ENVIRONMENTAL MANAGEMENT PLAN

EP Act 1986

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Document Prepared by:
GHD Pty Ltd
ABN 39 008 488 373
999 Hay Street
Perth, WA, 6000
Australia

T (08) 6222 8222
F (08) 6222 8222
E permail@ghd.com
W ghd.com

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Contents

1. SUMMARY **1**

2. CONTEXT, SCOPE AND RATIONALE **1**

2.1 Description of the Proposal 2
2.2 Pre-Commencement Activities 3
2.3 Key Environmental Factors 4
2.4 Condition Requirements 4
2.5 Rationale and Approach 7
2.6 Environmental Outcome or Management Objective(s) 7
2.6.1 Survey and study findings 8
2.6.2 Proposed pre-clearance surveys 9
2.6.3 Key assumptions and uncertainties 11

3. ENVIRONMENTAL MANAGEMENT PLAN COMPONENTS **13**

4. ADAPTIVE MANAGEMENT AND REVIEW **19**

4.1 Environmental Monitoring and Corrective Actions 20

5. INCIDENT REPORTING **20**

5.1 Environmental Incidents and Non-Compliance 20
5.2 Reporting 20

6. TRADITIONAL OWNER AND STAKEHOLDER CONSULTATION **21**

7. REFERENCES **22**

8. APPENDICES **23**

List of Tables

Table 1-1 Environmental Management Plan summary 1
Table 2-1 Key Environmental Factors and affected values 4
Table 2-2 MS1153 condition requirements 4
Table 2-3 Surveys completed for the Proposal 8
Table 2-4 Summary of key social surroundings aspects and potential Proposal impacts 11
Table 2-5 Key assumptions and uncertainties associated with ecological survey data 12
Table 3-1 EMP management-based provisions for Flora and Vegetation 13
Table 3-2 EMP management-based provisions for Terrestrial Fauna 15
Table 3-3 EMP management-based provisions for Social Surroundings 17

Appendices

Appendix A Figures 24

Abbreviations/acronyms

Term	Definition
AREH	Australian Renewable Energy Hub
BC Act	*Biodiversity Conservation Act 2019*
bp	bp Alternative Energy Investments Limited Pty Ltd
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DE	Development Envelope
DPLH	Department of Planning, Lands and Heritage
EP Act	*Environmental Protection Act 1986*
EBPC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERD	Environmental Review Document
EMP	Environmental Management Plan
Ha	Hectares
JHA	Job Hazard Assessment
MNES	Matters of National Environmental Significance
MS	Ministerial Statement
MW	Megawatt
NWAC	Nyangumarta Warrarn Aboriginal Corporation
PEC	Priority Ecological Community
SRE	Short-range Endemic
The Proposal/AREH	Australian Renewable Energy Hub
TEC	Threatened Ecological Community
WA	Western Australia

1. Summary

Table 1-1 Environmental Management Plan summary

Proposal Name	Australian Renewable Energy Hub
Proponent	NW Interconnected Power Pty Ltd
Ministerial Statement Number	1153
***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval Number**	2017/8112
Purpose	To provide environmental management measures for Pre-commencement activities
Key Environmental Factors	Flora and Vegetation Terrestrial Fauna Social Surroundings
Condition clause/s	MS Condition 7-2 / EPBC Condition 12

2. Context, scope and rationale

The Australian Renewable Energy Hub Proposal (**the Proposal/AREH**; previously referred to as the Asian Renewable Energy Hub), is a large-scale integrated renewable energy project, which will deliver up to 26 GW of renewable electricity at full scale. bp Alternative Energy Investments Limited Pty Ltd (**bp**) operates on behalf of the AREH Pty Ltd Incorporated Joint Venture in developing the Proposal[1].

The Nyangumarta people have Native Title determination, known as WCD2009/001 – Nyangumarta People (Part A), recognises that native title exists in parts of the determination area, which covers the Development Envelope (**DE**) of the Proposal. The Nyangumarta Warrarn Aboriginal Corporation (**NWAC**) is distinct from the Nyangumarta people themselves, although it represents their interests. This corporation is responsible for managing the Nyangumarta Warrarn Indigenous Protected Area (**IPA**). The IPA is a designated area where traditional owners have entered into an agreement with the Australian Government to promote biodiversity and cultural resource conservation. The Nyangumarta people are the Traditional Owners and Native Title holders, the NWAC serves as the legal and administrative entity that manages their land interests and engages with government bodies on their behalf. This EMP has been prepared with comments and engagement with NWAC.

This Environmental Management Plan (**EMP**) has been prepared in-line with Condition 7-2 of Ministerial Statement 1153 (MS 1153; as amended 11 April 2024) to support the Proposal as approved under the

[1] NW Interconnected Power Pty Ltd is a wholly owned subsidiary of Australian Renewable Energy Hub Pty Ltd; the AREH Incorporated Joint Venture between bp, Intercontinental Energy AREH Ltd, CWP Energy Asia Ltd and Pathway Investments Australia Pty Ltd.

Environmental Protection Act 1986 (**EP Act**). Condition 12 of the approval under the *Environment Protection and Biodiversity Act 1999* (**EPBC Act**) specifies the requirements for an Environmental Management Plan during clearing, construction, operation and decommissioning of the action. The EPBC Act Conditions have recently been amended to more clearly define 'Pre-commencement' and 'Commencement' of the action, and a new Condition 13C relating to Pre-commencement activities. This EMP has been prepared to support minor physical disturbance necessary to undertake Pre-commencement activities in-line with EPBC Act Condition 13C and is not intended to meet the requirements of EPBC Act Condition 12.

The EMP demonstrates that appropriate management measures will be in place during Pre- commencement activities for the Proposal, to ensure that the Western Australian (**WA**) Environmental Protection Authority (**EPA**) and Commonwealth Department of Climate Change, Energy, Environment and Water (**DCCEEW**) objectives for key and other Environmental Factors will be achieved, and that works are conducted in accordance with the AREH environmental policies and goals.

The EMP has also been prepared in accordance with *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans* (EPA, 2023a). This EMP has been prepared specifically for the Pre-commencement activities as described in Section 2.2.

2.1 Description of the proposal

The Proposal relates to the construction and operation of a proposed large-scale wind and solar renewable energy project ~220 km east of Port Hedland, in the northwest of Western Australia (Figure A- 1). The Proposal DE is 662,400 hectares (**ha**), within which there is an allowance for no more than 11,962 ha of permanent vegetation clearing.

The key elements of the original Proposal are:

- Up to 1,743 wind turbines with each turbine being up to 260 metres (**m**) from the ground to the top rotation limit.
- 2,000 megawatt (**MW**) of solar photovoltaic capacity that will be divided into 37 x 55 MW modules, of about 180 ha in size.
- Overhead and underground transmission line, with up to 50 m tall pylons spaced approximately every 450 m along the transmission corridor. The transmission cables will be buried underground about 14 km before reaching the coast and buried below the foredune and beach.
- Up to 1,514 km of site access tracks to link the wind turbines with other infrastructure.
- Up to 37 step-up substations distributed over the site, together with overhead power lines connecting the turbines to the substations and the substations to the converter station.
- Temporary construction compounds (including site parking, storage sheds, offices, accommodation, ablution facilities, crib rooms, fluid and fuel stores, and covered external areas and laydown areas) and a control centre to provide a base for the construction and operations personnel.

The Proposal will require about 3,000 workers during the 10-year construction period, and about 400 ongoing workers for the 50+ year operational life of the Proposal. A detailed description of the Proposal is provided in Section 2.3 of the Environmental Review Document [**ERD,** (Biota, 2019)].

2.2 Pre-commencement activities[1]

This EMP has been prepared to address the environmental management of the Pre-commencement activities. The approved Proposal describes a series of Pre-commencement activities (Section 2.6 of the ERD). The Pre-commencement activities comprise enabling works and/or further site planning works, including:

- Survey of critical boundaries and pegging of infrastructure locations.
- Detailed cultural heritage and flora and fauna surveys across the entire proposed footprint, with adjustments of road and infrastructure placement, if required.
- Engineering design works and submission for Building Licence.
- Preparation of works procedures.
- Deploying SoDAR and LiDAR instruments, and meteorological masts.
- Undertaking hydrogeology investigation (paleochannels and test bores).
- Preparation of temporary airstrip and helicopter landing areas.
- Detailed site investigation including geotechnical investigations involving a series of trial pits and/or boreholes.
- Establishing quarries and/or borrow pits (to support Pre-commencement activities)
- Sealing the Nyangumarta Highway up to the proposed Visitor Centre, and then upgrading and widening the rest of the track, including road realignments and profile corrections, where appropriate.
- Grading of a new access track to the temporary Pre-commencement camp, if required, and to enable surveys and investigations.
- Construction of a secure onsite temporary Pre-commencement camp.
- Erection of signage on the Great Northern Highway.

These Pre-commencement activities are anticipated to commence in 2024. At present, the location of the works is indicative, subject to geotechnical and other investigations. In addition, avoidance of environmental values described within MS 1153 will be applied, which may modify the location.

The indicative locations for the Pre-commencement activities are shown on Figure A-2. The confirmed location will be defined in the Infrastructure Staging and Layout Plan required under Condition 8 of MS1153 prior

[1] 'Pre-commencement has been defined within EPBC 2017/8112 and includes activities outlined in Section 2.2 and other minor activities. Pre-commencement as defined within this EMP represents the pre-construction activities detailed in the Environmental Review Document

2.3 Key Environmental Factors

The following key Environmental Factors are relevant for the Pre-commencement activities required for the Proposal and are addressed in this EMP:

- Flora and Vegetation.
- Terrestrial Fauna.
- Social Surroundings.

The ERD also considered Benthic Communities and Habitats, Marine Environmental Quality and Marine Fauna as key Environmental Factors, but Pre-commencement activities are only occurring in the terrestrial environment, so they have not been considered. A summary of key Environmental Factors and affected environmental values is shown in Table 2-1 and Figure A-3.

Table 2-1 Key Environmental Factors and affected values

Factor	Affected environmental values
Flora and Vegetation	Loss of vegetation and flora through clearing Introduction and/or spread of environmental weeds Spills or leaks of chemical, hydrocarbon and/or hazardous materials
Terrestrial Fauna	Loss of habitat through clearing Fauna injury/death from vehicle strike/clearing activities Fauna activity disturbance
Social Surroundings	Unknown heritage

2.4 Condition requirements

A summary of the requirements under MS1153 and where they have been addressed within this EMP is provided in Table 2-2 below.

Table 2-2 MS1153 condition requirements

Ministerial Condition	Where addressed in the EMP
7 Environmental Management (Terrestrial Fauna, Flora and Vegetation and Social Surroundings)	Section 3: • Table 3-1 – Management provisions for flora and vegetation • Table 3-2 – Management provisions for terrestrial fauna • Table 3-3 – Management provisions for social surroundings
Conservation Reserves 7-1 (1) avoid and minimise direct and indirect impacts on the environmental values of reserves managed under the *Conservation and Land Management Act 1984*, including the Kujungurru-Warrarn Nature Reserve;	Not required at this stage given Pre-commencement activities will not occur in the marine and dune areas

Flora and Vegetation 7-1 (2) no direct impacts and minimise indirect impacts to Threatened and Priority 1 flora species and minimise direct and indirect impacts on any other Priority flora species and Threatened and Priority ecological communities within the development envelope; 7-1 (3) minimise and manage the introduction, establishment and spread of weeds throughout the development envelope;	Section 3: Table 3-1 – Management provisions for flora and vegetation
Terrestrial Fauna 7-1 (4) minimise impacts on Threatened, Migratory and/or Priority listed fauna from interactions with operational wind turbines and associated infrastructure (including distribution and transmission cables);	Not required at this stage given Pre-commencement activities will not involve wind turbine operation and associated infrastructure
7-1 (5) minimise turbine collision impacts on fire attracted raptor species when undertaking prescribed burns;	Not required at this stage given Pre-commencement activities will not involve wind turbine operation and associated infrastructure
7-1 (6) no cable construction activities in beach and intertidal dune habitat during peak avifauna activity periods at Eighty Mile Beach;	Not required at this stage given Pre-commencement activities will not involve cable construction activities
7-1 (7) reduce predation risk to Threatened and Priority listed fauna from feral predators within the development envelope;	Section 3: Table 3-2 – Management provisions for terrestrial fauna
7-1 (8) no direct or indirect impact to bilby by prohibiting ground-disturbing activities within five (5) m of the entrance of any active bilby burrow(s);	Section 3: Table 3-2 – Management provisions for terrestrial fauna
7-1 (9) no direct or indirect loss of confirmed black-footed rock-wallaby habitat by prohibiting any clearing of vegetation or location of proposal infrastructure within the one (1) km buffer area(s) shown in Figure 4;	Section 3: Table 3-2 – Management provisions for terrestrial fauna
7-1 (10) no direct or indirect loss of confirmed black-footed rock-wallaby habitat attributable to the proposal by ensuring a one (1) km buffer zone is implemented around any rock pile habitat that is identified as having black-footed rock-wallaby prior to prescribed burning and construction activities in each stage commencing; and	Section 3: Table 3-2 – Management provisions for terrestrial fauna
7-1 (11) maintain viability of populations of black-footed rock-wallaby and bilby in the development envelope from activities attributable to the implementation of the proposal.	Addressed through management actions of implementing buffer zones, fauna surveys, and reducing predation risk from feral predators, as detailed in Table 3-2 of Section 3.
7-2 To achieve the objectives in condition 7-1, the proponent shall review, revise and submit to the CEO an updated Asian Renewable Energy Hub Environmental Management Plan (February 2020, Rev 0) prior to commencing ground disturbing activities.	The submission of this EMP
7-3 The revised Asian Renewable Energy Hub Environmental Management Plan shall:	
7-3 (1) detail industry best-practice bird detection and monitoring systems that will be implemented during operations of wind turbines	Not required at this stage given Pre-commencement activities will not involve wind turbine operation and associated infrastructure

7-3 (2) outline protocols to shut down the operation of specific turbines in advance if significant flocks of birds are detected and predicted to fly through turbines;	Not required at this stage given Pre-commencement activities will not involve wind turbine operation and associated infrastructure
7-3 (3) include provisions to monitor and record any avifauna impacts from operation of the wind turbines and associated transmission infrastructure;	Not required at this stage given Pre-commencement activities will not involve wind turbine operation and associated infrastructure
7-3 (4) include technically and practically feasible contingency measures to be implemented in the case where management targets relevant to avifauna mortality from operation of the turbines are not met;	Not required at this stage given Pre-commencement activities will not involve wind turbine operation and associated infrastructure
7-3 (5) detail the protocols to be undertaken prior to ground disturbing activities to identify active bilby burrows;	Section 3: Table 3-2 – Management provisions for terrestrial fauna
7-3 (6) detail the realignment of the Nyangumarta Highway to avoid active black-footed rock-wallaby habitat and include a timeframe for its planned commencement and completion;	To be addressed in future interactions of the EMP
7-3 (7) details of targeted surveys for Threatened Flora species and Priority Flora species to be undertaken prior to ground disturbing activities occurring in each stage;	Section 2.6.1.2 describes the findings from further targeted survey work undertaken in 2023 and identifies Threatened and Priority Flora species within the DE.
7-3 (8) details of weed management, hygiene and monitoring;	Section 3: Table 3-1 – Management provisions for flora and vegetation
7-3 (9) details of rehabilitation timing and completion criteria of temporary disturbed areas, including areas within the Eighty Mile Beach Marine Park and Kujungurru-Warrarn Nature Reserve	Minor rehabilitation is referred to in Section 3 – EMP Components: Tables 3.1, 3.2, 3.3 Rehabilitation not required for Eighty Mile beach Marine Park and Kujungurru-Warrarn Nature Reserve at this stage given Pre-commencement activities will not intersect with those areas.
7-3 (10) be prepared on the advice of the Department of Biodiversity, Conservation and Attractions and relevant Traditional Owner groups; and	Section 6: Traditional Owner and Stakeholder Consultation
7-3 (11) specify management actions; management targets; monitoring locations, methodologies, parameters and timing; and reporting to demonstrate that the objectives in condition 7-1 will be met.	Section 3 – EMP Components: Tables 3.1, 3.2, 3.3

2.5 Rationale and approach

The EMP has been developed to address Pre-commencement activities, with consideration of key environmental aspects, the findings of surveys and studies, and the environmental risks posed by the Pre- commencement activities defined in Section 2.2 and adaptive management approach described in section 4.

Future iterations of the EMP will be developed in a phased manner to include detailed plans to address construction, operation, and post-commencement activities.

2.6 Environmental outcome or management objective(s)

The objective of this EMP is to ensure that appropriate management measures will be in place during Pre-commencement activities of the Proposal, to achieve the EPA objectives for key Environmental Factors (EPA, 2016a; EPA, 2016b; EPA, 2023b). This EMP adopts management objectives based on consideration of:

- Survey and study findings
- Key assumptions and uncertainties
- Risks to environmental values including Matters of National Environmental Significance (**MNES**)
- Scientific information from the site and region
- Intensity, duration, magnitude and footprint of impact
- Changes in the environment
- External issues to the Proposal
- Timeframe for mitigation.

The management-based components provided within this EMP seek to align with established industry practices to avoid and minimise potential environmental and heritage impacts. This EMP has the following objectives for the Environmental Factors identified in the Section 3 in (tables 3-1 to 3-3):

Flora and Vegetation:

- Avoid, where not possible minimise impacts to flora and vegetation to that required for Pre-commencement activities Terrestrial Fauna:

Terrestrial Fauna:

- Avoid, where not possible minimise fauna habitat loss and minimise direct and indirect impacts to fauna as far as practicable

Social Surrounds:

- Avoid, where not possible minimise impacts to unidentified heritage values and social surrounds

2.6.1 Surveys and study findings

To date the following surveys have been completed for the Proposal, which provides broad context of the environment within the DE, however additional targeted ecological surveys will be required ahead of ground disturbing works as detailed in section 2.6.1. A summary of these studies is provided in Table 2-3 and shown on Figure A-3 and A-4, including the exclusion zones identified to protect Black-footed Rock Wallaby habitat. The reports have been provided in Appendix B.

Table 2-3 Surveys completed for the Proposal

Key environmental aspect	Studies	Reference
Flora and Vegetation	Detailed Flora and Vegetation Survey	Biota 2018a
	Detailed Flora and Vegetation Survey (in draft)	Biota 2023a
Terrestrial Fauna	Asian Renewable Energy Hub Terrestrial Fauna and SRE Survey	Biota 2018b
	AREH Terrestrial Fauna Survey (in draft)	Biota 2023b
Aboriginal heritage	Asian Renewable Energy Hub Environmental Review Document	Biota 2019

2.6.1.1 Vegetation

Ten vegetation types were identified in the DE, associated with five broad landforms and covering a mapped extent of 660,351 ha (Biota, 2023a). The vegetation in the DE was predominantly in Excellent condition, with a few minor regions marked as Very Good (see Appendix Figure A-4).

None of the ten vegetation types from the DE represent Threatened Ecological Communities (**TECs**) (Biota, 2023a).

Vegetation types labelled R1 and R2 by Biota are considered of local significance as the scattered isolated rocky outcrops may act as refugia during fires and periods of drought for species and may support species restricted to such habitats (Biota, 2023a).

2.6.1.2 Threatened flora

During 2023 surveys, one Threatened flora species (*Seringia exastia*) was recorded within the DE, with a total of 379 individuals recorded from 8 locations (Biota, 2023a). Although listed as Critically Endangered under the Commonwealth EPBC Act, this species has been delisted from State legislation and is expected to be delisted from Commonwealth legislation in the future.

The following nine species listed by the Department of Biodiversity, Conservation and Attractions (**DBCA**) as Priority species were also recorded within the DE:

- *Tephrosia rosea* var. Port Hedland (A.S. George 1114) (Priority 1): 2-4% cover (southwestern section of the Development Envelop).
- *Goodenia hartiana* (Priority 2): 0.1-5% cover at 29 locations (throughout the DE).
- *Bonamia oblongifolia* (Priority 3): 0.1–1% cover at 28 locations (throughout the DE).
- *Croton aridus* (Priority 3): 0.1–3% cover at nine locations (southwestern section of the DE).
- *Indigofera ammobia* (Priority 3): 0.1% cover at 17 locations (throughout the DE).
- *Phyllanthus* sp. aff. *hebecarpus* (Priority 3): 0.1% cover at two locations (southwestern section of the DE); identified by M. Hislop (WAH) as being very similar to *P. hebecarpus* found in the inland east Pilbara but having larger seeds.
- *Polymeria* sp. Broome (K.F. Kenneally 9759) (Priority 3): 0.1% cover at 17 locations (northwestern section of the DE)
- *Terminalia kumpaja* (Priority 3): 0.1-5% cover at 48 locations (northern and central sections of the DE).
- *Tribulopis marliesiae* (Priority 3): 400+ individuals at 96 locations (throughout the DE).

Five introduced flora species were also recorded in the DE.

2.6.1.3 Terrestrial fauna

The DE is situated on the boundary of the Pilbara and Kimberley Bioregions, but the faunal assemblage showed a strong association with the Pilbara bioregion and very few species with typical Kimberley distributions were recorded.

During 2018 surveys (Biota, 2018b) a range of mammal, bird, reptile and amphibian species were recorded across a range of habitats. Ten vertebrate species of conservation significance were recorded in the DE during the survey, comprising:

- Seven mammal species:
  - Bilby (*Macrotis lagotis*) – Schedule 3 (Biodiversity Conservation Act 2016; **BC Act**), Vulnerable (EPBC Act)
  - Black-footed Rock-wallaby (*Petrogale lateralis lateralis*) – Schedule 2 (BC Act), Endangered (EPBC Act)
  - Northern Quoll (*Dasyurus hallucatus*) – Schedule 2 (BC Act), Endangered (EPBC Act)

- Spectacled Hare-wallaby (*Lagorchestes conspicillatus*) – Priority 3 (BC Act)
- Brush-tailed Mulgara (*Dasycercus blythi*) – Priority 4 (BC Act)
- Northern Marsupial Mole (*Notoryctes caurinus*) – Priority 4 (BC Act)
- Western Pebble-mound Mouse (*Pseudomys chapmani*) – Priority 4 (BC Act).

– One bird species
  - Oriental Pratincole (*Glareola maldivarum*) – Schedule 5 (BC Act), Migratory (EPBC Act).

– Two reptile species
  - Flatback Turtle (*Natator depressus*) – Schedule 3 (BC Act), Vulnerable/Marine/Migratory (EPBC Act)
  - Dampierland Plain Slider (*Lerista separanda*) – Priority 2 (BC Act).

For short-range endemic (**SRE**) fauna, samples were collected from a combination of dry pitfall trapping and targeted searching of microhabitats. Three potential SRE taxa, all trapdoor spiders, were recorded from the DE, but they are likely to be more widespread, considering all three came from widely connected sandplain habitats with no barriers to dispersal, within the very widespread Nita and Little Sandy land systems.

2.6.1.4 Social surroundings

The DE is sited in a large-scale landscape setting in a remote part of the northeast Pilbara. This remoteness means that there is limited public access to the site, and very few nearby residents. The nearest sealed public road is the Great Northern Highway, which is to the northwest of the site and 10 km away at its nearest point.

There are four dwellings within 30 km of the DE:

– Wallal Station, located 24 km from the nearest turbine
– Mandora Station, located 18 km from the nearest turbine
– Eighty Mile Beach Caravan Park, located 24 km from the nearest turbine
– Sandfire Roadhouse, located 18 km from the nearest turbine.

The ERD considered visual and landscape aspects, along with noise and cultural heritage, as potential impacts to social surroundings, as summarised in Table 2-4. While the identified aspects were assessed in the ERD, only cultural heritage is considered relevant for the Pre-commencement works as the activities will not contribute to changed visual or noise impacts.

Table 2-4 Summary of key social surroundings aspects and potential Proposal impacts

Relevant factor	Key aspects and potential impacts
Visual and landscape	The Proposal is situated to the east of the Great Northern Highway on the boundary between inland coastal plains and the beginning of the extensive sandy deserts of northwest Australia. The land is gently sloping, rising very gradually as it goes inland. However, due to the extensive vistas, that rise is not readily perceptible across the landscape. Generally, there is little variability in the extensiveness of viewsheds or the type of landform visible across the entire extent of the DE. Considering the landscape that the Proposal is located within, along with the DE's distance from identified sensitive receivers, the ERD determined that there will be negligible negative visual effect on the regional or local landscape quality.
Noise	Noise modelling demonstrated that the expected noise generated by the wind turbines would be below 35dB at a range of ~2 km. This is the level established in the planning guidelines as best practice for proximity to homes in a quiet rural environment. Given the separation distance from the turbines to the nearest sensitive receiver is nearly 18 km, noise was not considered a significant potential impact on social surroundings.
Cultural heritage	The proposal has been refined to avoid areas where Aboriginal cultural heritage sites are likely to exist. All site planning will require cultural heritage surveys in accordance with an Interim Heritage Agreement between AREH, bp and NWAC, which commits the parties to best practice in terms of Aboriginal cultural heritage practices and avoidance. As such, any Aboriginal cultural heritage sites will be avoided by all Pre-commencement, construction, and operation activities, resulting in negligible risk of impacts to Aboriginal cultural heritage.

2.6.2 Proposed pre-clearance surveys

The current EMP is based on completed surveys and looks to utilise the most up to date science to inform actions. Targeted surveys are to be undertaken for all pre-clearance activities these will be based on pre-commencement activity layouts to be confirmed. Indicative Pre-commencement activity locations in Figure A-2 will be based on the outcomes of aboriginal cultural heritage surveys and engineering considerations, which will guide targeted pre-clearance ecological survey requirements detailed in Section X of this plan.

Pre-clearance surveys will adhere to EPA Technical Guidance (EPA, 2016c; EPA, 2020) protocols. Timing for targeted pre-clearance surveys will be as close to time of ground disturbance activities. Other time constraints considered are surveying for nocturnal fauna species and Flora identification surveys will be targeted to flora types. The Threatened flora species (*Seringia exastia*) that requires avoidance is non-flowering, so seasonality of surveys is not required

The EMP refers to surveys and pre-clearance surveys, it is assumed that the pre-clearance survey guidelines by the EPA are designed to ensure that surveys for Threatened fauna are conducted in a consistent and effective manner. These guidelines are in-line with the EPBC Act, BC Act 2016 (WA), EP Act, and recommendations from the DBCA. The purpose of these surveys is to identify significant habitat, habitat features, or the presence of individuals of Threatened species before any habitat disturbance occurs. This is crucial for the protection of biodiversity and the management of species that may not disperse in response to habitat modification.

2.6.3 Key assumptions and uncertainties

There is an acknowledgment that due to the remoteness there is limitation in environmental survey data which underpins a level of uncertainty. Potential constraints and uncertainties are noted in Table 2-5. Relevant inputs, such as flora, vegetation and fauna surveys were undertaken in accordance with the relevant EPA Technical Guidance (EPA, 2016c; EPA, 2020). It is noted that these studies were assessed as suitable to inform consideration of the entire Proposal (not just limited to Pre-commencement activities) under Section 38 of the EP Act and the EPBC Act.

Table 2-5 Key assumptions and uncertainties associated with ecological survey data

Factor	Limitations and assumptions
Flora and vegetation	**Limitations** – Surveys undertaken prior to the Project being approved added new data specific to the DE, however local level information was considered to be a limiting factor. – Systematic searches were not possible over the entire DE and are also not warranted given the very small percentage of the DE to be disturbed by the Proposal. – There was limited vehicle access within the DE, although this was mitigated by the use of a helicopter. **Assumptions** – Further targeted survey work and searches were undertaken in 2023. The 2023 survey has improved the overall knowledge of the site regarding conservation significant species.
Terrestrial fauna	**Limitations** – Systematic fauna sampling was completed in all fauna habitats, but it was not possible to ground-truth every part of the DE; and nor was it necessary with the very small proportion of the DE that will be affected by the Proposal. – Some areas were inaccessible by vehicle, so installation and regular checking of fauna traps in these areas was not possible. This was partially addressed by means of helicopter ground-truthing to confirm the habitats sampled systematically were representative of inaccessible areas. – SRE taxa are difficult to sample adequately, and this is a common limitation of these types of surveys. It is noted that the most prospective microhabitats of the DE were targeted, and personnel were experienced in SRE sampling. – There is a general lack of past biological survey effort in the locality, which may have limited some assessments of potential wider distributions (e.g. for SRE taxa and range extensions for some species). **Assumptions** – Further targeted survey work and searches were undertaken in 2023 under NVCP exemption, prior to any clearing works being commenced. Although not available yet, data from the 2023 survey is expected to improve the overall knowledge of the site regarding conservation significant species.

3. Environmental Management Plan components

This section identifies the management provisions that will be implemented via this EMP.

Table 3-1 to Table 3-3 detail the management objectives, associated actions and targets for each key Environmental Factor. Consistent with the approach recommended by EPA (2023a), the provisions for this EMP are detailed in tabular format, setting out objectives, actions and monitoring.

Table 3-1 EMP management-based provisions for Flora and Vegetation

EPA factor and objective	**Flora and Vegetation: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA, 2016b)**
EMP objective	Avoid, where not possible minimise impacts to flora and vegetation to that required for Pre-commencement activities
Key environmental values	Vegetation and flora, including Threatened and Priority flora species and vegetation communities
Key impacts and risks	– Loss of vegetation and flora through clearing, including significant flora – Introduction and/or spread of weeds degrading vegetation condition – Risk of works-induced bushfires – Risk of high intensity/extensive wildfire – Risk of off-road driving impacts on vegetation
Relevant outcomes	– No more than 11,962 ha of native vegetation cleared for the Proposal, with all individual vegetation types permanently cleared by <2% of their current extent within the DE – No loss of Threatened or Priority 1 flora species – No changes to conservation status of any Priority flora species – Low risk of novel weed introduction with provision for monitoring and control contingency response – No significant risk of fire starting as a result of Pre-commencement activities – Low risk of high intensity/ extensive wildfires

Management Targets	**Management Actions**	**Monitoring**	**Timing/frequency of actions**	**Reporting**
No unauthorised land disturbance, no more than 11,962ha of native vegetation cleared.	– Definition of clearing limits – Demarcate defined clearing limits and boundaries using real time GPS tracking – Job Hazard Analysis (JHA) or equivalent to include the risks and mitigation actions to be understood and adhered to as they pertain to the contractor and scope of work on the JHA	– Ad-hoc site walkovers to clearing boundaries against approved plans – Cumulative extents cleared using GPS tracking systems – All relevant contractors to sign onto JHA or equivalent on a daily basis – Real-time GPS tracking during clearing activities	– Prior to and following clearing activities	– Ad-hoc pre-clearance inspection with any discrepancies between clearing area and approved plans to be investigated and resolved – Pre-work and post work checklist – Annual environmental reporting

Management Targets	Management Actions	Monitoring	Timing/frequency of actions	Reporting
No loss of Priority 1 or Threatened flora species No changes to conservation status of any Priority flora species	–Threatened and Priority flora will be mapped on site using GPS system and avoided during ground disturbance activities – Staff and contractors must be informed of the location of Priority 1 and Threatened flora on site and their responsibility to protect it – Plan pre-commencement activities to avoid clearing of any known Priority 1 and Threatened species –Avoid other Priority flora species as far as practicable	– Priority and Threatened species on GPS tracking system – Pre-clearance survey – Clearing completed with GPS tracking to avoid known populations	– Prior to and following clearing activities	– Vegetation clearing records – Pre-work and post-work checklist – Annual environmental reporting
Limit and manage the introduction, establishment and spread of weeds	– All site personnel to be inducted on environmental responsibilities including hygiene management	– Record of all site personnel that have undertaken the induction	– Bi-annual weed monitoring program – Initiated one month after significant rainfall	– Induction records
	– Vehicles, equipment, tools and footwear to be inspected and cleaned of soil, vegetation material and seeds on entry/exit to site if traveling from outside of the established weed free zone or outside of 200 km of the DE. Clean down will consist of brushing, gouging, scraping and/or water blasting to remove any compacted soil or plant matter. – Vehicles and machinery to remain on designated access track areas, where possible. Establish weed free activity area and identified, vehicles can move freely within the area, if they have travelled on designated tracks and roads. Designate separate weed quarantine area.	– Routine spot checks of vehicles and equipment compliance with cleaning requirements		– Results of spot checks of vehicle and equipment cleaning compliance – Weed monitoring report
	– Fill material brought to site is to be certified weed free	– Inspection of fill material and certification		– Maintain records of fill certification
	– Monitoring and control program to eliminate any new infestations	– Monitoring to occur at sites within the DE, in areas where weeds have been previously recorded or where there is high potential for weed spread (e.g. nearby roads and tracks). Monitoring parameters to include weed diversity and abundance (% cover). – Biannual spraying program (if required) – Weed management of any new infestations to continue until weeds are eradicated within that season		– Annual environmental reporting – Weed monitoring and spraying report
No unplanned fire as a result of Pre-commencement activities	– All site personnel to be inducted on environmental responsibilities, including fire risk prevention	– Record of all site personnel that have undertaken the induction	– Ad-hoc environmental – compliance investigation	– Induction records – Pre-work and post work checklist
	– All non-essential work is to be stopped or postponed in the event that a Total Fire Ban with Catastrophic fire danger ratings or Emergency Warning is issued for the area. Works to be conducted in accordance with all local fire control laws and regulations.	– N/A		– Incident reporting system – Pre-work and post work checklist
	– Vehicles and equipment access limited to designated roads/access tracks and cleared areas, where possible	– N/A		
	– Implementation of a hot work permit system	– Compliance with hot work permits		– Permit record system
	– Smoking will be confined to designated smoking area only	– N/A		– Incident reporting system
Rehabilitation of disturbed areas not required for following work stages	–Contractors have rehabilitation clause in contracts –Areas not required for further activities in following stages will be rehabilitated –Temporary storage of topsoil from excavation –Direct return of topsoil material and completion with stockpile soil as soon as practicable on completion of activity.	– Record completion of rehabilitation – monitoring for re vegetation 3 weeks after return of topsoil	– Ad-hoc environmental compliance investigation	– Completed rehabilitation records – Annual environmental reporting

Table 3-2 EMP management-based provisions for Terrestrial Fauna

EPA factor and objective	**Terrestrial Fauna:** ***To protect terrestrial fauna so that biological diversity and ecological integrity are maintained*** (EPA, 2016a)
EMP objective	Avoid, where not possible minimise fauna habitat loss and minimise direct and indirect impacts to fauna as far as practicable
Key environmental values	Vertebrate and invertebrate fauna, including Threatened and Priority listed fauna, and potential SRE species
Key impacts and risks	– Loss of fauna habitat through clearance and ground disturbing activities including habitat for significant fauna – Fauna injury/death from vehicle strike/ground disturbing activities – Fauna activity disturbance from temporary increase in noise/vibration – Bushfire causing damage/loss of fauna habitat
Relevant outcomes	– No more than 11,962 ha of native vegetation cleared, with all individual vegetation types permanently cleared by <2% of their current extent within the DE – Low risk of novel weed introduction with provision for monitoring and control contingency response – No significant risk of fire starting as a result of Pre- commencement activities – Reduced risk of/from extensive, high intensity wildfires – No ground-disturbing activities within and adjacent to confirmed active Bilby burrows (5 m buffer zones) – No clearing of key habitats for Black-footed Rock-Wallaby (1 km rocky out- crop buffer zones) – No significant risk of increased feral fauna impacts on native fauna, particularly threatened species – No significant risk of avifauna collisions (related to guy wires and other meteorological mast infrastructure)

Management Targets	Management Actions	Monitoring	Timing/frequency of actions	Reporting
Minimise direct and indirect loss of fauna habitat	Definition of habitat clearing footprint to: • prohibit clearing of key habitats for Black-footed Rock-Wallaby (1 km rocky out-crop buffer zones, Ministerial Condition 7-1-(8). • prohibit ground-disturbing activities within and adjacent to confirmed active Bilby burrows (5 m buffer zones as advised in the Ministerial Condition 7-1-(8)) • minimise broader habitat disturbance	– Real-time GPS tracking during ground disturbance activities to avoid known habitat types – Site walkover to confirm cleared areas	– Prior to and following ground disturbance activities – Bi-annual weed monitoring program – Ad-hoc environmental compliance investigation	– Vegetation clearing records in compliance reporting – Annual environmental reporting
	– Significant fauna and habitat identified during a targeted fauna survey will be recorded in a centralised database to ensure that these areas can be easily identified during ground disturbance works			
	– Monitor for active Bilby burrows 14 days prior of ground disturbing activities – Ground disturbance activities will not occur until Bilby burrows in (5m) buffer zone is inactive – Trained personnel on site to monitor for active Bilby burrows during ground disturbing activities	– Pre-clearance survey records – Surveys in line with *Guidelines for surveys to detect the presence of bilbies, and assess the importance of habitat in Western Australia* – Surveys will utilise linear searches; 2 ha sign plot technique; initial survey to be conducted by qualified personnel to cover extent of proposed pre-commencement area – Post-clearance checks	– Prior to and during ground disturbance activities – Ad-hoc environmental compliance investigations by qualified personnel	– Compliance reporting – Vegetation clearing records
	– Clearing and ground disturbing activities limited to the defined limits and boundaries	– Real-time GPS tracking during ground disturbance activities		– Pre-work and post work checklist – Annual environmental reporting
	– Development and implementation of authorised access procedures to ensure that vehicles and machinery remain on designated roads/access tracks	– Compliance with access procedures – Ad-hoc inspections (during Pre-commencement activity) within the work area of clearing demarcation will be undertaken to confirm markings remain in place and are accurate		– Pre-work and post work checklist – Annual environmental reporting

Management Targets	Management Actions	Monitoring	Timing/frequency of actions	Reporting
	– Comprehensive weed hygiene measures, including clean down points prior to plant and vehicles entering site	– Monitoring to occur at sites within the DE, in areas where weeds have been previously recorded or where there is high potential for weed spread (e.g. nearby roads and tracks). Monitoring parameters to include weed diversity and abundance (% cover). – Biannual spraying program (if required)		– Results of spot checks of vehicle and equipment cleaning compliance – Weed monitoring report
	Pre-commencement fire risk measures, including: • controlled procedures for any welding and grinding activities, • inspection of the exhausts of machinery • use of spark suppressors on any generating equipment on site	– Ongoing monitoring of fire activity		– Pre-work and post work checklist – Annual environmental reporting
Minimise direct loss of fauna	– All site personnel to be inducted on fauna species that occur in the locality (native and introduced) and their environmental responsibilities including speed limit awareness.	– Record of all site personnel that have undertaken the induction	– Prior to and following ground disturbance activities – Ad-hoc environmental compliance investigation	– Induction records – Pre-work and post work checklis
	– Clearing to be undertaken progressively in one direction to allow fauna to move on. – In the event vertebrate fauna is injured during clearing or other ground disturbing activities, the animal shall be taken to an authorised veterinarian or trained wildlife carer, or if not practicable, humanely euthanised in accordance with Department of Biodiversity, Conservation and Attraction Standard Operating Procedures.	– Visual inspections for native fauna in clearing and activity areas		– Record known injuries to, or deaths of conservation significant fauna species in a Conservation Significant Fauna Interaction Register as soon as possible as the injury or death is identified
	– Observations of conservation significant fauna species by site personnel are to be reported to the site representative.			– Annual environmental reporting – Pre-work and post work checklist
	– Conduct regular scheduled airstrip inspections to ensure no loss of fauna due to strike inspections are inclusive of identifying approximate fauna occupation.	– Record of inspections		– Annual environmental reporting – Pre-work and post work checklist
	– Speed limits on roads and unsealed roads, reinforced through induction – Scheduling works to reduce impacts on nocturnal species by minimising night activities where possible	– Record of activities and times	– Ad-hoc environmental compliance investigation	– Annual environmental reporting – Induction records
	– All pits and quarries must be designed toavoid fauna entrapment, including appropriate fencing, and low gradientramps – Pre-work checks of pits and quarries to check for fauna species – All site personnel inducted on fauna entrapment risk – In the unlikely case that fauna becomes entrapped personnel will be require to file incident report and work under the BC Act to obtain authorisation to relocate the individual	– Post-drilling and quarry activity checks – Record of all site personnel that have undertaken the induction – Weekly monitoring, daily if risk of entrapment is higher i.e. when quarries or test pits left in situ without appropriate ramping	– Prior to and during quarrying/pit activities – Until appropriately decommissioned	– Pre-work and post work checklist – Induction records

Management Targets	Management Actions	Monitoring	Timing/frequency of actions	Reporting
Reduce predation risk to Threatened and Priority listed fauna from feral predators within the DE	– Implementation of targeted feral fauna monitoring and control in areas of higher risk, such as around accommodation. Measures will include: • waste to be stored in bins with lids and transferred to an appropriate facility for disposal, particularly for food waste • prohibiting feeding of fauna or disposal of food outside of allocated waste disposal points • targeted pest species control (if required)	– Waste management procedure compliance – Record of targeted feral monitoring	– Ah-hoc environmental compliance investigation	– Pre-work and post work checklist – Disposal receipts
Minimise risk of collisions for avifauna	– Guy wires on meteorological masts to be designed as per specification to increase visibility (e.g. installation of visibility devices), as appropriate	– No monitoring proposed	– Prior to installation	– Product specifications – Annual environmental reporting

Table 3-3 EMP management-based provisions for Social Surroundings

EPA factor and objective	Social Surroundings: to protect social surroundings from significant harm
EMP objective	Avoid, where not possible minimise impacts to unidentified heritage values and social surrounds
Key environmental values	Potential unidentified heritage
Key impacts and risks	Impact to site due to clearing, drilling, geotechnical investigations, wind and solar resource monitoring equipment placement, airstrip or compound development and other defined Pre- commencement activities
Relevant outcomes	No impact to Registered Aboriginal heritage sites

Management Targets	Management Actions	Monitoring	Timing/frequency of actions	Reporting
Limit impacts to unidentified heritage values	– Operate under heritage site avoidance approach to all works – bp is identified as a party to the Interim Heritage Agreement between AREH and Nyangumarta Warrarn Aboriginal Corporation (NWAC). All works will fall under Interim Heritage Agreement provisions. – All activities permitted under the Interim Heritage Agreement are notifiable under the Heritage Notice process. The heritage service provider will determine if a heritage survey or monitoring is required, based on their assessment of the activity and location – Any Aboriginal cultural heritage material or potential Aboriginal cultural heritage material that is identified in the course of conducting approved activities will be subject to the AREH Aboriginal Cultural Heritage Chance Finds Process. This includes discovery of skeletal, as per the Interim Heritage Agreement with NWAC – Inductions will include information on Aboriginal cultural heritage sites and the requirement to have appropriate controls in place to prevent harm to and not disturb these sites when carrying out activities.	– Records of Heritage Notices – Spatial management system	– Prior to any ground disturbing activities – Ah-hoc environmental compliance investigation	– Annual environmental reporting – Incident reporting system – Pre-work and post work checklist
Limit impacts from dust	– Minimise land clearing – Station a water cart for unsealed roads – Vehicles and equipment to remain on defined tracks and unsealed roads – Inform all employees and contractors of the importance of reducing the creation of dust generating activities through site induction training, – Manage dust through use of 2-way radio communications – Watering all high traffic and haulage areas on a routine basis for dust suppression.	– Site evaluation for conditions and use of water cart	– Asses requirements to ground disturbance activities – As required for unsealed roads	– Pre- post work checklist
Manage community complaints and concerns	– Develop a community concern register – Review complaints and concerns as they arise	– Keep records of community concerns and complaints – Keep records of actioned items against	– Establish the register prior to Pre-commencement activities – Keep the register open for comment throughout the Pre-commencement activity period	– Review comments when the arise – At the end of activity period review all comments and respond

4. Adaptive management and review

The adaptive management approach aims to reduce impacts by embedding a cycle of monitoring, reporting and implementing change, where required. This document applies the principles of adaptive management through monitoring, corrective actions and implementing changes.

This EMP is intended to be dynamic and may be updated to reflect changes in management practices and the natural environment after pre-clearance surveys are completed to ensure maintaining environmental objectives stated in the plan. This will also allow flexibility to adopt new technologies/management measures. Amendments to management actions and targets will be completed on an as needs basis. This will include revision/amendment of management actions that are not achieving the desired outcomes, monitoring identifying additional impacts and management actions, changes to relevant legislation or improvements to practices achieving a greater environmental outcome.

Adaptive Management means creating and maintaining a 'principle of review to ensure that work being done in the EMP is as effective as possible., adaptive management requires time to be set aside to assess the implementation of the EMP. The stages of adaptive management are as follows:

- Implement the management and mitigation measures as outlined in the EMP.
- Monitor and evaluate against the environmental provisions, which includes documenting EMP measures as they are carried out

This EMP covers Pre-commencement activities and is intended to be updated as the Project progresses beyond Pre-commencement to the commencement of the Project Activities. This EMP will be replaced by a Construction Environmental Management Plan when the construction phase of the Proposal commences, and subsequently and Operational EMP. The staged EMPs will align with the project stages and will allow for the management of new environmental risks as they become relevant, and the revision of the previous processes utilised in the EMP. Adaptive management of future EMPs will be based on what is learned from increased understanding of the ecological regime within the DE from preliminary surveys after completion.

4.6 Environmental monitoring and corrective actions

Internal monitoring of the environmental aspects outlined in this EMP will occur throughout the Pre-commencement phase of the Proposal. Any non-conformances or incidents within this EMP will be investigated, rectified or mitigated as soon as possible to ensure minimal ongoing environmental harm. Relevant procedures will be amended/updated as necessary and inductions and other workforce communication will be undertaken in a timely manner to minimise the risk of re-occurrences.

5. Incident reporting

5.6 Environmental incidents and non-compliance

Environmental incidences and non-compliances will be identified and recorded as soon as possible by the relevant responsible persons. Incidents will be mitigated or rectified where possible within 48 hours of being identified. Non-conformances to this plan will be reported to the site representative or equivalent within 48 hours of identification.

Any non-conformance to this plan will be reported to the EPA Compliance Branch within seven days of being known and investigated to determine:

- why the non-conformance occurred
- what was the environmental harm or alteration of the environment that resulted from the non-conformance
- what changes to project activities and/or management plans is required
- measures to prevent, control or abate the environmental harm that may have occurred.

5.7 Reporting

The environmental performance of the activities and auditing requirements will be assessed by bp prior to and throughout Pre-commencement activities. Reporting requirements will be undertaken in accordance with the Ministerial Statement, and the approved Compliance Assessment Plan via annual compliance reporting. If a significant non-conformance with this EMP occurs, the regulator will be notified of the non- compliance within seven days and the subsequent investigation within 60 days.

6. Traditional Owner and stakeholder consultation

This version of the EMP has been reviewed by NWAC and DBCA whereby comments and advice has been integrated. bp as operator undertakes ongoing engagement with Traditional Owners and key stakeholders. Ongoing consultation will continue throughout the Pre-commencement phase and beyond to ensure transparent and clear engagement informs all progress and that all concerns are addressed.

7. References

Biota. (2018). *Asian Renewable Energy Hub Terrestrial Fauna and SRE Fauna Survey.* Perth: Biota Environmental Sciences Pty Ltd.

Biota. (2019). *Asian Renewable Energy Hub Environmental Review Document.* Perth: Biota Environmental Sciences Pty Ltd.

Biota. (2023). *Australian Renewable Energy Hub Flora and Vegetation Survey - in draft.* Perth: Biota Environmental Sciences Pty Ltd.

EPA. (2016). *Environmental Factor Guideline - Terrestrial Fauna.* Perth: Environmental Protection Authority.

EPA. (2016). *Environmental Factor Guideline - Flora and Vegetation.* Perth: Environmental Protection Authority.

EPA. (2016). *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment.* Perth: Environmental Protection Authority.

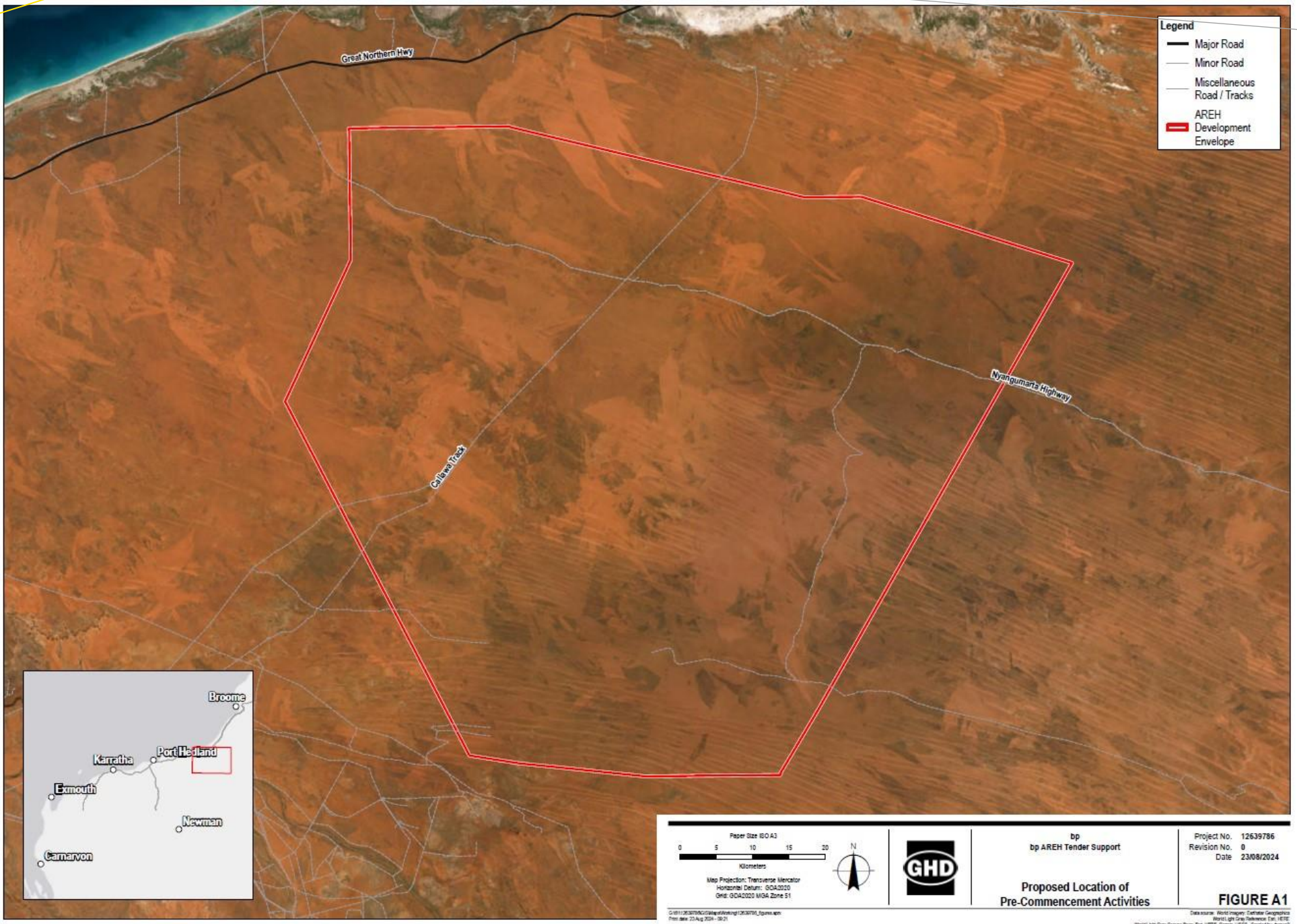
EPA. (2020). *Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment.* Perth: Environmental Protection Authority.

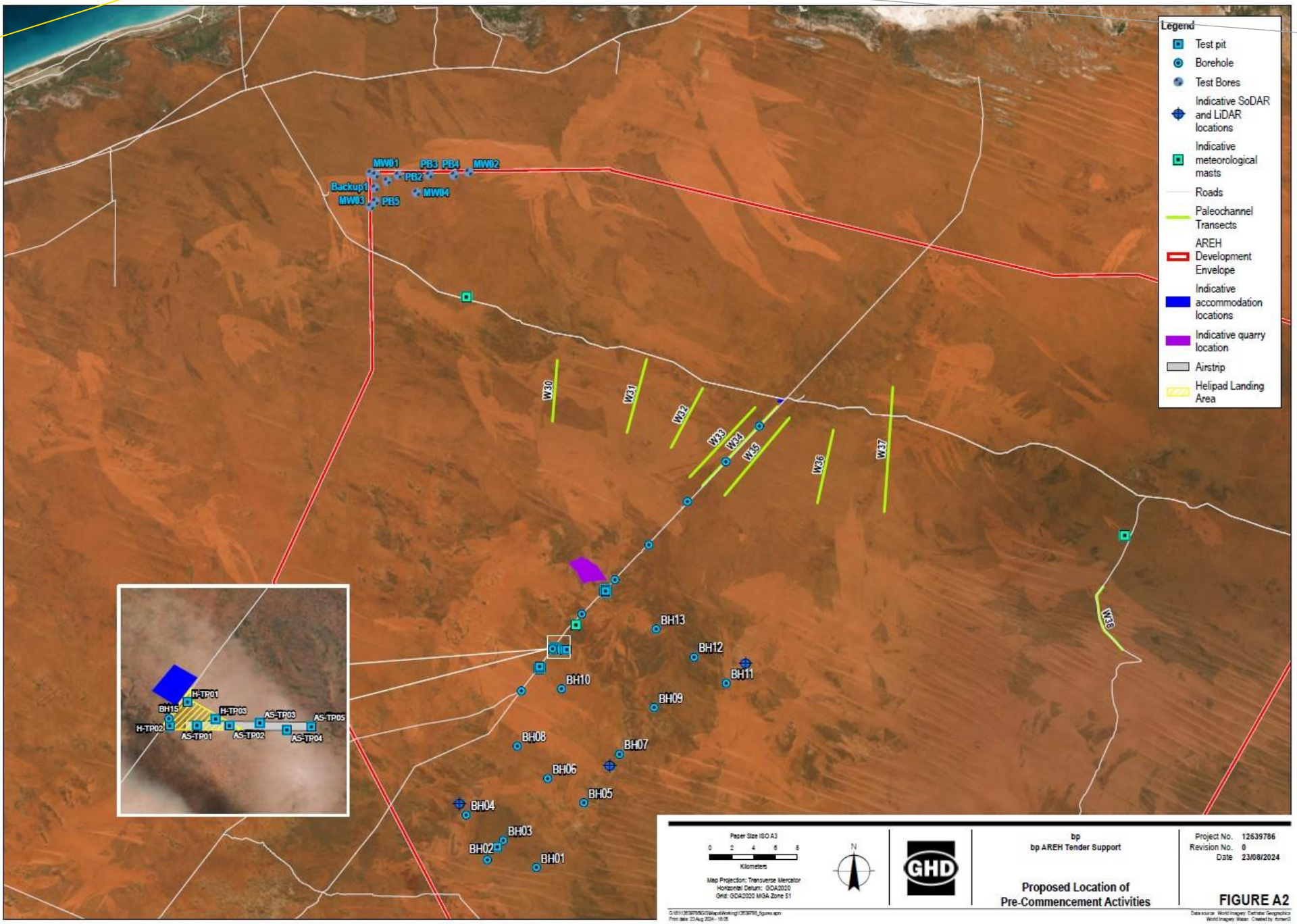
EPA. (2023). *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans.* Perth: Environmental Protection Authority.

EPA. (2023). *Environmental Factor Guideline - Social Surroundings.* Perth: Environmental Protection Authority.

8. Appendices

Appendix A Figures




Legend
Test pit
Borehole
Test Bores
Indicative SoDAR and LiDAR locations
Indicative meteorological masts
Roads
Paleochannel Transects
AREH Development Envelope
Indicative accommodation locations
Indicative quarry location
Airstrip
Helipad Landing Area
MW01
PB3
PB4
MW02
PB2
Backup1
MW04
MW03
PB5
W30
W31
W32
W33
W34
W35
W36
W37
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AS-TP02
AS-TP04
Paper Size ISO A3
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Kilometers
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 51
N
GHD
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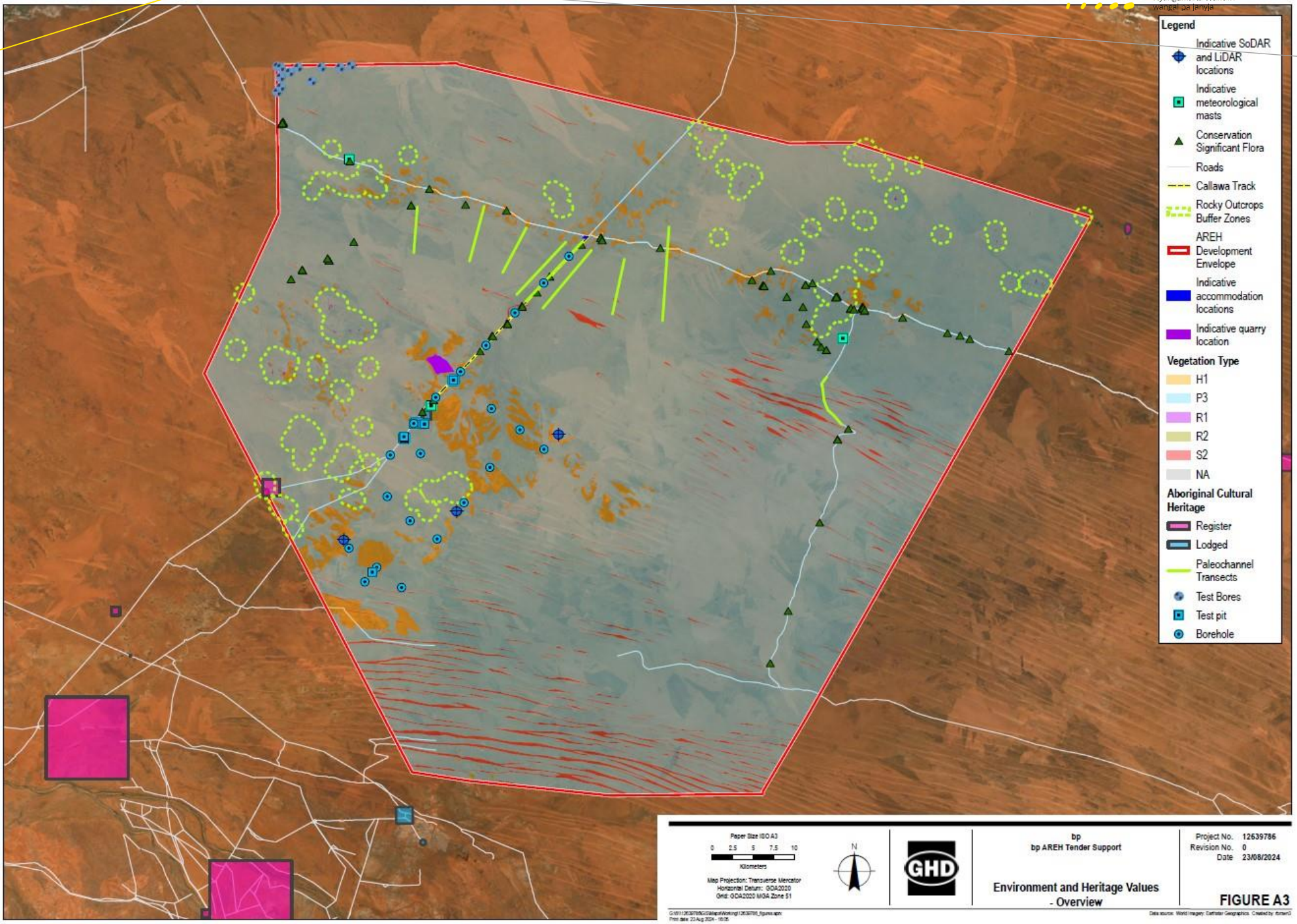
Proposed Location of Pre-Commencement Activities
Project No. 12639786
Revision No. 0
Date 23/08/2024
FIGURE A2

Australian Renewable Energy Hub

Nyangumarta Warrarn



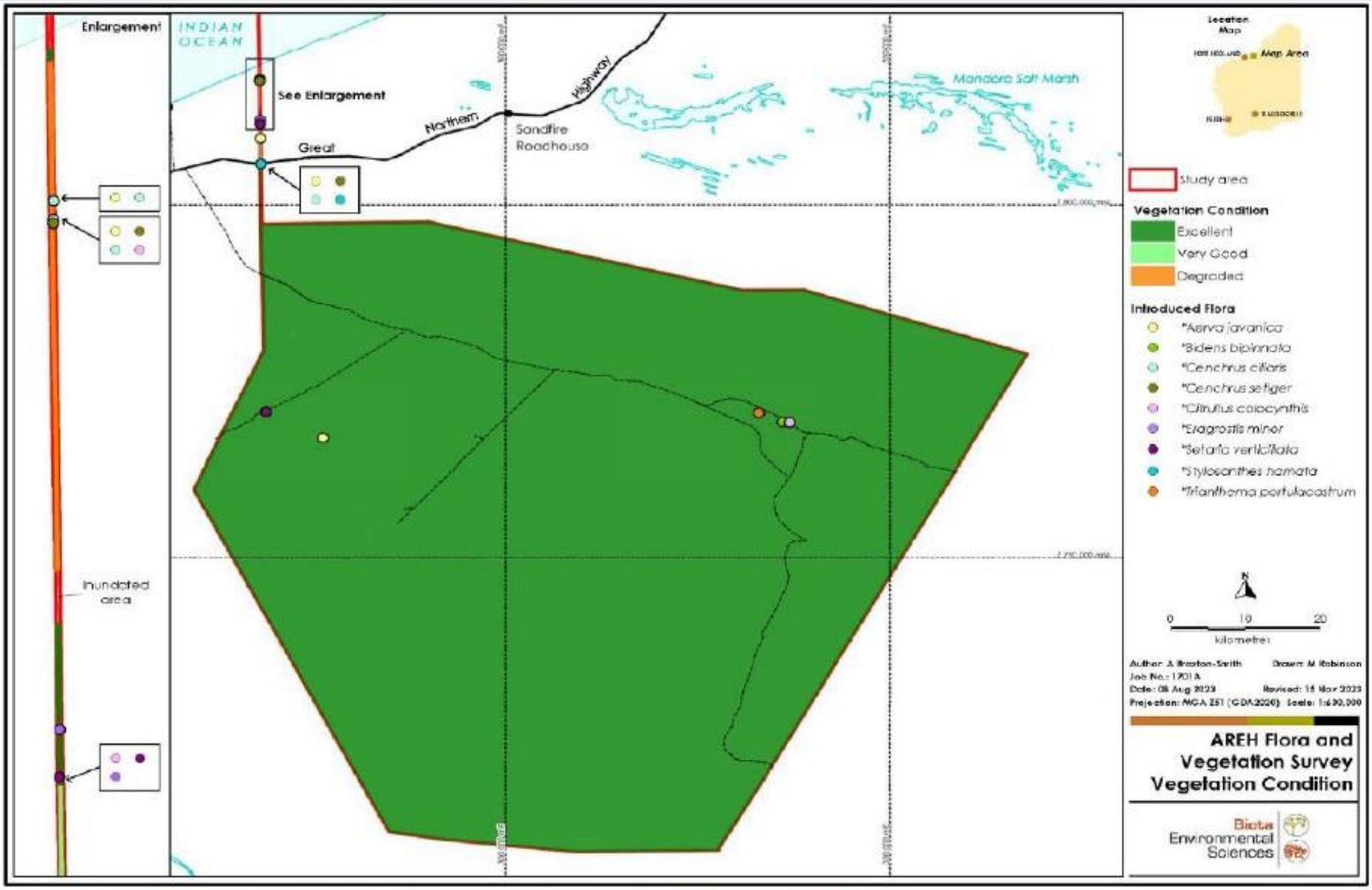


Figure A–4 *Vegetation condition mapping for the Development Envelope, with location of introduced flora*