ONSLOW RARE EARTHS PLANT

NATIVE VEGETATION CLEARING PERMIT APPLICATION SUPPORTING DOCUMENT

DOCUMENT NO. YB-2-0000-HE-EN-APP-00005

REVISION HISTORY

Revision	Date	Issued for	[redacted]
00	22/12/2021	Submission to DWER	

DOCUMENT DISTRIBUTION

DOCUMENT DISTIBUTION	
CONSULTED	
INFORMED	

CHANGE HISTORY

Revision	Date	Change Description	Updated by
A	28/10/2021	First Draft for Rev A	[redacted]
00	22/12/2021	Issued for submission to DWER	

TABLE OF CONTENTS

TABLE OF FIGURES

1. INTRODUCTION

1.1 PROJECT DETAILS

Hastings Technology Metals Limited (Hastings) is a leading Australian rare earths company. The proposed Onslow Rare Earths Plant (the OREP or Project) located within the Ashburton North Industrial Area (ANSIA) (**Figure 1**) will process a mineral concentrate from the proposed Yangibana Rare Earths Project site, approximately 300 km (direct) southeast of Onslow. The mineral concentrate will undergo a hydrometallurgical process to produce a mixed rare earth carbonate (MREC) which will be exported to overseas customers.

1.2 OTHER APPROVALS

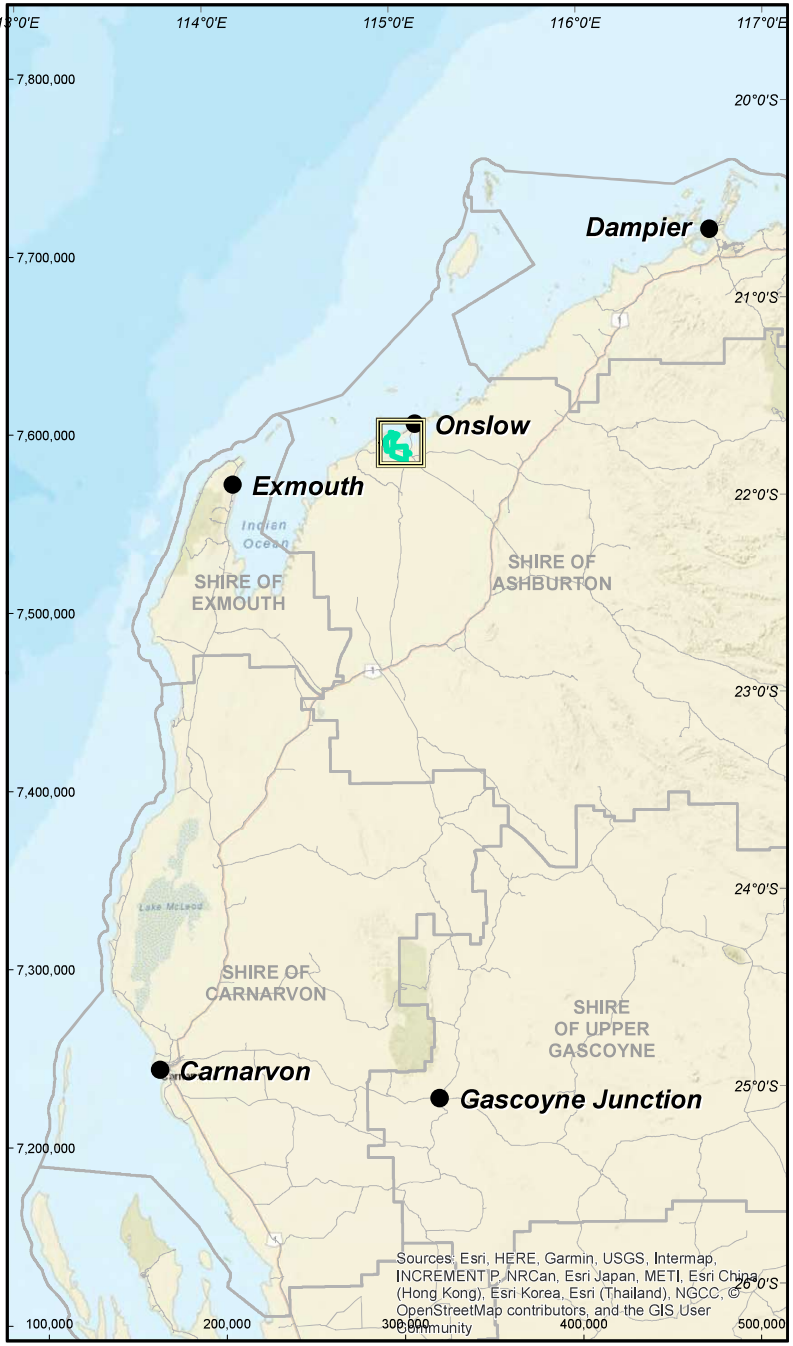
Hastings has obtained a "not a controlled action" decision (EPBC 2021/9046) from the Commonwealth Department of Agriculture, Water and the Environment (**Attachment 2**). Hastings does not intend to refer the Proposal to the Western Australian (WA) Environmental Protection Authority (EPA) under Part IV of the Environmental Protection Act 1986 following consultation with EPA Services and with due consideration to:

- ANSIA has been identified by the WA Government as a location suitable for strategic industrial development, specifically downstream processing. During their assessment of these areas, extensive environmental studies were undertaken to ensure development of the location would not significantly affect environmental factors. Hastings has complemented these studies with Project specific studies
- ANSIA having previously been given a 'not assessed' decision by the EPA (ref. CMS14338)
- Application of the significance test in the EPA's Statement of environmental principles, factors, objectives and aims of EIA.

In order to undertake the proposed clearing, Hastings seeks a Permit to Clear Native Vegetation (Purpose Permit) in accordance with section 51E of the Environmental Protection Act 1986 (WA; EP Act) and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA). A Development Application and a Works Approval will be submitted in due course and will be assessed in parallel with this application.

1.3 LAND DETAILS

The Proposal occurs within the General Industrial Zone as defined in Improvement Plan No. 41 and Improvement Scheme No. 1 for the Ashburton North Strategic Industrial Area. Hastings is currently negotiating a Lease Agreement with DevelopmentWA, who have granted conditional approval on behalf of the Western Australian government Department of Jobs, Tourism, Science and Innovation (**Attachment 12**).



HASTINGS Technology Metals Limited

ONSLOW RARE EARTHS PLANT

Regional Location and Development Envelope

Fig1_1_Regional Location.mxd
17 November 2021

Figure 1

2. DETAILS OF THE PROPOSAL

2.1 SUMMARY OF PROPOSED DEVELOPMENT

The Proposal is to construct and operate a hydrometallurgical rare earths processing plant within the Ashburton North Strategic Industrial Area (ANSIA) in Onslow, Western Australia.

The Proposal includes:

- Construction and operation of a hydrometallurgical process plant;
- Construction and storage of benign waste process liquors and gypsum in a lined evaporation pond; and
- Construction and operation of a water pipeline to bring treated water to the process plant from a nearby Reverse Osmosis Plant.

2.1.1 Clearing of native vegetation

Clearing of native vegetation is required to construct the process plant and associated infrastructure, evaporation pond and water pipeline.

2.1.2 Total area of clearing

The total land disturbance for the Proposal will be approximately 85.6 ha within a disturbance envelope of 128 ha (Figure 2).

2.1.3 Method of clearing

Vegetation and topsoil will be cleared together to a depth of approximately 200 mm using a lowered blade.

Topsoil collected (in accordance with the Hastings Land Clearing and Topsoil Stockpile Work Instruction) from within the disturbance footprint will be paddock dumped and stored at a height of up to two metres.

Storage of topsoil collected from within the footprint will be paddock dumped and require an area of approximately 8.5 ha (200 mm of topsoil collected from a disturbance footprint of approx. 85.6 ha and stored up to 2 m in height). Some of this topsoil will be reinstated immediately post-construction i.e. over the buried water pipeline corridor and at temporary laydown areas.

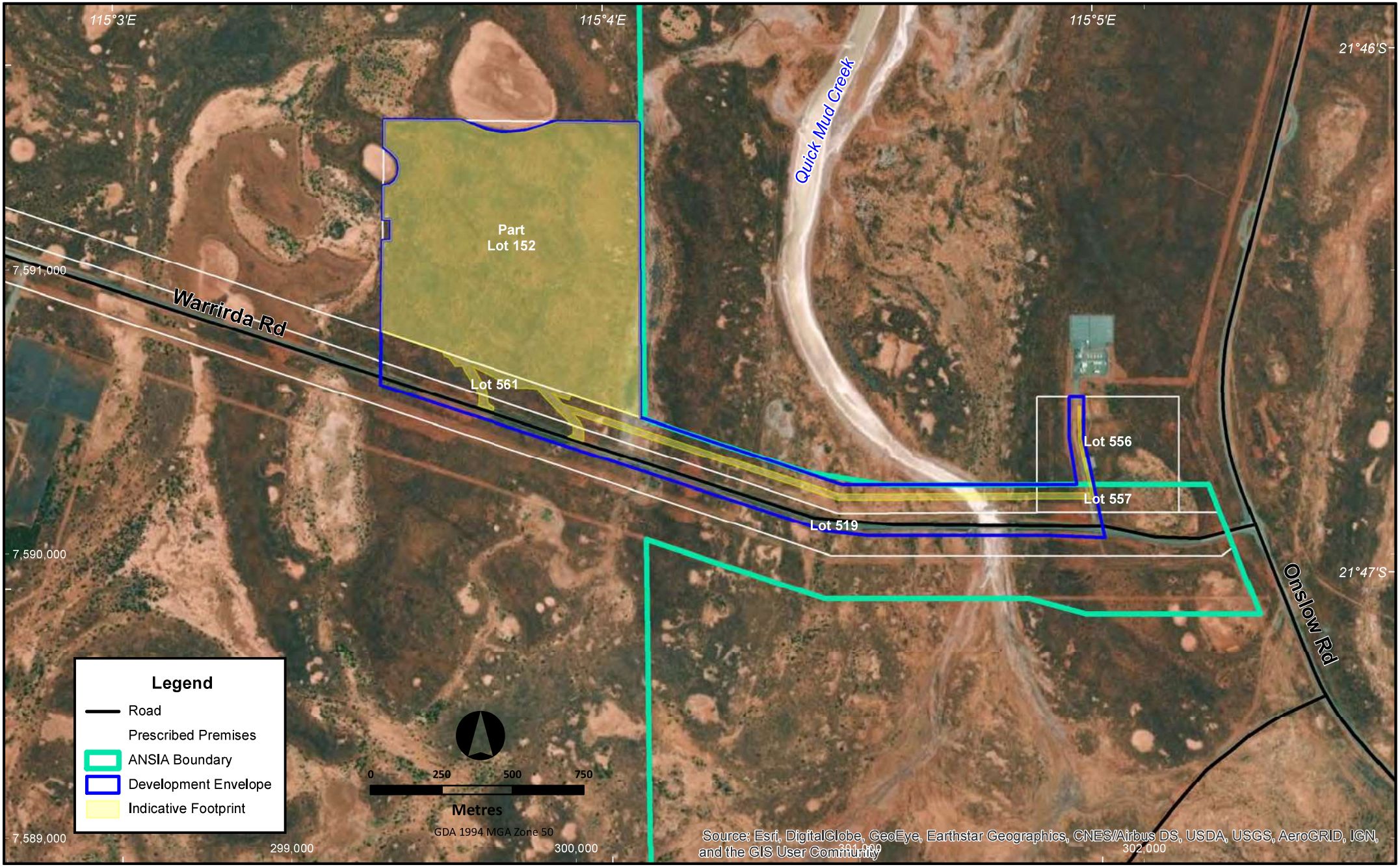
2.1.4 Timeframe

Disturbance activities will commence in June 2022 pending receipt of all approvals and will be completed by June 2024. The process plant and evaporation pond will remain in operation over a minimum 20 year period.

2.1.5 Purpose of clearing

Hastings is positioned to become Australia's next rare earths producer to meet increasing demand for rare earths as the world transitions to green technologies. Rare earths are critical in the manufacture of a wide variety of new consumer and industrial technologies. These range from energy efficient light bulbs to essential components in hybrid and electric vehicles, wind turbines, and medical technologies.

Downstream hydrometallurgical processing of rare earths is yet to be undertaken in Australia. Thus, development of the Onslow Rare Earths Plant represents a significant step forward in providing a higher valued product in the supply chain.



HASTINGS Technology Metals Limited

ONSLOW RARE EARTHS PLANT

Development Envelope and Disturbance Footprint

Fig2_1_DE_and Footprint.mxd
17 November 2021

Figure 2

2.2 SITE OVERVIEW

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies the Australian continent into regions (bioregions) of similar geology, landform, vegetation, fauna and climate characteristics (Department of the Environment (DoE) 2014). According to IBRA, the Project lies within the Carnarvon bioregion, and the Cape Range (CAR1) subregion.

The Cape Range subregion comprises (Kendrick and Mau 2002):

> *Cape Range and Giralia dunefields form the northern part of Carnarvon Basin. Rugged tertiary limestone ranges and extensive areas of red aeolian dune field, Quaternary coastal beach dunes and mud flats. Acacia shrublands over* Triodia *on limestone (*Acacia stuartii *or* A. bivenosa*) and red dune-fields,* Triodia *hummock grasslands with sparse* Eucalyptus *trees and shrubs on the Cape Range. Extensive hummock grasslands (*Triodia*) on the Cape Range and eastern dune-fields. Tidal mudflats of sheltered embaymentts of Exmouth Gulf support extensive mangroves. Beach dunes with* Spinifex *communities. An extensive mosaic of saline alluvial plains with samphire and saltbush low shrublands along the eastern hinterland of Exmouth Gulf. Islands of the Muiron, Barrow, Lowendal and Montebello groups are limestone-based. Subregional area is 2,547,911 ha*

The soils belong to the Onslow Plain Zone (Zone 201), as mapped by the Australian Soil Resource Information System (ASRIS). The dominant soil type in the Development Envelope is represented by the Dune System (201Du) and is described as coastal mudflats (with some sandplains and coastal dunes) on coastal deposits over sedimentary rocks of the Carnarvon Basin with tidal soils, Calcareous deep sands and some red deep sands, red/brown non-cracking clays and salt lake soils.

Soil Landscape Mapping Systems prepared by the Department of Primary Industries and Regional Development (DPIRD),provides an inventory and condition survey of lands at a 1:250 000 scale (version April 2018; DPIRD 2021). There are two land systems present within the Development Envelope outlined below:

- Dune Land System: linear and reticulate dunes, swales, swamps and depressions and claypans (98.8 ha)
- Onslow Land System: undulating sand plains, dunes and level clay plains supporting soft spinifex grasslands and minor tussock grasslands (28.8 ha) (RPS 2015).

The Proposal Area primarily occurs on linear and reticulate dunes consisting of dark red sands and loamy sands and are characterised by vegetation consisting of hummock grasslands of *Triodia schinzii* with numerous low shrubs and forbs (RPS 2021a).

The broader ANSIA is in low-lying ground on the Ashburton River Floodplain (LandCorp 2015). The regional catchment area is divided between the Ashburton River Mouth, the South West Catchment, and the Hooley Creek Catchment. Surface water runoff at the west of the processing plant site is directed towards the Hooley Creek drainage, while runoff at the east flows towards Quick Mud Creek (RPS 2021b). Surface water flow is ephemeral and restricted to local creeks, tidal flats and claypans in the area. The Development Envelope occurs on sand dunes and will not impact surface water flow.

3. ENVIRONMENTAL ASSESSMENT

3.1 FLORA AND FAUNA SURVEYS

The flora and fauna values in the Development Envelope are well understood. Numerous surveys have been conducted over a number of years including baseline surveys and targeted conservation significant species surveys.

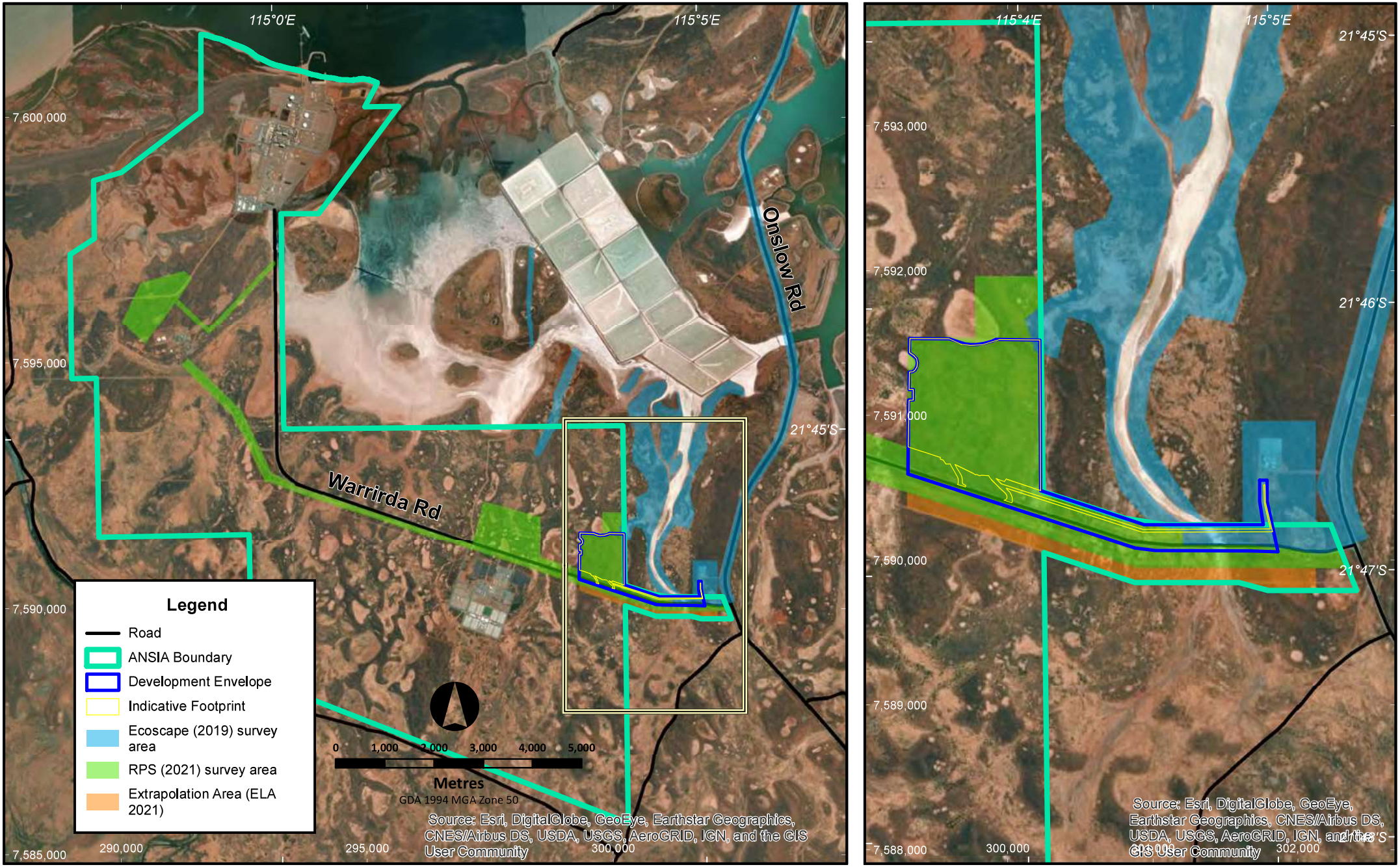
Numerous flora and fauna surveys for the ANSIA, or relevant to the ANSIA, have been undertaken since 2008. The combined coverage of floristic data and vegetation and habitat mapping from these previous surveys has enabled a detailed understanding of the existing flora and fauna values. **Table 1** summarises the flora and fauna investigations undertaken for the Proposal, as well as previous studies within the ANSIA. Key flora and fauna studies are provided in **Attachments 3-8**.

Coverage of flora and vegetation surveys within the Development Envelope and the broader ANSIA is shown in Figures 3 and 4, respectively. Coverage of terrestrial fauna surveys within the Development Envelope is shown in Figure 5.

Table 1 Summary of technical studies for flora and fauna

Report	Summary	Date / timing
Surveys within the Development Envelope		
Detailed flora and vegetation assessment RPS 2021a; **Attachment 3**	A flora and vegetation assessment of land within the ANSIA was undertaken to complement the results of previous surveys and to fill any knowledge gaps, covering 126 ha of the Development Envelope.	Single-phase survey – 16 to 23 October 2020
Addendum report: Onslow Rare Earths Plant – additional flora and vegetation survey ELA 2021b; **Attachment 4**	This report was prepared as an addendum to the *Onslow Rare Earths Plant Detailed Flora and Vegetation Assessment* (RPS 2021a). ELA undertook a reconnaissance level flora and vegetation survey to close potential ecological gaps from the previous survey.	22 – 23 June 2021
Targeted Eremophila forrestii subsp. viridis (P3) survey at Onslow ELA 2021c; **Attachment 5**	Desktop assessment and targeted flora survey in the areas adjacent to the alternative sites proposed by the Proponent to confirm the local extent of *Eremophila forrestii* subsp. *viridis* (P3). A total of 2856 individuals of *Eremophila forrestii* subsp. *viridis* were recorded during the field survey, comprising six populations. Five of these populations were new populations not previously recorded and the remaining one (population one) is considered an extension of an existing known population recorded from within the alternate areas.	13 to 16 December 2020
Onslow Reconnaissance Flora and Fauna Surveys – Dry Season Ecoscape 2019	A Reconnaissance flora survey and level 1 fauna survey covering 1.6 ha of the Development Envelope using 30m x 30m quadrats.	10 – 14 December 2018
Onslow Rare Earth Plant Detailed Fauna Assessment ELA 2021a; **Attachment 6**	Detailed fauna assessment of processing plant area and 'Extrapolation area' within the ANSIA Services Corridor (covered entire Development Envelope and some adjacent areas).	June 2021

Report	Summary	Date / timing
Onslow Rare Earth Plant Fauna Assessment BCE 2021; **Attachment 7**	Basic fauna assessment (desktop review and site inspection) of processing plant area within the Development Envelope (as well as three other nearby alternative site options).	September/October 2020
Onslow Rare Earths Plant Short Range Endemic Invertebrate Survey Bennelongia 2021; **Attachment 8**	Desktop review and reconnaissance field survey processing plant area within the Development Envelope (as well as three other nearby alternative site options).	April 2021
Onslow Reconnaissance Flora and Fauna Surveys Ecoscape 2019	Level 1 fauna survey of areas associated with proposed Water Treatment Plant, includes eastern parts of the Proposal Development Envelope – ANSIA Services Corridor, and water pipeline corridor (survey area overlapped Development Envelope).	December 2018
Surveys within the ANSIA		
Reconnaissance Flora and Vegetation Assessment – Ashburton North Strategic Industrial Area (ANSIA) – Phase 2 Area (RPS 2019b)	Reconnaissance (Level 1) survey in the unsurveyed portions of the Stage 2 area within the ANSIA boundary to support the Amendment to the ANSIA Improvement Scheme.	Single-phase 1 survey – 27 July to 3 August 2018
Flora and Vegetation Review – Ashburton North Strategic Industrial Area (RPS 2016)	Desktop survey	Desktop only
Ashburton North Strategic Industrial Area Flora and Vegetation Assessment (ENV 2012a)	Detailed (Level 2) quadrat-based field survey and targeted survey of 564 ha across the ANSIA Improvement Plant Area.	Phase 1 – 16 to 18 May 2011 Phase 2 – 20 to 22 July 2011
A Vegetation and Flora Survey of the Wheatstone Study Area, near Onslow (Biota 2010a)	Detailed (Level 2) quadrat-based field survey of 9,700 ha across the ANSIA Improvement Plant Area.	Phase 1 – 2 to 9 April 2009 Phase 2 – 15 to 24 April 2009 Targeted – 23 to 26 March 2009
Flora and Vegetation Survey – Ashburton North Project (Onshore Environmental Consultants 2008)	Detailed (Level 2) quadrat-based field survey	
Wheatstone Project Flora and Fauna Assessment Addendum (Biota 2010b; Outback Ecology Services 2010)	Detailed (Level 2) quadrat-based field survey of 3,400 ha across the ANSIA Improvement Plant Area.	N/A
Flora and Vegetation Survey – Ashburton North Project Area Stage 2 (Onshore Environmental Consultants 2009)	Detailed (Level 2) quadrat-based field survey of 2,660 ha across the ANSIA Improvement Plant Area.	N/A
BHBP Macedon Gas Development – Flora and Vegetation Survey (Astron 2009)	Detailed (Level 2) quadrat-based field survey and targeted survey of 1,200 ha across the ANSIA Improvement Plant Area.	Phase 1– 13 to 20 November 2008 Phase 2– 4 to 8 March 2009 Phase 3 – 17 to 23 April 2009



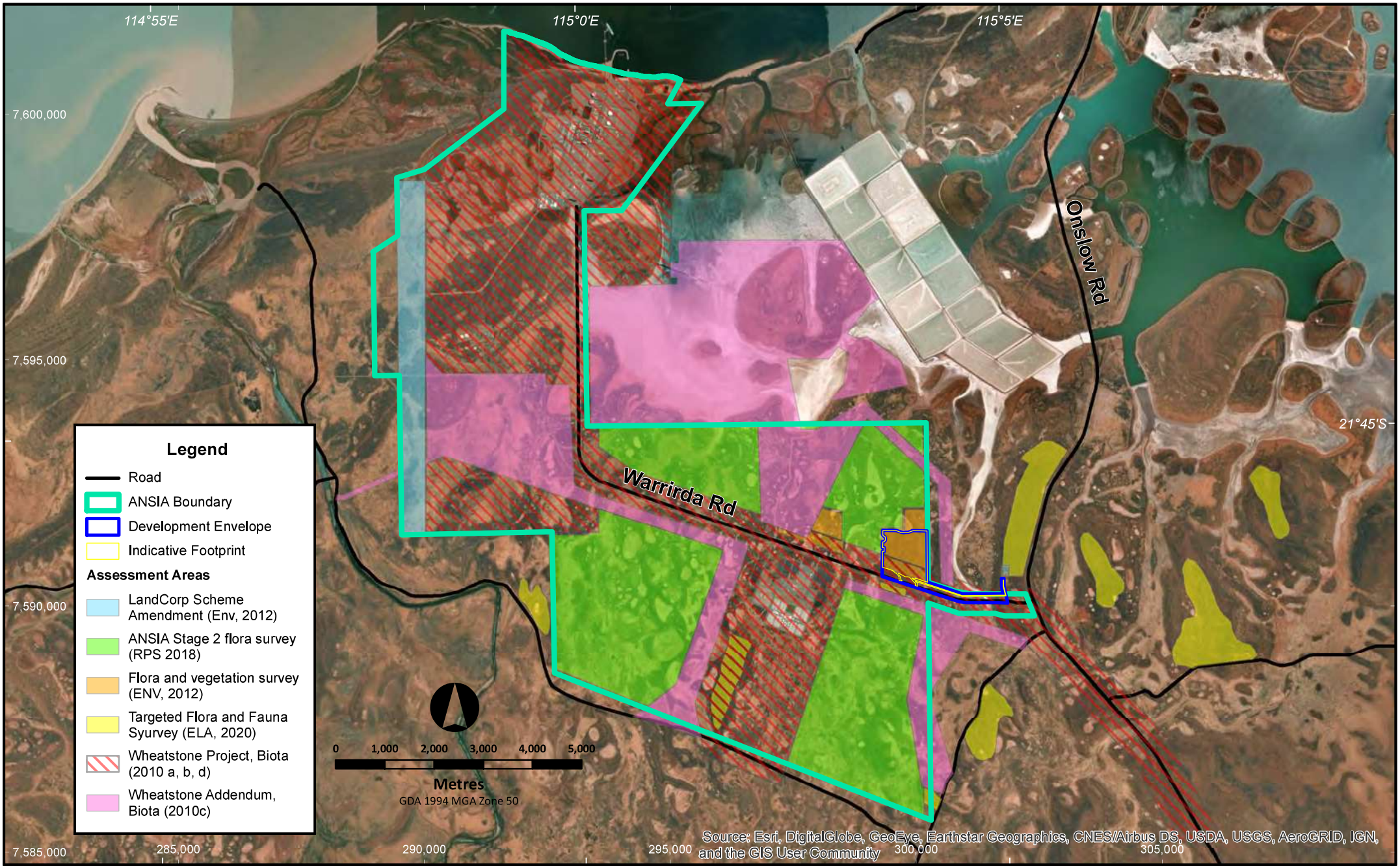
ONSLOW RARE EARTHS PLANT

Fig6_1_Flora_Veg.mxd
17 November 2021

HASTINGS Technology Metals Limited

Coverage of flora and vegetation surveys in the Development Envelope

Figure 3



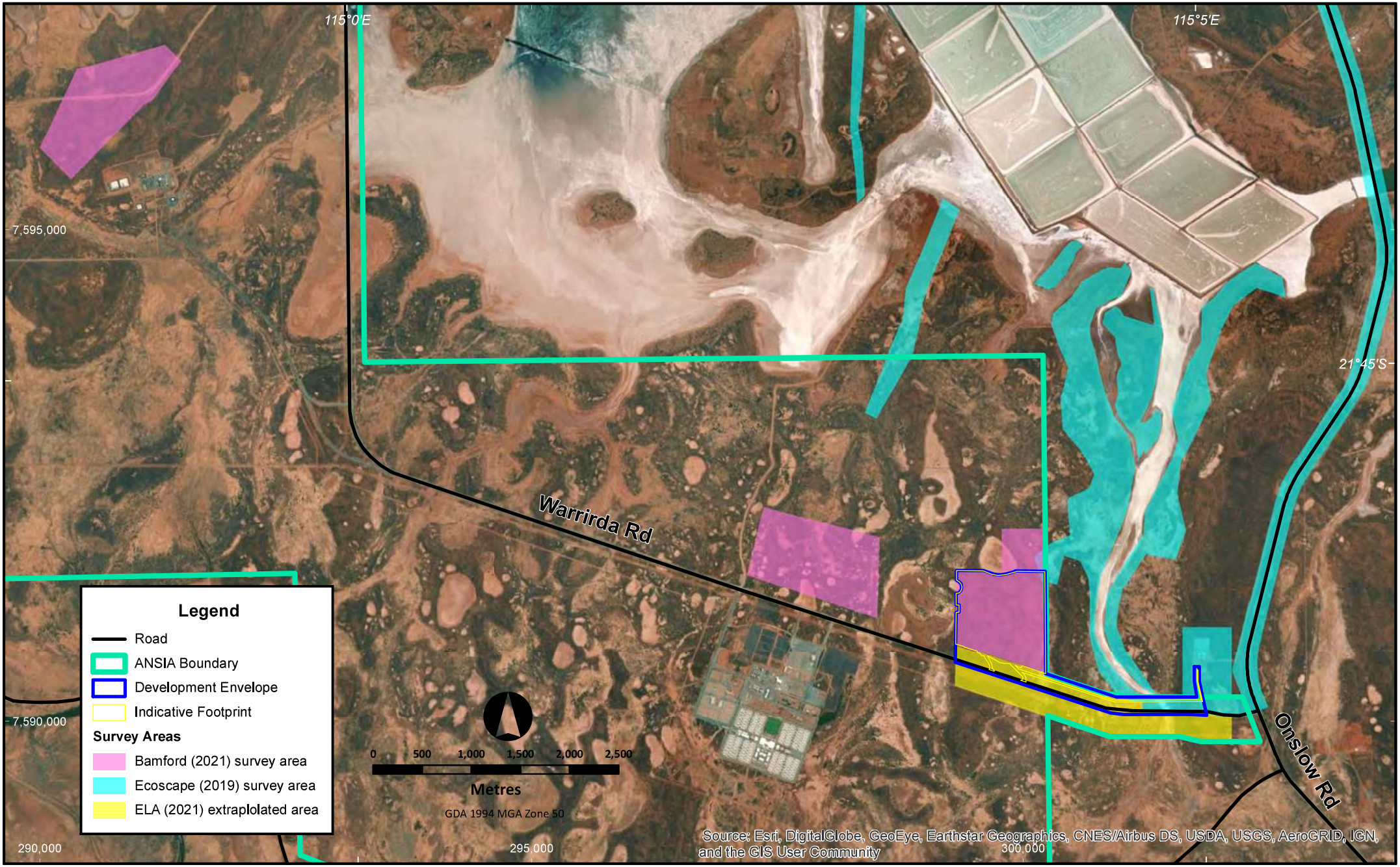
HASTINGS Technology Metals Limited

ONSLOW RARE EARTHS PLANT

Coverage of historical flora and vegetation surveys

Fig6_2_Historical_Flora_Veg.mxd
17 November 2021

Figure 4



HASTINGS Technology Metals Limited

ONSLOW RARE EARTHS PLANT

Coverage of terrestial fauna surveys

Fig7_1_Terrest_Fauna.mxd
17 November 2021

Figure 5

3.1.1 Database searches

A search of the following databases were undertaken over the proposed disturbance area as components of flora and fauna survey reports (Ecoscape 2015, 2016; Ecological 2017):

- Department of Biodiversity Conservation and Attractions (formerly Department of Parks and Wildlife) Threatened and Priority Flora databases (50 km buffer zone); and
- *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act) Protected Matters Search Tool (50 km buffer zone).

The database searches found:

- No communities in the project area constitute a Threatened Ecological Community (TEC) pursuant to the EPBC Act.
- No Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) characterised by a vegetation type within the Project area.

3.1.2 Survey Outcomes

3.1.2.1 Flora

Hastings commissioned RPS (2021) and Ecological (2021) to undertake a Level 2 Flora and Vegetation Assessment and targeted surveys, respectively of the Proposal area and surrounds, which included the Proposal disturbance footprint.

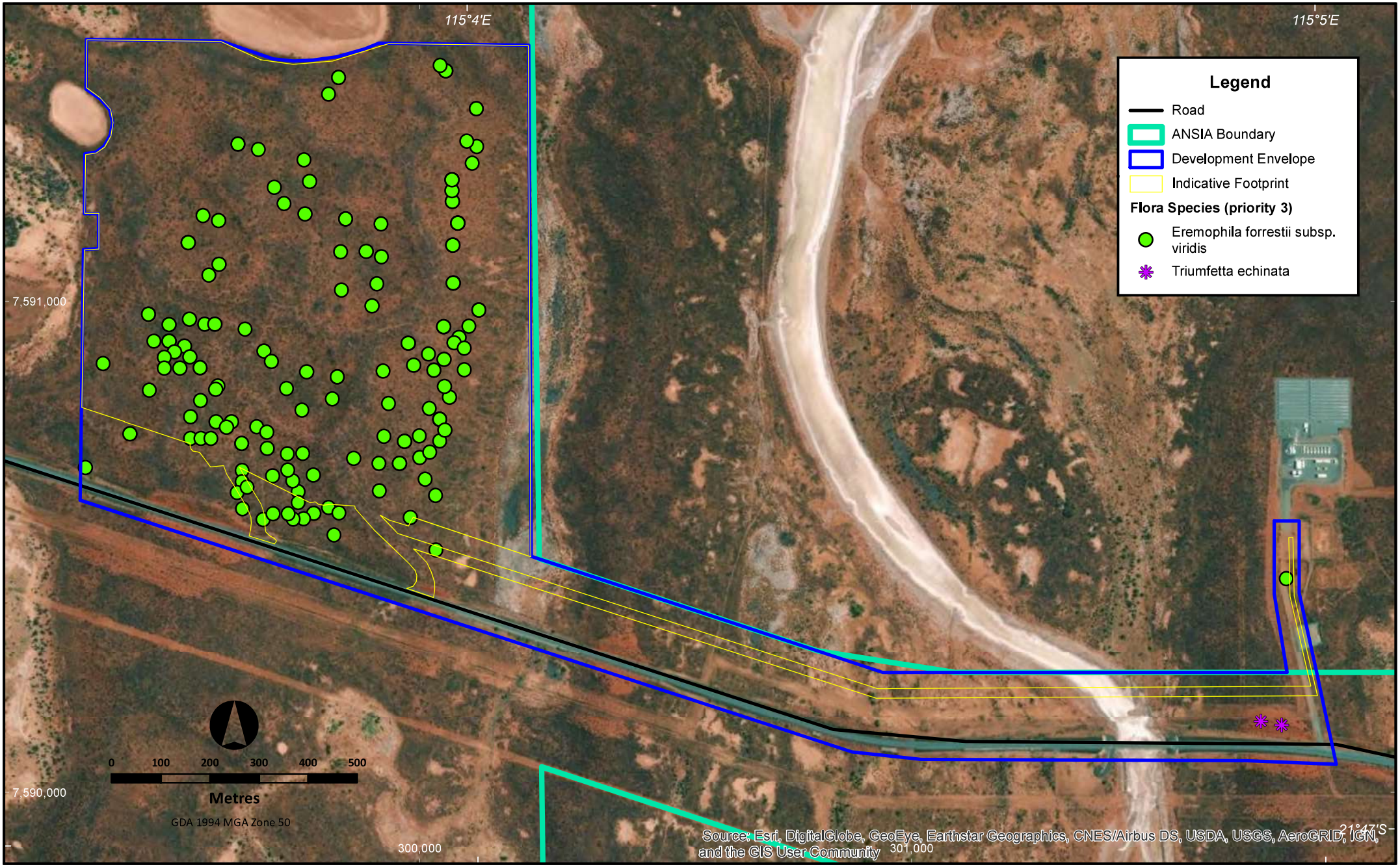
No threatened flora listed under the Environment Protection and Biodiversity Conservation Act 2000 (Cwth) and Biodiversity Conservation Act 2016 (BC Act; WA) were recorded in areas that were surveyed.

Three Priority flora species have been recorded from the ANSIA to date (Biota 2010a): *Eleocharis papillosa*, *Eremophila forrestii subsp. viridis* and *Triumfetta echinata*. Of these, two priority flora (listed by the Department of Biodiversity Conservation and Attractions (DBCA)) were recorded in the Development Envelope (**Table 2; Figure 6**).

Figure 7 shows the extent of *Eremophila forrestii subsp. viridis* within the region and **Figure 8** shows the extent of potential habitat of *Eremophila forrestii subsp. viridis*.

Table 2 Conservation significant flora recorded in the Disturbance Footprint (DF) and Development Envelope (DE)

Species	Habitat	Vegetation type	No. of known individuals in DF and (DE)	Other records of species
Eremophila forrestii subsp. *viridis* Priority 3 (P3)	Sand dunes and plains; mid and upper slopes of linear sand dunes, swales and gently undulating sand plains.	GsTe AteTe HsAsTe	1,271 (1,305)	This Priority flora species is known from six records on NatureMap (DBCA and WAH 2021). A total of 6,481 known individuals have been mapped (inside and outside of the Development Envelope (Biota 2010a; ENV 2012a; ELA 2021c; RPS 2021a and data supplied by Mineral Resources Ltd from studies undertaken by 360 Environmental and Spectrum).
Triumfetta echinata Priority 3 (P3)	Red sand dunes, plains and swales	AstTe	0 (19)	This Priority flora species is known from 8 records on NatureMap (DBCA and WAH 2021).



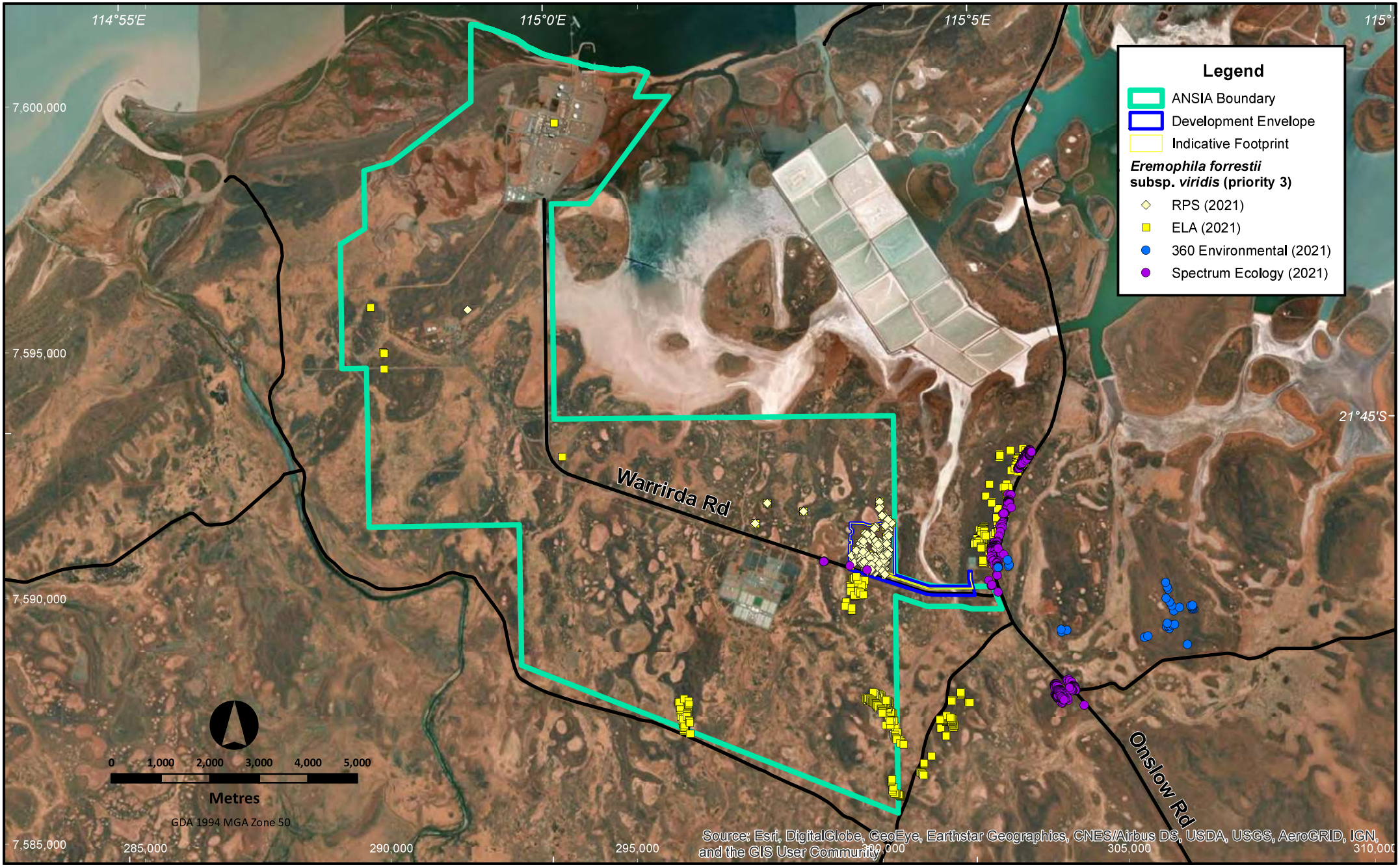
ONSLOW RARE EARTHS PLANT

HASTINGS Technology Metals Limited

Priority flora species recorded in the Development Envelope

Fig6_5_Flora_DE.mxd
17 November 2021

Figure 6



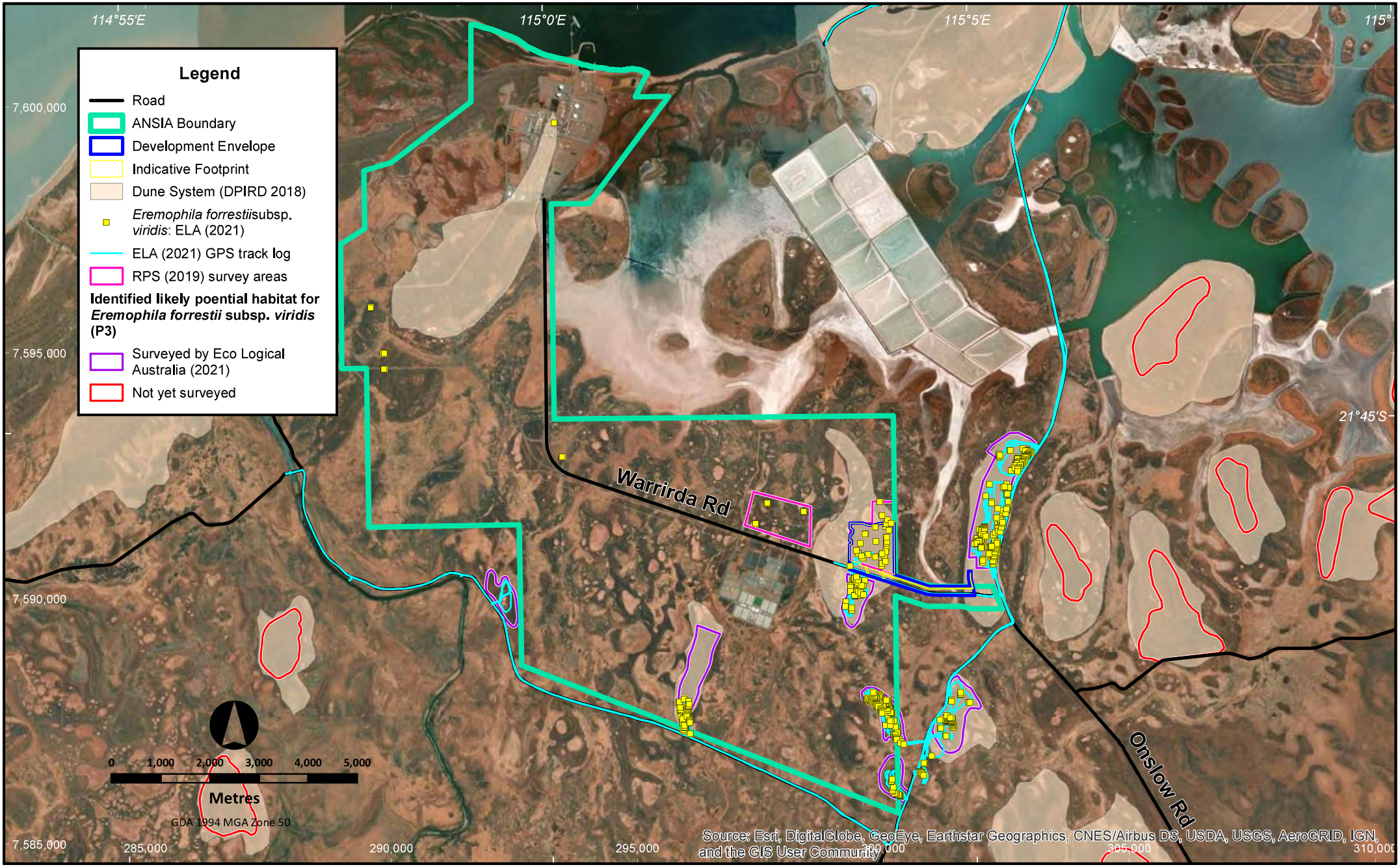
HASTINGS Technology Metals Limited

ONSLOW RARE EARTHS PLANT

Fig6_6_Eremophila.mxd
24 November 2021

Extent of known *Eremophila forrestii* subsp. *viridis* populations within the region

Figure 7



HASTINGS Technology Metals Limited

ONSLOW RARE EARTHS PLANT

Fig6_7_Eremophila_LH.mxd
22 November 2021

Likely habitat for *Eremophila forrestii* subsp. *viridis* (P3)

Figure 8

3.1.2.2 Vegetation

Vegetation types delineated and mapped within the RPS (2021a) and Ecoscape (2019) survey areas were merged with recent vegetation mapping undertaken by ELA (2021b). As a result, a total of nine vegetation types (excluding cleared areas) were mapped within the Development Envelope. Vegetation type extent is summarised in **Table 3**, described in **Table 4**, and mapped in **Figure 9**.

Table 3 Extent of vegetation types

Vegetation type	Survey area (ha)	Extent in Development Envelope (ha)	Extent in Disturbance Footprint (ha)	% impact
AteTe	229.2	34.0	23.3	10
GsTe	57.6	31.5	24.8	43
HsAstTe	49.7	37.8	31.1	62
TECSpp.	35.7	5.7	3.3	9
AstTe	59.4	0.4	0.0	0
AteAsyTe	4.5	4.5	0.0	0
AteTe.Sm/Ef/Eu	98.2	9.8	1.8	2
CP	24.3	<0.1	<0.1	0.4
MF	5.3	2.3	0.3	6
CL	22.1	5.8	0.3	1

No Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC), characterised by a vegetation type, were recorded within the study area.

Photographs of each vegetation type to be cleared are shown in **Table 4**.

Table 4 Description and photograph of each vegetation type

Vegetation type	Photograph
AteTe *Acacia tetragonophylla* Tall to Mid Isolated Shrubs to Open Shrubland over *Triodia epactia* Hummock Grassland	
GsTe *Grevillea stenobotrya* Tall Sparse to Open Shrubland over *Triodia epactia* Open Hummock Grassland	
HsAstTe *Hakea stenophylla* subsp. *stenophylla* Mid Sparse Shrubland over *Acacia stellaticeps* Low Sparse Shrubland over *Triodia epactia* Open Hummock Grassland	

TECspp *Tecticornia* spp. Low Open Samphire Shrubland over *Lawrencia viridigrisea* and *Eragrostis falcata* Sparse Forbland / Tussock Grassland	
AstTe *Acacia stellaticeps* Mid Open Shrubland over *Verticordia forrestii* and *Scaevola sericophylla* Low Sparse Shrubland over *Triodia epactia* Open Hummock Grassland	
AteAsyTe *Acacia tetragonophylla and A. synchronicia* Tall to Mid isolated shrubs to open shrubland over *Triodia epactia* hummock grassland	

AteTe.Sm/Ef/Eu *Acacia tetragonophylla* Tall to Mid Isolated Shrubs over *Triodia epactia* Hummock Grassland and *Sporobolus mitchellii, Eragrostis falcata* and *Eulalia aurea* Tussock Grassland	
CP Bare clay pans with only scattered annual grasses and forbs	
Mf Bare mudflats	

HASTINGS Technology Metals Limited

ONSLOW RARE EARTHS PLANT

Fig6_3_Veg_Types_DE.mxd
17 November 2021

Vegetation types mapped in the Development Envelope

Figure 9

3.1.2.3 Land and vegetation degradation summary

The historical land use has been pastoral, and evidence of degradation occurs due to previous disturbances (roads and tracks, services such as gas, water and power corridors) within the ANSIA, grazing and weeds. The vegetation condition ranges from very good to degraded within the development envelope.

3.1.2.4 Fauna

No threatened or endangered fauna species listed under the EPBC Act or Biodiversity Conservation Act (BC Act), nor priority species listed by the Department of Biodiversity, Conservation and Attractions (DBCA) were found within the development envelope during surveys.

A total of 41 conservation significant vertebrate fauna species were determined by BCE (2021) as possibly occurring, with five species assessed as resident or regular visitors:

- Pilbara Olive Python (*Liasis olivaceus barroni*; Vulnerable [VU] [EPBC Act and BC Act]) – regular visitor
- Brush-tailed Mulgara (*Dasycercus blythi*; P4 [DBCA]) – regular visitor
- Short-tailed mouse (*Leggadina lakedownensis*; P4 [DBCA]) – resident but not sighted in the area since the 1990's
- *Lerista planiventralis maryani* (P1 [DBCA]) – resident although this species has a preference for coastal dunes
- Barn Swallow (*Hirundo rustica*; Migratory [MI] [EPBC Act and BC Act]) – regular visitor.

Ecoscape (2019) also considered one mammal species (Northern Quoll [*Dasyurus hallucatus*]; listed as Endangered [EN] under the EPBC Act and BC Act) as having a high likelihood of occurrence (in the vicinity of the Proposal. However, there is no suitable habitat within the development envelope and thus this species would only visit or pass through the area.

BCE (2018) considered Pilbara Leaf-nosed Bats may overfly its study area (ANSIA Stage 2) while foraging, and thus this can be expected to also apply to the Development Envelope; however, no records exist within the Development Envelope or the surrounding ANSIA. Pilbara Leaf-nosed Bats require deep warm caves (and/or abandoned mine voids) of high humidity, which are not known to be present in the area (BCE 2018).

Along with the Northern Quoll and Pilbara Leaf-nosed Bat discussed above, an EPBC Act Protected Matters Search Tool (PMST) database search also identified 20 migratory bird species as having the potential to be present within 25 km of the Development Envelope (DAWE 2021c). Migratory waterbirds may occur across a range of habitats throughout Australia, including wetlands, coasts, rivers, lakes and mudflats. These species, including the Common Sandpiper and Gull-billed Tern were considered to be irregular visitors to the Development Envelope as the claypan habitat type occupies only a small area (2.8 ha) and is comprised of coarse sandy material unlikely to support an abundance of aquatic invertebrates (ELA 2021a). During flood events, relevant habitat areas within and nearby the Development Envelope may support small numbers of waterbirds; however, this habitat type is not restricted to the Proposal area and is more abundant to the north.

3.1.2.5 Fauna habitat

Five fauna habitats have been identified within the Development Envelope (**Table 5**; **Figure 10**). Habitat mapping has been based on descriptions developed by BCE (2021) and Ecoscape (2019). BCE (2021) definitions of fauna habitats are based on vegetation and substrate associations (VSAs), reflected in their naming convention. All habitat types are known to extend into the surrounding ANSIA area – i.e., all habitat types are expected to be relatively common in the region and wider subregion and not restricted to the Proposal area (ELA 2021a).

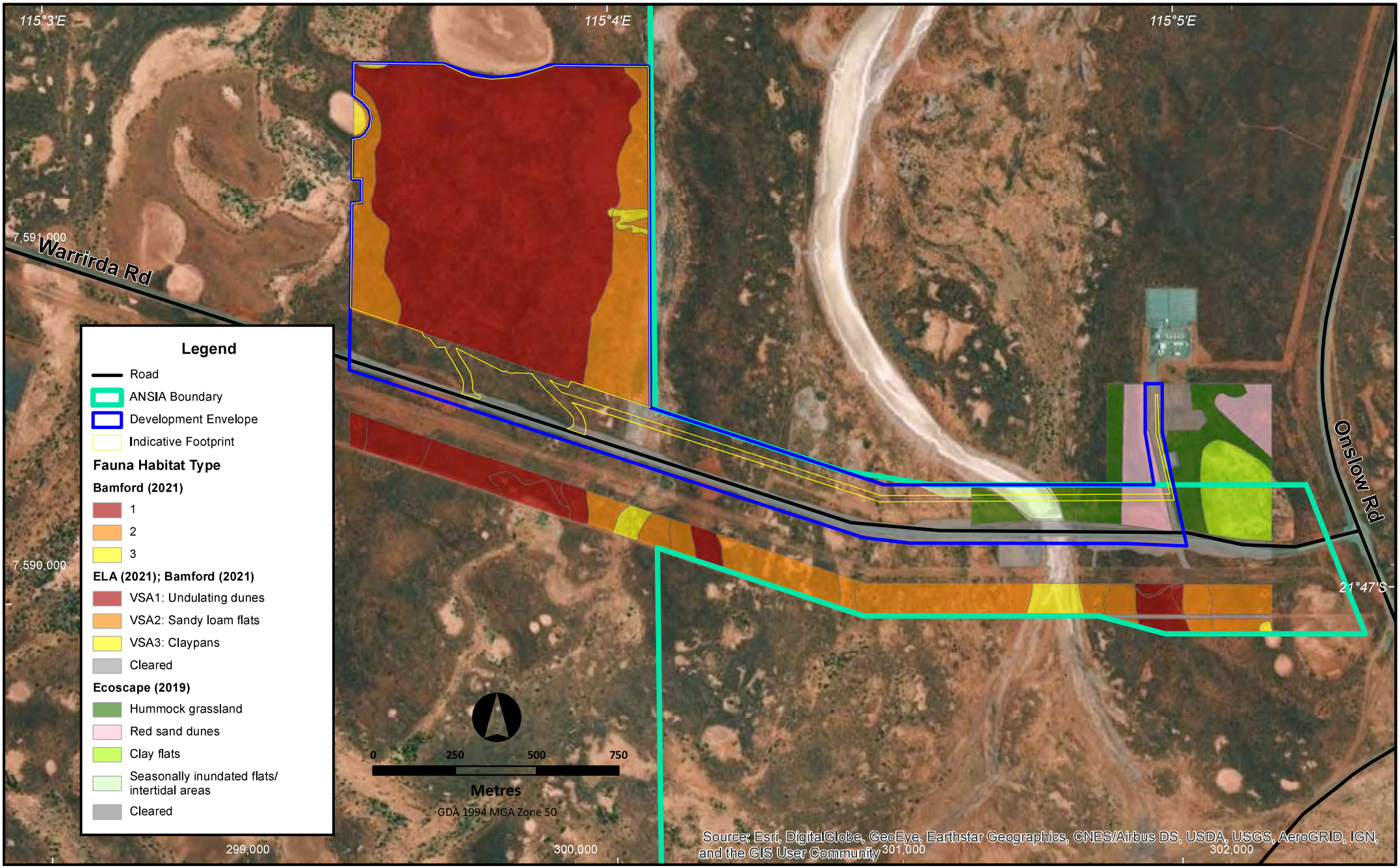
All fauna habitat types in the Development Envelope could potentially support populations of conservation significant fauna (ELA 2021a).

Table 5 Extent of fauna habitat

FAUNA HABITAT	SURVEY AREA (HA)	EXTENT WITHIN DEVELOPMENT ENVELOPE (HA)	EXTENT IN DISTURBANCE FOOTPRINT (HA)	% IMPACT
VSA 1: Undulating Dunes	180.3	74.1	63.6	35
VSA 2: Sandy Loam Flats with Termite Mounds (Sandy Loam Flats)	68.0	31.3	18.9	28
VSA 3: Claypans	65.2	2.8	1.0	2
VSA 4: Seasonally Inundated Flats / Intertidal Areas (Inundated Flats)	146.9	2.2	0.4	0.2
VSA 5: Hummock Grassland	344.2	3.8	0.7	0.2
Cleared	97.5	13.6	0.3	0.3

Both the Short-tailed mouse and *Lerista planiventralis maryani* are considered likely to occur within the Development Envelope, utilising VSA 1 and VSA 2 habitat types. While VSA 1 and VSA 2 are subject to a proportionally higher level of impact than the other habitat types, they are expected to be relatively common in the region and wider subregion and not restricted to the Proposal area (ELA 2021a) and therefore any subsequent impact on fauna species supported by these habitat types, including the Short-tailed mouse and *Lerista planiventralis maryani*, is expected to be low.

Fragmentation of habitat is not expected to be a significant concern for this Proposal. Pipelines within the infrastructure corridor part of the Development Envelope will be buried so no significant barrier to fauna movement will exist there. Similarly, the hydrometallurgical plant and evaporation pond will be surrounded by uncleared native vegetation, ensuring habitat connectivity will be maintained with no significant barrier to fauna movement in the area.



HASTINGS Technology Metals Limited

ONSLOW RARE EARTHS PLANT

Fauna Habitat types mapped within the Development Envelope

Fig7_2_Fauna_Habitat.mxd
17 November 2021

Figure 10

Short range endemics

The region is well represented with potential SREs, although much of this species richness is concentrated within Cape Range and Barrow Island (Bennelongia 2021). Most Cape Range SRE species are exclusively associated with caves and Barrow Island species appear to be restricted to the island (Bennelongia 2021).

The only records of SRE species in the vicinity of the Proposal found in the desktop review were mygalomorph spiders, with one species, Aname 'MYG034', recorded within the ANSIA - but not within the Bennelongia (2021) study areas, although vegetation mapping in those areas indicated a potential for microhabitats to occur and therefore expected to provide habitat refugia.

The field survey resulted in the collection of 92 specimens from 11 known species with the potential to be short range endemics (SRE) in the overall survey area, including 24 specimens from six species in the Development Envelope. Results for the entire survey area included representatives from the pseudoscorpions (five species), scorpions (one species), centipedes (two species), millipedes (two species), and slaters (one species). Three of these species were considered potential SRE species. The subset of the survey area falling within the Development Envelope included representation from the pseudoscorpions (two species), scorpions (one species), centipedes (one species), millipedes (one species), and slaters (one species) (Bennelongia 2021). No confirmed SRE species were collected in the Development Envelope during the 2021 field survey (Bennelongia 2021).

All pseudoscorpion species recorded, including the two recorded from the Development Envelope, were considered by Bennelongia (2021) unlikely to be SREs (i.e., to have confined distributions). The pseudoscorpion *Indolpium* `BPS347`was also thought to occupy differing habitats, including sand dunes, swales, flood plains and sand plains and therefore not expected to be significantly impacted by the Proposal (Bennelongia 2021).

The potential SRE *Urodacus* sp. was collected from a burrow on sand dunes in the Development Envelope. However, this habitat is locally common and considering the relatively small scale of the Proposal they are not expected to be significantly affected (Bennelongia 2021).

Ethmostigmus curtipes was initially thought to be a potential SRE species, however genetic studies have confirmed the identity of this species, which is a common, widespread species in Western Australia (Bennelongia 2021).

The slater species *Unixenus* sp. collected during the 2021 SRE survey is a well-known, widespread species and not considered to be a SRE species and therefore, any impact to it caused by the Proposal is not expected to be significant (Bennelongia 2021).

The potential SRE *Buddelundia* `BIS437` recorded during the 2021 SRE survey is likely a new species; however, the species is not considered to be under threat from the Proposal, as they were found across all SRE study areas, including outside the Development Envelope (Bennelongia 2021).

3.2 HYDROLOGY SUMMARY

Onslow is located within the Western Coastal Province (308), which has been categorised as vulnerable to moderate erosion as a result of weather activity, low ground cover and erodible soils.

Based on the subsurface conditions encountered in test pits and boreholes (Galt Geotechnical 2013), the soils across the process plant and evaporation pond areas are relatively consistent and are summarised as comprising:

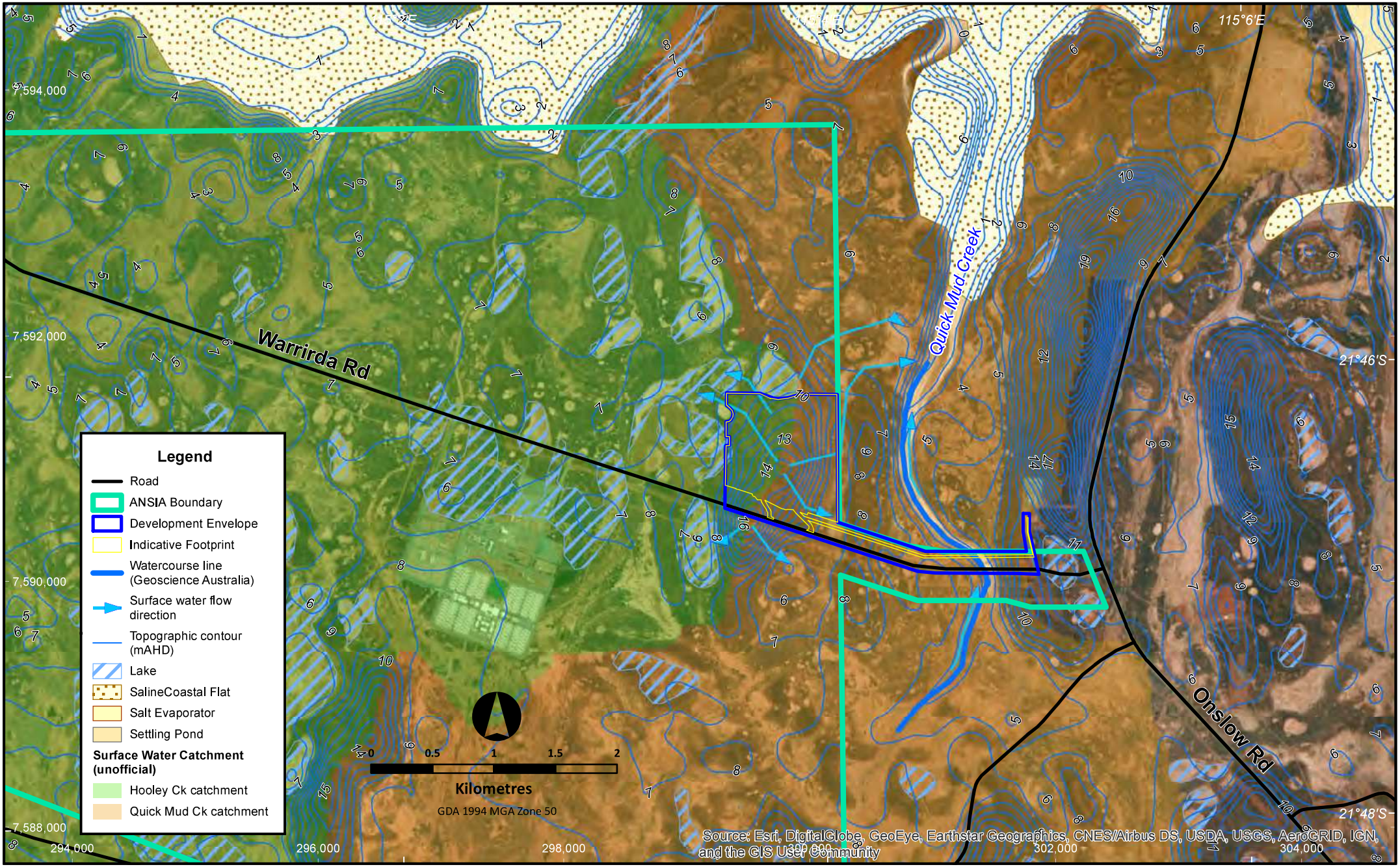
- Sand (SP): fine to medium grained, sub-rounded to sub-angular, generally red-brown, trace roots/rootlets to depths of up to 0.5m, trace fines increasing with depth, generally dry with moist bands near surface, typically very loose to medium dense (near surface), becoming dense with depth, locally very weakly cemented at depth, present from ground surface to depths of between 1.0m to a maximum of depth of investigation (15m), overlying;
- Gravelly Sand (SP): fine to medium grained, sub-rounded to sub-angular, generally red-brown, gravel is predominantly fine to medium grained, sub-angular, white/pale grey, trace to with some fines, dense, locally present from a depth of typically 1.0m, overlying;
- Silty Sand (SM): predominantly fine to medium grained, sub-rounded to sub-angular, generally red-brown, trace roots/rootlets to depths of up to 0.5m, generally dry, typically very loose to medium dense (near surface), decoming dense with depth, locally very weakly to weakly cemented, present from ground surface to the maximum depth of investigation (15m).

The Development Envelope consists of clayey soils in some minor lower lying areas i.e., claypans and where the water pipeline crosses Quick Mud Creek. Areas surrounding the Development Envelope include low lying coastal claypans that are prone to episodic rainfall events (RPS 2021b). The clayey soil type (surface and shallow depth) prevents drainage of rainfall and surface water runoff from the area. As a result, this leads to the lowest lying areas becoming marshy/inundated after extended periods of rainfall (Galt Geotechnical 2013).

The soils are non acid sulphate soils (NASS; Galt Geotechnical 2013).

The soils are not collapsible (Galt Geotechnical 2013).

Surface water runoff from the western boundary of the Development Envelope will be directed towards Hooley Creek, and from the eastern boundary flows towards Quick Mud Creek (**Figure 11**; RPS 2021b). Modelled studies indicate that there are two main waterways in proximity to the Development Envelope that become inundated during heavy rainfalls: Ashburton River and Quick Mud Creek (RPS 2021b).



HASTINGS Technology Metals Limited

ONSLOW RARE EARTHS PLANT

Topography and Drainage

Fig8_3_Topo_Drainage.mxd
18 November 2021

Figure 11

4. CLEARING PRINCIPLES

Schedule 5 of the Environmental Protection Act 1986 defines 10 clearing principles against which the potential impacts of the removal of native vegetation should be assessed. Clearing of native vegetation has been assessed against the 10 clearing principles and is described in **Table 6**.

Table 6 Assessment against 10 Clearing Principles

Clearing Principle	Assessment
(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.	The surveys undertaken within the Development Envelope have recorded a combined total of 95 flora taxa (90 native and five introduced) (ELA 2021b; RPS 2021a). The 2021 (ELA 2021a) detailed fauna survey recorded 66 terrestrial fauna species, which is comparable to other surveys given the extent of the survey area (e.g., 77 fauna species recorded by Thompson [2020 cited in ELA 2021a], and 67 species recorded by BCE [2018 cited in ELA 2021a]). 92 specimens of potential SRE from 11 known species in the overall survey area, included 24 specimens from six species in the Development Envelope. The proposal is not located within any Environmentally Sensitive Area or known Threatened or Priority Ecological Community listed under the EPBC Act or BC Act. Two Priority 3 flora species occur within the development envelope. The proposed activities will result in impacts to approximately 17% of the total number (6,841) of recorded *Eremophila forestii* subsp. *viridus* and no impact to *Triumfetta echinata*.
(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	Five habitat types occur within the development envelope as outlined in Table 5. All five represent significant habitat for fauna indigenous to Western Australia. All habitat types are expected to be relatively common in the region and wider subregion and not restricted to the Proposal area (ELA 2021a).
(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	No threatened flora pursuant to the EPBC Act or listed as declared rare under the *Biodiversity Conservation Act 2018* were recorded during flora surveys. One Priority listed flora species was recorded within the disturbance envelope.
(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.	The proposed disturbance is not located within any Environmentally Sensitive Areas or known Threatened or Priority Ecological Community.
(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	The proposed clearing is unlikely to impact significant remnant native vegetation.
(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	The proposed clearing for a water pipeline intersects Quick Mud Creek, however disturbance of the watercourse will be avoided using a horizontal directional drilling method to place the pipeline under the creek bed thus causing no disturbance to the bed and banks of the creek.

Clearing Principle	Assessment
(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The soils in the Development Envelope have been categorised as being vulnerable to moderate erosion as a result of weather activity, low ground cover and erodible soils. Stormwater runoff onto, across and throughout the Development Envelope, particularly runoff from hard surfaced areas (i.e. pavement, roads and roofs), is controlled to prevent erosional damage (Galt Geotechnical 2013). During the design of the Proposal the mitigation hierarchy (avoid, minimise and rehabilitate) has been applied to reduce the potential of soil erosion as a result of native vegetation clearing and stormwater runoff.
(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The proposed area to be cleared is not located within or adjacent to conservation areas and thus will not have an impact on the environmental values of a conservation area.
(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	The design and location of the proposal will not impede natural water drainage and will not result in additional sediment loads during heavy rainfall events. The soils are classed as non acid sulphate soils (NASS). The soils are susceptible to erosion.
(j) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	The proposal is situated on sand dunes and thus is not likely to cause or exacerbate the incidence or intensity of flooding.

5. AVOIDANCE AND MITIGATION

To minimise and mitigate the risk of detrimental environmental impacts resulting from the activities proposed in this application the following avoidance and mitigation measures have been adopted.

5.1 AVOIDANCE

The following avoidance measures have been considered in the project design and will be implemented during the Proposal:

- Clearing occurs in approved areas (i.e. demarcation of boundary).
- Vehicles/equipment and personnel staying on tracks/roads and within facility boundary.
- 50 m Disturbance Exclusion Zone demarcated around the mapped records of *Triumfetta echinata* within the Development Envelope.
- Existing tracks and other infrastructure will be utilised to the maximum extent practicable.
- The Proponent will implement strict hygiene procedures to prevent introduction of new or additional populations of weed species into the Development Envelope.
- The Proposal has been designed to avoid hazardous substances entering the local environment.
- Erosion prevention measures including but not limited to:
    - Drainage channels that are resistant to erosion
    - Reduce the velocity of water flow
    - Distribute the velocity evenly over the slope and include surface protection measures
    - Outlets for drainage shall have rock or concrete lining
    - Containment of stormwater on site via soak wells, swales etc
    - Revegetation to stabilize soils, where possible.

5.2 MINIMISE

The following minimisation measures will be implemented:

- Vegetation clearing shall be kept to the minimum amount necessary to allow access or approved works.
- Surface water management structures will be maintained to minimise erosion.
- Undertake weekly visual inspections of active work areas to monitor for erosion.
- Inspect surface water management structures and drainage lines for evidence of erosion and/or sedimentation.
- Inspect all infrastructure following heavy rainfall events.
- Minor erosion events will be rectified immediately.

The construction contractor will be required to implement the following management measures:

- Construction Environmental Management Plan (CEMP) to be implemented during the construction stage to manage disturbance areas, clearing and construction related environmental risks.
- Land clearing will be done in accordance with the Hastings Land Clearing and Topsoil Stockpile Work Instruction.
- Topsoil to be harvested and stored to retain viability of local provenance native seedbank.
- Management of existing weeds and prevention of the introduction and establishment of weed species (not currently present in the development envelope) via vehicle hygiene measures.
- Ground disturbance procedure to ensure delineation of clearing boundaries and topsoil management.
- Implement standard dust management measures including truck mounted water sprays and speed limits for traffic.
- Fire prevention, with fire extinguishers on all vehicles, inductions to include fire prevention awareness, and a fire break around the facilities.

6. REFERENCES

Astron Environmental Services (Astron). 2009. *BHBP Macedon Gas Development – Flora and Vegetation Survey (Phases 1 and 2).* Unpublished report prepared for URS Australia Pty Ltd.

Bancroft, W. J. and Bamford, M. J. (Bamford Consulting Ecologists [BCE]). 2005a. *Assessment of the Terrestrial Fauna of the Proposed BHP Billiton Onslow LNG Plant*. Unpublished report to URS Australia Pty Ltd, East Perth. M. J. and A. R. Bamford Consulting Ecologists, Kingsley, Western Australia

Bancroft, W. J. and Bamford, M. J. (Bamford Consulting Ecologists [BCE]). 2005b. *Repeat survey for terrestrial fauna at the proposed site of the BHP Billiton Onslow LNG Plant, Onslow, September 2005*. Unpublished report to URS Australia Pty Ltd, East Perth. M. J. and A. R. Bamford Consulting Ecologists, Kingsley, Western Australia.

Bamford, M. J., Cherriman, S. and Bamford, A. R. (Bamford Consulting Ecologists [BCE]). 2009a. *Survey for Migratory Waterbirds in the Wheatstone LNG Project Area, November 2008 and March 2009*. Techical Appendix K1 within the Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Wheatstone Project prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd, by M. J. and A. R. Bamford Consulting Ecologists, Kingsley, WA.

Bancroft, W. J. and Bamford, M. J. (Bamford Consulting Ecologists [BCE]). 2009b. *Fauna Assessment BHP Billiton Petroleum Pty Ltd Macedon Gas Development Terrestrial Plant Site and Linear Infrastructure Corridor*. Report prepared for URS Australia Pty Ltd

Bancroft, W. J. and Bamford, M. J (Bamford Consulting Ecologists [BCE]). 2018. *ANSIA Stage 2 Fauna Assessment*. Prepared for RPS Australia Asia Pacific. 23 December.

Bancroft, W. J. and Bamford, M. J (Bamford Consulting Ecologists [BCE]). 2021. *Onslow Rare Earth Plant Fauna Assessment*. Prepared for Hastings Technology Metals Ltd. 9 February.

Beard, J. S. 1976. *Vegetation Survey of Western Australia: Murchison 1:1 000 000*. Map and Explanatory Notes to Sheet 6. University of Western Australia Press, Perth.

Beard, J. S., 1990. *Plant Life of Western Australia*. Kangaroo Press Pty Ltd, Kenthurst NSW.

Bennelongia Environmental Consultants (Bennelongia). 2021. *Onslow Rare Earths Plant Short Range Endemic Invertebrate Survey*. Draft prepared for Hastings Technology Metals Limited. June.

Biota Environmental Sciences (Biota). 2010a. *A Vegetation and Flora Survey of the Wheatstone Study Area, near Onslow.* Unpublished report prepared for Chevron Australia.

Biota Environmental Sciences (Biota). 2010b. *Vegetation of the Wheatstone Addendum Area*. Unpublished report prepared for Chevron Australia.

Biota Environmental Sciences (Biota). 2010c. *Wheatstone Project Flora and Fauna Assessment Addendum*. Unpublished report prepared for URS Australia by Biota Environmental Sciences, Leederville, Western Australia.

Biota Environmental Sciences (Biota). 2010d. *Wheatstone Project Terrestrial Fauna Survey*. Biota Environmental Services, Leederville, Western Australia.

Department of Agriculture, Water and the Environment (DAWE). 2021a. *Australia's bioregions (IBRA)*. Available from: https://www.environment.gov.au/land/nrs/science/ibra.

Department of Agriculture Water and the Environment (DAWE). 2021b. *Species Profile and Threats Database*, Commonwealth of Australia. Department of Environment and Energy, Australian Government, Canberra. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

Department of Agriculture, Water and the Environment (DAWE). 2021c. EPBC Act Protected Matters Report. Available from: http://www.environment.gov.au/epbc/protected-matters-search-tool. Accessed August 2021.

Department of Biodiversity, Conservation and Attractions (DBCA). 2007 - 2021. *NatureMap*. Department of Parks and Wildlife and WA Museum. Available from: https://naturemap.dpaw.wa.gov.au/.

Department of Biodiversity, Conservation and Attractions and the Western Australian Herbarium (DBCA and WAH). 2021. *FloraBase—the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. Available from: https://florabase.dpaw.wa.gov.au/.

Department of the Environment (DoE). 2013. *Matters of National Environmental Significance, Significant impact guidelines 1.1*, Environment Protection and Biodiversity Conservation Act 1999. Canberra, ACT.

Department of the Environment and Energy (DoEE). 2002. *Interim Biogeographic Regionalisation for Australia (IBRA)*, Version 7, Department of the Environment.

Department of Primary Industries and Regional Development (DPIRD). 2021. *Natural Resource Information - Soil Landscape Mapping*. DPIRD, Western Australia.

Ecoscape. 2019. Onslow Reconnaissance Flora and Fauna Surveys. Prepared for Advisian.

Eco Logical Australia (ELA). 2021a. *Onslow Rare Earth Plant Detailed Fauna Assessment*. Prepared for Hastings Technology Metals Ltd. 4 August.

Eco Logical Australia (ELA). 2021b. *Addendum report: Onslow Rare Earths Plant – additional flora and vegetation survey.* Prepared for Hastings Technology Metals Limited.

Eco Logical Australia (ELA). 2021c. *Targeted Eremophila forrestii subsp. viridis (P3) Survey at Onslow*. Prepared for Hastings Technology Metals Ltd.

ENV Australia Pty Ltd (ENV). 2012a. *Ashburton North Strategic Industrial Area Flora and Vegetation Assessment*. Unpublished report prepared for The Planning Group.

ENV Australia Pty Ltd (ENV). 2012b. *Ashburton North Strategic Industrial Area Biological Desktop Review*. Report prepared for The Planning Group

ENV Australia Pty Ltd (ENV). 2012c. *Ashburton North Strategic Industrial Area Fauna Assessment*. Unpublished report prepared for The Planning Group, LandCorp.

Environmental Protection Authority (EPA). 2016a. *Environmental Factor Guideline: Flora and Vegetation*. Environmental Protection Authority, Western Australia.

Environmental Protection Authority (EPA). 2016b. *Environmental Factor Guideline: Terrestrial Fauna*. EPA, Western Australia. December 2016.

Environmental Protection Authority (EPA). 2016d. *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment*. EPA, Western Australia.

Environmental Protection Authority (EPA). 2016e. *Technical Guidance: Sampling of short range endemic invertebrate fauna.* EPA, Western Australia.

Environmental Protection Authority (EPA). 2020a. *Statement of Environmental Principles, Factors and Objectives*. EPA, Western Australia. June 2020.

Environmental Protection Authority (EPA). 2020d. *Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. EPA, Western Australia. July 2020.

Galt Geotechnics. 2013. Report on geotechnical study - Eastern General Industrial Area, Ashburton North, Onslow. Unpublished report prepared for LandCorp. December 2013.

Hill B.M. and Ward S.J. 2010. *National Recovery Plan for the Northern Quoll Dasyurus hallucatus*. Department of Natural Resources, Environment, The Arts and Sport, Darwin.

Keighery, B.J. 1994. *Bushland Plant Survey: A guide to plant community survey for the community*. Wildflower Society of Western Australia, Nedlands.

Kendrick, P. G. and Mau, R. 2002. *Carnarvon 1 (CAR1 - Cape Range subregion).* In: CALM (Ed.) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002, pp. 69-86. Department of Conservation and Land Management, Perth, Western Australia.

Metcalf, 2016a.

Onshore Environmental Consultants (OEC). 2008. *Flora and Vegetation Survey Ashburton North Project Area*. Unpublished report prepared for Chevron Australia.

Onshore Environmental Consultants (OEC). *2009 Flora and Vegetation Survey of the Ashburton North Project Area – Stage 2*. Unpublished report prepared for Chevron Australia.

Osman K, T. 2013. *Soil Erosion by Water*. Soil Degradation, Conservation and Remediation. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-7590-9_3.

Outback Ecology Services. 2010. *Wheatstone Amendment Area: Flora and Vegetation Assessment*. Unpublished report prepared by Golder Associates on behalf of Chevron Australia.

RPS Environment and Planning Pty Ltd (RPS). 2009. *Baseline Flora and Vegetation Survey Ashburton North Pipeline Route Option 3*. Unpublished report prepared for Chevron Australia.

RPS Environment and Planning Pty Ltd (RPS). 2014. *Terrestrial Fauna Review, Ashburton North Strategic Industrial Area*. Unpublished report prepared for LandCorp.

RPS Environment and Planning Pty Ltd (RPS). 2015. *Environmental Assessment Report, Ashburton North Strategic Industrial Area Improvement Scheme*. Report prepared for LandCorp.

RPS Environment and Planning Pty Ltd (RPS). 2016. *Flora and Vegetation Review - Ashburton North Strategic Industrial Area*. Unpublished report prepared for LandCorp.

RPS Environment and Planning Pty Ltd (RPS). 2019a. *Environmental Assessment Report: Ashburton Strategic Industrial Area - Phase 2*. Unpublished report prepared for LandCorp.

RPS Environment and Planning Pty Ltd (RPS). 2019b. *Reconnaissance Flora and Vegetation Assessment - Ashburton North Strategic Industrial Area (ANSIA) - Phase 2 Area*. Unpublished report prepared for LandCorp.

RPS Environment and Planning Pty Ltd (RPS). 2021a. *Detailed Flora and Vegetation Assessment – Onslow Rare Earths Plant*. Prepared for Hastings Technology Metals Ltd.

RPS Environment and Planning Pty Ltd (RPS). 2021b. *Desktop Hydrology and Hydrogeology Assessment, Onslow Rare Earths Plant.* Prepared for Hastings Technology Metals Ltd.

Threatened Species Scientific Committee (2016). *Conservation Advice Rhinonicteris aurantia (Pilbara form) (Pilbara Leaf-nosed Bat*). Canberra: Department of the Environment. Available: http://www.environment.gov.au/biodiversity/threatened/species/pubs/82790-conservation-advi ce-10032016.pdf. In effect under the EPBC Act from 10-Mar-2016.

Tille, P. J. 2006. *Soil-landscapes of Western Australia's rangelands and arid interior*. Department of Agriculture and Food (DAF), Perth.

TPG. 2012. *Ashburton North Strategic Industrial Area Stage 1B and 1C, Development Plan Report.* Perth. Available: https://www.dplh.wa.gov.au/getmedia/c45d144c-ba69-4164-b8d6-df639e57b2c2/IMP-Ashburton-Appendix_B_Engineering_Gap_Analysis.