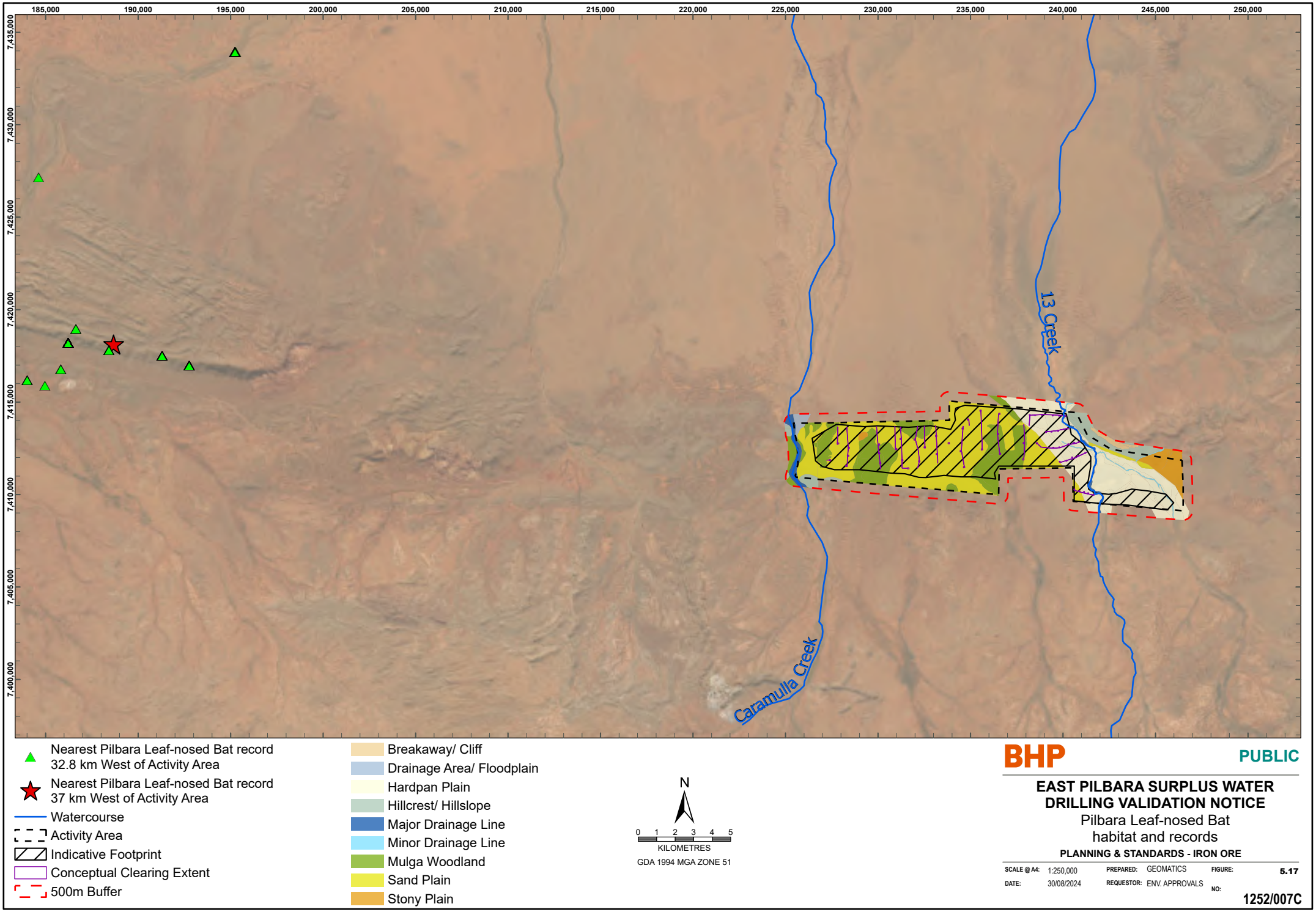
EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Pilbara Leaf-Nosed Bat
survey coverage

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:160,000	PREPARED:	GEOMATICS	FIGURE:	5.16
DATE:	4/07/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/014B

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_014_E_EastPilbaraSWD_VN_PLNBSurveys_RevB.aprx



Nearest Pilbara Leaf-nosed Bat record
32.8 km West of Activity Area

Nearest Pilbara Leaf-nosed Bat record
37 km West of Activity Area

Watercourse

Activity Area

Indicative Footprint

Conceptual Clearing Extent

500m Buffer

Breakaway/ Cliff

Drainage Area/ Floodplain

Hardpan Plain

Hillcrest/ Hillslope

Major Drainage Line

Minor Drainage Line

Mulga Woodland

Sand Plain

Stony Plain

N

0 1 2 3 4 5

KILOMETRES

GDA 1994 MGA ZONE 51

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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Pilbara Leaf-nosed Bat habitat and records

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:250,000	PREPARED:	GEOMATICS	FIGURE:	5.17
DATE:	30/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/007C

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_007_E_EastPilbaraSWD_VN_PLNBHabitatsAndRecords_RevC.aprx

5.6.4 Impact Assessment

There are no records of the Pilbara Leaf-nosed Bat within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary. The nearest record of the Pilbara Leaf-nosed Bat is approximately 36 km to the west of the Activity Area, and the nearest Category 2 cave is approximately 40 km to the west.

The potential direct and indirect impacts to the Pilbara Leaf-nosed Bat from the Activity (see Section 2) are considered below.

Habitat Loss

Clearing of native vegetation and loss of habitat has been considered as a possible threat to the Pilbara Leaf-nosed Bat given the presence of potential supporting habitat in the eastern portion of the Activity Area. The Activity will not result in the loss of supporting or critical habitat for the species as these habitats are not intersected by the planned tracks and drill pads. The prevailing distance between the potential supporting habitat within the Activity Area and the nearest Pilbara Leaf-nosed Bat roost is over 40 km, as such, habitat loss associated with this Activity does not fulfil the Notifiable Action Triggers for this Program Matter and is not considered to result in a residual impact for the species.

Habitat degradation from alteration of groundwater

Degradation and alteration to groundwater-dependent Pilbara Leaf-nosed Bat foraging habitat has been considered as a potential impact to Pilbara Leaf-nosed Bat populations. Riparian vegetation and potential groundwater dependent vegetation can be prone to alteration when exposed to mounding or depression, associated with extraction and injection of water to the source aquifer. Riparian vegetation, in particular facultative phreatophyte species (i.e. *Eucalyptus victrix* and *E. camaldulensis,* both present within the Activity Area) are estimated to be able to access groundwater from depths up to 21 m bgl.

Alteration to vegetation resulting from short term groundwater mounding and drawdown associated with aquifer testing is considered to be unlikely due to the characteristics of the aquifer and prevailing distance between groundwater dependant native vegetation (drawing from up to 21 m bgl) and the target aquifer (approximately 50 m bgl). Riparian vegetation in the Caramulla Creek and Thirteen Creek area is not dependant on groundwater supply from the deep, confined aquifer and unlikely to be impacted by the short-term testing. A potential drawdown of 1.0 m for a radius of approximately 2 km has been modelled for the target aquifer.

Whilst the superficial stratigraphy will not be impacted (and potential groundwater dependent riparian vegetation) by the short-term mounding and drawdown of the Activity, there may be some minor impacts in the deeper disconnected target aquifer.

The residual risk is considered to be low, with negligible potential of risk to the shallow aquifer which may support groundwater-dependent vegetation in the phreatic zone, and minor short-term impact to the deep aquifer expected, which will not impact availability of water for riparian vegetation. As a result, changes to the groundwater regime arising from the Activity are not predicted to result in residual impact to Pilbara Leaf-nosed Bat.

Habitat degradation from alteration of surface water

Alteration to surface water regimes has been considered as a potential impact to the Pilbara Leaf-nosed Bat. Increased run-off and sedimentation can impact habitat that supports the foraging of the Ghost Bat. This includes the change to the permanency, level or water quality of ephemeral creeks due to excess surface water run-off, alteration to topsoil condition, and sedimentation from the proposed Activity. Planned groundwater abstraction, surface discharge and reinjection testing will be conducted at select bores for a duration of up to thirty days per location. Discharge water quality will be of low salinity, low TSS and expected to infiltrate rapidly. No permanent pools are present in the ephemeral creeks intersecting the Activity Area. Implementation of a Discharge Management Plan and continuous monitoring during test pumping and bore development will minimise any changes to surface water drainage.

Potential surface water changes associated with the Activity present a low potential risk of impact, given the high permeability of the surface geology, the quality of the discharge water, continuous monitoring of water quality, and the short term and intermittent nature of the Activity. As a result, surface water changes are not predicted to result in residual impact to Pilbara Leaf-nosed Bat.

Habitat degradation from fire and weeds

The increase of vehicle movements and introduction of drilling machinery could increase the risk of fire and introduction of weeds. Fire and weed encroachment have the potential to degrade Pilbara Leaf-nosed Bat supporting habitat. The Activity will be conducted in adherence to BHP's internal procedures which will serve to minimise risk associated with the introduction of weeds and risk of fire. Habitat degradation from fire and weeds associated with the Activity is considered to have a low potential for impact due to the implementation of BHP's internal weed management practices and is not predicted to result in residual impact to Pilbara Leaf-nosed Bat.

Habitat degradation from dust

Vegetation clearing and vehicle movements may result in an increase in airborne particulate matter. Dust can indirectly affect fauna by altering the structure and composition of native vegetation and causing habitat degradation. Degradation of habitat value due to dust emissions is considered unlikely due to the short term and intermittent nature of the Activity and the implementation of dust management practices for the duration of the Activity. Dust generation from the Activity is not predicted to result in residual impact to Pilbara Leaf-nosed Bat.

Injury or mortality to faun from vehicle strike

The Activity will result in an increase in vehicles to the Activity Area. Pilbara Leaf-nosed Bats may be susceptible to vehicle strike due to a tendency to fly at relatively low heights and apparent interest in light sources (Armstrong 2001). The material risk of vehicle strike to Pilbara Leaf-nosed Bat is considered to be negligible given the lack of records in or proximal to the Activity Area. The Activity is not predicted to result in residual impact to the Pilbara Leaf-nosed Bat as a result of vehicle strike.

5.6.5 Summary

The impact assessment has identified several potential risks to vertebrate fauna associated with the Activity, however given the lack of records and critical habitat in or within 500 m (where surveyed) of the Activity Area there is a low potential for risk to the Pilbara Leaf-nosed Bat.

5.7 Grey Falcon

The following sections provide background information to demonstrate that Notifiable Action Triggers for Grey Falcon are not met. Impacts to the Grey Falcon are discussed to illustrate that the Program Matter Objective for this species will be met.

5.7.1 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, Schoenjahn 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 5-18 illustrates the regional records of Grey Falcon.

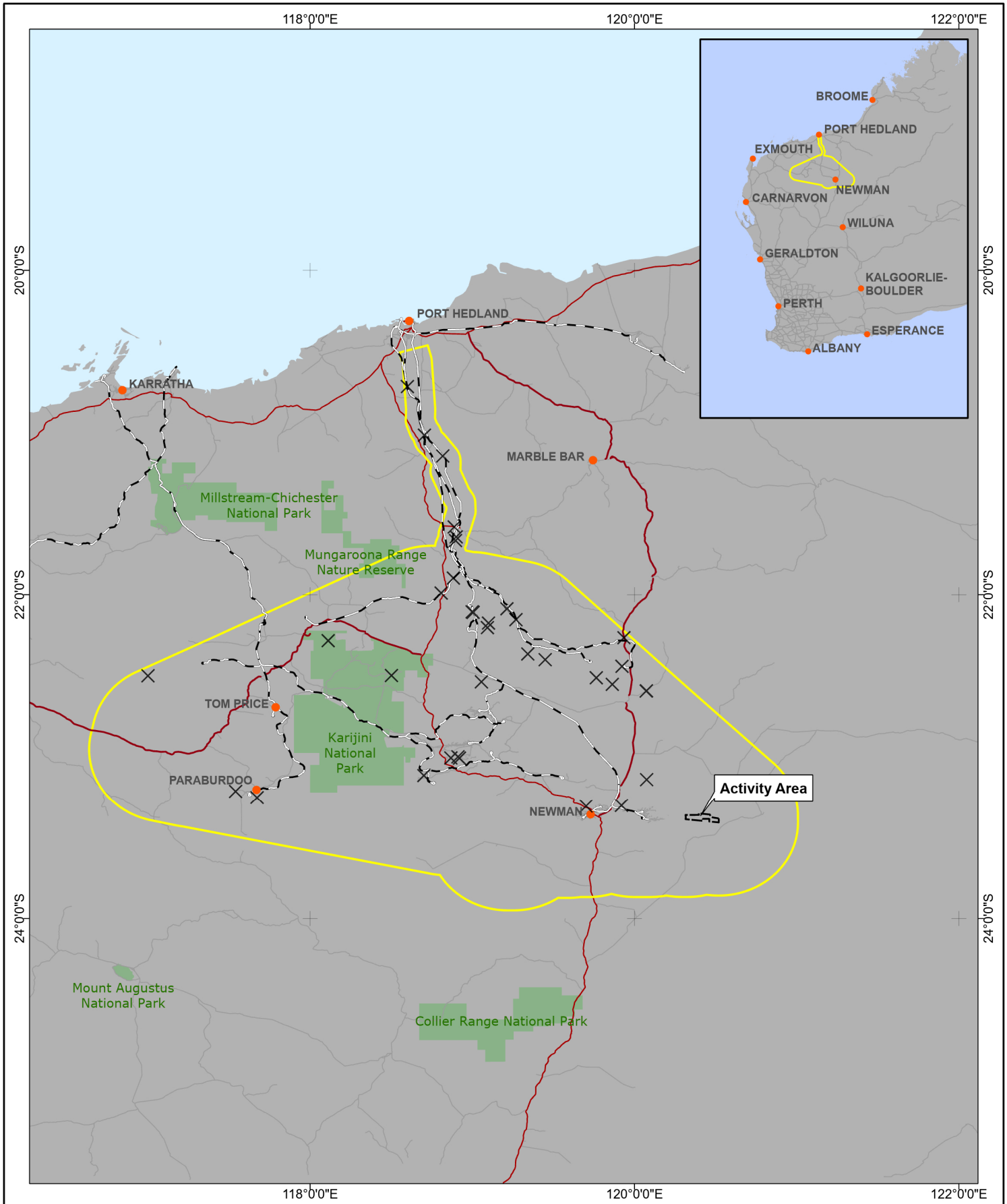
5.7.2 Local Habitat

Survey coverage for the Grey Falcon is shown in Figure 5-19, with local habitat and nearest record presented in Figure 5-20. The Activity Area falls within the current distribution of the Grey Falcon (Figure 5-18) whereby the species or species habitat may occur.

Grey Falcon critical habitat (Major Drainage Line) and supporting habitat (Drainage Area/Flood Plain, Mulga Woodland, Stony Plain, Sand Plain and Hardpan Plain) have been identified within the Activity Area. A contemporary in-field assessment by Astron (2023) determined a moderate pre-survey likelihood of occurrence of the Grey Falcon which was downgraded to a low likelihood of occurrence post-survey based upon the lack of records within the area, limited potential shelter and unsuitable foraging habitat.

5.7.3 Grey Falcon Records

There are no records of the Grey Falcon within the Activity Area or within 500 m (where surveyed) of the Activity boundary. The nearest Grey Falcon record is 38 km to the north-west.



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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Grey Falcon
regional records

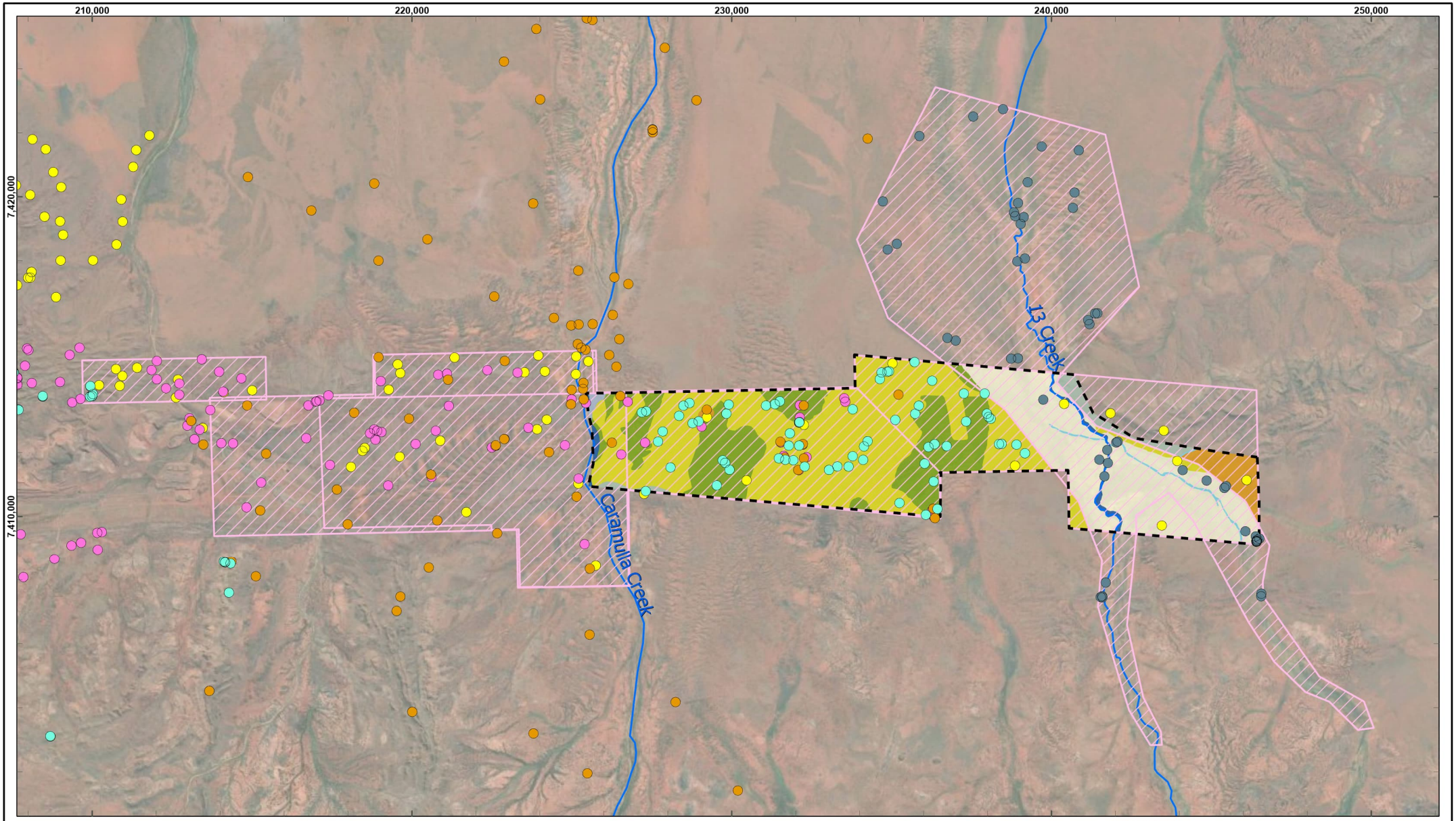
Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No: A1252-023
Date:	11/06/2024	Checked:	Figure: 5.18
Revision:	REV B	Reviewed: ENVIRO. A&I	

- Falco hypoleucos (Grey Falcon)
- Town
- Strategic Assessment Area
- Minor/Regional Road
- Major Road
- Rail Centreline
- Activity Area

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994



Activity Area
Survey coverage

Vertebrate Fauna Sample Sites (by sample year)

- Pre-2019
- 2019
- 2020
- 2021
- 2022
- 2023

Watercourse

- Breakaway/ Cliff
- Drainage Area/ Floodplain
- Hardpan Plain
- Hillcrest/ Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain

N

0 1 2 3 4 5
KILOMETRES

GDA 1994 MGA ZONE 51

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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Grey Falcon
survey coverage

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:160,000	PREPARED:	GEOMATICS	FIGURE:	5.19
DATE:	4/07/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/015B

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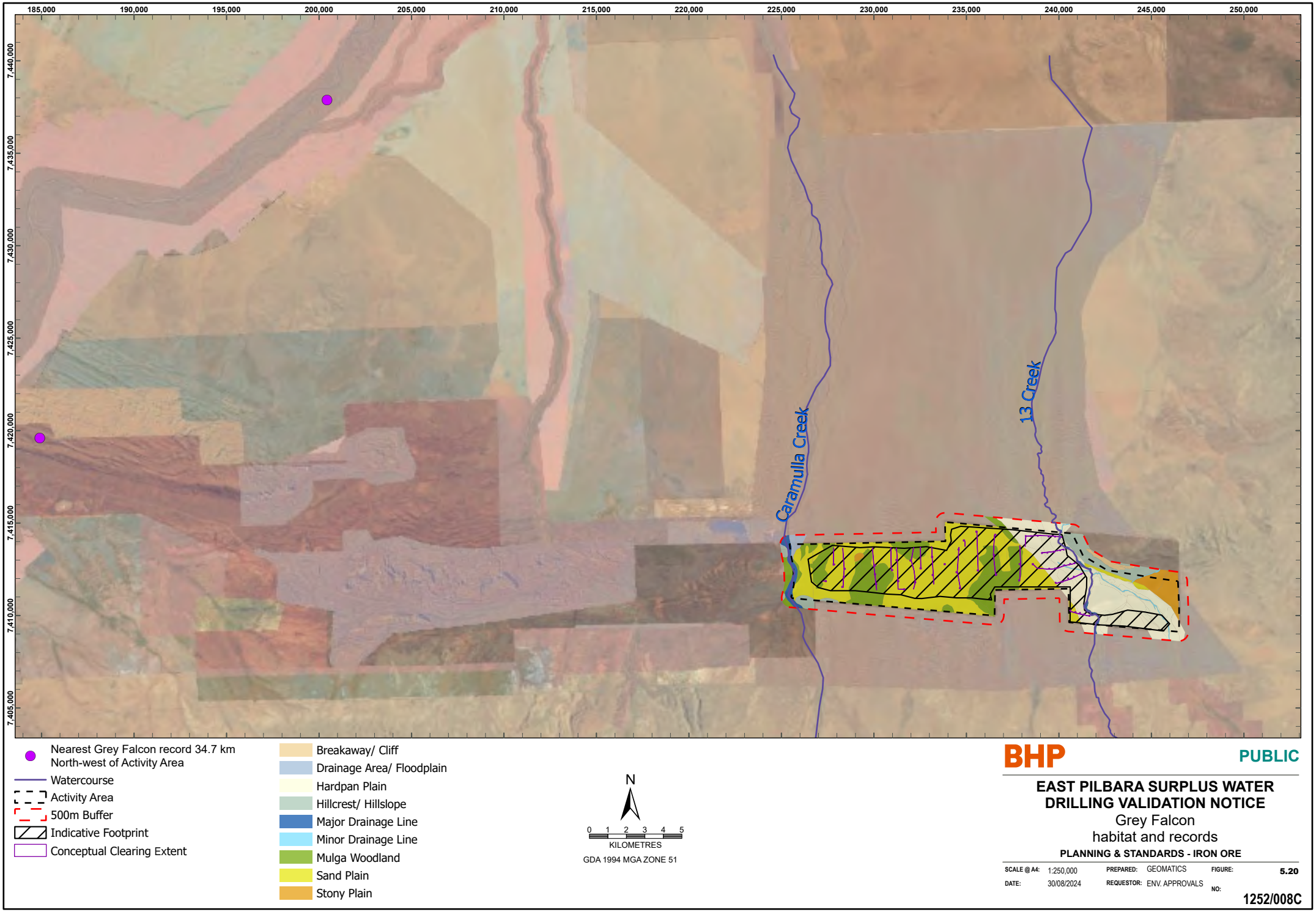

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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Grey Falcon
habitat and records

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:250,000	PREPARED:	GEOMATICS	FIGURE:	5.20
DATE:	30/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/008C

Document Path: Y:\Jobs\A1001_A1500\A1252\3Project\A1252_008_E_EastPilbaraSWD_VN_GreyFalconHabitatsAndRecords_RevC.aprx

5.7.4 Impact Assessment

There are no records of the Grey Falcon within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary. The nearest record of the Grey Falcon is approximately 40 km to the north-west of the Activity Area (Eco Logical 2013).

The potential direct and indirect impacts to the Grey Falcon from the Activity are considered below.

Habitat loss

Land clearing of the semi-arid zone and overgrazing of arid zone rangelands have been identified as possible threats to Grey Falcon. The Activity may result in the loss supporting habitat for the Grey Falcon including Hardpan Plain and Stony Plain, however the Activity is limited to clearing of up to 45 ha, of which a small proportion is comprised of Grey Falcon supporting habitat. Given the lack of records of Grey Falcon in the area, habitat loss associated with the Activity does not fulfil the Notifiable Action Triggers for this Program Matter and is considered to present negligible potential of risk to the species.

Habitat degradation from fire and weeds

The introduction and increase of vehicle movements associated with the Activity may increase risk of fire and spread of weeds. Fire and weed encroachment have the potential to degrade Grey Falcon critical and supporting habitat within and adjacent to the Activity Area. With standard BHP fire management and weeds control practices, the potential for increased fire and habitat degradation due to weeds are considered to have a low potential for risk. Habitat degradation from fire and weeds associated with the Activity is not predicted to result in residual impact to Pilbara Leaf-nosed Bat.

Habitat degradation from alteration of groundwater

Degradation and alteration to groundwater-dependent Grey Falcon nesting (Major Drainage Line) and foraging habitat has been considered as a potential impact to Grey Falcon populations. Riparian vegetation and groundwater dependent vegetation can be prone to alteration when exposed to mounding or depression, associated with extraction and injection of water to the source aquifer. Riparian vegetation, in particular facultative phreatophyte species (i.e. *Eucalyptus victrix* and *E. camaldulensis,* both present within the Activity Area) are estimated to be able to access groundwater from depths up to 21 m bgl.

Alteration to vegetation resulting from short term groundwater mounding and drawdown associated with aquifer testing is considered to be unlikely due to the characteristics of the aquifer and prevailing distance between groundwater dependant native vegetation (drawing from up to 21 m bgl) and the target aquifer (approximately 50 m bgl), and absence of Grey Falcon records within the Activity Area or within 500 m (where surveyed) of the Activity Area. Riparian vegetation in the Caramulla Creek and Thirteen creek area is not dependant on groundwater supply from the deep, confined aquifer and unlikely to be impacted by the short-term testing. A potential drawdown of 1.0 m for a radius of approximately 2 km has been modelled for the target aquifer.

Whilst the superficial stratigraphy will not be impacted (and potential groundwater dependent riparian vegetation) by the short-term mounding and drawdown of the Activity, there may be some minor impacts in the deeper disconnected target aquifer.

The residual risk is considered to be low, with negligible potential of risk to the shallow aquifer which may support groundwater-dependent vegetation in the phreatic zone, and minor short-term impact to the deep aquifer expected, which will not impact availability of water for riparian vegetation

As a result, changes to the groundwater regime arising from the Activity are not predicted to result in residual impact to Grey Falcon.

Habitat degradation from alteration of surface water

Alteration to surface water regimes has been considered as a potential impact to the Grey Falcon. Increased run-off, sedimentation or other discharges can impact habitat that supports the nesting and foraging of the Grey Falcon. This includes the change to the permanency, level or water quality of ephemeral creeks due to excess surface water run-off, alteration to topsoil condition, and sedimentation from the proposed Activity. Planned groundwater abstraction, surface discharge and reinjection testing will be conducted at select bores for a duration of up to thirty days per location. Discharge water quality will be of low salinity, low TSS, and expected to infiltrate rapidly. No permanent pools are present in the ephemeral creeks. Implementation of a Discharge Management Plan and continuous monitoring during test pumping and bore development will minimise any changes to surface water drainage.

Potential surface water changes associated with the Activity present a low potential risk of impact, given the high permeability of the surface geology, the quality of the discharge water, continuous monitoring of water quality, and the short term and intermittent nature of the Activity. As a result, surface water changes are not predicted to result in residual impact to Grey Falcon.

Habitat degradation from dust

Vegetation clearing and vehicle movements may result in an increase in airborne particulate matter. Dust can indirectly affect fauna by altering the structure and composition of native vegetation and causing habitat degradation. Degradation of habitat value due to dust emissions is considered unlikely due to the short term and intermittent nature of the Activity, and the implementation of dust management practices for the duration of the Activity. Dust generation from the Activity is not predicted to result in residual impact to Grey Falcon.

Feral Predators

Feral predators such as feral cats (*Felis catus*) and foxes (*Vulpes vulpes*) may predate on the Grey Falcon. Grey Falcons may roost on the bare open ground, and there is evidence of Grey Falcon within the gut contents of cats (Schoenjahn 2018). Chicks may also be vulnerable to predation at nest sites that are accessible to cats. The Activity is not likely to attract or increase the presence of feral predators such as feral cats or foxes which are already present within the Activity Area (Biologic 2018, Astron 2022, BHP 2022, Astron 2023). With standard BHP feral animal management practices in place and the lack of Grey Falcon records in the Activity Area and surrounds, the impacts of feral cats on the Grey Falcon associated with the Activity are considered to present a low potential for risk, and is not predicted to result in residual impact to Grey Falcon.

5.7.5 Summary

The Notifiable Action Triggers for the Grey Falcon are not applicable as no records exist within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary. Direct and indirect impacts to the Grey Falcon are considered to present a negligible potential risk to the species.

5.8 Night Parrot

The following sections provide background information to demonstrate that Notifiable Action Triggers for Night Parrot are not met. Impacts to the Night Parrot are discussed to illustrate that the Program Matter Objective for this species will be met.

5.8.1 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).

5.8.2 Local Habitat

Survey coverage for the Night Parrot is shown in Figure 5-22. The Activity Area falls within the area mapped as having a 'high priority for survey' (Astron 2023) in reference to the Night Parrot, and falls within the modelled potential distribution of the Night Parrot (Figure 5-21).

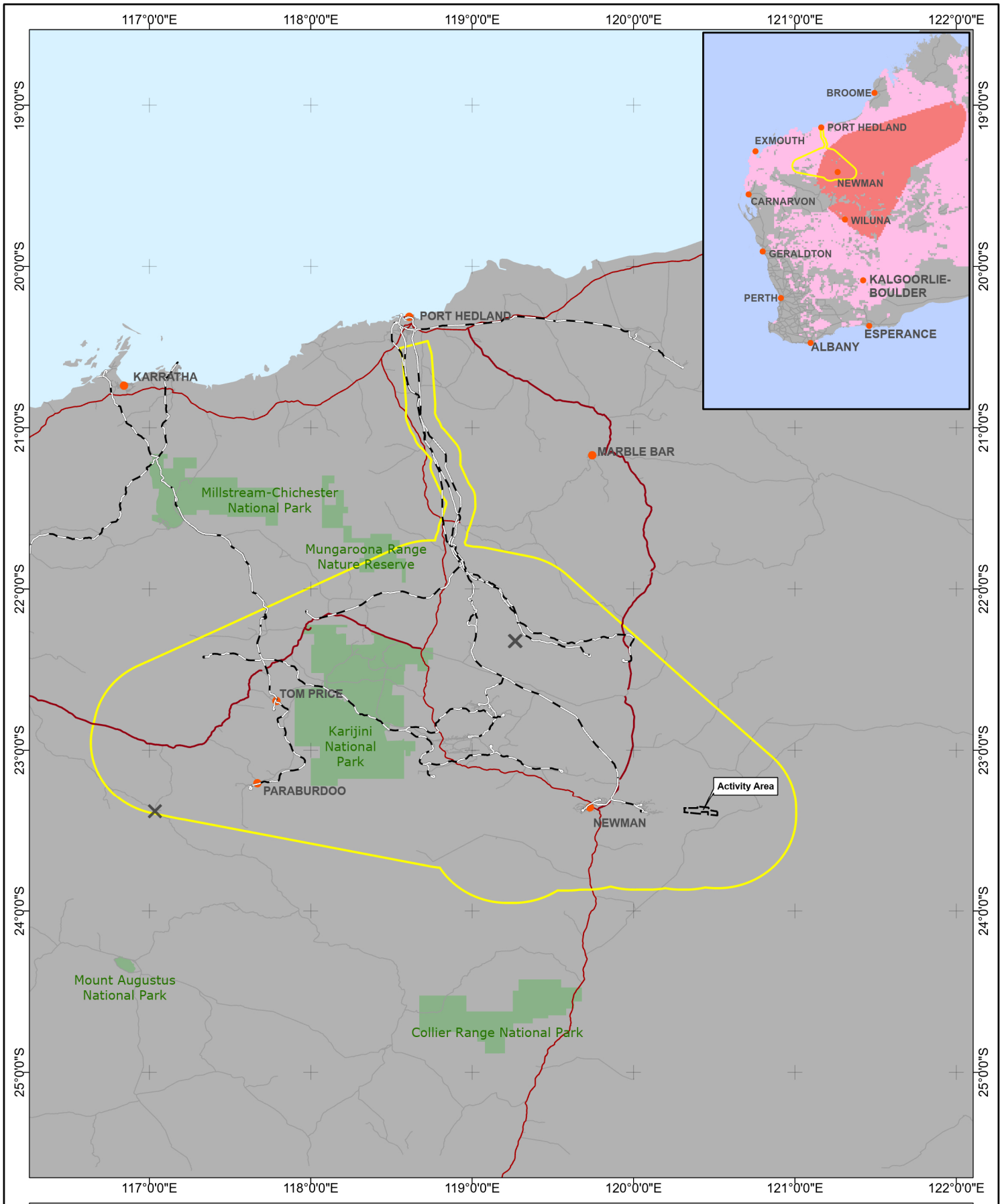
The Activity Area has been subject to extensive contemporary surveys which have provided a sound understanding of the present state of habitat types, condition and suitability to MNES that occupy the Activity Area and surrounds (to 500 m where surveyed). Contemporary surveys which intersected the Activity Area include: Biologic Environmental Survey (2018), GHD Pty Ltd (2019), Onshore Environmental Consultants Pty Ltd (2019), GHD Pty Ltd (2021a), Astron (2022), and Astron (2023).

No habitats within the Activity Area are considered critical habitat as they do not contain large mature clumps of *Triodia spp* (Astron 2022, Astron 2023). Supporting habitat for the Night Parrot identified within the Activity Area includes Drainage Area/Flood Plain, Sand Plain and Hardpan Plain (Biologic 2018, Astron 2022, Astron 2023).

5.8.3 Night Parrot Records

There are no records of the Night Parrot within the Activity Area or within 500 m (where surveyed) of the Activity Area despite extensive survey effort targeting MNES fauna, including the Night Parrot. Surveys conducted by Biologic (2018) and Astron (2022, and 2023) specifically targeted the Night Parrot and included passive acoustic recording tailored to the species. Records of the Night Parrot in the Pilbara region are scarce with the nearest record approximately 100 km from the Activity Area.

Whilst the Activity Area falls within the modelled distribution of the Night Parrot, the absence of records despite extensive survey effort, indicates that the species is unlikely to exist within the Activity Area.



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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Night Parrot regional records and distribution

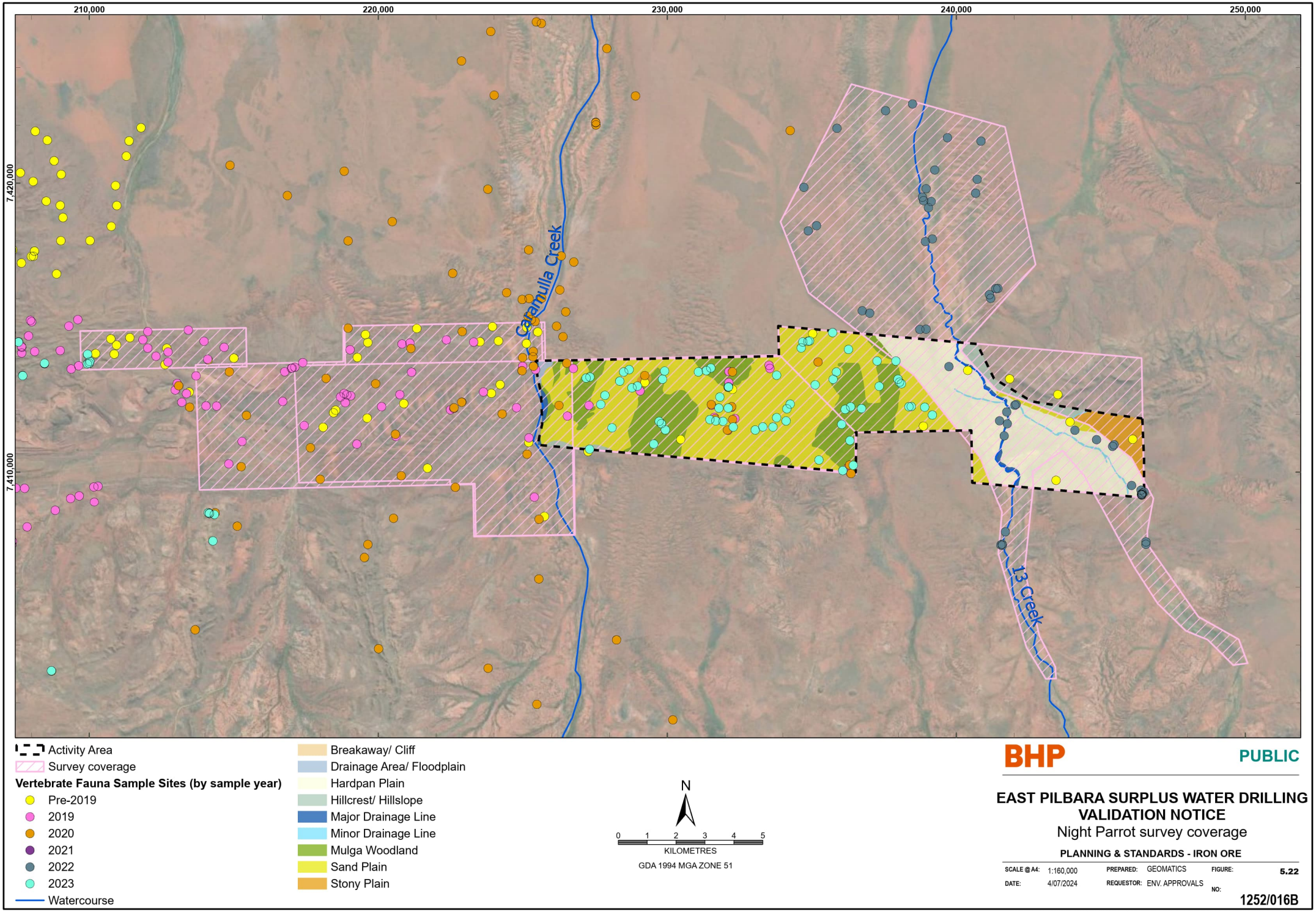
Scale @ A4:	1:3,500,000	Prepared: SPATIAL DATA	Project No: A1252-022
Date:	11/06/2024	Checked:	Figure: 5.21
Revision:	REV B	Reviewed: ENVIRO. A&I	

- Night Parrot
- Town
- Major Road
- Minor/Regional Road
- Rail Centreline
- Strategic Assessment Area
- Species or species habitat likely to occur
- Species or species habitat may occur

N

0 25 50 75
Kilometres

Coordinate System: GCS GDA 1994
Datum: GDA 1994



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EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Night Parrot survey coverage

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:160,000	PREPARED:	GEOMATICS	FIGURE:	5.22
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5.8.4 Impact Assessment

There are no records of Night Parrot from within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary (Biologic 2018, Astron 2022, BHP 2022, Astron 2023, Astron 2024). Records of the Night Parrot within the Pilbara are scarce with the nearest recording approximately 100 km from the Activity Area.

The potential direct and indirect impacts to the Night Parrot from the Activity (see Section 2) are considered below.

Habitat Loss

The Activity will not result in the loss of critical habitat for the Night Parrot due to the lack of records within the Activity Area and surrounds. Night Parrot potentially supporting habitat types will be subject to disturbance associated with the Activity, including Sand Plain and Stony Plain. Clearing associated with the Activity will not likely result in an impact to the Night Parrot, as the species is understood to travel up to 40 km in a single night to forage (Biologic 2020) and there are no records within the Activity Area or within 500 m (where surveyed) of the Activity boundary and the nearest record is approximately 100 km from the Activity Area. Habitat loss associated with the Activity is not predicted to result in residual impact to Night Parrot.

Habitat degradation from fire and weeds

The Night Parrot has shown a preference for roosting and nesting in dense clumps of spinifex that are long-unburnt and protected by firebreaks (Murphy 2015; TSSC 2016d; Murphy *et al*. 2017b; Burbidge 2020). The risk of fire degrading and impacting these habitat types is inferred to be high and may significantly inhibit or reduce the number of sites the Night Parrot populations could expand (National Environmental Science Program Threatened Species Research Hub 2019). The Night Parrot is therefore considered susceptible to the effects of changes in fire regimes or human-induced fire events. The increased presence of vehicles and drilling machinery may increase the risk of fire to Night Parrot supporting habitats within the Activity Area, by introducing ignition sources and weeds. Given the lack of records of the Night Parrot within the Activity Area, the impact of habitat modification to the Night Parrot has a very low potential for risk. The Activity will be conducted in adherence to BHP's internal procedures which will serve to minimise risk associated with the introduction of weeds and risk of fire. Habitat degradation from fire and weeds associated with the Activity is considered to have a low potential for impact due to the implementation of BHP's internal weed management practices and is not predicted to result in residual impact to Night Parrot

Habitat degradation from dust

Vegetation clearing and vehicle movements may result in an increase in airborne particulate matter. Dust can indirectly affect fauna by altering the structure and composition of native vegetation and causing habitat degradation. Degradation of habitat value due to dust emissions is considered unlikely due to the short term and intermittent nature of the Activity and the implementation of dust management practices for the duration of the Activity. Dust generation from the Activity is not predicted to result in residual impact to Night Parrot.

Habitat degradation from alteration of groundwater

Degradation and alteration to groundwater-dependent Night Parrot supporting habitat has been considered as a potential impact to Night Parrot populations. Riparian vegetation and groundwater dependent vegetation can be prone to alteration when exposed to mounding or depression, associated with extraction and injection of water to the source aquifer. Riparian vegetation, in particular facultative phreatophyte species (i.e. *Eucalyptus victrix* and *E. camaldulensis,* both present within the Activity Area) are estimated to be able to access groundwater from depths up to 21 m bgl.

Alteration to vegetation resulting from short term groundwater mounding and drawdown associated with aquifer testing is considered to be unlikely due to the characteristics of the aquifer and prevailing distance between groundwater dependant native vegetation (drawing from up to 21 m bgl) and the target aquifer (approximately 50 m bgl). Riparian vegetation in the Caramulla Creek and Thirteen Creek area is not dependant on groundwater

supply from the deep, confined aquifer and unlikely to be impacted by the short-term testing. A potential drawdown of 1.0 m for a radius of approximately 2 km has been modelled for the target aquifer.

Whilst the superficial stratigraphy will not be impacted (and potential groundwater dependent riparian vegetation) by the short-term mounding and drawdown of the Activity, there may be some minor impacts in the deeper disconnected target aquifer.

The residual risk is considered to be low, with negligible potential of risk to the shallow aquifer which may support groundwater-dependent vegetation in the phreatic zone, and minor short-term impact to the deep aquifer expected, which will not impact availability of water for riparian vegetation

As a result, changes to the groundwater regime arising from the Activity are not predicted to result in residual impact to Night Parrot.

Habitat degradation from alteration of surface water

Alteration to surface water regimes has been considered as a potential impact to Night Parrot populations. Increased run-off and sedimentation can impact habitat that supports the Night parrot. This includes the change to the permanency, level, or water quality of ephemeral creeks due to excess surface water run-off, alteration to topsoil condition, and sedimentation from the proposed Activity. Planned groundwater abstraction, surface discharge and reinjection testing will be conducted at select bores for a duration of up to thirty days per location. Discharge water quality will be of low salinity, low TSS and expected to infiltrate rapidly. No permanent pools are present in the ephemeral creeks that intersect the Activity Area. Implementation of a Discharge Management Plan and continuous monitoring during test pumping and bore development will minimise any changes to surface water drainage.

Potential surface water changes associated with the Activity present a low potential risk of impact, given the high permeability of the surface geology, the quality of the discharge water, continuous monitoring of water quality, and the short term and intermittent nature of the Activity. As a result, surface water changes are not predicted to result in residual impact to Night Parrot.

Feral Predators

The Night Parrot is vulnerable to predation by feral cats (*Felis catus*) and foxes (*Vulpes* vulpes) (TSSC 2016). The Activity is not likely to attract or increase the presence of feral predators such as feral cats (Felis catus) or foxes (*Vulpes vulpes*) which are already present within the Activity Area (Biologic 2018, Astron 2022, BHP 2022, Astron 2023). Given the lack of Night Parrot records within the Activity Area, the low suitability of the potentially supporting habitat, the potential impact from feral predators associated with the Activity is considered to have a low potential for risk, and is not predicted to result in residual impact to Night Parrot.

5.8.5 Summary

The Notifiable Action Triggers for the Night Parrot are not applicable as no records exist within the Activity Area or within 500 m (where surveyed) of the Activity Area boundary. Direct and indirect impacts to the Night Parrot associated with the Activity are considered to present a negligible potential risk to the species.

5.9 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 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.

6 Offset Proposal

6.1 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 Validation Notice are the clearing of supporting habitat for the Greater Bilby, as identified in Table 6-1 below.

6.2 Offset Requirements

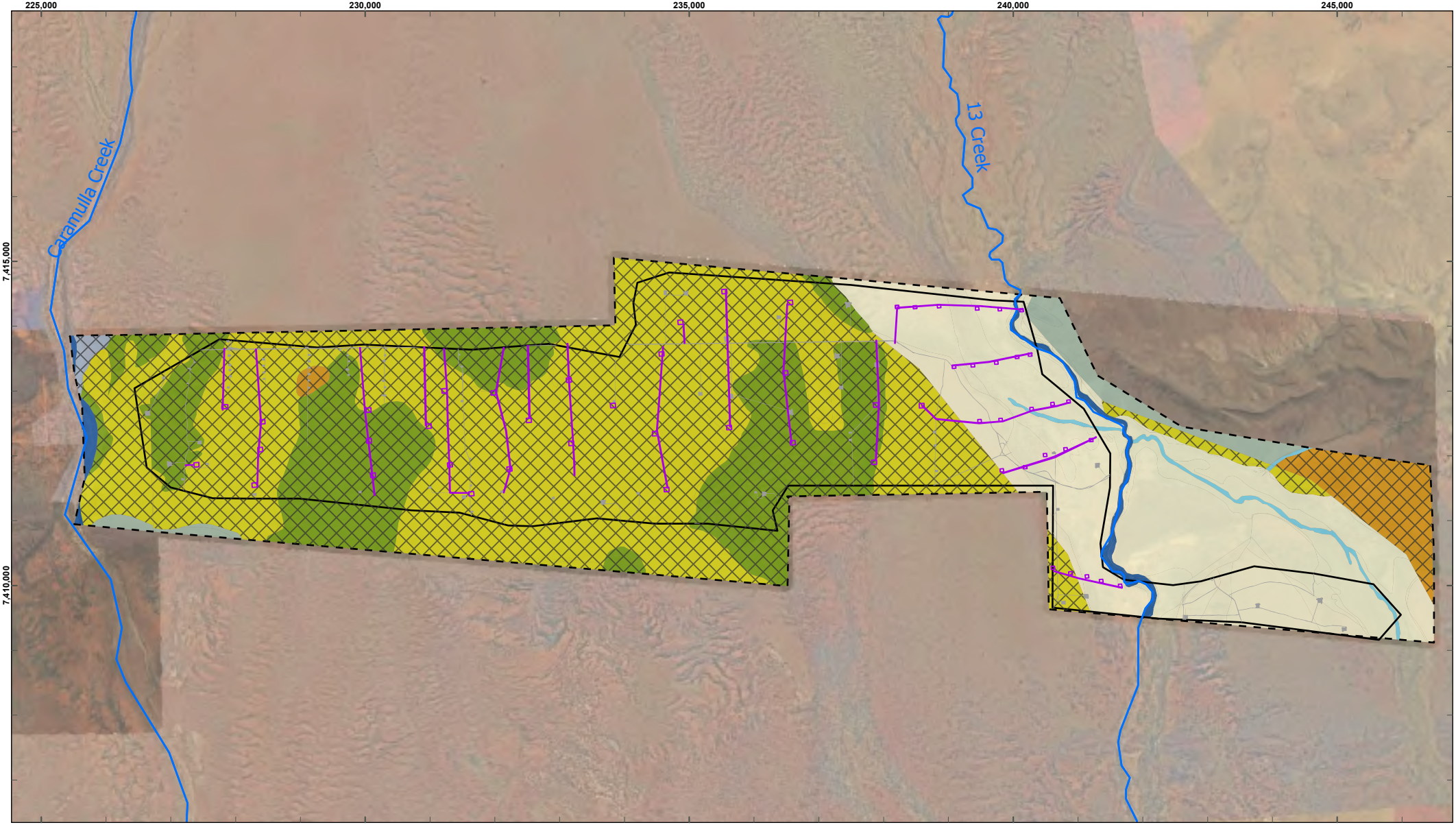
BHP developed the following objective for each of the Program Matters based on *the Standards for Accreditation of Environmental Approvals under the Environment Protection and Biodiversity Conservation Act 1999* and in consultation with the DCCEEW (Section 3.1.1 of the Program):

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

Offsets for the residual impacts identified in Table 6-1, are required to achieve this PMO. Furthermore, the PMOs identified for the Greater Bilby (Table 5-6), must also be achieved.

Table 6-1: Impacts requiring offsetting

Residual Impact	Habitat types and extent to be offset (ha)	Total area to be offset (ha)	Habitat Rating	Offset Rate ($/ha) excluding GST (rate to be adjusted annually with CPI)	Total minimum estimated financial offset ($) excluding GST
Greater Bilby					
Clearing of supporting habitat which supports foraging	Sand Plain – 29 ha Mulga Woodland – 15 ha Stony Plain – 1 ha	45	Supporting	1,653	74,385
Total Amount to be offset					74,385
Initial 10% pre-payment					7,438.5



- Watercourse
- Bilby Supporting Habitat
- Activity Area
- Indicative Footprint
- Conceptual Clearing Extent
- Current Clearing

- Breakaway/ Cliff
- Drainage Area/ Floodplain
- Hardpan Plain
- Hillcrest/ Hillslope
- Major Drainage Line
- Minor Drainage Line
- Mulga Woodland
- Sand Plain
- Stony Plain

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KILOMETRES

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BHP

PUBLIC

EAST PILBARA SURPLUS WATER DRILLING VALIDATION NOTICE

Fauna Habitat Offset Clearing

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:80,000	PREPARED:	GEOMATICS	FIGURE:	6.1
DATE:	28/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1252/028C

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6.3 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 45 ha of supporting habitat for Greater Bilby is therefore proposed to be offset by a financial contribution to the PEOF (habitat types to be offset shown in Figure 6.1).

Advance payment of 10% of the estimated total offset contribution to be paid into the PEOF within one month of the Validation Notice becoming effective.

A biannual payment for each hectare of critical and/or supporting habitat for the Greater Bilby.

Financial contributions to the PEOF will achieve the Program Matter Objective and relevant Program Matter Outcome through investment in one or more conservation projects related to the Greater Bilby, such as:

- Landscape scale programs to address threats such as weeds, feral animals, and inappropriate fire.
- 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 to 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 6.6).

6.4 Offset Calculation

6.4.1 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 Greater Bilby records has triggered the need for this Validation Notice, 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.

6.4.2 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.

6.4.3 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 critical habitat
- A minimum of $1,653 per ha of supporting habitat

6.5 Proposed Schedule

Key anticipated steps and the schedule for the provision of advanced and biannual payments to the PEOF are outlined in Section 6.5 and Table 6-3. 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 6-2: Offsets reporting period

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

Table 6-3: 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 7) for Contributions to the PEOF)	During 28 day public comment period
Authorisation	Validation Notice becomes effective	20 business days after publication of Final Validation Notice.
Implementation Advanced Payment	Advanced Payment (10% of the estimated total contribution), in accordance with the APOP	Within one month of Validation Notice becoming effective
	BHP to report payment of Advanced Payment in the AER	1 October 2025
Implementation Period 1	First 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 2025
Implementation Period 2 and so forth until final offset contributions are completed	Second annual reporting period	1 July 2025 to 30 June 2026
	Aerial survey/ground truthing	30 June 2026
	EPBC Impact Reconciliation Report submitted to DWER	30 September 2026
	BHP to report payment of Offset Payment in the AER	1 October 2026

6.6 Offsets Reporting

6.6.1 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.

6.6.2 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.

7 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.

7.1 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 7-1.

Table 7-1: Proposed clearing commitments – Greater Bilby

Clearing Commitment	Action	Monitoring And Frequency	Reporting
Clearing does not exceed the following limits: 1. Total disturbance of native vegetation limited to 45 ha	1. Implement BHP's internal ground disturbance permit process prior to all ground disturbance within the Activity Area to ensure clearing does not exceed upper limit or areas specified in the Validation Notice	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 the Validation Notice.	SEA AER
No disturbance to: 2. Known historical or new active Greater Bilby burrows/diggings	2. Pre-clearance inspection to confirm the absence of Greater Bilby burrows/diggings 3. If present, a 50 m buffer will be applied to avoid disturbance of burrow/digging	Inspection of site prior to disturbance. Annual review of habitat and habitat features disturbed in relation to this Validation Notice.	SEA AER

7.2 Management Commitments

The management commitments which form part of this Validation Notice are presented in Table 7-2.

Table 7-2: Proposed management commitments – Greater Bilby

Management Commitment	Action	Monitoring And Frequency	Reporting
Implement Discharge Management Plan	Implement Discharge Management Plan to provide controls on water quality and sediment load and physical hydrological characteristics of discharged water to surrounding habitat	Monitoring and recording of water quality intended for surface discharge prior to discharge Monitoring of wetting front, and potential scouring and erosion	SEA AER
Implement fire management	Abide by fire management procedures. No smoking within the Activity Area.	Continuous for the duration of the Activity.	SEA AER
Implement weed management	Implement BHP WAIO Weed Management Procedure for the duration of the Activity	Continuous for duration of the Activity	SEA AER
Implement speed restrictions in the Activity Area to reduce potential for risk of fauna strike and manage dust	Restriction of speed limits on access tracks within the Activity Area to 40 km/h	N/A	Report any vehicle strikes to MNES or near-misses. SEA AER
Implement feral animal management	Monitor the presence of feral cats and foxes through records of opportunistic sightings. Report all sightings to the Site Environmental Specialist. Cage trappings for cats if feral cats are sighted.	All personnel within the Activity Area to report any opportunistic sightings of feral cats and foxes to the Site Environmental Specialist. Cage trappings to be undertaken following reports of cat and fox sightings within the Activity Area.	SEA AER

7.3 Offset Commitments

The offset commitments which form part of this Validation Notice are presented in Table 7-3.

Table 7-3: Proposed offset commitments - Greater Bilby

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

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Appendices

Appendix 1: Strategic Assessment Area

Appendix 2: Contemporary Fauna Surveys

Appendix 3: Public Consultation – Response to Comments

Appendix 4: Hydrological Modelling

Appendix 5: Discharge Management Plan (first five locations)