Report and recommendations of the Environmental Protection Authority

Asian Renewable Energy Hub

NW Interconnected Power Pty Ltd

Report 1673

April 2020

Environmental impact assessment process timelines

Date	Progress stages	Time (weeks)
13/12/2017	EPA decided to assess – level of assessment set	
27/08/2018	EPA approved Environmental Scoping Document	36
07/05/2019	EPA accepted Environmental Review Document	38
13/05/2019	Environmental Review Document released for public review	6 days
24/06/2019	Public review period for Environmental Review Document closed	6
07/02/2020	EPA accepted proponent's Response to Submissions	32
19/02/2020	EPA received final information for assessment	12 days
19/03/2020	EPA board considered assessment	6
29/04/2020	EPA provided report to the Minister for Environment	6
04/05/2020	EPA report published	3 days
18/05/2020	Close of appeals period	2

Timelines for an assessment may vary according to the complexity of the proposal and are usually agreed with the proponent soon after the Environmental Protection Authority (EPA) decides to assess the proposal and records the level of assessment.

In this case, the EPA met its timeline objective to complete its assessment and provide a report to the Minister.

Dr Tom Hatton
Chairman

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Summary

This document is an assessment report for Western Australia's Minister for Environment. It describes the outcomes of an Environmental Protection Authority (EPA) environmental impact assessment of the Asian Renewable Energy Hub (the proposal), located about 220 kilometres east of Port Hedland in the northwest of Western Australia. The proponent is NW Interconnected Power Pty Ltd.

Proposal

The proposal is to construct and operate a large-scale wind and solar renewable energy project, comprising a series of onshore linear arrays of wind turbines and solar panels, and a transmission cable corridor to the coast. Offshore components comprise of four high voltage direct current inert subsea power cables extending to the limit of state waters.

Background and context

The proponent referred the proposal to the EPA on 17 November 2017. On 13 December 2017 the EPA decided to assess the proposal and set the level of assessment at Public Environmental Review with a proponent–prepared Environmental Scoping Document and a public review period for the Environmental Review document of six weeks. The proposal was also determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* to be assessed by an accredited process under the *Environmental Protection Act 1986*.

The EPA approved the Environmental Scoping Document for the proposal on 27 August 2018. On 13 December 2018, the proponent made an application to change the proposal during assessment under section s. 43A of the *Environmental Protection Act 1986*. The changes were approved, and included increases in the project's power generation, extent of native vegetation clearing, number of subsea power cables and solar panel arrays. The Environmental Review Document was released for public review from 13 May 2019 to 24 June 2019. Sixteen submissions were received.

Public submissions

Key issues raised in the submissions included:

- The implications of proposed fire management on the flora, vegetation and terrestrial fauna within the development envelope.
- The rehabilitation and closure of the proposal.
- The construction of the marine components of the proposal and the potential impacts local marine fauna.
- The potential impacts of the proposal on birds, including migratory birds.
- The proposed management of the local bilby population and their habitats.

The proponent has responded to these submissions by:

- Providing a revised Fire Management Strategy which proposes a pre-construction prescribed burning pilot study to inform adaptive fire management of the proposal.
- Committing to timing of construction to avoid key marine fauna spawning and pupping seasons.
- Committing to undertaking targeted vegetation surveys for threatened and priority flora prior to construction, and to avoid conservation significant flora where possible.
- Revising the Construction Environmental Management Plan to an Environmental Management Plan that includes the operational and decommissioning phases of the proposal. It will provide further detail on how the potential environmental impacts from the proposal will be managed, such as weed management, feral animal monitoring and avifauna monitoring.

Key environmental factors and relevant principles

The EPA identified the following key environmental factors (see section 4) during the course of its assessment:

1. Terrestrial Fauna – Clearing 11,962 hectares (ha) of fauna habitat to construct proposal infrastructure. Implementing the Fire Management Strategy will include prescribed burns within fauna habitat. Installing and operating the wind turbines may impact on terrestrial fauna.
2. Flora and Vegetation – Clearing 11,962 ha of native vegetation to construct proposal infrastructure, which includes access roads, turbine pads, solar panel arrays, substations and transmission lines.
3. Benthic Communities and Habitat – Disturbing 15.3 ha of benthic habitat from the installation of four subsea cables.
4. Marine Environmental Quality – Installing, operating, maintaining and decommissioning of four subsea export subsea cables through Eighty Mile Beach Marine Park and state waters may impact on marine environmental quality.
5. Marine Fauna – Installing, operating, maintaining and decommissioning of subsea export cables through Eighty Mile Beach Marine Park and state waters, and incoming vessel movements associated with the importation of wind turbines and solar panels, may impact on marine fauna.

In identifying the key environmental factors, the EPA had regard to the object and principles set out in s. 4A of the *Environmental Protection Act 1986*. The EPA considered that all the principles were particularly relevant to this assessment (see section 4):

1. The precautionary principle
2. The principle of intergenerational equity
3. The principle of the conservation of biological diversity and ecological integrity
4. Principles relating to improved valuation, pricing and incentive mechanisms

5. The principle of waste minimisation.

Conclusion and recommendations

Having assessed the proposal, the EPA recommends the proposal may be implemented subject to conditions.

The EPA recommends that the Minister for Environment notes:

1. The proposal assessed is for the construction and operation of a large-scale wind and solar renewable energy project, which will comprise a series of onshore linear arrays of wind turbines and solar panels, with a transmission cable corridor to the coast and a subsea cable to the edge of state waters.
2. The key environmental factors identified by the EPA in the course of its assessment are Terrestrial Fauna, Flora and Vegetation, Benthic Communities and Habitat, Marine Environmental Quality and Marine Fauna, set out in section 4.
3. The EPA has recommended that the proposal may be implemented, provided the implementation of the proposal is carried out in accordance with the recommended conditions and procedures set out in Appendix 4. Matters addressed in the conditions include the following:
    a) a Staged Fire Management Plan to monitor the potential impacts and benefits of a landscape-scale prescribed burn program
    b) spacing of infrastructure to mitigate potential avifauna interaction with infrastructure
    c) monitoring avifauna impacts from operation of the wind turbines and associated transmission infrastructure
    d) avoidance, mitigation and management measures to minimise the potential impacts of the proposal on terrestrial fauna, flora and vegetation, marine environmental quality, marine fauna and benthic communities and habitat
    e) sustainable decommissioning and rehabilitation of the site.

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1. Introduction

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the outcomes of the EPA's environmental impact assessment of the Asian Renewable Energy Hub (referred to in the report as the proposal). The proponent for the proposal is NW Interconnected Pty Ltd.

The proposal is to construct and operate a large-scale wind and solar renewable energy project about 220 kilometres (km) east of Port Hedland, in the northwest of Western Australia.

The EPA has prepared this report in accordance with s. 44 of the *Environmental Protection Act 1986* (EP Act). This section of the EP Act requires the EPA to prepare a report on the outcome of its assessment of a proposal and provide this assessment report to the Minister for Environment. The report must set out:

(a) what the EPA considers to be the key environmental factors identified during the assessment

(b) the EPA's recommendations as to whether or not the proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may also include any other information, advice and recommendations in the assessment report as it thinks fit.

The proponent referred the proposal to the EPA on 17 November 2017. On 13 December 2017, the EPA decided to assess the proposal and set the level of assessment at Public Environmental Review with a proponent–prepared Environmental Scoping Document and a public review period for the Environmental Review Document (ERD) of six weeks. The EPA approved the Environmental Scoping Document for the proposal on 27 August 2018. The ERD was released for public review from 13 May 2019 to 24 June 2019.

EPA procedures

The EPA followed the procedures in the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016* (State of Western Australia 2016) and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2018a).

1.2 Assessment on behalf of Commonwealth

The proposal was determined to be a controlled action by a delegate of the Commonwealth Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 8 February 2018 as it will, or is likely to have, a significant impact on the following Matters of National Environmental Significance (MNES):

- Ramsar wetlands (s. 16 and s. 17B)
- Listed threatened species and communities (s. 18 and s.18A)

- Listed migratory species (s. 20 and s 20A)
- Commonwealth marine areas (s. 23 and s. 24A).

The proposal was assessed as an accredited assessment between the Commonwealth and Western Australian governments.

2. The proposal

The proponent proposes to construct and operate a large-scale wind and solar renewable energy project about 220 km east of Port Hedland, in the northwest of Western Australia (WA) (Figure 1). The development envelope is 662,400 hectares (ha), with a clearing amount of 11,962 ha (Figure 2). The key elements of the 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.
- Four high voltage direct current (HVDC) cables offshore, which require 15.3 ha of benthic habitat disturbance.
- HVDC convertor station, which will convert the alternating current generated onsite into direct current to allow export.
- Overhead and underground transmission line, with up to 50 m tall pylons spaced 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. At this stage a bus-in / bus-out arrangement for workers based in Bidyadanga, Newman, Marble Bar, Broome and Port Hedland is proposed by the proponent.

The key characteristics of the proposal are summarised in Tables 1 and 2 below. A detailed description of the proposal is provided in section 2.3 of the ERD (Biota 2019a).

Table 1: Summary of the proposal

Proposal title	Asian Renewable Energy Hub
Short description	To construct and operate a large-scale wind and solar renewable energy project about 220 km east of Port Hedland and 270 km southwest of Broome, in the northwest of WA. The onshore components of the project will comprise a series of linear arrays of wind turbines and solar panels, with an above and below ground transmission cable corridor to the coast. The offshore component of the proposal comprises inert subsea power cables, with the marine component only extending to the limit of state waters.

Table 2: Location and proposed extent of physical and operational elements

Element	Location	Proposed extent
Terrestrial components		
Wind turbine hardstand (up to 1,743 individual turbines)	Figure 2	Clearing of no more than 523 ha within the development envelope. Wind turbines are to have about 800 m individual separation distance (linearly) and about 4 km separation distance between rows.
Photovoltaic solar arrays and associated electrical infrastructure (37 individual solar arrays)	Figure 2	Clearing of no more than 6,651 ha within the development envelope.
HVDC Converter station (1 site converter)	Figure 2	Clearing of no more than 23 ha within the development envelope.
Overhead transmission lines (including associated tracks and pylons)	Figure 2	Clearing of no more than 158 ha within the development envelope.
Overhead distribution cable	Figure 2	Clearing of no more than 1,611 ha within the development envelope.
Site access tracks	Figure 2	Clearing of no more than 2,303 ha within the development envelope.
Substations (37 site substations)	Figure 2	Clearing of no more than 357 ha within the development envelope.
Control compound, warehouse and accommodation	Figure 2	Clearing of no more than 337 ha within the development envelope.

Element	Location	Proposed extent
Construction laydown areas	-	Temporary clearing of no more than 592 ha within the development envelope.
Buried transmission cable section	Figure 2 and 3	Temporary clearing of no more than 21 ha within the development envelope. About 14 km linearly from the Great Northern Highway to the coast.
Marine components		
Off-shore subsea transmission cables (4 x 800 kilovolt HVDC cables)	Figure 2	No more than 15.3 ha seabed disturbance within the defined cable corridor. Cable is to be buried to a minimum depth of 5 m below seabed level.
Terrestrial and marine components combined		
Total permanent vegetation clearing	Figure 2	11,962 ha including no more than 0.2 ha Eighty Mile Beach Land System Priority Ecological Community.
Total temporary vegetation clearing	Figure 2	613 ha.
Total development envelope	Figure 2	No more than 662,400 ha.

Figure 1: Regional location

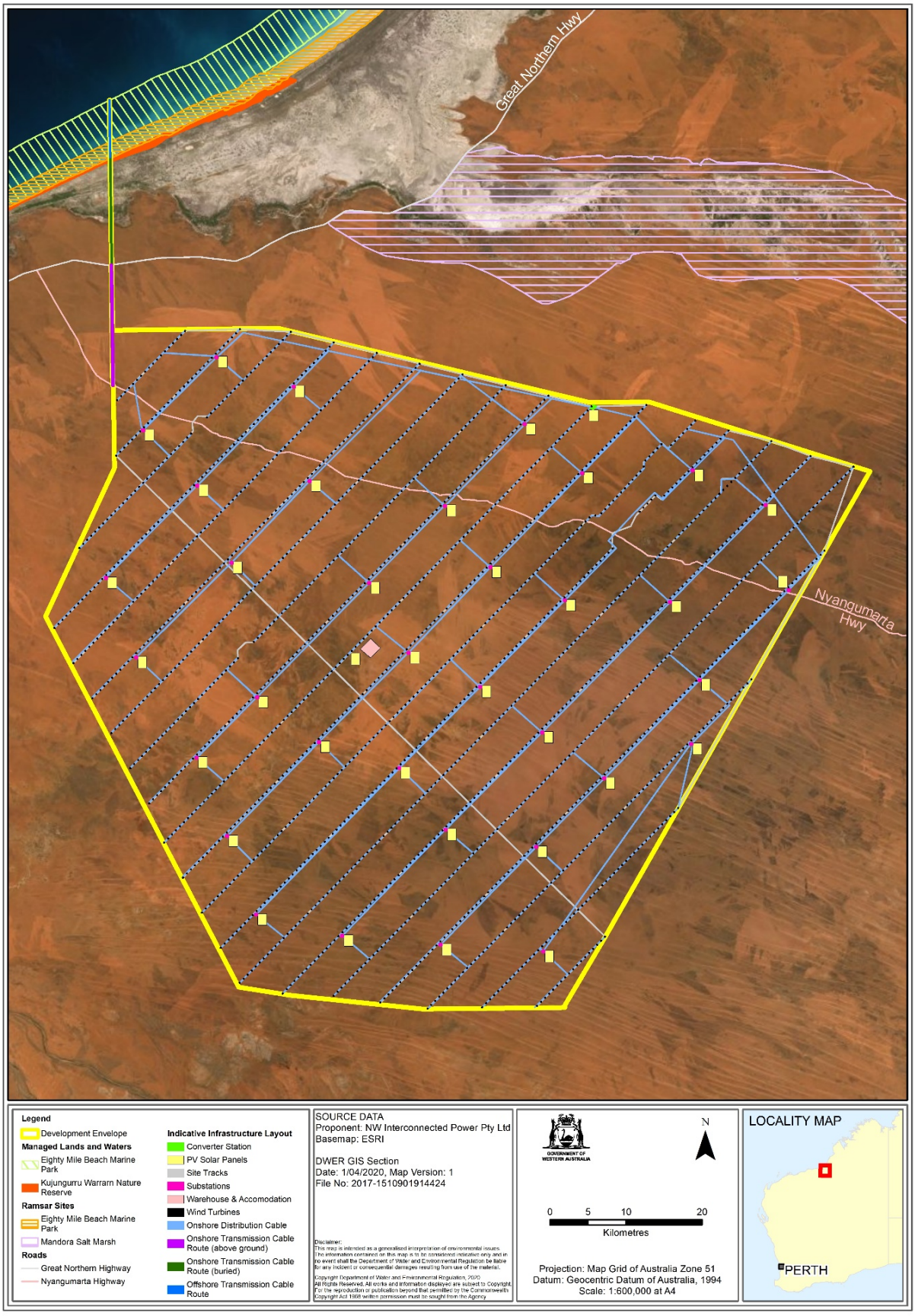

Figure 2: Development envelope and indicative footprint

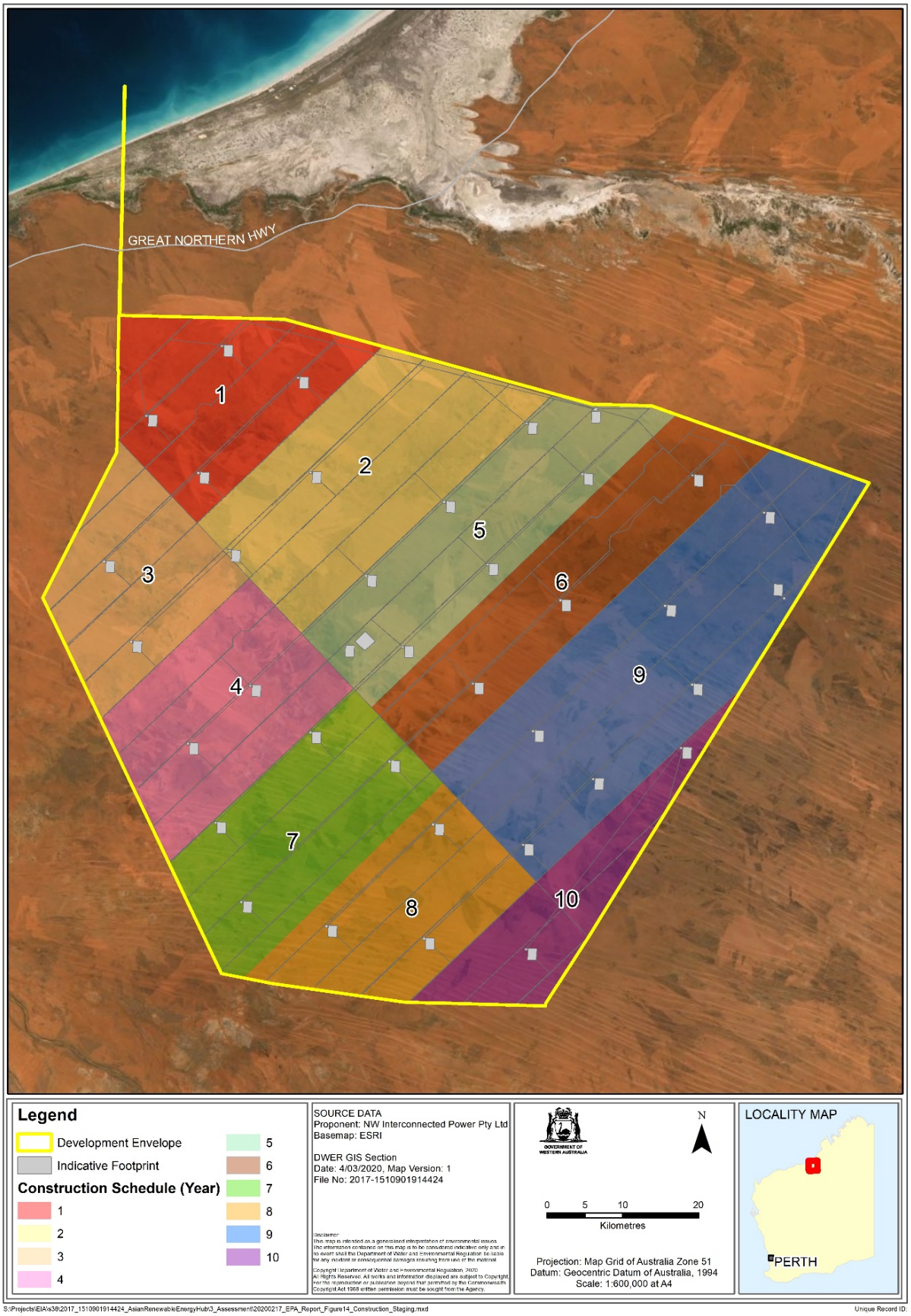

Figure 3: Proposed staged implementation

2.1 Changes to the proposal during assessment

The proponent requested the EPA consent to a change to the proposal during the assessment on 13 December 2018. The change was to:

- increase the extent of native vegetation clearing from 7,370 ha to 11,962 ha
- increase the number of cables exporting power from two to four (with a corresponding increase in temporary disturbance of the seabed from 3 ha to 15.3 ha)
- increase the total number of wind turbines and their capacity
- increase the total number of solar panel arrays and associated infrastructure.

The Chairman, as a delegate of the EPA, concluded that the changes were unlikely to significantly increase any impact that the proposal may have on the environment and gave consent under s. 43A of the EP Act to the change on 14 February 2019.

Tables 1 and 2 above include this change.

2.2 Context

The proposal is located within the Shire of Pilbara, with the offshore cable route located within the Shire of Broome. The proposal will be implemented in a staged manner, with a total of 10 stages (Figure 3). Each stage will be constructed annually over a 10-year period.

The development envelope is located on Unallocated Crown Land which currently has three oil and gas exploration permit applications. In May 2016, the proponent was granted a section 91 Licence under the *Land Administration Act 1997*, which covers about 14,000 km^2, and gives exclusive rights to develop a renewable energy project on the proposed site.

The coastal sections traversed by the cable corridor lie within the southern end of the Pindanland subregion of the Dampierland bioregion, while the inland areas of the main development envelope lie near the western edges of the McLarty and Mackay subregions of the Great Sandy Desert bioregion (Biota 2018a).

The proposed cable route traverses a pastoral station and the Kunjunguru-Warrarn Nature Reserve, which the proponent has been granted an easement to pass through.

The cable route also includes going through the Eighty Mile Beach Marine Park and Ramsar site and runs through state waters (below seabed). The Walyarta Conservation Park (Mandora Salt Marsh Ramsar site) is located 13 km to the north of the northern boundary of the development envelope.

The development envelope is within the Nyangumarta Native Title Claim area and the proponent is currently negotiating the terms of an Indigenous Land User Agreement.

3. Consultation

The EPA advertised the referral information for the proposal for public comment in November 2017 and received six submissions. Of these six submissions, one requested 'Do Not Assess', one submission requested 'Assess – Environmental Review – No Public Review' and four submissions requested 'Assess – Public Environmental Review'.

The proponent consulted with government agencies and key stakeholders during the preparation of the ERD. The agencies and stakeholders consulted, the issues raised and the proponent's response are detailed in Table 3.1 of the ERD (Biota 2019a).

A total of six agency submissions and 10 public submissions were received during the public review period. The key issues raised relate to:

- The Fire Management and Monitoring Strategy and the level of confidence needed so that the projects fire management activities will benefit the flora, vegetation and terrestrial fauna within the development envelope.
- The potential for increased wind erosion and sand dune mobilisation.
- The Construction Environmental Management Plan and how the potential impacts of the proposal would be managed to protect the environment.
- The outcomes for rehabilitation and closure of the proposal.
- The construction of the marine components of the proposal and the key spawning and pupping events of local marine fauna.
- The potential impacts to marine fauna from electromagnetic field generation, including the proposed methodology for cable installation and potential impacts from construction and operation.
- The potential impacts on birds, including migratory birds. Scientific justification regarding the proposed management of bilbies. Issues include, but are not limited to, predation given the implementation of the proposal will create highways for predator movement, and fire as a mitigation measure prior to construction.

The proponent addressed the issues raised in the Response to Submissions document (Biota 2019b), Environmental Management Plan (Biota 2020a) and Fire Management Strategy (Biota 2020b).

The EPA considers the consultation process has been appropriate and reasonable steps have been taken to inform the community and stakeholders about the proposed development. Relevant significant environmental issues identified from this process were taken into account by the EPA during its assessment of the proposal.

4. Key environmental factors

In undertaking its assessment of the proposal and preparing this report, the EPA had regard for the object and principles in s. 4A of the EP Act to the extent relevant to the particular matters that were considered.

The EPA considered the following information during its assessment:

- proponent's referral information, ERD and draft management plans
- public comments received on the referral, stakeholder comments received during the preparation of the proponent's documentation and public and agency comments received on the ERD
- proponent's response to submissions raised during the public review of the ERD
- EPA's own inquiries
- *Statement of environmental principles, factors and objectives* (EPA 2018b)
- relevant principles, policy and guidance referred to in the assessment of each key environmental factor in sections 4.1 to 4.3.

Having regard to the EP Act principles, the EPA considered the following principles were particularly relevant to its assessment of the proposal:

1. **The precautionary principle** – Terrestrial fauna, flora and vegetation could be significantly impacted by the proposal. Investigations into the biological and physical environment undertaken by the proponent have provided sufficient scientific certainty to assess the risks and identify measures to avoid or minimise impacts. The EPA notes that the proponent has identified measures to avoid or minimise impacts. The EPA also notes an adaptive management approach will be taken to fire management and has recommended conditions for staging of the fire management plans and independent reviews. The EPA has recommended conditions to ensure these measures are implemented by the proponent.
2. **The principle of intergenerational equity** – Terrestrial fauna, flora and vegetation could be significantly impacted by the proposal. The EPA notes that the proponent has identified measures to avoid or minimise impacts. The EPA has considered these measures during its assessment and has concluded that provided the recommended conditions are imposed on the implementation and decommissioning of the proposal, the environmental values will be protected, and the health, diversity and productivity of the environment will be maintained for the benefit of future generations. The EPA also notes that the proponent is seeking to implement a renewable energy project.
3. **The principle of the conservation of biological diversity and ecological integrity** – Terrestrial fauna, flora and vegetation could be significantly impacted by the proposal. The EPA notes that the proponent has identified measures to avoid or minimise impacts by avoiding black-footed rock-wallaby habitat and most populations of priority flora. The EPA also notes that the development envelope is of a scale that further targeted surveys and detailed design can further minimise potential impacts. The EPA notes an adaptive management approach will be taken to fire management and has recommended conditions for staging of the fire management plans and independent reviews. From its assessment of this

proposal the EPA has concluded that the proposal would not compromise the biological diversity and ecological integrity of the affected areas.

4. **Principles relating to improved valuation, pricing and incentive mechanisms** – The EPA notes that the proponent would bear the costs relating to mitigation and management of proposal-related impacts to flora, vegetation and terrestrial fauna. The EPA notes that by its very nature the proposal will not generate intractable or large volume waste streams. Hydrocarbon and putrescible wastes management during construction and operations will be contained and managed through standard practices. The EPA has had regard to this principle during the assessment of the proposal.
5. **The principle of waste minimisation** – The EPA notes that the proponent proposes to minimise waste by adopting the hierarchy of waste controls; avoid and reuse at waste stream sources, reuse and recycle where practicable and treat and/or dispose of waste in accordance with regulated requirements. The EPA also notes that the proposal by its very nature will not generate intractable or large waste streams. The EPA has had regard to this principle during the assessment of the proposal.

Appendix 2 of this report provides a summary of the principles and how the EPA considered these principles in its assessment.

Having regard to the above information, the EPA identified the following key environmental factors during the course of its assessment of the proposal:

- **Terrestrial Fauna** – The proposal requires the clearing of 11,962 ha of terrestrial fauna habitat for the construction of proposal infrastructure. Implementation of a Fire Management Strategy will include prescribed burns within fauna habitat. The installation and operation of wind turbines may impact on terrestrial fauna.
- **Flora and Vegetation** – The proposal would directly impact on 11,962 ha of native vegetation for the construction of proposal infrastructure, which includes access roads, turbine pads, solar panel arrays, substations and transmission lines.
- **Benthic Communities and Habitats** – The proposal would disturb 15.3 ha of benthic habitat from the installation of four HVDC cables.
- **Marine Environmental Quality** – The proposal involves the installation, operation, maintenance and decommissioning of four subsea export HVDC cables through Eighty Mile Beach Marine Park and state waters, which may impact on marine environmental quality.
- **Marine Fauna** – The proposal involves the installation, operation, maintenance and decommissioning of subsea export cables through Eighty Mile Beach Marine Park and state waters. Incoming vessel movements associated with the importation of wind turbines and solar panels may impact marine fauna movement.

The EPA considered other environmental factors during the course of its assessment of the proposal. These factors, which were not identified as key environmental factors, are discussed in the proponent's ERD (Biota 2019a). Appendix 3 of this

report contains an evaluation of why these other environmental factors were not identified as key environmental factors.

The EPA's assessment of the proposal's impacts on the key environmental factors is provided in sections 4.1 to 4.3. These sections outline whether or not the EPA considers that the impacts on each factor are manageable. Section 6 provides the EPA's recommendation as to whether or not the proposal may be implemented.

Assessment on behalf of Commonwealth

The EPA assessed the proposal on behalf of the Commonwealth Minister for Environment as an accredited assessment. The EPA has addressed Matters of National Environmental Significance (MNES) under each relevant factor and has summarised its assessment of MNES in section 5.

4.1 Terrestrial Fauna

The EPA's environmental objective for this factor is *to protect terrestrial fauna so that biological diversity and ecological integrity is maintained.*

Relevant policy and guidance

The EPA considers the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016d)
- *Technical Guidance – Sampling methods for terrestrial vertebrate fauna* (EPA 2016j)
- *Technical Guidance – Terrestrial Fauna Surveys* (EPA 2016k)
- *Technical Guidance – Sampling of short range endemic invertebrate fauna* (EPA 2016i)
- *Survey Guidelines for Australia's Threatened Mammals* (DSEWPaC 2011)
- *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010)
- *EPBC Act Policy Statement 3.21: Industry Guidelines for Avoiding, Assessing and Mitigating impacts on EPBC Act listed Migratory Shorebird Species* (Commonwealth of Australia 2017a)
- *EPBC Act Policy Statement 2.3: Wind Farm Industry* (Commonwealth of Australia 2009b)
- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016d).

EPA assessment

The proposal involves the clearing of 11,962 ha of native vegetation and the resulting loss of fauna habitat. Six major fauna habitats were identified and mapped across the development envelope (Figure 4). Table 4.11 in the proponent's ERD (Biota 2019a) provides details of each habitat, together with the land system where it is typically found within the development envelope. The proposal will intersect all six fauna habitats.

The EPA's assessment of the potential impacts and management on terrestrial fauna is discussed below with respect to the key subheadings:

- Land-dwelling fauna
- Avifauna.

Land-dwelling fauna

The proponent conducted a Level 2 terrestrial vertebrate fauna survey with targeted sampling for conservation significant terrestrial fauna species, and sampling for potential short-range endemic invertebrate fauna (Biota 2018a).

Conservation significant fauna includes species listed as:

- Threatened or Specially Protected (includes migratory species) under the *Biodiversity Conservation Act 2016*
- Threatened or Migratory species under the EPBC Act
- Priority species listed by the Department of Biodiversity, Conservation and Attractions (DBCA).

Survey results include the following:

- 31 mammal species, including the threatened black-footed rock-wallaby, bilby and northern quoll and five priority fauna species
- 77 species of reptiles and frogs
- 63 short range endemic invertebrate fauna, comprised of 29 trapdoor spiders, 10 scorpions and 24 land snails.

The EPA notes that the surveys were not undertaken fully in accordance with the relevant guidance due to the large geographic extent of the development envelope. However, the EPA considers the surveys provide sufficient context and information for the assessment of the proposal.

The proposal is situated in the inter-zone between the Pilbara and Kimberley regions. The faunal assemblage recorded shares greater similarity with the Pilbara, with very few Kimberley distribution species recorded during surveys (Biota 2018a). Some species recorded during the survey have well known distributions in the Pilbara, but had not previously been recorded as far north as the study area for the proposal.

Potential impacts

Based on the results of the surveys and the presence of species likely to occur, the EPA considers the potential significant impacts to conservation significant fauna from the proposal are:

- clearing of 11,962 ha of fauna habitats, including 11,147 ha of bilby preferred 'shrub and spinifex on sandplain habitat'
- the proposed implementation of a large scale and long-term (662,400 ha development envelope over the approximate 50-year life of the proposal) staged Fire Management Plan to mitigate current dominant wildfires
- the potential impacts to bilby and black-footed rock-wallaby, and changes to fauna and flora biodiversity and ecological processes in response to altered fire ecology
- introduction and spread of weeds during earthworks and construction activities
- increased feral fauna movement through the landscape
- long-term presence of access tracks partitioning the development envelope
- vehicle strike from operational vehicle movements
- project-induced wildfires and off-road driving impacts on habitat.

Black-footed rock-wallaby

Surveys discovered a new population of the endangered black-footed rock-wallaby (Biota 2018a). Targeted surveys identified activity of the species at multiple sites within the 'rock pile and breakaway habitat' in the northeast of the development envelope. This species is restricted to sites with suitable rocky habitat.

Records of the black-footed rock-wallaby within the development envelope are regionally significant due to the conservation significance of the species, and because they represent the only recent evidence of the species from the Great Sandy Desert. While the number of animals present in the colony cannot be determined from the proponent's survey, numerous scats were collected and individuals were regularly sighted on rock pile habitat (Biota 2018a).

Contextual survey work (Biota 2018a) undertaken as part of the targeted survey also identified significant black-footed rock-wallaby activity at a rock pile outside of the development envelope, within the recently vested Walyarta Conservation Park to the immediate north. This represents a significant new recognised biodiversity value within the conservation park. It also ensures that part of the habitat of the local population has a level of security, being located within the conservation estate.

In recognition of the significance of the new population of black-footed rock-wallaby, the proponent has undertaken the following:

- Mapped all confirmed and potential rock-wallaby core habitat and applied a minimum 1 km no development buffer to the habitat, with provision for connection between certain rock piles within the buffers.

- Modified the conceptual design for the proposal to avoid clearing impacts on both core rock pile habitat and surrounding foraging and local movement habitat.
- Conceptual realignment of the existing Nyangumarta Highway where it currently runs between several active rock piles that are separated by relatively short distances. This will remove the risk posed by existing and future vehicle movements through core habitat.

The EPA notes the proponent has recognised the significance of the newly discovered population and the potential impact pathways at an early stage of the design of the proposal. The EPA considers that the ratio of area in the development envelope (662,400 ha) to permanent clearing (11,962 ha) will allow the proponent sufficient opportunities to minimise impacts through implementation of a 1 km buffer to active rock piles.

The EPA is aware the realignment of the existing Nyangumarta Highway may be undertaken in the near future by a mining company undertaking exploration activities to the south east of the development envelope. The EPA understands that the Department of Water and Environmental Regulation is in discussion with the Department of Mines, Industry Relations and Safety to clarify this matter.

The outcomes of the proponent's mitigation process are shown visually in Figure 5, which shows A) the original conceptual design, and B) the modified conceptual design that the proponent has adopted to avoid impacts on black-footed rock-wallaby. This approach by the proponent has significantly mitigated potential impacts of the proposal on the species.

The EPA has recommended conditions 7-1(8) and 7-1(9) to ensure the proponent implements a minimum 1 km no impact buffer zone around any active black-footed rock-wallaby rock pile habitat within the development envelope. However, noting the long construction schedule and that other rock piles may host future populations of black-footed rock-wallaby, the EPA also recommended condition 8-1(3) to ensure that black-footed rock-wallaby habitat is avoided during implementation of each stage of the proposal.

The species is also susceptible to indirect impacts from predation by feral fauna (foxes and cats) and habitat degradation by introduced herbivores, and to changes in habitat and food availability caused by changed fire regimes.

The proposal has potential to increase feral fauna activity due to human induced increases in food availability via construction and operation camps, and by the construction of 2,303 ha of site access tracks partitioning the development envelope and potentially allowing for greater feral fauna movement. The EPA has recommended conditions 7-1(3) and 7-1(7) to ensure there are no significant increased impacts from weeds or feral animals on the species from implementation of the proposal.

Altered fire regimes, either through the partitioning of the development envelope from site access tracks or the implementation of the large-scale prescribed burn staged Fire Management Plan (discussed further below) have the potential to impact the species if not managed appropriately. The EPA has recommended the proponent

monitor and manage the species during implementation of the Staged Fire Management Plan (recommended condition 6).

Bilby

The bilby (vulnerable) was recorded at multiple locations surrounding the development envelope and was relatively commonly recorded. While the number of individuals present within the development envelope is not known, available information suggests it may be at similar density to other equivalent habitat in the locality. The information presented by the proponent indicates that there is no evidence a regionally significant population is present (Biota 2018a).

Unlike the black-footed rock-wallaby, the bilby is not site-dedicated and move through areas of suitable habitat over time, mostly in response to fire history, vegetation recovery and rainfall (Cramer et al. 2016). The relationship between bilby records from the development envelope and time since last fire indicates current activity is focused in suitable habitats that are about six years since last burnt. This is shown in Figure 6.

This is broadly in keeping with findings elsewhere, which suggest that bilby generally use habitats that are regenerating from fire. This is particularly so when adjoining habitat patches are greater than six years since last burnt, and where rainfall has recruited *Acacia* and other colonist species that provide foraging resources (Cramer et al. 2016[1]).

This preference for vegetation of a certain age has directed the proponent's approach to avoid and mitigate the proposal's potential impacts on the species. This approach involves the implementation of a prescribed burn program that manages both construction-based direct impacts and long-term operational impacts. The proposed management of potential impacts on the bilby by using prescribed burns is discussed in detail below.

Regarding the direct loss of habitat, the EPA notes the bilby's ability to move through the landscape, and that about 98 per cent of the development envelope following construction will contain suitable habitat for both burrow construction and will support the flora species known to be important in the species' diet. Therefore, the EPA considers this loss of potential habitat from clearing is relatively small in the context of the proposal development envelope and unlikely to have a significant residual impact on the local or regional populations and therefore will not require an offset.

In concluding that an offset is not required, the EPA notes the proposed work to be undertaken regarding landscape scale fire management and that the proposal is located in the Great Sandy Desert IBSA bioregion which is not included in the Pilbara Environmental Offsets Fund.

Like the black-footed rock-wallaby, bilby is also susceptible to indirect impacts from feral fauna and weeds. The EPA has recommended conditions 7-1(3) and 7-1(7) to ensure that there are no significant increased impacts from weeds or feral animals on the species from implementation of the proposal.

[1] https://www.publish.csiro.au/AM/AM16009

Other mammals

The proponent's fauna surveys also recorded the northern quoll (endangered), spectacled hare-wallaby (priority 3), brush-tailed mulgara (priority 4), northern marsupial mole (priority 4), western pebble-mound mouse (priority 4) and Dampier plain slider (priority 2).

All records of these species from the development envelope are new and represent additional populations to those previously known. The proposal would therefore not alter the conservation status of any of the fauna species known from the development envelope.

Two single scat records of the northern quoll were recorded from the development envelope with no evidence of denning or regular foraging activity recorded during the proponent's surveys. Considering 98 per cent of the preferred habitat for all the fauna species is to be retained within the development envelope (Table 4.17; Figure 4.25 of ERD), the direct impacts are not considered to be significant. Other potential indirect impacts that could affect fauna, including spread of feral fauna, weed introduction, changes to fire regimes and general construction activities, can be mitigated through the provided management provisions in the proponent's environmental management plan, in accordance with the EPA's recommended conditions 7-1 and 7-3.

Short range endemic fauna

Three species of trapdoor spiders from the proponent's survey were conservatively treated as potential short range endemics (Biota 2018a). These are all undescribed and are potentially newly recorded species. The EPA notes the proponent has committed to relocate the distribution pylon and associated access tracks to avoid the locations of the species.

The EPA considers it highly unlikely the potential impacts from the proposal on the species would be significant. As such there are no recommended conditions specific to short range endemics. However, the EPA notes the proponent has included the avoidance of the short range endemic fauna sites within their Environmental Management Plan. The EPA has recommended an Environmental Management Plan in condition 7-1.

Fire management

At present, the development envelope is subject to a frequent and uncontrolled fire regime, which results in extensive and intense wildfires that reduce overall habitat diversity. The proponent considers this has a significant negative impact on vegetation and fauna diversity and occurrence at the landscape scale. The 10-year fire history of the site is shown in Figure 7.

Fire management is considered a key issue, as fire is the major ecological process occurring within the proposal area. The proponent is proposing to mitigate wildfire risk by implementing a Fire Management Strategy (FMS) (Biota 2020b) across the 662,400 ha development envelope.

The FMS advocates large scale prescribed burning to reduce impacts on conservation significant fauna and landscape biodiversity values during construction and operations. The FMS also has other objectives including protection of infrastructure assets and workforce personnel.

The proponent is proposing to create a mosaic of large scale (about 15,000 ha) partitioned vegetation blocks with a diversity of time-since-burnt mosaics by implementing a staged prescribed burning program throughout the 50-year life of the proposal. This is proposed to allow areas of planned disturbance (for example, vegetation clearing) to be unattractive to conservation significant fauna, mainly the bilby.

This may encourage bilby populations to move within the landscape through means of their own behavioural ecology, relocating from planned construction areas into adjoining areas that are regenerating from fire with suitable habitat before disturbance for construction occurs.

The EPA considers there is some uncertainty regarding the proposed use of fire as a management measure for biodiversity outcomes due to:

- the unprecedented scale of the landscape proposed to be managed with prescribed burns
- the relatively new science regarding fire-mediated relocation of bilby populations
- the complexity of creating and managing a mosaic of time since fire vegetation mosaics with appropriate bilby habitat
- the achievability of implementing the FMS to meet a competing set of objectives.

There is knowledge available from other landscape-scale fire management practised elsewhere in Australia. In the spinifex hummock grasslands of the Pilbara and western deserts, large-scale fire management is implemented by state government organisations, such as the DBCA and the Department of Fire and Emergency Services. Non-government organisations such as the 10 Deserts Proposal, and Kanyirninpa Jukurrpa (the land and culture organisation of the Martu people) and pastoral enterprises also undertake fire management.

Indigenous fire management programs are now successfully applied on broad geographic scales (Robinson et al. 2016). The proponent has stated that potential partnerships with such organisations are possible for proposed landscape-scale burning programs within the development envelope and will be actively pursued.

There is also scientific evidence that bilby respond to fire by moving away from burrows located within recently burnt areas, establishing new residence burrows in nearby unburnt vegetation (Southgate and Carthew 2007[2]; Southgate et al. 2007; Cramer et al. 2016; Dziminski and Southgate 2017).

To address the uncertainty regarding the use of fire as a landscape management mechanism, the proponent has committed to undertaking the fire management

[2] https://www.publish.csiro.au/WF/WF06046

program in a staged manner. Prescribed burning in stage one will begin at least 36 months prior to ground disturbing activities and will cover the approximately 15,000 ha block required for the initial stage of construction.

This staged approach will provide the proponent with the opportunity to refine and develop best practice and proposal specific approaches, including:

- testing burn prescriptions
- testing methods to create and manage mosaics of vegetation age class
- monitoring procedures to detect changes to bilby behavior, numbers and distribution
- monitoring procedures for weed and feral animal responses post burns
- developing a range of methods to adaptively manage the prescribed burns.

The EPA notes that the current dominant ecological process across the development envelope are extensive and intense high temperature wildfires that reduce overall biological diversity and ecological integrity. The EPA considers that the proponent's proposed prescribed burning regime can potentially facilitate smaller, less intense and lower temperature-controlled burns that mitigate those that currently occur.

The EPA notes that the implementation of landscape-scale prescribed burning may result in other potential negative impacts. These include improved hunting and grazing conditions for feral carnivore and herbivore fauna, and promoting suitable conditions for weed and invasive species to dominate regrowth altering fauna habitat. The EPA notes that the proponent is proposing feral animal and weed management as part of their environmental management program. However, it is uncertain the consequential impacts any increases in number and distribution may have on conservation significant fauna, and the scale of management response required.

The DBCA has advised that the approach of the fire management strategy (in combination with the management of other processes including weeds and feral animals), provides a suitable framework to reduce the likely risks and residual impacts on conservation significant values. However, the DBCA considers that the management provisions require further development before the effectiveness of this approach could be confirmed. The DBCA noted this program could have a conservation benefit in the long-term as the knowledge gained could significantly contribute towards increasing scientific understanding regarding proposals that affect similar environmental values.

Based on the above, the EPA has recommended condition 6 that requires a Staged Fire Management Plan be implemented in a staged approach. This will ensure the proponent develops a site specific and best practice approach at a smaller scale prior to implementing a fire management approach across the development envelope. Noting the remaining uncertainties, the EPA has recommended conditions that require the proponent to:

- Minimise proposal-related impacts to the bilby and the black-footed rock-wallaby in the development envelope as defined in schedule 1 of the recommended conditions (condition 6-1(1)).
- Demonstrate how pre-construction and operational prescribed burning will be implemented and staged to create diverse fire age mosaics and range of bilby habitats (condition 6-6(3)).
- Specify measures and actions to ensure prescribed burning activities passively relocate bilby away from areas of scheduled construction (condition 6-2(2)).
- Detail how the baseline state for weeds, vegetation composition and fire age (time-since-burnt); and feral animal, bilby and black-footed rock-wallaby prior to prescribed burning will be determined (condition 6-2(3)).
- Include a program of ongoing consultation with nearby stakeholders, traditional land owners and surrounding land users (condition 6-6(5)).
- Facilitate a Performance Report be undertaken by an independent and approved fire ecologist, that will determine whether the Staged Fire Management Plan is achieving the objective of minimising impacts to bilby and black-footed rock wallaby. This review will be required every five years (conditions 6-10 and 6-11).

The EPA notes the information and potential results obtained through the implementation of the Staged Fire Management Plan will be collected over a long period of time (about 50 years) and could be substantial. The EPA considers this information, if publicly available and shared, may promote collaboration with interested organisations, such as the Pilbara Environmental Offsets Fund and the Western Australian Biodiversity Science Institute, and provide valuable information for future conservation research purposes and on-ground management of conservation significant species in similar arid environments.

Avifauna

The proponent undertook avifauna surveys that included aerial, ground and on-water avifauna counts of the surrounding wetlands and reserves. The proponent deployed automated call recording (bird) and ultrasonic call recording units (bats) within the development envelope, and completed a desktop study of existing literature.

The proponent also completed targeted migratory shorebird and waterbird surveys at Eighty Mile Beach Marine Park Ramsar site (Eighty Mile Beach) and Mandora Salt Marsh Ramsar site (Mandora Marsh) (Biota 2018c). During the survey, abnormally high rainfall occurred, and the Mandora Marsh flooded. The proponent took this opportunity to complete an assessment of non-migratory waterbird usage of the flooded Mandora Marsh. The details of how this assessment was conducted are included in the proponent's ERD (Biota 2019a).

Surveys undertaken recorded:

- 20 species of migratory shorebird, with a combined total of 17,961 individual migratory birds at Eighty Mile Beach.
- 29 species migratory shorebird and waterbird, with a combined total of 77,648 individual waterbirds and shorebirds at Mandora Marsh. The proponent noted

that dominant species recorded at the Mandora Marsh during different times of the year changed markedly, reflecting the change in available food sources from fish and macro-invertebrates to aquatic plants and smaller invertebrates.

- One migratory shorebird (oriental pratincole) in the development envelope.
- Nine bat species in the development envelope, none of which are of conservation significance and are common in the northwest.
- 68 bird species in the development envelope, including eight species of raptors.

Potential impacts

Avifauna is considered a key issue, since about 13 km to the north of the development envelope is the Mandora Marsh. This is located within the Walyarta Conservation Park and about 26 km to the north-west is the Eighty Mile Beach Marine Park (Figures 1 and 2). Both reserves are listed Ramsar sites and are used by conservation significant international and local migratory birds.

There is potential for high numbers of conservation significant avifauna to interact with the infrastructure once operational. For context, the complete shorebird counts of Eighty Mile Beach have yielded numbers greater than 450,000 migratory shorebirds, the highest abundance known for any shorebird site in Australia and amongst the highest across all sites along the East Asian Australasian Flyway. The Mandora Marsh is an ephemeral body, but when flooded, is known to have 500,000 migratory shorebirds congregate.

The EPA notes the data on the flight routes used by the migratory birds between north-western and southern Australia is very limited and the routes are not well understood. This also includes localised movements between coastal areas and relatively closer inland lakes (in wet years). However, there are no regular wetland systems that would be used by shorebirds or waterbirds within the development envelope.

Wind turbines and transmission and distribution infrastructure

There is potential for migratory and water birds to fly over the development envelope when moving from both Ramsar sites to the north of the development envelope to southern parts of Australia. This could create the potential for collision with wind turbines, dependent on the flight heights of the bird species relative to the wind turbine rotor heights.

Avifauna flight height is variable and depends on species' specific behaviour. Birds on migration will fly at greater heights, while birds engaged in localised or regional movements are likely to be at a low altitude, increasing the risk of collision. The design for the project is based on turbines that have an upper most rotor swing of about 260 m and a lower swing limit of about 90 m above the ground. Birds that regularly fly above or below this range would therefore be at low risk of collision with the rotors, even if they pass directly across the location of any of the operational turbines.

A comparison of the available data on waterbird and migratory shorebird flying heights, and the upper and lower rotor swing heights of the turbines, is shown in

Figure 4.27 of the proponent's ERD (Biota 2019a). Based on the full range of values cited in the proponent's literature review (shown in table 4.19 of the ERD), there is no overlap between the rotor swing range height and the flight heights documented for migratory shorebirds.

The EPA notes that of the avifauna recorded within the development envelope that are not water or shorebirds, about 84 per cent, in terms of individual abundance (1,501 of the 1,792 records) are passerine songbirds (Biota 2018a). These species do not fly significantly higher than the vegetation layer (less than10 m) and would therefore not be at risk of rotor collision.

Of the non-passerines, the raptors (birds of prey) are most at risk of collision with turbine rotors. None of the raptors recorded (Biota 2018a) were of elevated conservation significance. However, a risk remains that some individuals may have potential collisions due to their foraging behaviour placing them into the height range of the turbine rotors.

The proponent's surveys indicate that the area does not support large numbers of raptors. This is consistent with the overall landscape of the development envelope, which includes little to no landforms that create congregation points for raptors, such as cliffs and steep valleys.

The EPA notes that some raptor species, the black kite (*Milvus migrans*) in particular, can be attracted in numbers to fires as they prey on fleeing insects and small animals along the fire front (Bonta et al 2017[3]). The implementation of the proposed Staged Fire Management Plan (discussed above), may attract raptors to close proximity of the wind turbines.

Therefore, the EPA has recommended condition 7-1(5) to ensure protocols are prepared to reduce the risk of collision during the implementation of the Staged Fire Management Plan.

The pylons for the overhead power lines will be between 30 and 50 m in height, with the cables also in this same height range. As discussed above, these heights are below the level that migratory shorebird and waterbirds are likely to be flying at should they pass over the main development envelope. The EPA notes the likelihood of shorebirds or waterbirds flying at lower heights will increase as the transmission corridor approaches Eighty Mile Beach, where the vast majority of the shorebird activity is focussed. The proponent's mitigation strategies are discussed below.

Avifauna mitigation and management

The proponent's proposed avifauna mitigation includes selection and siting of the development envelope at the macro-scale to provide a separation distance of 26 km between the coastal portion of the Eighty Mile Beach Ramsar site and 13 km from the Mandora Salt Marsh Ramsar site (refer to Figure 1). For context of the separation distances, Rottnest Island is about 18 km from the Western Australian coast.

[3] http://www.bioone.org/doi/full/10.2993/0278-0771-37.4.700

The individual turbine spacing in each row are separated by about 800 m and each row of turbines is spaced in excess of four km from the next row. The site selection and spacing of the turbines has been chosen to reduce the risk of avifauna interacting with turbines.

In addition to the separation distances and turbine spacing mitigation, the proponent's proposed management measures include implementation of bird radar and real-time high definition video avifauna monitoring during operations. Operational protocols are proposed to shut down operation of individual turbines in advance if significant flocks of birds are detected on approach, and implementation of an avifauna impacts monitoring program.

With respect to the transmission lines and distribution infrastructure, the EPA notes the proponent has proposed an avoidance approach by burying the transmission line from the Great Northern Highway to the coast, a distance of about 14 km. The EPA agrees with the proponent's avoidance of potential impacts and has recommended this be controlled through the authorised extent in schedule 1.

The EPA notes the proponent has also committed to avifauna best practice overhead power lines within the main development envelope. All infrastructure that presents an electrocution risk will be designed with bird shielding to prevent perching and contacting. This also includes line visibility devices on overhead cabling in areas close to avifauna habitat at industry standard spacing's to minimise the risk of bird interactions.

The large scale of the proposal and high number of wind turbines (1,743) has the potential to impact avifauna, if not managed appropriately. The EPA has recommended:

- The separation distances of the development envelope from the Ramsar sites and spacing of the turbines and turbine rows be controlled through the authorised extent in schedule 1.
- The burying of the transmission line from the Great Northern Highway to the coast be controlled through the authorised extent in schedule 1.
- A requirement for the proponent to minimise turbine collision impacts on fire attracted raptor species when undertaking prescribed burns in accordance with recommended condition 7-1(5).
- A requirement for the proponent to minimise impacts on threatened, migratory and/or priority listed fauna from interactions with operational wind turbines and associated infrastructure (including distribution and transmission cables) in accordance with recommended condition 7-1(4).
- In accordance with recommended conditions 7-3(1), 7-3(2), 7-3(3) and 7-3(4), the proponent be required to:
    - monitor and record any avifauna impacts from turbine operations
    - detail industry best-practice bird detection and monitoring systems during operations of wind turbines

- 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
- include feasible contingency measures.

Summary

The EPA has paid particular attention to:

- *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016e)
- the large scale of the proposed 11,962 ha habitat clearing and the significant size of the 662,400 ha development envelope
- the proposed fire management across the significant 662,400 ha development envelope, how it is predicted to affect conservation significant fauna, fire attracted raptor species and more broadly the ecology of fauna and flora at a landscape scale
- the proposed use of fire to create a mosaic of vegetation ages and passively relocate bilby from areas of planned disturbance to areas of suitable habitat, and the recent science supporting this
- the ratio of development envelope (662,400 ha) to permanent clearing (11,962 ha) allowing final infrastructure layout design to avoid and minimise impacts to conservation significant habitats, such as the black-footed rock-wallaby rock pile habitat
- the staged construction of the proposal over a 10 year period, and the opportunities for adaptive management
- potential feral fauna and habitat modification from weeds, and their potential direct and indirect impacts on conservation significant fauna
- the proximity of the Eighty Mile Beach and Mandora Marsh Ramsar sites, and their importance to migratory and shorebirds
- the potential for avifauna interactions with proposal infrastructure, particularly with the 1,743 wind turbines
- the lack of conservation significant bird recordings within the development envelope
- the flight heights of avifauna compared to the turbine rotor swing range height
- the area not supporting large numbers of raptors species, but the potential for raptors to collide with turbine rotors due to their flight behavior.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Terrestrial Fauna that the impacts to this factor are manageable and would no longer be significant, provided there is:

Black-footed rock-wallaby and bilby

- control of the amount of habitat clearing through the authorised extent in schedule 1 of the recommended conditions

- a requirement for the proponent to minimise proposal-related impacts to the bilby and the black-footed rock-wallaby in the development envelope accordance with the recommended condition 6-1(1)
- a requirement for confirmed black-footed rock-wallaby rock pile habitat to be avoided, with 1 km buffers, prior to prescribed burning and construction activities in each stage of the proposal in accordance with the recommended conditions 7-1(8), 7-1(9) and 8-1(3)
- a requirement to maintain viability of populations of black-footed rock-wallaby and bilby in the development envelope from activities attributable to the implementation of the proposal;
- a requirement for feral fauna and weeds to be managed in accordance with the recommended conditions 7-1 and 7-3
- a requirement for the proponent to prepare and implement a Staged Fire Management Plan to monitor the potential impacts and benefits of a prescribed burn program in accordance with the recommended condition 6
- performance reports and independent fire ecologist reviews of the Staged Fire Management Plan every five years in accordance with recommended conditions 6-10 and 6-11.

Avifauna

- control of the separation distances between the development envelope and the Ramsar sites, and spacing of the turbines and turbine rows through the authorised extent in schedule 1
- the burying of the transmission line from the Great Northern Highway to the coast be controlled through the authorised extent in schedule 1
- a requirement for the proponent to be required to minimise turbine collision impacts on fire attracted raptor species when undertaking prescribed burns in accordance with the recommended condition 7-1(5)
- a requirement for the proponent to be required to minimise impacts on threatened, migratory and/or priority listed fauna from interactions with operational wind turbines and associated infrastructure (including distribution and transmission cables) in accordance with the recommended condition 7-1(4)
- recommended conditions 7-3(1), 7-3(2), 7-3(3) and 7-3(4) that require the proponent to:
    - detail industry best-practice bird detection and monitoring systems during operations of wind turbines
    - 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
    - monitor and record any avifauna impacts from turbine operations
    - include feasible contingency measures.

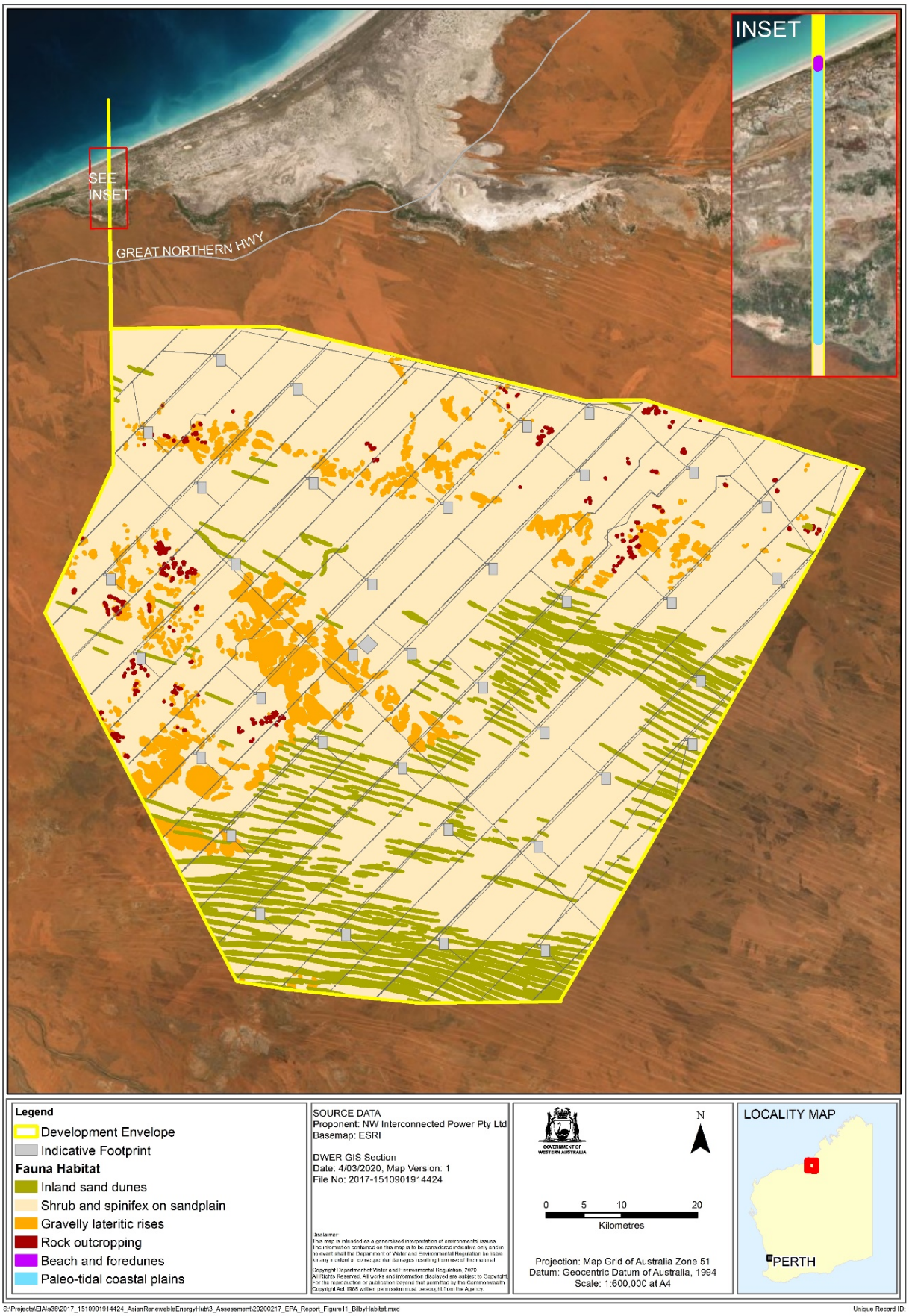

Figure 4: Mapped fauna habitat within the development envelope

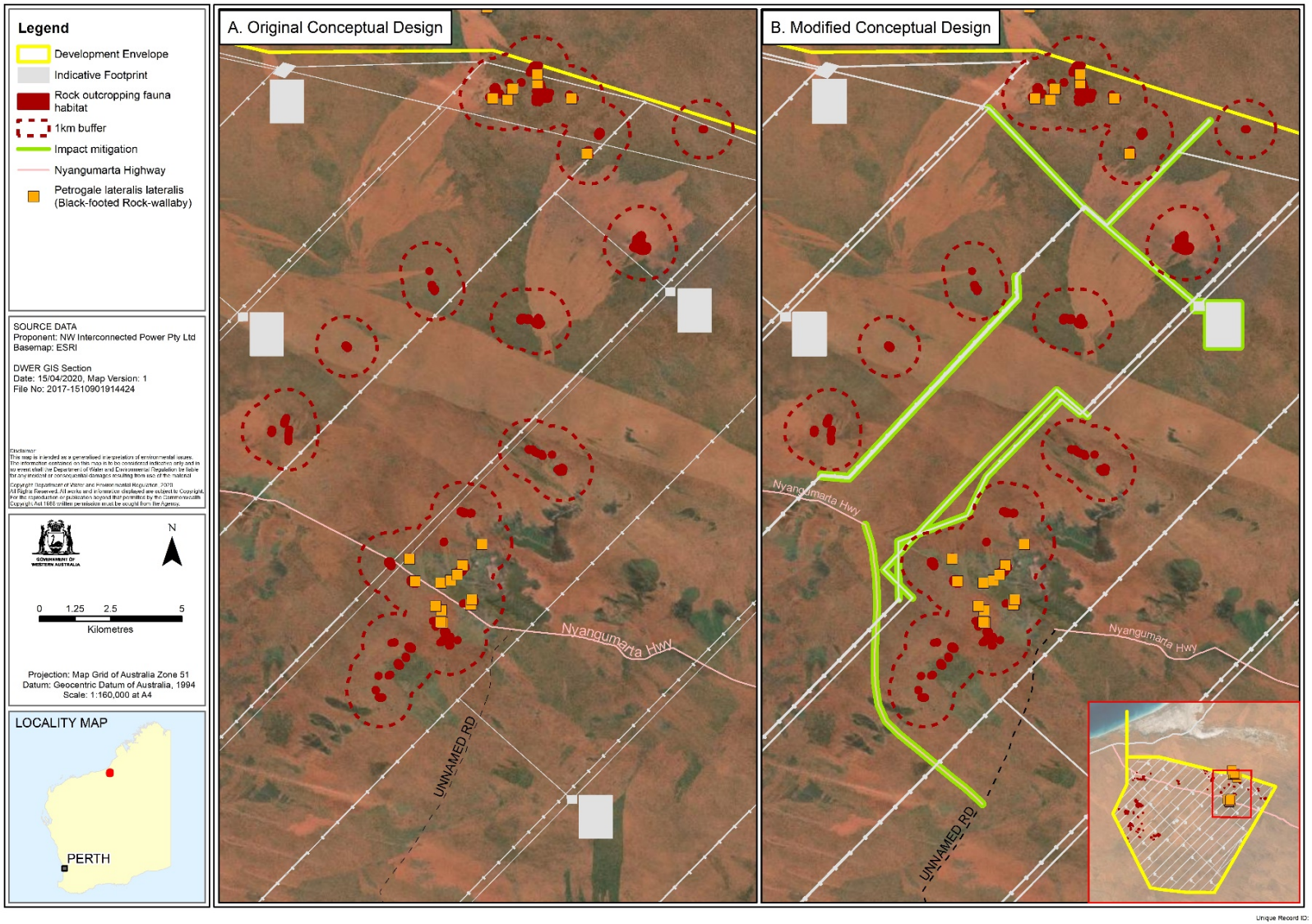

Figure 5: Black-footed rock-wallaby habitat avoidance

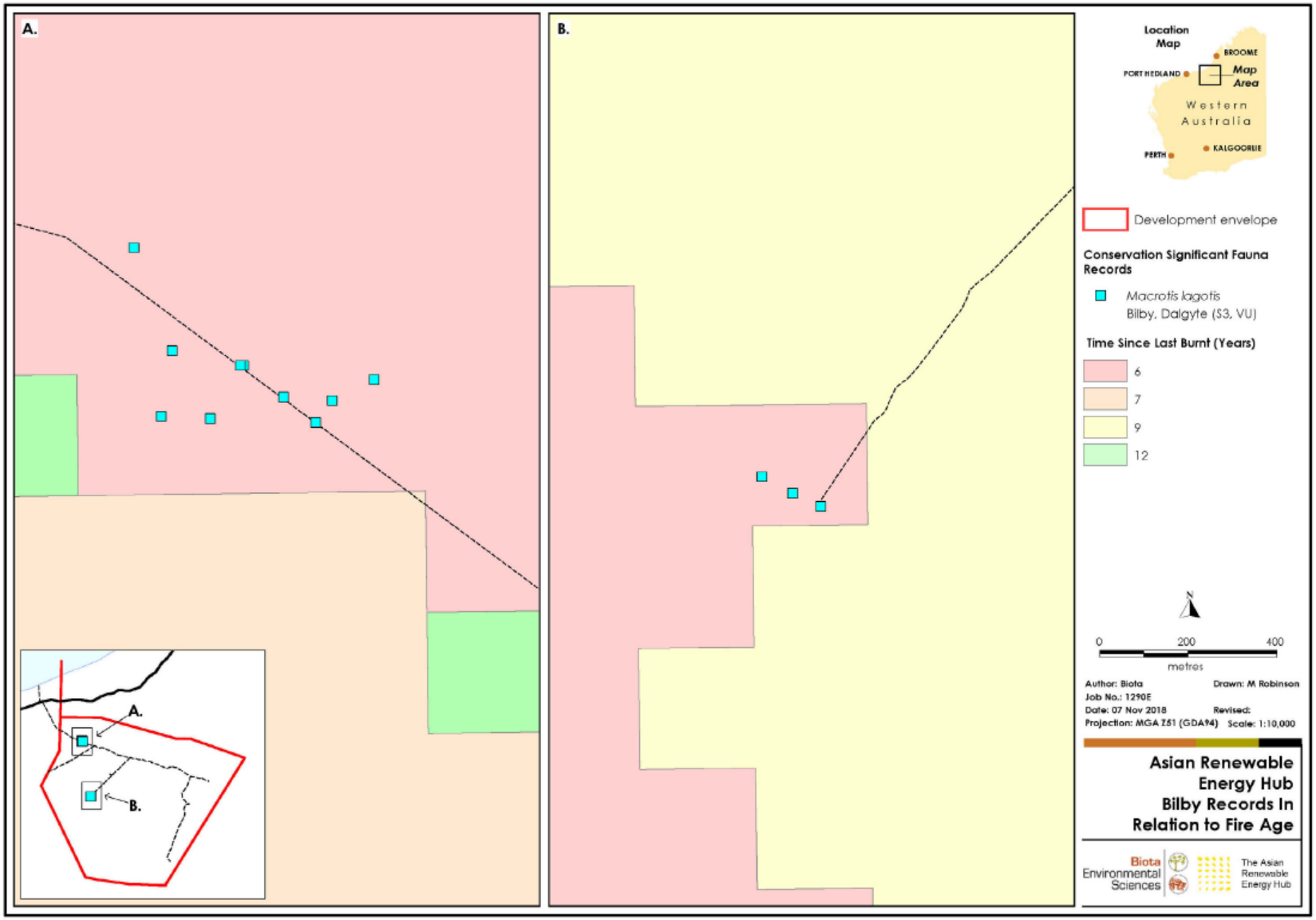

Figure 6: Bilby records in relation to fire age (time since last burnt) of vegetation

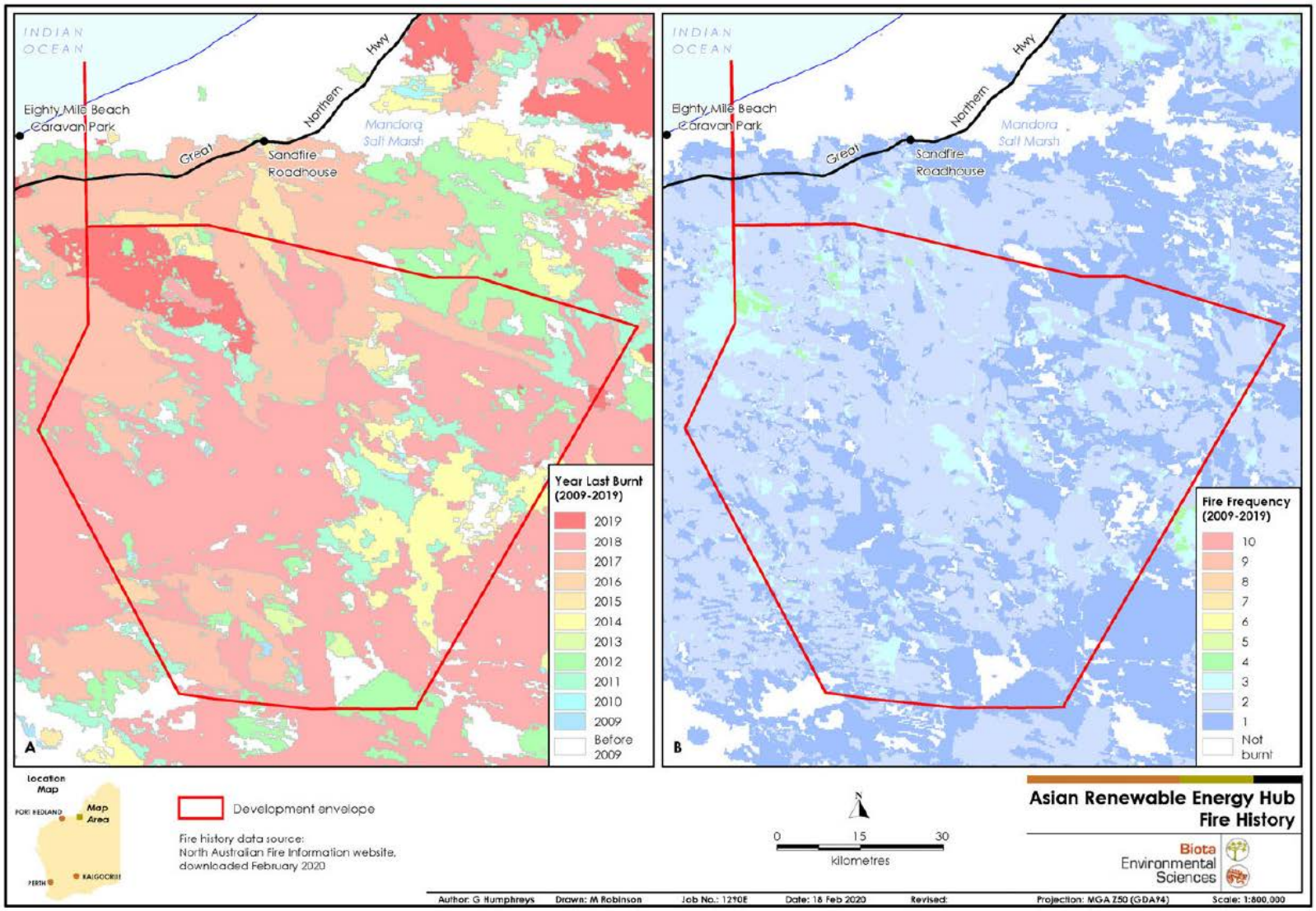

Figure 7: Fire history of the development envelope, showing A) year in which areas last burnt, and B) the number of years in the last decade areas in which areas burned (data source: http://www.firenorth.org.au/nafi3/)

4.2 Flora and Vegetation

The EPA's environmental objective for this factor is *to protect terrestrial fauna so that biological diversity and ecological integrity is maintained.*

Relevant policy and guidance

The EPA considers the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016b)
- *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016f)
- Priority Ecological Communities for Western Australia, version 28 (DBCA 2019)
- *Approved Conservation advice for Keraudrenia exastia (Fringed Keraudrenia)* (DEWHA 2009a)
- *Guidance Statement 6 – Rehabilitation of Terrestrial Ecosystems* (EPA 2006).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016b).

EPA assessment

The proposal involves the direct clearing of 11,962 ha of native vegetation within the 662,400 ha development envelope. Infrastructure placement will result in large areas of no direct impact and the loss of vegetation represents 1.81 per cent of the development envelope.

The proponent undertook flora and vegetation surveys relevant to the proposal in 2018. The flora and vegetation assessment of the development envelope was undertaken at a level 2 standard, as defined by the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016f). There were few weeds recorded from the main development envelope, and the vegetation was in 'Excellent' and 'Very Good' condition.

None of the vegetation types represent Threatened Ecological Communities at either State or Commonwealth levels. One vegetation type recorded from the cable corridor portion of the development envelope is the Priority 3 Eighty Mile Beach Land System Priority Ecological Community (PEC). The survey also recorded one threatened flora and eight priority listed species.

The EPA notes that the surveys were not undertaken in complete accordance with the relevant EPA guidance due to the large geographical extent of the development envelope. The majority of the project area has been mapped as four vegetation units, which indicates that vegetation mapping has been conducted at a regional scale, not at a local scale.

The EPA considers there is sufficient information for the assessment of the proposal, its potential impacts and potential environmental management requirements at this stage of the design phase.

The EPA also notes that the development envelope is of a scale that will allow the proponent to relocate infrastructure onsite should pre-clearing surveys identify significant flora or vegetation.

The proposal is also located adjacent to the Eighty Mile Beach Marine Park, Kujungurru-Warrarn Nature Reserve and Walyarta Conservation Park (Mandora Marsh).

Potential impacts

Based on the results of the surveys and the presence of species likely to occur, the EPA considers the potential significant impacts to conservation significant flora and vegetation from the proposal are:

- permanent clearing of up to 11,962 ha of flora and vegetation
- temporary disturbance of 612.4 ha during construction
- temporary disturbance of 1.27 ha within the Kujungurru-Warrarn Nature Reserve
- direct impact to 0.2 ha of the Eighty Mile Land System PEC
- the proposed implementation of a large-scale and long-term (662,400 ha development envelope over the approximate 50-year life of the proposal) Staged Fire Management Plan to mitigate the current dominant wildfires
- the potential consequential impacts to flora biodiversity and vegetation compositions in response to altered fire ecology.

Land systems

The proposal infrastructure is predominately located in Nita land system, which is the most common and widespread vegetation type (Figure 8). The EPA notes that all vegetation types within the main development envelope will have over 98 per cent of their current mapped extent retained with the implementation of the proposal. The EPA also notes that the proponent has avoided impacting key vegetation features such as drainage areas and most rocky outcrops.

The EPA notes that some additional short-term temporary clearing of 612.4 ha of vegetation will also occur. This is to allow for lay down of turbine components prior to construction and for trenching for the underground section of the transmission corridor north of the Great Northern Highway. The proponent has committed to the immediate rehabilitation of these areas during the construction phase of the proposal.

Eighty Mile Land System PEC and Kujungurru-Warrarn Nature Reserve

The Eighty Mile Land System PEC has a 42,259 ha overall extent. A very small and localised portion of the development envelope intersects this system (Biota 2018b) (Figure 4.12 of proponent's ERD), with trenching for the cable installation resulting in the clearing of 0.2 ha of the PEC. The clearing of 0.2 ha represents less than 0.01 per cent of the total extent of the Eighty Mile Land System PEC.

Kujungurru-Warrarn Nature Reserve has a 2,552 ha overall extent. A small section at the northern end of the transmission cable corridor will make a straight-line crossing of

the reserve for a length of 261 m (Figure 4.6 of proponent's ERD). This will equate to 1.27 ha of temporary disturbance to the reserve, or less than 0.05 per cent by area.

The EPA notes that the proposed clearing represents a small, short-term and localised impact. The EPA also notes that the proponent has committed to the rehabilitation of these disturbed areas on completion of the cable installation in this location. The EPA has recommended condition 7-3(8) to ensure that the rehabilitation of temporary disturbed areas is undertaken immediately after completion of construction activities.

Threatened and priority flora

Conservation significant flora includes species listed as:

- Threatened or Specially Protected under the *Biodiversity Conservation Act 2016*
- Threatened species listed under the EPBC Act
- Priority species listed by the DBCA.

Surveys identified one threatened flora species, *Seringia exastia (*formerly *Keraudrenia exastia),* within the development envelope, with a total of 334 individuals recorded from six locations across the development envelope (Figure 9). This species is listed as threatened under both the *Biodiversity Conservation Act 2016* and EPBC Act.

The confirmed records from the proponent's surveys extend the known range of *Seringia exastia* by about 290 km, from near Broome to the eastern section of the development envelope. The EPA notes that none of the known locations fall within the clearing footprint of the current conceptual infrastructure siting of the proposal. The EPA also notes that that this species may be synonymised with *Seringia elliptica* in the future and its listing status may change to a non-conservation listing.

Eight classified priority (P) flora taxa were recorded within the development envelope (Figure 9). These are:

- *Tephrosia* rea var. Port Hedland (P1)
- *Bonamia oblongifolia* (P3)
- *Croton aridus* (P3)
- *Indigofera ammobia* (P3)
- *Polymeria* ? sp. Broome (P3)
- *Seringia katatona* (P3)
- *Terminalia kumpaja* (P3)
- *Tribulopis marliesiae* (P3).

Bonamia oblongifolia and *Tribulopis marliesiae* were recorded from both the cable corridor and the main development envelope.

The EPA also notes the limitation with the proponent's initial vegetation surveys, and that further records of other threatened flora or priority flora may be recorded once the

detailed infrastructure layout is determined. The EPA notes that the proponent has advised that the location of individual infrastructure elements may be placed to avoid threatened flora.

Therefore, the EPA has recommended that the proposal be implemented in a manner to ensure no direct impacts to threatened or priority flora and ecological communities within the development envelope (condition 7-1(2)). To achieve this condition, the EPA has recommended condition 7-3(6) which requires the proponent to undertake targeted pre-clearance surveys for species prior to construction.

The EPA has also recommended that any threatened flora avoided during construction be identified and reported to the Chief Executive Officer of the DWER as part of the Infrastructure Staging and Layout Report in accordance with condition 8-1(3).

Fire management

The current landscape is susceptible to large intense unmanaged fires which can erase time-since-fire heterogeneity and can reduce vegetation diversity. Large areas of similar-aged vegetation have a similar vulnerability to burning in the future, resulting in increased loss of flora and fauna.

The proponent is proposing a Staged Fire Management Plan which will seek to provide a variety of time-since-fire areas across the landscape and increase the diversity of the vegetation types in the area. The floristic composition of these communities will then change with time since fire, providing a diversity of habitat for conservation significant fauna species across the site (this is discussed in detail above in Terrestrial Fauna).

Altered fire regimes, either through the partitioning of the development envelope from site access tracks or the implementation of a large scale prescribed burn Fire Management Plan (discussed above in Terrestrial Fauna) have potential to impact flora and vegetation if not managed appropriately. The EPA has recommended the proponent to monitor the potential impacts and benefits of the Staged Fire Management Plan on flora and vegetation in accordance with the recommended condition 6.

Summary

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Flora and Vegetation that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control of the clearing of native vegetation through the authorised extent in schedule 1 of the recommended environmental conditions (Appendix 4)
- a requirement that the proponent minimise and manage the introduction, establishment and spread of weeds throughout the development envelope in accordance with the recommended conditions 7-1(3) and 7-3(7)

- a requirement that no direct impacts to threatened or priority flora and ecological communities occurs within the development envelope in accordance with the recommended condition 7-1(2)
- a requirement that rehabilitation of temporary disturbed areas, including areas within the Eighty Mile Land System and Kujungurru-Warrarn Nature Reserve is included in the Environmental Management Plan in accordance with the recommended condition 7-3(8)
- a requirement for the proponent to undertake targeted surveys for threatened and priority flora prior to clearing activities occurring in each stage in accordance with the recommended condition 7-3(8)
- a requirement for the proponent to prepare and implement a Staged Fire Management Plan to monitor the potential impacts and benefits of the prescribed burn program in accordance with the recommended condition 6
- a requirement for the proponent to prepare and submit an Infrastructure Staging and Layout Report prior to commencement of construction activities for each stage of the proposal in accordance with the recommended condition 8.

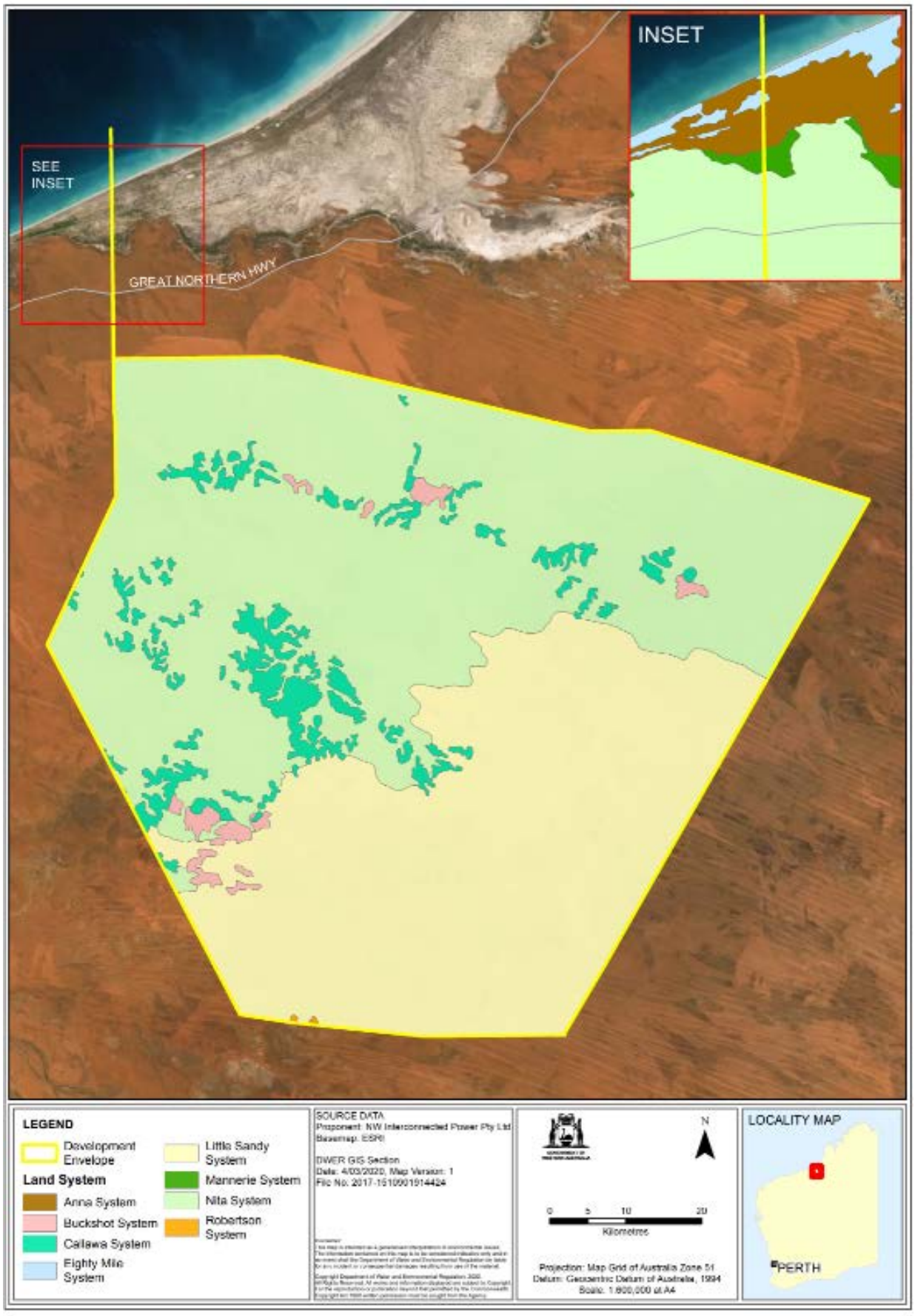

Figure 8: Land systems within the development envelope

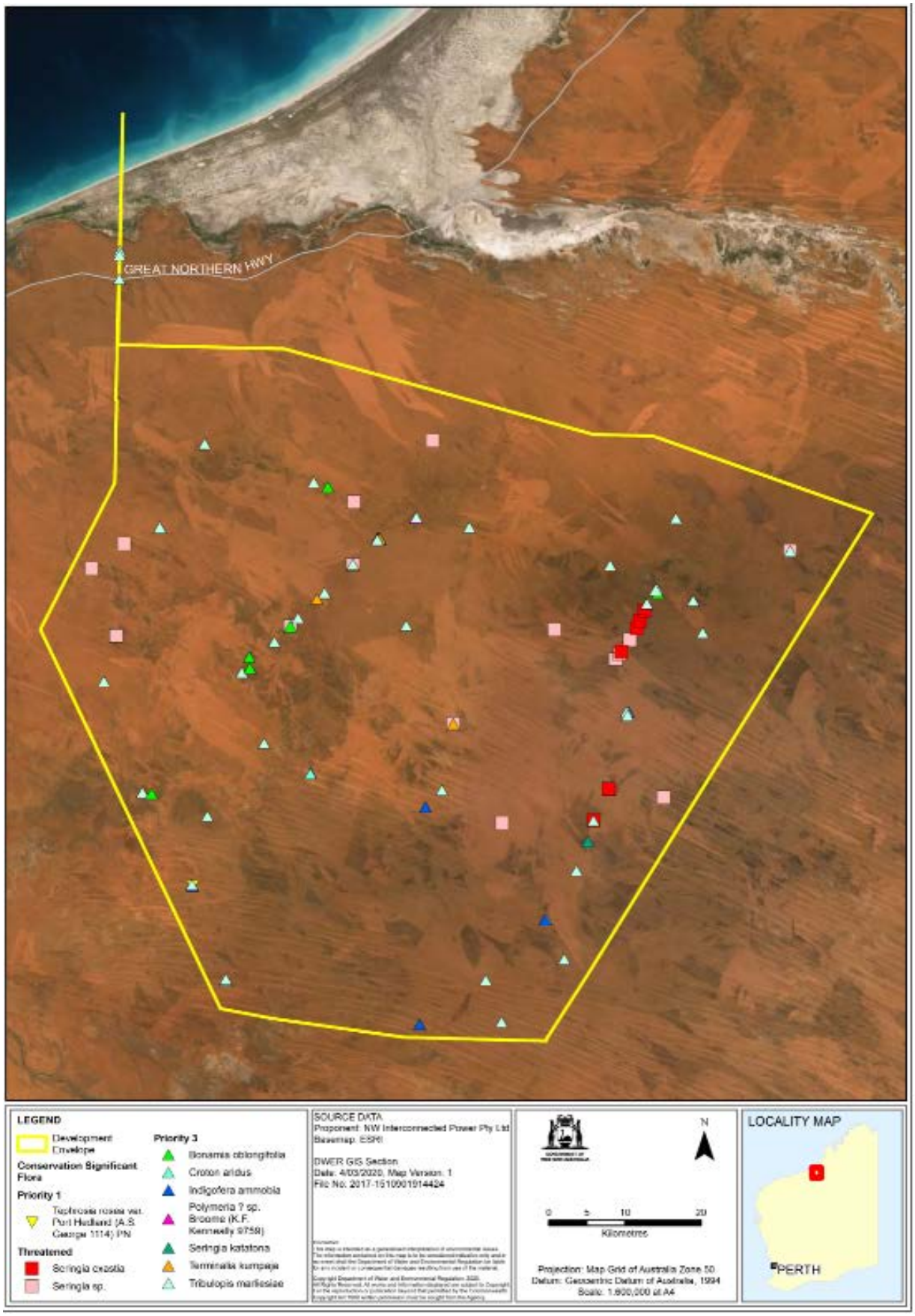

Figure 9: Conservation significant flora within the development envelope

4.3 Benthic Communities and Habitat, Marine Environmental Quality and Marine Fauna

The EPA's environmental objectives for these factors are:

- Benthic Communities and Habitats – *to protect benthic communities and habitats so that biological diversity and ecological integrity are maintained*
- Marine Environmental Quality – *to maintain the quality of water, sediment and biota so that environmental values are protected*
- Marine Fauna – *to protect marine fauna so that biological diversity and ecological integrity are maintained*.

These three environmental factors have been combined due to the inter-related effects of the proposal activities on the marine environment, including the environmental values of the Eighty Mile Beach Marine Park.

Relevant policy and guidance

The EPA considers the following current environmental policy and guidance is relevant to its assessment of the proposal for these factors:

- *Environmental Factor Guideline – Benthic Communities and Habitats* (EPA 2016a)
- *Environmental Factor Guideline – Marine Environmental Quality* (EPA 2016c)
- *Environmental Factor Guideline – Marine Fauna* (EPA 2016d)
- *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment* (EPA 2016g)
- *Technical Guidance – Protection of Benthic Communities and Habitats* (EPA 2016h)
- *Eighty Mile Beach Marine Park Management Plan 80 2014–2024* (Department of Parks and Wildlife 2014)
- *Marine bioregional plan for the North-west Marine Region* (DSEWPaC 2012).

The considerations for environmental impact assessment for these factors are outlined in Environmental Factor Guidelines for Benthic Communities and Habitat, Marine Environmental Quality, and Marine Fauna (EPA 2016a; EPA 2016c; EPA 2016d).

EPA assessment

The proposal involves the burial of offshore transmission cables to a minimum depth of 5 m, within a 5 m wide disturbance footprint for each individual cable from the intertidal area to the limit of state waters. The cables will be placed up to 50 m apart, and the cable corridor (for all four cables together) will be 200 m wide to allow for a 25 m buffer either side of each cable. The total expected temporary disturbance is up to 15.3 ha of the sea floor, proposed to be undertaken by a hydro-plough or other similar low impact installation technique. Of the four cables to be laid, no more than two would be laid in the same year. The cable installation period per cable is about one week.

The trenching of the cable through the dunal, beach and intertidal beach zones has also been included in this section due to the potential impacts on turtle nesting habitat.

The proponent completed a benthic habitat survey of the cable corridor in the offshore proposal area. Side scan sonar and towed video transects were completed along the cable corridor. Due to the high levels of turbidity, not all towed video footage could be used to identify benthic habitats. Overall, the area was found to be a homogenous sand flat with no significant topographic features (BMT 2018b). The mapped benthic habitats are shown in Figure 10.

The proponent considers that water quality in the cable corridor portion of the development envelope is likely to be high and consistent with normal conditions in nearshore areas in the region (BMT 2018a). The proponent also considers that contaminated sediments in the cable corridor are highly unlikely due to the lack of any development and discharges in the locality.

The EPA notes that the proponent did not undertake water quality and sediment sampling and did not provide turbidity modelling as a part of their ERD. However, the EPA notes the benthic habitat survey work undertaken and the information provided in the proponent's ERD about the distribution of benthic communities. Given the above and the relatively small scale and short duration of the potential impacts, the EPA considers it has enough information to conduct its assessment of the potential impacts to the receiving marine environment, with potential loss of benthic communities being the key issue.

The marine waters adjacent to the development envelope support a variety of marine fauna, several of which are significant and protected under the *Biodiversity Conservation Act 2016* and the EPBC Act. A search of the online EPBC Act Protected Matters Search Tool completed by the proponent (BMT 2018a) identified 26 listed threatened species and 61 listed migratory species that may occur in the development envelope locality. A detailed list of the conservation significant marine fauna species is provided in Table 4.2 of the proponent's ERD. Turtle, cetacean and sawfish species have been assessed as most likely to be present within the development area.

The flatback turtle (listed as vulnerable) is endemic to northern Australian waters. Eighty Mile Beach is an important rookery for the species (Department of Conservation and Land Management 2009; DSEWPaC 2012), with peak nesting activity occurring between late-November and early December. Flatback turtles spend most of their lives in shallow water (less than 20 m), migrating long distances between feeding and breeding (Hale and Butcher 2009). The species occurs along the entire northwest coast (Figure 4.3 of the proponent's ERD). One nest was located within the development envelope during the terrestrial fauna survey (Biota 2018a).

Most whales and dolphins known from the area are more commonly seen in the deeper offshore waters (Department of Parks and Wildlife 2014). Species known to prefer nearshore waters include the Indo-Pacific humpback dolphin, bottlenose dolphin, common bottlenose and Australian snubfin dolphin.

Information on dugong (listed as other protected fauna, and migratory; marine) in the Kimberley region is limited. The species commonly aggregate in protected shallow

bays and mangrove channels, primarily feeding on seagrass (Bennelongia et al. 2009; Department of Parks and Wildlife 2014). Dugong are regularly sighted in relatively large aggregations in the shallow embayments at the southern end of Eighty Mile Beach Marine Park (Department of Parks and Wildlife 2014). However, while dugong use other parts of the Eighty Mile Beach Marine Park, the lack of seagrass in the cable corridor portion of the development envelope indicates that it does not comprise significant habitat for dugong.

Eighty Mile Beach Marine Park is known to support green and dwarf sawfish (listed as vulnerable) breeding and represents suitable habitat for largetooth and narrow sawfish (DSEWPaC 2012; Department of Parks and Wildlife 2014). Sawfish prefer very shallow water over mudflats and sandbanks, often resting during slack tide when water movement is low (Stevens *et al.* 2008).

The EPA notes that the coastal crossing and subsea sections of the cable corridor development envelope are within the Eighty Mile Beach Marine Park, which was gazetted as a Class A Marine Park in January 2013 and is jointly managed by the DBCA, Traditional Owners and other stakeholders. The EPA has taken into account the proponent's assessment of the proposal's impacts against the cultural and ecological values detailed in DBCA's *Eighty Mile Beach Marine Park management plan 80* (2014–2024).

Potential impacts

Based on the results of the surveys and literature reviews, and the presence of species likely to occur, the EPA considers the potential significant impacts to the receiving marine environment from the proposal are:

Benthic Communities and Habitats

- direct disturbance to the seabed during cable lay or pull-up.

Marine Environmental Quality

- increased water column turbidity during cable lay or pull-up
- potential release of background sediment contaminants
- potential hydrocarbon spills and waste generation from vessels.

Marine Fauna

- potential introduced marine species from vessel biofouling or ballast water
- disturbance to marine fauna from vessel movements (entanglement / collisions / noise), both in relation to cable installation vessels and international shipping for the project
- direct disturbance of beach nesting areas for marine turtles during cable lay or pull-up
- marine fauna, particularly turtles, behavior modification from artificial lighting on vessels during construction (BMT 2018a).

During the operational phase of the proposal, the potential impacts relevant to the operation of the HVDC cables may involve:

- chlorine formation during monopole cable operation
- sediment contamination related to cable deterioration
- electromagnetic field generation during cable operation that may affect electrically sensitive marine fauna
- heat dissipation altering water temperatures during cable operation (BMT 2018a).

The potential impacts of the proposal on the marine environment are discussed below with respect to the Benthic Communities and Habitats, Marine Environmental Quality and Marine Fauna.

Benthic Communities and Habitats

As discussed above, no significant or restricted benthic communities and habitats were found during the proponent's survey (BMT 2018b) and the area had moderate to high energy from the prevailing tidal regime with significant turbidity throughout. Additional turbidity and sediment deposition caused by cable laying is expected to be localised, temporary and not significant. Therefore, the impact of the proposal on benthic communities is primarily determined by the extent and configuration of the disturbance footprint.

The 15.3 ha temporary disturbance from cable laying is relatively small in scale when distributed along the corridor that is about five km. The corridor is along a direct linear route from the coast to the edge of state waters. It will be backfilled by the hydroplough or similar equipment whilst laying the cable and is not an irreversible disturbance, such as that posed by a dredged channel, and does not result in a permanent barrier to tidal and water movement.

In the context of the EPA's recommended typical local assessment unit of about 50 km^2 (5,000 ha), the proposed 15.3 ha temporary disturbance is negligible at 0.3 per cent. The proponent mapped 1,380 ha of local sand-dominated benthic communities and habitats (BMT 2018a) and the proposed 15.3 ha disturbance remains negligible at 1.1 per cent of this habitat type. The direct temporary loss of 15.3 ha of sand-dominated benthic communities and habitats within the broader context of the 200,000 ha Eighty Mile Beach Marine Park represents a very localised and short-term disturbance of less than 0.01 per cent of the Eighty Mile Beach Marine Park area.

Therefore, the EPA does not consider the disturbance to benthic communities and habitats from cable activities and operation to be significant and is unlikely to impact the biological diversity and ecological integrity of the marine environment, including the Eighty Mile Beach Marine Park.

The EPA recommends the 15.3 ha seabed disturbance be controlled to the defined cable corridor through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4) to ensure the potential impacts from cable installation, maintenance and decommissioning activities are negligible.

Marine Environmental Quality

Cable installation activities are temporary and expected to take a few weeks to complete. Similar timeframes are expected for any cable maintenance during

operation or decommissioning activities. Operation of the cable is expected to be for about 50 years.

Release of contaminates

There is a risk of potential release and mobilisation of contaminated sediments into the water column during activities that cause seabed disturbance. The risk from the proposal is considered negligible, given the cable corridor traverses the coast through a State Marine Park with no human development bordered by low density pastoral leases, with limited public access points, and no history of urban or industrial development (BMT 2018a). To manage this risk the proponent has committed to undertaking sediment sampling prior to installing the cable in their Environmental Management Plan.

Various hydrocarbons will be used during the cable commissioning, decommissioning and any maintenance repair works. The proponent has detailed industry standard housekeeping and spill prevention protocols in their Environmental Management Plan to manage potential impacts.

Cable deterioration has a potential risk of being a contamination source, from release of contaminants due to cable damage or degradation during operations. Burial will mitigate cable deterioration due to wave action or currents and the potential release of contaminants into the marine environment. Cable deterioration will be further managed through the implementation of a maintenance schedule.

The EPA has recommended condition 9-2 to ensure the proponent does not spill hydrocarbons or waste pollution, or release sediment contaminants, that have the potential to deteriorate the water quality of the marine environment in the Eighty Mile Beach Marine Park.

Hypochlorous acid

The transmission system is a monopole system using a ground return with the entire reverse electrical current flowing into the ground via electrodes. This system produces hydrogen (at the cathode) and chlorine (at the anode) in the surrounding seawater by electrolysis. Chlorine gas produced at the anode will react exclusively with water to produce hypochlorous acid (BMT 2018a).

The proponent has committed to not locating the anode within state waters. This removes the potentially harmful chemical products (hypochlorous acid) being produced in the Eighty Mile Beach Marine Park and their potential impact on the surrounding marine environment. The EPA has recommended condition 9 to ensure the anode is not located within the Eighty Mile Beach Marine Park or state waters.

Impacts on water quality will be localised and there is a high level of confidence that any minor impacts will recover within a reasonable time frame. Based on the above, the EPA considers the potential impacts to Marine Environment Quality from cable activities and operation is not significant, and is unlikely to impact the quality of water, sediment and biota of the marine environment, including the Eighty Mile Beach Marine Park.

Marine Fauna

Trenching through the beach and intertidal sections of the cable corridor has the potential to impact on turtle nesting habitat and sawfish pupping activities. The proponent has committed to scheduling construction activities to avoid these key periods. The EPA supports this approach and has recommended condition 9-2 to ensure construction activities avoid the peak turtle nesting and hatching season and the sawfish pupping period.

Marine fauna behavioural modification due to artificial lighting is not expected to be a significant environmental impact during cable works activities, as they are temporary in nature and scheduled during daylight hours. There are no clear indications that underwater noise impacts related to the installation, decommissioning and maintenance repair works of subsea cables pose a high risk of harming marine fauna (OSPAR Commission 2009).

All international shipping to deliver turbine components for the project from overseas will be via existing commercial ports on the Pilbara coast, with the most likely destinations being Port Hedland and Dampier. There is still a potential risk for collisions with cable laying vessels, or entanglement with equipment and anchor lines during installation, decommissioning and any maintenance works. The potential impact could result in injury or fatality to individual fauna (BMT 2018a).

The EPA notes the cable corridor is about 7 m deep (lowest astronomical tide) at the edge of state waters, due to this the risk to large marine mammals is low, including during peak migration season. The EPA notes the proponent has committed to implement marine fauna observers and stop work protocols during subsea cable installation activities to prevent potential collisions or entanglement. The EPA agrees with the proponent's approach to manage the potential impacts and has recommended condition 9-2(2)(e) requiring the implementation of a marine mammal observer and stop work protocols during subsea cable activities.

Cable lay and trenching vessels are slow moving and species or individuals that are naturally inquisitive and attracted to moving vessels (for example, dolphins) will have time to leave the area in the event of a disturbance response. There will be no risk of marine fauna entanglement or entrainment with the cables once they are operational, as they will be buried 5-10 m below the seabed.

Electromagnetic field and heat generation during cable operation

Magnetic or electric senses have been recorded for a wide range of marine fauna including marine mammals, sea turtles, many groups of fishes (including elasmobranches) and groups of invertebrates (BOEMRE 2011; BMT 2018a).

Marine fauna functions supported by an electro or magnetic sense include the detection of prey; predators; conspecifics to assist with feeding, navigation, predator avoidance; and social or reproductive behaviours. These functions are at risk of interference if sensory capabilities overlap with cable Electromagnetic Field (EMF) levels detectable by the organism (BMT 2018a).

Monopolar HVDC transmission systems can have a direct electric field within a few metres of the cable that is within the sensory detection thresholds for elasmobranch species (sharks and rays). This can result in behavioural changes, such as repelling or attracting elasmobranchs (BOEMRE 2011; Sutton et al. 2016; BMT 2018a). The strength of both magnetic and electric fields rapidly declines the greater the distance from the cable. This means exposure of marine species to EMF can be eliminated by cable shielding and burial to adequate depths (OSPAR Commission 2009).

In other similar subsea cable transmissions in the Bass Strait in Australia, the external surface temperature of the subsea cable was calculated to reach 30–35ºC, and the seabed surface temperature directly overlying the cables was predicted to rise by a few degrees Celsius at a burial depth of 1.2 m (OSPAR Commission 2009). However, the tropical seawater temperatures in the region of this proposal naturally range from warm to hot conditions of 23–32°C and therefore the significance of heat generated by the subsea cables will be less than that in Bass Strait.

The proponent’s principle mitigation for potential impacts from EMF and heat dissipation is through burial of the subsea cable to a minimum of 5 m below the seabed. Additionally, to further mitigate potential EMF impacts on marine fauna, the proponent has committed to define cable specifications (with measures such as shielding) and model EMF levels to show it is negligible prior to installation. Post-installation, they have committed to verify the burial depth and shielding effectiveness.

Based on the above, the potential impacts to Marine Fauna from cable activities and operation is not considered significant and is unlikely to impact the biological diversity and ecological integrity of the marine environment, including the Eighty Mile Beach Marine Park.

The EPA agrees with the proponent's approach to mitigate the potential impacts from EMF and heat dissipation and has recommended condition 9-2 to ensure the potential impacts from the operation of the cable are negligible. Condition 9-2 includes the following:

- the HVDC cables are buried to a minimum 5 m below seabed level, including through coastal areas of turtle nesting habitat
- details of electromagnetic-field and cable heat dissipation threshold levels for marine fauna, particularly electrically sensitive marine fauna
- inclusion of electromagnetic-field and heat dissipation modelling results of the HVDC cables to be implemented and results compared to threshold levels
- the proponent to detail adequate cable shielding specifications, and other electromagnetic-field and cable heat dissipation mitigation measures where relevant
- detailed management actions to be implemented in the event operational electromagnetic-field or heat dissipation levels are higher than predicted.

Summary

The EPA has paid particular attention to:

- *Environmental Factor Guideline – Benthic Communities and Habitats* (EPA 2016a)
- *Environmental Factor Guideline – Marine Environmental Quality* (EPA 2016c)
- *Environmental Factor Guideline – Marine Fauna* (EPA 2016d)
- *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment* (EPA 2016g)
- *Technical Guidance – Protection of Benthic Communities and Habitats* (EPA 2016h)
- *Eighty Mile Beach Marine Park Management Plan 80 2014–2024* (Department of Parks and Wildlife 2014)
- the nature and duration of the proposal activities in the marine environment
- the small scale, extent and duration of potential impacts from subtidal cable laying activities on benthic communities and marine environmental quality. There is a high level of confidence that any minor impacts to water quality and any nearby benthic communities will recover within a reasonable time frame
- the proponent's commitment to not undertake cable trenching activities during turtle nesting season and peak sawfish pupping periods
- the proponent's commitment to mitigate potential EMF emissions by burying the transmission cable at least 5 m below the seabed, and to detail cable shielding specifications and undertake EMF modelling with post installation verification
- the proponent's commitment to undertake sediment sampling prior to installing the cable
- the proponent's commitment to not locate the cable anode in state waters, removing the potential impacts from hypochlorous acid.

The EPA considers, having regard to the relevant EP Act principles and environmental objectives for Benthic Communities and Habitats, Marine Environmental Quality and Marine Fauna that the impacts to these factors are manageable and would no longer be significant, provided:

- there is control of the clearing of native vegetation in the defined cable corridor through the authorised extent in schedule 1 of the recommended environmental conditions (Appendix 4)
- there is control of the 15.3 ha seabed disturbance in the defined cable corridor through the authorised extent in schedule 1 of the recommended environmental conditions (Appendix 4)
- the proponent prepares a Marine Environmental Management Plan to the satisfaction of the CEO of DWER prior to commencing coastal or marine ground disturbing activities in accordance with the recommended condition 9-2 that requires:
    - turbidity generation is minimised

- sediment and water quality is sampled prior to construction activities and is monitored during operations and decommissioning
- spill of hydrocarbons or waste material, or release of sediment contaminants, that have the potential to deteriorate the water quality does not occur
- the cable anode is not located in the Eighty Mile Beach Marine Park and state waters to avoid the potential impacts from hypochlorous acid production
- a marine mammal observation zone and a cease work zone is maintained during any subsea cable activities
- control of what periods of the year cable trenching and subsea cable laying activities can occur to avoid key marine fauna (turtle and sawfish) biological windows
- the HVDC cables are buried to a minimum 5 m below seabed level, including through coastal areas of turtle nesting habitat
- details of electromagnetic-field and cable heat dissipation threshold levels for marine fauna, particularly electrically sensitive marine fauna
- inclusion of electromagnetic-field and heat dissipation modelling results of the HVDC cables to be implemented and results compared to threshold levels
- the proponent to detail adequate cable shielding specifications, and other electromagnetic-field and cable heat dissipation mitigation measures where relevant
- detailed management actions to be implemented in the event operational electromagnetic-field or heat dissipation levels are higher than predicted.

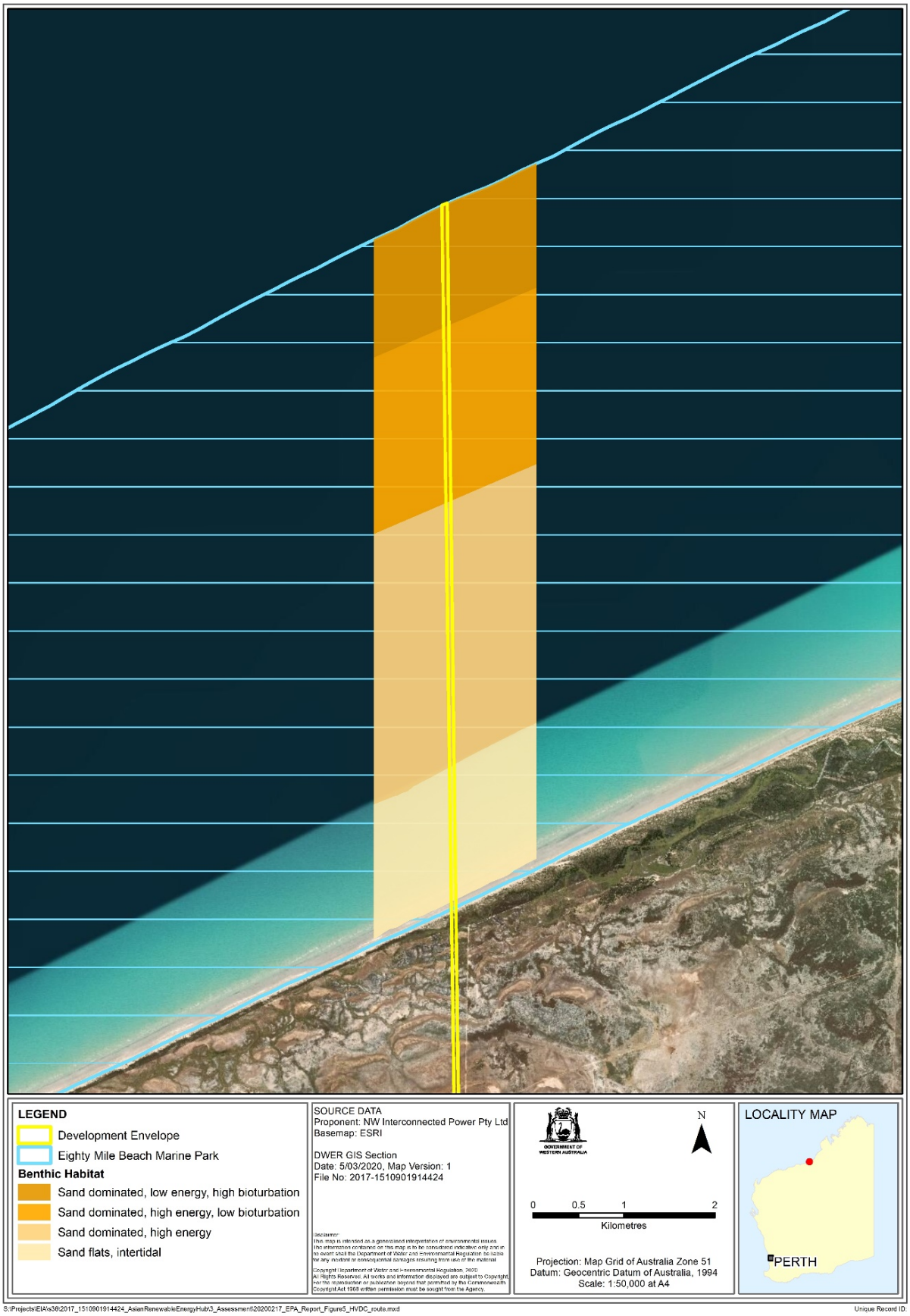

Figure 10: Coastal crossing and subsea sections of the cable corridor development envelope

5. Matters of National Environmental Significance

The Commonwealth Minister for the Environment has determined that the proposal is a controlled action under the EPBC Act as it is likely to have a significant impact on one or more MNES. It was determined that the proposed action is likely to have a significant impact on the following matters protected by the EPBC Act:

- Ramsar wetlands (s. 16 and s. 17B)
- Listed threatened species and communities (s. 18 and s. 18A)
- Listed migratory species (s. 20 and s. 20A)
- Commonwealth marine areas (s. 23 and s. 24A).

The EPA has assessed the controlled action on behalf of the Commonwealth as an accredited assessment under the EPBC Act.

This assessment report is provided to the Commonwealth Minister for Environment who will decide whether or not to approve the proposal under the EPBC Act. This is separate from any Western Australian approval that may be required.

Commonwealth policy and guidance

The EPA had regard to the following relevant Commonwealth guidelines, policies and plans during its assessment:

- *Commonwealth EPBC Act Environmental Offsets Policy* (Commonwealth of Australia 2012)
- *Approved conservation advice for* Keraudrenia exastia *(Fringed Keraudrenia)* (Commonwealth of Australia 2009a)
- *Approved conservation advice for* Macrotis lagotis *(Greater Bilby)* (Commonwealth of Australia 2016a)
- *National Recovery Plan for the Greater Bilby* (Macrotis lagotis) (Department of Natural Resources, Environment and the Arts 2006)
- *Approved conservation advice for* Petrogale lateralis lateralis (*Black flanked rock wallaby*) (Commonwealth of Australia 2016b)
- *Recovery Plan for five species of rock wallabies* (Department of Parks and Wildlife 2013)
- *Recovery Plan for marine turtles in Australia 2017–2027* (Commonwealth of Australia 2017b)
- *Approved conservation advice for* Megaptera novaeangliae *(Humpback whale)* (Commonwealth of Australia 2015a)
- *Approved conservation advice for* Pristis clavata (*Dwarf sawfish*) (DEHWA 2009b)
- *Sawfish and river sharks multispecies recovery plan* (Commonwealth of Australia 2015b)

- *Approved conservation advice for green sawfish* (Commonwealth of Australia 2008)
- *National Recovery Plan for the Northern Quoll Dasyurus hallucatus* (Hill, B.M. & S.J. Ward, 2010)
- *Threat Abatement Plan for predation by feral cats* (Department of the Environment, 2015)
- *Threat Abatement plan for competition and land degradation by rabbits* (DoEE, 2016)
- *Threat abatement plan for predation by the European red fox* (DEWHA, 2008)
- *Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses* (SEWPaC, 2012).

EPA assessment

The EPA notes that the proponent has given attention in the ERD to the intent of Commonwealth policy, guidelines and plans considered to be relevant for this matter. Impacts to the environment are covered under the key environmental factors of Terrestrial Fauna, Flora and Vegetation and Marine Fauna.

Listed threatened species and communities

Six fauna species, and one flora species listed under the EPBC Act, are known to occur within the development envelope. There are no listed threatened ecological communities within the development envelope and therefore no potential impact on listed communities. The listed fauna and flora species are:

- flatback turtle (Vulnerable)
- dwarf sawfish (Vulnerable)
- green sawfish (Vulnerable)
- black-footed rock-wallaby (Endangered)
- bilby (Vulnerable)
- northern quoll (Endangered)
- *Seringia exastia* (Critically Endangered).

The assessment of the potential impacts to species listed as Threatened under the EPBC Act is detailed in the Terrestrial Fauna, Flora and Vegetation and Marine Fauna factors in section 4 of this report.

Ramsar wetlands

The Eighty Mile Beach Ramsar site is situated within the wider locality of the proposal's development envelope. It is comprised of two areas, the Eighty Mile Beach itself and the inland Mandora Marsh (also known as Walyarta). The ecological values of the Ramsar site have been described earlier in this report, as:

- marine fauna
- migratory shorebirds.

The only direct impact on the Eighty Mile Beach Ramsar site will be minor and temporary, being limited to trenching of the transmission cables through Eighty Mile Beach. There are no impacts to the Mandora Marsh part of the Ramsar site. The EPA has not undertaken an assessment against Ramsar listing criterion 3 as there is no potential direct or indirect impact from the proposal on either Grey Mangroves or potential new species of Goby.

The assessment of the potential impacts to the Eighty Mile Beach Ramsar site listed under the EPBC Act is detailed in the Terrestrial Fauna and Marine Fauna factors in section 4 of this report.

Listed migratory species

Listed migratory species relevant to this assessment fall into two categories: marine fauna species and migratory shorebirds.

Potential impacts on marine migratory species are largely limited to the flatback turtle and two sawfish species, which may potentially be impacted during cable installation activities. This impact will be mitigated by staging the offshore cable work so that it occurs outside of peak turtle breeding activity and sawfish pupping season.

Potential impacts on migratory shorebirds utilising the Ramsar site have been assessed in significant detail in the Terrestrial Fauna environmental factor (section 4.1 of this report). Impacts are largely mitigated through avoidance, with the development envelope situated 13 km from Mandora Marsh and 26 km from Eighty Mile Beach itself at its closest point. Infrastructure layout has allowed for 4 km spacing between each turbine row and 800 m between each turbine linearly.

The assessment of the potential impacts to the listed migratory species under the EPBC Act is detailed in the Terrestrial Fauna and Marine Fauna factors in section 4 of this report.

Summary

The EPA recommends the following environmental conditions to minimise impacts on MNES:

Terrestrial Fauna

- control of the amount of habitat clearing through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- requirement for the proponent to minimise proposal-related impacts to the bilby and the black-footed rock-wallaby in the development envelope in accordance with the recommended condition 6-1(1)
- requirement for active black-footed rock-wallaby rock pile habitat to be avoided, with 1 km buffers, during implementation of each stage of the proposal in accordance with the recommended conditions 7-1(8), 7-1(9) and 8-1(3)
- requirement for feral fauna and weeds to be managed and implemented in accordance with the recommended conditions 7-1 and 7-3

- requirement for the proponent to prepare and implement a Staged Fire Management Plan to monitor the potential impacts and benefits of a prescribed burn program in accordance with the recommended condition 6
- performance reports and independent fire ecologist reviews of the Staged Fire Management Plan every five years in accordance with recommended conditions 6-11 and 6-12.

Avifauna

- control of the separation distances of the development envelope from the Ramsar sites and spacing of the turbines and turbine rows through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- the burying of the transmission line from the Great Northern Highway to the coast be controlled through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- requirement for the proponent to minimise impacts on threatened, migratory and/or priority listed fauna from interactions with operational wind turbines and associated infrastructure (including distribution and transmission cables) in accordance with the recommended condition 7-1(4)
- in accordance with the recommended conditions 7-3(1), 7-3(2), 7-3(3) and 7-3(4), the proponent be required to:
    - monitor and record any avifauna impacts from turbine operations
    - detail industry best-practice bird detection and monitoring systems during operations of wind turbines
    - 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
    - include feasible contingency measures.

Flora and Vegetation

- control of the clearing of native vegetation through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- requirement that the proponent minimise and manage the establishment of weeds throughout the development envelope in accordance with the recommended conditions 7-1(3) and 7-3(7)
- requirement that no direct impacts to threatened flora and no increase in conservation status of any priority flora species occurs within the development envelope in accordance with the recommended condition 7-1(2)
- requirement for the proponent to undertake targeted surveys for threatened and priority flora to be undertaken prior to clearing activities occurring in each stage in accordance with the recommended condition 7-3(8)
- requirement for the proponent to prepare and submit an Infrastructure Staging and Layout Report prior to commencement of construction activities for each stage of the proposal in accordance with the recommended condition 8.

Marine Fauna

- control of the clearing of native vegetation in the defined cable corridor through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- control of the 15.3 ha seabed disturbance in the defined cable corridor through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- the proponent prepares a Marine Environmental Management Plan to the satisfaction of the CEO of DWER prior to commencing coastal or marine ground disturbing activities in accordance with the EPA's recommended condition 9-2 that requires:
    - turbidity generation is minimised
    - sediment and water quality is sampled prior to construction activities and is monitored during operations and decommissioning
    - spill of hydrocarbons or waste material, or release of sediment contaminants, that have the potential to deteriorate the water quality does not occur
    - the cable anode is not located in the Eighty Mile Beach Marine Park and state waters to avoid the potential impacts from hypochlorous acid production
    - a marine mammal observation zone and a cease work zone is maintained during any subsea cable activities
    - control of what periods of the year cable trenching and subsea cable laying activities can occur to avoid key marine fauna (turtle and sawfish) biological windows
    - the HVDC cables are buried to a minimum 5 m below seabed level, including through coastal areas of turtle nesting habitat
    - details of electromagnetic-field and cable heat dissipation threshold levels for marine fauna, particularly electrically sensitive marine fauna
    - inclusion of electromagnetic-field and heat dissipation modelling results of the HVDC cables to be implemented and results compared to threshold levels
    - the proponent to detail adequate cable shielding specifications, and other electromagnetic-field and cable heat dissipation mitigation measures where relevant
    - detailed management actions to be implemented in the event operational electromagnetic-field or heat dissipation levels are higher than predicted.

The EPA's view is that the impacts from the proposal on the above-listed MNES are not expected to result in an unacceptable or unsustainable impact on the Ramsar wetlands (s. 16 and s. 17B); Listed threatened species and communities (s. 18 and s. 18A); Listed migratory species (s. 20 and s. 20A); and Commonwealth marine areas (s. 23 and s. 24A).

6. Conclusion

The EPA has reviewed the assessment and taken a holistic view of the likely residual impacts of the proposal. The EPA has considered the degree of connectivity and interrelatedness of the processes relating to the environment, with a focus on fire ecology and nearby wetland environments that provide key habitat for avifauna.

Application of the mitigation hierarchy

Consistent with relevant policies and guidance, the proponent has addressed the mitigation hierarchy by identifying measures to avoid, minimise and rehabilitate environmental impacts including:

- minimising impacts on bilby populations and habitats by using prescribed burns
- being flexible within the large extent of the development envelope for final design of infrastructure siting to avoid threatened flora and fauna habitat where possible
- implementing a 1 km no impact buffer around significant black-footed rock-wallaby rock pile habitat
- immediately rehabilitating temporary disturbed areas for construction activities
- burying the transmission line from the Great Northern Highway to the coast, to avoid potential interactions with avifauna using the Eighty Mile Beach Ramsar wetland
- avoiding coastal cable trenching and intertidal subsea cable laying activities during key marine fauna biological windows of the year
- locating the cable anode outside of state waters to avoid hypochlorous acid production occurring in the Eighty Mile Beach Marine Park.

Conclusion

The EPA has taken the following into account in its assessment of the proposal as a whole:

- impacts to all the key environmental factors
- EPA's confidence in the proponent's proposed mitigation measures
- relevant EP Act principles and the EPA's objectives for the key environmental factors
- EPA's view that the impacts to the key environmental factors are manageable, provided the recommended conditions are imposed.

Given the above, the EPA recommends that the proposal may be implemented subject to the conditions recommended in Appendix 4.

7. Recommendations

The EPA recommends that the Minister for Environment notes:

1. The proposal assessed is for the construction and operation of a large-scale wind and solar renewable energy project which will comprise a series of onshore linear arrays of wind turbines and solar panels, with a transmission cable corridor to the coast and a subsea cable to the edge of state waters.
2. The key environmental factors identified by the EPA in the course of its assessment are Terrestrial Fauna, Flora and Vegetation, Benthic Communities and Habitats, Marine Environmental Quality and Marine Fauna, set out in section 4.
3. The EPA has recommended that the proposal may be implemented, provided the implementation of the proposal is carried out in accordance with the recommended conditions and procedures set out in Appendix 4. Matters addressed in the conditions include the following:
    a) a Staged Fire Management Plan to monitor the potential impacts and benefits of a landscape-scale prescribed burn program
    b) spacing of infrastructure to mitigate potential avifauna interaction with infrastructure
    c) monitoring avifauna impacts from operation of the wind turbines and associated transmission infrastructure
    d) avoidance, mitigation and management measures to minimise the potential impacts of the proposal on terrestrial fauna, flora and vegetation, marine environmental quality, marine fauna and benthic communities and habitat
    e) sustainable decommissioning and rehabilitation of the site.

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Appendix 1: List of submitters

Organisations

Department of Water and Environmental Regulation
Department of Planning, Lands and Heritage
Department of Biodiversity, Conservation and Attractions
Department of Mines, Industry Regulation and Safety
The Wilderness Society
Birdlife Western Australia
Shire of Broome
Shire of East Pilbara

Individuals

One confidential submission
Warwick J Boardman
Gary Davies
Nihara Gunwardene
Valerie and Andrew Brandstater
Thomas Ransome
Dave Blackburn
Colin Fairclough

Appendix 2: Consideration of principles

EP Act Principle	Consideration
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by –* *a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *b) an assessment of the risk-weighted consequences of various options.*	In considering this principle, the EPA notes that Terrestrial Fauna and Flora and Vegetation could be significantly impacted by the proposal. The assessment of these impacts is provided in this report. Investigations into the biological and physical environment undertaken by the proponent have provided sufficient scientific certainty to assess the risks and identify measures to avoid or minimise impacts. The EPA notes that the proponent has identified measures to avoid or minimise impacts. The EPA has recommended conditions to ensure these measures are implemented by the proponent. From its assessment of this proposal the EPA has concluded that there is no threat of serious or irreversible harm.
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*	In considering this principle, the EPA notes that Terrestrial Fauna and Flora and Vegetation could be significantly impacted by the proposal. The assessment of these impacts is provided in this report. The EPA notes that the proponent has identified measures to avoid or minimise impacts. The EPA has considered these measures during its assessment and has concluded that provided the recommended conditions are imposed on the implementation of the proposal, the environmental values will be protected, and the health, diversity and productivity of the environment will be maintained for the benefit of future generations. The EPA also notes that the proponent is seeking to implement a renewable energy project.
3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	In considering this principle, the EPA notes that terrestrial fauna and flora and vegetation could be significantly impacted by the proposal. The assessment of these impacts is provided in this report. The EPA notes that the proponent has identified measures to avoid or minimise impacts by avoiding black-footed rock-wallaby habitat and most

EP Act Principle	Consideration
	populations of Priority Flora. The EPA also notes that the development envelope is of a scale that targeted surveys and detailed design can further minimise potential impacts. From its assessment of this proposal the EPA has concluded that the proposal would not compromise the biological diversity and ecological integrity of the affected areas.
4. Principles relating to improved valuation, pricing and incentive mechanisms *(1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimize costs to develop their own solution and responses to environmental problems.*	In considering this principle, the EPA notes that the proponent would bear the costs relating to mitigation and management of proposal related impacts to flora and vegetation and terrestrial fauna. The EPA notes that by its very nature the proposal will not generate intractable or large volume waste streams. Hydrocarbon and putrescible wastes management during construction and operations can be contained and managed through standard practices. The EPA has had regard to this principle during the assessment of the proposal.
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	In considering this principle, the EPA notes that the proponent proposes to minimise waste by adopting the hierarchy of waste controls: • avoid and reuse at waste stream sources • reuse and recycle where practicable • treat and/or dispose of in accordance with regulated requirements.

EP Act Principle	Consideration
	The EPA also notes that the proposal by its very nature will not generate intractable or large waste streams. The EPA has had regard to this principle during the assessment of the proposal.

Appendix 3: Evaluation of other environmental factors

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
LAND			
Landforms	Potential impacts include: • disruption to sand dunes • sand mobilisation.	Agency comments The Department of Mining, Industry Regulation and Safety and the Department of Water and Environmental Regulation advised that the proponent should consider the potential for dune blowouts and sand mobilisation as a result of track construction activities across the development envelope. These agencies advised that the proposal did not take into account the difficulties in negotiating a path around the east/west oriented sand dunes system located in the southern and eastern parts of the project. These agencies stated that the proponent needs to consider how the location of the proposed infrastructure (wind turbines, solar farms and associated tracks and powerlines) will be optimised to avoid disturbance to sand dunes.	Landforms was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal or in the Environmental Scoping Document. Having regard to: • the large development envelope allowing avoidance of significant dunal systems • the commitment of the proponent to apply surface stabilisation measures in all locations where civil works intersect dune habitat • comments on the proposal • the commitment of the proponent to undertake post-construction monitoring of stabilised interface areas and remedial actions as required • the significance considerations in the *Statement of Environmental Principles, Factors and Objectives* (EPA 2018b), the EPA considers it is unlikely that the proposal would have a significant impact on Landforms and that the impacts to this factor are manageable. Accordingly, the **EPA did not consider Landforms to be a key environmental factor** at the conclusion of its assessment.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
WATER			
Inland Waters	Potential impacts include: • disruption to downstream or offsite sedimentation • changes to hydrological flow regimes • contamination from hydrocarbons or metals • sheet flow in major rainfall events • offsite impacts to the Eighty Mile Beach wetland.	<u>Agency comments</u> The Department of Water and Environmental Regulation noted that while it is unlikely that clearing associated with the proposal would result in downstream or off-site sedimentation impacts, the potential impacts to surface water from sedimentation and/or changes to hydrological flow regimes should be discussed. It noted that management measures with regard to surface water or groundwater contamination should also be discussed. The Department of Water and Environmental Regulation requested that additional information be provided regarding the design of construction and operational access roads to ensure that access tracks to do not impede surface water flow. <u>Public comments</u> The heat attracted by the solar panels could cause further environmental damage.	Inland Waters was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal or in the Environmental Scoping Document. Having regard to: • no off-site sedimentation is considered likely • the proponent's commitment to water sensitive designs that are incorporated into standard practices to manage surface flows and maximise aquifer recharge • the 16 km distance between the proposal and the nearest wetland • no abstraction of groundwater being required • the surface hydrology being dominated by sandplains and dunes with rapid infiltration • the significance considerations in the *Statement of Environmental Principles, Factors and Objectives* (EPA 2018b), the EPA considers it is unlikely that the proposal would have a significant impact on Inland Waters and that the impacts to this factor are manageable. Accordingly, the **EPA did not consider Inland Waters to be a key environmental factor** at the conclusion of its assessment.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
PEOPLE			
Social Surroundings	Potential impacts to Aboriginal heritage sites. Construction and Operation noise The visual amenity of the turbines to people passing on the Nyangumarta Highway.	<u>Agency Comments</u> The Department of Planning, Lands and Heritage advised that the site is located entirely within the Nyangumarta Warrarn Indigenous Protected Area, and recommended that pre-clearance surveys are undertaken. The cumulative impact of all the wind turbines combined could extend to the nearby residents. Consideration should be given to staff working on site once the first stage is complete, that is, they will be exposed to operational turbines during construction of subsequent stages. There were no agency or public comments on visual amenity.	Social Surroundings was identified as a preliminary key environmental factor in the Environmental Scoping Document. Having regard to: • the remoteness of the site away from sensitive receptors and significant landscapes • all known heritage sites will be avoided • ongoing consultation with the Traditional Owners during construction • any sites identified during construction will be protected under the *Aboriginal Heritage Act 1972* • the noise modelling conducted by the proponent • commitment of the proponent to remove all infrastructure at the end of the project life • the significance considerations in the *Statement of Environmental Principles, Factors and Objectives* (EPA 2018b), the EPA considers it is unlikely that the proposal would have a significant impact on Social Surroundings and that the impacts to this factor are manageable. Accordingly, the **EPA did not consider Social Surroundings to be a key environmental factor** at the conclusion of its assessment.

Appendix 4: Identified Decision-Making Authorities and Recommended Environmental Conditions

Identified Decision-Making Authorities

Section 44(2) of EP Act specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities (DMAs), and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified:

Decision-Making Authority	Legislation (and Approval)
1. Minister for Aboriginal Affairs	*Aboriginal Heritage Act 1972* (Section 18 disturbance of a site of Aboriginal significance)
2. Minister for Lands	*Land Administration Act 1997* (Lease and easement)
3. Minister for Environment	*Biodiversity Conservation Act 2016* (Taking of flora and fauna, disturbance of threatened species or communities)
4. CEO, Department of Health	*Health Act 1911* and *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*
5. CEO, Shire of East Pilbara	*Planning and Development Act 2005* (Development application)
6. CEO, Shire of Broome	*Planning and Development Act 2005* (Development application)
7. Director General, Department of Biodiversity, Conservation and Attractions	*Conservation and Land Management Act 1984*
8. CEO, Department of Water and Environment Regulation	*Environmental Protection Act 1986* (Works approval and licence, native vegetation clearing permit)
9. CEO, Economic Regulation Authority	*Electricity Industry Act 2004* (Licences to construct, operate the works and transmission and distribution system)
10. Chief Dangerous Goods Officer, Department of Mines, Industry, Regulation and Safety	*Dangerous Goods Safety Act 2004* (Storage and handling of hazardous materials)

Note: In this instance, agreement is only required with DMAs 1 to 3 since these DMAs are Ministers.

Recommended Environmental Conditions

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
***(Environmental Protection Act 1986*)**

ASIAN RENEWABLE ENERGY HUB

Proposal:	The proposal is to construct and operate a large-scale wind and solar renewable energy project at a site approximately 220 km east of Port Hedland and 270 km southwest of Broome, in the northwest of Western Australia
Proponent:	NW Interconnected Power Pty Ltd Australian Company Number 606 603 874
Proponent Address:	Level 2, 139 Frome Street Adelaide SA 5000
Assessment Number:	2140

Report of the Environmental Protection Authority: 1673

Pursuant to section 45 of the *Environmental Protection Act 1986,* it has been agreed that the proposal described and documented in Table 2 of Schedule 1 may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

1 Proposal Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Table 2 of Schedule 1, unless amendments to the proposal and the authorised extent of the proposal have been approved under the EP Act.

2 Contact Details

2-1 The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit for Proposal Implementation

3-1 The proponent shall not commence implementation of the proposal after eight (8) years from the date of this Statement, and any commencement, prior to this date, must be substantial.

3-2 Any commencement of implementation of the proposal, on or before eight (8) years from the date of this Statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of eight (8) years from the date of this Statement.

4 Compliance Reporting

4-1 The proponent shall prepare, and maintain a Compliance Assessment Plan which is submitted to the CEO at least six (6) months prior to the first Compliance Assessment Report required by condition 4-6, or prior to implementation of the proposal, whichever is sooner.

4-2 The Compliance Assessment Plan shall indicate:

(1) the frequency of compliance reporting;

(2) the approach and timing of compliance assessments;

(3) the retention of compliance assessments;

(4) the method of reporting of potential non-compliances and corrective actions taken;

(5) the table of contents of Compliance Assessment Reports; and

(6) public availability of Compliance Assessment Reports.

4-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 4-2 the proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1.

4-4 The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 4-1 and shall make those reports available when requested by the CEO.

4-5 The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.

4-6 The proponent shall submit to the CEO the first Compliance Assessment Report fifteen (15) months from the date of issue of this Statement addressing the twelve (12) month period from the date of issue of this Statement and then

annually from the date of submission of the first Compliance Assessment Report, or as otherwise agreed in writing by the CEO.

The Compliance Assessment Report shall:

(1) be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf;

(2) include a statement as to whether the proponent has complied with the conditions;

(3) identify all potential non-compliances and describe corrective and preventative actions taken;

(4) be made publicly available in accordance with the approved Compliance Assessment Plan; and

(5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1.

5 Public Availability of Data

5-1 Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal, the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)), management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

5-2 If any data referred to in condition 5-1 contains particulars of:

(1) a secret formula or process; or

(2) confidential commercially sensitive information,

the proponent may submit a request for approval from the CEO to not make these data publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.

6 Fire Management – Staged Fire Management Plan (Terrestrial Fauna and Flora and Vegetation)

6-1 The proponent shall prepare a Staged Fire Management Plan to demonstrate the following environmental objective will be met:

(1) avoid and minimise proposal-related impacts to the bilby and the black-footed rock-wallaby in the development envelope defined in Schedule 1.

6-2 The initial Staged Fire Management Plan will apply to the first stage of the proposal and shall:

(1) include a map showing the first stage of the proposal to be implemented and the areas to receive prescribed burns prior to construction;

(2) specify measures and actions to ensure prescribed burning activities passively relocate bilby away from areas of scheduled construction activities and meet the objective in condition 6-1;

(3) specify the monitoring parameters and procedures that will be used to determine the baseline state prior to prescribed burning for weeds, vegetation composition and fire age (time-since-burnt); and feral animal, bilby and black-footed rock-wallaby abundance, distribution and habitat;

(4) specify the monitoring parameters and procedures that will be used for post burn surveys for those values identified in condition 6-2(3);

(5) show evidence of any third-party input received including from Nyangumarta Traditional Owners and surrounding land users, including how that input was addressed;

(6) provide the format and timing for the reporting of baseline and post-burn surveys to demonstrate compliance with the objective in condition 6-1; and

(7) demonstrate adaptive management by providing options for ongoing management actions and measures.

6-3 The proponent shall submit to the CEO the initial Staged Fire Management Plan on advice of the Department of Biodiversity, Conservation and Attractions at least thirty-six (36) months prior to commencement of construction activities, and shall not commence any prescribed burns in the first stage of the proposal until the CEO has confirmed in writing that the initial Staged Fire Management Plan satisfies the requirements of condition 6-2.

6-4 The proponent shall implement the initial Staged Fire Management Plan approved in writing by the CEO.

6-5 At least twelve (12) months prior to commencement of construction activities in the remaining stages of the proposal the proponent shall revise and update the Staged Fire Management Plan that is to apply to the remaining stages of the proposal and demonstrate the environmental objective in condition 6-1 will be met.

6-6 The revised and updated Staged Fire Management Plan shall:

(1) discuss how monitoring results and learnings from the implementation of the initial Staged Fire Management Plan will be applied to the remaining stages of the proposal;

(2) include maps defining the implementation stages of the proposal, and detail how fire history mapping will be undertaken and documented for the life of the proposal;

(3) demonstrate how pre-construction and operational prescribed burning will be implemented and staged in the development envelope to create a mosaic of diverse fire age habitats beneficial for bilby;

(4) detail pre and post burn monitoring parameters of weeds, vegetation composition and time-since-burnt; and feral animals, bilby and black-footed rock-wallaby abundance, distribution and habitat;

(5) include a program of ongoing consultation with Nyangumarta Traditional Owners and surrounding land users;

(6) specify **management actions; management targets**; monitoring locations, methodologies, parameters and timing; and reporting to demonstrate compliance with the objective in condition 6-1; and

(7) specify a process and timeline to show adaptive management and for revision of management actions and targets and updates to the plan in the event targets are not being met.

6-7 The proponent:

(1) shall not commence implementation of the revised Staged Fire Management Plan, until the CEO has confirmed in writing that the revised Staged Fire Management Plan satisfies the requirements of condition 6-6;

(2) may review and revise the Staged Fire Management Plan, with any changes to management actions and/or targets of the Fire Management Plan to be approved by the CEO in writing;

(3) shall review and revise the Staged Fire Management Plan as and when directed by the CEO by a notice in writing; and

(4) shall implement the latest revision of the Staged Fire Management Plan approved by the CEO.

6-8 The proponent shall continue to implement the Staged Fire Management Plan until the CEO has confirmed by notice in writing that the proponent has demonstrated that the objective in condition 6-1 has been met.

6-9 Where monitoring or investigations indicate a failure to meet or implement management action(s) or management target(s) detailed in the approved Staged Fire Management Plan, the proponent shall meet the requirements of condition 4-5 (Compliance Reporting) and shall implement the measures outlined in the approved Staged Fire Management Plan, including, but not limited to, actions and investigations to be undertaken.

6-10 The proponent shall prepare and submit a Staged Fire Management Plan Performance Report to the CEO within five (5) years of commencing prescribed burns and every five (5) years thereafter, until the proponent can demonstrate that the objective of condition 6-1 will continue to be achieved, or unless otherwise agreed by the CEO.

6-11 The Staged Fire Management Plan Performance Report shall include the following:

(1) an independent review of the implementation and effectiveness of the measures and actions in the Staged Fire Management Plan against the objective of condition 6-1 by an independent fire ecologist expert approved by the CEO in writing;

(2) results of the monitoring undertaken and an analysis of gathered ecological information, in particular demonstrating the creation and maintenance of a mosaic of differing fire ages within each stage; and

(3) how monitoring and learnings from the implementation of the Staged Fire Management Plan will be applied to the remaining construction stages and operational life of the proposal.

7 Environmental Management (Terrestrial Fauna, Flora and Vegetation and Social Surroundings)

7-1 The proponent must ensure the following environmental objectives are achieved when implementing and operating the terrestrial components of the proposal:

Conservation Reserves

(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 Kunjungurru Warrarn Nature Reserve;

Flora and Vegetation

(2) no direct impacts to Threatened flora species and minimise direct and indirect impacts on any Threatened and Priority flora species and ecological communities within the development envelope;

(3) minimise and manage the introduction, establishment and spread of weeds throughout the development envelope;

Terrestrial Fauna

(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);

(5) minimise turbine collision impacts on fire attracted raptor species when undertaking prescribed burns;

(6) no cable construction activities in beach and intertidal dune habitat during peak avifauna activity periods at Eighty Mile Beach;

(7) reduce predation risk to Threatened and Priority listed fauna from feral predators within the development envelope;

(8) 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;

(9) no direct or indirect loss of confirmed black-footed rock-wallaby habitat attributable to the proposal by ensuring a 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

(10) maintain viability of populations of black-footed rock-wallaby and bilby in the development envelope from activities attributable to the implementation of the proposal.

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) at least 12 months prior to commencing ground disturbing activities.

7-3 The revised Asian Renewable Energy Hub Environmental Management Plan shall:

(1) detail industry best-practice bird detection and monitoring systems that will be implemented during operations of wind turbines;

(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;

(3) include provisions to monitor and record any avifauna impacts from operation of the wind turbines and associated transmission infrastructure;

(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;

(5) 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;

(6) details of targeted surveys for Threatened Flora species and Priority Flora species to be undertaken prior to clearing activities occurring in each stage;

(7) details of weed management, hygiene and monitoring;

(8) 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;

(9) be prepared on the advice of the Department of Biodiversity, Conservation and Attractions and relevant Traditional owner groups; and

(10) 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.

7-4 The proponent:

(1) may review and revise the Asian Renewable Energy Hub Environmental Management Plan; or

(2) shall review and revise the Asian Renewable Energy Hub Environmental Management Plan as and when directed by the CEO by a notice in writing.

7-5 The proponent shall implement the latest revision of the Asian Renewable Energy Hub Environmental Management Plan approved by the CEO.

7-6 The proponent shall not commence ground disturbing activities until the CEO has confirmed in writing that the Asian Renewable Energy Hub Environmental Management Plan satisfies the requirements of condition 7-1 and 7-3.

7-7 The proponent shall continue to implement the Asian Renewable Energy Hub Environmental Management Plan until the CEO has confirmed by notice in writing that the proponent has demonstrated that the objectives in condition 7-1 have been met.

7-8 Where monitoring or investigations indicate a failure to meet or implement management action(s) or management target(s) detailed in the approved Asian Renewable Energy Hub Environmental Management Plan, the proponent shall meet the requirements of condition 4-5 (Compliance Reporting) and shall implement the measures outlined in the approved Environmental Management Plan, including, but not limited to, actions and investigations to be undertaken.

8 Infrastructure Staging and Layout

8-1 At least three (3) months prior to commencement of construction activities in each stage of the proposal, the proponent shall prepare and submit an Infrastructure Staging and Layout Report to the CEO. The report is to include:

(1) a figure showing boundaries of the stages of the proposal;

(2) maps and spatial data showing the location, alignment, spacing and height (where relevant) of the physical elements in Table 2 of Schedule 1 to be constructed in the upcoming stage of the proposal, and for each constructed stage of the proposal;

(3) location(s) of areas to be avoided in the upcoming stage including any black-footed rock-wallaby habitat (and the associated one (1) km buffer) and Threatened Flora species as required by condition 7-1;

(4) a table with estimates of the disturbance footprint for the upcoming stage; and

(5) a table with a calculation of the cumulative disturbance footprint to date, combined with estimates of future disturbance to ensure the proposal is implemented consistent with the authorised extent in Table 2 of Schedule 1.

9 Environmental Management (Marine Environmental Quality and Marine Fauna)

9-1 The proponent must ensure the following environmental objective is achieved when constructing, operating, maintaining or decommissioning the marine components of the proposal:

(1) minimise direct and indirect impacts on the environmental values of marine parks, and their adjacent coastal areas, managed under the *Conservation and Land Management Act 1984*, including the Eighty Mile Beach Marine Park.

9-2 To achieve the objective in condition 9-1, the proponent shall prepare and submit to the CEO a Marine Environment Management Plan at least six (6)

months prior to commencing dune, beach, intertidal or subsea ground disturbing activities. The Marine Environment Management Plan shall:

(1) identify the relevant environmental values of the Eighty Mile Beach Marine Park that are likely to be impacted by the proposal;

(2) detail management and mitigation measures to protect the environmental values of the Eighty Mile Beach Marine Park and adjacent coastal areas during construction, operation, maintenance and decommissioning of marine components of the proposal including specific measures to;

  (a) minimise turbidity generation;

  (b) ensure that sediment and water quality is sampled prior to construction activities and is monitored during operations and decommissioning;

  (c) ensure that no spillage of hydrocarbons or waste material, or release of sediment contaminants, that have the potential to deteriorate water quality occurs;

  (d) ensure the cable anode is not located in the Eighty Mile Beach Marine Park and State Waters to avoid the potential impacts from hypochlorous acid production;

  (e) ensure a qualified marine fauna observer will maintain a marine mammal **Observation Zone** and a **Cease Work Zone** during any subsea cable activities;

  (f) ensure cable installation activities in dune and beach habitat or subsea cable construction activities are not undertaken during peak turtle nesting and hatching season (1 November – 31 March in any year);

  (g) ensure subsea cable construction activities in the **Intertidal Zone** are not undertaken during sawfish pupping season (1 January – 31 May in any year); and

  (h) ensure the HVDC cables are buried to a minimum depth of five (5) m below seabed level, including through coastal areas of turtle nesting habitat, unless otherwise approved by the CEO.

(3) detail electromagnetic-field and cable heat dissipation threshold levels for marine fauna, particularly electrically sensitive marine fauna;

(4) include electromagnetic-field and heat dissipation modelling results of the HVDC cables to be implemented and compare the results to threshold levels;

(5) detail adequate cable shielding specifications, and other electromagnetic-field and cable heat dissipation mitigation measures where relevant;

(6) detail operational electromagnetic-field and heat dissipation verification monitoring and include management actions to be implemented in the event levels are higher than predicted;

(7) be prepared on the advice of the Department of Biodiversity, Conservation and Attractions; and

(8) specify **management actions**; **management targets**; monitoring locations, methodologies, parameters and timing; and reporting to demonstrate that the measures in condition 9-2 will ensure the objective in condition 9-1 will be met.

9-3 The proponent:

(1) may review and revise the Marine Environment Management Plan; or

(2) shall review and revise the Marine Environment Management Plan as and when directed by the CEO by a notice in writing.

9-4 The proponent shall implement the latest revision of the Marine Environment Management Plan approved by the CEO.

9-5 The proponent shall not commence ground disturbing activities in coastal or marine environments until the CEO has confirmed in writing that the Marine Environment Management Plan satisfies the requirements of condition 9-1 and 9-2.

9-6 The proponent shall continue to implement the Marine Environment Management Plan until the CEO has confirmed by notice in writing that the proponent has demonstrated that the objective in condition 9-1 have been met.

9-7 Where monitoring or investigations indicate a failure to meet or implement management action(s) or management target(s) detailed in the approved Marine Environment Management Plan, the proponent shall meet the requirements of condition 4-5 (Compliance Reporting) and shall implement the measures outlined in the approved Environmental Management Plan, including, but not limited to, actions and investigations to be undertaken.

10 Decommissioning and Rehabilitation

10-1 At least five (5) years prior to the forecasted completion of the operational phase of the proposal the proponent shall prepare and submit a Decommissioning and Rehabilitation Plan to the CEO, on advice of the Department of Biodiversity, Conservation and Attractions and the Department of Planning, Lands and Heritage, to meet the following objective:

(1) ensure the proposal is decommissioned and rehabilitated in an ecologically sustainable manner.

10-2 The proponent is to include an update on the forecasted completion of the operational phase and decommissioning of the proposal in each Compliance Assessment Report required by condition 4-6.

10-3 The proponent:

(1) may review and revise the Decommissioning and Rehabilitation Plan;

(2) shall review and revise the Decommissioning and Rehabilitation Plan as and when directed by the CEO by a notice in writing; and

(3) shall implement the latest revision of the Decommissioning and Rehabilitation Plan approved by the CEO.

Schedule 1

Table 1: Summary of the proposal

Proposal title	Asian Renewable Energy Hub
Short description	Proposal is to construct and operate a large-scale wind and solar renewable energy project at a site approximately 220 km east of Port Hedland and 270 km southwest of Broome, in the northwest of Western Australia. The onshore terrestrial components of the project will comprise a series of linear arrays of wind turbines and solar panels, with an above and below ground transmission cable corridor to the coast. The offshore marine component of the proposal comprises inert subsea power cables, with the marine component of the proposal only extending to the limit of state waters.

Table 2: Location and authorised extent of physical and operational elements

Column 1	Column 2	Column 3
Element	**Location**	**Authorised Extent**
Terrestrial Components		
Wind turbines and hardstands (up to 1,743 individual turbines). Photovoltaic solar arrays and associated electrical infrastructure. HVDC Converter Station. Overhead transmission lines (including associated tracks and pylons). Overhead distribution cable. Site access tracks. Substations. Control compound, warehouse and accommodation.	Figure 2	Total permanent vegetation clearing of no more than 11,962 ha including no more than 0.2 ha of the Eighty Mile Beach Land System Priority Ecological Community. Wind turbines are to have approximately 800 m individual separation distance (linearly) and approximately 4 km separation distance between rows.

Construction laydown areas. Buried transmission cable section.	- Figure 2 and 3	Total temporary vegetation clearing of no more than 613 ha including no more than 592 ha for construction laydown areas and 21 ha buried transmission cable section. Buried transmission cable is to be approximately 14 km in length from the Great Northern Highway to the Coast.
Marine components		
Offshore subsea transmission cables (4x 800kV HVDC cables)	Figure 3	No more than 15.3 ha seabed disturbance within the defined cable corridor.
Terrestrial and marine components combined		
Total development envelope	Figure 2	No more than 662,400 ha.

Table 3: Abbreviations and Definitions

Acronym or Abbreviation	Definition or Term
Cease Work Zone	A 100 m circular zone around subsea cable construction activities, where should the marine fauna observer sight a marine mammal, then cable construction activities shall cease until that mammal has moved more than 100 m away. The marine fauna observer must log all marine mammals and marine mammal's behaviour within this 100 m zone that could be interpreted as display of disturbance or distress.
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the *Environmental Protection Act 1986*, or his delegate.
Development envelope	The area within the yellow line marked in Figure 1.
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
ha	Hectare
HVDC	High Voltage Direct Current
Intertidal Zone	The area of the marine shoreline that is exposed to air at the lowest astronomical tide, and covered with seawater at the highest astronomical tide.
km	Kilometre
m	metres
Management actions	As defined in the EPA's *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans.*
Management targets	As defined in the EPA's *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans.*
Observation Zone	A 300 m circular zone around subsea cable construction activities within which the marine fauna observer much watch for and log all

	marine mammals and marine mammal's behaviour that could be interpreted as display of disturbance or distress.
Priority Flora species	Plant taxa listed by the Department of Biodiversity, Conservation and Attractions as Priority flora species.
Threatened flora species	Plant taxa listed as a threatened species in accordance with the *Biodiversity Conservation Act 2016.*
Weeds	Any plant declared under section 22(2) of the *Biosecurity and Agriculture Management Act 2007*, any plant listed on a National Weeds List and any weeds listed on DBCA's Pilbara or Kimberley Impact and Invasiveness Ratings list as amended or replaced from time to time.

Figures (attached)

Figure 1: Regional location

Figure 2: Asian Renewable Energy Hub development envelope and indicative infrastructure layout with proposal elements

Figure 3: Coastal and offshore cable route

Figure 4: 1 km buffers for confirmed black-footed rock-wallaby rock pile habitat

Figure 1: Regional location

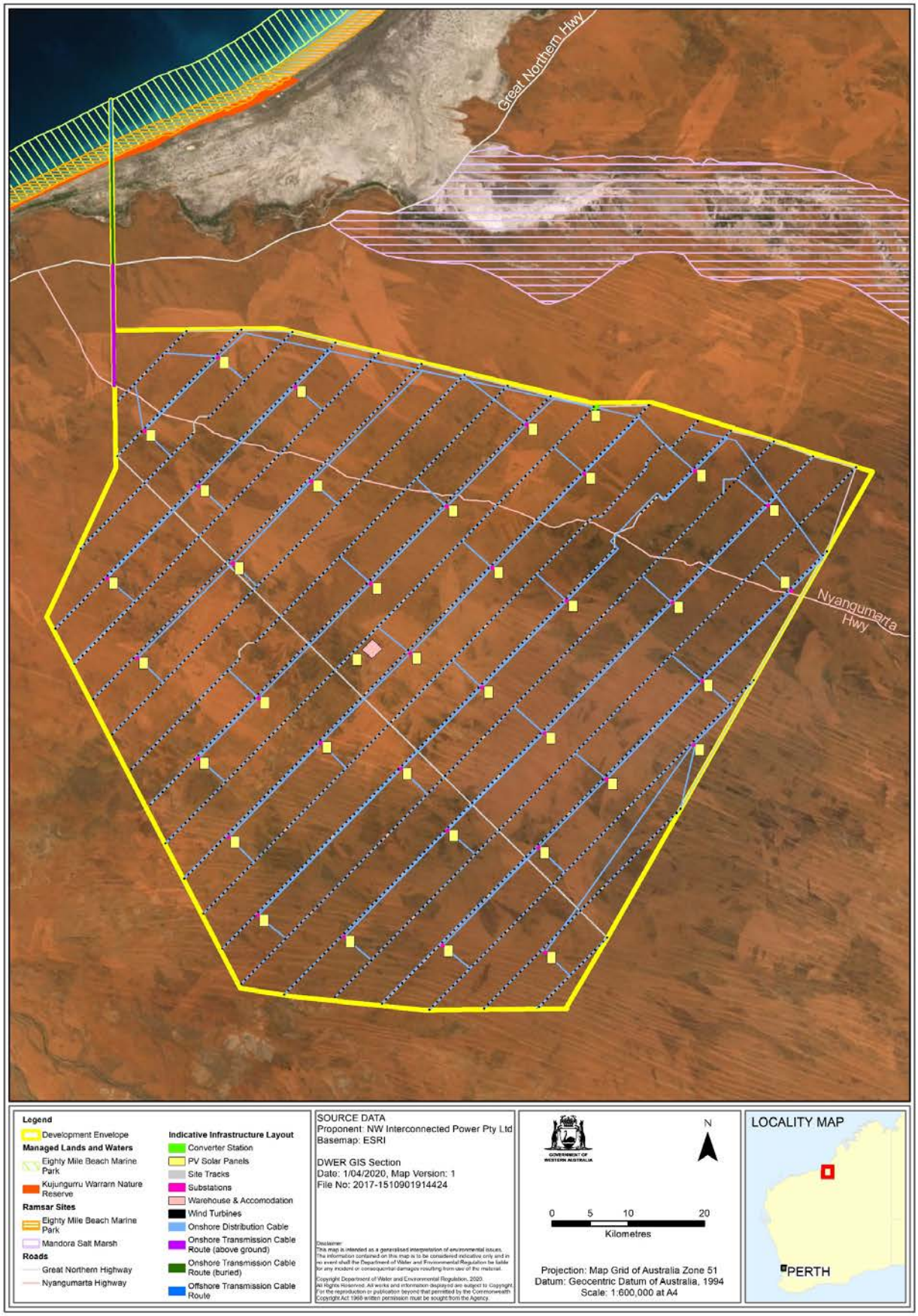

Figure 2: Asian Renewable Energy Hub development envelope and indicative infrastructure layout with proposal elements

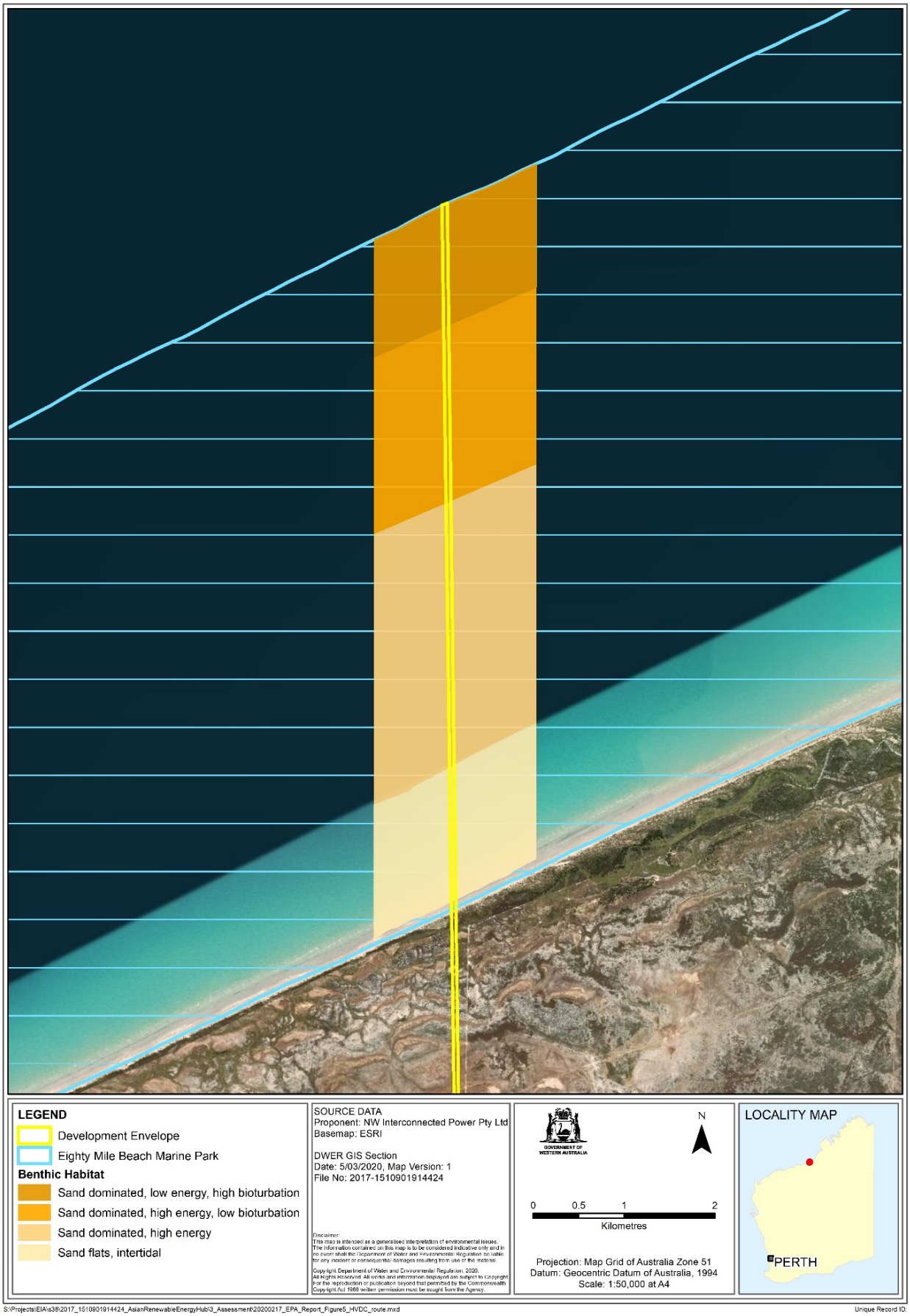

Figure 3: Indicative coastal and offshore cable route

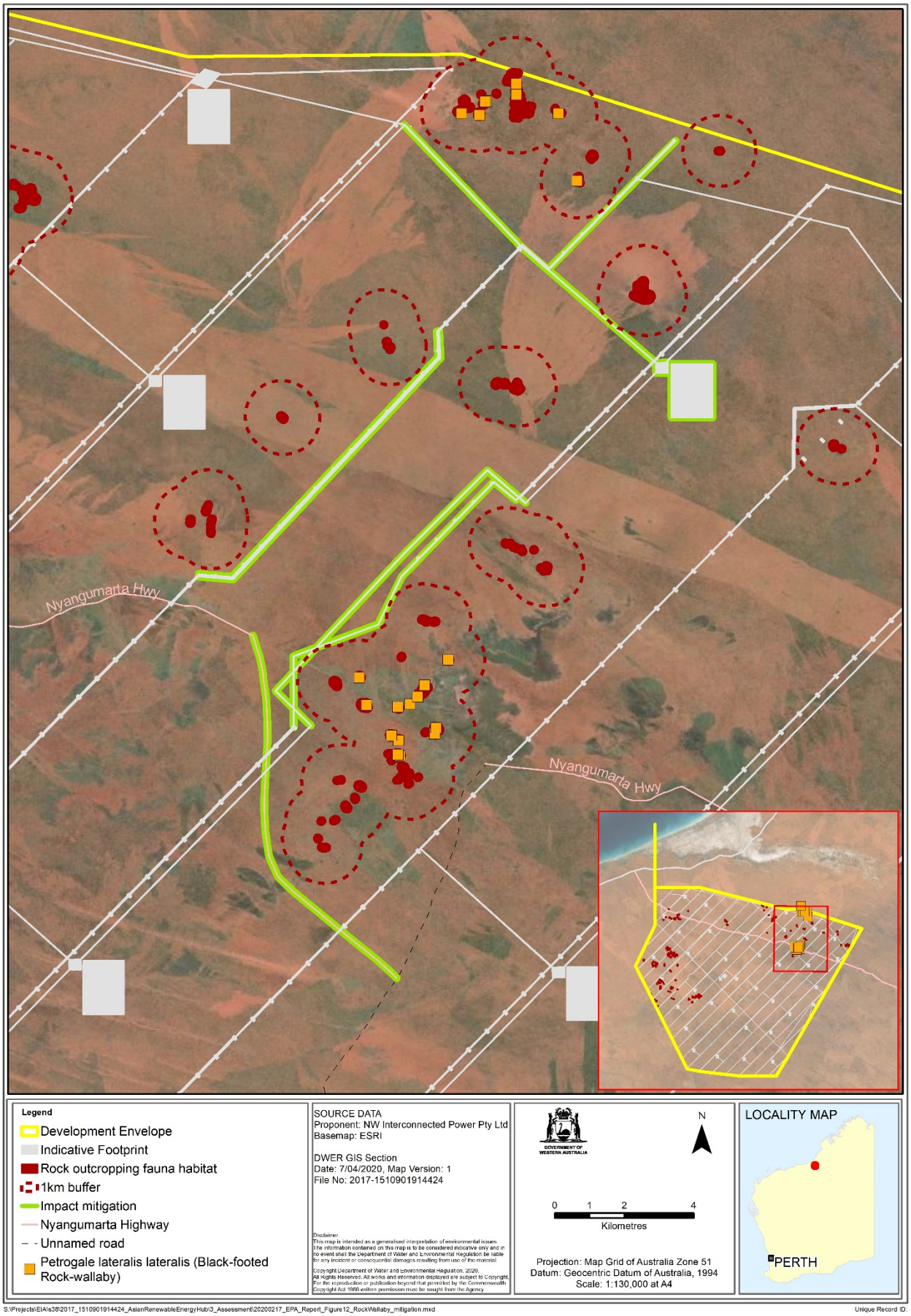

Figure 4: 1km buffers for confirmed black-footed rock-wallaby rock pile habitat

Schedule 2

Spatial coordinates for the boundaries of the proposal (MGA Zone 50). Note: All spatial data for this proposal is in spherical (instead of Cartesian).

Coordinates defining the boundaries shown in Figures 1, 2, 3 and 4 are held by the Department of Water Environmental Regulation, Reference Number DWERDT273858.