



Onslow Rare Earths Plant Short  
Range Endemic Invertebrates  
Survey

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Final Report

Short-Range Endemics | Subterranean Fauna

Waterbirds | Wetlands





# Onslow Rare Earths Plant SRE Invertebrate Survey

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## EXECUTIVE SUMMARY

Hastings Technology Metals Limited proposes to develop the Onslow Rare Earths Plant (OREP) located 17 km southwest of the Onslow townsite in the Ashburton North Strategic Industrial Area (ANSIA). The proposed OREP encompasses a hydromet process plant and waste evaporation pond over an approximate area of 1.25 km<sup>2</sup>. Four Areas are being investigated for their suitability for this purpose and in combination make up 'the Project area' for the purpose of this survey. Only one of the four areas will be developed with the preferred option occurring within the ANSIA

The Carnarvon basin has a high diversity of species belonging to Short-Range Endemic (SRE) Groups. These are groups of terrestrial invertebrate species that tend to have highly restricted ranges and may be threatened by individual development projects. Despite the small size of the OREP, it may have the potential to negatively affect populations of some SRE species if not assessed via desktop, field survey and impact assessment in accordance with EPA guidelines. The purpose of this assessment is to determine the likelihood that the OREP will or will not impact SRE species.

Previous survey records of terrestrial invertebrate species from SRE Groups encompassing the Carnarvon Basin were compiled by searching the databases of the Western Australian Museum, Bennelongia, and relevant publications for a search area of approximately 10,000 km<sup>2</sup>.

The conclusion of the desktop review was that at least 106 species belonging to SRE groups (i.e., species with ranges <10,000 km<sup>2</sup>) have been recorded in the search area. These species include 43 mygalomorph (trapdoor) spiders, 13 araneomorph (modern) spiders, nine gastropods, eight pseudoscorpions, six scorpions, five millipedes, one centipede, and one isopod. Effort to collect terrestrial invertebrates (particularly targeting SRE Groups) in the vicinity of the Project has occurred predominantly on Barrow Island and the Cape Range peninsula.

The distributions of recorded species revealed that the majority of SRE species documented are exclusively associated with habitats limited to either Cape Range or Barrow Island. The only records of SRE species near the Project areas were mygalomorph spiders, with just one species, *Aname* 'MYG034', previously recorded within the ANSIA but not within the Project areas.

A reconnaissance field survey was undertaken in April 2021 to provide additional information and to confirm (or otherwise) the conclusions of the desktop review. The survey documented 11 species with the potential to be further considered within SRE target groups, including five species of pseudoscorpion, two species of centipede, two species of millipedes, one species of scorpion, and one species of slater. Three species were determined to be potential SREs and the remaining eight were either unlikely SREs or widespread species.

Of the three species, *Buddelundia* 'BIS437' is a potential SRE however as it was recorded across all four survey areas and therefore, it is not considered threatened by the development. Potential SREs that are currently only known from one Area in the Project and therefore are of conservation significance are the pseudoscorpion *Atemnidae* 'BPS349' (Area 3), and the scorpion *Urodacus* 'BSCO068' (Area 1). These species are, however, data deficient potential SREs and assigning them as potential SREs is precautionary.

Despite the presence of potential SRE fauna in the Project area, the small size of the impact footprint of the Project and presence of habitat beyond the Project area suggests that the OREP is very unlikely to have a conservation significant impact on any SRE fauna.

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## 1. INTRODUCTION

Hastings Technology Metals Limited proposes to develop the Onslow Rare Earths Plant (OREP) located 17 km southwest of the Onslow townsite in the Ashburton North Strategic Industrial Area (ANSIA) (Figure 1).

The proposed OREP encompasses a hydromet process plant and waste evaporation pond over an approximate area of 1.25 km<sup>2</sup>. Four Areas are being investigated for their suitability for this purpose and combined, make up 'the Project area' (Figure 2). The clearing of native vegetation for the development of the OREP has the potential to detrimentally impact terrestrial Short-Range Endemic (SRE) invertebrate fauna inhabiting the OREP footprint.

This report provides an evaluation of conservation values pertaining to SRE terrestrial invertebrates, as well as other conservation-listed terrestrial invertebrates, in the vicinity of the Project. The appraisal is based principally on the information derived from an initial desktop assessment and the reconnaissance field survey.

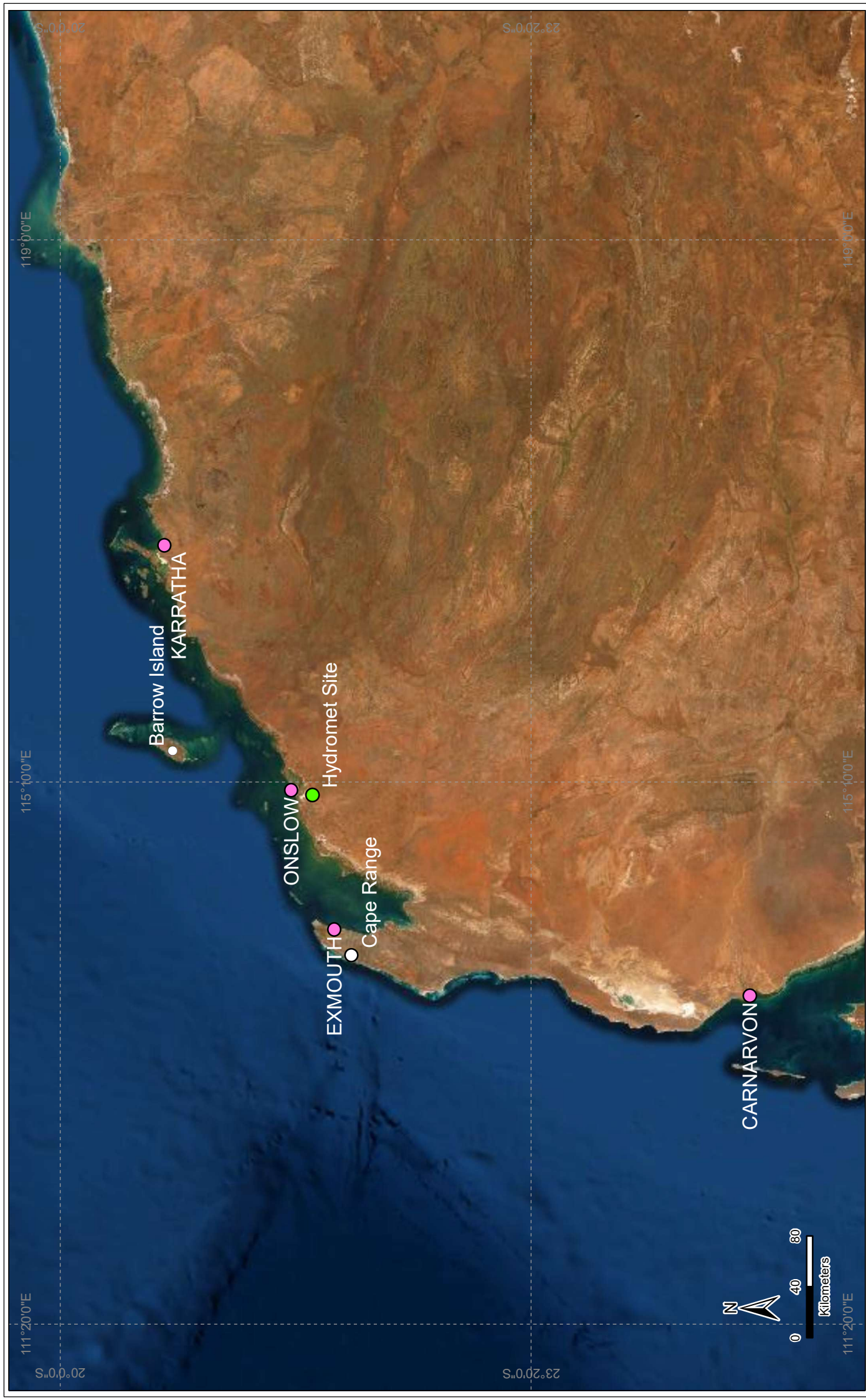
## 2. LEGISLATION

An ecological community that comprises a naturally occurring biological assemblage in a particular habitat type may be listed by the Minister for the Environment, under the *Biodiversity Conservation Act 2016*, as a Threatened Ecological Community (TEC) if it is presumed to be totally destroyed, critically endangered, endangered or vulnerable. A community that is threatened but does not meet these criteria, is rare but not threatened, is near threatened, has recently been removed from the TEC list, or is conservation-dependent, may be listed informally by the Department of Biodiversity, Conservation and Attractions (DBCA) as a Priority Ecological Community (PEC). There are no PECs or TECs in the vicinity of the search area listed as terrestrial SRE taxa. There are also no terrestrial invertebrate species listed as Threatened by the Minister under the *Biodiversity Conservation Act 2016* or as Priority species by DBCA in the vicinity of the Project.

## 3. SRE FRAMEWORK

Short Range Endemic (SRE) species are defined as having overall ranges of less than 10,000 km<sup>2</sup> (Harvey 2002), as well as exhibiting patchy distributions within their range, slow growth, low fecundity and poor dispersal capabilities. Guidelines for the consideration and assessment of SRE invertebrates in Western Australia are provided in *Environmental Factor Guideline: Terrestrial Fauna* (EPA 2016a) and *Technical Guidance: Sampling of short range endemic invertebrate fauna* (EPA 2016b). Assessment typically focuses on taxonomic groups (the SRE Groups) that are known to contain moderate to high proportions of SRE species. These groups include land snails (Gastropoda), millipedes (Diplopoda), centipedes (Chilopoda), pseudoscorpions (Pseudoscorpiones), scorpions (Scorpiones), spiders (Araneae, mainly trapdoor spiders) and slaters (Isopoda). Some other groups, such as velvet worms (Onychophora) and earthworms (Oligochaeta) are SRE Groups in mesic landscapes.








GCS GDA 1994  
Author: hclark  
Date: 5/07/2021

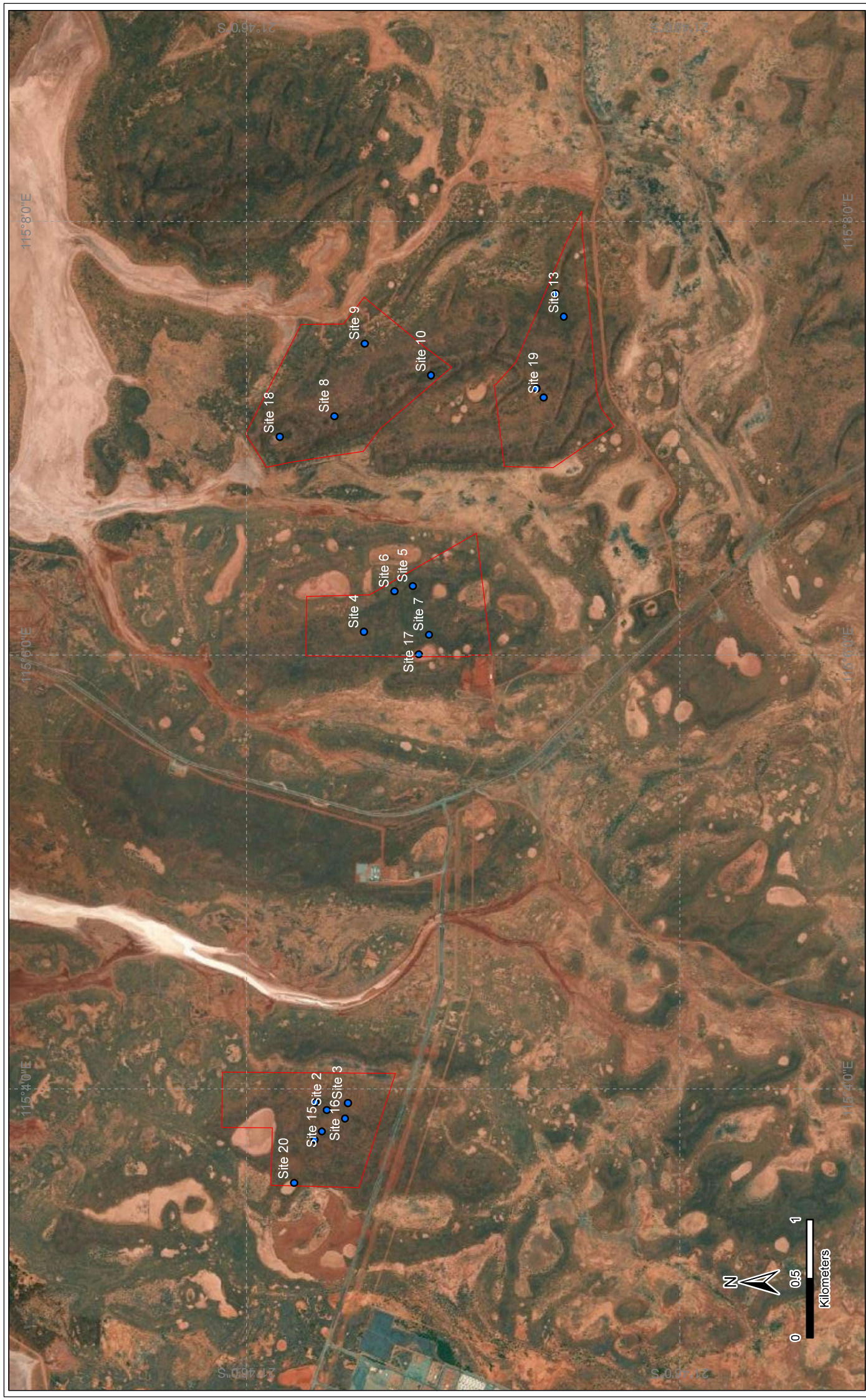


**Legend**

-  Hydromet Site
-  Towns
-  Geographical Features

**Figure 1. Location of The Project within Western Australia**





- Legend**
- Sampled Sites
  - Hydromet Plant
  - Site Areas



**Figure 2. Sampled Sites within the Hydromet Plant Site Areas.**



Groups that are usually more widespread due to high vagility, ecological plasticity or xeric adaptation, may contain species with restricted ranges (e.g. Framenau *et al.* 2008; López-López *et al.* 2016; Rix *et al.* 2015) and, conversely, some species in groups with a high proportion of SREs, may be widespread. Therefore, determining whether a species has a significantly restricted range (notionally <10,000 km<sup>2</sup>) is often difficult. However, the distribution of an SRE Group species is likely to reflect the extent of its preferred or obligate habitat(s). Species that are only found in restricted or patchy habitats usually have smaller ranges than those collected from extensive or common habitats. An additional constraint to assessment is that, in some groups, short-range endemism may be related to life history rather than historical biogeography. This consequently results in a species occupying only part of a widespread habitat and therefore being an SRE (Harvey 2002; Harvey *et al.* 2011; Rix *et al.* 2015).

In this report, SRE status is inferred based on the classification system of the Western Australian Museum (WAM), where a species can be classified into one of the following categories:

1. **Confirmed SREs** have a known distribution range smaller than 10,000 km<sup>2</sup>. The taxonomy is well known, and the group well represented in collections and/or via comprehensive sampling.
2. **Potential SREs** belong to a group with gaps in our knowledge of its distribution, either because the group is not well represented in collections, taxonomic knowledge is incomplete, or the distribution is poorly understood due to insufficient sampling.
3. **Widespread (not SRE)** species have a known distribution range larger than 10,000 km<sup>2</sup>. The taxonomy is well known, and the group well represented in collections via comprehensive sampling.

The factors considered when evaluating the SRE status of each species in this report were the known range of the species, habitat(s) at the collection location(s) and the spatial extent and connectivity of these habitats, as well as the distribution patterns of phylogenetically related surrogate species (ideally members of the same genus). **Potential SREs** can be separated into species which are treated as SREs as a precautionary measure because of insufficient information to determine whether they are widespread (**data deficient Potential SREs**), species that are unlikely to be SREs although the information suggesting this is not definitive (**Unlikely SREs**), and species that existing information suggest are quite likely SREs (**Potential SREs**).

When considering potential impacts on a species, it is recognised that even SRE species may be locally widespread around a project area, so that identifying potential SRE species is only the first part of a filtering process used to determine whether species may be threatened by a proposed development. Moreover, the actual level of threat to an SRE species depends on its distribution relative to the development footprint, rather than SRE status alone. Determining the likely level of threat to a species requires consideration of the extent of the species' preferred habitat, both within and outside the area of disturbance.

## 4. DESKTOP REVIEW

Existing records of terrestrial invertebrates and associated habitat information were examined to appraise the likelihood of SRE and/or conservation listed invertebrate species occurring in the vicinity of the Project.

### 4.1 Habitat

Detailed vegetation mapping has been carried out by Hastings Technology Metals at a proportion of the proposed Project areas but unfortunately is not available over the wider ANSIA. The vegetation within the OREP revealed that the site is dominated by *Acacia* shrubland over tussock grassland. The tenement vegetation is predominantly in good or very good condition and lacks historical soil disturbance (Appendix 2).

The Carnarvon Bioregion has undergone long-term aridification, historical clearing for pastoral land use and livestock grazing. Undisturbed habitat similar to that found in the OREP area is therefore of potential ecological importance (DAWE 2008, Kendrick and Mau 2002).

#### 4.1 Previous records

Previous records of terrestrial invertebrate species were compiled from Bennelongia and the Western Australian Museum (WAM) databases, an earlier survey in the Wheatstone by Biota Environmental Sciences (Biota 2010), and published taxonomic literature. This resulted in a comprehensive search area of 10,000 km<sup>2</sup> centred on the proposed site for the OREP.

Collating this information provides an indication of some of the likely groups that may be present at the area of interest as well as an indication of the sample effort that has been undertaken historically. Appendix 1 provides a tabulated list of species previously recorded in the search area. It is important to note that due to incomplete or inconsistent taxonomy for some records, it is not possible to determine the exact number of species collected. Some recorded species may contain multiple taxa and, conversely, some specimens assigned to different taxa may actually represent the same species.

According to the desktop review approximately 106 species belonging to SRE groups have been previously recorded in the search area (Figure 3). These species include 43 mygalomorph (trapdoor) spiders, 13 araneomorph (modern) spiders, nine gastropods, eight pseudoscorpions, six scorpions, five millipedes, one centipede, and one isopod.

Using species records as a proxy for sampling coverage, the effort to collect terrestrial invertebrates (particularly targeting SRE Groups) within the search area has predominantly been focused on Barrow Island and the Cape Range peninsula. These regions are considered priority communities within the Carnarvon Bioregion and therefore, in contrast to the area of the Pilbara around the proposed OREP, have been intensively sampled and monitored (Majer *et al.* 2013; Humphreys 1993; Humphreys and Adams 1993; Humphreys and Shear 1993;).

#### 4.3 Likelihood of SRE species

The desktop review of SRE invertebrates in the area revealed a plentiful assemblage of potential SREs. Much of this richness can be attributed to the inclusion of Cape Range and Barrow Island in the search area. The majority of SRE species recorded from Cape Range are exclusively associated with the caves in the area and similarly those on Barrow Island appear to be restricted to the island. The only records of SRE species near the Project areas were mygalomorph spiders, with one species, *Aname* 'MYG034', recorded within the ANSIA but not within the Project areas (Harvey *et al.* 2018) (Figure 3).

Vegetation mapping within the Project areas revealed that the site is in good to very good condition with the potential for microhabitats to occur. The area is therefore likely to provide habitat refugia for many SRE species.



Figure 3. Records of potential SRE species in relation to the ANSIA



## 5. FIELD SURVEY

In order to corroborate the conclusions of the desktop study, a reconnaissance field survey targeting invertebrates belonging to SRE Groups was undertaken from the 22<sup>nd</sup> to the 26<sup>th</sup> April 2021 by Huon Clark and Vitor Marques. The aim of the survey was to collect species from recognised SRE groups from representative habitat types across the four Areas being investigated for their suitability as the potential OREP site (combined, Project areas).

### 5.1. Survey Timing

Many SRE Groups are most active, and therefore likely to be collected, during and immediately following substantial rainfall.

A significant amount of rain fell seven days before the start of the survey. The weather station located at the Onslow airport recorded a total of 45.8 mm rainfall from the 9<sup>th</sup> to 15<sup>th</sup> April 2021. No further rain was recorded in the survey area during the remainder of April. Conditions were considered ideal for the survey.

### 5.2. Sampling effort and methods

A total of 20 sites across four Areas (those being investigated for their suitability as the proposed OREP) were sampled using a range of active search techniques. These active search techniques varied at each site according to habitat, knowledge of the biology of certain taxa and visual observations of burrows or other tell-tale signs of target species. These sites were dispersed across each of the representative habitats identified from vegetation mapping (sand dune crests and swales, sand plains, floodplains and claypans) (Appendix 2). The distribution of sampling sites is shown in Figure 2.

Outlined below are the collection and methods used while in the field:

1. **Habitat characterisation** consisted of recording the dominant vegetation type; land formation, and slope of terrain; the depth of leaf litter and estimated proportion of the site area covered by three depth categories (< 1mm, between 1mm and 5mm and > 5mm); and the estimated extent of fire and stock impact on the site (both in categories of 1 to 4).
2. **Active foraging** consisted of visual searching for evidence of SRE species and included searching under boulders and bark, counting spider burrows and digging up representative burrows to confirm species identifications, using UV torch searches at night to find scorpions, setting of cup traps to catch scorpions, digging through litter and around roots, and sieving litter. Foraging was conducted in all relevant microhabitats present at a survey site, such as under logs, rocks, tree bark. Active foraging was always performed for at least 1 hour by two people, equating a total of 2 hours of sampling effort per site.
3. **Litter and soil sampling** were performed by collecting up to 0.0037 m<sup>3</sup> of litter and soil from each site to capture small SRE species, such as pseudoscorpions, small snails, scorpions, centipedes and millipedes. The litter/soil samples were sorted in the laboratory using Tullgren funnels to separate the animals from the litter/soil.

The survey targeted seven SRE Groups: spiders (Araneae), pseudoscorpions (Pseudoscorpiones), scorpions (Scorpiones), centipedes (Chilopoda), millipedes (Diplopoda), slaters (Isopoda) and snails (Gastropoda). Even though earthworms (Oligochaeta) and velvet worms (Onychophora) are known to contain SREs, these groups were not targeted as they are restricted to high-rainfall areas (Blakemore 2000; Reid 2002). When foraging, the individuals of all target SRE Groups were preserved in 100% ethanol and returned to the laboratory for full identification. Morphological species identifications were undertaken by Jane McRae (millipedes, scorpions and centipedes), Heather McLetchie (millipedes), Huon Clark (isopods) and Melanie Fulcher (pseudoscorpions).

### 5.3. Genetics

Specimens collected in the field were placed in 100% ethanol and transported to the laboratory for identification. Three SRE specimens from Onslow were identified for DNA sequencing of the CO1 and 12S genes, to provide additional certainty that the morphological identifications of these animals were correct. Sequencing two genes provides extra data in the event that one gene fails to sequence properly or there are insufficient data in the literature to make accurate comparisons. However, unless otherwise stated, decisions about species status have been made using the 'bar-coding' CO1 gene.

Genetic sequencing was conducted in house. Gene extraction was performed using the Qiagen DNeasy® Blood & Tissue Kit. Specimens were sequenced for variation at the mitochondrial cytochrome c oxidase subunit I (CO1) using the primers LCO1490 and HC02198 (Folmer *et al.* 1994) and at the mitochondrial small subunit ribosomal RNA gene (12S) using the primers SRG14197 and SRN14745 (Simon *et al.* 2006). Sequences were subsequently sent to AGRF for Sanger sequencing. After sequences were returned to Bennelongia, they were edited and aligned in Geneious (Kearse *et al.* 2012), using default parameters. To test that the amplified sequences were the target DNA, sequences were translated into proteins. Genetic distances and phylogenetic trees were calculated using genetic models derived in Geneious. Genetic distances between unique genetic sequences (haplotypes) were measured using uncorrected p-distances (total percentage of nucleotide differences between sequences). Available sequences on GenBank and in the grey literature were included in phylogenetic analyses to provide a framework for assessing intra and interspecific variation, as well as to examine levels of differentiation among individuals within described species across their geographic ranges.

### 5.4. Survey results

#### 5.4.1. Species Accounts

The field survey resulted in the collection of 92 specimens from SRE groups from a known 11 species (Table 1). This included representatives from the pseudoscorpions (five species), centipedes (two species), millipedes (two species), scorpions (one species) and slaters (one species). Three of these species are considered potential SRE species and five are considered Unlikely SRE species. No confirmed SRE species were collected during the survey. The distributions and SRE statuses of recorded species within each target group are discussed below.

#### Mygalomorph spiders

From the desktop search, previous literature indicates the occurrence of mygalomorph spiders within proximity to the Project areas with one species, *Aname* 'MYG034', recorded within the broader ANSIA (approx. 6km away from the nearest survey area; Figure 3) (Harvey *et al.* 2018). In contrast to this there were, however, no mygalomorph spiders recorded during the reconnaissance survey.

#### Pseudoscorpions

##### Family Atemnidae

Pseudoscorpions belonging to the family Atemnidae collected from the survey were identified as *Atemnidae* 'BPS349' and are believed to be a new species, the distribution of which is unknown. *Atemnidae* 'BPS349' was collected at the top of a large sand dune in 'Area 3'. Information from the Bennelongia database suggests members of this family occur throughout the Pilbara in various habitats, however SRE status cannot be inferred from this. It is therefore, considered a data deficient potential SRE.

**Table 1:** Species of SRE invertebrate groups recorded in the Project area and its vicinity.

NB: red shading indicates higher order identifications specimens of which may belong to species already represented in the table

Higher Classification	Lowest Identification	Area 1								Area 2				Area 3				Area 4				Distribution comments
		Site 01	Site 02	Site 03	Site 14	Site 15	Site 16	Site 20	Site 04	Site 05	Site 06	Site 07	Site 17	Site 08	Site 09	Site 10	Site 18	Site 11	Site 12	Site 13	Site 19	
<b>Arthropoda</b>																						
<b>Pseudoscorpiones</b>																						
Atemnidae	Atemnidae 'BPS349'													3								New species, only known from the Project area. <b>Potential SRE.</b>
Olpidae	Beierolpium 8/2 'BPS350'														1							New species, only known from the Project area. <b>Unlikely SRE</b>
	Indolpium 'BPS347'	1	3							1	1				5			2	8			New species, only known from the Project area. <b>Unlikely SRE</b>
	Indolpium 'BPS348'															5						New species, only known from the Project area. <b>Unlikely SRE</b>
	Indolpium sp.	1								3					1					1		Likely one of the above species.
	Olpidae sp.														3			1		2		Likely one of the above species.
	Xenolpium sp.																			1		Uncertain ID, juvenile <b>Unlikely SRE.</b>
<b>Scorpiones</b>																						
	Urodacus 'BSCO068'						1															Uncertain ID, juvenile <b>Potential SRE.</b>
<b>Myriapoda</b>																						
Scolopendridae	Scolopendra morsitans												1									Widespread. <b>Not SRE</b>
	Ethmostigmus curtipes				1	1																Widespread. <b>Not SRE</b>
<b>Diplopoda: Polyxenida</b>																						
Polyxenidae	Unixenus sp.	7	1	1						4	2	2		2	3	2				2		Uncertain ID, <b>Unlikely SRE.</b> (Short and Huynh 2013).
Synxenidae	Phryssonotus novaeollandiae																		1			Widespread (Short and Huynh 2009). <b>Not SRE</b>
<b>Malacostraca: Isopoda</b>																						
Armadillidae	Buddelundia 'BIS437'	1	6							11									1			New species, only known from the Project area. <b>Potential SRE</b>



### Family Olpiidae

Pseudoscorpions from the Olpiidae family are considered good dispersers because of their tendency to phoresy with flying insects. The Pilbara species also appear to be very robust and adapted to the arid conditions and are not generally regarded as SREs (Cosgrove *et al.* 2016). Notably, however, some species can have limited distributions due to restricted, specialist habitats (Harvey 2010, 2012; Harvey 2018; Harvey *et al.* 2015).

*Beierolpium* 8/2 `BPS350` is an undescribed new species and was found within 'Area 3' of the proposed Project areas. The genus *Beierolpium* 8/2 has been recorded across Western Australia and the family is known to have phoretic associations with insects (Jhasser Martínez *et al.* 2018), and thus not usually considered SREs. However, confidently inferring the SRE status for *Beierolpium* 8/2 `BPS350` is not possible and so remains an unlikely SRE.

Two species from the genus *Indolpium* were collected. *Indolpium* `BPS347` is believed to be a new species and were widespread throughout the four OREP Area options. It is proposed as an unlikely SRE due to its prevalence across differing habitats- ranging from sand dunes, swales, flood plains and sand plains. Due to its abundance, it is assumed that it will not be significantly impacted by the proposed development.

*Indolpium* `BPS348` were found exclusively in 'Area 3'. This is a new species and confidently inferring SRE status is difficult with such limited data, for reasons stated above this will tentatively be treated as an unlikely SRE.

Finally, *Indolpium* sp. and *Olpiidae* sp. were represented by a further six individuals each. These individuals could not be identified to a species level as they were juveniles, however, they are suspected to be one of the above-mentioned species.

The four species recorded at the Project are considered unlikely to have confined distributions. They were recorded either under tree bark during bark peel, or in leaf litter under trees such as *Hakea* and *Acacia* and were collected from both the crests and swales of sand dunes - habitats which are regionally common. The collection habitat (and microhabitat) is not considered prospective for SRE pseudoscorpions, unlike habitats such as rock outcrops, which can form habitat isolates.

### Scorpions

Six species of potential SRE scorpions were recorded within the desktop search belonging to the genus *Urodacus* in the family Urodacidae. Urodacid scorpions are ground-dwelling, burrowing hunters and have been recorded on Barrow Island, the Cape Range, as well as inland from the tenement (Astron 2009; DAWE 2008).

One scorpion was collected during the reconnaissance survey. This was a juvenile individual from the genus *Urodacus*. A second individual (which, based on size was likely another juvenile) was observed in the field within 50 m of the collected specimen. The desktop search identified that other potential SRE scorpions belonging to the same genus have the potential to occupy the project area. Due to the life stage of the collected individual a determination on species could not be made through morphology. As a result, genetic sequencing was conducted on this individual. A BLAST on GenBank and comparisons with sequences contained within the Bennelongia database did not reveal a genetic match. The closest relative identified was a species from the Bennelongia database which was collected approximately 500 km to the east. This had a genetic divergence on the CO1 gene of 8.5% while intraspecific divergences in COI in the genus are usually < 5%. As a result, this animal is classified as a potential SRE and has been given a new Bennelongia species code, *U.* `BSCO068`.

U. `BSCO068` was opportunistically collected from a burrow on sand dunes in 'Area 1'. This habitat is found across the tenement and considering the size of the proposed OREP they are unlikely to be significantly affected.

### Centipedes

During the field survey individuals from the family Scolopendridae were collected. The described (widespread) species *Scolopendra morsitans*, was collected from 'Area 2'. Centipedes from the subfamily, Otostigminae were exclusively found within 'Area 1' and based on morphological characteristics, were considered to be a new species and a potential SRE. A conservative approach was taken to conduct genetic sequencing to ensure this species had not been collected elsewhere. A BLAST in GenBank and further comparisons with sequences held within the Bennelongia database identified a genetic match. With a genetic divergence on the CO1 gene of 0.9%, this species has been updated to *Ethmostigmus curtipes*. This is a widespread species found throughout Western Australia, and this information is reflected in Table 1.

### Millipedes

The five species of *potential SRE* millipedes recorded from the desktop search had only been recorded on the Cape Range and during the reconnaissance survey none of them were collected within the project area. The two species that were collected during the survey, Polyxenidae *Unixenus* sp. and Synxenidae *Phryssonotus novaehollandiae* are well known, wide spread species and are not considered SREs (Short and Huynh 2013; Short and Huynh 2009).

### Isopods

#### Family Armadillidae

Isopods from the species *Buddelundia* `BIS437` were found abundantly across all four possible project development Areas. Species of this genus can vary widely in the size of their distributions, and some are SREs (Judd 2004). This is likely a new species and is currently considered a data deficient potential SRE. They are not considered to be under threat from the proposed development, as they were found across all project Areas.

## 6. CONCLUSIONS

The desktop review of SRE invertebrates in the area revealed many records of potential SREs, the majority of which, were restricted to Cape Range or Barrow Island. The only species identified as previously collected in the ANSIA were mygalomorph spiders. The desktop study concluded that the threat of the OREP development on SRE species was low.

The reconnaissance field survey undertaken in April 2021 under ideal survey conditions in the Project area collected 11 species belonging to SRE target groups, including five species of pseudoscorpion, two species of centipede, two species of millipedes, one species of scorpion; and one species of slater. Three species were determined to be potential SREs and the remaining eight were either unlikely SREs or widespread species. *Buddelundia* `BIS437` is a potential SRE however, as it was recorded across all four Areas it is not considered threatened by the development. Potential SREs that are currently only known from one 'Area' in the Project and therefore are of conservation significance are the pseudoscorpion *Atemnidae* `BPS349` (Area 3), and the scorpion *Urodacus* `BSCO068` (Area 1). These species are, however, data deficient Potential SREs and assigning them as potential SREs is precautionary.

The primary impacts to SRE species within the selected Project area are expected to occur as a result of clearing of high-quality vegetation. Given that the proposed site of the OREP is <2 km<sup>2</sup>, the likelihood of an entire SRE species being restricted to the development area can be regarded as low. Regardless of the presence of potential SRE fauna in the Project Area, the negligible impact footprint of the Project on the surrounding habitat suggests that the Project is very unlikely to have significant impact on any SRE fauna.

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