PORT HEDLAND IRON PROJECT - STAGE 1

SUPPLEMENTARY REPORT

PORT HEDLAND IRON PTY LTD

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ACKNOWLEDGEMENT OF COUNTRY

Preston Consulting acknowledges the Traditional Owners of the lands on which it works, in particular the Kariyarra people, the Traditional Custodians of the land on which the activity is proposed. Preston Consulting pays its respects to Elders past and present, to emerging community leaders and to all Aboriginal and Torres Strait Islander peoples.

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EXECUTIVE SUMMARY

THE PROPOSAL

The Port Hedland Iron Project - Stage 1 (the Proposal) is a staged development of a large-scale downstream iron ore processing facility 10 km south-west of Port Hedland in the Pilbara region of Western Australia (WA) (Figure 2-2). The Proposal is being developed by Port Hedland Iron Pty Ltd (PHI) on behalf of joint venture partners POSCO, Marubeni and China Steel Company (see Section 1.2).

The development envelopes, disturbance footprint and indicative infrastructure footprint for the Proposal is provided in Figure 2-3. A summary of the Proposal is provided in Table ES1 and the key proposal elements (e.g., development, action, activities or processes) which are likely to cause an impact on the environment are summarised in Table ES2.

Table ES1: Key characteristics of the Proposal

Proposal Title	Port Hedland Iron Project – Stage 1
Proponent Name	Port Hedland Iron Pty Ltd
Short Description	Port Hedland Iron Pty Ltd (PHI) is progressing the development of a large-scale downstream iron ore processing facility known as the Port Hedland Iron Project (the Proposal). The Proposal is located in the Boodarie Strategic Industrial Area approximately 10 km southwest of Port Hedland in the Pilbara region. The Proposal's regional location is shown in Figure 2-2 and the indicative footprint and development envelopes are shown in Figure 2-3. The Proposal will consist of a pellet plant and a HBI Plant, consuming approximately 3-3.5 Mtpa of iron ore. The first processing step is to produce iron ore pellets (3-3.5 Mtpa). Most of the pellets will be fed into the HBI plant to produce approximately 2 Mtpa HBI. The remainder of the pellets (~0.7 Mtpa) will be exported from the Port as pellets. The infrastructure to be developed within the Boodarie SIA for the Proposal will include: • Iron ore processing facility (IOPF) comprising one pellet and one HBI plant producing approximately 2 Mtpa of HBI and 0.7 Mtpa of iron ore pellets; • Hydrogen production and storage facilities for supply to IOPF; • Nitrogen plant and • Supporting infrastructure such as: o HBI and pellet handling and storage facilities; o Flux storage; o Administration and other non-process buildings; o Workshops; o Water storage and management areas; o Magnetite concentrate/ore handling facilities; o Power production, management and transmission; o Carbon capture, storage and transport infrastructure; o Drainage and sediment control; and o Access roads. The HBI and iron ore pellets will be shipped out of the Port of Port Hedland (PoPH). The scope of the Proposal does not include any construction works at the PoPH or the export of pellets and HBI. Water, power and natural gas will be supplied by third parties and subject to separate approvals by the relevant third-party and therefore not part of this referral. However, the referral includes an EIDE to allow connection within the Boodarie SIA to third party suppliers, if needed, as well as development of access roads and drainage for the Proposal. The EIDE covers the infrastructure corridors identified in the Boodarie SIA Structure Plan. These infrastructure corridors are managed by the Department of Jobs, Tourism, Science and Innovation (JTSI). The layout of the infrastructure within the EIDE will be determined

	once commercial arrangements with third-party suppliers have been finalised as well as consultation undertaken with JTSI. The Proposal also excludes early works for communications infrastructure, laydown areas and access roads.

Table ES2: Location and proposed extent of physical and operational elements

Element	Location / Description	Maximum extent, capacity or range
Physical Elements		
Plant Development Envelope: • Clearing of native vegetation; • Construction; • Earthworks; • Ore processing; and • Transport.	Figure 2-3	Disturbance of up to 300 ha within a 518 ha Development Envelope.
EIDE: • Clearing of native vegetation; • Construction; and • Transport.	Figure 2-3	Disturbance of up to 90 ha within a 466 ha Development Envelope.
Construction Elements		
N/A	N/A	N/A
Operational Elements		
Ore processing	N/A	Production of 3.5 Mtpa of iron ore pellets and 2.0 Mtpa of HBI.
Greenhouse gas emissions		
Construction		
Scope 1	The Proposal will generate greenhouse gas (GHG) emissions predominantly from diesel combustion and land clearance. GHG emissions during the Proposal construction phase are estimated at 288,120t CO_2-e.	
Scope 2	Electricity may be sourced from a third-party power supplier with an 'islanded' power station or from the NWIS grid. For the purposes of this estimate, it has been assumed power will be from the NWIS. Estimated Scope 2 emissions are 50,329 t CO_2-e.	
Scope 3	GHG emissions for the Proposal construction phase associated with upstream and downstream processing have been estimated at 4,478,760 CO_2-e.	
Operation		
Scope 1	Key Scope 1 emissions sources for the Proposal include: • Combustion of diesel by light vehicles and machinery; • Combustion of natural gas to produce heat in the pelletising and HBI making process; and • Chemical reactions with fluxes and other reagents including the consumption of natural gas for reduction of pelletised iron ore in the HBI making process. Total Scope 1 greenhouse gas emissions: 18,551,930 t CO_2-e.	
Scope 2	The Proposal will be powered by connection to third-party power supplies. The estimated emissions are based on data provided by a potential third-party supplier for their existing network. Commercial negotiations are ongoing for this supply and the exact Scope 2 emissions will be determined once the preferred power supply provider is selected. Scope 2 emissions will therefore be accurately quantified during the assessment.	

Element	Location / Description	Maximum extent, capacity or range
	Total Scope 2 greenhouse gas emissions: 2,291,460 t CO_2-e.	
Scope 3	Scope 3 emissions have been estimated using known emissions intensities, import/export quantities and distances, and production rates. Scope 3 emissions estimates include the following sources: • Processing of HBI to steel using electric arc furnace; • Export of HBI and Pellets from Port Hedland to South Korea; • Supply of Iron Ore from a third-party provider; and • Import of reagents (bentonite and limestone) from the closest major international exporters using ocean shipping method. Total Scope 3 greenhouse gas emissions: 511,810,175 t CO_2-e.	
Rehabilitation and closure		
Areas temporarily cleared during the construction phase that are not required for operations will be rehabilitated following construction. Final rehabilitation to commence within 12 months of cessation of decommissioning. Topsoil will be spread across the site, with seeding of native species likely to be required.		
Commissioning		
Commissioning of the processing facility to be undertaken subject to operational limits.		
Decommissioning		
All above-surface infrastructure will be removed from site. Buried concrete and other buried infrastructure may be remain in-situ if they do not pose a contamination risk.		
Other elements which affect extent of effects on the environment		
Proposal Time	Maximum proposal life	101 years
	Construction phase	2.5 years
	Operations phase	99 years
	Decommissioning phase	Approximately 10 years

KEY ENVIRONMENTAL FACTORS

The EPA has identified Flora and Vegetation, Terrestrial Fauna, Air Quality, Greenhouse Gas Emissions, and Social Surroundings as Key Environmental Factors relevant to the Proposal.

Table ES3 summarises relevant information on the potential impacts, mitigation, residual impacts, outcomes and offsets for each of the relevant Key Environmental Factors. The appendices provided include supporting studies and investigations undertaken to inform this ERD, the key elements of which are included in this document.

Table ES3: Summary of potential impacts, proposed mitigation, residual impacts and outcomes

Flora and Vegetation	
EPA Objective	The EPA Objective for this Key Environmental Factor is to protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Policy and Guidance	• Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023a); • EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a); • EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b); • Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021c);

	• Environmental Factor Guideline - Flora and Vegetation (EPA, 2016a); • Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (2016b); and • Guidance Statement 6 – Rehabilitation of Terrestrial Ecosystems (EPA, 2006).
Potential impacts	<u>General native flora and vegetation</u> • Up to 387.1 ha of native vegetation clearing. All of this vegetation is considered to be in Very Good to Excellent condition; • Reduction in vegetation health as a result of: o Establishment or spread of weed species / populations due to earthmoving and vehicle traffic; o Dust deposition due to dust generated by construction and operation activities ; o Alterations to surface water and groundwater regimes resulting in impacts to the health of downstream vegetation; and o Hydrocarbon and other spills. <u>Locally significant vegetation</u> • Disturbance of up to: o 5.9 ha of EvGlEa (49.6% of mapped extent); and o 130.0 ha of AsTsch (48.5 of mapped extent). • Reduction in vegetation health as a result of: o Establishment or spread of weed species / populations due to earthmoving and vehicle traffic; o Dust deposition due to dust generated by construction and operation activities ; o Alterations to surface water and groundwater regimes resulting in impacts to the health of downstream vegetation; and o Hydrocarbon and other spills. <u>Priority Flora</u> • Disturbance of up to two records Tephrosia rosea var. Port Hedland (A.S. George 1114) (Priority 1). • Up to 387.1 ha of disturbance to native vegetation, some of which may provide habitat for these species. • Reduction in vegetation health as a result of: o Establishment or spread of weed species / populations due to earthmoving and vehicle traffic; o Dust deposition due to dust generated by construction and operation activities ; o Alterations to surface water and groundwater regimes resulting in impacts to the health of downstream vegetation; and o Hydrocarbon and other spills.
Mitigation	**Avoid:** PHI has conducted extensive flora and vegetation surveys of the areas within and surrounding the development envelopes and have utilised this information to undertake planning and design revisions. A total of 1,440.7 ha of native vegetation was recorded within the Survey Areas. During the preparation of the Proposal's site layout, a key consideration was the avoidance of vegetation wherever practicable, and the footprint minimised to smallest extent possible to avoid clearing of native vegetation. The Proposal is located within an area set aside as a Strategic Industrial Area where there is existing industrial development and is not located in undeveloped, pristine parts of the Pilbara. It therefore avoids impacts to flora and vegetation in these pristine, undeveloped areas. **Minimise:** • Implement industry best practice management measures for flora and vegetation: • Obtain and comply with Works Approval(s) and Licences issued under Part V of the EP Act: **Rehabilitate** The key rehabilitation measures that relate to flora and vegetation are summarised below: 1. All infrastructure will be removed; and 2. The disturbance footprints will be revegetated with local native species.

	A lease with the State Government under the LAA is expected to contain terms and conditions of requiring decommissioning and rehabilitation of the Proposal at the end of its operational life, which will ensure rehabilitation measures are implemented. **Offset** After the implementation of the mitigation measures described above, it is predicted that the Proposal will have an unavoidable significant residual impact on 387.1 ha of Good to Excellent quality native vegetation. Proposed offsets for this significant residual impact are discussed in detail in Section 10 and the Impact Reconciliation Procedure (IRP) in Appendix 2.
Outcomes	The EPA's environmental objective for this factor is "to protect flora and vegetation so that biological diversity and ecological integrity are maintained". In the context of this objective: "ecological integrity" is listed as the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements (EPA, 2016a). Phoenix conducted extensive flora and vegetation surveys of the development envelopes. PHI has incorporated avoidance and minimisation measures into the Proposal design and operational processes, however direct impacts to flora and vegetation are unavoidable. The Proposal will result in the clearing of up to 387.1 ha of native vegetation in Very Good to Excellent Condition. One significant flora species was recorded within the Survey Area *Tephrosia rosea* var. Port Hedland (A.S. George 1114) and up to two records may be disturbed should the Proposal be implemented. If the Proposal is approved, the Ministerial Statement is likely to contain a condition requiring the finalisation and implementation of the IRP provided in Appendix 2. The offset measures will be reviewed and refined in the IRP and will be informed by discussions with DEMIRS, DBCA, DCCEEW and EPA Services to ensure they adequately counterbalance the residual impacts. The predicted outcomes for Flora and Vegetation are therefore: • Disturbance to no more than 387.1 ha native vegetation, all of which will be of a Very Good to Excellent condition quality; • Clearing of 387.1 ha of Good to Excellent quality vegetation is considered a significant residual impact requiring offsets; • Disturbance to now more than two records of *Tephrosia rosea* var. Port Hedland (A.S. George 1114); and • Negligible adverse indirect impacts associated with dust deposition and changes to surface water flows. Based on the above, the Proposal is expected to be able to meet the EPA's objective for this factor.
Terrestrial Fauna	
EPA Objective	The EPA Objective for this Key Environmental Factor is to protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Policy and Guidance	• Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023a); • EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a); • EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b); • Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021c); • Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016c); • Technical Guidance – Terrestrial fauna surveys (EPA, 2020b); and • Technical Guidance – Sampling of short-range endemic invertebrate fauna (EPA, 2016d).
Potential Impacts	<u>General fauna and habitat (including locally significant fauna)</u> • Up to 390 ha of native fauna habitat disturbance; • Death or injury of fauna due to vehicle strike or earthmoving equipment; • Increased predation or competition from introduced fauna. • Alterations to fauna behaviour (including feeding or breeding characteristics) as a result of elevated dust, light or noise emissions; • Alteration of habitat characteristics as a result of changes to the surface water regime; and • Reduction in habitat health as a result of: o Increased sedimentation during construction; o Leaks or spillages of hydrocarbons or chemicals; and o Introduction or spread of weed species. <u>Bilby</u> • Up to 378.1 ha (26.8% of local extent) of disturbance to critical habitat; • Increased predation or competition from introduced fauna.

	• Alterations to behaviour (including feeding or breeding characteristics) as a result of elevated light or noise emissions. Grey Falcon and Black Falcon • Up to 386.1 ha (26.1% of local extent) of disturbance to potential foraging habitat; • Increased predation or competition from introduced fauna; and • Alterations to behaviour (including feeding or breeding characteristics) as a result of elevated light or noise emissions. Northern Quoll • Up to 1.6 ha (18% of local extent) of disturbance to potential foraging/dispersal habitat; • Increased predation or competition from introduced fauna; and • Alterations to behaviour (including feeding or breeding characteristics) as a result of elevated light or noise emissions. Brush-tailed Mulgara • Up to 378.1 ha (26.8% of local extent) of disturbance to breeding and foraging habitat; • Increased predation or competition from introduced fauna; and • Alterations to behaviour (including feeding or breeding characteristics) as a result of elevated light or noise emissions.
Mitigation	**Avoid:** The key avoidance mechanism implemented by PHI was the design of the development envelopes to avoid key habitat features associated with terrestrial fauna. The Proposal has been reduced to the minimum possible footprint to avoid disturbance where possible. As for flora and vegetation, the Proposal is located within an area set aside as a Strategic Industrial Area where there is existing industrial development and is not located in undeveloped pristine parts of the Pilbara remote from any supporting infrastructure. It therefore avoids impacts to fauna and fragmentation of fauna habitat in these pristine undeveloped areas. **Minimise:** • Implement industry best practice management measures for terrestrial fauna: • Obtain and comply with the following approvals: and • Implement the measures to minimise the risk and impact of hydrocarbon spills and other contamination. **Rehabilitate:** The key rehabilitation measures that relate to terrestrial fauna are summarised below: 1. All infrastructure will be removed; and 2. The development envelopes will be revegetated with local native species. The Proposal is required to sign a Lease with the State Government under the LAA. PHI expects that the terms and conditions of the lease will require decommissioning and rehabilitation of the Proposal at the end of its operational life, which will ensure rehabilitation measures are implemented. **Offset:** After the implementation of the mitigation measures described above, it is predicted that the Proposal will have an unavoidable significant residual impact on: • Good to Excellent quality remnant fauna habitat; • Critical Bilby Habitat; • Foraging/dispersal habitat for the Northern Quoll; • Foraging habitat for the Grey Falcon and Black Falcon; and • Breeding and foraging habitat for the Brush-tailed Mulgara. Proposed offsets for these significant residual impacts are discussed in detail in Section 10 and the IRP in Appendix 2.
Outcomes	The EPA's environmental objective for this factor is to "protect terrestrial fauna so that biological diversity and ecological integrity are maintained". In the context of this objective: "ecological integrity" is listed as the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements (EPA, 2016c). PHI has incorporated avoidance, minimisation and rehabilitation measures into the Proposal design and operational processes, however some direct impacts to terrestrial fauna are unavoidable. The Proposal will result in disturbance to 386.1 ha of native vegetated fauna habitat, in a relatively uncleared landscape. All of this vegetation is considered to be in Good to Excellent condition, no poor or degraded vegetation was recorded in the survey. Evidence of the Bilby was recorded in the survey and is listed as Vulnerable under the EPBC Act and BC Act. It is primarily threatened predation by foxes and feral cats and loss and

	fragmentation of breeding and foraging habitat as a result of vegetation clearing. Sandplain habitat has been identified as critical habitat for the Bilby. This habitat is present throughout the development envelopes. However, Sandplain habitat is widespread across the Pilbara and critical habitat is defined as any area where the Bilby is known or likely to occur, as shown in Figure 6-4. This constitutes up to 216,636,018 ha of habitat. Therefore, disturbance of up to 378.1 ha of habitat (0.0001% of regional extent) within a SIA is unlikely to result in a significant impact on the species. Nevertheless, after the implementation of avoidance, minimisation and rehabilitation mitigation measures, disturbance of 378.1 ha of critical habitat is deemed to be significant and is proposed to be counterbalanced by offsets, outlined in Section 10 and the IRP in Appendix 2, to ensure that the EPA objective can be met. The Grey Falcon was recorded in the survey and is listed as Vulnerable under the EPBC Act and BC Act. The Black Falcon was also recorded in the survey and is not currently listed under the EPBC Act or BC Act but is considered locally significant. Sandplain, Open Woodlands and Drainage habitat were considered potential foraging habitat for both species of falcon. Both falcon species are wide ranging with a distribution across the arid and semi -arid zone of Australia and prey on smaller bird species. The Proposal will require up to 386.1 ha of disturbance to potential foraging habitat which is deemed to be significant and is proposed to be counterbalanced by offsets, outlined in Section 10 and the IRP in Appendix 2, to ensure that the EPA objective can be met. The Northern Quoll was considered possible to occur within the Survey Area and is listed as Endangered under the EPBC and BC Act. The Drainage Area may provide potential foraging and dispersal habitat for the species, particularly considering the relatively recent record (2018) approximately 4.5 km from the development envelopes. The Proposal will require up to 1.6 ha of Drainage Area habitat which is deemed to be significant and is proposed to be counterbalanced by offsets, outlined in Section 10 and the IRP in Appendix 2, to ensure that the EPA objective can be met. The Brush-tailed Mulgara was recorded in the survey and is listed as Priority 4 by DBCA. Sandplain habitat provides breeding and foraging habitat for the species. The Proposal will require up to 378.1 ha of Sandplain habitat which is deemed to be significant and is proposed to be counterbalanced by offsets, outlined in Section 10 and the IRP in Appendix 2, to ensure that the EPA objective can be met. The predicted outcomes for Terrestrial Fauna are therefore: • Disturb no more than the following environmental values: o 386.1 ha of fauna habitat of in Good to Excellent quality condition; o 378.1 ha of critical habitat for the Bilby and breeding/foraging habitat for Brush-tail Mulgara; o 1.6 ha of foraging/dispersal habitat for Northern Quoll; and o 386.1 ha of foraging habitat for Grey Falcon and Black Falcon. If the Proposal is approved, the Ministerial Statement is likely to contain a condition requiring the finalisation and implementation of the IRP provided in Appendix 2. The offset measures will be reviewed and refined in the IRP and will be informed by discussions with DEMIRS, DBCA, DCCEEW and EPA Services to ensure they adequately counterbalance the residual impacts. Based on the above the Proposal is expected to be able to meet the EPA's objective for this factor.
Air Quality	
EPA Objective	The EPA Objective for this Key Environmental Factor is to maintain air quality and minimise emissions so that environmental values are protected.
Policy and Guidance	• Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023a); • EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a); • EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b); • Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021c); and • Environmental Factor Guideline – Air Quality (EPA, 2020c).
Potential Impacts	<u>Local airshed – dust and air emissions</u> • Exceeding recognised air quality standards at sensitive receptors for: o Dust emissions; and o Air emissions.
Mitigation	**Avoid:** The Proposal is also located within a Special Control Area for the Boodarie SIA. Boodarie SIA has an industrial buffer zone which is recognised as a Special Control Area under the Town of Port Hedland's Local Planning Scheme (Figure 7-22). The Special Control Area prevents the establishment of any new sensitive receptors within this area and avoids land use conflicts.

	The design and operation of the Proposal will ensure the receptors are not exposed to exceedances of relevant health criteria. **Minimise:** • Obtain and comply with Works Approval and Licence issued under Part V of the EP Act; • Obtain and comply with the Ministerial Statement to be issued under Part IV of the EP Act; • Implement industry best practice management measures for air quality; and • Maximise electrical efficiency. **Rehabilitate:** The key rehabilitation measures that relate to air quality are summarised below: 1. All infrastructure will be removed; and 2. The area will be revegetated with local native species.
Outcomes	The EPA's environmental objective for this factor is "to maintain air quality and minimise emissions so that environmental values are protected" (EPA, 2020c). With the implementation of these mitigation measures, it is predicted that dust emissions will not: • Change the number of excursions of the criteria at the Taplin Street receptor; • Change the maximum predicted 24-hour PM_{10} concentration at the Taplin St receptor; and • Change the maximum predicted 24-hour PM_{10} concentration at either the Wedgefield or South Hedland receptors. The Proposal has been designed to ensure that impacts arising from air emissions are avoided and minimised where possible. The Proposal has designed to include a buffer, to ensure air quality at sensitive receptors is not significantly impacted. The Proposal activities have been optimised to keep product handling and energy requirements low, subsequently minimising emissions from combustion products. The environmental outcome proposed for this factor is: air quality at occupied receptors maintained at current concentrations. This proposed outcome is consistent with the EPA's objective for this factor, and can be assured by the following: 1. Works Approval and Licence under Part V of the EP Act; and 2. Clearing limits and PDE boundaries implemented by the Ministerial Statement. The proposed environmental outcome could potentially be applied as an outcomes-based condition in the Ministerial Statement (if approved). Air quality monitoring will be conducted to ensure that the proposed outcome is being met. The predicted outcome for Air Quality is therefore: • No change in concentration or excursions of the existing air quality. Based on the above, PHI considers that the Proposal can be implemented such that there are no significant residual impacts to this factor, and the EPA objective can be met.
Greenhouse Gas Emissions	
EPA Objective	The EPA Objective for this Key Environmental Factor is to reduce net GHG emissions in order to minimise the risk of environmental harm associated with climate change.
Policy and Guidance	• Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023a); • EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a); • EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b); • Instructions on how to prepare Environmental Protection Act 1986 (EP Act) Part IV Environmental Management Plans (EPA, 2021c); and • Environmental Factor Guideline – Greenhouse Gas Emissions (EPA, 2024).
Potential Impacts	• Up to 18,118,941 tCO_2 -e over the life of the Proposal averaging 178,512 tCO_2-e per year; • Up to 204,378 t CO_2-e of Scope 2 GHG emissions per year; and • Up to 5,152,041 t CO_2-e of Scope 3 GHG emissions per year.
Mitigation	The following measures are proposed to manage and mitigate the potential environmental impacts from GHG emissions: <u>Scope 1</u> • Best practice technology: o Pellet Plant; and o HBI Plant; • Hydrogen utilisation; o Self supply (onsite hydrogen plant); o Third party supply; o Long term hydrogen plan; o Hydrogen injection;

	• Carbon capture and storage; • Electrification of fleet; In addition to the decarbonisation strategies evaluated in the previous sections, there are other opportunities that can be assessed in the future, especially for abating Scope 3 emissions. At a very high-level, some of these opportunities are listed below: • Waste heat recovery; • Optimising equipment choice, redundancy and sizing; • Sustainable buildings; • Using less emission intensive reagents; • Using green ammonia or biofuels for bulk transport via shipping; and • Using sustainable aviation fuel. <u>Scope 2</u> The WA Government is also planning to significantly the boost the share of renewable energy generation sources in the NWIS and close all government owned coal-fired power plants by 2029. The $3 billion 'Rewiring the Nation' deal signed in 2023 will allow for major upgrades to the transmission in the NWIS and finance the increase of renewable energy. As a result of these changes, the GHG emissions intensity of power supplied into the NWIS will lower substantially in coming years. The State Government released the *Sectoral emissions reduction strategy for WA* (SERS) in December 2023 (Government of WA, 2023) which outlines the key priorities, benchmarks and milestones for WA's transition to net zero emissions while supporting the decarbonisation of our region. As of 2023, less than two percent of power from the NWIS is currently generated from renewable sources. However, the NWIS is assumed to reach renewable energy percentages of around 60% in 2030, and 75% in 2040; in line with forecasts from APA Group for expected renewable supply in the Pilbara and reflects recent announcements from mining communities. Additionally, the Pilbara Independent System Operator has been implemented to oversee the NWIS as part of a new "light handed" access regime will improve system security and reliability. With these proposed changes, emissions are projected to decline by <1 Mt $CO_{2\text{-}e}$ from 2023 to 2035 as renewable supply makes up a growing share of generation (Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2023). Scope 2 GHG emissions will continually decrease over the life of the Proposal through the overall emissions reductions from the NWIS, although there is some uncertainty at the rate this will be achieved. The SERS notes the need to ensure substantial increase in transmission infrastructure and increase the renewable generation capacity in the NWIS to satisfy current and future demand of renewable energy sources (Government of WA, 2023). Further reductions in Scope 2 emissions will also be achieved by maximising the electrical efficiency of the Proposal including by: • Regular monitoring of electrical load on the processing equipment and investigation whenever the load falls outside optimal parameters; • Regular maintenance and inspection of processing equipment to optimise efficiency; • Regular electrical calibration checks on the processing equipment; • Use of high efficiency electrical motors throughout the mine site; and • Use of variable speed drive pumps, compressors and other processing equipment. <u>Scope 3</u> Scope 3 emissions for the Proposal include downstream processing of HBI into steel, purchased goods, capital goods, upstream and downstream transport, fuels, waste generation and personnel travel to and from site. Low emissions HBI produced by the Proposal will enable POSCO to replace a portion of its South Korean Blast Furnace-Basic Oxygen Furnace (BF-BOF) with Electric Arc Furnace (EAF). EAFs can be powered by renewable energy and do not require coal as a reductant (compared to BF-BOF which relies on combustion of coal). Initially, the Proposal will enable a reduction in emissions by approximately 50% for every tonne of steel produced by using LNG as a reductant when compared to current methods that rely on coal. The Proposal plans to achieve a significant further reduction in GHG emissions (up to 92%) compared to current methods, once 100% of the reductant is hydrogen rather than LNG. The steel making processes and potential reductions in emissions intensity (t $CO_{2\text{-}e}$/t product) are shown in Figure 8-8. The Proposal will have the potential to reduce global GHG emissions from the current steel making operations by 2.4 Mt $CO_{2\text{-}e}$/a once using 100% hydrogen as the reductant. This reduction is the equivalent of 0.51% of Australia's total GHG annual emissions in 2023. The Proposal will temporarily increase Australia's GHG emissions by 0.9 Mtpa (0.2%) – as there is currently no downstream reduction of iron ore in Port Hedland, with all iron ore shipped without downstream processing.

	The temporary increase in Australian GHG emissions will be mitigated (Section 2.7) so that the emissions intensity is progressively reduced, and the resulting emissions profile aligns with Australia's emission reduction targets. There is no proven process route at an industrial scale to produce primary net zero steel today. As mentioned in Section 1, PHI has limited influence over the way the product is processed by external companies. However, POSCO, the seventh largest steel-producing company in the world, and the receiver of a significant portion of the HBI, will see a significant reduction in their emissions from steelmaking (this Proposal's Scope 3 emissions) (Worldsteel Association, 2023). POSCO's ambition to produce steel from HBI is a necessary, transitional step that allows incremental reductions in emissions intensity by up to 92% from steel made using high grade magnetite iron ore. The Proposal will prove that significant emissions reductions are possible with the use of hydrogen at a commercial scale and enable the transition to other technologies like HyREX, that will enable similar decarbonisation but from lower grade hematite iron ore. PHI will also consider low carbon options when undertaking the procurement process for infrastructure and input suppliers. Preference will be given to those options with clear carbon accounting and lower carbon intensity where they are commercially competitive. PHI is also investigating additional alternatives such as the introduction of green ammonia or biofuels for bulk transport via shipping and using sustainable aviation fuel.
Outcomes	The Proposal is expected to contribute an annual average of 185,616 t CO_2-e per annum of Scope 1 emissions and 23,072 t CO_2-e per annum of Scope 2 emissions, increasing WA's emissions by 0.15%. Production of low carbon emissions steel making precursors is a key step for decarbonisation of the steel making process. GHG emissions from the Proposal will be counterbalanced by its contribution to GHG reductions realised in the complete steelmaking process. Through the implementation of these measures, PHI anticipate that GHG emissions from the Proposal will be significantly reduced, and this will help to enable Caravel to achieve its objective of net zero GHG emissions by 2050. The predicted outcomes for GHG are therefore: • Total Scope 1 and Scope 2 emissions do not exceed emissions targets; and • Net-zero emissions from the Proposal by 2050. The implementation of design and operational mitigation measures is expected to ensure that the Proposal does not significantly impact this factor. The EPA objective for this factor is therefore able to be met.
Social Surroundings	
EPA Objective	The EPA Objective for this Key Environmental Factor is to protect social surroundings from significant harm.
Policy and Guidance	• Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023a); • EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a); • EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b); • Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021c); and • Environmental Factor Guideline – Social Surroundings (EPA, 2016e).
Potential Impacts	<u>Local residents and community</u> • Access to the land will only be granted with appropriate safety measures; and • Amenity impacts from visual, noise and dust emissions, traffic during construction or operation of the Proposal; <u>Traditional uses of the land</u> • Access to the land will only be granted with appropriate safety measures; and • Amenity impacts from visual, noise and dust emissions, traffic during construction or operation of the Proposal. <u>Aboriginal heritage sites</u> • No sites are predicted to be directly impacted by the Proposal; and • No registered Aboriginal Heritage Sites are predicted to be affected by dust emissions from construction or operation of the Proposal.
Mitigation	**Avoid:** No Aboriginal heritage sites are located in the PDE. Within the EIDE, PHI intent is to work with JTSI to avoid Aboriginal heritage sites but acknowledge this may not be possible for all Aboriginal heritage sites.

	As previously noted, the Proposal location has been chosen to be within a Special Control Area for the Boodarie SIA. The Boodarie SIA has an industrial buffer zone which is recognised as a Special Control Area under the Town of Port Hedland's Local Planning Scheme (Figure 7-22). The Special Control Area is intended to avoid land use conflicts and amenity impacts by preventing the establishment of incompatible land uses and sensitive receptors within proximity to the SIA. **Minimise:** • Obtain and comply with Works Approval and Licence issued under Part V of the EP Act; • Obtain and comply with a Development Approval issued under the Planning and Development Act 2005 (WA); • Investigate and install screening if deemed necessary; • Minimise noise and light emissions; • Implement industry best-practice management measures for Aboriginal Heritage; • If required, obtain and comply with approvals under the AH Act for any Aboriginal Heritage sites that are to be disturbed; and • If required, ensure Aboriginal 'cultural salvage areas' are appropriately managed (in agreement with KAC) to salvage and store or repatriate artefacts prior to disturbance.
Outcomes	The EPA's environmental objective for this factor is to "protect social surroundings from significant harm" (EPA, 2016e). The Proposal has incorporated avoidance, minimisation and rehabilitation measures into the Proposal design and operational processes to ensure that social surroundings impacts are minimised. The Proposal is expected to result in minor impacts to Traditional Uses of the Land and Local Residents and Community given the small footprint, lack of direct uses of the land and the location of the Proposal in an SIA. There are no listed European Heritage values which occur within the development envelopes and therefore impacts to European Heritage and values will be completely avoided. PHI has completed Aboriginal Heritage investigations over the majority of the PDE. PHI intends to complete additional heritage surveys within the remainder of the PDE and within the EIDE in Q1 2025 and these will be used to further inform the detailed design. PHI will avoid all four registered heritage sites identified on the ACHIS within the EIDE. The predicted outcomes for Social Surroundings are therefore: • No disturbance to identified Aboriginal Heritage sites unless otherwise agreed to with KAC; • All disturbance to be undertaken in accordance with the ACHMP; • No change in the existing concentration and excursions of existing air quality; • No significant amenity impacts at sensitive receptors unless otherwise agreed through an Amenity Agreement; and • Compliance with the EP Act Noise Regulations. Based on the above, PHI considers that the Proposal can be implemented such that there are no significant residual impacts to this factor, and the EPA objective can be met.

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Appendix 1: Detailed flora and vegetation survey for the Port Hedland Green Steel Project (Phoenix, 2024a)
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Appendix 3: Bilby Management Plan
Appendix 4: Detailed terrestrial fauna survey for the Port Hedland Green Steel Project (Phoenix, 2024b)
Appendix 5: Air Quality Assessment Report (Ramboll, 2024)
Appendix 6: PHI Project – Dust Emissions Assessment Air Quality Modelling Assessment (ETA, 2024)
Appendix 7: Port Hedland Green Steel Project Decarbonisation Project Emissions Assessment (Wood, 2024)
Appendix 8: Port Hedland Green Steel Project Environmental Noise Assessment (HSA, 2024)

1 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this Supplementary Document is to provide a detailed description of the Port Hedland Iron Project (the Proposal), and to enable assessment of the potential environmental impacts that may result should the Proposal be implemented. This Supplementary Document outlines the key elements (characteristics) required for the construction and operation of the Proposal. The assessment will be completed by the Environmental Protection Authority (EPA) under the provisions of Part IV of the *Environmental Protection Act 1986* (EP Act).

This Supplementary Document has been prepared in accordance with the following EPA guidance:

- Environmental Impact Assessment (EIA) (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a);
- Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023a);
- Environmental Impact Assessment (Part IV Divisions I and 2) Administrative Procedures (EPA, 2024b);
- Instructions on how to prepare an Environmental Review Document (EPA, 2021a); and
- Instructions on How to Identify the Content of a Proposal: Instruction and template (EPA, 2021b).

This Supplementary Document focuses on the Environmental Factors that were deemed to be 'Key' by the EPA. Potential impacts to these Key Environmental Factors are described in detail and are assessed using relevant studies specific to the Proposal. This Supplementary Document therefore describes the most relevant characteristics and impacts of the Proposal for EIA and provides all relevant biological and technical reports and survey results as Appendices (Appendix 1-9).

The Proposal is to construct and operate a pellet and hot briquette iron (HBI) plant, collectively consuming approximately 3-3.5 million tonnes per annum (Mtpa) of iron ore. Most iron ore pellets produced will be fed into the HBI plant to produce approximately 2 Mtpa of HBI. The remaining pellets (~0.7 Mtpa) will be exported from the Port of Port Hedland (PoPH) as pellets.

The Proposal triggers a requirement for environmental assessment and approval under Part IV of the EP Act. The Proposal was referred to the EPA to set the level of assessment, which has since been identified as "Referral Information with additional information (required under s. 40(2)(a) of the EP Act) and public review". It has a public review period for additional assessment information of 4 weeks.

1.2 PROPONENT

The Proponent for the Proposal is Port Hedland Iron Pty Ltd (PHI) (ABN: 667 564 589).

Contact Person: Mr Troy Park
Email: troypark@posco.com
Phone: +61 8 9486 7052
Street Address: Level 48, Central Park, 152-158 St. Georges Terrace,
Perth, Western Australia, 6000, Australia

PHI has been established as a special purpose vehicle to develop the Proposal. It represents the interests of the Joint Venture partners of POSCO, Marubeni and China Steel Company as shown in Figure 1-1.

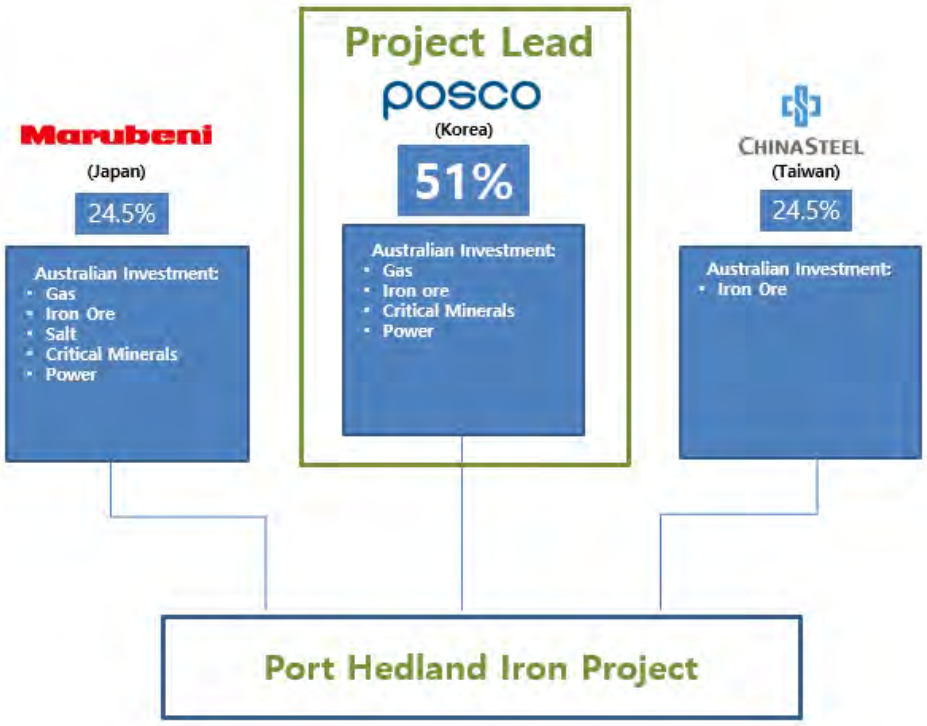


Figure 1-1: Ownership structure

1.3 LEGISLATIVE CONTEXT

1.3.1 PART IV OF THE *ENVIRONMENTAL PROTECTION ACT 1986*

Part IV of the EP Act makes provisions for the EPA to undertake EIA of significant proposals, strategic proposals and land use planning schemes. The Proposal is considered to be a significant proposal and therefore requires assessment under Part IV of the EP Act.

The EPA uses environmental principles, factors and associated objectives as the basis for assessing whether a proposal or land use planning scheme's impact on the environment is acceptable. The environmental principles, factors and objectives, therefore, underpin the EIA process.

The Proposal was referred under Section 38 of the EP Act on 14 September 2023. The EPA released its decision to assess the Proposal as an Assessment on Referral Information, with additional information required under s. 40(2) (a), on 13 December 2023.

1.3.2 SECTION 87 OF THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The Proposal was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) on 22 December 2023 (EPBC 2023/09764). DCCEEW determined that the Proposal was a 'controlled action' and required assessment and approval under the *Environment*

Protection and Biodiversity Conservation Act, 1999 (EPBC Act), due to potential impacts on the following relevant controlling provisions:

- Listed threatened species and communities (Sections 18 & 18A).

The Proposal will be assessed on preliminary documentation by DCCEEW. The Proposal is not being assessed as an accredited assessment by the EPA.

1.3.3 Other Approvals and Regulation

Land Tenure

The Boodarie Strategic Industrial Area, located approximately 10 km south-west of Port Hedland, is zoned for strategic and downstream processing industries and has been planned by the WA Government to accommodate a range of mineral, gas processing and other strategic industries. The Proposal is located on land zoned as a Strategic Industrial Area (SIA) (within the Boodarie SIA) under the Town of Port Hedland (ToPH) Local Planning Scheme No. 7. SIAs are planned for downstream processing and other heavy and strategic industries, these areas are surrounded by an industry protection zone to ensure heavy industry can continue to operate without land use conflict (https://siawa.com.au/#planned). Re-zoning of the area is not required.

The Proposal is located within the Kariyarra Native Title Determination and requires compliance under the *Native Title Act 1993* (Cth). Negotiations with Kariyarra Aboriginal Corporation (KAC) and Kariyarra Traditional Owners in respect of an Indigenous Land Use Agreement have commenced and are currently ongoing.

Should the Proposal commence, the Proposal will be implemented on a Lease issued by the Government of WA under the *Land Administration Act 1997* (WA) (LAA). On 30 December 2022, the State Government allocated approximately 960 ha of land at the Boodarie SIA to PHI for the purpose of constructing and operating the Proposal. Following the land allocation, PHI needs to negotiate an Option to Lease and a Lease with DevelopmentWA. This negotiation has commenced.

In advance of the Option to Lease, an application for a Section 91 (s91) Licence under the LAA was submitted to Department of Planning, Lands and Heritage (DPLH). The s91 Licence was granted and enabled early land access for investigations on the land required for the Proposal. The Proposal is covered by File Notation Areas (16658 and 16673) for the purposes of the Pilbara SIA (Boodarie Core Strategic Industry Zone).

Planning approvals in the SIA are managed under the Boodarie SIA Structure Plan (Structure Plan). The Structure Plan provides for the long-term strategic industrial development of the area and is intended to coordinate the detailed land use and development of the BSIA. A development application will need to be submitted to the ToPH under the *Planning and Development Act 2005* (WA) that meets the requirements laid out in the Structure Plan. Whilst the development Application is submitted to the ToPH, it will be assessed by the relevant Development Assessment Panels as the mandatory value threshold for requiring Development Assessment Panel review of $10 million will be exceeded.

Proposal dependencies such as provision of water, gas, hydrogen and accommodation are outside of the scope of this referral but will also require applicable planning approvals.

Other Decision-Making Authorities, Approvals and Regulation

Implementation of the Proposal is subject to other approvals in addition to Part IV of the EP Act and the EPBC Act. Table 1-1 identifies other approvals and associated legislation that will apply to the Proposal. The relevant decision-making authorities have also been identified for each approval or legislation.

Table 1-1: Other approvals and regulation

DMA and department (if relevant)	Legislation or agreement regulating the activity	Approval required and relevant proposal element	Whether and how statutory decision-making process can mitigate impacts on the environment? (Yes/No and summary of reasons Include a separate line item for each relevant impact, and discuss how the EPA's factor objective will be met)		
			Relevant Impact	Relevant Key Environmental Factor and Objective	Can the DMA mitigate impacts and how will the EPA's factor be met?
Chief Executive Officer, Department of Water and Environmental Regulation (DWER)	*Environmental Protection Act 1986*	**Works Approval** Required for the construction and commissioning of the Processing Plant **Licence** Required for the operation of the Processing Plant	Air emissions, dust emissions and noise emissions	**Air Quality** EPA's objective: *To maintain air quality and minimise emissions so that environmental values are protected.* **Terrestrial Fauna** EPA's objective: *To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.* **Flora and Vegetation** EPA's objective: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained.* **Social Surroundings** EPA's objective: *To protect social surroundings from significant harm.*	Yes. While not expected to be significant, the primary source of potential emissions to air from the Proposal is the Processing Plant and the design of the plant will be assessed under Part V of the EP Act to ensure emissions of pollutants to the air are minimised and do not result in significant impacts to any sensitive receptors. While not expected to be significant, a primary source of dust emissions from the Proposal is the Processing Plant and the design of the plant will be assessed under Part V of the EP Act to ensure dust emissions are minimised and do not result in significant impacts to any sensitive receptors. While not expected to be significant, the primary source of noise emissions from the Proposal is the Processing Plant and the design of the plant will be assessed under Part V of the EP Act to ensure noise emissions are minimised and do not result in significant impacts to any sensitive receptors. Noise emissions from other aspects of the site are not expected to be significant and are unlikely to require additional regulation under Part IV of the EP Act in order to meet the objective for this factor.
Chief Dangerous Goods (DG) Officer (Department of Energy, Mines, Industry Regulation and Safety (DEMIRS))	*Dangerous Goods Safety Act 2004* (WA)	**DG Licence** May be required for the bulk storage of fuel if above specified limits (unlikely)	Contamination of soils, groundwater and surface water (hydrocarbon spills)	**Flora and Vegetation** EPA's objective: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained.* **Terrestrial Fauna**	Yes. The storage and management of hydrocarbons will already be regulated under Part V of the EP however the DG Licence provides additional mitigation for the design and storage of larger volumes of DG (if large volumes of hydrocarbons (>100,000 L) are required to be stored on site).

DMA and department (if relevant)	Legislation or agreement regulating the activity	Approval required and relevant proposal element	Whether and how statutory decision-making process can mitigate impacts on the environment? (Yes/No and summary of reasons Include a separate line item for each relevant impact, and discuss how the EPA's factor objective will be met)		
			Relevant Impact	**Relevant Key Environmental Factor and Objective**	**Can the DMA mitigate impacts and how will the EPA's factor be met?**
			Fire (combustion of stored fuel)	EPA's objective: *To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.*	A DG Licence sets standards for the way in which DGs are stored on site. These standards are aimed at ensuring DGs are stored safely and in such a way that will not result in impacts to the environment. Having a DG Licence ensures potential spills and combustion risks from the Proposal are mitigated. A DG licence (in combination with the Part V approvals) will meet the objectives of the EPA for both factors by minimising the risk of contamination of soils and water, and protecting flora and vegetation, and terrestrial fauna by minimising the risk of fire. Regulation of the potential impacts on the environment from the storage of DG is therefore not expected to be required under Part IV of the EP Act.
Chief Executive Officer (ToPH)	*Planning and Development Act 2005* (WA)	**Development Approval Application** Permission for specified use or development to occur	Noise emissions	**Social Surroundings** EPA's objective: *To protect social surroundings from significant harm.*	Yes. Construction of the Proposal is unlikely to result in significant noise emissions and changes to traffic movements. The development approval application will assess the significance of noise emissions on surrounding land uses and determine what mitigation measures are required to obtain consent to undertake development of the Proposal. Road design and traffic management will be prepared in consultation with MRWA and ToPH. The ToPH Structure Plan for the Boodarie SIA includes a buffer zone to prevent impacts on surrounding land uses from industrial activity in the Boodarie SIA.
			Dust emissions	**Social Surroundings** EPA's objective: *To protect social surroundings from significant harm.*	Yes. Given the requirements of Part of the EP Act the impacts from dust emissions are unlikely. However, a development approval application will assess dust emissions, in addition to Part V of the EP Act, on the surrounding land uses and determine what mitigation measures are required to obtain consent to undertake development of the Proposal. Noting that the ToPH Structure Plan for the Boodarie SIA includes a buffer zone to prevent impacts on surrounding land uses from industrial activity in the Boodarie SIA.
Minister for Water	*Rights in Water and*	**Bed and Banks**	Alteration of	**Flora and Vegetation**	Yes.

DMA and department (if relevant)	Legislation or agreement regulating the activity	Approval required and relevant proposal element	Whether and how statutory decision-making process can mitigate impacts on the environment? (Yes/No and summary of reasons Include a separate line item for each relevant impact, and discuss how the EPA's factor objective will be met)		
			Relevant Impact	Relevant Key Environmental Factor and Objective	Can the DMA mitigate impacts and how will the EPA's factor be met?
	Irrigation Act 1914 (RIWI Act)	**Permit** Required if taking, storing or diverting water	surface water flows	EPA's objective: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained.*	A Bed and Banks Permit is required within a proclaimed surface water area for the taking, storing or diverting of water. Depending on the final footprint, including within the infrastructure corridors, a Bed and Banks Permit may be required for the Proposal. The Bed and Banks Permit will ensure that the any disturbance of bed and banks of a watercourse minimises the impacts to the water regimes of that watercourse and associated vegetation.
Minister for Aboriginal Affairs	*Aboriginal Heritage Act 1972* (AH Act)	**Consent under Section 18 of the *AH Act.*** Required to impact any Aboriginal site	Damage or disturbance of any Aboriginal site	**Social Surroundings** EPA's objective: *To protect social surroundings from significant harm*.	Yes. Prior to ground disturbance, heritage surveys will be completed with Kariyarra Traditional Owners in respect of the area required for the Proposal. To date, an archaeological heritage survey has been completed over the majority of the development envelopes and did not identify any Aboriginal sites. The Proponent will continue to consult with KAC and Kariyarra Traditional Owners in respect of any potential impacts of the Proposal on Aboriginal sites. As there is some flexibility within the development envelopes, impacts to Aboriginal sites will be avoided where practicable, and otherwise mitigated or managed in consultation with KAC and Kariyarra Traditional Owners. If impact to an Aboriginal site is proposed, the Proponent will, in consultation with KAC and Kariyarra Traditional Owners, seek consent under Section 18 of the AH Act. This process will meet the EPA's objective for Social Surroundings by protecting Aboriginal sites from significant harm.

2 THE PROPOSAL

2.1 BACKGROUND

2.1.1 REASON FOR THE PROPOSAL

Port Hedland Iron Pty Ltd (PHI) is progressing a feasibility assessment of a large-scale iron ore processing facility known as the Port Hedland Iron Project (Proposal). The ownership structure of the Proposal is being finalised but is currently a Joint Venture (JV) between POSCO (51%), Marubeni Corporation (24.5%) and China Steel Corporation (24.5%). Should the Proposal proceed past a Final Investment Decision, construction of Stage 1 of the Proposal is proposed to commence in Q1 2027.

The home countries of the JV partners (South Korea, Japan and Taiwan) are all committed to net zero emissions by 2050 – as is Australia. Hence, they all have a strong environmental driver to move towards low emissions steel making. The emissions intensity of the current steelmaking technology (using blast furnaces with coal as the reductant) is 2.2 tCO_2 per t of liquid steel (tCO_2/t-LS) (Figure 2-1). The Proposal can reduce GHG emissions intensity from start up by around 55% to 1.1 tCO_2/t-LS. Further reductions can be achieved as hydrogen becomes available at competitive costs and input is incrementally increased.

Port Hedland is seen as a logical location for a low emissions iron operation due to its proximity to ore sources, a population centre, a port and potential for long term, cheap renewable energy.

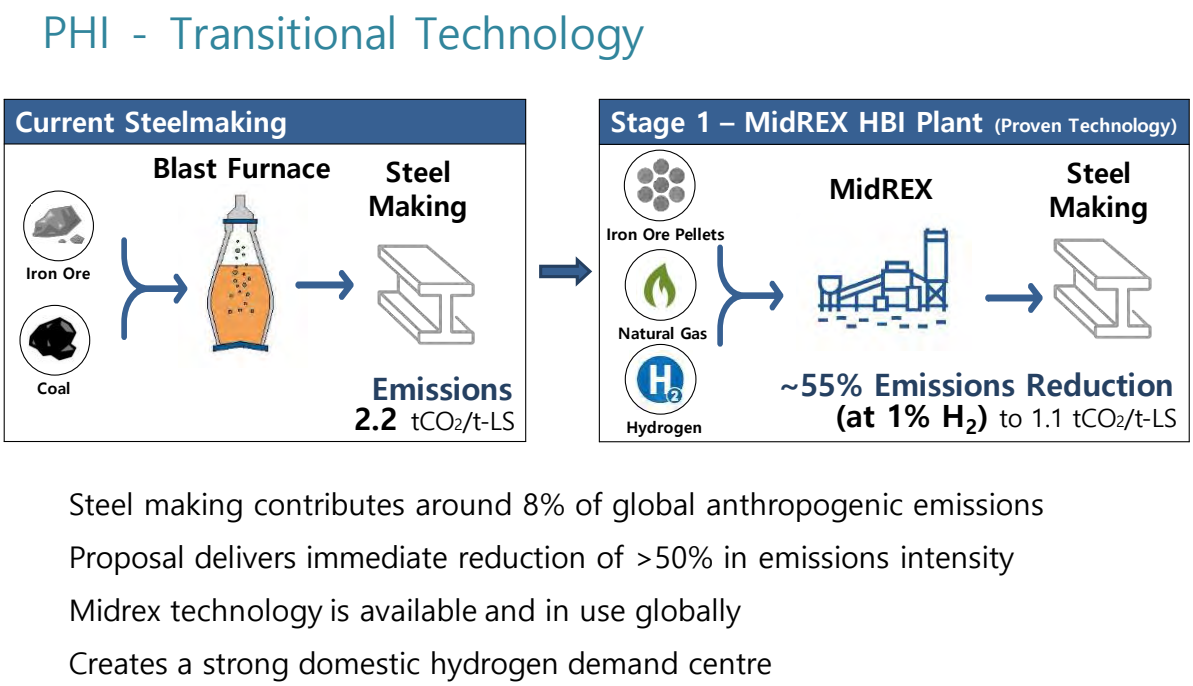


Figure 2-1: Emissions reduction basis for Proposal

The Proposal is currently in a feasibility investigation stage where the details of plant design are being prepared. In order to reach a Final Investment Decision, Environmental Approval under Part IV of the EP Act is required.

2.2 PROPOSAL DESCRIPTION

2.2.1 PROPOSAL LOCATION

The Proposal is located within the Boodarie SIA in the ToPH, within the Kariyarra Native Title Determination. The Boodarie SIA comprises 3,743 ha of "Strategic Industry" zoned land. The Boodarie SIA is situated 4 km west of South Hedland townsite and approximately 12 km south of Port Hedland townsite in WA (Figure 2-2).

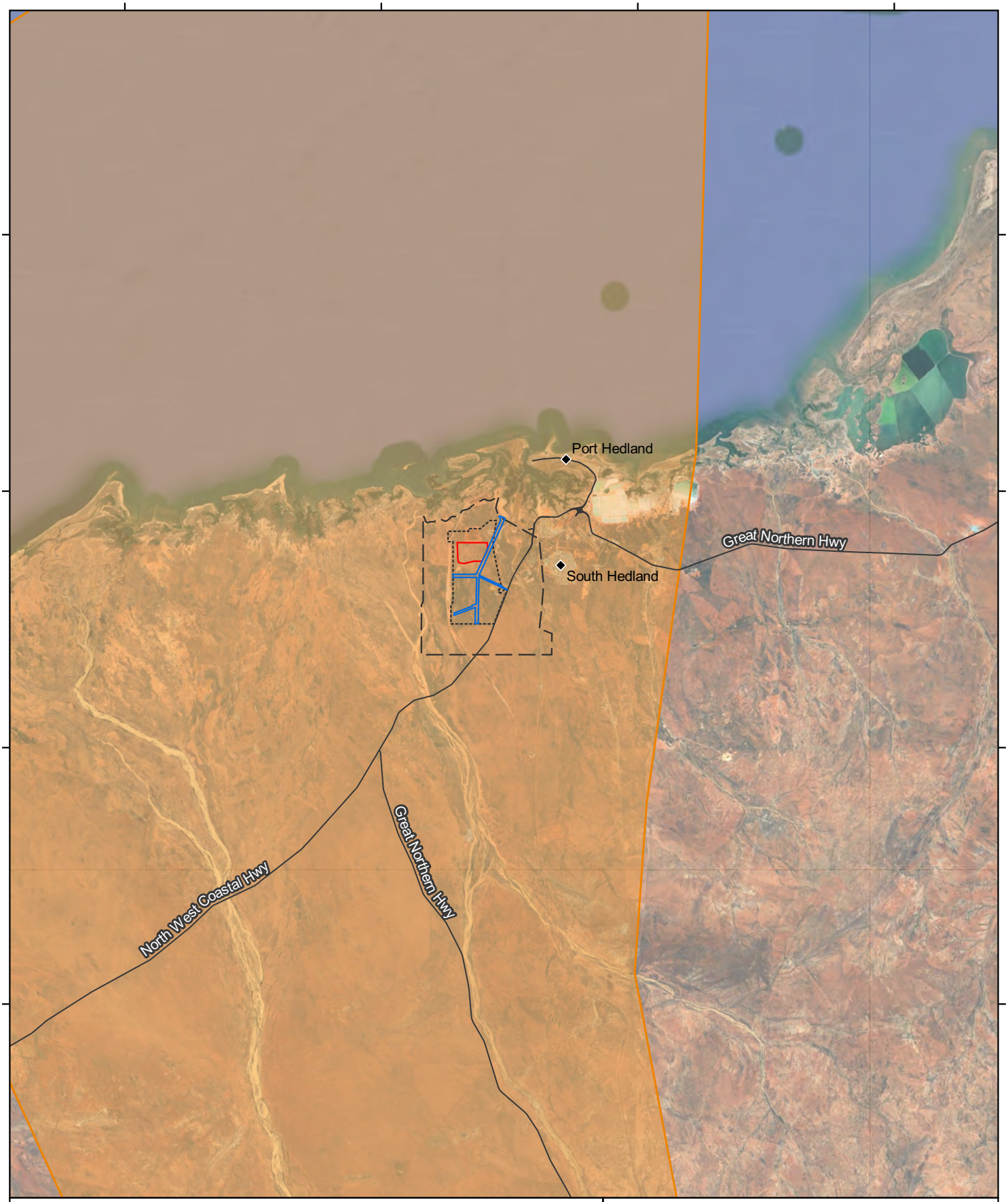
The Proposal's proposed location is on Kariyarra Native Title Determination within the BSIA approximately 10 kilometres (km) south-west of Port Hedland, and 4 km west of South Hedland in the Pilbara region of WA. Existing development with the Boodarie SIA includes sand mining, power stations, temporary iron ore stockpiling and laydown areas. The Boodarie SIA has been identified as the most viable location in the Pilbara for the Proposal with good access to labour, ore, gas, power and port and good potential for renewable energy, green hydrogen and water supply. Within the Boodarie SIA, 915 hectares (ha) of land has been identified for the purpose of constructing and operating iron making facilities.

2.2.2 DEVELOPMENT ENVELOPES AND DISTURBANCE FOOTPRINTS

The Proposal includes a 518 ha Plant Development Envelope (PDE) and a 466 ha External Infrastructure Development Envelope (EIDE), within which up to 300 ha and 90 ha will be disturbed, respectively (Figure 2-3).

2.2.3 TIMEFRAME

The maximum Proposal life is expected to be approximately 101 years, with the start date for construction scheduled for Q1 2027 and operations in 2031. The construction phase is expected to last 2.5 years and operations to commence thereafter, over a 99-year period. Decommissioning will occur approximately 10 years after cessation of operations and final rehabilitation will commence within 12 months of cessation of decommissioning.



Legend

- Plant Development Envelope
- External Infrastructure Development Envelope
- Kariyarra Native Title Determination Area (LGATE-066)
- Boodarie Strategic Industrial Area
- Industry Protection Zone
- Major Roads (LGATE-195)
- Towns

Imagery: Google Satellite

PHGS_0406_027

Figure 2-2: Proposal location

Preston Consulting

0 10 20 km

GDA 2020 (MGA Zone 50)

1:500,000 (A4)

AS

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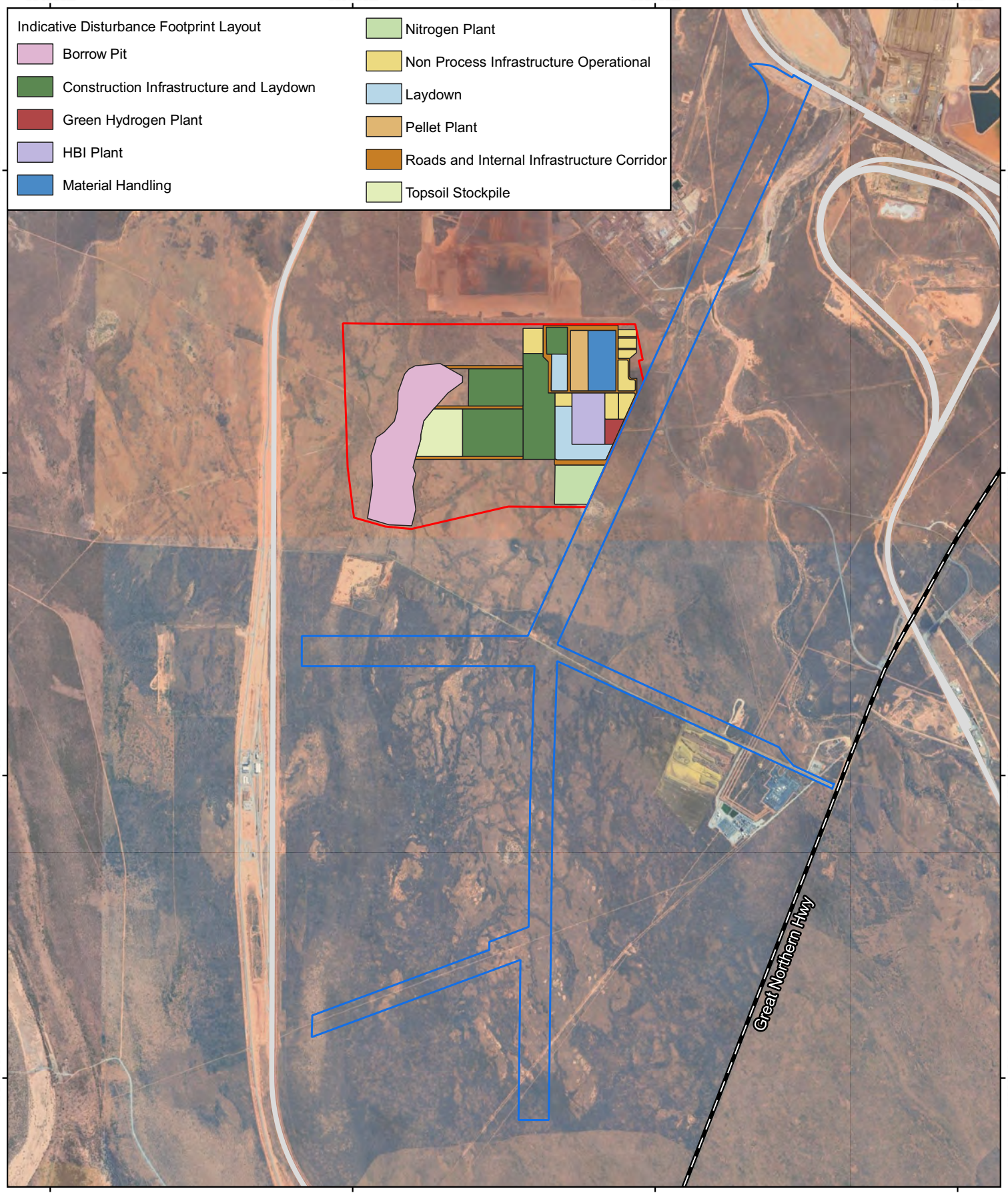


Legend

- External Infrastructure Development Envelope
- Plant Development Envelope
- Freeways & Highways (LGATE-195)
- Railway (DPLH-058)

Imagery: Google Satellite

Preston Consulting

GDA 2020 / MGA Zone 50

0 1 2 km

1:50,000 (A4)

Figure 2-3: Development envelopes and indicative disturbance footprint

AS

September 2023

2.2.4 PROPOSAL CONTENT ELEMENTS

PHI has referred to the EPA's instructions 'How to Identify the Content of a Proposal (EPA, 2021b) which focuses on how to define the Proposal elements for the purposes of an EIA under Part IV of the EP Act. In accordance with these instructions, a summary of the Proposal is provided in Table 2-1 and the Proposal elements (e.g., physical, construction and operational) which are likely to cause an impact on the environment are summarised in Table 2-2.

Table 2-1: General Proposal content description

Proposal Title	Port Hedland Iron Project – Stage 1
Proponent Name	Port Hedland Iron Pty Ltd
Short Description	Port Hedland Iron Pty Ltd (PHI) is progressing the development of a large-scale downstream iron ore processing facility known as the Port Hedland Iron Project (the Proposal). The Proposal is located in the Boodarie Strategic Industrial Area approximately 10 km southwest of Port Hedland in the Pilbara region. The Proposal's regional location is shown in Figure 2-2 and the indicative footprint and development envelopes are shown in Figure 2-3. The Proposal will consist of a pellet plant and a HBI Plant, consuming approximately 3-3.5 Mtpa of iron ore. The first processing step is to produce iron ore pellets (3-3.5 Mtpa). Most of the pellets will be fed into the HBI plant to produce approximately 2 Mtpa HBI. The remainder of the pellets (~0.7 Mtpa) will be exported from the Port as pellets. The infrastructure to be developed within the Boodarie SIA for the Proposal will include: • IOPF comprising one pellet and one HBI plant producing approximately 2 Mtpa of HBI and 0.7 Mtpa of iron ore pellets; • Hydrogen production and storage facilities for supply to IOPF; • Nitrogen plant and • Supporting infrastructure such as: o HBI and pellet handling and storage facilities; o Flux storage; o Administration and other non-process buildings; o Workshops; o Water storage and management areas; o Magnetite concentrate/ore handling facilities; o Power production, management and transmission; o Carbon capture, storage and transport infrastructure; o Drainage and sediment control; and o Access roads. The HBI and iron ore pellets will be shipped out of the PoPH. The scope of the Proposal does not include any construction works at the PoPH or the export of pellets and HBI. Water, power and natural gas will be supplied by third parties and subject to separate approvals by the relevant third-party and therefore not part of this referral. However, the referral includes an EIDE to allow connection within the Boodarie SIA to third party suppliers, if needed, as well as development of access roads and drainage for the Proposal. The EIDE covers the infrastructure corridors identified in the Boodarie SIA Structure Plan. These infrastructure corridors are managed by the Department of Jobs, Tourism, Science and Innovation (JTSI). The layout of the infrastructure within the EIDE will be determined once commercial arrangements with third-party suppliers have been finalised as well as consultation undertaken with JTSI. The Proposal also excludes early works for communications infrastructure, laydown areas and access roads.

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

Element	Location / Description	Maximum extent, capacity or range
Physical Elements		
Plant Development Envelope: • Clearing of native vegetation; • Construction; • Earthworks; • Ore processing; and • Transport.	Figure 2-3	Disturbance of up to 300 ha within a 518 ha Development Envelope.
EIDE: • Clearing of native vegetation; • Construction; and • Transport.	Figure 2-3	Disturbance of up to 90 ha within a 466 ha Development Envelope.
Construction Elements		
N/A	N/A	N/A
Operational Elements		
Ore processing	N/A	Production of 3.5 Mtpa of iron ore pellets and 2.0 Mtpa of HBI.
Greenhouse gas emissions		
Construction		
Scope 1	The Proposal will generate greenhouse gas (GHG) emissions predominantly from diesel combustion and land clearance. GHG emissions during the Proposal construction phase are estimated at 288,120t CO_2-e.	
Scope 2	Electricity may be sourced from a third-party power supplier with an 'islanded' power station or from the NWIS grid. For the purposes of this estimate, it has been assumed power will be from the NWIS. Estimated Scope 2 emissions are 50,329 t CO_2-e.	
Scope 3	GHG emissions for the Proposal construction phase associated with upstream and downstream processing have been estimated at 4,478,760 CO_2-e.	
Operation		
Scope 1	Key Scope 1 emissions sources for the Proposal include: • Combustion of diesel by light vehicles and machinery; • Combustion of natural gas to produce heat in the pelletising and HBI making process; and • Chemical reactions with fluxes and other reagents including the consumption of natural gas for reduction of pelletised iron ore in the HBI making process. Total Scope 1 greenhouse gas emissions: 18,551,930 t CO_2-e.	
Scope 2	The Proposal will be powered by connection to third-party power supplies. The estimated emissions are based on data provided by a potential third-party supplier for their existing network. Commercial negotiations are ongoing for this supply and the exact Scope 2 emissions will be determined once the preferred power supply provider is selected. Scope 2 emissions will therefore be accurately quantified during the assessment. Total Scope 2 greenhouse gas emissions: 2,291,460 t CO_2-e.	
Scope 3	Scope 3 emissions have been estimated using known emissions intensities, import/export quantities and distances, and production rates. Scope 3 emissions estimates include the following sources:	

Element	Location / Description	Maximum extent, capacity or range
	• Processing of HBI to steel using electric arc furnace; • Export of HBI and Pellets from Port Hedland to South Korea; • Supply of Iron Ore from a third-party provider; and • Import of reagents (bentonite and limestone) from the closest major international exporters using ocean shipping method. Total Scope 3 greenhouse gas emissions: 511,810,175 t CO_2-e.	
Rehabilitation and closure		
Areas temporarily cleared during the construction phase that are not required for operations will be rehabilitated following construction. Final rehabilitation to commence within 12 months of cessation of decommissioning. Topsoil will be spread across the site, with seeding of native species likely to be required.		
Commissioning		
Commissioning of the processing facility to be undertaken subject to operational limits.		
Decommissioning		
All above-surface infrastructure will be removed from site. Buried concrete and other buried infrastructure may be remain in-situ if they do not pose a contamination risk.		
Other elements which affect extent of effects on the environment		
Proposal Time	Maximum proposal life	101 years
	Construction phase	2.5 years
	Operations phase	99 years
	Decommissioning phase	Approximately 10 years

2.2.5 Detailed Description

The Proposal requires the parallel development of many support services and facilities. PHI is actively completing the planning, engineering, land access, commercial negotiations and approvals for the iron-making components of the Proposal (essentially pellet plant and HBI plant). These items are identified as within battery limits with details as shown in Table 2-3. The current descriptions of the items inside and outside of the battery limits are outlined in Table 2-3 and Table 2-4. Values provided within the Table are approximate. An indicative layout is provided in Figure 2-3.

All items which are outside the battery limits will be subject to their own approvals processes, with third party suppliers required to obtain their own approvals, if existing approvals do no exist.

Table 2-3: Inside battery limits

Proposal Area	Area Description
Magnetite concentrate/ore and flux unloading facility	Raw magnetite concentrate / iron ore will be unloaded by using seven sets of side tip truck unloading systems designed for 300 t/h. A 1,200 t/h stacker will be used to form feed stockpiles with a total storage of 70,000 tonnes. A 1,200 t/h rail mounted bridge scraper reclaimer will be provided to transfer iron ore / concentrate to the iron ore storage bins.
Flux additive stockyard and materials handling system	Additives for the pellet plant (limestone and bentonite) imported into the plant site by road haulage and will be unloaded via tip truck unloading system which is designed for 100 t/h. Stacker designed for 500 t/h of additive will form stockpiles will be used to load either product.
3.5 Mtpa pellet plant	Two horizontal high intensity mixers in parallel operation. Seven pelletising discs, double deck roller feeder with epsilon chute for size-segregated feeding of green pellets to indurating machine, pelletising system, induration machine, rotary kiln and cooler.
Pellet stockyard and materials handling system	Pellet storage, pellet screen for fines which will be reprocessed. Rail mounted stacker will load pellets onto stockpile. Bridge drum reclaimer will transfer pellets from stockpile to HBI plant.
MIDREX HBI Plant	MIDREX HBI process. Top charging feed hopper above shaft furnace, shaft furnace for pellet direct reduction, hot briquetting system – seven briquetting machines to form the hot briquettes. Four hot fines recycling systems. Two HBI cooling conveyors will cool the generated HBI to allow transfer to the product handling system. Gas cleaning system, reformer and heat recovery system.
HBI stockyard and materials handling system	HBI product will be transported to HBI storage yard via a series of conveyors. HBI will be stacked by level luffing and slewing type stacker which will travel on a rail. HBI will be reclaimed via mobile equipment which will feed trucks to transport to port facilities for export.
Hydrogen electrolyser	A pilot hydrogen plant (electrolyser) will be constructed at the Boodarie SIA to supply the initial 1% hydrogen requirements for the Proposal, being 2,000 tpa. However, if an immediate and cost-effective source of hydrogen becomes available PHI may utilise third party supplied hydrogen instead of the electrolyser.
Associated non-process infrastructure and maintenance facilities	• Internal roads to the process plant boundary limits and tie-in to existing roads, access road alongside conveyor corridor; • Main Gatehouse and Weighbridge – entry and exit; • Workshop/stores; • Administration Building; • Operations/Central Control Room; • Mess building; • Emergency Services Building;

Proposal Area	Area Description
	• Laboratory; • Power Receiving Substation; • Fire/Water/Nitrogen Protection; • Roads and other miscellaneous works; • Diesel Tanks; • Sewerage System; • External Fence; and • Dust Suppression Systems.
Water treatment – Raw	Brackish water reverse osmosis (BWRO) and includes the following main systems/equipment: • Dissolved Air Flotation, consisting of Sump, Mixing Tank, Pumps, Treated Water Basin; • Ultrafiltration (UF System), consisting of Pumps, Filter, UF unit, Reject Water Basin, UF Treated Water Basin; and • BWRO System, consisting of Pumps, BWRO membranes, Industrial and Potable Water Basin.
Water treatment – Waste	Waste Water Treatment Plant: HBI Plant, Industrial wastewater includes overflow/drain water from water ponds, clarifiers. All this water will be collected in the industrial wastewater collecting pond located at the water treatment area.

Table 2-4: Outside battery limits

Proposal Area	Description
Export/import infrastructure facilities at the Port of Port Hedland	Town Berth PH1, Utah Point and possibly Lumsden Point.
Balance of hydrogen supply	PHI is in discussion with third parties for supply of hydrogen in excess of the 1% (2,000 tpa) requirement to come from the onsite electrolyser. Potential location will depend on detailed engineering and agreement on firming and storage requirements.
Power	Third party supplied 120 MW hybrid power station of a mixed split of thermal and renewable either islanded or grid connected.
Water Supply	Groundwater abstraction borefield and associated infrastructure including storage tanks, pumps, and pipelines will transfer the water resource approximately 110 km to the Boodarie SIA. Contingency water supply (likely to be temporary desalination plant).
Gas supply	Gas supply pipeline will be owned and operated by third party. Options are existing pipelines owned by APA Group or new pipeline connected to Australian Gas Infrastructure Group's Dampier to Bunbury Natural Gas Pipeline.
Carbon Capture and Storage	Location of transport and storage infrastructure outside of Boodarie SIA depending on commercial arrangements with potential service providers. Equipment necessary to capture carbon emissions will form part of the pellet and HBI plant, which is within the battery limit of the Proposal.
Workforce Facilities	• *Temporary Accommodation* – bespoke facility (approximately 2,000 person) will facilitate mobilisation in Q1 2027 for early works at the Boodarie SIA (land within the Kingsford Smith Business Park (within the airport precinct) or at Lots 331 and 506 in South Hedland); and • *Permanent Accommodation* – will accommodate both construction and operational workforce in the long term (Lots 331 and 506 South Hedland).

Transport and Port

The HBI and iron ore pellets will be shipped out of the PoPH. The scope of the Proposal does not include any construction works at the PoPH or the export of pellets and HBI.

Water, Power and Natural Gas Supply

Water, power and natural gas will be supplied by third parties and subject to separate approvals by the relevant third party and are therefore not part of this referral. However, the referral includes an EIDE to allow connection within the Boodarie SIA to third-party suppliers if needed, as well as development of access roads and drainage for the Proposal. The EIDE covers the infrastructure corridors identified in the BSIA Structure Plan. The planning for these infrastructure corridors will be managed by JTSI. The layout of the infrastructure within the EIDE will be determined once commercial arrangements with third-party suppliers have been finalised as well as consultation undertaken with JTSI.

The Proposal also excludes early works for communications infrastructure, laydown areas and access roads.

Surface Water Diversions and Barriers

Pentium Water (2023) found that the Proposal is located in a low-lying area within the South West Creek floodplain, with several tributaries that impact the area. As a result, the Proposal site is prone to sporadic flooding. The site is flat, but with minor undulations/ unevenness, and after rainfall, standing water and pooling would occur where the site is not otherwise modified. Due to the flatness of the site, the 100-year flood velocities are low, typically <1m/s.

Implementing the Proposal is unlikely to impact flood levels and does not represent a risk to the environment from a surface water perspective, provided normal mitigating controls are implemented during all phases of the Proposal.

The Turner River is located 7 km west of the Proposal however it is west of the Roy Hill railway and does not interact with the Proposal.

2.3 PROPOSAL ALTERNATIVES

Table 2-5 provides an analysis of the alternatives considered in the development of the Proposal.

Table 2-5: Proposal alternatives

Alternative	Discussion
Location	Alternative locations could be in other States or locations within WA. More likely alternative locations would be overseas where land access is easily obtained and costs are likely to be lower. The development of the Proposal overseas would result in the avoidance of local impacts. Many countries are actively seeking to attract such projects. Attracting a project such as this Proposal to the Pilbara would be consistent with many government policies and objectives – particularly those supporting downstream processing and the development of manufacturing capability in Australia. It represents an opportunity for Australia to be part of the global emissions reduction pathway for green steel.
Technology	Proposal is utilising existing best practice available technology for HBI production. It incorporates the production of pellets at the front end to promote safer operating conditions. HBI technologies considered both Midrex and Energiron. Both are established technologies and can produce HBI and hot DRI (HDRI). Midrex have demonstrated and proven HBI production, including the use of hydrogen as a reductant. HBI production based on 100% hydrogen technology from start-up is not being considered as the required hydrogen production technology and capability is yet to be developed on a cost-effective basis. Hydrogen will be incorporated into the Proposal as it is developed, proven safe, economic and practicable (expected to be 5-10 years away). Two different pelletising technologies were considered: Straight Grate (SG) and Grate Kiln (GK). GK was selected due to better pellet quality.
Timeline	This is not being considered. Delays would see increased likelihood of alternative locations being utilised.
No Development	This is not being considered. No development would require the continuing use coal-fired blast furnaces for steel production and does not align with the Joint Venture parties.

2.4 LOCAL AND REGIONAL CONTEXT

2.4.1 BIOGEOGRAPHIC REGIONS

The Proposal is located within the Roebourne Interim Biogeographical Regionalisation for Australia (IBRA) subregion (PIL4) of the Pilbara bioregion, 15 km southwest of Port Hedland. 98% of the development envelopes are situated within the Uaroo land system, while the remaining 2% is within the Littoral system.

2.4.2 SOIL AND LANDFORM

In 2013 Landcorp undertook geotechnical investigations on the Boodarie SIA. Investigations determined that soil conditions were reasonably uniform across the site and comprised of a surficial topsoil layer (sand with variable organic content) overlying mixed floodplain deposits (and upper silty sand overlying dense, locally variably cemented clayey sand). The 2013 report determined that the site is situated within low-lying land that is prone to flooding and that the surface is lightly to densely vegetated with low lying shrubs and grass. Vegetation associations within the development envelopes include 589: "Short bunch-grass savanna/ grass steppe" and 647: "Grass steppe".

2.4.3 SURFACE WATER

Based on modelling from Pentium Water (2023), it was determined that the Proposal was not subject to tide or sea surge flooding despite Port Hedland's general vulnerability to cyclonic rainfall intensities, flooding creeks and run-off from land upstream. The soils on site (silty clay) typically have a low infiltration rate, and stormwater is therefore predicted to run-off. The area is flat and flood velocities are very low, thereby minimising the potential for undue erosion/ sedimentation.

2.4.4 GROUNDWATER

Historical groundwater modelling indicates that groundwater in the region is generally shallow but also saline, reflecting the location close to the coast. Monitoring results from groundwater bores within the decommissioned BHP HBI Plant indicate that the elevation of groundwater varies from 3 to 5 m Australian Height Datum (AHD) at the BHP HBI Plant site and from 2 to 3 m AHD closer to the ocean. In response to rainfall recharge of the shallow unconfined groundwater aquifer, groundwater elevations in the Boodarie area vary seasonally by up to 2 m. Groundwater elevations usually peak in April (which appears to be due to high rainfall at the beginning of the year) and generally decline for the remainder of the year. Salinity has ranged from 13,000 and 52,000 mg/L TD (EPA, 1995; BHP Billiton Pty Ltd, 2011).

No groundwater abstraction is proposed as part of the Proposal. Water supply will be sourced from third parties who will be required to obtain their own environmental approvals.

2.4.5 LAND USE

The dominant land use of the PIL4 subregion comprises grazing (native pastures), Aboriginal lands and reserves, conservation, mining leases and urban development (Kendrick & Stanley 2001). Land use summaries extracted from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES 2018) within the PIL4 subregion are summarised as 'production from relatively natural environments' and 'conservation and natural environments'. Land use across the development envelopes is subject to similar usages (and proportional area) to the PIL4 subregion.

The Proposal is located on land zoned as a SIA (within the Boodarie SIA) under the ToPH Local Planning Scheme No. 7. SIAs are planned for downstream processing and other heavy and strategic industries, these areas are surrounded by an industry protection zone to ensure heavy industry can continue to operate without land use conflict (https://siawa.com.au/#planned). Individual projects within the SIA are to be managed under the Boodarie SIA Structure Plan (Structure Plan). The Structure Plan provides for the long-term strategic industrial development of the area and is intended to coordinate the detailed land use and development of the BSIA.

The Port Hedland and South Hedland power stations and a pipe stockyard are situated adjacent to the Proposal to the east.

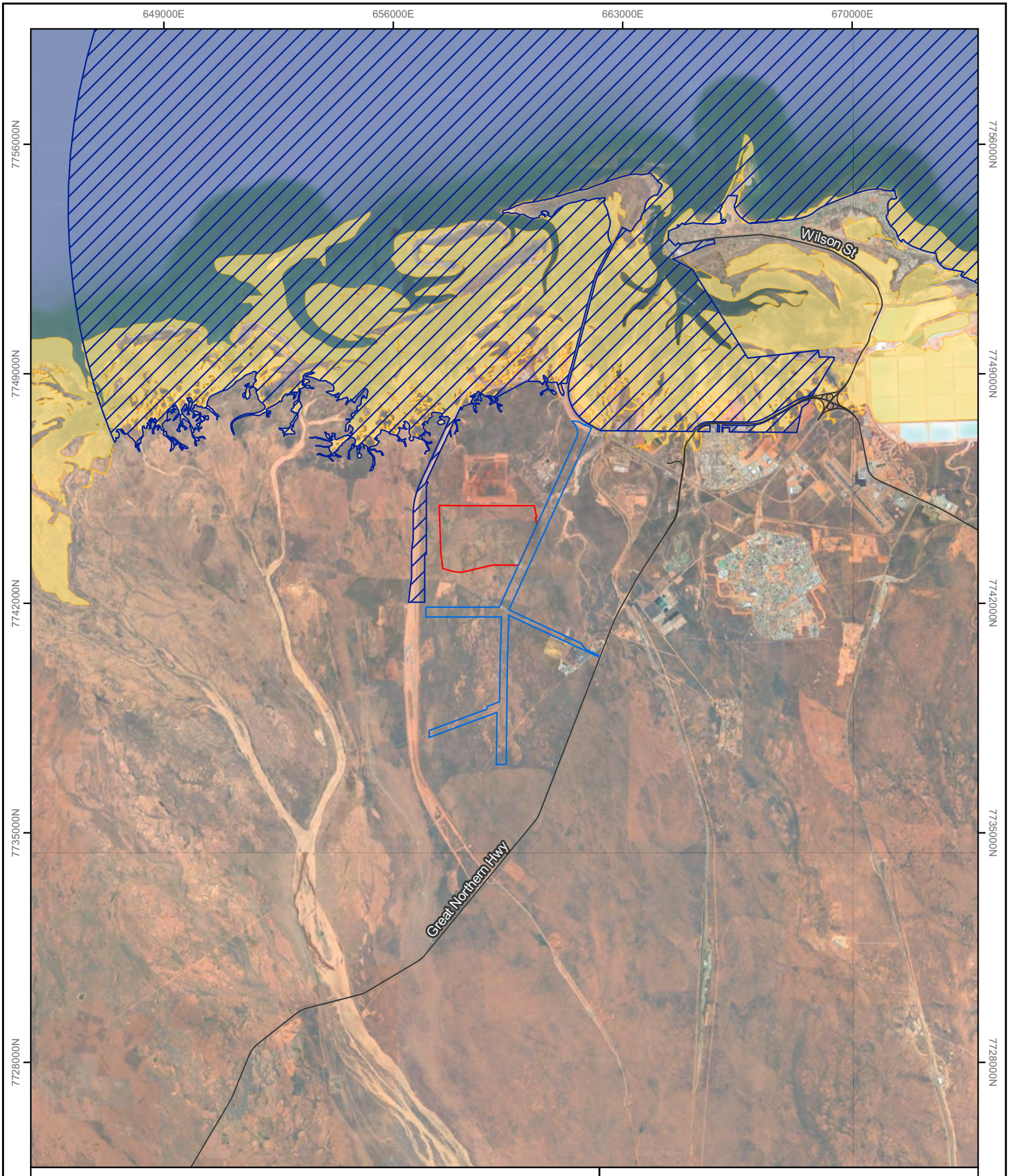
2.4.6 ENVIRONMENTAL ASSETS

Environmental assets include Environmentally Sensitive Areas (ESA) which are areas requiring special protection due to their landscape, wildlife and/or historical value. ESAs are declared in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005, which was gazetted on 8 April 2005. The following areas are declared to be ESAs:

- Declared World Heritage property as defined in section 13 of the EPBC Act;
- An area that is included on the Register of the National Estate, because of its natural heritage value, under the Australian Heritage Council Act 2003 of the Commonwealth;
- A defined wetland and the area within 50 m of the wetland. Defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands;
- Area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located;
- Area covered by a TEC;
- A Bush Forever site listed in "Bush Forever" Volumes 1 and 2 (2000), published by the WA Planning Commission, except to the extent to which the site is approved to be developed by the WA Planning Commission;
- Areas covered by the Environmental Protection (Gnangara Mound Crown Land) Policy 1992;
- Areas covered by the Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002;
- Areas covered by the lakes to which the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 applies; and
- Protected wetlands as defined in the Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998.

No ESAs or conservation reserves intersect the development envelopes (Figure 2-4). The nearest conservation reserves are Mungaroona Range Nature Reserve and Eighty Mile Beach Marine Park, located approximately 101 km south-southwest and 110 km north-west from the Proposal boundary, respectively.

There is a recommended EPA Redbook Marine Conservation Reserve where the Proposal is located, spanning from Mary Anne Islands to Cape Keraudren (Figure 2-4). This includes the PoPH in its entirety.



Legend

- Plant Development Envelope
- External Infrastructure Development Envelope
- Port Authorities Boundary (LGATE-243)
- EPA Redbook Recommended Conservation Reserves (DBCA-029)
- Major Roads (LGATE-195)

Imagery: Google Satellite

PHGS_0406_012

Figure 2-4: Conservation reserves and management zones

Preston Consulting

0 3 6 km

GDA 2020 (MGA Zone 50)

1:150,000 (A4)

AS

15/11/2024

3 STAKEHOLDER ENGAGEMENT

3.1 KEY STAKEHOLDERS

The Commonwealth, State and Local Government and community groups, Traditional Owners and landowners/farmers are considered key stakeholders for the Proposal.

3.1.1 GOVERNMENT STAKEHOLDERS

Commonwealth, State and Local Government authorities have been briefed on the Proposal to ensure any issues, concerns or suggestions are identified and, where appropriate, addressed or responded to by PHI. The consultations have resulted in some changes to the Proposal design; however, in most cases the purpose was to provide the Government stakeholders with relevant information.

The following Government stakeholders have been consulted:

Commonwealth:

- Prime Ministers' Office;
- Net Zero Authority (NZEA);
- Australian Renewable Energy Agency (ARENA);
- DCCEEW;
- Foreign Investment Review Board'
- National Reconstruction Fund;
- Department of Industry Science and Resources;
- Major Projects Facilitation Agency; and
- Northern Australia Infrastructure Facility.

State:

- JTSI;
- DEMIRS;
- DPLH;
- Department of Water and Environmental Regulation (DWER);
- Development WA;
- EPA;
- Pilbara Ports Authority (PPA);
- Main Roads WA;
- WaterCorp; and
- Pilbara Development Commission.

Local:

- ToPH.

3.1.2 Traditional Owners

The Kariyarra People are the Traditional Owners of the land where the Proposal will be constructed and operated. This relationship will be formally recognised via an Indigenous Land Use Agreement (ILUA) which is currently under negotiation with the Kariyarra people represented by KAC. The ILUA will also form a basis for the issue of leases of land within the BSIA. The Government of WA is understood to also be in negotiations with the Kariyarra people regarding the whole of the BSIA.

PHI has been working with the KAC over two years to define the heritage values associated with the Proposal area, how impacts to those values will be minimised and how the Group will participate in the development and operation of the Proposal. KAC have provided monitors for all flora and fauna survey work and geotechnical investigations completed to date.

3.1.3 Corporate and Community Stakeholders

PHI recognises that individuals, companies and communities may also be interested in the impacts of the Proposal. The following corporate and community stakeholders were deemed to be relevant to this Proposal:

- Port Hedland Industries Council (PHIC);
- Port Hedland Chamber of Commerce;
- Clean Energy Finance (CEF);
- Climate Change Australia (CCA);
- World Wildlife Fund (WWF); and
- The Superpower Institute.

3.1.4 Potential Suppliers and Adjacent Landholders

- BP/Australia Renewable Energy Hub (AREH);
- BHP;
- Fortescue;
- Vysarn Water (Vysarn);
- APA Group (APA);
- Horizon Power (Horizon);
- Woodside Energy Pty Ltd (Woodside);
- Santos Limited (Santos); and
- Hancock Prospecting (Hancock).

3.2 Stakeholder Engagement Process

PHI has a consultation strategy which identifies key external parties and stakeholders and is proactively engaging with these parties and stakeholders in respect of the potential implementation and resulting impacts of the Proposal. The aim of such extensive consultation is to develop productive relationships that ensure the Proposal is underwritten by sustainable agreements and necessary statutory approvals. The consultation strategy has also been developed to secure the approvals necessary for the construction and operation of the Proposal, which requires consultation with the above stakeholders.

PHI has consulted with KAC and Kariyarra Traditional Owners, Local, State and Commonwealth Governments. PHI has held pre-referral meetings with the EPA, DWER, JTSI, PPA, Development WA and DCCEEW regarding the Proposal, and feedback has been incorporated into this Supplementary Document where applicable.

PHI ensures attendance at local events and for a where regional development issues are discussed. PHI is a member of PHIC and plans to establish more of a local presence as Proposal development plans are progressed and the Proposal proceeds toward a Final Investment Decision.

3.3 STAKEHOLDER CONSULTATION

PHI has a Stakeholder Consultation Register which maintains records of all consultations with stakeholders. The Register summarises key issues raised by stakeholders during the consultation process and describes how PHI has responded to those issues. A summarised version of the Stakeholder Consultation Register is provided in Table 3-1 to provide details of the stakeholder consultation undertaken to-date for the Proposal. A stakeholder consultation plan is also provided in Table 3-2 to demonstrate PHI's commitment to early and ongoing stakeholder consultation.

Table 3-1: Stakeholder consultation register

Stakeholder	Date/s	Relevant issues / topics raised	Proponent response / outcome
Government Stakeholders			
Australian Renewable Energy Agency (ARENA)	Meeting – Aug 2023; Jul, Nov 2024.	• Proposal introduction; • Support; • Hydrogen Headstart; • Hydrogen Transition Plan; • Timing; • Funding; • Retrospectivity; • Relationship with Act/mandate; • 10% Cap on non-Australian content; • Process; • Submission; • Knowledge Sharing Plan; and • Board approval.	• Government support for cost gap with Oman; • ARENA queried 1% hydrogen plant and transition timing; • Updates provided by ARENA did not appear applicable to PHI.
Clean Energy Finance Corporation (CEFC)	Meeting – Jun 2024.	• Proposal update.	N/A
DCCEEW	Meeting – April - Dec 2023; Jun 2024.	• Proposal update; • DCCEEW areas of responsibility and capability; • EPBC referral; • Safeguard Mechanism; • Progress to date; • Production variables; • International best practice; • Decarbonisation recognition for new entrants; • Primary Iron Making Production Variable; and • Night Parrot.	• Setting baselines and decline rates; • Consultation on framework for setting international best practice; • Consultation on production variables for steel making; • Baseline for ironmaking likely to increase; • Pellet Production Variable (PV) to remain for pellet export; • Emissions intensity determined through benchmarking; • Baseline for ironmaking will not be changed; • Commencement date for decline rate will remain in 2023; and • DCCEEW requested regular engagement with PHI.
Department of Industry, Science and Resources (DISR)	Meeting – Feb - Oct 2024.	• Proposal Overview; and • Funding.	• Further information required; and • DISR provided a response to PHI's RFI.

Stakeholder	Date/s	Relevant issues / topics raised	Proponent response / outcome
Government Stakeholders			
DPLH	Meeting - Mar 2023.	• Executive VP visit; • Traditional Owner Engagement • S91 licence application; • Proposed investigation program timeframes; • NVCP; • Port facilities; and • Site visit.	N/A
Department of Premier	Meeting – Mar - Apr 2024.	• Proposal update; • Change of Chairman; • Native Title; • Funding;and • Reference letter to Premier.	N/A
Department of Water and Environmental Regulation (DWER)	Meeting – Apr 2023.	• Proposal introduction; • Pre-referral meeting; and • Stage 1 of the Proposal.	• Scope of referral for Stage 1 is acceptable
DevelopmentWA	Meeting – Jan - Nov 2023; Mar - Aug 2024.	• Proposal introduction; • Development approach; • Option to Lease; • Traditional Owner Engagement; • S91 licence application; • Land allocation; • Terms of reference; • Group format risks, interdependencies and general discussion; • Proposed investigation program timeframes; • Funding; • Site visit; and • Personal introduction.	• DevelopmentWA to issue key terms for option to lease and a valuation for the Proposals land allocation; • DevelopmentWA to ask Group for consents to land allocation details to be shared within the IRG; and • Members to provide feedback on format of IRG meetings to JTSI by 31 December 2023.
EPA	Meeting - Apr 2023.	• Proposal introduction; • Pre-referral meeting; and • Stage 1.	• Scope of referral for Stage 1 is acceptable.
JTSI	Meeting – Jun - Dec 2022; Jan - Nov 2023; Feb - Nov 2024.	• Proposal introduction; • Land allocation; • Option to lease; • Lead Agency Frameworks;	• JTSI to organise intergovernmental meetings; • International best practice framework still being decided; • PV for existing facilities and new facilities will be the same;

Stakeholder	Date/s	Relevant issues / topics raised	Proponent response / outcome
Government Stakeholders			
		• Terms of reference; • Group format risks, interdependencies and general discussion; • Executive VP visit; • Traditional owner engagement update; • S91 licence application; • Native Clearing Permit (NVCP); • IAF support; • Safeguard Mechanism and GHG's; • Hydrogen; • BSIA planning; • BSIA rent relief; • Funding; • Air Quality • Native Title; • State ILUA; • Party requirements; • Proponent progress; • Water; and • Company name.	• Emission intensity will use international data if not available, will revert to domestic data; • Scope of PV broad; • International best practice framework has been completed by approval process is ongoing; • JTSI to provide risk register; • JTSI to provide demand forecast table for power and water needs; • Create a water sub-committee; • JTSI Hydrogen person to attend next meeting; • Proponents to put forward plans for corridors; • Proponents to put forward plans for corridors; • Need an agreement between AREH and PHI; and • Contact Development WA about participating in baseline environmental studies.
KAC	Meeting - Dec 2022; Feb, - Dec 2023; Jan - 2024.	• Proposal introduction; • ILUA negotiations commencement; • Kariyarra priorities; • Workforce accommodation; • Personnel introductions; • Site visit; • Lack of services in BSIA; • Water; • Renewable power; • Native Title negotiations; and • Proposal update.	N/A
K Chaney	Meeting – Oct 2024.	• BSIA lack of facilities; • Native Title; • Hydrogen; and • Government support.	• Government reluctant to support a gas proposal without a clear path to Hydrogen; and • Interested in the project and not negative.

Stakeholder	Date/s	Relevant issues / topics raised	Proponent response / outcome
Government Stakeholders			
Major Project Facilitation Agency	Meeting - Mar, Aug 2023.	• Proposal introduction; and • Progress update.	• Changes relating to the structure of the WA Government; and • Plan for Hydrogen and Carbon Capture Use, and Storage (CCUS) implementation.
Member for the Pilbara (Kevin Michel MLC)	Meeting – Oct 2023.	• Briefing the member.	N/A
Minerals Research Institute of WA	Meeting – Dec 2023; Mar 2024.	• Proposal update; • Funding; • Industry commitment and guidance; • Hematite; and • Test or and processes to develop solutions.	• Suggested that pellet plants are WA's best play into green steel market; • Questions from the floor about PHI's view and any issues; and • Positive response to Proposal but acknowledgement of significant risks.
Minister Bowen's office	Meeting – Nov 2023.	• New facilities and best practice; • International best practice; • Safeguard Mechanism; and • Australian Carbon Credit Units (ACCUs).	• Reliance on high grade ore for Project feed; • Potential for HyREX; • Hydrogen supply plans and risks; • FID timing; and • Safeguard Mechanism settings and best practice.
Minister Carey's Office (Minister for Planning; Lands; Housing and Homelessness)	Meeting – Nov 2023.	• Site visit; and • Meet personnel.	N/A
Minister for Climate Change and Energy	Meeting – Feb 2024.	• Proposal overview.	N/A
Minister for Education; Aboriginal Affairs; Citizenship and Multicultural Interests Meeting	Meeting – Oct 2023.	• Project awareness and progress; and • Native Title.	N/A
Minister for Industry and Science	Meeting – Feb 2024.	N/A	N/A

Stakeholder	Date/s	Relevant issues / topics raised	Proponent response / outcome
Government Stakeholders			
Minister for Environment; Climate Action; Racing and Gaming Meeting	Meeting – Oct 2023.	• Briefing the minister; • Hydrogen; • Emissions over the life of the Project; • Green energy; • Flora and fauna; • CCUS; • Dust; • Port Hedland's attitude.	• Emissions profile vs EPA path to Net Zero..
Minister for Mines and Petroleum; Energy; Hydrogen Industry; Industrial Relations	Meeting – Oct 2023.	N/A	N/A
Minister for Planning; Lands; Housing; Homelessness Meeting	Meeting – Oct 2023.	• Briefing the minister; • Workforce accommodation; and • Lease option signatures and timing.	• Lease matters are a matter for Government rather than the Minister; and • Keep in contact with Policy Adviser.
Minister for Resources, Minister for Northern Australia	Meeting – Feb 2024.	N/A	N/A
Minister Saffioti (Deputy Premier; Treasurer; Minister for Transport, Tourism)	Meeting – Nov 2023.	• BSIA discussion; and • Priority of the Proposal.	• PHI and Government departments should continue dialogue.
Minister for Trade and Tourism	Meeting – Apr 2024	N/A	N/A
NZEA	Meeting – Aug - Oct 2023; Feb - Oct 2024.	• Proposal introduction; • NZEA's role in relation to the Proposal; • Establish lines of communication; • Delay FID until 2025; • Confidentiality and FOI; • Hydrogen; and • Funding.	• Further briefings as required; • NZEA to circulate contact list and confidentiality provisions; and • PHI to provide Proposal update/working together plan.

Stakeholder	Date/s	Relevant issues / topics raised	Proponent response / outcome
Government Stakeholders			
Northern Australia Infrastructure Facility (NAIF)	Meeting – Aug 2023.	• Proposal introduction; and • Funding.	N/A
Office of Hon. Rita Saffioti MLA	Meeting – Nov 2023.	• Personnel introductions; • Site visit; • Lack of services in BSIA; • Water; and • Renewable power.	N/A
Office of Hon Stephen Dawson MLC	Meeting – Nov 2023.	• Personnel introductions.	N/A
Pilbara Development Commission	Meeting – Apr, Sep 2023; Dec 2024.	• Proposal introduction; • Addressing Project questions; • Native Title negotiations; • Name change; and • Workforce accommodation.	N/A
PPA	Meeting – Feb - 2023; Nov 2024.	• Proposal introduction; • Proposal update; • Status of the PH1 export facilities; • Lumsden Point development; • Lumsden and Utah logistics; • Exportation options; • Handling and stockpile requirements; • Dust emissions; • Executive VP visit; • Traditional Owner Engagement; • S91 licence application; • Proposed investigation program timeframes; • Native Vegetation Clearing Permit; • Clarification on port facilities; • Tour of the in-construction; • Construction and operational costs; • Product storage; Information gaps; • Project planning; • Site visit; and	• PHI to provide the required information; • Safety of the product queried and handling requirements; • Commercial arrangements; • Incorporation of Port approvals into Proposal planning; and • Work with PPA on Proposal.

Stakeholder	Date/s	Relevant issues / topics raised	Proponent response / outcome
Government Stakeholders			
		• Water.	
PHIC	Meeting – Aug 2023.	• Membership options; and • PHIC dust modelling.	N/A
Port Hedland International Airport (PHIA)	Meeting – Jun - Dec 2023; Feb 2024.	• Temporary accommodation; • Planning requirements; • Charter flights to and from PHIA; • Secure option to lease; and • Tenure requirements.	• Temporary accommodation encouraged at the airport; and • PHIA to put forward an option.
Prime Minister's Office	Meeting – Feb 2024.	N/A	N/A
ToPH	Meeting – Jan - Dec 2023; Feb 2024.	• Proposal introduction and overview; • Proposal update; • Ore sources and their means of delivery; • Import materials and transport requirements; • Planning requirements; • Personnel introductions • Incoming and Outgoing services; and • Workforce accommodation.	• ToPH supportive of the Proposal; • Design to be in line with the ToPH's design guidelines; and • Good introduction for VC Kim.
WaterCorp	Meeting – Aug, Oct 2024.	• Proposal update; • WaterCorp update; • Water supply BSIA; • Information required by WaterCorp; and • Current schedules.	• Collaboration on aspects of the Project, aspects are still to be defined.

Table 3-2: Stakeholder consultation plan

Timing	Stakeholder	Type	Purpose of Planned Engagement	Issues to be Raised
2025 - ongoing	EPA Services - DWER	Telephone, letters, email and meetings	Correspondence during assessment under Part IV of the EP Act. EPA Board meeting.	• Presentation of EIA; • Review of draft referral information; • Draft conditions; • EPA Board meeting; • Compliance; and • Offsets.
2025 - ongoing	DCCEEW	Telephone, letters, email and meetings	Correspondence during assessment under EPBC Act.	• Presentation of EIA; • Review of referral information; • Draft conditions; • Management Plans; • Compliance; and • Offsets.
2025 - ongoing	Industry Regulation - DWER	Telephone, letters, email and meetings	Correspondence to obtain works approvals under Part V of the EP Act.	• Future Works Approvals and Licence requirements; • Proposal timing (i.e., construction); • Potential environmental impacts; and • Compliance.
2025 - ongoing	DBCA	Telephone, letters, email and meetings	Advice into ongoing management of Proposal within close proximity to Priority Flora. Offset sites and management.	• Priority Flora; and • Offsets.
2025 - ongoing	Federal Government Agencies and Authorities	Telephone, letters, email and meetings	Funding and financing opportunities.	• Details for funding applications and arranging Project finance; and • Dependent projects.
2025 - ongoing	Local Government Authorities	Telephone, letters, email and meetings	Correspondence summarising the Proposal status (i.e., approvals to date and path forward).	• Approvals required; • Future applications; • Path forward for the Proposal; • Local workforce availability; • Export through the port; and • Offsets.

Timing	Stakeholder	Type	Purpose of Planned Engagement	Issues to be Raised
2025 - ongoing	Kariyarra People	Telephone, email, letter and copies of approval documents. Meetings.	Feedback on Proposal design.	• Approvals to date; • Future applications; • Studies undertaken and key findings; • Path forward for the Proposal; • Potential for indigenous contracting and employment opportunities; • Bush tucker/ bush medicine management; • Heritage protection; • Provision of land management information; and • Offsets.
2025 - ongoing	Non-government organisations and community groups	Telephone, letters, email and meetings	Input and provision of information.	• Provision of ecological information; • Invitation for comment; • Priority Flora; and • Offsets.

4 ENVIRONMENTAL PRINCIPLES

The EP Act identifies a series of principles for environmental management (Section 4a, EP Act, as amended). PHI has considered these principles in relation to the development and implementation of the Proposal. Table 4-1 outlines how the principles relate to the Proposal.

Table 4-1: EP Act principles

Principle	How it will be addressed by the Proposal
1. The precautionary principle Where there are threats of serious irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the 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.	PHI has commissioned numerous environmental studies over the past two years in order to inform the design of the Proposal. Heritage studies and monitoring will be undertaken to ensure ground disturbance does not impact on Heritage Sites. The indicative layout presented in the Supplementary Document has been significantly reduced from the initial plans in order to minimise environmental impacts. The Proposal is located within a SIA with appropriate land zoning and management of land use in the SIA and buffer zone. It is therefore considered that there is significant environmental knowledge associated with the Proposal and no threat of serious or irreversible damage to the environment.
2. The principle of intergenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	The Proposal is addressing a key global issue – climate change associated with greenhouse gas emissions. Australia is well placed to capitalise on renewable energy generation to reduce the carbon emissions from steel production – which contributes around 8% of global emissions. It is important to start addressing the hard to abate sectors such as steel making to enable the transition to net zero emissions. This Proposal is driven by those realities. Ecological offsets are proposed to ensure no net loss of identified environmental values including good to Excellent quality vegetation and significant fauna habitat. Land lease conditions are expected to require land rehabilitation at end of Proposal life. This will ensure no long term negative environmental legacy remains once the Proposal finishes operations.
3. The principle of the conservation of biological diversity and ecological integrity Conservation of biological diversity and ecological integration should be a fundamental consideration.	Survey work has been used to confirm the range and status of environmental values within the vicinity of the Proposal. PHI will mitigate potential impacts from the Proposal according to the mitigation hierarchy; avoid, reduce and offset. Where impacts cannot be avoided or reduced to enable PHI to achieve its objectives, offsets have been proposed. The Proposal is located within a SIA which was established through a State Government planning process and avoids impacts on areas of high biological diversity and ecological integrity.

Principle	How it will be addressed by the Proposal
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 principle – those who generate pollution and waste should bear the cost of containment, avoidance or 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; and 4) Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which benefit and/or minimise costs to develop their own solutions and responses to environmental problems.	The Proposal will produce low carbon emissions iron. The provision of low emissions iron will come at a higher cost. These capital costs to be incurred by PHI for this Proposal are directly as a result of addressing the aim of reducing global GHG emissions by incrementally moving from coal to gas to hydrogen-based steel production (as hydrogen supply increases). As discussed in Section 2.2.5, the Proposal plan, design and management controls have been revised to reduce potential impacts to environmental factors. PHI will incur the cost of installing pollution control measures on plant and equipment to minimise emissions to air. PHI will also be required to bear the costs for offsetting the significant residual impacts. The Safeguard Mechanism applies to the Proposal and PHI will be required to offset any emissions from the Proposal that exceed the baseline of the facility or implement other measures. The adoption of hydrogen as the reductant will be based on Federal subsidies for hydrogen production to assist in the transition to green hydrogen.
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.	The plant design includes fine particle capture and re-introduction into the process to reduce total particulate emissions. The process will utilise waste heat and cooling processes to recycle heat. The MidRex process recycles gas combustion products such as carbon dioxide and Hydrogen to enhance the reducing environment and minimise waste. Waste for the whole Proposal will be minimised by adopting the hierarchy of waste controls; avoid, minimise, re-use, recycle and safe disposal.

5 FLORA AND VEGETATION

5.1 EPA OBJECTIVE

The EPA Objective for this Key Environmental Factor is to protect flora and vegetation so that biological diversity and ecological integrity are maintained.

5.2 POLICY AND GUIDANCE

Relevant EPA and Commonwealth Government guidance documents for flora and vegetation are summarised in Table 5-1.

Table 5-1: Policy and guidance relevant to the Flora and Vegetation Key Environmental Factor

Policy and Guidance	How guidance has been considered
WA Government	
Key EPA documents	
Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023a)	This document was considered in the preparation of this Supplementary Report and to inform EIA. It was used identify the Key Environmental Factors likely to be impacted by the Proposal and the EPA's objective for each factor.
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a)	This document has been considered in planning for the Part IV approval process and has been used to inform the preparation of this Supplementary Report.
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b)	This document has been considered in planning for the Part IV approval process and has been used to inform the preparation of this this Supplementary Report.
Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021c)	This document was considered but not deemed to be relevant as no management plans were prepared for this factor.
Relevant EPA Factor Guidelines	
Environmental Factor Guideline - Flora and Vegetation (EPA, 2016a)	This document was considered in the preparation of this section (Section 5) of the Supplementary report.
Relevant EPA Technical Guidance	
Technical Guidance – Flora and Vegetation Surveys for EIA (EPA, 2016b)	This document was used to inform the survey effort required to undertake EIA for the Proposal and is referenced throughout the Flora and Vegetation report for the Proposal.
Guidance Statement 6 – Rehabilitation of Terrestrial Ecosystems (EPA, 2006)	This document has been considered in the design and planning of the Proposal; it has also been considered in the preparation of mitigation measures for the Proposal.
Other Policy and Guidance	
Biosecurity and Agriculture Management Act 2007 (BAM Act)	This document was considered during the assessment of weeds recorded in the Survey Area (Phoenix, 2024a; Appendix 1)
WA Environmental Offsets Policy (EPA, 2011)	This document was considered during the development of proposed offsets for Flora and Vegetation (Appendix 1).
WA Environmental Offsets Guidelines (EPA, 2014a)	This document was considered during the development of proposed offsets for Flora and Vegetation. (Appendix 1).
WA Environmental Offsets Template (EPA, 2014b)	This document was considered during the development of proposed offsets for Flora and Vegetation (Appendix 1).

Policy and Guidance	How guidance has been considered
Commonwealth Government	
Key Documents	
Generic guidelines for the content of a draft EPBC Act Public Environment Report (PER)/Environmental Impact Statement (EIS; including the objects and principles of the EPBC Act, 1999; DotEE, 2016a)	This document was considered in the preparation of this Supplementary Report and while undertaking EIA.
EPBC Act Environmental Offsets Policy (DSEWPaC, 2012) – including the Offset Assessment guide	This document was considered when determining whether offsets were expected to be required for this factor.
Environmental Management Plan Guidelines (DotE, 2014)	This document was considered but not deemed to be relevant as no management plans were prepared for this factor.
EPBC Act Condition Setting Policy (DAWE, 2020)	This document was used as guidance for the referral process and EIA of the Proposal.
EPBC Act Outcomes-based conditions policy (DotE, 2016a)	This document was used to assist in developing the outcomes for Flora and Vegetation.
Relevant Technical Guidance	
Relevant EPBC Act listed species-specific survey guidelines and protocols.	This document was used as guidance when undertaking surveys of EPBC listed species and potential survey limitations.
Relevant EPBC Act listed species-specific Recovery plans, Threat Abatement Plans, ACAs and other documents.	This document was used as guidance to assess and manage EPBC listed species that may be impacted by the Proposal.

5.3 RECEIVING ENVIRONMENT

The information in this section has been sourced from the Flora and Vegetation Assessment Phoenix Environmental Sciences Pty Ltd (Phoenix) (2024a; Appendix 1) undertaken for the Proposal.

5.3.1 BIOREGIONAL CONTEXT

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into large 'bioregions' and 'subregions' based on climate, geology, landform, native vegetation and species information (DotEE, 2016b). The Proposal is located in the Roebourne subregion (PIL4) of the Pilbara bioregion (Figure 5-1) which is characterised as:

"Quaternary alluvial and older colluvial coastal and subcoastal plains with a grass savannah of mixed bunch and hummock grasses and dwarf shrubsteppe of *Acacia stellaticeps* or *A. pyrifolia* and *A. inaequilatera*. Uplands are dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* woodlands. Samphire, Sporobolus and mangal occur in the marine alluvial flats and river deltas (Kendrick & Stanley 2001)."

5.3.2 Survey Effort

Phoenix was commissioned by PHI to undertake a detailed flora and vegetation survey for the Proposal. The purpose of the survey was to delineate key flora values for the proposal to inform the environmental assessment and approvals process, as well as provide context for the preparation of EIA documentation. Surveys were completed in April and September of 2023 and included a desktop study, field survey and reporting. The 'Survey Area' is approximately 1,476.3 ha and includes four corridors with the western-most corridor located adjacent to the Port Hedland power station (Figure 5-2).

Several biological database searches were undertaken to identify and prepare lists of significant flora and vegetation communities that may occur within the Survey Area. A literature search was conducted for accessible reports for biological surveys conducted within a 40 km radius of the Survey Area to build on the lists developed from the database searches.

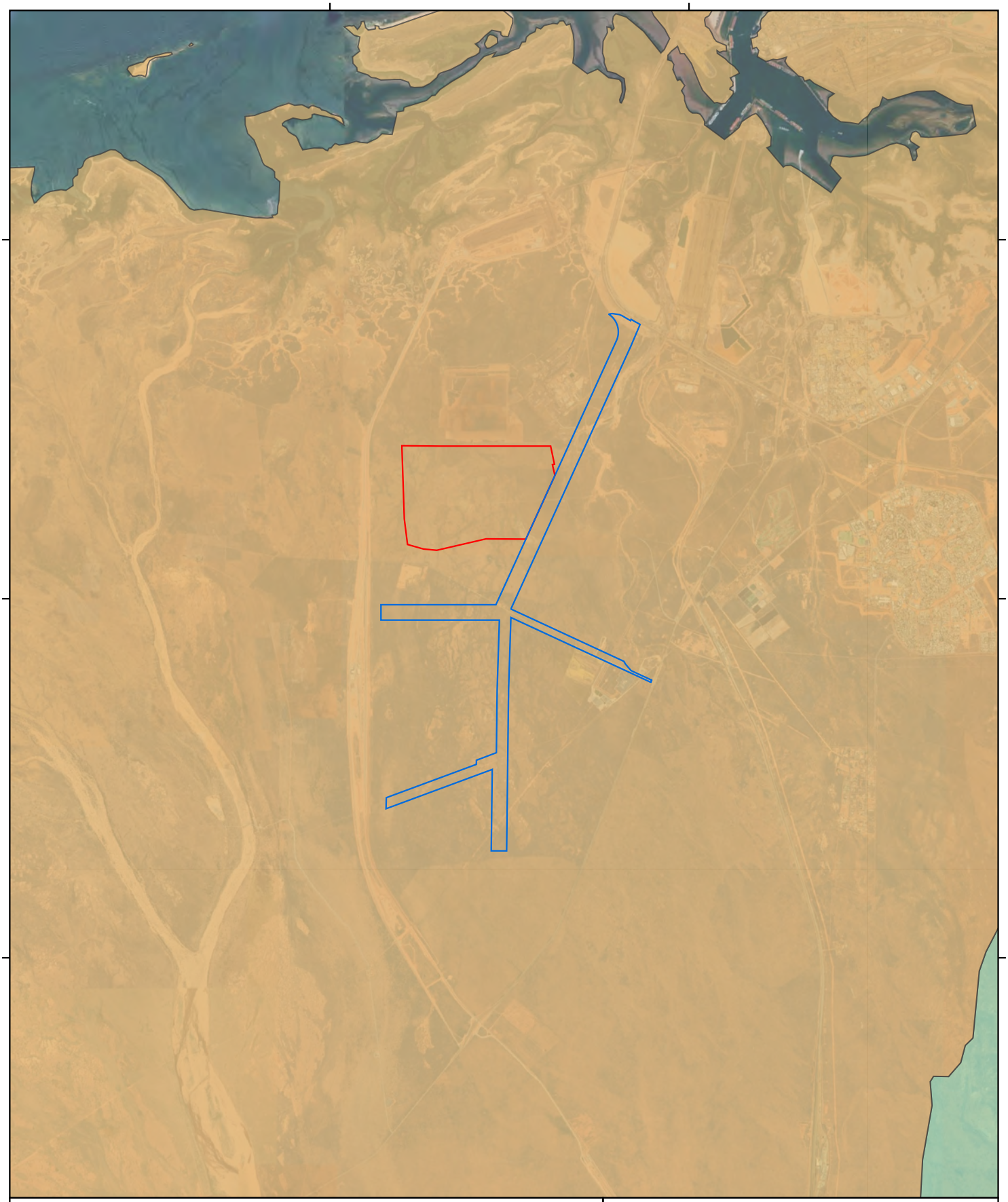
Quadrat locations were selected to ensure than an accurate representation of the major vegetation types within the Survey Area were sampled adequately, with a minimum of at least three quadrats per vegetation type. Phoenix sampled a total of 41 quadrats across the Survey Area (Figure 5-3). Quadrat sampling dimensions were 50 m x 50 m in accordance with EPA guidance for the Eremaean Botanical Province (EPA, 2016b). The following information was collected from each quadrat:

- Location: The geographic coordinates of all four corners of the quadrat in WGS84 projection;
- Description of vegetation: A broad description utilising the structural formation and height classes based on National Vegetation Information System ESCAVI (2003) and in accordance with the EPA (2016b);
- Habitat: A brief description of landform and habitat;
- Geology: A broad description of surface soil type and rock type;
- Disturbance History: A description of any observed disturbance including an estimate of time since last fire, weed invasions, soil disturbance, human activity and fauna activity;
- Vegetation Condition: Using the condition scale in EPA (2016b) for the Eremaean Botanical Province;
- Height and Percentage Foliage Cover (PFC): A visual estimate of cover of total vegetation cover, cover of shrubs and trees >2 m tall, cover of shrubs <2 m, total grass cover and total herb cover;
- Photograph: A colour photograph of the vegetation within each quadrat in a south-easterly direction from the north-west corner of the quadrat; and
- Flora Species List: Comprehensive list of all flora species recorded within the quadrat.

Additional targeted searches were undertaken for significant flora (Threatened and Priority), Declared Pests and Weeds of National Significance (WoNS). Vegetation was traversed by foot utilising transects with searched focused on habitats considered likely to support significant flora. If a flora species was suspected to be significant, the following information was recorded:

- GPS coordinated, including population boundaries where applicable;
- Description of the habitat and floristic community in which the potential significant species was located;
- Population size estimate (i.e. estimated number of individual plants) where applicable;

- Specimen collection for taxonomic identification and lodgement to the WA Herbarium; and
- Photograph of live plant in situ and description of important details, such as flower colour, height of individual or average height of population.



Legend

- Plant Development Envelope
- External Infrastructure Development Envelope

IBRA7 Subregions

- Chichester (PIL01)
- Roebourne (PIL04)

Imagery: Google Satellite

PHGS_0406_013

Figure 5-1: IBRA subregions

Preston Consulting

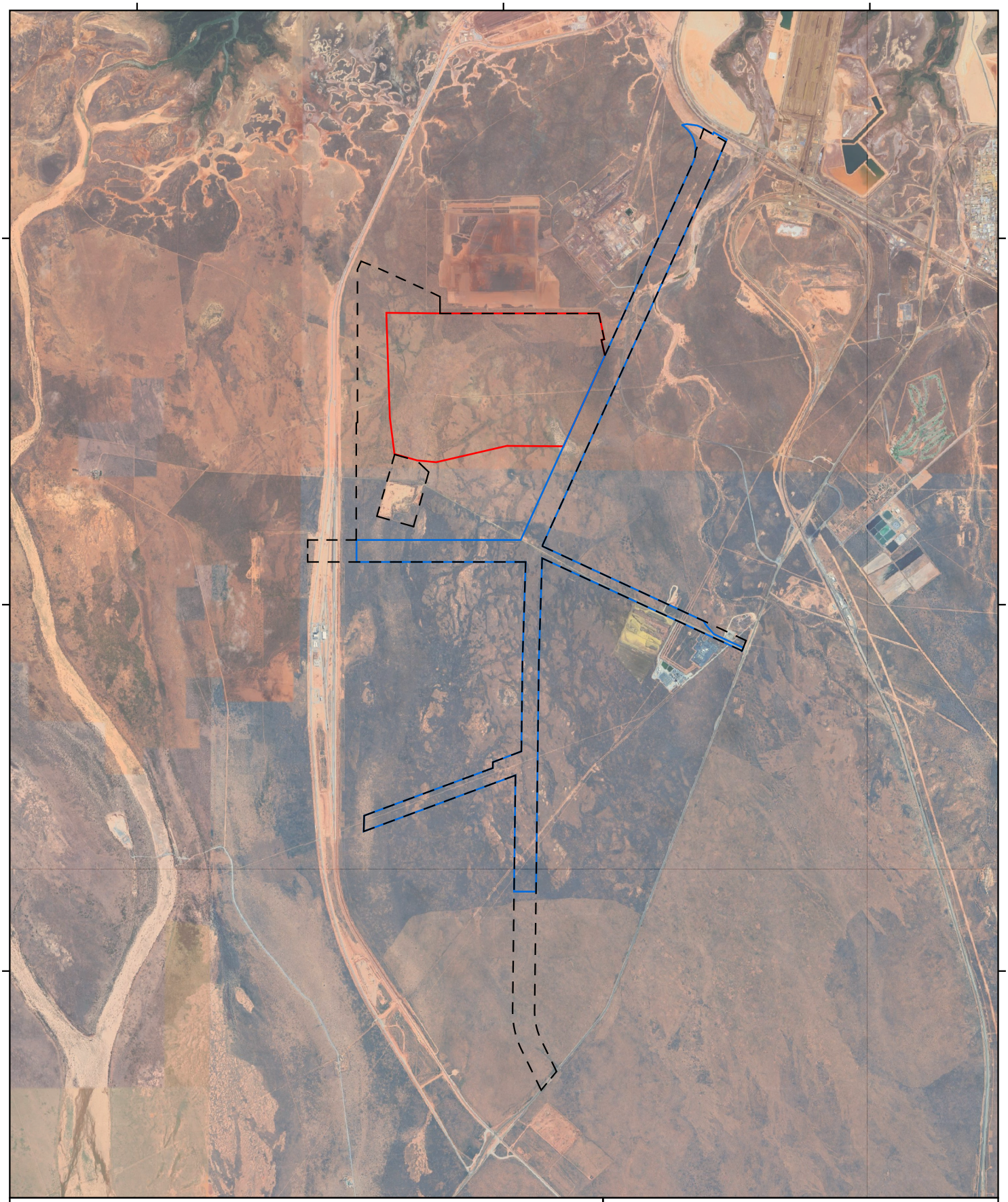
0 2 4 km

GDA 2020 (MGA Zone 50)

1:100,000 (A4)

AS

15/11/2024



Legend

- Plant Development Envelope
- External Infrastructure Development Envelope
- Flora and Vegetation Survey Area

Imagery: Google Satellite

Figure 5-2: Flora and Vegetation Survey Area

Preston Consulting

0 1 2 km

N

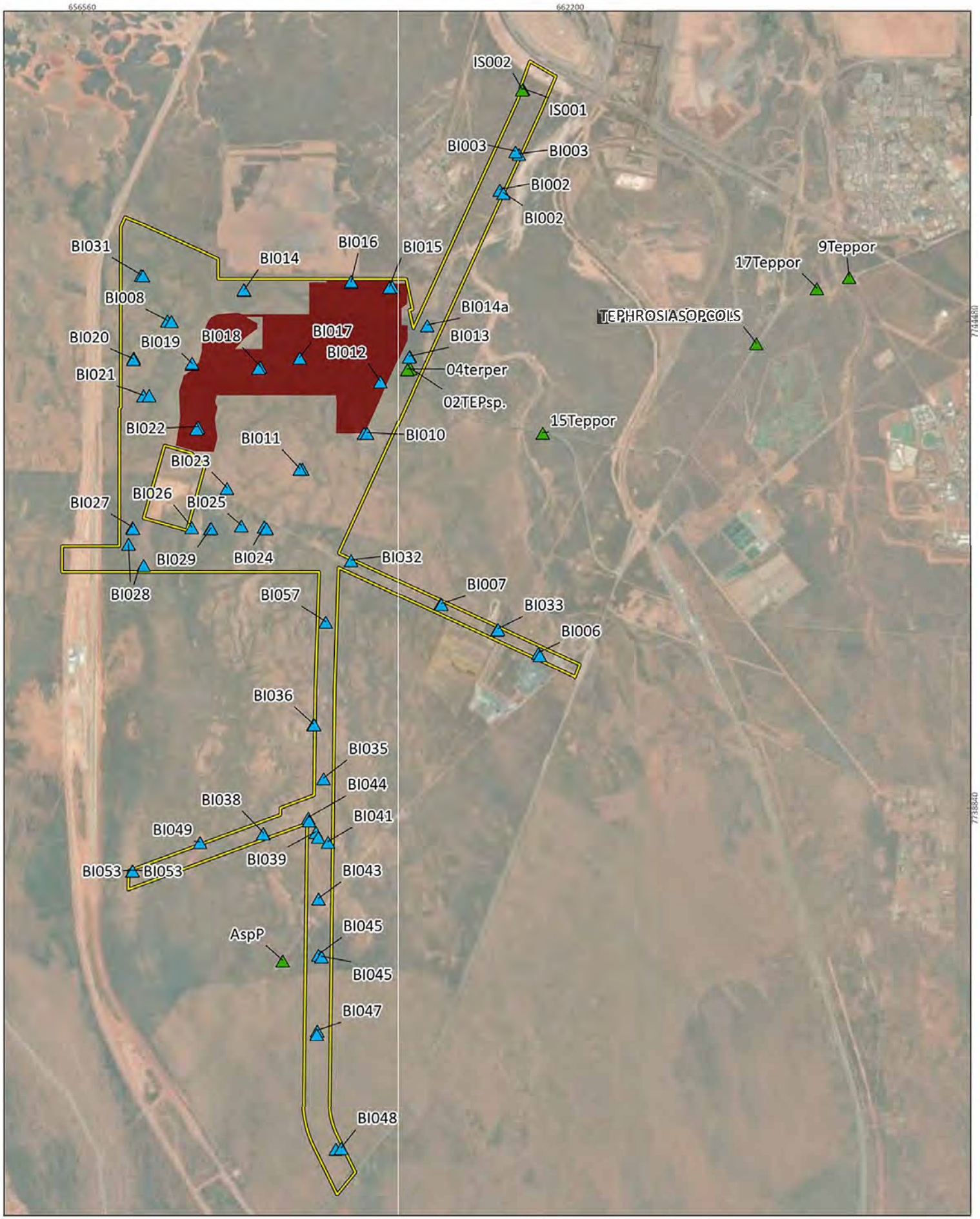
GDA 2020 (MGA Zone 50)

1:70,000 (A4)

PHGS_0406_014

AS

18/12/2024



Western Australia

PERTH

Port Hedland Green Steel Pty Ltd
Port Hedland Green Steel Project

Project No	1558
Date	11/12/2024
Drawn by	JL
Map author	LB

0 1 2
Kilometers

1:56,500(at A4) GDA 1994 MGA Zone 50

Study area

Indicative disturbance footprint

Site type

Individual specimen

Quadrat

Figure 5-3: Flora survey sample sites

PHOENIX ENVIRONMENTAL SCIENCES

5.3.3 Alignment with Technical Guidance

Phoenix designed and implemented field assessments based on the relevant State and Commonwealth legislation and guidelines, as well as EPA technical guidance. All botanists held valid collection licences to collect flora for scientific purposes, issued under the BC Act. Further detail on survey limitations is provided in Table 5-2.

Table 5-2: Potential limitations of the flora and vegetation surveys

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information (i.e., pre-existing background versus new material).	**Not a limitation.** Regional information was found in the ENV (2011a) report. Additionally, previous surveys have been conducted in the vicinity of the Survey Area.
Scope (i.e., what life forms, etc., were sampled).	**Not a limitation.** All items in the scope were achieved.
Proportion of flora collected and identified (based on sampling, timing and intensity).	**Not a limitation.** Sufficient sites were surveyed to capture the flora of the Proposal during the time of survey. The three of the total 140 taxa that were not identified due to insufficient taxonomic characters, had affinity to common species and thus there was no concern of confusion with significant flora.
Completeness and further work which might be needed (i.e., was the Survey Area fully surveyed).	**Not a limitation.** All items in the scope were achieved.
Survey timing, weather, season, cycle.	**Not a limitation.** Surveys were conducted during the primary and supplementary survey periods appropriate for the botanical province (EPA, 2016b).
Disturbances (fire, flood, accidental human intervention, etc.).	**Limitation.** There is evidence of fire across the Survey Area. In particular the northernmost and southernmost areas appear to be more fire affected than the central region. The vegetation types will change with the pass of time as the vegetation matures depending on the occurrence and frequency of fires.
Access problems (i.e., ability to access the Survey Area).	**Limitation.** Over 12 ha (<1% of the Survey Area) in the northeast corridor were not surveyed as a result of restricted access due to cultural significance in the area. No similar textures occur in the Survey Area and therefore vegetation type was not assigned to this area.
Experience levels (e.g., degree of expertise in plant identification to taxon level).	**Not a limitation.** Dr Grant Wells who led the field surveys for this Proposal, has more than 18 years of experience conducting surveys in the Pilbara region.

5.3.4 Flora

The Phoenix (2024a) desktop review identified records of 544 flora taxa within the 40 km desktop search extent, comprising of 485 native species and 60 introduced species. The taxa represents 228 genera and 72 families. The most prominent families were the Fabaceae, Poaceae, Malvaceae, and Amaranthaceae.

Significant Flora

Desktop Assessment

Phoenix's (2024a) desktop review found records of 13 significant flora species within the search extent (Figure 5-4). No Threatened flora listed under the EPBC Act and/or BC Act were identified within the Survey Area, 12 Priority flora species listed by the DBCA were identified. The remaining significant species recorded was a locally significant species *Phyllanthus* sp. B Kimberley Flora.

There were no records of significant flora within the Survey Area, however 7 records were within 5 km of the Survey Area (Figure 5-4). Taking into consideration the proximity of known records and preferred habitat of each significant species it was considered that 8 of these species may occur in the Survey Area.

Field Survey

Phoenix's (2024a) field survey identified one Priority flora species within the Survey Area: *Tephrosia rosea* var. Port Hedland (A.S. George 1114), Priority 1 (DBCA) (Figure 5-5). *Tephrosia rosea* var. Port Hedland (A.S. George 1114) was recorded inside and outside the Survey Area. One population was identified within the Survey Area consisting of six individuals. A further three populations were recorded outside the Survey Area, containing 26, two, and 15 individuals respectively. All the populations were recorded in disturbed areas in road verges.

Tephrosia rosea var. Port Hedland (A.S. George 1114) appears to occur opportunistically along areas of disturbance. This species was recorded in the vegetation type AsTsch, which comprises over 18% of the Survey Area. It is possible that disturbance within this vegetation type may result in the establishment of further individuals/populations of this species.

The likelihood of occurrence assessment for the remaining significant species identified in the desktop review determined that five species may possibly occur, and seven species are unlikely to occur in the Survey Area (Table 5-3).

Table 5-3: Likelihood of occurrence for significant flora identified in the desktop review

Species	Status	Likelihood of Occurrence
Priority Species		
Tephrosia rosea var. Port Hedland (A.S. George 1114)	P1 (DBCA)	**Recorded** Occurs in the eastern part of the Survey Area where the habitat is suitable and only in areas when there is disturbance through the vegetation, i.e. a road.
Gomphrena pusilla	P2 (DBCA)	**Unlikely** There are no records of *Acacia bivenosa* in the Survey Area, a species normally associated with *Gomphrena pusilla*. Furthermore, its suitable habitat, limestone ridgetops and calcareous coastal dunes, is not present within the Survey Area.
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	P3 (DBCA)	**Possible** Suitable habitat for this species was found within the Survey Area. This species has also been recorded 1 km away from the Survey Area.
Eragrostis crateriformis	P3 (DBCA)	**Possible** This species is associated with soils with clay in the soil, and in drainage lines. While its occurrence is possible in the Survey Area,

Species	Status	Likelihood of Occurrence
Priority Species		
		only two quadrats (BI003 and BI025) have descriptions of clay in its soil texture and therefore potential habitat is limited.
Euphorbia clementii	P3 (DBCA)	**Unlikely** There is no suitable habitat for this species in the Survey Area.
Euploca mutica	P3 (DBCA)	**Possible** Suitable habitat across most vegetation types in the Survey Area with collection records nearby.
Gomphrena leptophylla	P3 (DBCA)	**Possible** Habitat especially suitable in the floodplains in the grasslands.
Gymnanthera cunninghamii	P3 (DBCA)	**Unlikely** This species is associated with Eucalyptus and Melaleuca woodlands on creeks. While site BI010 has a Eucalyptus woodland on what appears to be a floodplain, this habitat doesn't exactly match the habitat descriptions shown in FloraBase for this species (WA Herbarium, 2024).
Rothia indica subsp. *Australis*	P3 (DBCA)	**Possible** Suitable habitat, and collections near the Survey Area.
Triodia chichesterensis	P3 (DBCA)	**Unlikely** No suitable habitat. The Survey Area is not represented by quartzite on undulating plains on woodlands which is the known habitat for this species.
Bulbostylis burbidgeae	P4 (DBCA)	**Unlikely** While this species grows in hummock grasslands, the Survey Area does not contain granite boulders, hill tops, or outcrops, the habitat requirement of *B. burbidgeae*.
Ptilotus mollis	P4 (DBCA)	**Unlikely** No suitable habitat found in the Survey Area, i.e. no outcrops or hill slopes.
Phyllanthus sp. B Kimberley Flora (T.E.H. Aplin et al. 809)	Indeterminate	**Unlikely** This species is associated with riparian habitats, there is only one likely habitat for this species within the Survey Area. The riparian habitat is located in the northeastern corridor. However, due to heritage restrictions the creek line was not surveyed.

Range Extensions Flora

Significant range extensions were recorded for three species: *Eragrostis setifolia, Maireana georgei* and *Santalum spicatum.* None of these species are listed under the BC or EPBC Act however are considered locally significant as range extensions. Details on these species has been provided in Table 5-4.

Table 5-4: Range extension flora

Species	Distribution and Ecology
Eragrostis setifolia Nees (Neverfail Grass)	Caespitose perennial, grass-like or herb, 0.12 – 0.6 m high, with hairy, thickened base. Flowers January to December. Clay, loam, alluvium, grey sand, sometimes saline soils. Seasonally flooded habitats. The Australasian Virtual Herbarium (AVH) contains 241 records of this species across WA (including coastal waters), with 62 individual records in the Pilbara region.
Maireana georgei (Diels) Paul G.Wilson (Satiny Bluebush)	Compact, rounded shrub, 0.15 – 1 m high. Flowers August to October. Variety of soils. The AVH contains 594 records of this species across WA (including coastal waters), with 80 individual records within the Pilbara region.
Santalum spicatum (R.Br.) A.DC.	Shrub, 1-5 m high, hemiparasitic on roots. Flowers February to June and are green/ red. Red sandy soils. Among rocks. The AVH contains 425 records of this species across WA (including coastal waters), with 20 individual records in the Pilbara region.

Unidentified flora

Three specimens collected during the survey could not be identified to species level (Table 5-5), mainly as a result of insufficient taxonomic characters, as plants were sterile (lacking reproductive structures) and damaged.

None of the unidentified species in the survey were considered likely to be Priority flora. Both the *Eucalyptus* and the *Corymbia* species resemble many of the commonly occurring species in the area, they were simply unidentifiable due to the absence of fertile material in combination with fire damage. Furthermore, WA Herbarium (2024) shows that there are no species of Priority flora from the aforementioned genera in the Roebourne subregion.

The indetermined Poaceae species resembles the genus *Eriachne*. While there was no specimen collected for this entity, the field team correctly identified the *Eriachne* genus when making collections. The WA Herbarium (2024) shows only four Priority species of the Poaceae family occurring in the Roebourne subregion: *Eragrostis crateriformis*, *Eragrostis surreyana*, *Themeda* sp. Hamersley Station (M.E. Trudgen 11431), and *Triodia degreyensis*. Since none of the Priority species belong in the genus *Eriachne*, the Poaceae sp. record is unlikely to be a Priority species.

Table 5-5: Unidentified taxa recorded during the field survey

Taxon	Comments
Corymbia sp.	Sterile and available material damaged by fire.
Eucalyptus sp.	Sterile and available material damaged by fire.
Poaceae sp.	Sterile.

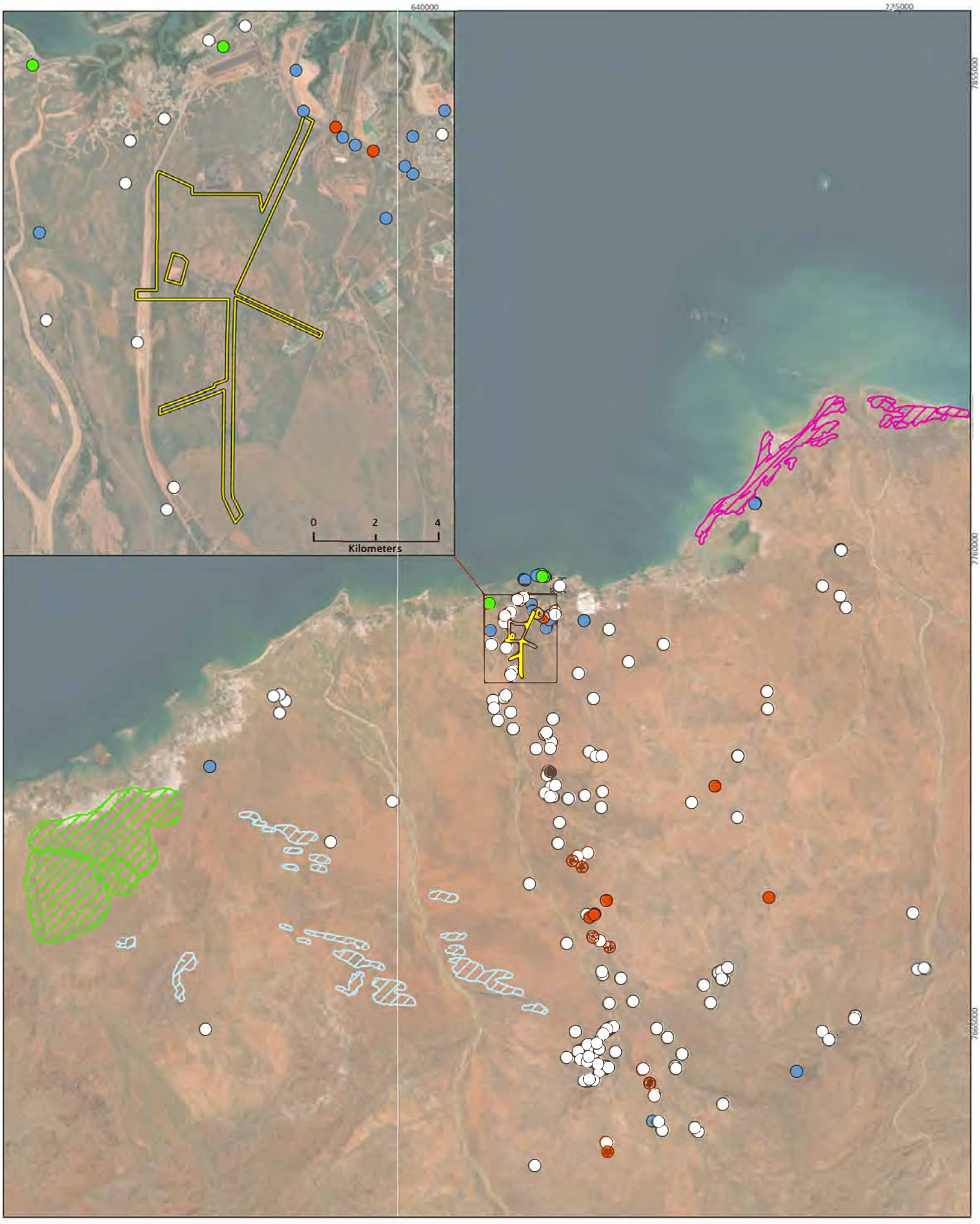
Introduced (Exotic Species)

Phoenix's (2024a) desktop review identified 60 records of introduced species within the desktop search extent. Of these 60 introduced species, six are Declared Pests and three are WoNS. Species recorded as Declared Pests or WoNS are listed below:

- *Calotropis procera:* Declared Pest;
- *Coccinia grandis:* Declared Pest;
- *Indigofera hochstetteri:* Declared Pests;
- *Opuntia stricta:* Declared Pests and WoNS;
- *Parkinsonia aculeata:* Declared Pests and WoNS; and
- *Tamarix aphylla:* Declared Pests and WoNS.

Four introduced flora species were recorded during Phoenix's (2024a) field survey, none of these were listed as Declared Pests or as WoNS. All of the introduced flora recorded during the field survey have previously been recorded in the Pilbara bioregion with all of them having an extensive range in WA (WA Herbarium 1998). These species include:

- *Aerva javanica*;
- *Stylosanthes hamata*;
- *Cenchrus ciliaris*; and
- *Cenchrus setiger*.



Port Hedland Green Steel Pty Ltd
Port Hedland Green Steel Project

Project No	1558
Date	7/03/2024
Drawn by	JL
Map author	LB

0 20 40
Kilometers

1:976,900(at A4) GDA 1994 MGA Zone 50

Study area

Status
- P1 (DBCA list)
- P2 (DBCA list)
- P3 (DBCA list)
- P4 (DBCA list)

TEC/PEC name, category
- Eighty Mile Land System, Priority 3
- Gregory Land System, Priority 3
- Horseflat Land System of the Roebourne Plains, Priority 3

Figure 5-4: Desktop search results for Threatened and Priority Flora

PHOENIX ENVIRONMENTAL SCIENCES

Figure 5-5: Location of significant flora recorded during the field surveys

5.3.5 VEGETATION

Land Systems

DPIRD undertakes land systems mapping for WA using a nesting soil-landscape mapping hierarchy (Schoknecht & Payne 2011). Under this hierarchy, land systems are defined as areas with recurring patterns of landforms, soils, vegetation and drainage (Payne & Leighton 2004). The Survey Area intersects two land systems (Figure 5-6) and include the following:

- *The Uaroo System* (98% of the development envelopes): which is characterised by broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered Acacia shrubs; and
- *The Littoral System* (2% of the development envelopes): which is characterised by bare coastal mudflats (unvegetated), samphire flats, sandy islands, coastal dunes and beaches, supporting samphire low shrublands, sparse acacia shrublands and mangrove forests.

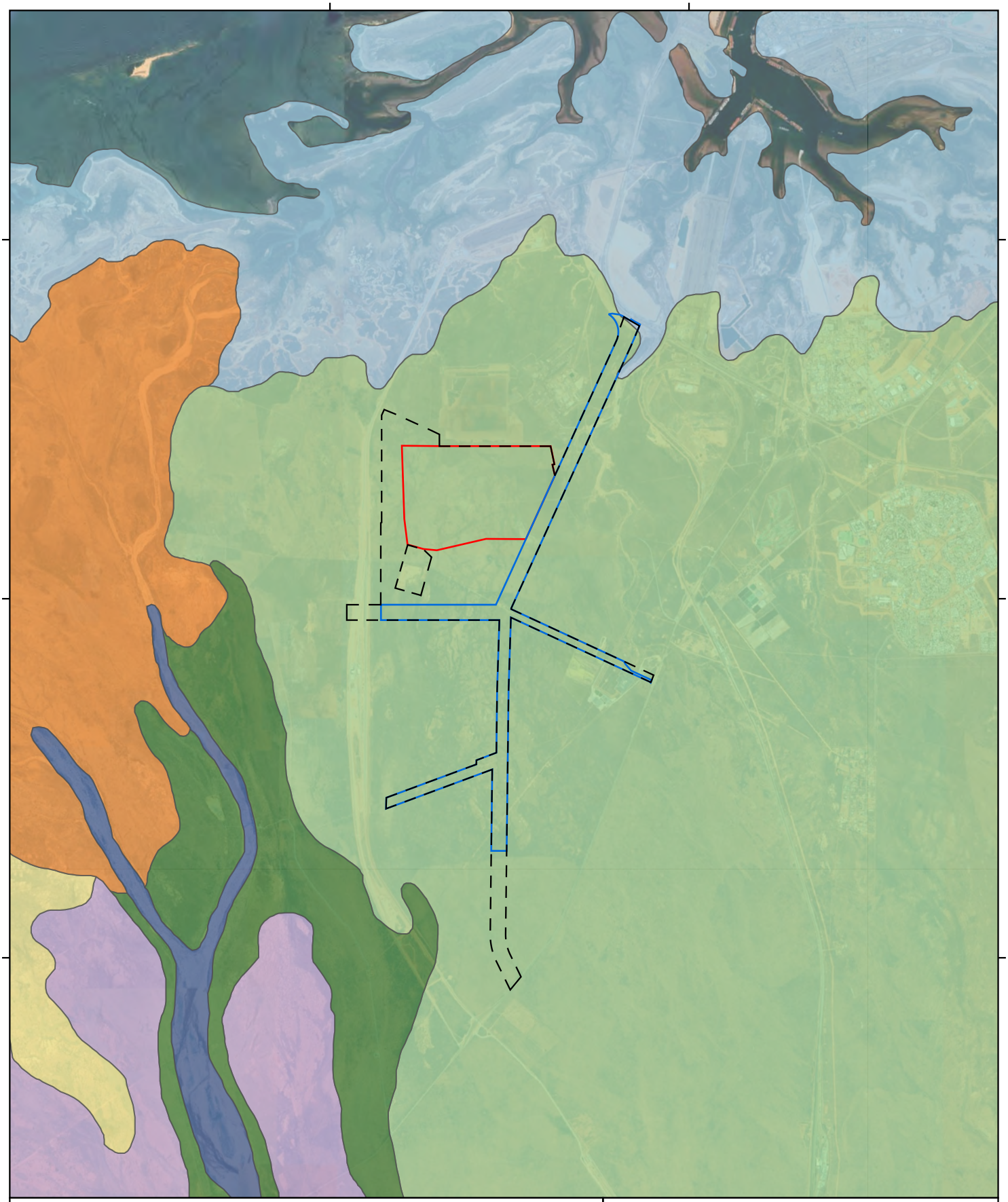


Figure 5-6: Land systems

Regional Native Vegetation Extent

Native vegetation within 10, 15 and 20 km of the development envelopes was mapped using DPIRD's Native Vegetation Extent dataset (DPIRD, 2017) (Figure 5-7). The extent of native vegetation surrounding the development envelopes is summarised in Table 5-6.

Table 5-6: Native vegetation surrounding the Proposal

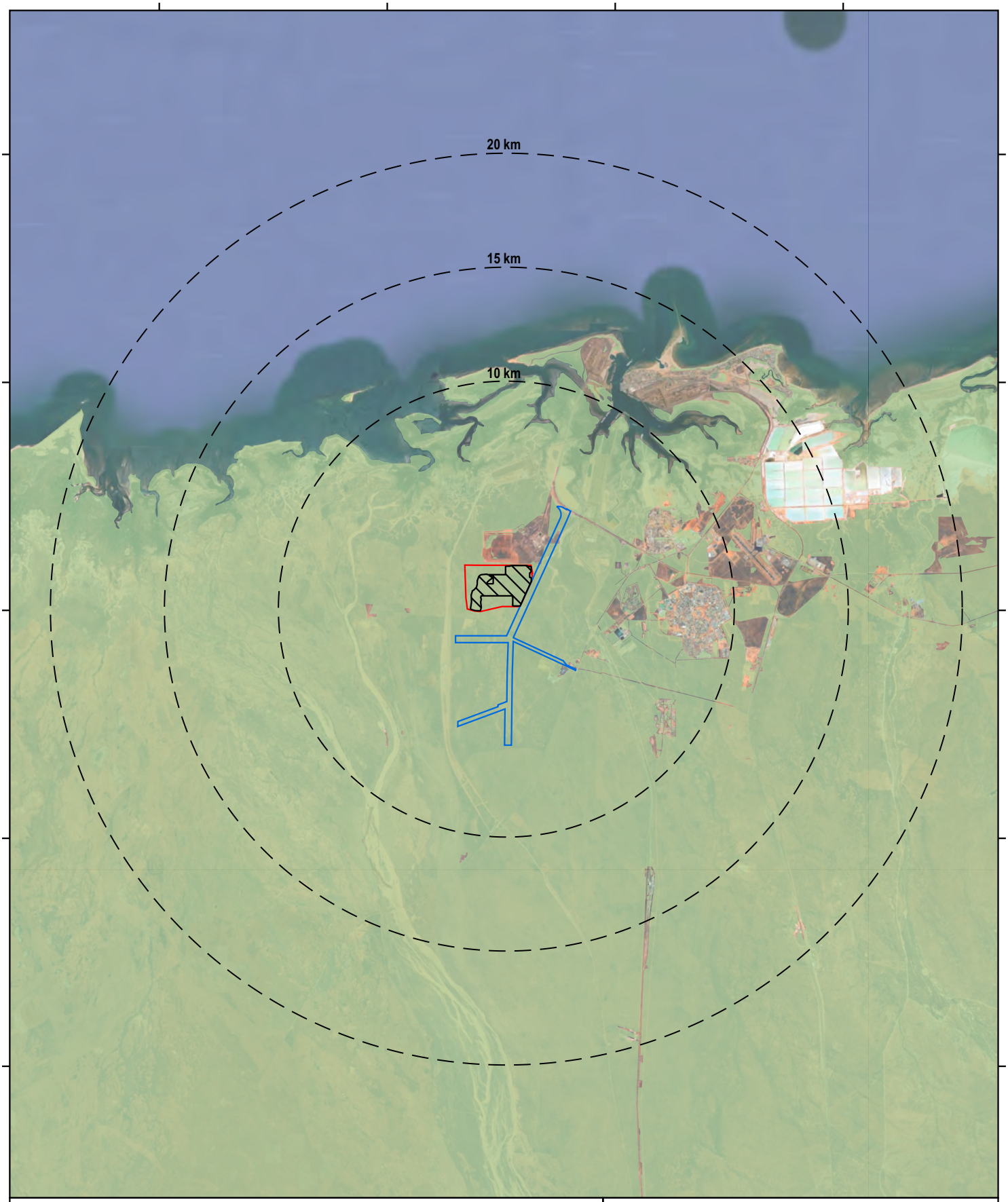
Radius (km)	Area of native vegetation remaining (ha)	% of native vegetation remaining
Development envelopes	983.2	98.0
10	48,078.9	87.0
15	80,617.0	89.3
20	122,722.9	92.1

Vegetation Associations

Regional scale pre-European vegetation mapping for WA (Beard *et al.* 2013; DPIRD 2018) identifies two vegetation associations mapped in the Survey Area (Figure 5-8). The remaining extent for both vegetation associations at the Statewide scale exceeds 99.0% they are therefore considered of Least Concern (Table 5-7). However, none of vegetation association 645 is currently represented in DBCA lands.

Table 5-7: Statewide extent of pre-European vegetation associations present in the Survey Area

Vegetation association	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	Current extent in DBCA lands (%)	% of Survey Area
589, Mosaic: Short bunch grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex	807,698.6	802,713.4	99.4	1.9	82.9
647, Hummock grasslands, dwarf-shrub steppe; *Acacia translucens* over soft spinifex	195,860.9	191,711.4	97.9	N/A	17



Legend

- Plant Development Envelope
- External Infrastructure Development Envelope
- Native Vegetation (DPIRD-005)
- Buffers

Imagery: Google Satellite

PHGS_0406_015

Figure 5-7: Extent of native vegetation surrounding the Proposal

Preston Consulting

0 4 8 km

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GDA 2020 (MGA Zone 50)

1:225,000 (A4)

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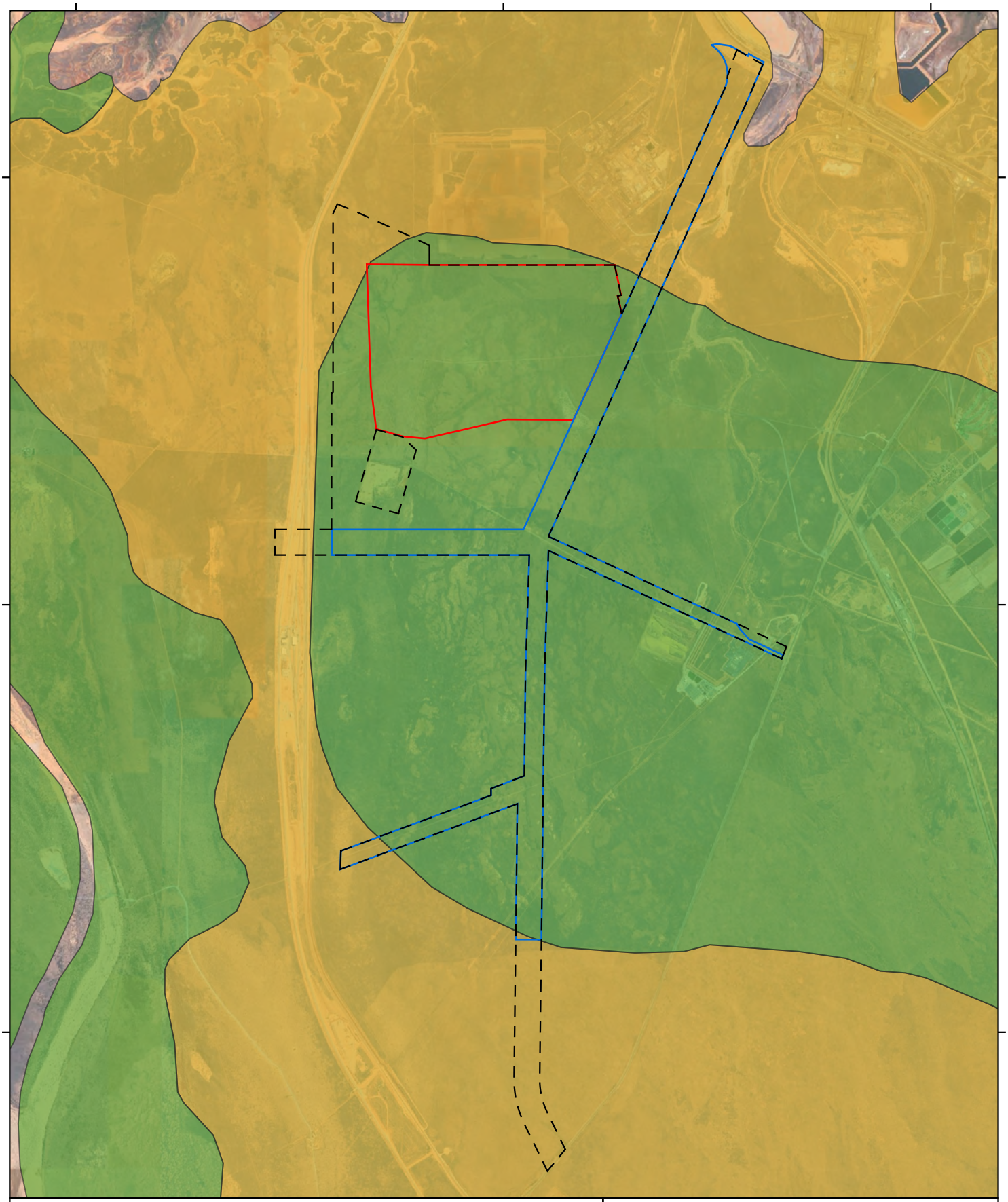
15/11/2024



Legend

- Plant Development Envelope
- External Infrastructure Development Envelope
- Flora and Vegetation Survey Area

Pre-European Vegetation (DPIRD-006)

- 589: Short bunch-grass savanna/Grass-steppe
- 647: Shurb-steppe

Imagery: Google Satellite

PHGS_0406_022

AS

18/12/2024

Figure 5-8: Pre-European vegetaion

Preston Consulting

0 1 2 km

N

GDA 2020 (MGA Zone 50)

1:60,000 (A4)

Vegetation Communities

Six vegetation types were defined and mapped across the Survey Area (Figure 5-9). The most dominant vegetation type accounting for 28.0% of the mapped vegetation was AsPtTe which is defined as 'Low sparse shrubland of *Acacia stellaticeps, Pluchea tetranthera*, and *Afrohybanthus aurantiacus*, over a low open to hummock grassland of *Triodia epactia* and/or *T. secunda*, with *Eriachne mucronata*'. The four vegetation types consisting of *Acacia* shrublands over *Triodia* hummock grasslands (AccCiiTe, AccAsTe, AsTsch and AsPtTe) dominated the Survey Area, comprising nearly 85% followed by the hummock grasslands of *Triodia epactia* and *T. secunda* (TeTsec), comprising 11% of the Survey Area. Of the remaining area, 2% was cleared and <1% consisted of a 'not assessed' area and a *Eucalyptus victrix* woodland EvGlEa, respectively. The area that was not assessed was due to a registered heritage site. The EvGlEa appeared to be a unique vegetation type in the Survey Area and should is regarded as locally significant.

Vegetation Condition

The condition of vegetation within the Survey Area ranged from Good to Excellent (excluding cleared). The condition rating for vegetation within the Survey Area was based on the appropriate condition scale for the Eremaean Botanical Province (EPA, 2016b). There is evidence of fire across the Survey Area, in particular the northernmost and southernmost areas. The vegetation types will change with the pass of time as the vegetation matures depending on the occurrence and frequency of fires. The vegetation condition ratings relate to vegetation structure, the level of disturbance and weed cover at each structural layer and the ability of the vegetation unit to regenerate. The areas mapped are shown in Figure 5-10 and outlined in Table 5-8.

Table 5-8: Vegetation Condition

Vegetation Condition	Area mapped within the Survey Area (ha)	Proportion of mapped vegetation (%)
Excellent	1,349.5	91.4
Very Good	77.2	5.2
Good	1.9	0.1
Cleared	35.5	2.4

Threatened and Priority Ecological Communities

The DBCA Threatened and Priority Ecological Communities database search identified the presence of one PEC within the desktop search extent (Figure 5-4;Table 5-9). The PEC, the Eighty Mile Land System, Priority 3 (DBCA), does not intersect with the Survey Area. This PEC is located approximately 38 km away from the Survey Area.

No TECs or PECs were recorded within the Survey Area during the survey.

Table 5-9: TECs and PECs identified in the desktop review

Community Name	Status	Proximity to Survey Area	Description
Eighty Mile Land System	P3 (DBCA)	38 km northeast of Survey Area	Beach foredunes, longitudinal coastal dunes and sandy plains with tussock grasslands and spinifex grasslands. Threats: extensive threatening processes acting at landscape scales, namely altered fire regimes, over grazing, erosion, and weed invasion (buffel grass).

Locally Significant Vegetation

Two vegetation types were considered locally significant (Table 5-10; Figure 5-9). EvGlEa is considered locally significant due to its restricted distribution within the Survey Area. EvGIEa, while considered locally significant, does not contain any Priority of Threatened flora identified within the survey area. A small area with a similar vegetation type appears to occur in the west and it is recommended to treat this area as locally significant too. The vegetation type AsTsch, was considered significant as one population of the Priority 1 flora *Tephrosia rosea* var. Port Hedland occurred within the vegetation type.

Table 5-10: Significant vegetation types within the Survey Area

Vegetation Type	Significance	Level of Significance
EvGlEa	There are 11.9 ha of this unique vegetation type represented in one sole region of the Survey Area.	Locally significant
AsTsch	This vegetation is suitable habitat for the Priority 1 *Tephrosia rosea* var. Port Hedland, although apparently only when there is disturbance through the vegetation, i.e. a road. While the extent of this vegetation type consists of 267.8 ha in the Survey Area, there was only one collection of the Priority flora in the Survey Area. *T. rosea* var. Port Hedland was collected along a road that extends for 800 m within the AsTsch vegetation type. All other recordings of the priority flora were also collected along road verges but outside of the Survey Area.	Locally significant

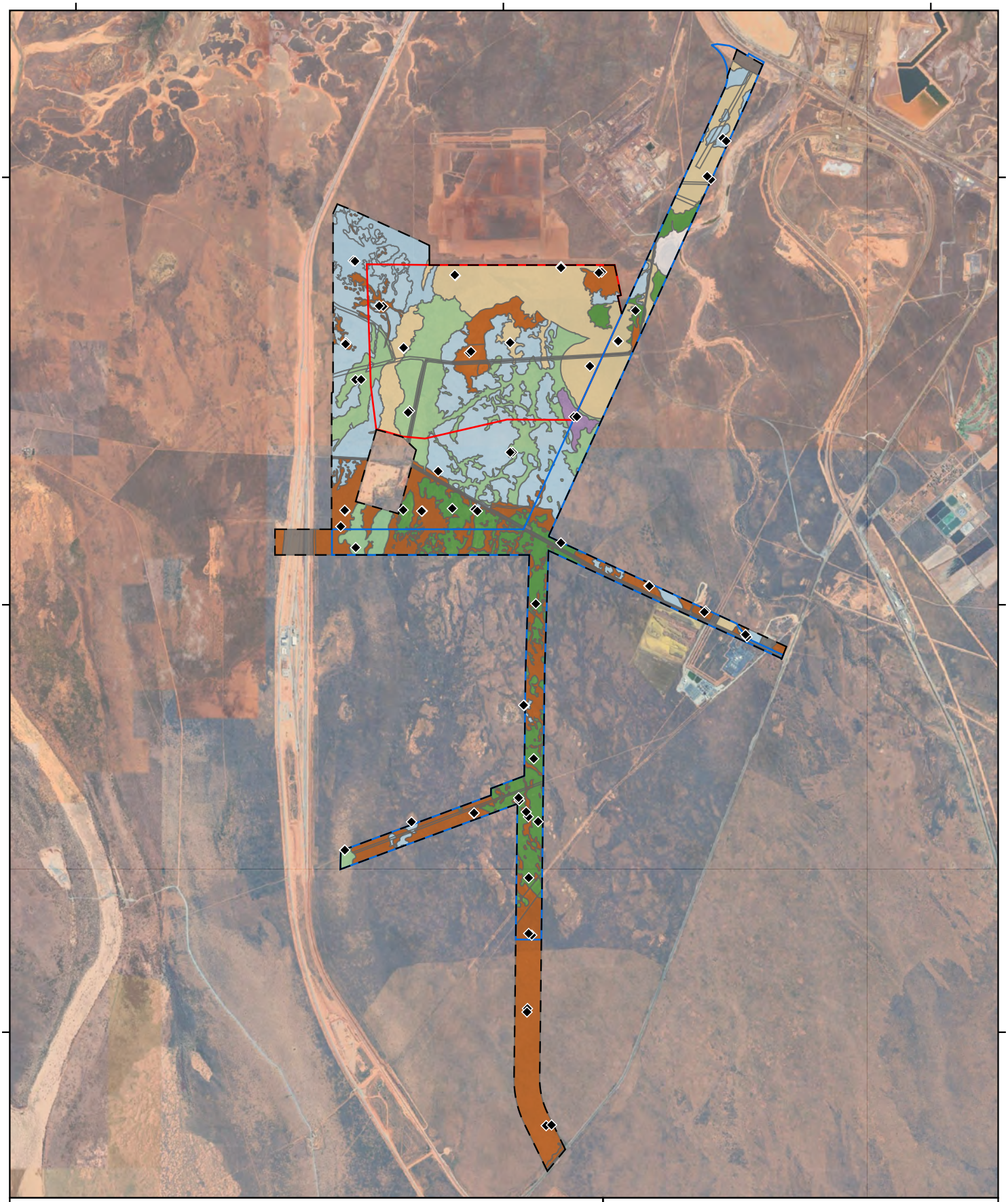


Figure 5-9: Vegetation Communities

Legend

- Plant Development Envelope
- External Infrastructure Development Envelope
- Flora and Vegetation Survey Area
- Flora Sample Sites

Vegetation Condition

- Excellent
- Very good
- Good
- Not assessed

Imagery: Google Satellite

PHGS_0406_023

Figure 5-10: Vegetation Condition

Preston Consulting

0 1 2 km

N

GDA 2020 (MGA Zone 50)

1:60,000 (A4)

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18/12/2024

5.3.6 Environmental Values

Based on the information provided throughout Section 5.3, the following environmental values were determined to require assessment for this factor:

- General native flora and vegetation, which includes locally significant vegetation and all native vegetation types listed in Phoenix (2024a) in order to assess broad local and regional impacts;
- Locally significant vegetation communities;
- Priority Flora including *Tephrosia rosea* var. Port Hedland (A.S. George 1114) which was recorded in the Survey Area and the five other species which could possibly occur within the Survey Area; and
- Range extension flora.

5.4 Potential Impacts

Table 5-11 defines the potential impacts (direct, indirect and cumulative) on the environmental values listed above in a local and regional context. Assessment of the potential impacts is provided in the following sections.

Note that the calculations are based on the indicative disturbance footprint which includes 2.9 ha of already cleared vegetation, out of the 390 ha total disturbance footprint. Minor changes in the indicative layout could result in clearing up to 390 ha of native vegetation, although utilising already cleared areas in the development envelopes will be a priority in developing the Proposal.

Table 5-11: Potential impacts on flora and vegetation

Environmental value	Potential direct impact	Potential indirect impact	Impacts associated with other proposals	Total cumulative impact
General native flora and vegetation Two vegetation associations were recorded in the development envelope. The surrounding landscape is predominantly intact: • 589: 99.4% vegetation remaining; and • 647: 97.9% vegetation remaining.	Up to 387.1 ha of native vegetation clearing. All of this vegetation is considered to be in Very Good to Excellent condition.	Reduction in vegetation health as a result of: • Establishment or spread of weed species / populations due to earthmoving and vehicle traffic; • Dust deposition due to dust generated by construction and operation activities ; • Alterations to surface water and groundwater regimes resulting in impacts to the health of downstream vegetation; and • Hydrocarbon and other spills.	The Proposal occurs within the Boodarie SIA. It is anticipated that up to 80% of the SIA will be cleared to allow the development of additional projects. Therefore, it is anticipated that there will be additional clearing of up to 3,166 ha.	Up to 3,553.1 ha of native vegetation clearing. Reduction in vegetation health due to indirect impacts.
Locally significant vegetation Vegetation type EvGlEa and AsTsch were identified as locally significant as unique vegetation and habitat for *Tephrosia rosea* var. Port Hedland (A.S. George 1114) (Priority 1), respectively. 11.9 ha and 267.8 ha of EvGlEa and AsTsch was mapped within the Survey Area, respectively.	Disturbance of up to: • 5.9 ha of EvGlEa (49.6% of mapped extent); and • 130.0 ha of AsTsch (48.5 of mapped extent).	As above	As above	Up to 3,553.1 ha of native vegetation clearing which includes: • 5.9 ha of EvGlEa (49.6% of mapped extent); and • 130.0 ha of AsTsch (48.5 of mapped extent).
Priority Flora One Priority flora species was recorded in the Survey Area, *Tephrosia rosea* var. Port Hedland (A.S. George 1114), and five species could possible occur.	Disturbance of up to two records *Tephrosia rosea* var. Port Hedland (A.S. George 1114) (Priority 1). Up to 387.1 ha of disturbance to native vegetation, some of which may provide habitat for these species. Disturbance to individuals or potential habitat is possible if individuals are found to be present.	As above	As above	Direct disturbance to on significant species. Potential loss of suitable habitat. Potential reduction in habitat health due to indirect impacts.

5.5 ASSESSMENT OF IMPACTS

The following sections assess the potential impacts on each environmental values identified in Section 5.3.6.

5.5.1 GENERAL NATIVE FLORA AND VEGETATION

Table 5-12 summarises the extent of the potential direct impacts on general native flora and vegetation. Additional assessment information and context is provided in the following sections. There are no significant predicted indirect impacts to fauna habitat as a result of the Proposal and therefore indirect impacts have not been included in Table 5-12. There are no predicted impacts associated with altered surface water regimes.

Table 5-12: Potential impacts on general flora and vegetation

Flora / Vegetation / Feature	Current regional extent (ha / numbers)	Current extent in Survey Area (ha)	Current extent in development envelopes (ha)	Current extent in Indicative Disturbance Footprint (ha) and %
Regional Native Vegetation				
Extent within 10 km of development envelopes	48,078.9	N/A	983.2	387.1 (0.8% of remaining regional extent)
Extent within 15 km of development envelopes	80,617.0			387.1 (0.5% of remaining regional extent)
Extent within 20 km of development envelopes	122,722.9			387.1 (0.3% of remaining regional extent)
Vegetation Associations (Relevant to IBRA subregion – Roebourne subregion)				
589	671,327.5 (99.4% of pre-European extent)	1,225.3	942.2	367.4 (0.05% of current regional extent)
647	184,774.7 (97.8% of pre-European extent)	251.0	112.3	20.6 (0.01% of current regional extent)
Vegetation communities (Phoenix, 2024)				
AccCiiTe	N/A	224.8	158.4	120.0 (75.8% of local extent)
AccAsTe	N/A	344.2	188.7	40.4 (11.7% of local extent)
AsTsch	N/A	266.8	266.8	130.0 (48.5% of local extent)
EvGIEa	N/A	11.9	11.9	5.9 (49.6% of local extent)
AsPtTe	N/A	413.6	191.0	57.7 (13.9% of local extent)
TeTsec	N/A	167.2	134.1	30.7 (18.3% of local extent)
Not Assessed	N/A	12.2	12.2	2.4 (19.8% of local extent)
Cleared	N/A	35.5	19.6	2.9 (9.3% of local extent)
Significant Flora				
Tephrosia var. Port Hedland (A.S. George 1114)	24 records	6 records (four identified outside the Survey Area)	2 records	2 records (33% of local records)

Direct Disturbance

The Proposal will result in the clearing of up to 387.1 ha of native vegetation. The indicative disturbance area for the PDE has been overlaid onto the vegetation associations and communities in Figure 5-11.

Vegetation Condition

The condition of the vegetation within the development envelopes and indicative footprint is provided in Table 5-13.

Table 5-13: Vegetation condition within the development envelopes and indicative footprint

Vegetation Condition	Extent within development envelopes (ha)	Extent within indicative disturbance footprint (ha)
Excellent	888.7	365.5
Very Good	57.6	21.6
Cleared	19.6	2.9

Vegetation Associations

When assessing the disturbance associated with the Proposal at a regional scale, the majority of the disturbance will occur within two vegetation associations '589: Short bunch-grass savanna/ grass-steppe' and '647: Shrub-steppe' within the development envelope (Figure 5-11). It should be noted that Beard's (1981) vegetation association mapping is broadscale and will not always represent the actual vegetation on the ground.

The current regional extent of vegetation association '589: Short bunch-grass savanna/ grass-steppe', within the Roebourne subregion, is 671,327.5 ha (99.4% of pre-European extent). Approximately 942.2 ha of the remaining vegetation of this association intersects the development envelopes, with up to 367.4 ha predicted to be disturbed. This disturbance will reduce the current extent to 670,960.1 ha (99.3% of pre-European extent) if the Proposal proceeds.

The current regional extent of vegetation association '647: Shrub-steppe', within the Roebourne subregion, is 184,774.7 ha (97.8% of pre-European extent). Approximately 112.3 ha of the remaining vegetation of this association intersects the development envelopes, with up to 20.6 ha is predicted to be disturbed. This disturbance will reduce the current extent to 184,754.1 ha (97.8% % of pre-European extent) if the Proposal proceeds.

The Proposal will result in direct disturbance of approximately 387.1 ha of native vegetation, all of which is considered to be in Very Good to Excellent condition. Both vegetation associations that will be impacted have more than 97% of their pre-European extent remaining if the Proposal was to proceed.

The disturbance of 387.1 ha of Very Good to Excellent condition vegetation associations will be minimised during detailed design, however disturbance will be unavoidable. Offsets are proposed to counterbalance those impacts (Section 10).

Local Impacts

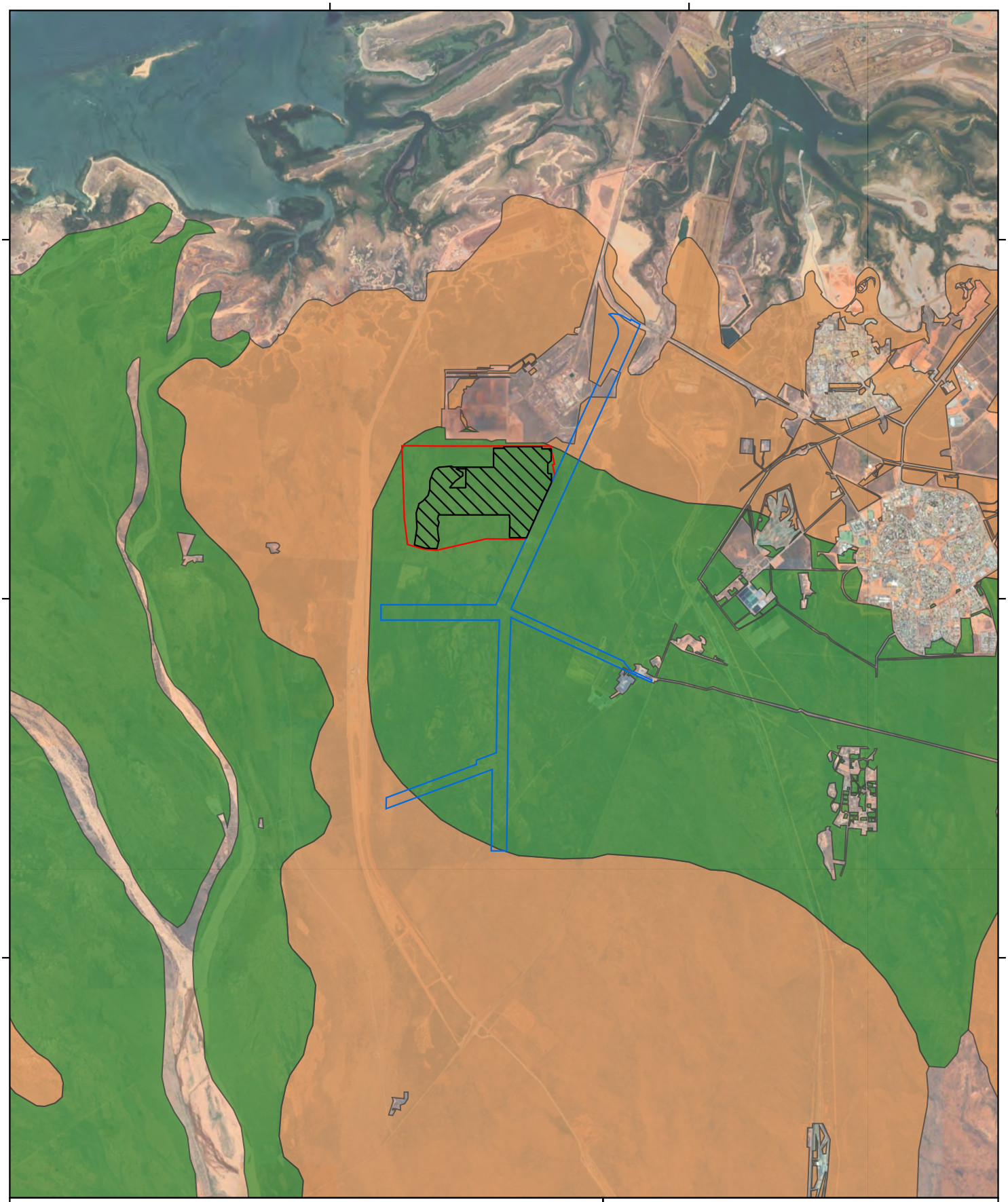
The proposed clearing represents a reduction of 0.8% of the remaining extent of native vegetation within 10 km of the Proposal, 0.5% within 15 km and 0.3% within 20 km. The Proposal will therefore result in additional cumulative pressures on the remaining vegetation in the surrounding cleared landscape. Offsets proposed for the vegetation associations described above will also aid to counterbalance these additional pressures on local and regional vegetation.

As shown in Table 5-12, five of the seven local vegetation communities (including 'not assessed') will have more than 50% of their mapped extent within the development envelopes and, of these, on vegetation type will have more than 50% of their mapped extent within the proposed indicative disturbance footprint (AccCiiTe). This vegetation type is not considered locally significant.

Locally Significant Vegetation

An assessment has been provided below of the impacts of the direct disturbance of the vegetation types that were identified as being locally significant in Section 5.3.5. Where more detail is warranted, it has been provided in subsequent sections:

- **EvGIEa** – 5.9 ha of this habitat is proposed to be disturbed. This equates to 49.6% of the local extent. This vegetation type was identified a unique vegetation type represented in one sole region of the Survey Area; and
- **AsTsch** – 130.0 ha of this habitat is proposed to be disturbed. This equates to 48.5% of the local extent. This vegetation type was identified as significant as it provides habitat for *Tephrosia rosea* var. Port Hedland (Priority 1). This species has been identified within this vegetation type along roadsides and other disturbed areas.



Legend

- Plant Development Envelope
- External Infrastructure Development Envelope
- Indicative Disturbance Footprint

Remaining Pre-European Vegetation

- 589: Short bunch-grass savanna / Grass-steppe
- 647: Shrub-steppe

Imagery: Google Satellite

PHGS_0406_016

Figure 5-11: Vegeation Association (remaining extent) disturbed by the Proposal

Preston Consulting

0 2 4 km

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GDA 2020 (MGA Zone 50)

1:100,000 (A4)

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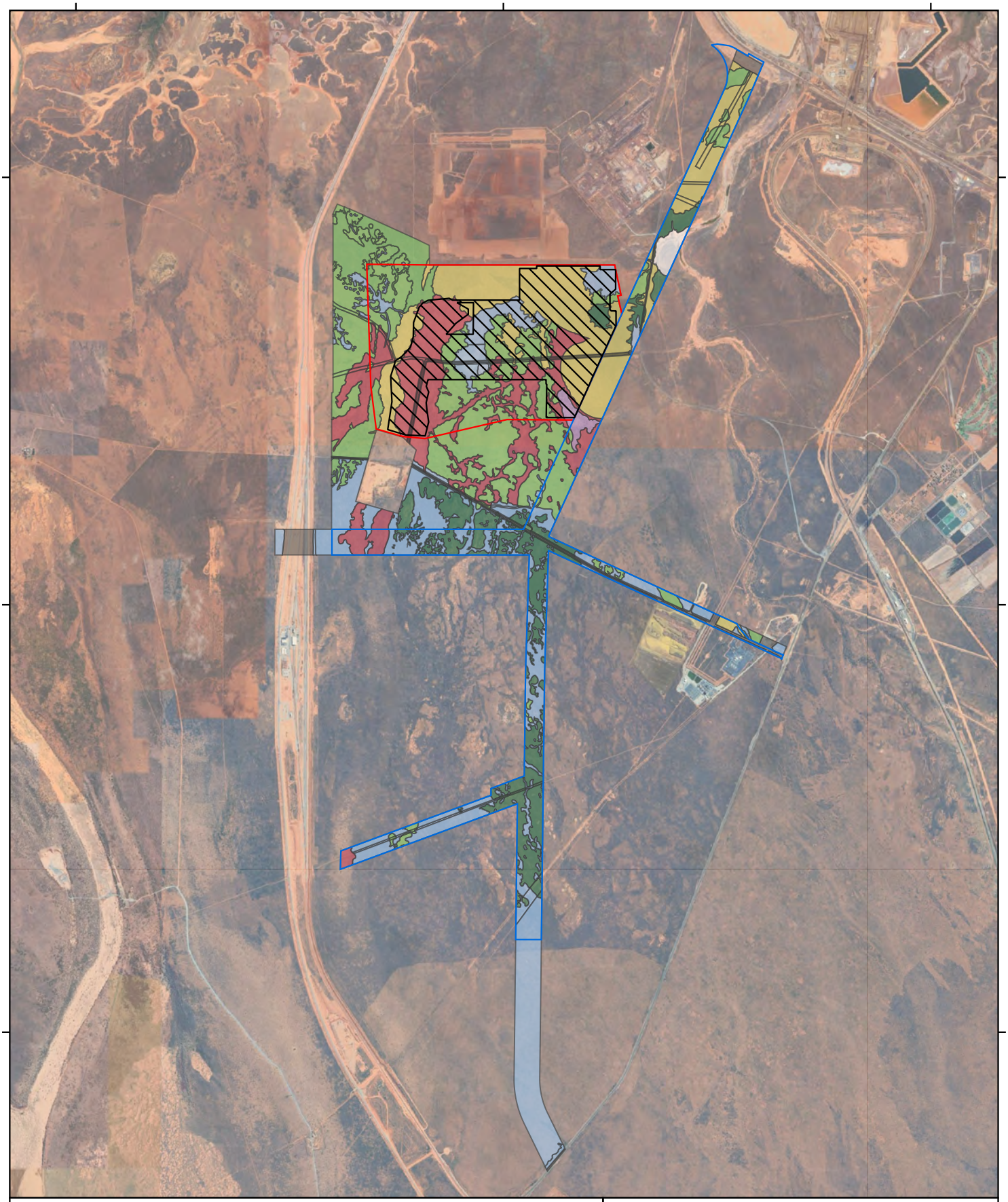


Figure 5-12: Vegetation communities disturbed by the Proposal

Changes to Surface Water Regimes

As part of the Boodarie SIA planning process, a District Water Management Strategy has been approved by DWER. There is a level of uncertainty regarding other projects which may be developed within the Boodarie SIA and how they will impact surface water regimes. However, under the District Water Management Strategy a coordinated approach to surface water management across the Boodarie SIA will be implemented to ensure ecological protection (GHD, 2013). As part of development approvals, PHI will need approval for a Local Water Management Strategy that aligns with District Water Management Strategy and demonstrate that changes in surface water regimes do not cause significant ecological damage.

The site is flat, but with minor undulations/ unevenness and after rainfall, standing water and pooling would occur where the site was not otherwise modified. Due to the flatness of the site, the 100-year flood velocities are low, typically <1m/s. Any runoff from the site will be captured in sedimentation basin(s) or trapped behind bunds as part of the Local Water Management Strategy. As a result, there are no indirect impacts predicted as a result of altered surface water regimes.

The Proposal is unlikely to impact flood levels. The Proposal does not represent a risk to the environment from a surface water perspective, provided normal mitigating controls are implemented during all phases of the Proposal.

Weeds

Weeds have the potential to outcompete and displace native vegetation if introduced or conditions are altered to favour their growth. Weeds may be spread and/or introduced by vehicles and equipment, resulting in soil and weed vegetative material being transported around site and being present on equipment entering and exiting site.

No Declared Pests or WoNS were recorded in the Survey Area, however four introduced species were identified. Standard weed hygiene will be implemented to ensure no introduction of new species or spread of existing species.

Hydrocarbon and Chemical Spills

Hydrocarbon and other chemical spills associated with hydraulics failures on machinery and refuelling spills may occur on occasion in previously disturbed operational areas, where native vegetation will be non-existent. Spills generally result in no impact due to refuelling and other hydrocarbon transfers occurring within bunded areas. Where a spill does occur on unbunded ground, they result in a defined area of hydrocarbon-contaminated soil that can be remediated via passive means such as bioremediation. The storage and management of hydrocarbons will already be regulated under Part V of the EP and the DG Licence under the *dangerous Goods Safety Act 2004* which will provide additional mitigation for the design and storage of larger volumes of DG (if large volumes of hydrocarbons (>100,000 L). Proposed control measures are identified in Section 5.6 and are designed to further reduce the risk of vegetation impacts from hydrocarbon spillage.

Dust Deposition

There is the potential for deposited dust to affect the health of susceptible vegetation by adversely affecting photosynthesis and transpiration rates. The Proposal is located within the Boodarie SIA with an existing elevated level of dust deposition. PHI will also be required to manage dust from the Proposal in accordance with a Works Approval and Licence under Part V of the EP Act, which is expected to have strict requirements on dust emissions given the cumulative dust emissions in Port Hedland.

5.5.2 Priority Flora

***Tephrosia rosea* var. Port Hedland (A.S. George 1114)**

Tephrosia rosea var. Port Hedland (A.S. George 1114) (Priority 1 –DBCA) was recorded twice within the Survey Area within vegetation type AsTsch and an additional four records were identified outside of the Survey Area (Phoenix, 2024a; Figure 5-5). All populations of *Tephrosia rosea var.* Port Hedland (A.S. George 1114) were recorded in disturbed areas in road verges. Two known records have the potential to be impacted by the Proposal. This species is not endemic to the development envelopes and has previously been recorded in 25 different locations with records ranging from Karratha to north of Nullagine (Figure 5-13).

Up to 267.8 ha of vegetation type AsTsch occurs within the Survey with up to 130.0 ha (48.5%) proposed to be cleared for the Proposal. Although AsTsch is suitable habitat for the *Tephrosia rosea* var. Port Hedland (A.S. George 1114), the species only occurs in areas where there is disturbance through the vegetation (i.e., a road). It is possible that disturbance within this vegetation type may result in the establishment of further individuals/ populations of this species.

PHI will prioritise avoidance of this species where possible, however given the distribution of the species and the regional records, it is unlikely that disturbance of two records will lead to a significant impact on the species (i.e. will not have an impact on the survival of the species).

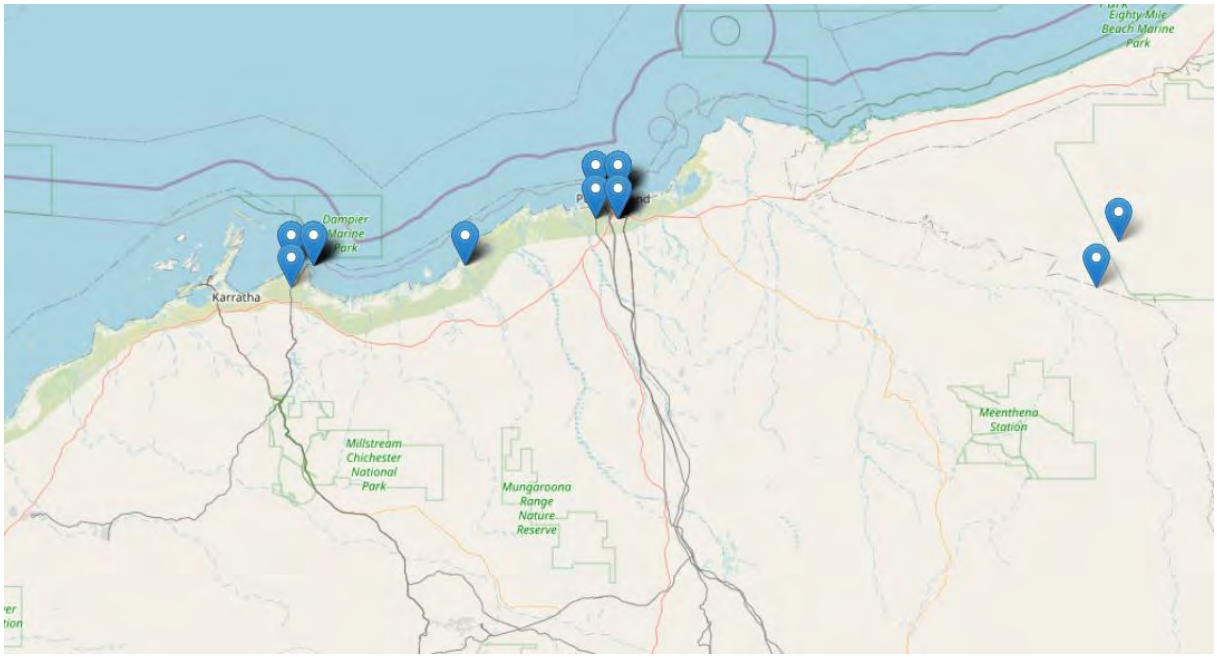


Figure 5-13: Regional records of Tephrosia rosea var. Port Hedland (A.S. George 1114) (from Florabase)

Other Priority Flora

There are five Priority Flora species identified as possibly occurring within the Survey Area, this includes:

- *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095) (Priority 3 –DBCA);
- *Eragrostis crateriformis* (Priority 3 – DBCA);
- *Euphorbia clementii* (Priority 3 – DBCA);
- *Euploca mutica* (Priority 3 –DBCA); and
- *Gomphrena letophylla* (Priority 3 –DBCA).

None of these Priority Flora were recorded within the Survey Area. This includes failing to record any Priority flora species during targeted pre-clearance surveys undertaken as part of geotechnical investigations for the Proposal.

Indirect Impacts

Section 5.5.1 provides a detailed assessment of indirect impacts on native flora and vegetation, which showed that indirect impacts would be minimal outside the area of direct disturbance. This assessment is suitable for this value also, with the Proposal considered unlikely to indirectly impact any known Priority Flora records if the mitigation measures listed in Section 5.6 are implemented.

5.6 MITIGATION

PHI has mitigated the potential impacts to this factor according to the mitigation hierarchy; avoid, minimise, rehabilitate, offset.

5.6.1 AVOID

PHI has conducted extensive flora and vegetation surveys of the areas within and surrounding the development envelopes and have utilised this information to undertake planning and design revisions.

A total of 1,440.7 ha of native vegetation was recorded within the Survey Areas. During the preparation of the Proposal's site layout, a key consideration was the avoidance of vegetation wherever practicable, and the footprint minimised to smallest extent possible to avoid clearing of native vegetation.

The Proposal is located within an area set aside as a Strategic Industrial Area where there is existing industrial development and is not located in undeveloped, pristine parts of the Pilbara. It therefore avoids impacts to flora and vegetation in these pristine, undeveloped areas.

5.6.2 MINIMISE

The following mitigation measures are proposed to ensure that direct and indirect impacts to flora and vegetation are minimised:

1. **Implement industry best practice management measures for flora and vegetation:**
    a. Implement industry best practice management measures for flora and vegetation;
    b. Preparation and implementation of a Bushfire Management Plan (BMP) which includes best management practices to reduce the risk of bushfires as a result of the Proposal;
    c. Implementation of industry-standard controls for hydrocarbon storage and handling;
    d. Clearing is to be conducted on an as-needed basis, followed by progressive rehabilitation of cleared area s as soon as is practicable;
    e. Minimise clearing by utilising existing access tracks and disturbance where practicable;
    f. Implement industry-standard controls for waste management, sedimentation and spillages;
    g. The introduction and spread of weeds will be minimised through strict operational hygiene practices; and
    h. Offset payments to the PEOF may be required for the loss of Good to Excellent quality vegetation.
2. **Obtain and comply with Works Approval(s) and Licences issued under Part V of the EP Act:**
    a. Part V approvals are expected to include limits on dust emissions that, whilst focussed on air quality, will have secondary benefit of managing dust emissions from the Proposal to minimise impacts on flora and vegetation;

5.6.3 REHABILITATE

The key rehabilitation measures that relate to flora and vegetation are summarised below:

1. All infrastructure will be removed; and
2. The disturbance footprints will be revegetated with local native species.

A lease with the State Government under the LAA is expected to contain terms and conditions of requiring decommissioning and rehabilitation of the Proposal at the end of its operational life, which will ensure rehabilitation measures are implemented.

5.6.4 OFFSETS

After the implementation of the mitigation measures described above, it is predicted that the Proposal will have an unavoidable significant residual impact on 387.1 ha of Good to Excellent quality native vegetation. Proposed offsets for this significant residual impact are discussed in detail in Section 10 and the IRP in Appendix 2.

5.7 PREDICTED OUTCOME

The EPA's environmental objective for this factor is "to protect flora and vegetation so that biological diversity and ecological integrity are maintained". In the context of this objective: "ecological integrity" is listed as the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements (EPA, 2016a).

Phoenix conducted extensive flora and vegetation surveys of the development envelopes. PHI has incorporated avoidance and minimisation measures into the Proposal design and operational processes, however direct impacts to flora and vegetation are unavoidable. The Proposal will result in the clearing of up to 387.1 ha of native vegetation in Very Good to Excellent Condition.

One significant flora species was recorded within the Survey Area *Tephrosia rosea* var. Port Hedland (A.S. George 1114) and up to two records may be disturbed should the Proposal be implemented. If the Proposal is approved, the Ministerial Statement is likely to contain a condition requiring the finalisation and implementation of the IRP provided in Appendix 2. The offset measures will be reviewed and refined in the IRP and will be informed by discussions with DEMIRS, DBCA, DCCEEW and EPA Services to ensure they adequately counterbalance the residual impacts.

The predicted outcomes for Flora and Vegetation are therefore:

- Disturbance to no more than 387.1 ha native vegetation, all of which will be of a Very Good to Excellent condition quality;
- Clearing of 387.1 ha of Good to Excellent quality vegetation is considered a significant residual impact requiring offsets;
- Disturbance to now more than two records of *Tephrosia rosea* var. Port Hedland (A.S. George 1114); and
- Negligible adverse indirect impacts associated with dust deposition and changes to surface water flows.

Based on the above, the Proposal is expected to be able to meet the EPA's objective for this factor.

6 TERRESTRIAL FAUNA

6.1 EPA OBJECTIVE

The EPA Objective for this Key Environmental Factor is to protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

6.2 POLICY AND GUIDANCE

Relevant EPA and Commonwealth Government guidance documents for terrestrial fauna are summarised in Table 6-1.

Table 6-1: Policy and guidance relevant to the Terrestrial Fauna Key Environmental Factor

Policy and Guidance	How guidance has been considered
WA Government	
Key EPA documents	
Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023a)	This document was considered in the preparation of this Supplementary Document and to inform EIA. It was used identify the Key Environmental Factors likely to be impacted by the Proposal and the EPA's objective for each factor.
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a)	This document has been considered in planning for the Part IV approval process and has been used to inform the preparation of this Supplementary Document.
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b)	This document has been considered in planning for the Part IV approval process and has been used to inform the preparation of this Supplementary Document.
Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021c)	This document was considered during the preparation of the Bilby Management Plan (Appendix 3)
Relevant EPA Factor Guidelines	
Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016c)	This document was considered in the preparation of this section (Section 6) of the Supplementary Document.
Relevant EPA Technical Guidance	
Technical Guidance – Terrestrial fauna surveys (EPA, 2016c)	This document was used to inform the survey effort required to undertake EIA for the Proposal and is referenced in the terrestrial fauna report for the Proposal.
Technical Guidance – Sampling of short-range endemic invertebrate fauna (EPA, 2016d)	This document was used to inform the survey effort required to undertake EIA for the Proposal and is referenced in the terrestrial fauna report for the Proposal.
Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA, 2020b)	This document was used to inform the survey effort required to undertake EIA for the Proposal and is referenced in the terrestrial fauna report for the Proposal.
Other Policy and Guidance	
WA Environmental Offsets Policy (EPA, 2011)	This document was considered during the development of proposed offsets for Terrestrial Fauna.
WA Environmental Offsets Guidelines (EPA, 2014a)	This document was considered during the development of proposed offsets for Terrestrial Fauna.

Policy and Guidance	How guidance has been considered
WA Environmental Offsets Template (EPA, 2014b)	This template was used during the development of proposed offsets for Terrestrial Fauna.
Commonwealth Government	
Key Documents	
Generic guidelines for the content of a draft EPBC Act PER/EIS (including the objects and principles of the EPBC Act, 1999) (DotEE, 2016a)	This document was considered in the preparation of this supplementary document and while undertaking EIA.
EPBC Act Environmental Offsets Policy (DSEWPaC, 2012) – including the Offset Assessment guide	This document was considered when determining whether offsets were expected to be required for this factor.
Environmental Management Plan Guidelines (DotE, 2014)	This document was considered during the preparation of the Bilby Management Plan (Appendix 3)
EPBC Act Condition Setting Policy (DAWE, 2020)	This document was used as guidance for the referral process and EIA of the Proposal.
EPBC Act Outcomes-based conditions policy (DotE, 2016a)	This document was used to assist in developing suitable outcomes for Terrestrial Fauna.
Relevant Technical Guidance	
Relevant EPBC Act listed species-specific survey guidelines and protocols.	This document was used as guidance when undertaking surveys of EPBC listed species and potential survey limitations.
Relevant EPBC Act listed species-specific Recovery plans, Threat Abatement Plans, ACA's and other documents.	This document was used as guidance to assess and manage EPBC listed species that may be impacted by the Proposal.

6.3 RECEIVING ENVIRONMENT

Information in this section has been sourced from the *Port Hedland Green Steel Project: Detailed Terrestrial Fauna Survey 2023* (Phoenix, 2024b, Appendix 4).

6.3.1 SURVEY EFFORT

Phoenix was commissioned by PHI to undertake a detailed fauna survey for the Proposal. The purpose of the survey was to define the fauna vales of the Survey Area to inform Proposal planning and the EIA process. The survey was conducted in February 2023 and included a desktop assessment, detailed and targeted survey. The terrestrial fauna Survey Area aligns with the flora and vegetation Survey Area and is approximately 1,476.3 (Figure 6-1).

Several biological database searches were undertaken to identify and prepare lists of significant fauna that may occur within the Survey Area. A literature search was conducted for accessible reports for biological surveys conducted within a 40 km radius of the Survey Area to build on the lists developed from the database searches.

A total of 58 survey sites were sampled during the field survey (Figure 6-1). These include six systematic survey sites, 25 Greater Bilby (*Macrotis lagotis*) (Bilby) plots, seven Bilby transects and 20 additional opportunistic /reference /targeted survey sites. The key field methods that were undertaken during the detailed surveys were:

- Habitat assessment and mapping;
- System trapping;
- Active diurnal and nocturnal searches;

- Avifauna surveys;
- Bat echolocation recordings;
- Camera trapping;
- Targeted surveys for Bilby; and
- SRE invertebrate sampling.

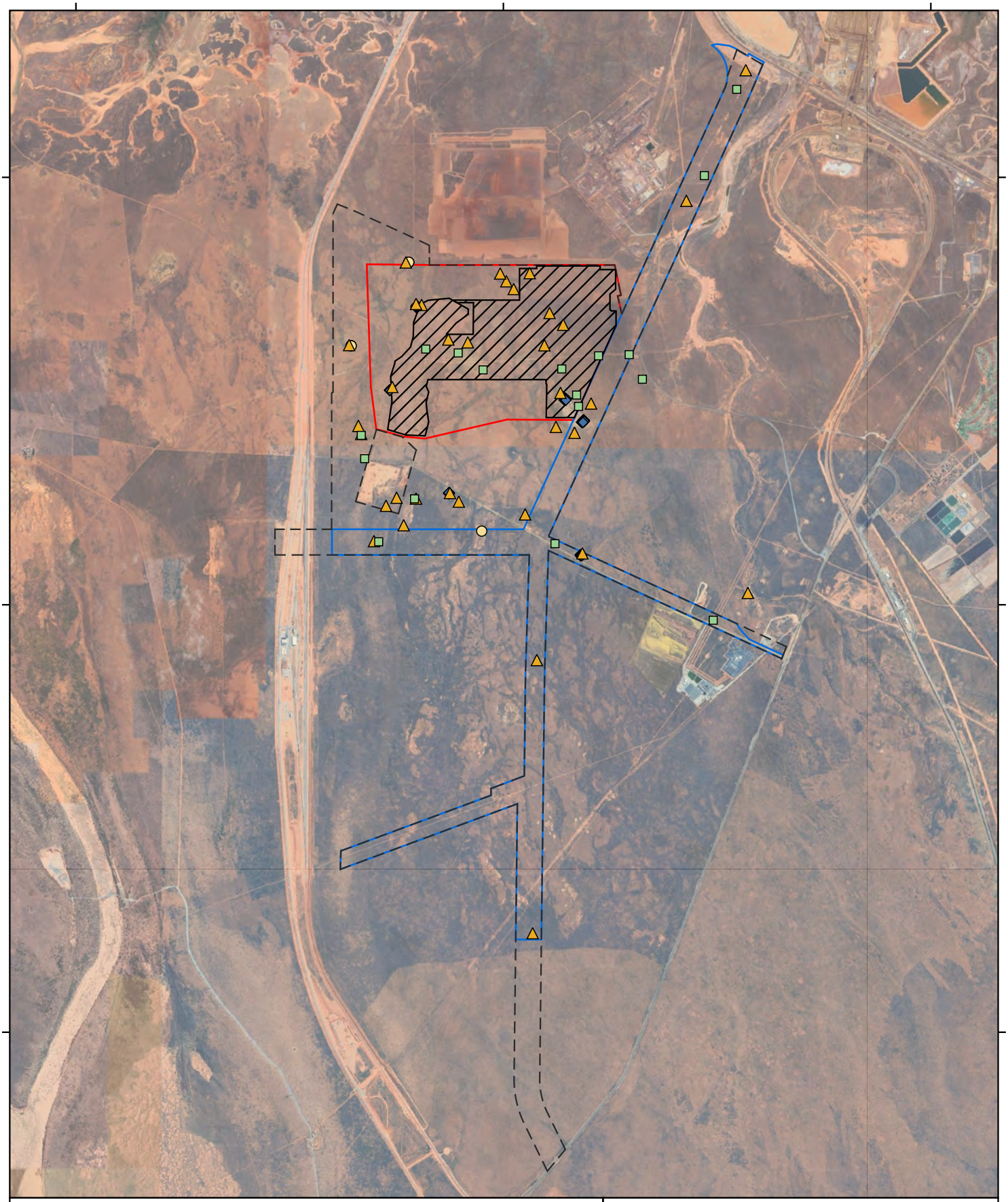


Figure 6-1: Terrestrial fauna survey area and sample sites

Habitat Assessment and Mapping

Initial habitat characterisation was undertaken using various remote geographical tools, including aerial photography (Google Earth®), land system maps and topographic maps. Habitats with the potential to support significant terrestrial fauna species were identified based on known habitats within the Pilbara bioregion. Tentative sites were selected for the survey to represent all habitat types. Final survey site selection was conducted after ground-truthing of site characteristics. At the broadest scale, site selection considered aspect, topography and land systems. At the finer scale, consideration was given to proximity to water bodies (drainage lines and creek), vegetation complexes and condition and soil type. Sites were primarily chosen to represent the best example of distinct habitats within the broader habitat associations of the Survey Area with a focus on species of significance identified in the desktop review. Two replicates per habitat type were selected for detailed systematic sampling. Habitat descriptions and characteristics were recorded at all systematic survey sites.

To more accurately define and delineate the fauna habitats in the Survey Area, photographs were taken while traversing the Survey Area with a focus on transitions between fauna habitats (ecotones) apparent from aerial imagery. All photographs were geolocated and spatially mapped to reference. Photographs were used in conjunction with survey site descriptions and regional land system descriptions to map the fauna habitats of the Survey Area.

Systematic trapping

Six systematic trapping sites were established to capture terrestrial mammals, reptiles and amphibians (Figure 6-1). Each site comprised five 'sub-sites' which consisted of two dry pitfall traps, four funnel traps and two aluminium box traps. The pipes and buckets were installed flush with the substrate, with an aluminium drift fence bisecting each pit. Funnel traps were positioned at the start and finish of each drift fence, and one on either side of the drift fence in the centre between pitfall traps. Aluminium box traps were place in vegetation adjacent to the trap line. Sub-sites were positioned approximately 20 m apart along a 100 m transect. The aluminium box traps were baited with a universal bait mixture consisting of oats, peanut butter and sardines to attract small mammals. Aluminium box and funnel traps were shrouded with reflective closed cell insulation to provide shade and protection for any captured animals. All traps were given as much shade as possible under/around vegetation. Reflective closed cell insulation and leaf litter were used to provide protection from the elements in the bottom of all buckets. Traps were open for seven consecutive nights and checked within three hours of sunrise. Baits were removed and replaced every second day. The total vertebrate trapping effort for the 6 systematic trapping sites during the surveys was 1,608 trap-nights, where a trap-night is defined as one trap remaining open for one night.

Active diurnal and nocturnal searches

Active searches were undertaken at each systematic site and two additional sites throughout the Survey Area. Active searches primarily targeted diurnal herpetofauna and mammals from direct sightings and secondary evidence. Searches focused on significant species identified in the desktop review as potentially occurring within the Survey Area, including Brush-tailed Mulgara (*Dasycercus blythi* – Priority 4) and Bilby.

Searches were undertaken in any observable microhabitats considered likely to support mammals, reptiles and amphibians. Techniques included: raking leaf and bark litter, overturning logs, searching beneath the bark of trees, investigating dead trees and logs, investigating burrows and identifying any secondary evidence including tracks, diggings, scats, fur or sloughs (shed skins), predation or feeding sites, and fauna constructed structures such as nests. Between 0.7 to 6.3 person hours was spent active searching at each site for a total of 11.3 hours over the duration of the field survey. Nocturnal searches were undertaken at each systematic site to detect the presence of any nocturnal fauna species. Nocturnal searches were undertaken between sunset and 9 pm when activity levels were highest for most nocturnal species. Searches consisted of using head torches to detect animal movement, eye shine, or other evidence of fauna presence. These searches particularly targeted reptiles and mammals, but also nocturnal birds. Approximately 21 person hours of nocturnal searches were undertaken during the field surveys.

Avifauna Surveys

Twenty-minute avifauna surveys were undertaken at each of systematic site and two additional sites. Avifauna surveys were confined to the habitat type (up to 2 ha) represented by each site to collect assemblage data for each habitat. Avifauna surveys were undertaken throughout the day with a focus on periods of higher activity around sunrise and sunset. Surveys consisted of bird recordings from visual sightings and call recognition. Between 0.7 to 3.0 person hours was spent of avifauna census at each site for total of 9.3 hours over the during the field survey.

Additional avifauna observations were also recorded opportunistically while other field work was being completed, including observations made during travel and active searches. SongMeter SM4 recording devices were deployed at 3 sites for 3 - 8 nights to target Night Parrot (*Pezoporus occidentalis* – Critically Endangered) in accordance with survey guidelines (DPaW 2017). The Song Meters were deployed at systematic sites in locations considered potential roost habitat for Night Parrot and set to record continuously over the deployment period. The migratory and non-migratory avifauna assemblage identified in the desktop review as potentially occurring was taken into consideration when undertaking systematic avifauna surveys and traversing theSurvey Area.

Bat Echolocation Recordings

Song Meter SM4 recording devices were used to record bat echolocation calls at five sites during the field survey (Figure 6-1). Recording devices were deployed at each site for a minimum of 4 nights of recording for 8 - 12 continuous hours per night. The Song Meters were positioned in areas of habitat likely to have increased insect activity and to attract bats (i.e. likely foraging areas or movement corridors) and/or potential roosting sites where possible.

Camera Trapping

Four motion-sensitive camera traps baited with universal bait were deployed for five nights to gather broad fauna assemblage data outside of disturbance periods. Cameras were deployed for a total of 20 camera trap-nights.

Targeted Bilby Surveys

The objective of the targeted Bilby survey was to determine their presence/absence from the Survey Area and identify areas of recent activity by adopting survey methods detailed in DBCA (2018). Bilby populations are known to have moving home ranges (Dziminski *et al.* 2020). Detection of secondary evidence including scats, tracks, burrows and diggings is the most reliable technique to determine whether bilbies are currently or were formerly present in an area. The occurrence of fresh scats, definitive tracks and/or multiple concentrated diggings can be indicative of current presence; unclear tracks, burrows and diggings in the open can indicate potential activity but cannot alone be used to verify current presence. A combination of linear transects and 2 ha sign plots were undertaken to provide extensive and representative coverage in all suitable habitat types across a large Survey Area that varies considerably in shape. It is recommended for 2 - 4 plots to be searched per 100 ha, with plot spacing increasing with the size of the Survey Area (DBCA 2018). By combining these methods, there is an increase in confidence in detecting the presence of Bilby in a given area (DBCA 2018). Linear transects were searched with approximately 20 m spacing in the Survey Area corridors where suitable habitat was located. A total of 18 transects were traversed on foot to detect Bilby presence.

The standardised 2 ha sign plot method was used for the centre portion of the Survey Area where suitable habitat was identified. The methods involved searching multiple 2 ha plots for Bilby sign, for 25 minutes. Sign plots were distributed to include all areas of suitable Bilby habitat across the Survey Area. A total of 25 (2 ha) plots were searched. All locations of secondary evidence were recorded on GPS enabled devices.

Short-Range Endemic Invertebrates

Phoenix was engaged by PHI to determine the presence of SRE invertebrate fauna occurring in the Survey Area. The assessment was based on the habitat types present within the Survey Area, as well as previous records of terrestrial invertebrates within a search area around the Proposal.

The specific aims of the surveys were to:

- Characterise SRE invertebrates in the SRE Survey Area;
- Provide further information on the potential SRE habitats of the SRE Survey Area and its surrounds; and
- Assess the SRE status of species and the likelihood of their confinement to disturbance areas at the Proposal.

The survey approach and methods used were based on *Technical Guidance: Sampling of Short-Range Endemic Invertebrate Fauna* (EPA, 2016d). The survey was designed to target species from invertebrate groups known to contain a high proportion of range-restricted species: spiders (Mygalomorphae), centipedes (Chilopoda), millipedes (Diplopoda), two-pronged bristletails (Diplura), flatworms (Tricladia), land snails (Eupulmonata), pseudoscorpions (Pseudoscorpiones), scorpions (Scorpiones), and slaters (Isopoda).

Sampling Effort

Sampling for SRE invertebrates was conducted at all six systematic sites including areas identified as suitable habitats for SREs. Sampling comprised the following methods:

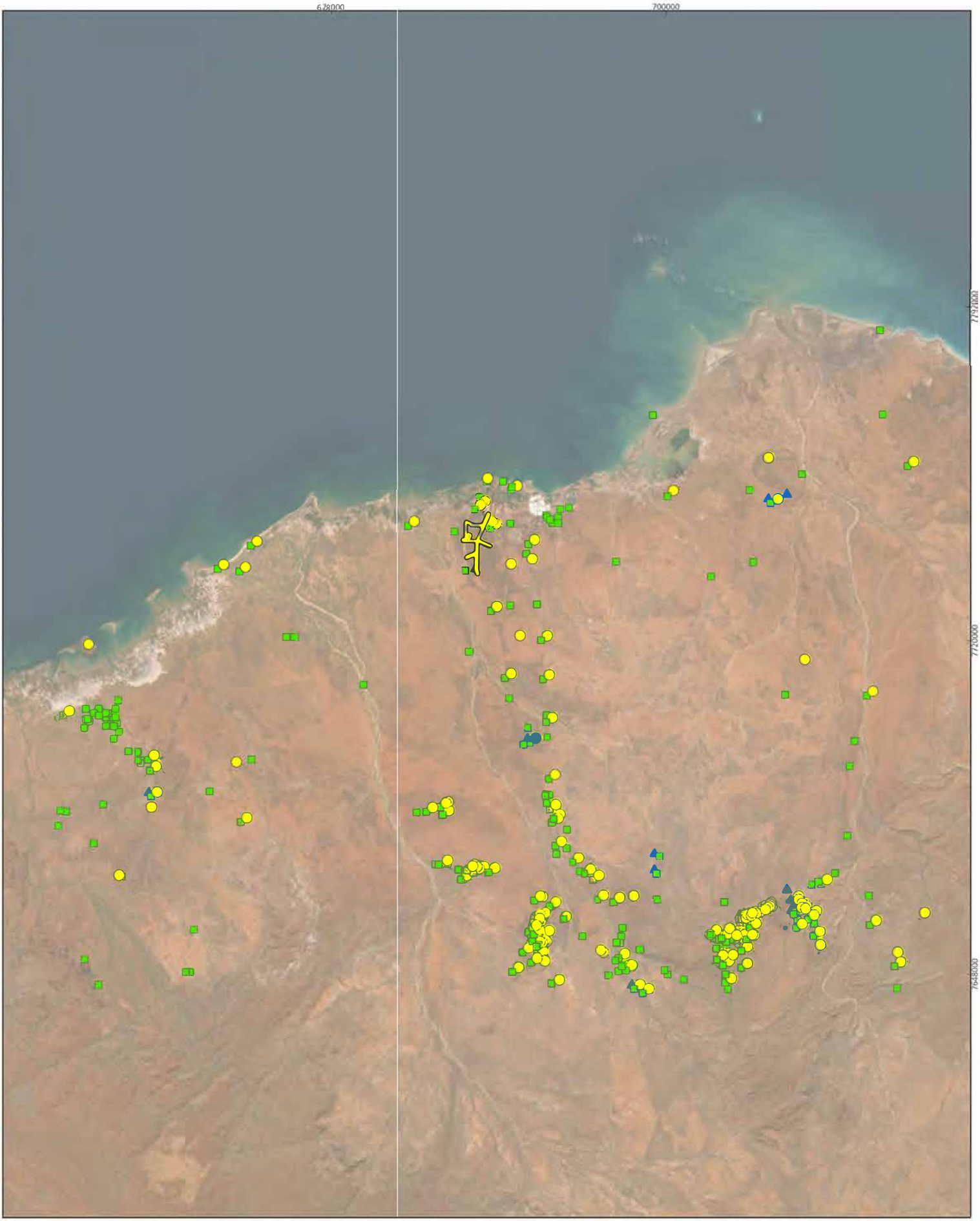
- Dry pit trapping;
- Active foraging;
- Litter/ soil sieving; and
- Blowing for mygalomorph spiders.

Active foraging comprised inspection of logs, the underside of bark of larger trees and the underside of rocks. Methodical searches were conducted amongst the leaf litter of shade-bearing tall shrubs and trees, including raking of litter.

A standardised approach was undertaken whereby each site, considered suitable SRE habitat, was sampled for 20 minutes, with a total search effort of approximately 1.8 hours. Trapdoor spider burrows identified during the searches were excavated if they were considered inhabited. Spider burrows were located by visual inspection and blowing, whereby a leaf blower is used to open the lid and expose the burrow. Excavation involved removing soil from around the burrow to carefully expose the burrow chamber and remove the spider. Combined litter/soil sifts were undertaken at two sites, with up to three sifts conducted at each site dependent on abundance of leaf litter. Leaf litter samples were sieved through three stages of decreasing mesh size over a round tray and invertebrates were picked from the sieves and tray with forceps. These samples particularly targeted small spiders (Araneomorphae), pseudoscorpions, buthid scorpions, millipedes, centipedes (in particular Geophilomorpha and Cryptopidae), smaller species of molluscs (e.g. Pupillidae) and slaters.

Phoenix's (2024b) desktop review identified seven confirmed SREs and 78 potential SRE taxa within the desktop search (100 km buffer). Most of these species were recorded within habitat types that are not present within the Survey Area with the exception of one record of a mygalomorph. A further 50 taxa of uncertain SRE status and 70 non-SRE taxa from SRE groups were identified. The desktop records indicate one SRE-group species of uncertain status (*Rhagada* 'sp. indet', one record) was recorded within the Survey Area (Figure 6-2). This record was located approximately 165 m from the southeastern boundary of the Survey Area. A further 23 taxa were within 5 km of the Survey Area, comprising five mygalomorph spiders (family Anamidae), five pseudoscorpions (Chthoniidae, Olpiidae), five scorpions (Buthidae, Urodacidae), two isopods (Armadillidae) and six land snails (Pupillidae), of which 13 are widespread, seven are uncertain and three are potential SRE taxa.

Overall, the Survey Area is comprised of generally low value SRE habitat. No confirmed SRE species were recorded within the Survey Area, and it is unlikely any of the recorded potential SRE species are restricted to the Survey Area only.



Port Hedland Green Steel Pty Ltd
Port Hedland Green Steel Project

Project No	1557
Date	29/09/2023
Drawn by	FK
Map author	SP

0 20 40
Kilometers

1:1,054,000 (at A4) GDA 1994 MGA Zone 50

Study area

SRE status

- Potential
- Confirmed
- Uncertain

Figure 6-2: Desktop records of SRE fauna

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6.3.2 Alignment with Technical Guidance

EPA Guidance Statement 56 (EPA, 2020a) and technical guidance (EPA, 2020a) outlines a number of limitations that may arise during surveying. Further detail on survey limitations is provided in Table 6-2.

Table 6-2: Potential limitations of the Terrestrial Fauna Survey

EPA Limitation	Comments
Availability of contextual information at a regional and local scale	**Not a Limitation:** Database searches and previous surveys within the vicinity of the Proposal provided a comprehensive species list for the region.
Competency/experience of the team carrying out the survey	**Not a Limitation:** The survey team have more than 20 years of combined experience conducting fauna surveys in the Pilbara region of WA.
Scope and completeness	**Not a Limitation:** The scope was sufficient for the size of the Survey Area and the fauna habitats present and is considered complete.
Proportion of fauna recorded and/or collected, any identification issues	**Not a Limitation:** Based on species accumulation curves, a sufficient proportion of fauna was recorded for the Survey Area.
Access within the Survey Area	**Not a Limitation:** All parts of the Survey Area were accessible.
Timing, rainfall, season	**Not a Limitation:** Timing of the survey (Autumn season) was optimal for the Survey Area and consistent with EPA (2020b) guidance for the Eremaean Climatic Province.
Disturbance that may have affected the results of the survey	**Not a Limitation:** No disturbances affected the results of the survey.

6.3.3 Fauna Habitat

Three fauna habitats were identified within the Survey Area (Table 6-3; Figure 6-3). These fauna habitats were identified as Sandplains, Open Woodlands and Drainage Line. All habitat types identified in the Survey Area are typical of the Roebourne subregion and Uaroo land system. Habitats within the Survey Area are considered abundant and widespread throughout the Pilbara. The majority of the Survey Area (95.6%) is comprised of Sandplain habitat and is characterised by red-orange sandy soils on a gently undulating plain. The dominant vegetation complexes comprise of spinifex hummock grasslands and low *Acacia stellaticeps* shrublands. Open Woodlands comprise of only 15.4 ha (0.9%) of the Survey Area, occurring at two discrete locations. The linear infrastructure corridor in the north-east intersects a small section of Drainage Line habitat. The Drainage Line habitat is a Heritage protected area due to the presence of shell middens. As a result, no fauna sampling was conducted in this area. A total of 42.1 ha (2.8%) of the Survey Area has been cleared/disturbed and is largely devoid of native vegetation.

All three fauna habitats represent low value SRE habitat. Most of the SRE invertebrate species, identified in the desktop assessment, were recorded in habitat types that are not present within the Survey Area, except for one species of mygalomorph.

Table 6-3: Fauna Habitat

Fauna Habitat	Key Habitat Elements	Area within Survey Area (ha)
Sandplains	• Mosaic of spinifex hummock grasslands and Low *Acacia stellaticeps* shrublands on an undulating plain.	1,409.6
Open Woodlands	• Open low to mid *Eucalyptus* woodland over evenly scattered, open tussock grasses with spinifex hummocks present. • Predominantly sandy soil with a shallow sandy-clay crust.	15.4
Drainage Line	• Small section of the Foreshore flats with intertidal water slow, predominantly dry. • Heritage protected area.	8.9
Cleared/Disturbed	• Cleared areas with infrastructure and roads.	45.1

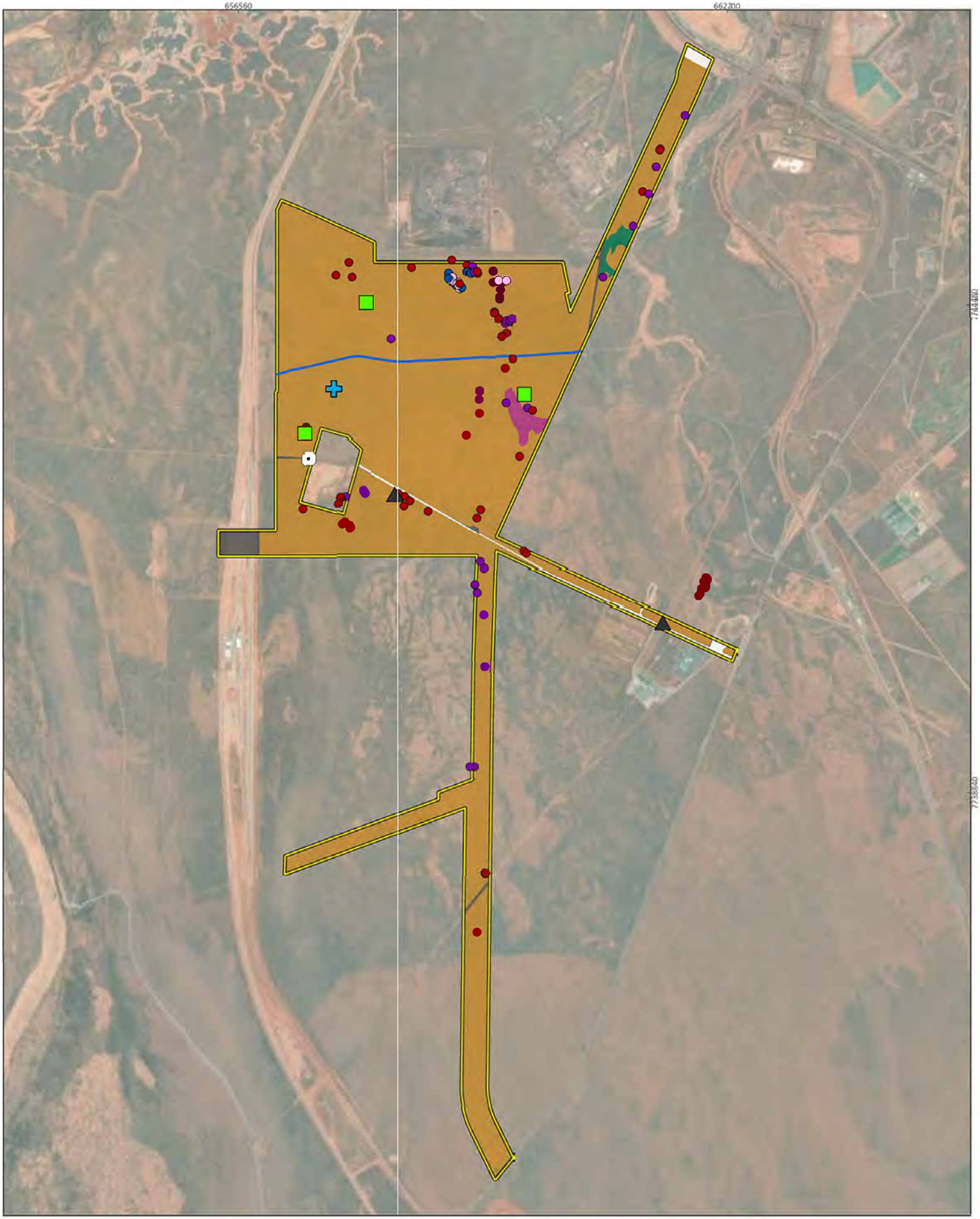

Figure 6-3: Fauna habitats and significant fauna records

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6.3.4 General Vertebrate Fauna Assemblages

A total of 82 vertebrate species were recorded in the detailed survey, comprising of six amphibians, 36 reptiles, 25 birds and 15 mammals (including two introduced species). This represents less than half of the species that were identified as potentially occurring in the desktop review

Amphibians

There are 11 amphibian species that potentially occur within the Survey Area of which two were observed during the field survey. The observed species were the Little Red Tree Frog (*Litoria rubella*) and the Desert Spadefoot (*Notaden nichollsi*). The recorded amphibian assemblage within the Survey Area is 1.9% of the total vertebrate species assemblage.

The Little Red Tree Frog (*Litoria rubella*) is a common species often found around most sources of water in arid regions such as waterholes, gorges, rocky areas and are frequently found around human structures. *Litoria rubella* eggs are laid in small clusters that are attached to vegetation in and around water bodies.

The Desert Spadefoot (*Notaden nichollsi*) is generally identified in open country with sparse vegetation cover. This species is known to burrow over 1 m deep when inactive and is often found near termite mounds. *Notaden nichollsi* breeds in temporarily flooded area of clay or sandy soils. The spawn is a large, shapeless clump of over 1,000 eggs.

Reptiles

There are 93 reptile species that potentially occur within the Survey Area of which 38 were observed during the field survey. These comprise of five snakes, four legless lizards, six geckos, 16 skinks, four goannas and three dragons.

Habitats that retain leaf litter, woody debris and logs are likely to be important for providing shelter to reptiles, as are granite outcrops with crevices and exfoliating rock. The reptile assemblage of each habitat is likely to be influenced by the substrate (e.g., rocky, clayey or sandy), but there is also likely to be considerable overlap with many of the remaining species being widely distributed and occurring across several habitats.

Birds

There are 48 bird species that potentially occur within the Survey Area of which 23 were observed during the field surveys. Of the 23 species, 16 families were represented passerines (perching birds). The remaining 25 species from 12 families represent non-passerines. Raptors (Pandionidae, Accipitridae, Falconidae) recorded the highest diversity among birds, representing over 20% of the recorded assemblage.

Mammals

There are 46 mammal species that potentially occur within the Survey Area of which 13 native mammal species were recorded within the Survey Area. These comprise of three species if carnivorous marsupials (Dasyuridae), one species of macropod (Macropodidae), one species of omnivorous marsupial (Thylacomyidae), five microchiropteran bats from two families (Molossidae, Vespertilionidae), two species of native rodent (Muridae) and one monotreme (Tachyglossidae).

Two feral predators, the Cat (*Felis catus*) and Fox (*Vulpes vulpes*) were recorded. These species are likely to be common in the Survey Area.

6.3.5 SIGNIFICANT FAUNA

For the purposes of this assessment the term 'significant fauna' refers to:

- Fauna species listed under the EPBC Act or BC Act, or priority species listed by DBCA;
- Species with restricted distribution;
- Species with a degree of historical impact from threatening processes; and
- Species that provide an important function required to maintain the ecological integrity of a significant ecosystem.

Two Threatened, one Priority and two Migratory listed fauna species were recorded within the Survey Area. These species include:

- Greater Bilby (*Macrotis lagotis*) – Vulnerable (BC & EPBC Acts);
- Grey Falcon (*Falco hypoleucos*) – Vulnerable (BC & EPBC Acts);
- Brush-tailed Mulgara (*Dasycercus blythi*) Priority 4 (DBCA);
- Fork-tailed Swift (*Apus pacificus*) – Migratory (BC & EPBC Acts); and
- Osprey (*Pandion cristatus*) – Migratory (BC & EPBC Acts)

One species was recorded during the survey that was not identified by the desktop results, the Black Falcon (*Falco subniger*). This species is a rare visitor in the Pilbara and considered locally significant. The Black Falcon does not have any formal conservation status under the BC or EPBC Acts and is not listed by DCBA as a Priority fauna species.

The significant fauna species that were recorded during the field surveys are shown in Figure 6-3 and outlined in Table 6-4. There were no species identified in the desktop assessment that were considered likely to occur. There was one species that was considered possible to occur, the Northern Quoll (*Dasyurus hallucatus*; Endangered BC & EPBC Acts).

Table 6-4: Significant fauna potentially occurring within the Survey Areas

Species	Status				Likelihood of Occurrence	Notes
	EPBC Act	BC Act	DBCA Priority	Locally Significant		
BIRDS						
Apus pacificus **Fork-tailed Swift**	Mi	Mi			Recorded	One record of this species was directly sighted (BIE04) at the survey site. This species occurs in a wide range of dry or open habitats, including riparian woodlands, tea-tree swamps, low scrub, heathland, saltmarsh, grassland and spinifex sandplains, open farmland and inland and coastal sand dunes which is supported by the Survey Area (DSEWPaC 2011).
Pandion cristatus **Osprey**	Mi	Mi			Recorded	One record of this species was directly sighted (Opp11) at the survey site. This species is present across most of coastal Australia but is absent from Tasmania and Victoria.
Falco hypoleucos **Grey Falcon**	Vu	Vu			Recorded	Two records (one pair and one fledged juvenile) were directly slighted (BIE001, Opp15). This species uses a large variety of habitats such as timbered plains, creek lines, shrublands and open grasslands. The habitat requirements of this species are supported by the Survey Area.
Falco subniger **Black Falcon**				LS	Recorded	One record of this species was directly sighted at the survey site. This species occurs throughout Australia and its listing status varies from state to state.
MAMMALS						
Macrotis lagotis **Greater Bilby**	Vu	Vu			Recorded	Survey records sourced 128 records of this species with 112 of those found in the Survey Area. 32 old diggings and 53 old scats were recorded inside of the Survey Area. 12 records of scent diggings and 15 records of recent scats were found within the Survey Area. This species prefers hummock grasslands in plains and alluvial areas, open tussock grasslands on uplands and hills, and mulga woodland/shrubland on ridges and rises. The habitat requirements of this species are supported by the Survey Area.
Dasucercus blythi **Brush-tailed Mulgara**			P4		Recorded	Two records of active or recently active burrows were identified within the Survey Area. This species occurs in spinifex grasslands throughout much of the arid zone, digging their burrows in the flats between low sand dunes. This is supported by the environment presented in the Survey Area.
Dasyurus hallucatus **Northern Quoll**	En	En			Possible	This species is found in a variety of habitats, however, rocky areas provide an important denning habitat, while they forage in nearby grasslands and creek lines. Within the Survey Area there is an absence of suitable denning habitat, but a suitable dispersal habitat is present in minor drainage habitat. It is therefore possible for this species to occur within the Survey Area.

EPBC Act listed species: Vu = Vulnerable, En = Endangered, Cr = Critically Endangered, Mi = Migratory, Ma = Marine
BC Act listed species: Vu = Vulnerable, En = Endangered, Cr = Critically Endangered, Mi = Migratory, OS = Other Specially Protected Fauna.
DBCA Priority Species: P1 – P5 = Priority 1 – 5.
Locally Significant = LS

Threatened Fauna

There are two Threatened fauna species (Bilby and Grey Falcon) that were recorded in the survey and one Threatened fauna species (Northern Quoll) that was considered possible to occur. Threatened species are those that are considered in danger of extinction as their populations have declined and/or are still declining, and their total population size is small and/or fragmented or geographically restricted. Sites that support these species may be important for their long-term conservation, particularly if the site supports a resident or breeding population.

Greater Bilby – Macrotis lagotis

The Bilby is listed as Vulnerable under the BC Act and EPBC Act.

The Bilby is a burrowing marsupial and is characterised by its long, silky blue-grey fur and its long pinkish ears. Their body is compact is size and they feature a pointed snout with a long tongue and a tail that is black and white in colour (Burrell, 2024). This species is found in a range of habitats from arid rocky soils with little ground cover to semi-arid shrublands and woodlands (Burrell, 2024). They are also known to inhabit spinifex and tussock grassland regions (Burrell, 2024). Once common throughout Australia, the Bilby is found within semi-arid regions of the Australian mainland; the Tanami Desert of the Northern Territory, the Great Sandy and Gibson Deserts, parts of the Pilbara and Kimberley regions of WA and the clayey and stony soils of the Mitchell grasslands of southwest Queensland (Burrell, 2024). Threats to the Bilby include predation by foxes and feral cats, an increased frequency of intense, high severity fires that reduce habitat and food availability and grazing by rabbits and other introduced herbivores that reduce food resources and impacts vegetation structure (DCCEEW, 2023a).

Habitat critical to survival of the Bilby, as defined by DCCEEW (2023a), includes:

- Any area where the species is known or likely to occur, as shown on the distribution map in Figure 6-4;
- Any location outside the known or likely distribution where bilbies are found to occur;
- Any area, between the areas noted above, that may be periodically occupied by bilbies; and
- Any area which bilbies may naturally colonise or may feasibly be reintroduced.

Based on this, Sandplain habitat recorded within the Survey Area is considered to be critical habitat for the Bilby under DCCEEW's definition.

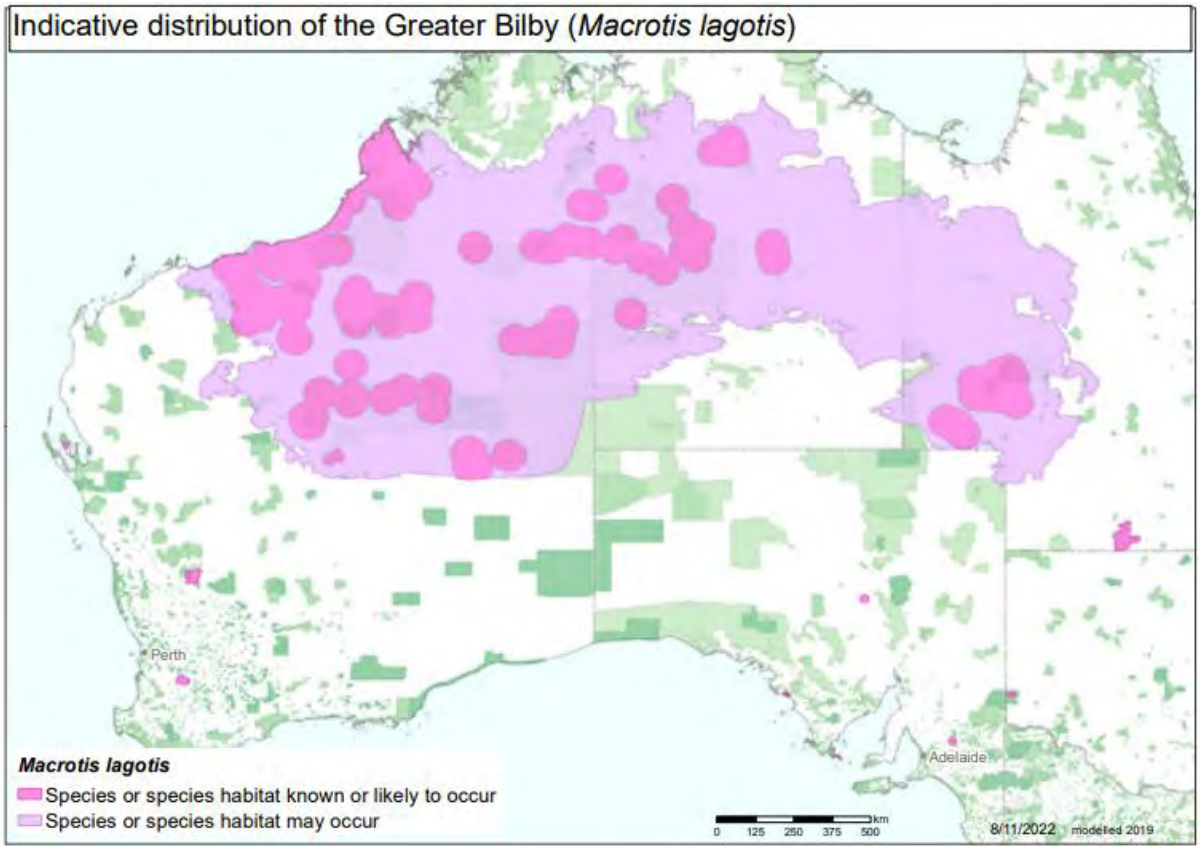

Figure 6-4: Modelled current distribution of the Bilby (*Macrotis lagotis*) (DCCEEW, 2023)

Having been previously recorded within the Survey Area by Phoenix (2022), it is unsurprising that secondary evidence of the species was recorded throughout the Survey Area during the survey. While most secondary evidence identified was old (> 2 week), some recent evidence of Bilby activity was identified from odorous scats and loose sandy spoil associated with diggings that are indicative of Bilby foraging activity. All recent scats and diggings were located near the northern boundary of the Survey Area. Despite both intensive and extensive targeted survey effort (25 Bilby search plots and seven transects searches), no Bilby burrows (old, recently active, or active burrows) were located.

Bilby are known to utilise relatively large, mobile home ranges in response to the scarcity of food resources in the semi-arid and arid parts of their range. While the Survey Area clearly forms part of a local population's home range, the absence of track sequences and wider spread of recent activity (indicative of current or very recent Bilby presence) within the Survey Area, particularly the area near the northern boundary, may suggest that they have dispersed elsewhere, outside of the Survey Area. Nevertheless, whether the local Bilby population is currently occupying the Survey Area or not, it is likely to return given that it has been recorded nearby on multiple occasions.

Grey Falcon – Falco hypoleucos

The Grey Falcon is listed as Vulnerable under the BC Act and EPBC Act.

The Grey Falcon occurs in the arid and semi-arid zones of Australia and has an overall Australian listing of Vulnerable (Sutton, 2010). The distribution of this species is restricted largely to areas of the highest annual temperatures where average annual rainfall is below 500 mm (Birdlife International, 2024). Grey Falcons typically nest and roost along heavily wooded drainage lines.

With large foraging home ranges, they predominantly prey on other bird species in flight from above. Speculative threats to the Grey Falcon include land/ range degradation caused by overgrazing in arid zone rangelands and the clearance of open woodlands, localised DDT-related eggshell thinning (which is no longer considered a problem), nesting-site availability, competition between other bird species, predation by feral species and threats from potential international falconry (Birdlife International, 2024).

Major Drainage Line habitat, is considered critical habitat and represents the most suitable breeding and foraging habitat for Grey Falcons. Major Drainage Line habitat provides large trees for nesting and waterbodies which act as attractants for prey. No Major Drainage Line habitat is present within the Survey Area. Grey Falcon forage over a variety of habitat and may utilise the Survey Area for foraging. Major Drainage Line habitat is approximately 6 km west associated with the Turner River, which has a catchment of 4,802 km^2 and is approximately 236 km in length (FMG, 2022).

A breeding pair and single fledged juvenile were recorded perched on a transmission tower at the western end of the Survey Area adjacent to the APA Boodarie Power Station. Grey Falcons and numerous other birds of prey species frequently nest high up on transmission towers which provide nest security from predators and a vantage point from which to observe prey. The Survey Area would only comprise a fraction of the resident Grey Falcons' foraging home range and given the means with which they hunt their prey (on the wing) clearing of native vegetation for the Proposal, and subsequent Proposal activities are unlikely to negatively impact the pair.

Northern Quoll – Dasyurus hallucatus

The Northern Quoll is listed as Endangered by the BC Act and EPBC Act.

The Northern Quoll is a nocturnal predator, consuming invertebrates, small mammals, replies, birds, carrion and fruit (DCCEEW, 2017). This species is commonly found in rocky areas, with rugged rocky habitats such as gorges, gullies, escarpments, boulder fields and small caves critical for denning and shelter (DCCEEW, 2017). Drainage lines connecting rocky areas represents dispersal and foraging habitat for the species. The Northern Quoll formerly occurred across northern Australia from WA to south-east Queensland (DCCEEW, 2017). Its current distribution has severely declined from its historical distribution especially in the more arid parts of its range. Extant populations occur in the Pilbara and Kimberley regions, parts of the Northern territory and near-coastal Queensland. The species remnant populations are associated with rocky areas. Threats to Northern Quoll population include predation by feral cats, being poisoned via cane toads and a loss of habitat due to agriculture and urban developments.

No rocky habitats, critical to support Northern Quoll, are present within the Survey Area and therefore the Survey Area is unlikely to support a resident population. However, the species has been recorded approximately 4 km east-northeast of the Survey Area and given its wide foraging range (>5 km) and the proximity and connectivity of the Survey Area to the large drainage line to the east, it is possible, Northern Quoll may, albeit infrequently, forage in the eastern extent of the Survey Area.

Migratory Fauna

Two Migratory species were recorded within the Survey Area, no other migratory species were considered likely or possible to occur (Table 6-4; Figure 6-3).

Although migratory species are not always present at a site, a particular site may have significance as a seasonal or ephemeral foraging, breeding or shelter area. Impacts to these sites may then impact the population both within the site and further afield. For migratory shorebirds, a site is deemed internationally important if it regularly supports more than 1% of the flyway population of a species, or a total abundance of at least 20,000 shorebirds, and nationally important if it regularly supports more than 0.1% of the flyway population of a species, at least 2,000 shorebirds or at least 15 shorebird species (Hansen et al., 2016; DCCEEW, 2024a). None of these criteria were met for any species within the Survey Area.

Osprey – Pandion cristatus

The Osprey is listed as Migratory under the BC Act and EPBC Act.

The Osprey is a medium-sized raptor that generally appears singly but have been known to also occur in pairs or family groups. This species is most abundant in the northern portion of Australia, where high population densities occur in remote areas, this species is rare to uncommon within the southern parts of WA. The breeding range for the Osprey extends around the northern coast of Australia from Albany in WA to Lake Macquarie in NSW, with a second isolated breeding population on the coast of South Australia. The area of occupancy of the Osprey in Australia is estimated to be 117,400 km^2.

The Osprey occurs within littoral and coastal habitats and terrestrial wetlands of tropical Australia and offshore islands. For the most part, this species is found in coastal regions but will occasionally frequent inland areas along major rivers, particularly in northern Australia. The main threat to Osprey populations throughout Australia is the loss, degradation or alteration of habitat for urban development purposes. Another lesser threat to the population is the ingestion of prey items containing pollutants such as pesticides, heavy metal for fishing tackle. The competition for food, reduced water quality disturbance or persecution by humans and accidental mortality arising from collisions with powerlines are further examples of threats to the Osprey population numbers. Various management strategies across the eastern portion of the country have been implemented to stabilise population numbers.

Ospreys are a predominantly coastal species but also forage in mangroves and other large water bodies where they almost exclusively prey on large fish. The habitats present within the Survey Area are unlikely to provide any utility to the species and therefore will not be impacted by the Proposal.

Fork-tailed Swift – Apus pacificus

The Fork-tailed Swift is listed as Migratory under the BC Act and EPBC Act.

The Fork-tailed Swift is a non-breeding visitor to Australia between September and April (Boehm, 1962). While it can be common further north, in southwest Australia this species is generally scarce (Johnstone & Storr, 1998). The bird is primarily observed foraging for insects in proximity to cyclonic weather (Boehm, 1962). Although a migratory species, the Fork-tailed Swift has a large range and a large population that appears to be stable (BirdLife International, 2021b).

Fork-tailed swifts are an almost exclusively aerial species and are therefore not limited by the availability of specific terrestrial habitats. As such, the species will not be affected by the clearing of native vegetation or Proposal related activities within the Survey Area.

Priority Fauna

There is one Priority fauna species that was recorded in the Survey Area. No other Priority species were considered likely or possible to occur (Table 6-4).

Brush-tailed Mulgara – Dasycercus blythi

The Brush-tailed Mulgara is listed as Priority 4 by DBCA. The Brush-tailed Mulgara is a medium sized carnivorous Australian marsupial species weighing approximately 100 grams. The species is sexually dimorphic with males being much larger than females.

This species occurs in spinifex grasslands throughout much of the arid zone, digging their burrows in the flats between low sand dunes. Given that Brush-tailed (*Dasycercus blythi*) and Crest-tailed (*Dasycercus cristicauda)* mulgaras were until 2005, considered the same species, their separate distribution is still misunderstood. Populations of Brush-tailed Mulgara's often occur as scattered with relatively low population densities while still being locally abundant. Population size will fluctuate throughout the year depending on season and food availability. This species was recorded in the Survey Area from two active or recently active burrows (Phoenix, 2024b).

Brush-tailed Mulgara were previously recorded in and nearby the Survey Area (DBCA 2022). While no direct sightings of the species were recorded during the current survey, two recently active, or active burrows were recorded and subsequently targeted with Elliot traps but evaded capture.

Locally Significant Fauna

Black Falcon – Falco subniger

The Black Falcon is considered Locally Significant within WA.

As per the NSW Government Local Land Service (n.d.), Black Falcons frequent upon western slopes and plains, although they visit tablelands and occur in drier and more open coastal valleys and floodplains. The Black Falcon inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded (eucalypt dominated) watercourses. The Black Falcon is often associated with streams or wetlands, visiting them in search of prey. It uses standing dead trees as lookout posts. The Black Falcon utilises the same habitat as the Grey Falcon. Therefore, it's likely that all fauna habitats identified within the Survey Area may represent potential foraging habitat.

The specific migratory pattern of this species is poorly understood, with the Black Falcon being a rare visitor to the Pilbara (Johnstone *et al.* 2013). While the Black Falcon is not listed as significant in WA, it is protected in other States that form parts of its range. These listings include:

- New South Wales: Vulnerable under the *Biodiversity Conservation Act 2016*;
- South Australia: Rare under the *National Parks and Wildlife Act 1972*; and
- Victoria: Critically Endangered under the *Flora and Fauna Guarantee Act 1988*.

6.3.6 SHORT-RANGE ENDEMIC INVERTEBRATES

A total of 14 specimens from three families of SRE invertebrate species were identified within the Survey Area. Of those 14 specimens, 13 individuals were found within Open Woodland habitat whilst the remaining species was located within Sandplain habitat. Open Woodland, which appears to be locally isolated, extends eastward outside of the Survey Area and connects to larger open woodlands along drainage lines, therefore any SRE species identified within this habitat are not likely to be isolated to the Survey Area alone.

Two mygalomorph (trapdoor spider) species were collected but were unable to be identified to species level due to sequencing failure. These records are cautiously determined as potential SRE species. Overall, the Survey Area comprises low value SRE habitat. No confirmed SRE species were recorded within the Survey Area, and it is unlikely any of the recorded potential SRE's are restricted to the Survey Area.

Overall, the Survey Area comprises extensive and mostly continuous low prospectivity SRE habitat. No Confirmed SRE species were recorded within the Survey Area and it is unlikely any of the recorded Potential SRE's are restricted to the Survey Area.

6.4 ENVIRONMENTAL VALUES

The information provided in Section 6.3 was utilised to determine the environmental values that require assessment for this factor. Environmental values were included for assessment based on the following parameter (from the EPA's Environmental Factor Guideline; Terrestrial Fauna):

- Fauna species listed under the EPBC Act or BC Act that were recorded, known to occur or are considered to have a high or moderate likelihood of occurring within the Survey Areas;
- Species with restricted distribution;
- Species with a degree of historical impact from threatening processes;
- Species that provide an important function required to maintain the ecological integrity of a significant ecosystem; and
- Habitat types that are important to the life history of a significant species, i.e., breeding, feeding and roosting or aggregation areas, or where they are unique or isolate habitats in the landscape or region.

The two Migratory species recorded, the Osprey and the Fork-tailed Swift are not considered to be affected by the Proposal due to the lack of suitable habitat within the Survey Area. Ospreys are a predominantly coastal species, and the Fork-tailed Swift is an almost exclusively aerial species. Therefore, these species have not been considered further in this assessment.

The Northern Quoll was considered possible to occur due to a relatively recent (2018) record 4.5 km from the development envelopes. There is no critical denning or highly productive foraging habitat (complex rocky habitats) present in the Survey Area. The Drainage Line habitat may be considered as suitable dispersal habitat and therefore the Northern Quoll has been considered as a key environmental value requiring assessment.

Section 6.3.5 identified five significant fauna species that were recorded or considered possible to occur within the Survey Area. These species have the potential to be impacted by the Proposal and therefore have been considered as key environmental values requiring assessment.

Section 6.3.5 identified that no confirmed SREs were identified within the Survey Area however two potential SRE species were recorded. No habitats were identified as being restricted to the development envelopes and all habitats were deemed to be low value SRE habitat. Therefore, SRE's have not been considered further in this assessment.

Two fauna habitats were identified as being restricted and/or isolated, Open Woodlands and Drainage Line habitat. Sandplain habitat was identified as habitat for Bilby. These habitats are considered significant and therefore require assessment.

The following Environmental Values were therefore determined to require assessment for this factor:

- General fauna species and habitat (provides a general assessment of fauna assemblages and habitat and includes the one locally significant fauna specie);
- Listed significant fauna species; and
- The Black Falcon as a locally significant species.

6.5 POTENTIAL IMPACTS

Table 6-5 defines the potential impacts (direct, indirect and cumulative) on the environmental values for this factor in a local and regional context. Assessment of the potential impacts is provided in the following sections.

Table 6-5: Potential Impacts on Terrestrial Fauna

Environmental value and current extent	Potential direct impact	Potential indirect impact	Impacts associated with other proposals	Total cumulative impact
General fauna and habitat (including locally significant fauna) Current habitats are relatively undisturbed, all vegetation associations have more than 90% of their pre-European extent remaining (Least Concern)	Up to 390 ha of native fauna habitat disturbance. Death or injury of fauna due to vehicle strike or earthmoving equipment.	Increased predation or competition from introduced fauna. Alterations to fauna behaviour (including feeding or breeding characteristics) as a result of elevated dust, light or noise emissions. Alteration of habitat characteristics as a result of changes to the surface water regime. Reduction in habitat health as a result of: • Increased sedimentation during construction; • Leaks or spillages of hydrocarbons or chemicals; and • Introduction or spread of weed species.	The Proposal occurs within the Boodarie SIA. It is anticipated that up to 80% of the SIA will be cleared to allow the development of additional projects in the SIA. Therefore, it is anticipated that there will be additional clearing of up to 3,166 ha.	Up to 3,556 ha of disturbance to native fauna habitat. Potential indirect habitat health impacts.
Bilby Up to 1,409.6 ha of sandplain habitat (critical habitat) was recorded within the Survey Area	Up to 378.1 ha (26.8% of local extent) of disturbance to critical habitat.	Increased predation or competition from introduced fauna. Alterations to behaviour (including feeding or breeding characteristics) as a result of elevated light or noise emissions.	As above	Up to 3,556 ha of disturbance to native fauna habitat which includes 378.1 ha of critical habitat. Potential indirect habitat health impacts.
Grey Falcon and Black Falcon Up to 1,433.9 ha of potential foraging habitat was recorded within the Survey Area including; • 15.4 ha of Open Woodlands; • 1,409.6 ha of Sandplain; and • 8.9 ha of Drainage Area.	Up to 386.1 ha (26.1% of local extent) of disturbance to potential foraging habitat.	Increased predation or competition from introduced fauna. Alterations to behaviour (including feeding or breeding characteristics) as a result of elevated light or noise emissions.	As above	Up to 3,556 ha of disturbance to native fauna habitat which includes 386.1 ha of potential foraging habitat. Potential indirect habitat health impacts.

Environmental value and current extent	Potential direct impact	Potential indirect impact	Impacts associated with other proposals	Total cumulative impact
Northern Quoll Up to 8.9 ha of potential foraging/dispersal habitat (Drainage Area) was recorded within the Survey Area.	Up to 1.6 ha (18% of local extent) of disturbance to potential foraging/dispersal habitat.	Increased predation or competition from introduced fauna. Alterations to behaviour (including feeding or breeding characteristics) as a result of elevated light or noise emissions.		Up to 3,556 ha of disturbance to native fauna habitat which includes 1.6 ha of potential foraging/dispersal habitat. Potential indirect habitat health impacts.
Brush-tailed Mulgara Up to 1,409.6 ha of breeding and foraging habitat (Sandplain habitat) was recorded within the Survey Area	Up to 378.1 ha (26.8% of local extent) of disturbance to breeding and foraging habitat.	Increased predation or competition from introduced fauna. Alterations to behaviour (including feeding or breeding characteristics) as a result of elevated light or noise emissions.		Up to 3,556 ha of disturbance to native fauna habitat which includes 378.1 ha of potential breeding/foraging habitat. Potential indirect habitat health impacts.

6.6 ASSESSMENT OF IMPACTS

The following sections assess the potential impacts on each environmental value identified in Section 6.4.

6.6.1 GENERAL FAUNA SPECIES AND HABITAT

Direct Disturbance

The Proposal will result in the direct disturbance of up to 386.1 ha of vegetated terrestrial fauna habitat (excludes already cleared areas of 3.9 ha) (Figure 6-5). There are several items of note during this assessment:

- All the vegetation to be disturbed is considered to be in Good to Excellent condition; and
- The Proposal is located in the Boodarie SIA which has been zoned for the purposes of industrial development.

When assessing the disturbance associated with the Proposal at a regional scale, the majority of the disturbance will occur within two vegetation associations; '589: Short bunch-grass savanna/ Grass Steppe', and '647: Shrub-steppe' For a detailed description of these vegetation associations, refer to Section 5.

Table 6-6 lists out the potential direct impacts to fauna habitats mapped during the surveys.

Table 6-6: Potential direct impacts to fauna habitats

Fauna habitat types	Extent within Survey Areas (local extent)	Extent within development envelopes	Current extent in Indicative Disturbance Footprint (ha) and %
Open Woodland	15.4	12.8	6.4 (41.6% of surveyed extent)
Sandplain	1,406.9	936.0	378.1 (26.9% of surveyed extent)
Drainage Line	8.9	8.3	1.6 (18.0% of surveyed extent)
Cleared/ disturbed	45.1	19.8	3.9 (8.6% of surveyed extent)

An assessment of the impacts of the direct disturbance of fauna habitat has been provided below and is shown in Figure 6-5. Where more detail is warranted, it has been provided in subsequent sections:

- **Open Woodland** – Up to 6.4 ha of this habitat is proposed to be disturbed. This equates to 41.6% of the extent within the Survey Area. This habitat is not restricted to the development envelope but has been identified as habitat for the Gey Falcon and Black Falcon. As such this habitat type has been discussed in further detail in Section 6.6.3 and 6.6.6;
- **Sandplain –** Up to 378.1 ha of this habitat is proposed to be disturbed. This equates to 26.8% of the extent within the Survey Area. This habitat is not restricted to the development envelope but has been identified as habitat for Bilby, Grey Falcon, Brush-

tailed Mulgara and Black Falcon. As such this habitat type has been discussed in further detail in Section 6.6.2, 6.6.3, 6.6.5 and 6.6.6; and

- **Drainage Line –** Up to 1.6 ha of this habitat is proposed to be disturbed. This equates to 18.0% of the local extent within the Survey Areas. This habitat is not restricted to the development envelopes and has been identified as an important habitat for Grey Falcon, Northern Quoll and Black Falcon. As such this habitat type has been discussed in further detail in Section 6.6.3, 6.6.4 and 6.6.6.

Offsets proposed in Section 10 for the loss of native vegetation are proposed to also counterbalance the loss of native fauna habitat.

Fauna Vehicle Strike

There is a risk of fauna death or injury during clearing, operations or transport. The majority of birds and larger fauna would be expected to flee the areas to be cleared as the equipment approaches. It is likely however that there will be some fauna injuries or deaths during these activities. PHI will implement management measures to minimise this likelihood (refer to Section 6.7).

Vehicle strike may lead to fauna injuries or fatalities as light vehicles and trucks will regularly use the access road. Vehicle speed limits will be the responsibility of Main Roads WA. Internal roads under PHI control will be speed restricted to reduce the likelihood of vehicle strike.

Based on the above, any fauna strike impacts are likely to be rare and not significant on a local or regional scale.

Increased Predation

Phoenix (2024b) recorded two introduced species during fauna surveys including Cats (*Felis catus*) and foxes (*Vulpes vulpes*). The Proposal has the potential to introduce additional species or increase the population of existing introduced species, through the following vectors:

- Food wastes at work areas; or
- Presence of additional cleared corridors that may be utilised by introduced fauna for access or predation.

The appropriate management and disposal of food wastes (refer to Section 6.7) will ensure that food wastes do not attract fauna to the area. No pets will be brought to site.

With the implementation of controls (refer to Section 6.7) potential introduced fauna impacts described above are expected to be able to be appropriately mitigated such that impacts to fauna are not significant on a local or regional scale.

Altered Fauna Behaviour

The Proposal will produce low levels of artificial light and noise emissions. The main source of noise and light emissions will be the process and pellet plant. Equipment moving within the development envelope will produce noise emissions however this will be limited to the indicative disturbance footprint. Nevertheless, it is expected that some fauna will keep their distance from the development envelopes while operating. Potential impacts to the significant fauna as a result of noise is discussed further in sections below.

With the implementation of controls (refer to Section 6.7) potential increased risks to fauna from light or noise emissions are expected to be able to be appropriately mitigated such that impacts are not significant on a local or regional scale.

Hydrocarbon Spills

Hydrocarbon spills associated with hydraulics failures on machinery and refuelling spills may occur on occasion in operational areas. Spills generally result in no impact due to refuelling and other hydrocarbon transfers occurring within bunded areas. Where a spill does occur on unbunded ground, they result in a defined area of hydrocarbon-contaminated soil that can be remediated via passive means such as bioremediation.

Proposed control measures are identified in Section 6.7 and are designed to further reduce the risk of fauna habitat impacts from hydrocarbon spillage.

Changes to the Surface Water Regime

Impacts associated with the surface water regime are expected to be minor and unlikely to significantly affect fauna habitat. As part of the Boodarie SIA planning process, a District Water Management Strategy has been approved by DWER. There is a level of uncertainty regarding other projects which may be developed within the Boodarie SIA and how they will impact surface water regimes. However, under the District Water Management Strategy a coordinated approach to surface water management across the Boodarie SIA will be implemented to ensure ecological protection (GHD, 2013). As part of development approvals, PHI will need approval for a Local Water Management Strategy that aligns with District Water Management Strategy and demonstrate that changes in surface water regimes do not cause significant ecological damage. The minor changes to the surface water regime are unlikely to cause significant impacts to terrestrial fauna habitat.

Dust Deposition

There is the potential for deposited dust to affect the health of susceptible vegetation, and therefore fauna habitat, by adversely affecting photosynthesis and transpiration rates. The Proposal is located within the Boodarie SIA with an existing elevated level of dust deposition. PHI will implement a standard dust mitigation measures to ensure dust levels, associated with the Proposal, are reduced to a negligible level.

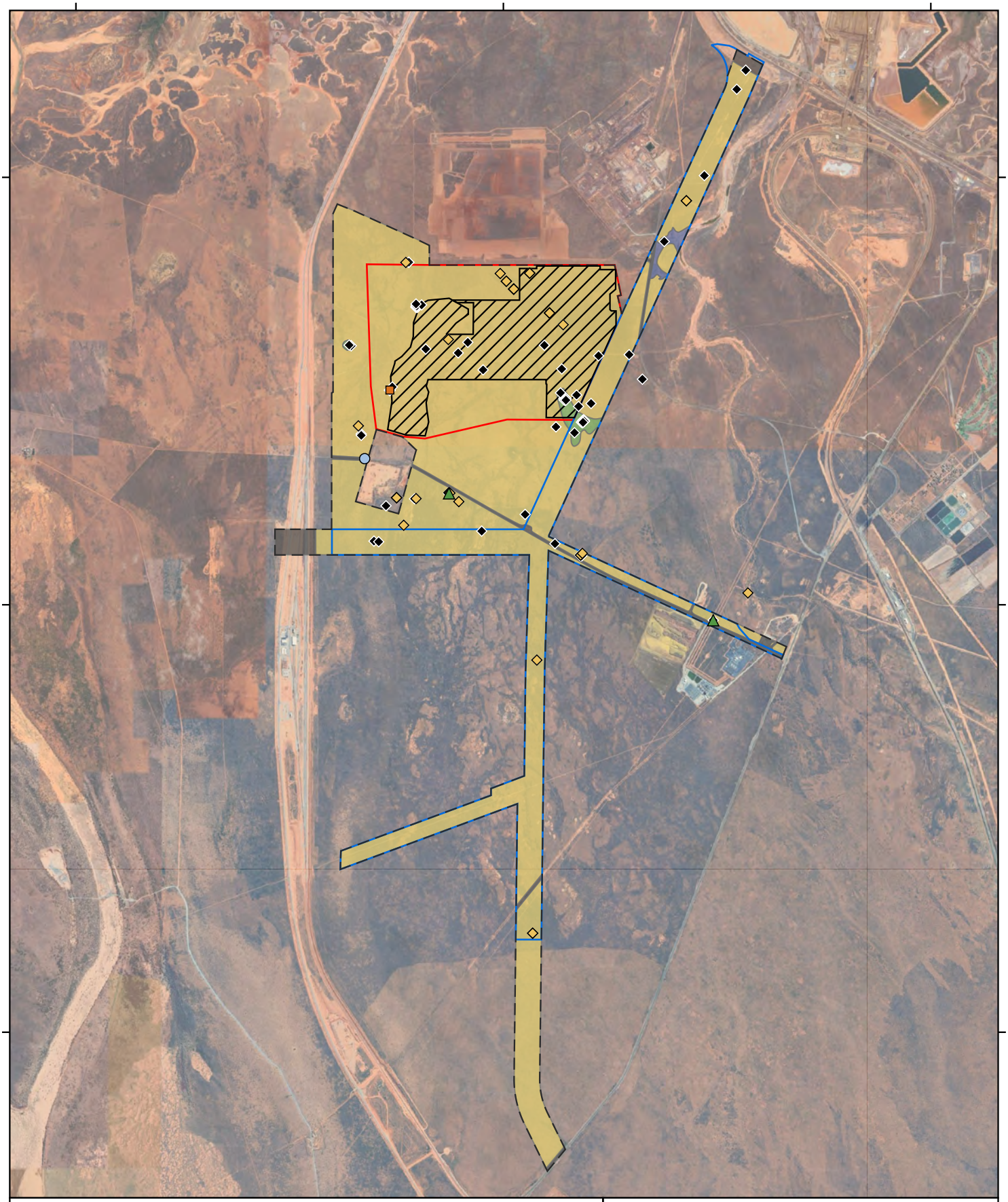

Figure 6-5: Indicative direct disturbance to fauna habitat

6.6.2 BILBY

The Bilby is listed as Vulnerable under the EPBC and BC Acts. Prior to European settlement the Bilby frequently occurred across the-quarters of the Australian continent in semi-arid and arid zones. Since European settlement, largely due the introduction of feral species and alterations to habitat, the Bilby currently occupies 20% of its original range. The species recorded within the development envelopes with sources of previous and current evidence of Bilby activity uncovered during Phoenix's (2024b) survey. All recent odorous scats and loose sandy spoil associated with diggings were located near the northern boundary of the Survey Area. Phoenix (2024) identified Bilby habitat across the PDE and EIDE. Based on this, it is likely that most of the Boodarie SIA would be considered Bilby habitat due to the extent within the surveyed area.

Sandplain habitat is considered critical habitat for the Bilby and is widespread across the Pilbara. Critical habitat is defined as any area where the Bilby is known or likely to occur, as shown in Figure 6-4 (DCCEEW, 2023). Based on this, any disturbance within the 216,636,018 ha area, identified within the Recovery Plan, is considered to be disturbance to critical Bilby habitat. This also means that there is also no possible alternative design that would avoid habitat considered critical for Bilby.

Up to 1,409.6 ha of potential critical habitat was recorded within was recorded within the Survey Area. Up to 378.1 ha (26.8% of local extent or 0.0001% of regional extent) may be disturbed as a result of the Proposal. No indirect impacts are expected to result in further disturbance to Bilby habitat

Based on the above assessment, the Proposal is predicted to result in impacts to 378.1 ha critical habitat. While these habitats are wide-ranging in the area, these impacts to the Bilby are nevertheless considered significant, and therefore offsets are proposed under the PEOF to counterbalance the impacts to these species in Section 10.

6.6.3 GREY FALCON

The Grey Falcon is listed as Vulnerable under the EPBC Act and BC Act. A breeding pair and single fledged juvenile were recorded perched on a transmission tower at the western end of the Survey Area adjacent to the Alinta Power Station. The species occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and WA. The species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species might become marginally more widespread, although it is essentially confined to the arid and semi-arid zones at all times (TSSC, 2020).

The Grey Falcon is only restricted by habitat in relation to roosting sites (inland drainage lines, grasslands, sparse wooded lowlands, often using old nests and communication towers etc.) and its foraging range is widespread due to its prey mainly being other birds. The tussock grassland habitat is used widely for hunting by the Grey Falcon (Garnett and Crowley, 2000). In the Pilbara, the Grey Falcon is mostly recorded from the coastal plain between the De Grey and Ashburton Rivers. The preferred habitat of this species comprises lightly wooded coastal and riverine plains.

Given the wide-ranging nature of this species, all habitat types within the development envelopes are considered potential foraging habitats:

- Sandplain;
- Drainage Area; and
- Open Woodlands.

Up to 1,433.9 ha of potential Grey Falcon broad foraging habitat was recorded within the Survey Area. Up to 386.1 ha (26.1%) may be disturbed as a result of the Proposal. It is likely that the Proposal would only comprise a fraction of the resident Grey Falcons foraging home range. Given the means with which they hunt their prey (on the wing), the clearing of native vegetation for the Proposal, which does not include any areas of heavily wooded drainage lines, and subsequent activities are unlikely to negatively impact the recorded pair of Grey Falcons. No indirect impacts are expected to result in further disturbance to Grey Falcon habitat.

Based on the above assessment, the Proposal is predicted to result in direct impacts to 386.1 ha of broad foraging habitat. Given the scale of disturbance, the impacts to the Grey Falcon are considered significant, and therefore offsets are proposed under the PEOF to counterbalance the impacts to these species in Section 10.

6.6.4 NORTHERN QUOLL

The Northern Quoll is listed as Endangered under the EPBC Act and BC Act. The Northern Quoll considered a possibly occurring in the Survey Area. There is a relatively recent record identified 32 km and 43 km from the Survey Area and a nearby record 4 km east-northeast of the Survey Area which was identified in 2012. Given its wide foraging range (>5 km) and the proximity and connectivity of the Survey Area to the drainage line to the east, it is possible that Northern Quoll may infrequently forage in the Drainage Area habitat. Up to 8.9 ha of Drainage Area habitat was recorded within the Survey Area. Up to 1.6 ha (18.0%) may be disturbed as a result of the Proposal.

There is no suitable denning habitat within or in the vicinity of the Proposed Action and no Northern Quoll were recorded during the survey of the development envelopes (Phoenix, 2024b). In addition, there are no structurally diverse woodlands or forest areas containing large diameter trees that would be considered habitat critical for survival of the species.

The species may disperse through the development envelopes based on the recent records (Phoenix, 2024b) in the surrounding area. However, given the Proposal will be located relatively near residential areas and existing industrial facilities it is not considered dispersal habitat connecting populations important for the long-term survival of the Northern Quoll.

No indirect impacts are expected to result in further disturbance to Northern Quoll habitat.

Based on the above assessment, the Proposal is predicted to result in impacts to 1.6 ha suitable habitat. While the Northern Quoll is wide-ranging, these impacts are nevertheless considered significant, and therefore offsets are proposed under the PEOF to counterbalance the impacts to Northern Quoll in Section 10.

6.6.5 BRUSH-TAILED MULGARA

The Brush-tailed Mulgara is listed as a Priority 4 species by DBCA. This species occurs within spinifex grasslands throughout much of the arid zone, digging their burrows in the flats between low sand dunes (Phoenix, 2024b). The Brush-tailed Mulgara was recorded in the Survey Area from two active or recently active burrows. Sandplain habitat is considered to be suitable breeding and foraging habitat for the species.

Up to 1,409.6 ha of Sandplain habitat was recorded within the Survey Area. Up to 378.1 ha (26.8%) may be disturbed as a result of the Proposal. No indirect impacts are expected to result in further disturbance to Brush-tailed Mulgara habitat

Based on the above assessment, the Proposal is predicted to result in impacts to 378.1 ha suitable habitat. While these habitats are wide-ranging in the area, these impacts to the Brush-tailed Mulgara are nevertheless considered significant, and therefore offsets are proposed under the PEOF to counterbalance the impacts to Brush-tailed Mulgara in Section 10.

6.6.6 BLACK FALCON

The Black Falcon (*Falco subniger*) is not currently listed under the EPBC or BC Act however has been considered locally significant as a rare visitor to the Pilbara. This species sports broad shoulders, long, pointed wings and feathered legs (eBird, n.d). This species is an aggressive aerial hunter that prefers open environments and is often confused with darker Brown Falcon individuals (eBird, n.d.). The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring. Individuals may congregate at food sources (e.g. after fires which expose prey, when there are irruptions of quail or button-quail, or during locust plagues). The Black Falcon inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees.

Given the wide-ranging nature of this species, all habitat types within the development envelopes are considered potential foraging habitats:

- Sandplain;
- Drainage Area; and
- Open Woodlands.

Up to 1,433.9 ha of potential Black Falcon broad foraging habitat was recorded within the Survey Area. Up to 386.1 ha (26.1%) may be disturbed as a result of the Proposal. No indirect impacts are expected to result in further disturbance to Black Falcon habitat.

Based on the above assessment, the Proposal is predicted to result in direct impacts to 386.1 ha of broad foraging habitat. Given the scale of disturbance, the impacts to the Black Falcon are considered significant, and therefore offsets are proposed under the PEOF to counterbalance the impacts to these species in Section 10.

6.7 MITIGATION

PHI has mitigated the potential impacts to this factor according to the mitigation hierarchy; avoid, minimise, rehabilitate and offset.

6.7.1 AVOID

The key avoidance mechanism implemented by PHI was the design of the development envelopes to avoid key habitat features associated with terrestrial fauna. The Proposal has been reduced to the minimum possible footprint to avoid disturbance where possible.

As for flora and vegetation, the Proposal is located within an area set aside as a Strategic Industrial Area where there is existing industrial development and is not located in undeveloped pristine parts of the Pilbara remote from any supporting infrastructure. It therefore avoids impacts to fauna and fragmentation of fauna habitat in these pristine undeveloped areas.

6.7.2 MINIMISE

The following mitigation measures are proposed to ensure that direct and indirect impacts to terrestrial fauna are minimised:

1. **Implement industry best practice management measures for terrestrial fauna:**
    a. Bilby Management Plan (Attachment 2) which includes commitments to minimise impacts to Bilby and Bilby habitat;
    b. Clearing is to be conducted on an as-needed basis, to avoid and/or minimise disturbance of any significant fauna habitat;
    c. Minimise clearing by utilising existing access tracks and disturbance where practicable; and
    d. Offset payments to the PEOF may be required for the loss of Good to Excellent quality vegetation/ fauna habitat.
2. **Obtain and comply with the following approvals:**
    a. Ministerial Statement to be issued under Part IV of the EP Act;
    b. EPBC Act approval;
    c. Works Approval(s) and Licence to be issued under Part V of the EP Act; and
    d. DG Licence issued under the DG Act if required; and
3. **Implement the measures to minimise the risk and impact of hydrocarbon spills and other contamination**.

6.7.3 REHABILITATE

The key rehabilitation measures that relate to terrestrial fauna are summarised below:

1. All infrastructure will be removed; and
2. The development envelopes will be revegetated with local native species.

The Proposal is required to sign a Lease with the State Government under the LAA. PHI expects that the terms and conditions of the lease will require decommissioning and rehabilitation of the Proposal at the end of its operational life, which will ensure rehabilitation measures are implemented.

6.7.4 OFFSETS

After the implementation of the mitigation measures described above, it is predicted that the Proposal will have an unavoidable significant residual impact on:

- Good to Excellent quality remnant fauna habitat;
- Critical Bilby habitat;
- Foraging/dispersal habitat for the Northern Quoll;
- Foraging habitat for the Grey Falcon and Black Falcon; and
- Breeding and foraging habitat for the Brush-tailed Mulgara.

Proposed offsets for these significant residual impacts are discussed in detail in Section 10 and the IRP in Appendix 2.

6.8 PREDICTED OUTCOME

The EPA's environmental objective for this factor is to "protect terrestrial fauna so that biological diversity and ecological integrity are maintained". In the context of this objective: "ecological integrity" is listed as the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements (EPA, 2016c).

PHI has incorporated avoidance, minimisation and rehabilitation measures into the Proposal design and operational processes, however some direct impacts to terrestrial fauna are unavoidable. The Proposal will result in disturbance to 386.1 ha of native vegetated fauna habitat, in a relatively uncleared landscape. All of this vegetation is considered to be in Good to Excellent condition, no poor or degraded vegetation was recorded in the survey.

Evidence of the Bilby was recorded in the survey and is listed as Vulnerable under the EPBC Act and BC Act. It is primarily threatened predation by foxes and feral cats and loss and fragmentation of breeding and foraging habitat as a result of vegetation clearing. Sandplain habitat has been identified as critical habitat for the Bilby. This habitat is present throughout the development envelopes. However, Sandplain habitat is widespread across the Pilbara and critical habitat is defined as any area where the Bilby is known or likely to occur, as shown in Figure 6-4. This constitutes up to 216,636,018 ha of habitat. Therefore, disturbance of up to 378.1 ha of habitat (0.0001% of regional extent) within a SIA is unlikely to result in a significant impact on the species. Nevertheless, after the implementation of avoidance, minimisation and rehabilitation mitigation measures, disturbance of 378.1 ha of critical habitat is deemed to be significant and is proposed to be counterbalanced by offsets, outlined in Section 10 and the IRP in Appendix 2, to ensure that the EPA objective can be met.

The Grey Falcon was recorded in the survey and is listed as Vulnerable under the EPBC Act and BC Act. The Black Falcon was also recorded in the survey and is not currently listed under the EPBC Act or BC Act but is considered locally significant. Sandplain, Open Woodlands and Drainage habitat were considered potential foraging habitat for both species of falcon. Both falcon species are wide ranging with a distribution across the arid and semi -arid zone of Australia and prey on smaller bird species. The Proposal will require up to 386.1 ha of disturbance to potential foraging habitat which is deemed to be significant and is proposed to be counterbalanced by offsets, outlined in Section 10 and the IRP in Appendix 2, to ensure that the EPA objective can be met.

The Northern Quoll was considered possible to occur within the Survey Area and is listed as Endangered under the EPBC and BC Act. The Drainage Area may provide potential foraging and dispersal habitat for the species, particularly considering the relatively recent record (2018) approximately 4.5 km from the development envelopes. The Proposal will require up to 1.6 ha of Drainage Area habitat which is deemed to be significant and is proposed to be counterbalanced by offsets, outlined in Section 10 and the IRP in Appendix 2, to ensure that the EPA objective can be met.

The Brush-tailed Mulgara was recorded in the survey and is listed as Priority 4 by DBCA. Sandplain habitat provides breeding and foraging habitat for the species. The Proposal will require up to 378.1 ha of Sandplain habitat which is deemed to be significant and is proposed to be counterbalanced by offsets, outlined in Section 10 and the IRP in Appendix 2, to ensure that the EPA objective can be met.

The predicted outcomes for Terrestrial Fauna are therefore:

- Disturb no more than the following environmental values:
    - 386.1 ha of fauna habitat of in Good to Excellent quality condition;
    - 378.1 ha of critical habitat for the Bilby and breeding/foraging habitat for Brush-tail Mulgara;
    - 1.6 ha of foraging/dispersal habitat for Northern Quoll; and
    - 386.1 ha of foraging habitat for Grey Falcon and Black Falcon.

If the Proposal is approved, the Ministerial Statement is likely to contain a condition requiring the finalisation and implementation of the IRP provided in Appendix 2. The offset measures will be reviewed and refined in the IRP and will be informed by discussions with DEMIRS, DBCA, DCCEEW and EPA Services to ensure they adequately counterbalance the residual impacts.

Based on the above the Proposal is expected to be able to meet the EPA's objective for this factor.