

# Memo Report



To: Gavin Edwards  
Director, Preston Consulting

From: Tim Morald & David Leach  
Phoenix Environmental Sciences

Date: 09 December 2021

Scope: Memo report of targeted searches at Mardie Salt Project for *Minuria tridens*.

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Dear Gavin Edwards,

Phoenix Environmental Sciences (Phoenix) is pleased to present this memo report summarising results of the flora targeted search at Mardie Salt Project for *Minuria tridens* (P1) conducted 28 September – 4 October 2021.

## Background

BCI Minerals Ltd (BCI) is seeking to develop the Mardie Salt Project (the Project), located 105 kilometres southwest of Karratha, Western Australia. The Project is a proposed solar salt operation that will utilise seawater and evaporation to produce a concentrated salt product and other associated products.

Previous baseline flora and vegetation surveys conducted by Phoenix (Phoenix 2020) found four populations (76 recorded plants) of *Minuria tridens* (P1) within the Project study area (Figure 1). BCI has requested a targeted pre-clearance survey for *Minuria tridens* within potential habitat vegetation types AcAjTe and AtAjTe that occur within the proposed development envelope. Results of the survey aim to; ensure compliance with potential future EP Act conditions, assist planning of the Project and understand potential proportional impacts.

## Scope

The proposed scope of work is as follows:

- Define the extent/boundary of known populations of *Minuria tridens* at known locations.
- Conduct targeted searches for *Minuria tridens* potential habitat vegetation types AcAjTe and AtAjTe (previously mapped by Phoenix) that occur within the development envelope.

## Methods

A suitably qualified senior botanist, as per the technical guidance (EPA 2016), supervised and led the field survey and all other aspects of this work.

## Desktop assessment

Areas of potential habitat (vegetation types AcAjTe and AtAjTe) to search for *Minuria tridens* within the development envelope were identified prior to the survey. The desktop assessment considered locations of existing records of the taxa and vegetation type mapping within the development envelope.

## Targeted search survey

Targeted searches for *Minuria tridens* were conducted from 28 September to 4 October 2021. Targeted searches occurred on foot in meandering transects within areas identified as potential habitat by the desktop assessment. Transects were spaced ~100 m apart to maximise the ground covered. On finding a population, botanists focused targeted searches to define the population boundary. Where plants were encountered the following information was collected:

- GPS coordinates, including population boundary 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
- specimen collection for taxonomic identification and lodgement at the WA Herbarium
- photograph of live plants in-situ (eg. Figures 2 & 3) and description of important details, such as flower colour, height of individual or average height of population.

## Results

### Desktop assessment

Desktop assessment identified 93 areas totalling 763 hectares of AcAjTe type vegetation and three areas totalling 25 hectares of AtAjTe type vegetation. Both these vegetation types were considered potential habitat for *Minuria tridens* (Figure 1) due to occurrence of known populations in these vegetation types.

### Targeted search survey

Previous locations of *Minuria tridens* at Mardie were revisited to define their extent and boundaries. No further individuals were found at these locations. In total the four previously known populations contain a total of 76 recorded plants (Table 1).

Four populations of *Minuria tridens* were found in the development envelope, these populations contained 266 recorded plants (Figures 2-4). These new populations reported here are referred to by unique identifiers<sup>^</sup> (^for purpose of this report only); SE has one GPS point and 10 recorded plants, NW has one GPS point and 16 recorded plants, SW has three GPS points (200 m length) and 30 recorded plants, NE has 19 GPS points (within 10-hectare area) and 210 recorded plants (Table 1).

Therefore, this survey brings the total *Minuria tridens* recorded plants to 342 with 22% occurring outside the development envelope (Table 1).

The habitat of *Minuria tridens* appears specific; with plants found along west, south, or east facing edges of sandy inland islands. Plants were predominantly towards the top of slopes often where the dunes or low sand cliffs are or have been collapsing (Figure 3). The sand or sandy-loam soil ranges in colour from orange through orange-red to light brown containing little to no organic matter with no parent material (rocks) apparent on or near the surface.

The new populations of *Minuria tridens* were found in vegetation type AcAjTe; consisting of sparse *Prosopis glandulosa* tall shrubs over scattered chenopods over *Cenchrus ciliaris* (Buffel Grass) and *Triodia epactia* hummock grassland (Figure 3). Whilst still mapped as AcAjTe the vegetation associated with the SW *Minuria tridens* population varied slightly, consisting of *Scaevola spinescence* over *Sida*

*fibulifera* and *Lawrenzia viridigrisea* over *Triodia epactia* and *Triodia wiseana* hummock grassland. *Minuria tridens* populations were typically found on island edges and hence often close to boundary with samphire open shrublands but not considered to be transitional.

No new records of *Minuria tridens* were found within the vegetation type AtAjTe; this vegetation type constitutes less than 5% of the total search area (see inset Figure 1) and was generally more than 150 m from island edges (i.e. not typically where this species was found).

A couple of small areas of potential habitat were not searched due to access issues, i.e. small island (0.3 ha) within 100 m of the gas pipeline and island edge isolated by haul road (in-use at time of survey, at pond zero site). Other areas identified prior to the survey as potential habitat subsequently turned out to be unsuitable and were not searched (Figure 4).

This targeted search covered potential *Minuria tridens* habitat within the development envelope. However, the vegetation and soil complexes within which the Mardie *Minuria tridens* have been found, extend beyond the development envelope; 15 kilometres north-east of the known populations (Phoenix 2020). Visual examination of satellite imagery, north-east of development envelope, suggests existence of similar landforms to known *Minuria tridens* populations. As such, it is possible that suitable habitat and undetected populations extend here.

Eight representative specimens of *Minuria tridens* were collected in the field and their identity confirmed by taxonomist Dr Andrew Perkins. A subset of the collected specimens will be lodged with the Western Australian Herbarium.

Discussions with BCI (Julie Mahony), subsequent to survey, indicated that recorded plants in the 'SW' *Minuria tridens* population are within the proposed Pond 1 footprint. Pond 1 will be filled with sea water once construction is completed, as early as July 2022. Phoenix concurs with BCI's assessment that:

- a) Any inundation as part of BCI's proposed activities will likely result in death of *Minura tridens* plants, constituting taking/clearing of plants.
- b) Subsequently, this triggers the requirement under Ministerial Statement 1175, condition 5-3(2)(b) for development of a research strategy into *Minuria tridens* propagation and transplanting potential.
- c) Avoidance of impacts to *Minuria tridens* during construction of Pond 1 is required.
- d) The research strategy is required to be developed prior to the filling of the pond in July 2022.

Yours Sincerely,

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**Table 1** *Minuria tridens* records at Mardie Salt Project

Existing populations <sup>1</sup>		
Identifier <sup>^</sup>	Plant records	# of GPS points
<b>A</b>	30	5
<b>B</b>	18	1
<b>C</b>	22	2
<b>D</b>	6	1
<u>total</u>	<u>76</u>	<u>9</u>
New populations <sup>2</sup>		
Identifier <sup>^</sup>	Plant records	# of GPS points
<b>NE</b>	210	19
<b>NW</b>	16	1
<b>SE</b>	10	1
<b>SW</b>	30	3
<u>total</u>	<u>266</u>	<u>24</u>
All populations <sup>3</sup>		
<b>Total</b>	<b>342</b>	<b>33</b>

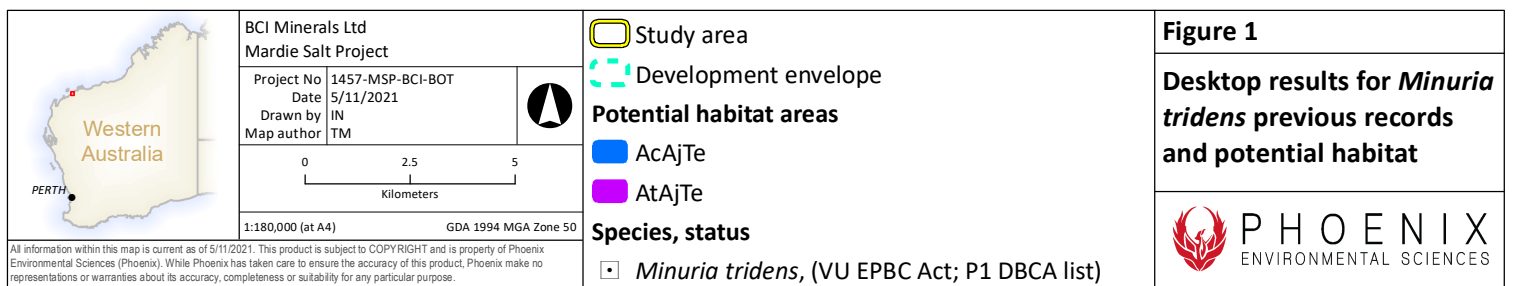
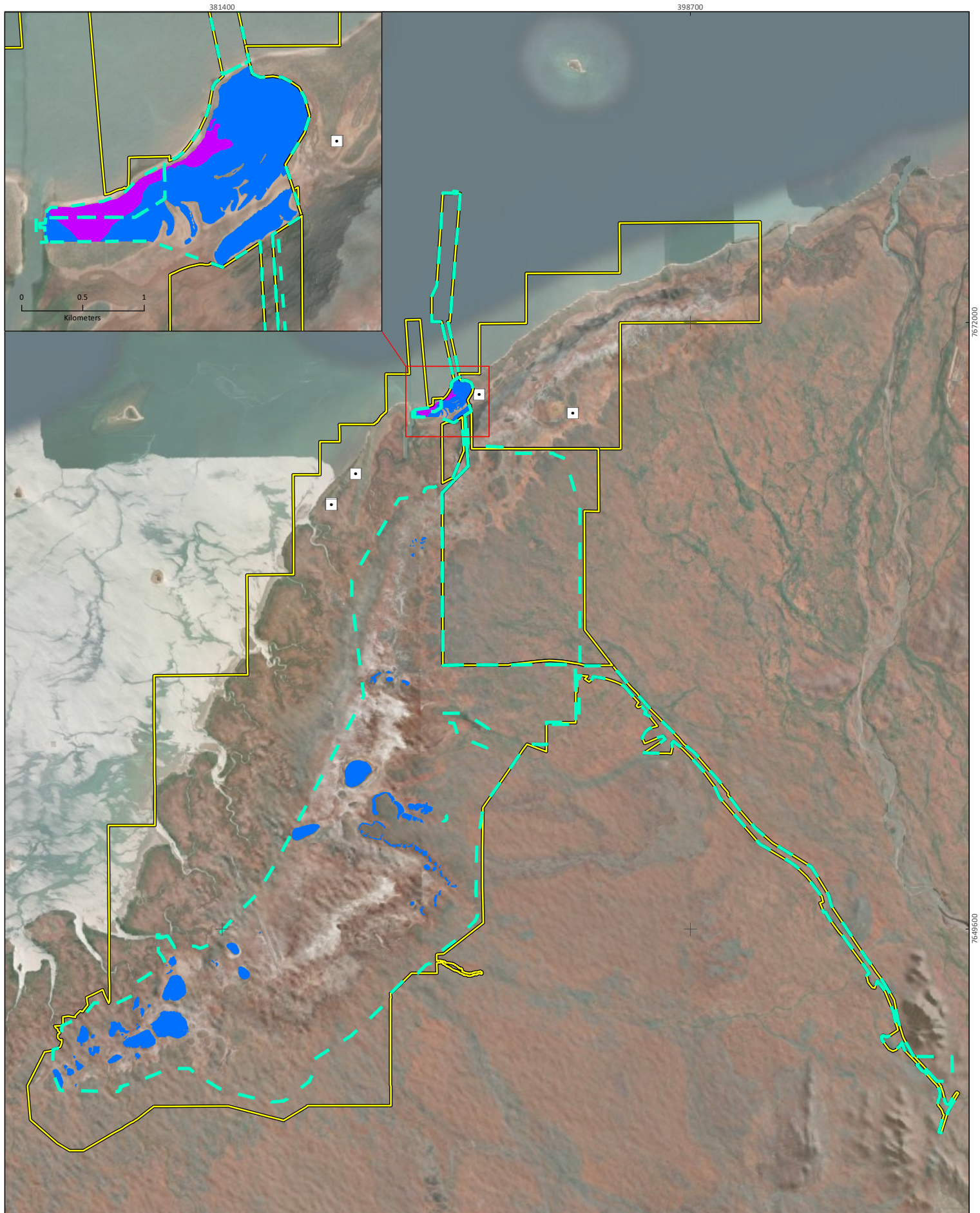
<sup>1</sup> Outside development envelope

<sup>2</sup> Inside development envelope

<sup>3</sup> Sum of existing and new populations

<sup>^</sup> For purpose of this report only









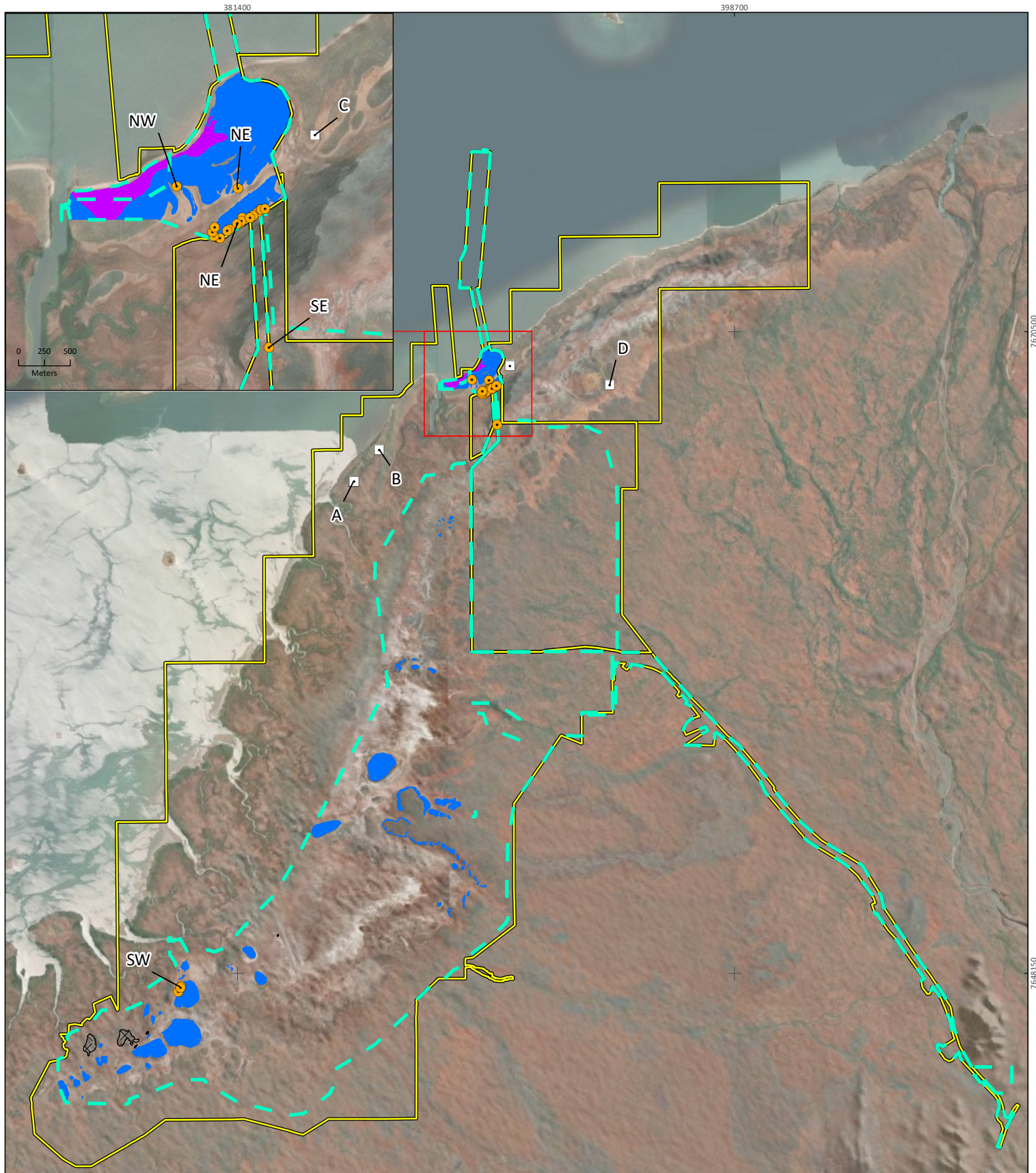
**Figure 2** In-situ photo of *Minuria tridens* within the SW population





**Figure 3** Typical *Minuria tridens* (foreground centre) habitat; this field photo of the largest population found (NE), collapsing sand cliff in background, also associated vegetation of *Cenchrus ciliaris* and *Triodia epactia* closed hummock grassland





#### Species, status

- *Minuria tridens*, (VU EPBC Act; P1 DBCA list) - Field records
- *Minuria tridens*, (VU EPBC Act; P1 DBCA list) - Previous records



BCI Minerals Ltd  
Mardie Salt Project

Project No 1457-MSP-BCI-BOT  
Date 12/11/2021  
Drawn by IN  
Map author TM



0 2.5 5  
Kilometers

1:180,000 (at A4) GDA 1994 MGA Zone 50

All information within this map is current as of 12/11/2021. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

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- Study area
- Development envelope
- Potential habitat areas**
- AcAjTe (searched)
- AcAjTe (not searched)
- AtAjTe (searched)

#### Figure 4

***Minuria tridens* field records and potential habitat**



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ENVIRONMENTAL SCIENCES

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## Reference List

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- Phoenix. 2020. *Detailed flora and vegetation survey for the Mardie project*. Phoenix Environmental Sciences, Balcatta, WA. Unpublished report prepared for BCI Minerals Ltd.