



Multicom Resources Limited

Offset Strategy



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## Offset Strategy

2 February 2021

### Multicom Resources Limited

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# 1 Purpose

Multicom Resources Limited (Multicom) is seeking to mine and process vanadium pentoxide (V<sub>2</sub>O<sub>5</sub>) and alternative vanadium-based products. Multicom proposes to take advantage of the increasing supply gap associated with high-strength steel production, the growth market of vanadium batteries and the emergence of vanadium based compounds as a revolutionary metal in new technologies. There is increasing global demand for lighter weight and higher strength steels in addition to increasing global demand for renewable and reliable energy, making vanadium a valuable resource. The Saint Elmo Vanadium Project is the action (EPBC 2017/8007) and includes a greenfield mine site, Offsite Water Storage Facility (OWSF) and associated infrastructure.

The action would occur within a number of Mine Lease Application (MLA) areas located approximately 25 kilometres (km) east of Julia Creek, in north-western Queensland. The MLAs comprise an area of approximately 9,246 hectares (ha) and the action would impact approximately 7,418 ha of land relevant to this Environmental Offsets Strategy (Offset Strategy).

This Offset Strategy provides offsets for a significant residual impact (SRI) to Julia Creek Dunnart *Sminthopsis douglasi*, a Matter of National Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), that are relevant to SRI criterion ‘modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline’. The Offset Strategy is prepared in accordance with the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (EOP), *National recovery plan for the Julia Creek dunnart (Sminthopsis douglasi)* (DERM 2009), approved *Conservation Advice for Sminthopsis douglasi Julia Creek Dunnart* (TSSC 2016) and *The Action Plan for Australian Mammals 2012* (Woinarski et al. 2014).

The Offset Strategy:

- Outlines the impacts to potential habitat for the Julia Creek Dunnart, as a result of the action
  - This includes a description of the action, its relevance to Julia Creek Dunnart, and the dunnart’s ecology in a local and regional context;
- Describes the assessment process, including the SRI;
- Identifies threatening processes, land use / tenure challenges and options for improved ecosystem function and resilience;
- Identifies the preferred offset approach and how it meets the EOP; and
- Includes offset management measures that are measurable and bound by specific timeframes.

## 2 Project Description

This Offset Strategy will deliver offsets to improve the scientific understanding of Julia Creek Dunnart *Sminthopsis douglasi*, its life history and the thresholds of threats (alone and in combination) and applicable criteria for future successful, direct land-based offsets. The offsets described in this Offset Strategy will facilitate rehabilitation of known habitat for the species and ultimately, conservation of an important population of the species.

The Offset Strategy includes components that are staged, with timing of their implementation dependent on the completion and results of earlier stages as well as actual operating production of the mine. A core component of the Offset Strategy, regarding the important population of Julia Creek Dunnart at the Julia Creek aerodrome, can be implemented prior to commencement of the action.

### 2.1 Description of the Action

The location of the action is approximately 25 km east of Julia Creek in the North West Minerals Province in north-western Queensland, within McKinlay Shire Local Government Area (LGA) (**Figure 1**).

The action will consist of a shallow open cut mine to obtain access to large known deposits of vanadium bearing sedimentary material within MLA100162. Strip mining is proposed to be carried out sequentially from mining panels. Once the material is removed, the panel will be back filled with beneficiated gangue and overburden material, then contoured and sheeted with topsoil. Revegetation will be progressive with relevant native grassland species, *Astrebla* and *Iseilema* spp. in accordance with the current grazed, pre-mined state. An OWSF is also proposed, with water to be diverted from the Flinders River, under allocation through the Water (Gulf) Plan, stored in the OWSF before being transported to the mine site by 24 km of buried pipeline. The OWSF and associated infrastructure will be rehabilitated in line with the mine. The OWSF and associated infrastructure comprise three (3) separate mine (infrastructure) lease components: MLA100244 – OWSF infrastructure area, MLA100245 – pipeline from OWSF to Project site and MLA100246 – aqueduct from the Flinders River to the OWSF.

Operational production is scalable and based on market demand, with an initial target of 5,000-10,000 tonnes per annum (tpa) and a maximum tonnage of 20,000 tpa V<sub>2</sub>O<sub>5</sub> product over a 30 year mine life. This means that implementation of the Offset Strategy will also be scalable, reflecting actual operation of the mine and the subsequent impacts to potential Julia Creek Dunnart habitat.

#### 2.1.1 Local and Regional Context

The action is located wholly within the McKinlay Shire LGA, within the Flinders River Catchment. The Flinders River Catchment measures approximately 10,900,000 ha and comprises the Flinders, Cloncurry and Saxby Rivers, which drain to the Gulf of Carpentaria, north of the action.

Historically, the region and land use associated with the action has been used for cattle grazing on unimproved pastures comprising native grasslands. The action tenement lies within freehold, leasehold, stock route and reserve land.

### **2.1.2 Ecological Features of the Action**

The action is predominantly located within Mitchell Grass Downs (MGD) bioregion (**Figure 1**) and is comprised of open grasslands used for grazing purposes, consistent with the MGD bioregion. The bioregion covers an area of approximately 33,532,000 ha, with approximately 23,788,550 ha of this area located in north-western Queensland. The OWSF and part of the pipeline are in the Gulf Plains bioregion, which covers 12,110,000 ha wholly within Queensland.

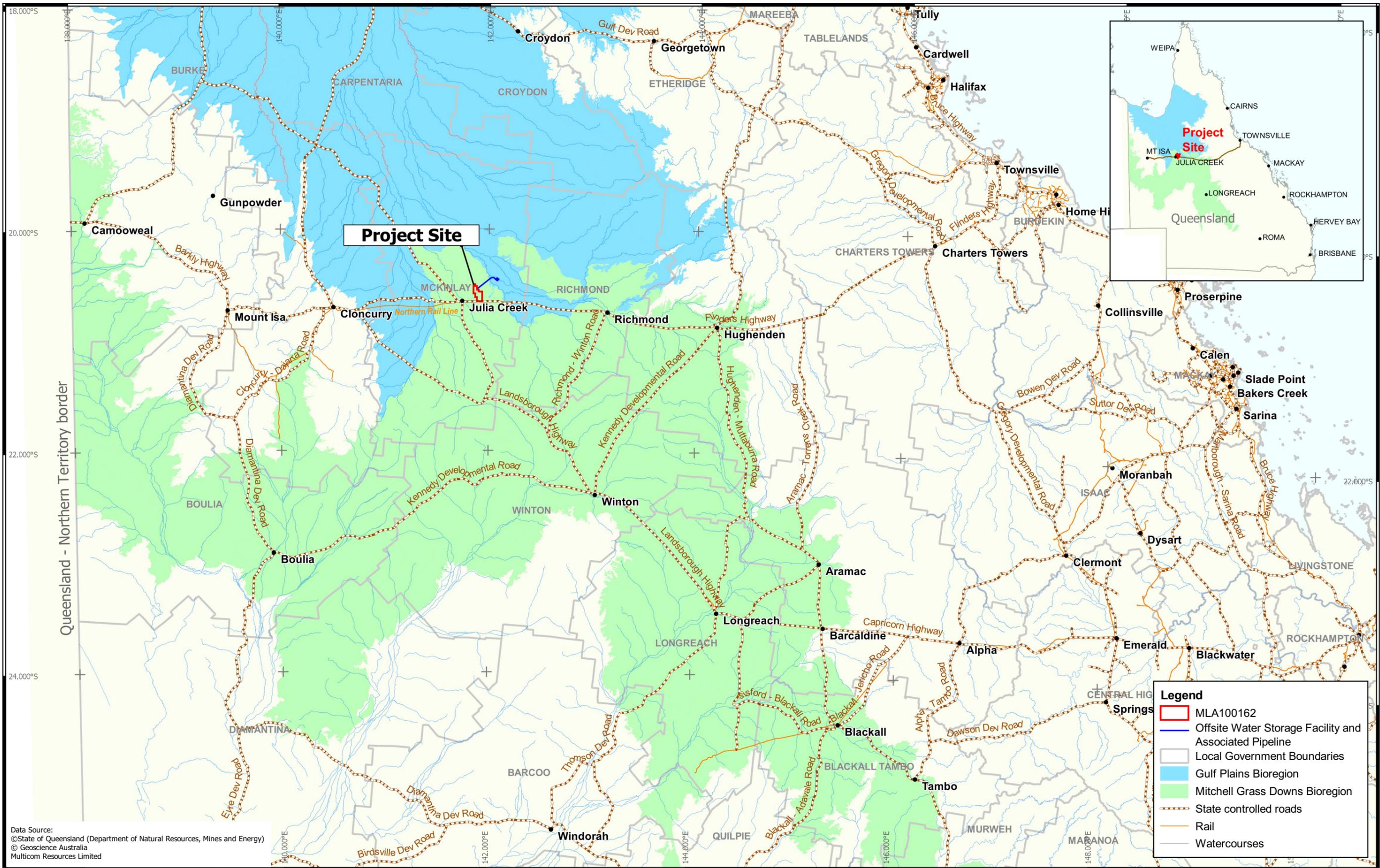
The MGD bioregion is dominated by Mitchell Grass (*Astrebla* spp.) tussock grasslands on rolling plains (downs). The soils consist predominantly of deep, heavy clays. The plains are interspersed with drainage lines, supporting open grasslands, herblands or eucalypt woodlands and isolated remnant plateaus. The grasslands comprise a significant natural resource used historically for cattle grazing. The Project area, OWSF and associated infrastructure are strongly dominated by grasslands, with weak representation of eucalypt communities on ephemeral waterways.

The Gulf Plains bioregion encompasses low-lying country and offshore islands of north-western Queensland. Major river systems dissect the broad alluvial plains – the Nicholson, Gregory and Leichhardt drain from the North West Highlands; the Cloncurry, Flinders and Norman from the MGD bioregion; and the Gilbert, Staaten, Nassau and Mitchell from the Einasleigh Uplands bioregion. A major environmental pressure on the bioregional biota is the combination of generally flat grazing country and monsoonal climate that can result in alternating periods of inundation during the wet season followed by a long dry season (QG 2015).

### **2.1.3 Julia Creek Dunnart**

Julia Creek Dunnart is a small, cryptic marsupial listed as Vulnerable under the EPBC Act and Endangered under Queensland's *Nature Conservation Act 1992* (NC Act). The Recovery Plan for the species (DERM 2009) identifies habitat critical to the species as Mitchell Grass (*Astrebla* spp.) tussock grasslands which grow in areas of dominant summer rainfall. These grasslands are treeless or lightly timbered and occur on rolling plains (downs) on deep cracking clay soils.

File Path: G:\GIS\K\epic Environmental\Projects\BE190034\_01 St Elmo Offset Strategy\Workspaces\Figure 1 Project Location within Gulf Plains and Mitchell Grass Downs Bioregion.qgs



Data Source:  
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 © Geoscience Australia  
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**Legend**

- MLA100162
- Offsite Water Storage Facility and Associated Pipeline
- Local Government Boundaries
- Gulf Plains Bioregion
- Mitchell Grass Downs Bioregion
- State controlled roads
- Rail
- Watercourses



Scale: 3,500,000@A3

Datum: GDA94



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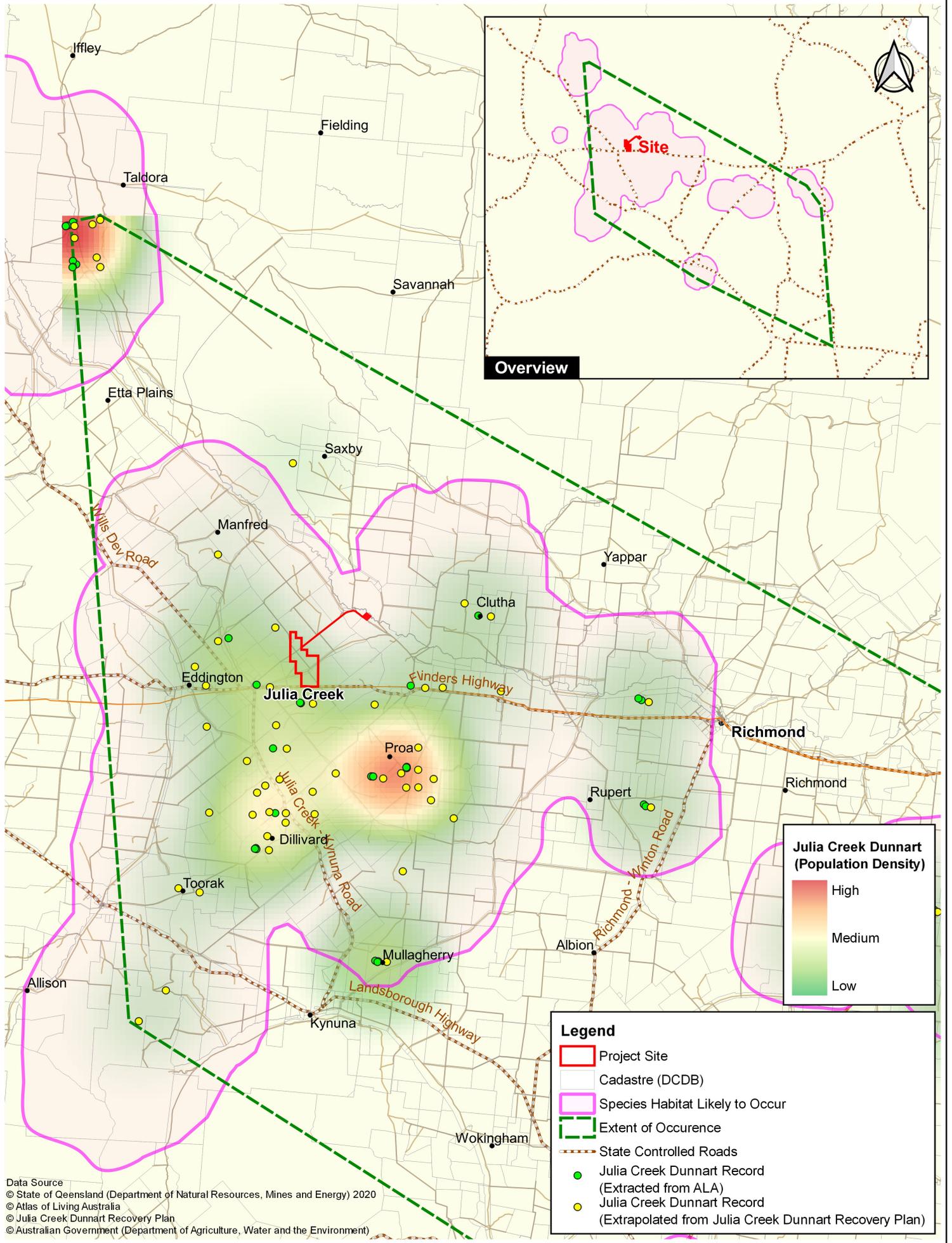
Figure 1  
 Project Location within Gulf Plains and Mitchell Grass Downs Bioregions

Analyses by McAlpine and Howes (2005) and Smith et al. (2007) used land tenure, soil type, seasonal variability, Prickly Acacia *Vachellia (Acacia) nilotica* densities and livestock movements as the key variables affecting habitat suitability. A range of values for ground cover abundance, soil cracks and grazing pressure were used to define suitable habitat. Due to the relationship between habitat suitability and land tenure, protected areas (e.g. Bladensburg National Park) were predicted as having the greatest probability of high habitat suitability, while stock routes and wide road reserves were predicted to have medium-high habitat suitability in wet season scenarios (McAlpine & Howes 2005). In these areas, grazing pressure is low or absent and the density of Prickly Acacia and stock watering points is low (DERM 2009). Smith et al. (2007) found ground cover as the most influential factor on habitat suitability, followed by grazing pressure, which directly influences ground cover. An exclusion experiment on Proa station, which supported a population of Julia Creek Dunnart, found that sheep had no apparent effect on the vegetation and soil characteristics, but the stocking rate was 'modest'. The effect of cattle was not tested (Lundie-Jenkins & Payne 2000).

Julia Creek Dunnart is not known from within the action area and none was recorded during field surveys undertaken as part of the Environmental Impact Statement (EIS). The surveys were undertaken by suitably qualified and experienced persons, including those with specific experience in trapping the Julia Creek Dunnart (CVs available on request). There is habitat onsite that may be associated with the species, albeit degraded to varying degrees by known threatening processes of cattle grazing, feral pest animals and Prickly Acacia infestation. This is also the case for the OWSF and associated infrastructure corridor.

There are two *Atlas of Living Australia* (ALA) records within three km of the Project area, a Queensland Museum specimen, date of collection unknown but published in 1979, and a Department of Environment and Heritage Protection (DEHP) record (ALA 2018) from 2000 (refer **Figure 2**). Both are from Garomna Station, located immediately south of the action. There are 669 Wildlife Online (WO) records within 50 km of the action (QG 2020). None of these is in the immediate area of the action and the closest is the 2000 record above (duplicated datum across databases). Based on habitat modelling by Smith et al. (2007), areas associated with the action are not associated with a known or potential population of importance for the species. The overall accuracy of the model predictions was 89 percent, indicating a moderate-high level of discrimination, with a high proportion (93 percent) of low suitability sites correctly predicted, though only 43 percent of medium suitability sites and no high suitability sites were correctly predicted (Smith et al. 2007).

© QGIS 2019 File Path: G:\GIS\Epic Environmental\Projects\BE200001\_01 Multicom Saint Elmo Supp Works\Workspaces\Figure 2 Modelled Occurrence of Julia Creek Dunnart and Nearby Records.qgs



Data Source  
 © State of Queensland (Department of Natural Resources, Mines and Energy) 2020  
 © Atlas of Living Australia  
 © Julia Creek Dunnart Recovery Plan  
 © Australian Government (Department of Agriculture, Water and the Environment)

**Legend**

- Project Site
- Cadastre (DCDB)
- Species Habitat Likely to Occur
- Extent of Occurrence
- State Controlled Roads
- Julia Creek Dunnart Record (Extracted from ALA)
- Julia Creek Dunnart Record (Extrapolated from Julia Creek Dunnart Recovery Plan)

**Julia Creek Dunnart (Population Density)**

High

Medium

Low



Scale: 1:1,500,000 @ A4  
 Datum: GDA94 Projection: MGA56

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Figure 2  
 Modelled Occurrence of Julia Creek  
 Dunnart and Nearby Records

The species has a patchy distribution and low abundance. Most survey records indicate the species occurs in small, dispersed populations and local abundance can fluctuate significantly in relation to seasonal conditions (Mifsud 2001 in DERM 2009). The species may be difficult to trap even in areas that it is known to occur. For example, Woolley (1992) reported a trapping success rate never greater than 0.8 percent, surveys at Lyrian in 1995 failed to capture any individuals despite the species being present in 1992 and 1994 (Mifsud 1999 in DERM 2009) and it took five (5) years of short annual surveys to record the species in Moorrinya National Park (DERM 2009).

Given the history of grazing pressure and active threatening processes, it is possible that the species has never occurred on the action areas but given the difficulty in demonstrating the presence of Julia Creek Dunnart even from areas it is known to occur, a prolonged survey effort over many years would be required to adequately indicate absence. Multicom have taken a conservative approach toward potential for the species to use habitat associated with the action and committed to improving this potential through management of known threatening processes – grazing, feral animals and Prickly Acacia.

#### 2.1.4 Julia Creek Dunnart Habitat Clearing Schedule

The Project has been separated into 11 mine domains based on the mining infrastructure layout and sequencing (refer to **Figure 3**). **Table 1** provides the staged clearing schedule for Julia Creek Dunnart habitat within the Project, OWSF and associated infrastructure areas, including and the total area of disturbance within each mining domain, timing of initial disturbance, as well as commencement and finalisation of rehabilitation during the 30 year mine life.

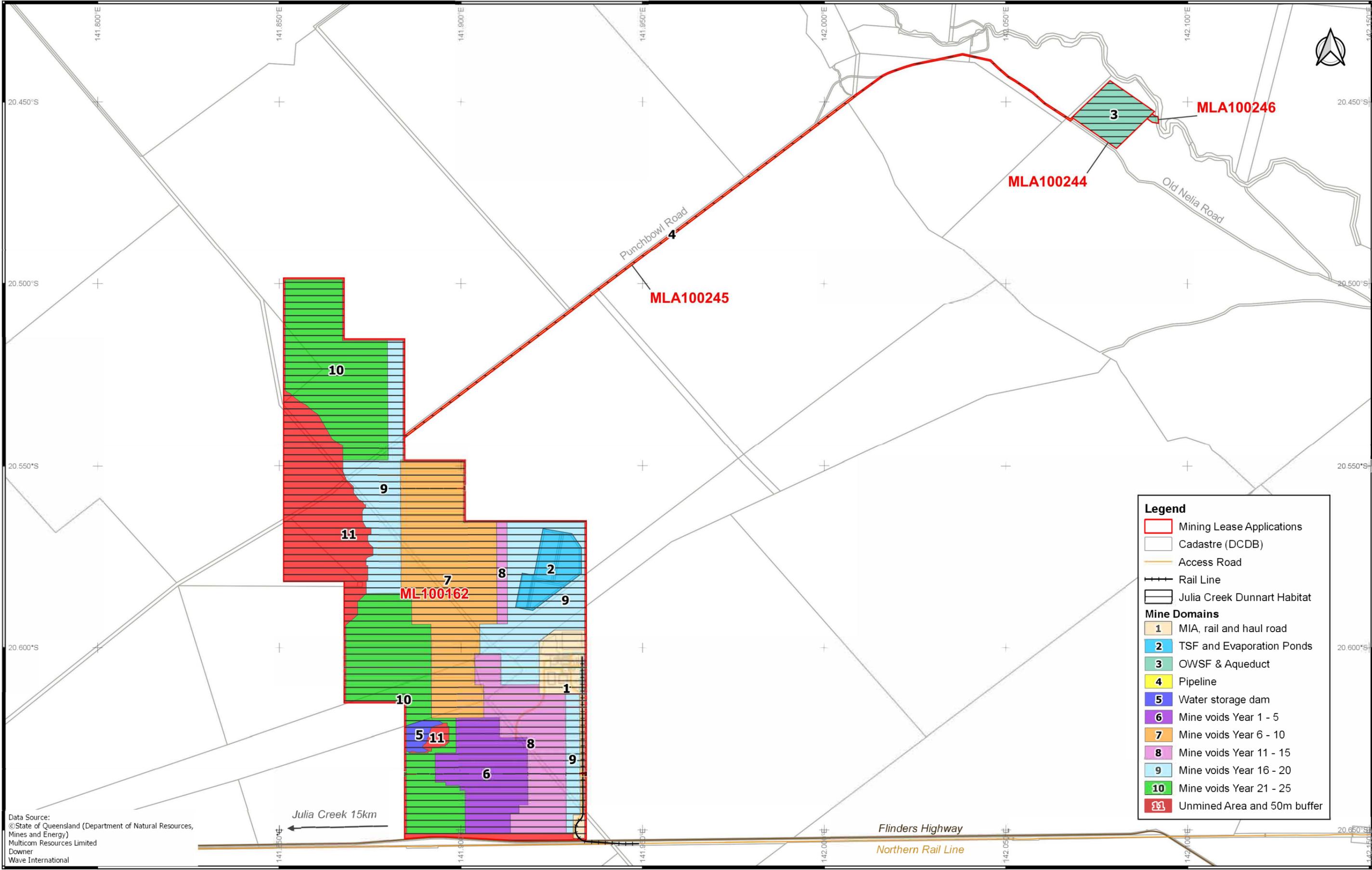
**Table 1: Mine Domain, Sequence and Timing**

Disturbance Domain	Descriptions	Disturbance Area (ha)	Initial Disturbance	Rehabilitation Commences	Rehabilitation Completion Goal
Domain 1	MIA, rail and haul road	595	Year 0 <sup>1</sup>	Year 25	Year 30
Domain 2	TSF and Evaporation Ponds	259	Year 0 <sup>1</sup>	Year 25	Year 30
Domain 3	OWSF & Aqueduct	197.5	Year 0 <sup>1</sup>	Year 25	Year 29
Domain 4	Pipeline	20	Year 0 <sup>1</sup>	Year 25	Year 29
Domain 5	Water storage dam	61	Year 0 <sup>1</sup>	Year 29	Year 30
Domain 6	Mine voids Year 1 - 5	656	Year 1	Year 2	Year 9
Domain 7	Mine voids Year 6 - 10	1,551	Year 6	Year 7	Year 14
Domain 8	Mine voids Year 11 - 15	845	Year 11	Year 12	Year 19
Domain 9	Mine voids Year 16 - 20	1,469	Year 16	Year 17	Year 24
Domain 10	Mine voids Year 21 - 25	2,276	Year 22	Year 23	Year 28
Domain 11	Unmined Area and 50 m buffer	1,428	None	None	None

Note:

<sup>1</sup> Initial disturbance will occur during construction, prior to mine operations commencing.

File Path: G:\GIS\epic Environmental\Projects\BE2020\BE200001.01 Multicom Saint Elmo Supp Works\Workspaces\Offset Strategy\Figure 3 Staged Clearing of Julia Creek Dunnart Habitat.ogx



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 Mines and Energy)  
 Multicom Resources Limited  
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 Wave International

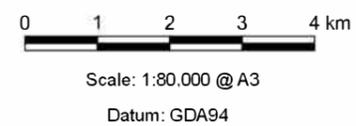
Julia Creek 15km

**Legend**

- Mining Lease Applications
- Cadastre (DCDB)
- Access Road
- Rail Line
- Julia Creek Dunnart Habitat

**Mine Domains**

- 1 MIA, rail and haul road
- 2 TSF and Evaporation Ponds
- 3 OWSF & Aqueduct
- 4 Pipeline
- 5 Water storage dam
- 6 Mine voids Year 1 - 5
- 7 Mine voids Year 6 - 10
- 8 Mine voids Year 11 - 15
- 9 Mine voids Year 16 - 20
- 10 Mine voids Year 21 - 25
- 11 Unmined Area and 50m buffer



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Figure 3  
 Staged Clearing of Julia Creek Dunnart Habitat

### 3 Assessment Process

The *Survey guidelines for Australia's threatened mammals, EPBC Act survey guidelines 6.5* (DSEWPC 2011) recommend survey techniques to detect the presence of Julia Creek Dunnart in areas up to 5 ha in size. The guideline recommends 400-500 trap nights per 5 ha area (100 traps for four to five consecutive nights). The total disturbance area of potential Julia Creek Dunnart habitat associated with the action is approximately 7,418 ha of Mitchell Grass downs or similar Gulf Plains habitat. To comply fully with the guideline would require a minimum of 5,935 nights of trapping for one 2-person team (assuming no trap failure or having to close traps due to weather conditions). It is not feasible to comply with the recommended guidelines for such a large area.

The environmental impact associated with this scale of trapping has not been quantified but would be considered detrimental to habitat quality in and of itself given it would involve repeatedly traversing substantial areas of grasslands in vehicles. Trapping survey effort for Julia Creek Dunnart habitat associated with the action was 2,225 box trap (generic Elliott A) trap nights, 110 remote camera trap nights and 108 hair tube trap nights.

Note: The survey guidelines state on page 1: ***These guidelines are not mandatory. Proposals failing to meet these survey guidelines for reasons of efficiency, cost or validity will not necessarily default to a judgement that referral is required (that is, that a significant impact is likely), especially where the proponent issues an evidence-based rationale for an alternative survey approach. Alternatives to a dedicated survey may also be appropriate. For example, a desktop analysis of historic data may indicate that a significant impact is not likely.***

Julia Creek Dunnart is assessed under the relevant significance criteria for a Vulnerable species (refer to Section 17.13.2.2 in Chapter 17 in the EIS). These criteria refer to an 'important population'. The action area is not identified in the *National recovery plan for the Julia Creek dunnart (Sminthopsis douglasi)* (DERM 2009) as supporting an important population.

Potentially suitable habitat for Julia Creek Dunnart occurs throughout the action area. There is road reserve associated with the pipeline that will connect the action to the OWSF at Flinders River. A stock route is present but is subject to on-going grazing by livestock and variable levels of infestation by Prickly Acacia. All lands associated with the action reflect similar levels of grazing use, weed infestation and presence of feral pest animal species.

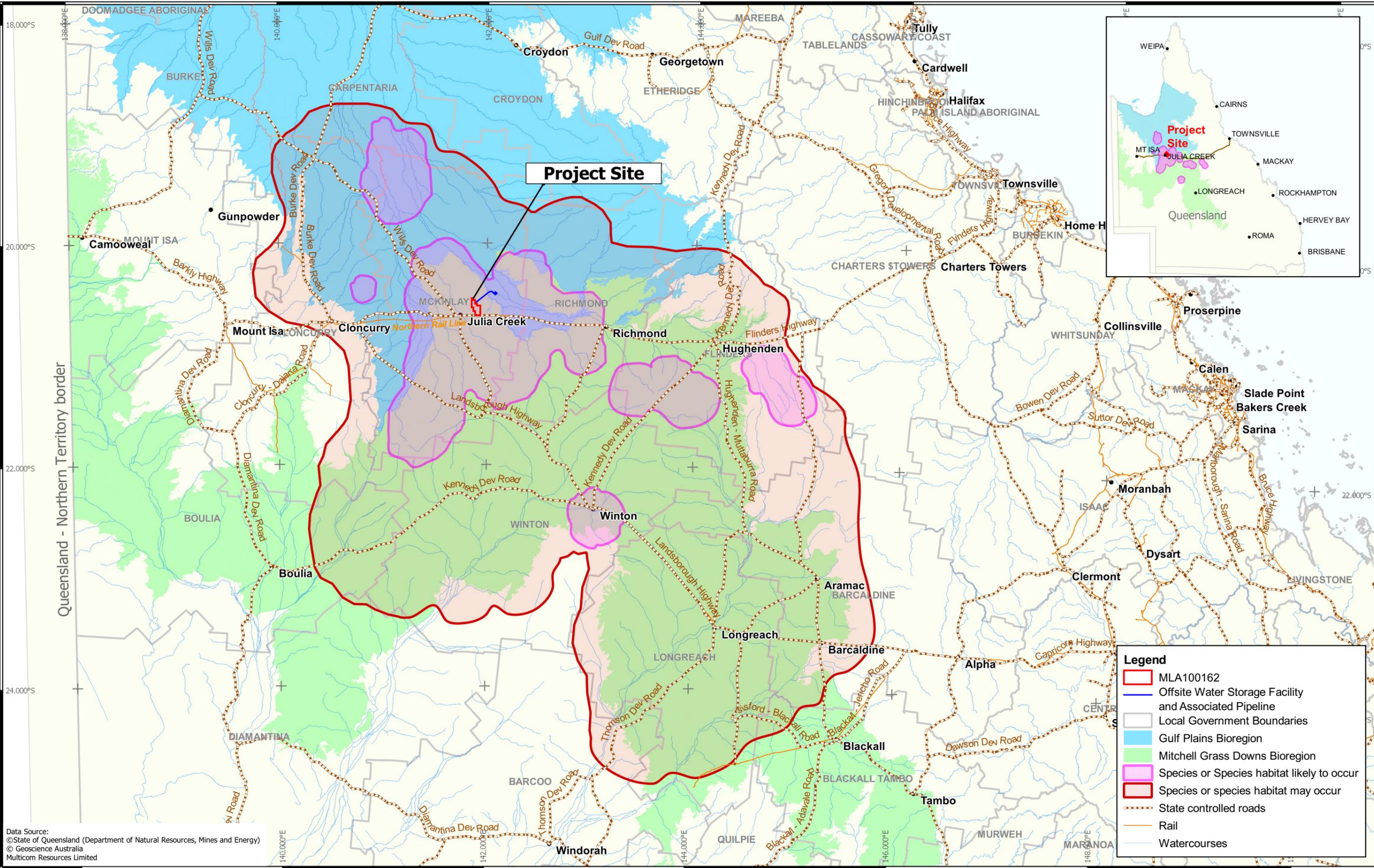
#### 3.1 Significant Impact Assessment

The action may result in the loss, and subsequent rehabilitation, of approximately 7,418 ha of Mitchell Grass Downs and Gulf Plains habitat, some of which may provide suitable habitat for the species should it utilise the area in the future. **Table 2** describes the significant impact assessment under the *MNES Significant impact guidelines 1.1* (DEE 2013) for Julia Creek Dunnart.

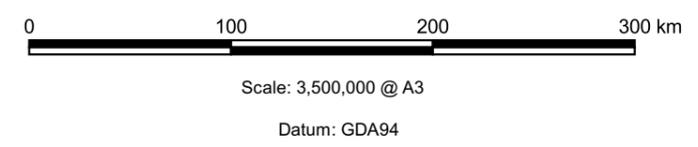
**Table 2: MNES Significant Impact Assessment - Julia Creek Dunnart**

Criterion	Assessment against Significance Criteria (Vulnerable)
<b>Julia Creek Dunnart <i>Sminthopsis douglasi</i></b>	
Lead to a long-term decrease in the size of an important population of the species	<p>Julia Creek Dunnart is restricted to the Mitchell Grass downs country of north-west Queensland and is historically known to occur within the vicinity of the Project, however it has not been recorded within the actual Project site itself. The MGD bioregion covers an area of approximately 33,532,000 ha (<b>Figure 4</b>). Heavy clay soil (cracking clay), which is considered a suitable habitat for the species, has been identified as occurring across the Project site.</p> <p>The Project site is not identified within the <i>National recovery plan for the Julia Creek Dunnart (Sminthopsis douglasi)</i> (DERM 2009) as an area known to support an important population for the species. Any possible population is not near the known limits of the species' range (ALA 2018).</p>
Reduce the area of occupancy of an important population	No important population of the species has been identified to occur within the Project areas (DERM 2009). Therefore, the Project will not result in a reduction of the area of occupancy of an important population.
Fragment an existing important population into two or more populations	The Project site is not identified as supporting an important population (DERM 2009). The species is sparsely distributed across its range. Therefore, the Project is not expected to further materially fragment any existing population(s), whether or not those populations are considered important or not.
Adversely affect habitat critical to the survival of the species	<p>The <i>National recovery plan for the Julia Creek Dunnart (Sminthopsis douglasi)</i> (DERM 2009) identifies habitat critical to the species as Mitchell Grass (<i>Astrebla</i> spp.) tussock grasslands, which grow in areas of dominant summer rainfall. These grasslands are typically treeless or lightly timbered and occur on rolling plains (downs) on deep cracking clay soils, covering an area of approximately 33,532,000 ha (<b>Figure 4</b>). Previous analyses used land tenure, soil type, seasonal variability, Prickly Acacia <i>Vachellia nilotica</i> densities and livestock movements as key variables affecting habitat suitability. A range of values for ground cover abundance, soil cracks and grazing pressure were also used to define suitable habitat. The program found that due to the relationship between habitat suitability and land tenure, protected areas such as Bladensburg National Park were predicted as having the greatest probability of high habitat suitability, while stock routes and wide road reserves were predicted to have medium-high habitat suitability in wet season scenarios. In these areas, grazing pressure is low or absent and the density of Prickly Acacia and stock watering points are low (DERM 2009).</p> <p>Potentially suitable habitat for Julia Creek Dunnart occurs throughout the Project site, but due to the presence of key threatening processes, it is not considered critical to the survival of the species. Further, the land tenure is not protected, and the Project site does not include a road reserve. A road reserve is present in the proposed pipeline alignment associated with the OWSF but disturbance to this will be very short-term and impacts negligible. A stock route is present; however, it is subject to on-going livestock grazing activities and variable densities of infestation by Prickly Acacia. The stock route also contains the largest dam in the Project site, which is subject to the heaviest infestation of Prickly Acacia. The Project area is identified as an area of core infestation of Prickly Acacia in the <i>North West Queensland Regional Weed and Pest Animal Management Strategy 2020 – 2024</i> (Curry et al. 2020). These characteristics limit the suitability of the stock route for Julia Creek Dunnart.</p> <p>The habitat present in the Project site is heavily disturbed and does not appear to be critical habitat for the species. As a result, the Project is not considered to adversely affect habitat critical to the survival of the species.</p>
Disrupt the breeding cycle of an important population	As indicated in the species recovery plan (DERM 2009) the Project site is not identified as supporting an important population. Therefore, the Project will not disrupt the breeding cycle of an important population. In addition, as identified in the assessment of critical habitat for the species (Smith et al. 2007; DERM 2009) any individuals, if present within the Project site, are not identified as part of an important population.

Criterion	Assessment against Significance Criteria (Vulnerable)
<p>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p>The Julia Creek Dunnart occurs in north-west Queensland, and its preferred habitat is Mitchell Grasslands, which are widespread across the area. The area of land that has been determined to support the occurrence of the species is estimated at 6,000,000 ha, refer <b>Figure 4</b> (Woinarski et al. 2014; TSSC 2016).</p> <p>Given the degraded nature of the potential habitat within the Project site, it is not expected the Project will modify, destroy, remove or isolate or decrease the availability of quality of habitat to the extent that the species is likely to decline. In fact, mining and eventual rehabilitation of the Project site is likely to result in an improvement in the quality of habitat that could be available for the species, primarily through removal of current threatening processes known to restrict the species.</p> <p>Regardless of rehabilitation however, it is based on this SRI that an offset has been deemed necessary. The disturbance to potential habitat for the species could lead to further decline and it is for these reasons that an offset is proposed.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat</p>	<p>Invasive species considered to be threats to the Julia Creek Dunnart include feral Cat <i>Felis catus</i> and Prickly Acacia. Both species are already present within the Project site, with large areas infested with the latter species. The Project lies in an area of core infestation of Prickly Acacia (Curry et al. 2020). The Project will not result in the establishment of an invasive species harmful to Julia Creek Dunnart. The Project may act to reduce the prevalence of an existing invasive species, ultimately resulting in a reduction to known threatening processes and improvement in habitat quality.</p> <p>Weed and pest control measures will be incorporated into the Project Construction and Operational Environmental Management Plans, as part of a Weed Management Plan. This plan will be implemented to control the introduction and spread of weed species across the Project site. The Weed Management Plan will be in place for the life of the Project and will minimise the potential for weed invasion and in the long-term potentially improve habitat condition within vegetation communities located adjacent to Project infrastructure.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>The Project Weed Management Plan will incorporate the management of invasive species and assist in the prevention of pest plant introduction and associated diseases resulting from Project activities. Project equipment sourced from overseas will be suitably quarantined as required under State and Commonwealth legislation.</p> <p>The Project is not expected to introduce disease that may result in the decline of the Julia Creek Dunnart.</p>
<p>Interfere substantially with the recovery of the species</p>	<p>The <i>National recovery plan for the Julia Creek Dunnart</i> (Sminthopsis douglasi) (DERM 2009) includes six specific objectives and 16 actions. The Project will not preclude or inhibit any of the objectives and actions and may, through a potential offset program, aid in protection of suitable habitat, implement weed control programs and promote awareness of the species (as per Actions 2.1, 3.2 and 5.1).</p> <p>The Project would require realignment of the stock route which, as identified above, has the potential to contain medium to high habitat suitability for the species during wet season scenarios (DERM 2009). It is important to note the stock route is currently subject to grazing pressure, a large artificial water source and infestations of Prickly Acacia, substantially limiting its suitability for Julia Creek Dunnart. If possible, the realignment could be placed to provide better quality habitat by removing and/or avoiding Prickly Acacia infestations. Stock route management is Action 2.3 of the recovery plan.</p> <p>The Project is not expected to interfere with the recovery of the species.</p>



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**Multicom Resources Limited**  
**Saint Elmo Vanadium Project**  
**Offset Strategy**  
 Figure 4  
 Julia Creek Dunnart Habitat Areas within  
 Gulf Plains and Mitchell Grass Downs Bioregions Extent

## 4 Offset Strategy

The Offset Strategy is developed in response to the SRI criterion: ‘modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline’ due to the loss of 7,418 ha of potential Julia Creek Dunnart habitat.

The Offset Strategy will benefit Julia Creek Dunnart through accurate scientific assessment and description of the ecology of the species and its preferred habitat. This will include quantitative assessment of the thresholds of known threatening processes and how they influence the species’ local abundance and distribution. Community involvement and long-term monitoring of threatening processes and their management will provide additional social benefits. This Offset Strategy proposes practical actions that will be used to select and secure lands to restore habitat for the species as well as expand and protect a known important population.

### 4.1 Julia Creek Dunnart Recovery Plan (DERM 2009) Actions

The key actions required to promote the recovery of Julia Creek Dunnart have been considered for the Offset Strategy. These recovery actions include:

- Conducting surveys to clarify the extent of the species’ distribution;
- Negotiating voluntary management agreements for key Julia Creek Dunnart sites and encouraging landholders to protect and manage such sites;
- Continuing and expanding implementation of pest animal and plant control programs (e.g. feral Cats, Prickly Acacia), and Julia Creek Dunnart population monitoring programs; and
- Investigating interactions between predators, water sources and grazing management.

### 4.2 Supporting Information

Detailed information associated with the Offset Strategy is described in the following technical reports and EIS Chapters:

- Terrestrial Ecology Technical Report (2019) undertaken by Epic Environmental (Appendix A20);
- Terrestrial Ecology Technical Report for Offsite Water Storage Facility (2020) undertaken by Epic Environmental (Appendix A33);
- Chapter 8 – Flora and Fauna;
- Chapter 17 – MNES; and
- Chapter 20 – Offsite Water Storage Facility and Associated Infrastructure.

### **4.3 Offset Strategy Objectives**

The overarching objective of the Offset Strategy is to provide strong empirical evidence for conservation gain that would improve viability of any local Julia Creek Dunnart population and increase scientific understanding of the species and its habitat at a broader scale. The Offset Objectives are detailed in **Table 3**.

#### **4.3.1 Field Surveys to Determine Distribution**

Confirm the existing distribution, populations and identify habitat preference of the Julia Creek Dunnart through a long-term field survey program to inform monitoring and management within the region. The focus of the surveys will be to quantify the habitat quality characteristics of importance to the species and how these characteristics change as a result of thresholds for threatening processes.

#### **4.3.2 Population and Habitat Monitoring**

Establish a monitoring program for up to 20 years at five known populations within the species known distribution. The monitoring program will be established with scientific experts to ensure it is scientifically robust and able to detect changes in the population and distribution.

#### **4.3.3 Threat Abatement Program**

Undertake a threat abatement program through a feral cat control program across the distribution range (as informed by the field surveys in objective 1). One aim of the program will be to reduce predation by feral cats. This will include information on the current status of feral cats within the species known distribution, develop a suitable methodology, implementation plan and a monitoring plan.

Undertake research for the removal of Prickly acacia to identify and quantify the relative benefits to Julia Creek Dunnart habitat quality within the MGD bioregion as a result of removal of Prickly Acacia.

#### **4.3.4 Habitat and Breeding Program**

Retain and protect approximately 1,000 ha of suitable habitat for the Julia Creek Dunnart within the Saint Elmo property (located outside of the Mine Lease that will not be affected by mining activities). An additional small, experimental area has been identified within the Saint Elmo property and will be retained to conduct various trials in fencing, rehabilitation / revegetation and stocking rates.

Re-instate Julia Creek Dunnart sanctuary at Julia Creek Aerodrome and re-establish the breeding program to facilitate the reintroduction of the species into appropriate habitat at sites where the species had been known historically and where new habitat is identified as achieving quality criteria.

## 4.4 Offset Strategy Actions

The following actions will be implemented to achieve each objective (outlined in Section 4.3) of the Offset Strategy and are justified with costs in **Table 3**:

### 4.4.1 Field Surveys to Determine Distribution

The field surveys are an indirect offset and will address knowledge gaps in ecology, management actions and monitoring for the Julia Creek Dunnart.

To determine the extent of the Julia Creek Dunnart and its potential habitat within the MGD, the field surveys will involve the following:

- Undertake broadscale mapping and data gathering;
  - Obtain and review historical records from Queensland Government;
  - Consult with experienced persons who were involved in previous captive breeding and field surveys for Julia Creek Dunnart;
- Develop a trapping program;
  - Conduct trapping survey within sites across the species known distribution, including Toorak Research Station which held an important population of Julia Creek Dunnart (DERM 2009);
  - Trapping methods will be in accordance with trapping and data collection methods outlined in Mifsud 2000 and 2001;
  - Gut analysis of predators (feral cats) and owl pellets (opportunistic collection) will also assist in identifying the presence of Julia Creek Dunnarts in survey areas where trapping has been unsuccessful;
- Review field survey data and provide updates to the community regarding progress of the research and key findings;
- Provide all survey data to the QLD and Commonwealth Government, which will also be made available to the public; and
- Publish research findings upon completion of surveys;
  - Survey data will be reviewed and published in suitable, peer-reviewed journals. The survey method and data will be reviewed by a suitably qualified expert/environmental professional.

Field surveys will be undertaken by a suitably qualified expert (i.e. a person who has had previous experience in undertaking targeted surveys for the species and been successful in finding the species) as well as University students who will be trained and supervised by a suitably qualified expert.

The survey method will also be peer reviewed by a suitably qualified expert prior to implementation.

#### **4.4.2 Population and Habitat Monitoring**

Habitat monitoring is an indirect offset that will assist in addressing knowledge gaps and management actions for the Julia Creek Dunnart.

The monitoring program will involve:

- Engage a suitably qualified expert who has experience in the Julia Creek Dunnart;
  - This person will be involved in and will supervise all staff working on the field surveys;
- Develop habitat monitoring program;
  - Habitat quality will be determined in accordance with the Queensland Guide to determining terrestrial habitat quality (2007);
- Implement a monitoring program;
  - Monitoring will be undertaken by suitably qualified environmental consultants / professionals with experience in Julia Creek Dunnart;
  - The method for long term monitoring will be in accordance with the methods and data collection standards outlined in Mifsud 2000;
- Trapping events would consider:
  - Either end of the breeding season to determine breeding success and recruitment of the population in each year;
  - After significant fire / flood events to identify impacts on the populations; and
- Publish results of monitoring program.

The monitoring program would be undertaken by a suitably qualified expert (i.e. a person who has had previous experience in the Julia Creek Dunnart and would train and supervise all staff involved in the monitoring program.

#### **4.4.3 Threat Abatement Program**

The threat abatement (feral cat control) program will aim to reduce the number of feral cats in Julia Creek Dunnart habitat and better understand the impact of weed removal on the species habitat.

The threat abatement program will involve:

- Consultation with Southern Gulf NRM to identify programs currently being run / trialled within the region and their success;
- Undertake desktop review of publicly available data;
- Plan and develop feral cat control program;
  - Implement / trial improved feral cat control methods;
- Implement a trapping / culling program for feral cats to obtain gut samples:

- Consultation with QLD National Parks, Council and landowners would occur prior to implementation;
- Persons involved in this program would hold the appropriate licences;
- All animals would be culled in a human way;
- Gut samples will be analysed by a suitably qualified person; and
- Select and monitor sites where landowners are actively managing Prickly Acacia;
  - Identify a population of Julia Creek Dunnart confirmed to be present after trapping surveys on a property where there is no or little Prickly Acacia present. Compare this to an adjacent property or area where no Julia Creek Dunnarts appear to be present where there is also Prickly Acacia. Trapping surveys would be undertaken subsequent to the removal of Prickly Acacia to confirm if the Julia Creek Dunnarts colonise the cleared area after Prickly Acacia is removed.
- Publish results of feral cat control and weed management program.

Conservation gain will be achieved indirectly through improved understanding of the impacts of feral cat and prickly acacia removal on Julia Creek Dunnart habitat. The findings will inform the management actions in this offset package and assist land managers in managing feral species on their properties to assist with increasing habitat quality for the Julia Creek Dunnart.

#### **4.4.4 Habitat and Breeding Program**

Conservation gain will be achieved directly through retention of habitat with potential to support Julia Creek Dunnart and by reinstating a breeding program for the species. Success will inform rehabilitation programmes across the MGD bioregion that are seeking to enhance habitat for the species.

The habitat improvement and breeding program will involve:

- Desktop and field assessment of potential sites within the species known distribution;
- Undertake habitat quality assessment of the impact site (i.e. mine site) and proposed offset site in accordance with the methodology outlined in the *Qld Guide to determining terrestrial habitat quality (2017)*.
- Secure a parcel of land for the purpose of the offset that is outside of the proposed Saint Elmo Vanadium Project mining area. This land will not be affected by mining activities. If required, seismic testing could be undertaken to confirm that mining and ancillary activities would not have a vibration impact on the Julia Creek Dunnart

The reinstatement of the sanctuary and breeding program would facilitate re-introductions of the species into the suitable habitat at sites with known historical distribution and newly established habitat that meets the habitat quality criteria.

- Undertake consultation with DES to determine permits required to reinstate the breeding program (i.e. capture of wild individuals and numbers required to prevent inbreeding);
- Repair fencing to exclude predators and other threatening processes;
- Undertake surveys within the sanctuary to trial different methods such as radio tracking, thermal imaging, standard camera traps and/or Elliott traps;
- Consult with a research body regarding further research on preferred bait types and general species behaviour;
- Facilitate research on preferred bait type and general species behaviour; and
- Facilitate breeding program.

#### **4.5 Threatening Processes**

The greatest threats to Julia Creek Dunnart are from threatening processes outlined in the species' Recovery Plan (DERM 2009) - introduced predators (particularly Cats *Felis catus*), invasion of Prickly Acacia, which binds the soils reducing potential areas of refuge during periods of excessive temperatures, and by livestock grazing which compacts the soil and degrades habitat value (Maxwell et al. 1996). Potential threatening processes include fire and small population size, which leaves the species susceptible to local extinctions (DERM 2009). Four (4) exotic species were recorded during the terrestrial ecology field surveys, including feral Cat, feral Pig *Sus scrofa*, Goat *Capra hircus* and Dingo *Canis familiaris dingo*. All these threatening processes are active across the action areas.

#### **4.6 Ecosystem Function and Resilience**

The 2019 floods in the region were of such scale as to affect not just habitat quality of the Mitchell Grass downs, but also ecosystem function.

Fundamental and potentially irreversible losses in ecosystem function become more likely as a result of intensive commodity production (Fischer et al. 2006). With the action, there will be a temporary loss of ecosystem function acting beyond even intensive grazing. However, Multicom will rehabilitate the landscape. An appropriate diversity of species across functional groups is required for ecosystem function to be maintained.

Highly focused management actions may be required to maintain keystone species and threatened species, and to control invasive species (Fischer et al. 2006). The predicted resilience of affected habitats, notwithstanding the disturbance regimes to which they are currently subject, and the retention of relevant species within the surrounding landscape mean that rehabilitation of the action areas will be supplemented by recolonisation given the lack of barriers to movement. A high level of manipulation is not considered necessary if the subsequent substrate is suitable and the correct plant species re-establish. Control of Prickly Acacia may mean that eventually ecosystem function on the rehabilitated land is closer to a natural state than what currently exists.

The action may result in the loss, and subsequent rehabilitation, of approximately 7,418 ha of Mitchell Grass downs habitat. This habitat may have some potential for Julia Creek Dunnart and an assemblage of species specialised for life in a grassland and, in some cases, utilisation of the soil cracks typical of the habitat.

The action will not fragment the landscape given the comparative homogeneity of habitats but may result in the movement of individual animals. Creating protected areas on public and private land is a foundation for landscape resilience and to connect people with nature (Murphy et al. 2012). In this instance, removal of Prickly Acacia in the surrounding landscape, as proposed through this Offset Strategy, will increase the resilience of both the ecosystem as a whole and presumably for Julia Creek Dunnart, should it be present. This is consistent with building ecosystem resilience as per *Australia's Biodiversity Conservation Strategy 2010-2030*.

#### **4.7 Social, Economic and/or Environmental Co-benefits**

There are opportunities to deliver social, economic and/or environmental co-benefits with the proposed Offset Strategy, with Multicom committing to ensure an appropriate level of resources and funding to be invested toward scientific research, securing land and practical on the ground management measures.

Multicom have entered into a collaborative agreement with Southern Gulf NRM, a not-for-profit community organisation, which works to assist in the implementation of strategic planning and investment activities that care for natural and cultural assets. As part of the collaboration agreement, Southern Gulf NRM has and will provide advice and input into the development of the Offset Strategy, land management practices involving Prickly Acacia management and control, feral species management and general ongoing liaison and support with landowners.

Multicom is also consulting with Ms. Trish O'Hara from the School of Agriculture and Food Science, at The University of Queensland (UQ). Trish O'Hara was involved with the previous acquisition of a Julia Creek Dunnart colony in 2009 and conducted surveys for the species in 2015 and 2016. The 2015 survey located Julia Creek Dunnart within the Julia Creek Airport area and the 2016 survey, which was undertaken near Nelia, did not result in any captures. It is proposed that Trish O'Hara / UQ provide technical (physical on ground) support moving forward. This support could help lead toward the development and delivery of the Offset Strategy.

## 5 Offset Approach

The Offset Approach includes a range of compensatory and direct offsets. These are described below, along with justifications on their interaction, compliance with relevant Commonwealth requirements and conservation benefit.

### 5.1 Offset Research Program

An Offset Research Program is proposed to confirm the existence of Julia Creek Dunnart within the action area, an area proposed to be retained as a direct land-based offset (Area 1 in **Figure 5**) and the ‘important population’ at Julia Creek aerodrome. Area 1 within MLA100162 contains 715 ha of RE 4.9.1c (recognised potential Julia Creek Dunnart habitat) and 346 ha of mixed polygon RE 4.9.1c/4.9.2b. In the event the species is confirmed over the 5-year period of the research program, management strategies will be developed to improve the long-term viability of Julia Creek Dunnart habitat and further targeted toward research priorities on key threatening processes. If the species is not confirmed, the thresholds for threatening processes will be investigated to quantify the relevant importance or interaction of threats that may be impeding use of habitat by Julia Creek Dunnart. The Program will be undertaken in a transparent, scientifically robust and timely manner and consider the use of best practice research approaches.

It is recognised that there is currently deficient information on the following matters relevant to the species:

- Quantitative rehabilitation criteria specific to the study area and the soils of the Project that can demonstrate that the habitat requirements of the species can be recreated following relevant impacts. Important habitat requirements for the species include cracking functionality of soils, recovery of important grassland vegetation species and surface water hydrological patterns; and
- Quantitative threshold levels for known threatening processes and the relative importance or combination of factors, including grazing stocking rates and density of Prickly Acacia, that could affect the abundance and distribution of the species.

It is anticipated that findings would be published in an internationally recognised peer-reviewed scientific journal or be of a standard that would be acceptable for publication in such a journal. Data and information collected will have creative commons licensing and be free and accessible. Further, it is anticipated that research outputs will inform future management decisions for Julia Creek Dunnart, and where possible, be readily applicable to other similar matters.

### 5.1.1 Project Action Plan

The Project action plan will be carried out in line with the objectives detailed in the *National recovery plan for the Julia Creek Dunnart* (*Sminthopsis douglasi*) (DERM 2009) and will be developed with the assistance of Ms. Trish O’Hara and Southern Gulf NRM. The Project action plan will outline the tasks to be undertaken as part of the Offset Research Program and details are provided in **Table 3**. Costs associated with the proposed offset actions are provided in **Table 4**.

The Project action plan will include but not be limited to the level of detail provided and provides outcomes that are specific, measurable, achievable, relevant whilst being bound to specified timeframes.

The Offset Strategy is ambitious and multi-faceted. Certain components will occur subsequent to the success of others or may be redesigned due to failure or unexpected results. This is a typical aspect of scientific research. If outcomes are entirely predictable then there is no need for the research.

Certain actions, such as investigation into the Julia Creek aerodrome population, will be able to be commenced immediately after a formal agreement is reached with a research body that provides field staff. Such an agreement cannot be reached until there is certainty of the action proceeding.

Other components, such as the captive-breeding program, are dependent on the goodwill and co-operation of the Queensland Government. The advantage of such a multi-faceted strategy is that the failure of one component results in more resources being directed to another existing component or gives rise to an additional component.

### 5.1.2 Conformance with Commonwealth Policy

One of the eight (8) key overarching principles set out by the EPBC Act EOP is ‘effectively account for and manage the risks of the offset not succeeding’. There is no certain conservation gain from securing land that may not support Julia Creek Dunnart. The difficulty in capturing the species means that it could take many years of trapping to actually identify that an offset is not succeeding due to the land in question not supporting the species. The proposed Project action plan is flexible, providing for alteration to activities should they be failing to achieve the original objective. This significantly reduces the likelihood of the proposed offset not succeeding. The EOP also states that deviation from the 90 percent direct offset requirement is only considered where:

- It can be demonstrated that a greater benefit to the protected matter is likely to be achieved through increasing the proportion of other compensatory measures in an offsets package or;
- Scientific uncertainty is so high that it is not possible to determine a direct offset that is likely to benefit the protected matter.

The Recovery Plan identified four important populations. One of these, Toorak Station, was sold by the Queensland Government to graziers in 2012 and presumably has had its stocking rate increased. It cannot reliably be considered to remain an ‘important population’ without investigation. There has been no trapping since 2016 to confirm the continuance of the Julia Creek aerodrome population and, particularly given the landscape-scale and catastrophic floods of early 2019, there is currently no evidence it is present. Surveys will be undertaken within Toorak Station to validate the status of the species on the property and will be included as part of the long-term survey program.

It is likely that the only remaining ‘important populations’ of any certainty are in National Parks. The National Parks in question are approximately 200 km (Bladensburg) and 300 km (Moorrinya) distant from the Project, respectively. Woolley (2015) stated that the known range of the species has been extended recently but there is no published report to confirm the continued presence of animals in areas where they have been found in the past. However, data available from the Julia Creek Dunnart species profile on the Queensland Government website (QG 2020) shows that there were multiple records of Julia Creek Dunnart in Bladensburg National Park in September 2015 and August 2016. There is no more recent publicly available record. It is not known if this is simply due to a lack of survey effort if it’s due to a lack of survey success or if the data are not being made available. The most recent record available for Moorrinya National Park is 1999. Again, it is not known how this should be interpreted. Surveys will be undertaken in Bladensburg and Moorrinya National Parks as part of the long-term survey program.

Uncertainty over whether or not important populations persist within National Parks indicate the uncertainty with identifying parcels of land likely to support the species. There is no record of Julia Creek Dunnart available through the species profile data (Queensland Government) for any location since 2016, when several were captured in Bladensburg National Park. The most recent record held by the *Atlas of Living Australia* is 2007.

**Table 3: Julia Creek Dunnart Offset Project Action Plan**

Offset Priority	Offset Description (i.e. purpose, location and outcome)	Offset Actions	Responsible Person(s) for Offset Activity	Timing (i.e. commencement, duration, frequency) and Requirements	Conservation Gain Measures	Success Measurement Criteria (measured annually)	Committed Cost <sup>1 3</sup> Contribution
<b>Field Surveys to Determine Distribution</b>							
Conduct long-term field survey program to verify distribution and publish findings	<p>Purpose of the surveys are to determine the extent of the Julia Creek Dunnart distribution, populations, identify habitat preference, and inform monitoring and management within the region. This will include survey of known important populations at the Julia Creek Aerodrome, Toorak Station, Bladensburg NP and Moorinya NP as well as locations across the range of the species and its potential habitat within the Mitchell Grass downs.</p> <p>A focus of the research will be to quantify the habitat quality characteristics of importance to the species and how these characteristics change as a result of thresholds for threatening processes.</p> <p>The recovery plan (DERM 2009) is scheduled to expire in 2020 and has not yet been reviewed (TSSC 2016). Any additional findings will aid the review process and enable new data to be included in the recovery plan that reflects the current status of the species and its habitat.</p> <p>The surveys are proposed to be conducted over spatial and temporal scales that will develop robust scientific data that will contribute directly to conservation gains for the species.</p>	<ol style="list-style-type: none"> <li>1. Broadscale mapping and data gathering;</li> <li>2. Obtain historical records from Queensland Government;</li> <li>3. Engage with experts who were involved in previous captive breeding and field surveys for Julia Creek Dunnart;</li> <li>4. Develop trapping program;</li> <li>5. Conduct trapping survey within up to 40 sites across the species known distribution, including Toorak Research Station which held an important population of Julia Creek Dunnart (DERM 2009);</li> <li>6. Review field survey data and provide community with updates on the progress of the research and key findings;</li> <li>7. All survey data will be provided to the QLD and Commonwealth Government and made available to the public; and</li> <li>8. Publish research findings upon completion of surveys.</li> </ol>	<p>Surveys will be undertaken by a suitably qualified expert (i.e. a person who has had previous experience in undertaking targeted surveys for the species and been successful in finding the species) or the survey methodology will be peer reviewed by a suitably qualified expert.</p> <p>Survey data will be reviewed and published in suitable, peer-reviewed journals. The survey method and data will be reviewed by a suitably qualified expert/environmental professional.</p> <p>Partnerships will be sought with respected research institutes such as the University of Queensland to enable involvement of junior and senior research staff.</p>	<ul style="list-style-type: none"> <li>▪ Commence engagement with expert and preliminary planning phase mid October 2020;</li> <li>▪ Commence baseline monitoring in Q1 2021 at known important populations;</li> <li>▪ Stratify remaining likely habitat areas across the region and identify secondary survey locations. Commence secondary baseline survey program in Q3 2021;</li> <li>▪ The surveys will occur at 10 sites with two survey locations at each site to be undertaken annually;</li> <li>▪ Two of the 10 sites will be surveyed per year for a period of five years initially (i.e. a total of 40 surveys over five years);</li> <li>▪ The surveys will be undertaken for a minimum of 5 years and up to 10 years at locations if the species is recorded;</li> <li>▪ Surveys will be undertaken either side of breeding season and potentially after fire/flood events;</li> <li>▪ Publish research findings in scientifically peer-reviewed journals; and</li> <li>▪ Would require access to two National Parks and provision of any site records by DES.</li> </ul>	<p>The surveys are an indirect offset and will address knowledge gaps in ecology, management actions and monitoring.</p> <p>Conservation gain through this offset action is not directly measurable. Conservation gain will be achieved indirectly through improved understanding of the species' distribution, which will inform the management actions in this offset package as well as being available to be used for management actions by land managers.</p>	<p>This offset action is research and does not have directly quantifiable success criteria.</p> <p>Success will be qualitatively measured as completion of surveys and publication of results.</p> <p>The surveys may be opportunistic and once the species is located, subsequent long-term monitoring will be undertaken to collect habitat data.</p>	<p>\$1,219,550</p> <p>Specific cost breakdowns will be reviewed and developed once the initial survey of known important populations is achieved.</p>
<b>Population and Habitat Monitoring</b>							
Population and habitat monitoring	<p>Establish a monitoring program for up to 20 years within the species known distribution. The monitoring program will be established with scientific experts to ensure it is scientific robust and able to detect changes in the population and distribution.</p> <p>The monitoring will inform management actions and also provide information on the species' habitat preference, behaviour, populations and response to management actions.</p>	<ol style="list-style-type: none"> <li>1. Engage with suitably qualified expert who will be involved with the field surveys;</li> <li>2. Develop habitat monitoring program;</li> <li>3. Implement monitoring program; and</li> <li>4. Publish results of monitoring program.</li> </ol>	<p>Habitat monitoring will be undertaken by suitably qualified environmental consultant/professionals. Monitoring surveys will occur on up to five properties (sites) with two survey trapping events annually. Monitoring surveys of each site will be repeated every three years.</p> <p>Surveys will be undertaken either side of breeding season and potentially after fire/flood events.</p>	<ul style="list-style-type: none"> <li>▪ Commence development of program in Q4 2020;</li> <li>▪ Commence habitat monitoring in Q1 of 2021 for 5 sites, measured twice annually for up to 20 years; and</li> <li>▪ Surveys of each site are repeated every three years.</li> </ul>	<p>Habitat monitoring is an indirect offset that will assist in addressing knowledge gaps and management actions.</p> <p>Conservation gain will be achieved indirectly through improved understanding of the species distribution, which will inform management actions in this offset package.</p>	<p>This offset action is research and does not have directly quantifiable success criteria. Success will be qualitatively measured as completion of monitoring and publication of results.</p>	<p>\$4,865,470</p> <p>Final costs for the monitoring program will be further refined once the level of involvement from DES and other research entities are known.</p>

Offset Priority	Offset Description (i.e. purpose, location and outcome)	Offset Actions	Responsible Person(s) for Offset Activity	Timing (i.e. commencement, duration, frequency) and Requirements	Conservation Gain Measures	Success Measurement Criteria (measured annually)	Committed Cost <sup>1 3</sup> Contribution
<b>Threat Abatement</b>							
Feral cat control	A feral cat control program will be undertaken across the distribution range (as informed by the field surveys) with the aim of reducing predation by feral cats. This will include information on the current status of the feral cats within the known distribution range, methodology, implementation plan, and a monitoring plan.	<ol style="list-style-type: none"> <li>1. Consult with Southern Gulf NRM;</li> <li>2. Undertake desktop review of publicly available data;</li> <li>3. Plan and develop feral cat control program;</li> <li>4. Implement/trial improved feral cat control methods; and</li> <li>5. Publish results of feral cat control program.</li> </ol>	Suitably qualified pest management contractor and/or environmental consultant.	<ul style="list-style-type: none"> <li>▪ Commence development of program in H1 2022;</li> <li>▪ Implement program in H2 2022; and</li> <li>▪ five sites measured twice annually for up to 20 years.</li> </ul>	<p>The feral cat control program will reduce the number of feral cats in Julia Creek Dunnart habitat.</p> <p>Baseline surveys will be undertaken to establish baseline feral cat numbers and inform priority management areas.</p> <p>Feral cat surveys and Julia Creek Dunnart population surveys will be undertaken across the managed areas to measure change.</p>	This offset action is research and does not have directly quantifiable success criteria. Success will be qualitatively measured as completion of monitoring and publication of findings.	\$2,190,000 initial estimate, then TBD for a larger-scale program.
Research prickly acacia removal benefits	Purpose is to quantify the relative benefits to Julia Creek Dunnart habitat quality within the MGD bioregion as a result of removal of Prickly Acacia.	<ol style="list-style-type: none"> <li>1. Consult with Southern Gulf NRM;</li> <li>2. Undertake desktop review of publicly available data;</li> <li>3. Select and monitor sites where landowners are actively managing Prickly Acacia; and</li> <li>4. Identify a population of Julia Creek Dunnart confirmed to be present after trapping surveys on a property where there is no or little Prickly Acacia present. Then compare this to an adjacent property or area where no Julia Creek Dunnarts appear to be present where there is also Prickly Acacia. Trapping surveys would be undertaken subsequent to the removal of Prickly Acacia to confirm if the Julia Creek Dunnarts colonise the cleared area after Prickly Acacia is removed.</li> </ol>	Research will be conducted by a suitably qualified environmental professional.	<ul style="list-style-type: none"> <li>▪ Commence planning and development of research in H1 2021; and</li> <li>▪ Commence identification of 5 sites where weed management is active H2 2021; and</li> <li>▪ Monitor the 5 sites once annually over 20 years.</li> </ul>	<p>Research is an indirect offset and will assist in addressing knowledge gaps and management actions.</p> <p>Conservation gain through this offset action is not directly measurable. Conservation gain will be achieved indirectly through improved understanding of the impacts of prickly acacia removal on Julia Creek dunnart habitat. The findings will inform the management actions in this offset package and assist land managers.</p>	This offset action is research. Habitat quality criteria will be quantified over time as the habitat responds to the removal of the weed. Success will inform rehabilitation and weed removal programmes across the region that are seeking to enhance habitat for the species.	\$806,450
<b>Habitat Improvement and Breeding Program</b>							
Retain and protect approximately 1,000 ha of habitat within the Saint Elmo property	<p>Legally secure approximately 1,000 ha of potential habitat suitable for Julia Creek Dunnart within the Saint Elmo property. This area is outside of the proposed Saint Elmo Vanadium Project Mine Lease boundary and will not be affected by mining activities.</p> <p>A further small, experimental area has been identified within the Saint Elmo property and will be retained to conduct various trials in fencing, rehabilitation / revegetation and stocking rates.</p>	<ol style="list-style-type: none"> <li>1. Undertake desktop and field assessment of potential sites within the species known distribution;</li> <li>2. Undertake habitat quality assessment of the impact site (i.e. mine site) and proposed offset site; and</li> <li>3. Secure offset parcel of land.</li> </ol>	Proponent (Multicom).	<ul style="list-style-type: none"> <li>▪ Commence 2025.</li> </ul>	<p>Conservation gain through this offset action is directly measurable.</p> <p>Conservation gain will be achieved directly through retention of habitat with potential to support Julia Creek Dunnart. Success will inform rehabilitation programmes across the MGD bioregion that are seeking to enhance habitat for the species.</p>	This offset is a direct land-based offset. Habitat quality criteria will be quantified over time as the habitat responds to rehabilitation / revegetation.	\$372,103 initial estimate, however TBD based on the results from monitoring research and research actions that will quantify habitat quality criteria and thresholds for threatening processes.
Re-instate sanctuary at Julia Creek Aerodrome and re-establish breeding program	<p>Re-instate sanctuary for the species at Julia Creek Aerodrome, including re-establishment of breeding program.</p> <p>The breeding program will facilitate re-introductions of the species into appropriate habitat at sites where the</p>	<ol style="list-style-type: none"> <li>1. Repair fencing to exclude predators and threatening processes;</li> <li>2. Undertake surveys within the sanctuary to trial different methods such as radio tracking, thermal imaging, standard camera traps and/or Elliott traps;</li> </ol>	<p>Suitably qualified contractor for fencing repairs as directed by Multicom.</p> <p>Surveys will be undertaken by a suitably qualified expert.</p>	<ul style="list-style-type: none"> <li>▪ Commence re-instatement / repair works of the sanctuary at the aerodrome in H2 2021;</li> <li>▪ Consult with a research body in late 2020;</li> </ul>	<p>Conservation gain through this offset action is directly measurable.</p> <p>Conservation gain will be achieved directly through protection of habitat to</p>	This offset is a combination of a direct and indirect offset. Habitat quality criteria will be quantified over time as the habitat responds to	\$908,115

Offset Priority	Offset Description (i.e. purpose, location and outcome)	Offset Actions	Responsible Person(s) for Offset Activity	Timing (i.e. commencement, duration, frequency) and Requirements	Conservation Gain Measures	Success Measurement Criteria (measured annually)	Committed Cost <sup>1 3</sup> Contribution
	<p>species had been known historically and where new habitat is identified as achieving quality criteria.</p> <p>The item will contribute to ongoing extension programs being delivered by the McKinlay Shire Council and Southern Gulf NRM.</p>	<p>3. Consult with a research body regarding further research on preferred bait types and general species behaviour;</p> <p>4. Facilitate research on preferred bait type and general species behaviour; and</p> <p>5. Facilitate breeding program.</p>	<p>Epic (suitably qualified/ environmental professionals) and Multicom will facilitate the research program with a research body. Breeding program will be facilitated by a suitably qualified environmental professional.</p>	<ul style="list-style-type: none"> <li>▪ Commence surveys within sanctuary 2021;</li> <li>▪ Facilitate breeding program (pending trapping survey findings) over 5 year period; and</li> <li>▪ Provide ongoing funding for the program for a 20 year period.</li> </ul>	<p>support Julia Creek Dunnart. Success of the breeding program will inform future research of the species, including management of the species and its habitat.</p>	<p>rehabilitation / revegetation. Success will also be measurable through the successfully produced offspring in the breeding program and re-introductions into the wild.</p>	
<b>Total:</b>							<b>\$10,361,688</b>

Notes:

■ = high priority (most beneficial for the species)

■ = moderate priority (could be beneficial for the species)

<sup>1</sup>Includes in-kind and direct contribution

<sup>2</sup>Noting that the best Mitchell Grass land for Julia Creek Dunnart is also the best grazing country in the area, this will also depend on community and stakeholder education. Further work is required to determine alternative programs in the event landowners do not wish to agree.

<sup>3</sup>Indicates the cost is an average value based on the total cost over a 20 year period, including 3% rise in CPI per annum.

**Table 4: Offset Costing**

Offset Priority	Cost Component	Estimated Itemised Costing	Timing / Staging	Cost <sup>1 2 3</sup>	
<b>Field Surveys to Determine Distribution</b>					
<p>Conduct long-term field survey program to verify distribution and publish findings</p> <p><i>Note: Surveys have been costed to show the cost break-down as a total over the five year program. There will be 10 sites selected with two surveys conducted at each site. Each year two sites will be surveyed until all sites are completed after five years (i.e. four surveys per year). Subsequent surveys will have the same amount of funding allocated as shown in this table. Costings are shown as a total for the whole program.</i></p> <p><i>The survey costs include wages and accommodation costs. Student involvement will not require wages or any wages will be paid at a reduced rate. Accommodation costs for locations such as Bladensburg NP will be substantially less. Any savings on survey costs will be allocated to other components as required or additional surveys will be conducted.</i></p>	<p><b>Indicative Costing for the program over five years (10 sites, 2 surveys per site and 2 sites surveyed per year for five years, assuming there are initially 40 surveyed sites)</b></p>	-	Surveys will be undertaken for a minimum of 5 years and up to 10 years at locations if the species is recorded	<b>\$1,219,550 total</b>	
	Desktop preparation and review of historical information (including preparation of mapping / shapefiles)	\$60,000	November 2020		
	Develop trapping programs for four study areas	\$62,500	November 2020		
	Engagement with a research body	\$50,000	Mid October 2020		
	Ongoing survey preparation (site specific)	\$48,000	-		
	<b>Implementation of trapping program per survey period per location</b>				
	Travel costs (return flights for 2 people and hire car)	\$32,650	Commence surveys May 2021		
	Accommodation 12 nights for 2 people (possibly relevant only for Julia Creek) per survey	\$40,000	-		
	Personnel labour – 2 people for 13 days including travel (one expert and one university student)	\$330,000	-		
	Fauna trapping equipment (per survey):		-		
	- Elliott traps (125 traps)	\$12,500			
	- Bait mix	\$800			
	- Camera traps	\$13,000			
	- Survey quadrat, star pickets and flagging tape	\$550			
	- GPS	\$6,500			
- Digital camera (site photos)	\$650				
- Batteries	\$800				
- Satellite Phone	\$2,600				
- Freight	\$10,000				
Sundries (e.g. food, fuel, PPE etc.)	\$44,000	-			
Review of field survey data	\$250,000	-			
Provision of updates to community	\$30,000	-			
Publication of findings upon completion of surveys (multiple articles, determined by results)	\$125,000	-			
Refinement of survey program (site specific)	\$100,000	Once surveys of known important populations complete, stratify remaining likely habitat across the region and identify secondary survey locations. Commence secondary baseline survey program in Q3 2021.			
<b>Population and Habitat Monitoring</b>					
<p>Population and habitat monitoring</p> <p><i>Note: Monitoring program will be for five sites surveyed twice (i.e. pre and post breeding season) every three years for up to 20 years within the species known distribution (informed by field surveys).</i></p> <p><i>Student involvement will not require wages or any wages will be paid at a reduced rate. Accommodation costs for locations such as Bladensburg NP will be substantially less. Any savings on survey costs will be allocated to other components as required or additional surveys will be conducted.</i></p>	Engagement with suitably qualified expert panel (e.g. a research body and Southern Gulf NRM)	\$268,704	Expert panel to run for 20 years and meet once per year (commence 2020)	<b>\$4,865,470 total</b>	
	Development of habitat monitoring program:	\$268,704	Expert to provide expert assistance to the program every year for 20 years		
	- Engagement of suitable expert (such as Dr Patricia Woolley, Greg Mifsud or Dr Andrew Baker)				
	- Expert provision of guidance for a post-graduate student				
	- Post-graduate student labour				
	<b>Implementation of habitat monitoring program (total for 90 surveys):</b>				
	Travel costs (return flights for 2 people and hire car)	\$325,266	First survey June 2021		
	Accommodation 5 nights for 2 people (possibly relevant only for Julia Creek)	\$241,883	-		
	Personnel labour – 2 people (1 expert and 1 university student) for 6 days including travel	\$2,176,500	-		
	Sundries for 2 people (e.g. food, fuel, PPE etc.)	\$290,200	-		
	Equipment:		-		
- Elliott traps (125 traps)	\$151,146				
- Bait mix	\$6,046				
- Camera traps	\$96,733				
- Survey quadrat, star pickets and flagging tape	\$2,284				
- GPS	\$48,367				
- Digital camera (site photos)	\$4,837				
- Batteries	\$4,837				
- Satellite Phone	\$19,347				
- Freight	\$120,917				
Review of field survey data	\$671,759	-			
Publication of results of monitoring program	\$167,940	-			
<b>Threat Abatement</b>					
Feral cat control	Consult with Southern Gulf NRM	\$1,000,000	Commence H1 2022 and undertaken annual for 20 year period	<b>\$2,190,000</b>	

Offset Priority	Cost Component	Estimated Itemised Costing	Timing / Staging	Cost <sup>1 2 3</sup>		
<i>Note: program will be undertaken at 5 sites, measured twice annually for up to 20 years</i>	Undertake desktop review of publicly available data	\$240,000	Commence H1 2022 and undertaken annual for 20 year period			
	Plan and develop feral cat control program suitable for the Mitchell Grass downs: - Engagement of suitable expert (such as Professor Sarah Legge, Dr John Read or Dr Katherine Moseby) - Expert provision of guidance for a post-graduate student - Post-graduate student labour	\$200,000	Commence H1 2022 and undertaken annual for 20 year period			
	Implement / trial improved feral cat control methods (methods unknown at this stage)	\$500,000	Commence 2022 and undertaken annual for 20 year period			
	Publication of results of the trial	\$250,000	-			
Research prickly acacia removal benefits  <i>Note: sites will be monitored once annually for up to 20 years. Student involvement will not require wages or any wages will be paid at a reduced rate. Any savings on monitoring costs will be allocated to publication as required or additional monitoring events will be conducted.</i>	Consult with Southern Gulf NRM, in part to identify suitable sites	\$50,000	H1 2021	<b>\$806,450</b>		
	Undertake desktop review of publicly available data and complete planning and development of research	\$24,000	H1 2021			
	<b>Select and monitor 5 sites where landowners are actively managing Prickly Acacia (sites monitored once annually for 20 years):</b>		H2 2021			
	Travel costs (return flights for two people and/or hire car)	\$51,500	-			
	Accommodation eight nights for two people	\$32,000	-			
	Personnel labour – two people (one expert, one university student) for five days including travel	\$300,000	-			
	Sundries (e.g. food, fuel, PPE etc.)	\$40,000	-			
	Equipment: - Star pickets & flagging tape - GPS - Digital camera (site photos) - Satellite phone - Batteries	\$450 \$7,000 \$700 \$400 \$400	-			
	Review of field survey data	\$250,000	-			
	Publication of results of monitoring program	\$50,000	-			
	<b>Habitat Improvement and Breeding Program</b>					
	Retain and protect approximately 1,000 ha of habitat within the Saint Elmo property	<b>Undertake habitat quality assessment of the impact site (i.e. mine site) and proposed offset site:</b>			2025	<b>\$372,103</b> initial estimate, however TBD based on the results from monitoring research that will quantify habitat quality criteria
Desktop assessment of potential sites within the Mine Lease that have not been previously mined		\$6,000	Commence 2025			
Desktop assessment of impacted sites		\$6,000	Commence 2025			
Negotiate and secure land access through voluntary agreement with relevant landholders. Includes minor legal costs to draft the agreements		\$2,500	-			
Achieve compensation agreement for access to land for the duration of the offset. The terms of the agreement will be to compensate for the loss of full stock production levels over the designated offset area, reducing stocking rates during key grass growing periods (post-wet season) or periods of extended drought. The compensation value is not a purchase price, but simply to account for reduced stocking rates and provision of access to the land for the duration of the offset		\$143,500	-			
<b>Habitat field assessment and monitoring (one trip every five years for entire program):</b>		H2 2020				
Travel costs (return flights for two people (one expert, one university student) and hire car)		\$10,300	-			
Accommodation five nights for two people (one expert, one university student)		\$6,400	-			
Personnel labour – two people (one expert, one university student) for six days including travel		\$60,000	-			
Sundries (e.g. food, fuel, PPE etc.)		\$8,000	-			
Equipment: - Elliott traps - Bait mix - Star pickets and flagging tape - GPS - Digital camera - Satellite phone - Batteries		\$5,000 \$200 \$55 \$1,400 \$140 \$560 \$80	-			
Secure offset parcel of land		\$25,000	-			
Establish cattle exclusion fencing		\$94,868	Commence 2025			
Allowance for gates or grids at approximately 1km intervals (as needed)		\$2,100	Commence 2025			
Re-instate sanctuary at Julia Creek Aerodrome and re-establish breeding program  <i>Note: ongoing funding will be provided for the program over a 10 year period.</i>		Consult with a research body regarding further research on preferred bait types and general species behaviour. Utilise existing McKinlay Shire Council labour and understanding of issues to be addressed at the site	\$10,000	H2 2020	<b>\$908,115</b> Note: this is an estimate only. Actual costs would be determined in consultation with McKinlay Shire Council, research bodies, DES and other key stakeholders.	
	<b>Undertake survey trials within the sanctuary:</b>		2025			
	Travel costs (return flights for two people (one expert, one university student) and hire car)	\$26,900	-			
	Accommodation five nights for two people (one expert, one university student)	\$20,000	-			
	Personnel labour – two people (one expert, one university student) for six days including travel	\$138,000	-			
Sundries (e.g. food, fuel, PPE etc.)	\$24,000	-				

Offset Priority	Cost Component	Estimated Itemised Costing	Timing / Staging	Cost <sup>1 2 3</sup>
The cost of the surveys is incorporated in Offset Priority 1 above, other than additional equipment costs as identified.	Undertake surveys within the sanctuary to trial difference methods such as radio tracking, thermal imaging, standard camera traps and/or Elliott traps:		Commence surveys April 2021	
	- Thermal imaging camera (one off purchase)	\$1,000		
	- Titley Electronics model LT2 transmitters (or equivalent)	\$5,000		
	- Yagi AY/C antenna (or equivalent)	\$1,000		
	- Regal 2000 receiver (or equivalent)	\$2,500		
	- Camera trap hire	\$3,000		
	- SD cards	\$800		
	- Camera trap bait	\$100		
	- Batteries	\$690		
	- Star pickets and flagging tape (for camera traps)	\$125		
	Facilitate research on preferred bait type and general species behaviour (some information will be gleaned from trapping surveys but most would be derived from a captive breeding program)	\$50,000	-	
	Facilitate breeding program for 10 year period (this component is dependent on the cooperation of the Queensland Government)	\$625,000	Over 5 year period	
			<b>TOTAL</b>	<b>\$10,361,688</b>

Notes:

■ = high priority (most beneficial for the species)

■ = moderate priority (could be beneficial for the species)

<sup>1</sup> Assumes 3% rise in CPI per annum

<sup>2</sup> The costings in this table will be reviewed and updated periodically to reflect any changes in the program as a result of seasonality, climate, threat abatement success etc.

<sup>3</sup> Indicates the cost is an average value based on the total cost over a 20 year period, including 3% rise in CPI per annum.

## **5.2 Improved Scientific Base Understanding**

### **5.2.1 Julia Creek Aerodrome and Toorak Station**

Through the items described above, it is proposed that the first step in the Offset Strategy is to develop a survey plan to verify if the species is still in the area of the action. In 2005 one (1) Julia Creek Dunnart was found adjacent to the Julia Creek Aerodrome. Subsequent to negotiations with McKinlay Shire Council in 2007, vermin proof fencing was installed, encompassing 273 ha. Twenty (20) captive-bred individuals were introduced to the aerodrome as a pilot program. Trapping was conducted on two separate occasions (August 2007 and April 2008), however no released animal was recaptured. The Recovery Plan was written in 2009 and despite the lack of captures in 2007 and 2008 this artificially enhanced population (the natural population apparently of unknown size) was considered an ‘important population’. The reinstatement of the sanctuary for the Julia Creek Dunnart, including the re-establishment of the breeding program would assist with informing future research of the species, including management and its habitat. It would also contribute to ongoing extension programs being delivered by McKinley Shire Council and the Southern Gulf NRM.

Funding for the study of the population at the aerodrome ceased some years ago and it is unknown if the population is extant. The most recent captures were of six (6) individuals in 2015. None was captured in 2016 and no trapping has been conducted at the site since that year. Toorak Station was sold by the QLD Government. It is important to understand whether the species is still located in the area and whether Toorak Station is still a known important population.

A survey of these locations of important populations is especially important given the widespread flooding that occurred in the region during February 2019<sup>1</sup>, which was estimated to have killed more than 600,000 head of cattle. Anecdotal information from the Julia Creek community indicated the flood was devastating for local wildlife, including dunnarts. Should the local Julia Creek Dunnart population have been substantially reduced in number, or possibly extirpated, then compensatory purchase or undertaking of conservation agreements on other areas of suitable habitat would be of little value. A re-introduction program may need to be considered based on re-establishment of captive breeding. Flooding is mentioned as a threat in the Recovery Plan (DERM 2009).

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<sup>1</sup><https://www.abc.net.au/news/2019-02-05/drone-shows-extent-of-flooding-at-julia-creek/10782036>; <https://www.theland.com.au/story/5906136/queensland-floods-decimate-native-wildlife/>; and <https://theconversation.com/catastrophic-queensland-floods-killed-600-000-cattle-and-devastated-native-species-120753>

## 5.2.2 Retained Habitat

Habitat within the mine site footprint but separate to the area of impact may be retained (**Figure 5**). This remnant habitat will not be cleared or mined. The Area 1 includes 715 ha of RE 4.9.1c and 346 ha of RE 4.9.1c/4.9.2b. Area 2 contains 41 ha of RE 4.9.1c. RE 4.9.1c is recognized as habitat for Julia Creek Dunnart and the mixed polygon of RE 4.9.1c/4.9.2b will contain areas that are potentially suitable habitat.

Areas of retained habitat are currently subject to varying degrees of infestation by Prickly Acacia and cattle grazing, similar to the action area. A trapping survey and quantitative assessment of habitat criteria should be implemented prior to mining in adjacent areas.

If Julia Creek Dunnart is found to be present, the current land use can be modified regarding grazing intensity and Prickly Acacia management (or the use of existing areas of variable infestation) to study the impact thresholds of these threats to Julia Creek Dunnart. Research can also investigate the impacts of artificial water sources. Should there be no evidence of the presence of the dunnart then the species could be re-introduced assuming the proposed captive breeding program has gone ahead.

### 5.2.1 Positive Land Management Activities

Management activities including a feral Cat program (addressing key priority actions in the *Threat abatement plan for predation by feral cats* (DE 2015)) and a major weed program have been considered to provide a conservation gain to the Julia Creek Dunnart. Such programs have the potential to improve the viability of the Julia Creek Dunnart and/or avert any threats of extinction and future loss, degradation or damage of their habitat from threatening processes.

Predation by feral Cats is recognised as one of the primary factors in the decline and extinction of several native mammal species in Australia (Woinarski et al. 2014). Implementation of feral Cat control measures in areas that may not currently support Julia Creek Dunnart will have a flow-on effect in that it will reduce recruitment of Cats in areas that do. That is, it is not strictly necessary to confirm the presence of Julia Creek Dunnart before control of Cats could be implemented in a particular location as long as the habitat is suitable for the dunnart. Feral Cat control will also benefit other native species, not just Julia Creek Dunnart, which is an additional benefit of any program.

Cats predate on Julia Creek Dunnart as a direct threat, and compete with it for food resources, as an indirect threat. The effects of feral predators such as Cats are exacerbated where grazing pressure reduces vegetation cover during wet conditions when soil cracks are closed. It is then more difficult for dunnarts to avoid predation due to a lack of shelter.



Control techniques already in use in Australia include:

- Exclusion fencing, either netted fences that use an electrified wire mounted 15 cm from the top and 10 cm outward from the fence or non-electrified fencing incorporating a netted ceiling, or a curved overhang;
- Shooting, which is humane when the shooters are experienced but is expensive, labour intensive and time consuming. It may be appropriate inside the fenced habitat at Julia Creek aerodrome if Cat control is found to be required. It is not considered appropriate at large scales. Daytime shooting in open habitats such as Mitchell Grass downs may be practical as Cats take refuge in the canopy of low trees along drainage lines;
- Leg-hold traps with padded jaws placed at sites where territorial markers, such as faecal deposits and claw-marking, are noticed. Otherwise fish oil and/or a visual stimulus such as bird feathers hung from a bush or stick can be used as an attractant;
- Cage traps, baited; and
- Poisoning, using fresh meat baits containing 1080, under permit.

The Offset Strategy includes trapping surveys to ascertain if the ‘important population’ as identified by the Recovery Plan at Julia Creek aerodrome exists. The Offset Strategy proposes repair to fencing of the site, eradication of feral predators, such as Cats, and re-introduction of Julia Creek Dunnart, all as required. Any population that persists or is re-introduced will be monitored. Given the success elsewhere in re-establishing populations of native mammals threatened by feral predators through predator-proof exclusion fencing, the possibility of expanding the fenced area at the Julia Creek aerodrome will be explored.

A major motivation behind the research components of this offset strategy is that there is insufficient knowledge of Julia Creek Dunnart biology, distribution and thresholds for threatening processes. The research is intended to achieve the baseline data that is necessary to determine the abundance and distribution of the threat of Prickly Acacia, timeframes for its control and measurable criteria for whatever target is being considered.

### **5.3 Offset Assessment Guide: Offset Calculator Tool**

To provide a comparative size and cost quantum for a direct land-based, data collected from multiple field surveys and sites was used to inform required inputs to the DAWE *Offset Assessment Guide: Offset Calculator tool*. The results of the calculator tool are presented in **Appendix A** and demonstrate that the proposed offset items in **Table 3** above are in excess of the value for a direct land-based offset alone.

For comparative purposes, the values entered into the calculator in **Appendix A** identified an offset of approximately 48,500 ha in area to replace the habitat lost to the action. For the purposes of this comparison against the proposed offset, Multicom have assumed an offset area of 50,000 ha. At an estimated \$143.50/ha to secure a covenant to reduce stocking rates, this would equate to \$7,193,400. If Multicom relied upon this figure to acquit the offset, there is no certainty that the land would be of any benefit to Julia Creek Dunnart, for the reasons described above. Including the requirements to secure, monitor and manage the land the total cost of the offset would be \$9,914,100 over a period of 20 years.

The *Offset Assessment Guide* supports the requirements of the EOP through a balanced spreadsheet approach to determine suitable offsets for threatened species and ecological communities.

#### **5.4 Offset Management Plan**

An Offset Management Plan (OMP) will be developed to provide scientifically robust management measures to address the Project's potential impacts to Julia Creek Dunnart. Appropriate management activities will be based on relevant conservation advice, the latest recovery plan, threat abatement plans and ecological descriptions for the species.

The OMP will describe:

- Offset requirements of the Project in accordance with the EPBC Act EOP;
- Management activities to meet the recovery plan and threat abatements plan objectives, the offset requirements of the Project, in accordance with the EPBC Act EOP and associated Offsets Assessment Guide; and
- Monitoring, reporting, auditing and continuous improvement systems to ensure the best outcomes for the Julia Creek Dunnart.

The overall objective of the OMP is to improve site characteristics for Julia Creek Dunnart foraging and breeding habitat.

##### **5.4.1 Adaptive Management**

As part of the OMP, Multicom will adaptively implement the plan to address experiences and to mitigate uncertainty where the plan is not delivering improvements to site habitat condition. The adaptive management cycle is based on core adaptive management principles, outlined in **Figure 6**.

Adaptively implementing the plan is critical to achieving the plan’s objectives, for example where adjustment actions and arrangements can be made to enhance effectiveness and deliver improvements to site habitat condition. To maintain an adaptive approach, Multicom will:

- Collect and incorporate new data / information as a result of implementing the plan, with new findings from data collected or from new information derived from external sources;
- Effectively schedule monitoring on an annual basis to make informed decisions on risk management, auditing and reporting activities;
- Commit to periodically reviewing risks, including those in response to the changing risk level, new information, changing circumstances or the results from implementing corrective actions;
- Undertake an annual review of the effectiveness of management measures with significant levels of uncertainty and relatively long implementation timeframes, upon which the plan is highly dependent;
- Indicate that the consequences of significant environmental incidents are addressed; and
- Review the plan as soon as possible when there are indications of OMP failure/s.

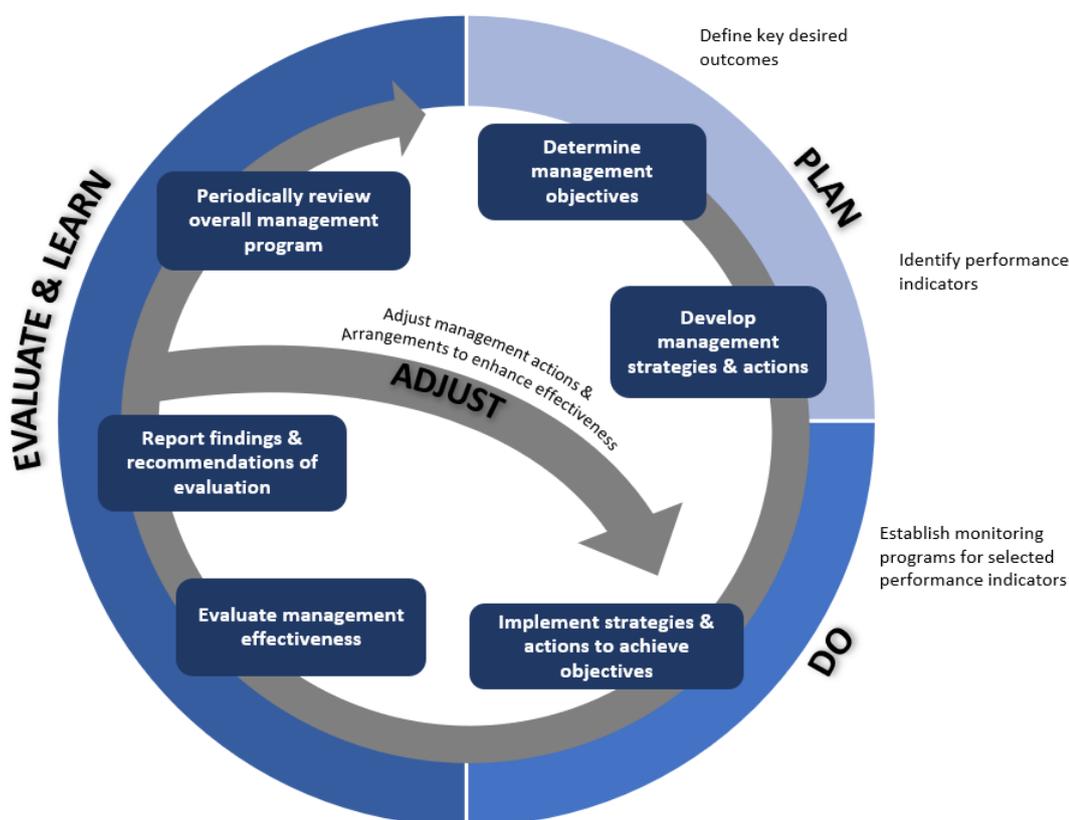


Figure 6: Adaptive Management Cycle

## 5.5 Compliance with Principles of EPBC Act EOP

An assessment of the proposed Offset Strategy’s compliance with the principles of the EPBC Act EOP (as mentioned in **Section 3.2**) is provided in **Table 5**.

**Table 5: Assessment against Principles of EPBC Act EOP**

EPBC Act EOP Principles		Offset Strategy Compliance
1	Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action.	Through a combination of compensatory and direct offsets, the Offset Strategy will deliver an overall conservation outcome for Julia Creek Dunnart that improves or maintains the viability of the species.  The proposed offset approach will result in an overall beneficial conservation outcome.
2	Be built around direct offsets but may include other compensatory measures.	A conservation benefit to the Julia Creek Dunnart is expected to be achieved through direct offsets as well as increasing the proportion of other compensatory measures in an offset package.
3	Be in proportion to the level of statutory protection that applies to the protected matter.	The Julia Creek Dunnart is listed as Vulnerable under Commonwealth legislation. The proposed offsets will contribute directly to the actions and strategies described in the relevant recovery plan. Accordingly, the proposed offsets are considered to be in proportion to the level of statutory protection applied to the species.
4	Be of a size and scale proportionate to the residual impacts on the protected matter.	The likely residual impacts from the Project are difficult to determine, based on a lack of either confirmed or database records from the Project area. Any possible residual impact is likely to affect the potential use of habitat by the species, should it be present now or in the future. Therefore, the proposed offsets are considered to be of an appropriate size and scale to the residual impacts because it will provide a direct and relevant improvement of the conservation outcomes for the species.
5	Effectively account for and manage the risks of the offset not succeeding.	The offset approach includes a range of research-based outcomes that will be suitably robust both in terms of spatial and temporal variability. This will be appropriate to manage the risk of inadequate experimental design and to ensure there is sufficient data for analyses and interpretation.
6	Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action.	Largely, the offsets are in addition to what is required by law. However, the offsets will also build on current land management requirements, especially for weeds, to encourage broader scale beneficial outcomes. There is no other required offset for the Project. The proposed offset will contribute directly to an improved conservation outcome for Julia Creek Dunnart.
7	Be efficient, effective, timely, transparent, scientifically robust and reasonable.	<b>Efficient</b> – The OMP will ensure the efficient delivery of the proposed offset package. Prior to commencing, a detailed research plan will be submitted to DAWE. This will ensure accountability and efficient delivery of the offsets.  <b>Effective</b> – The proposed measures will be devised to contribute to the future viability of Julia Creek Dunnart habitat and deliver an overall conservation outcome that improves or maintains the viability of Julia Creek Dunnart as compared to what is likely to have occurred if neither the action nor the offset had taken place.  <b>Timely</b> – The research will be undertaken in a timely manner. Securing the retained habitat could occur immediately following approval of the action.  <b>Transparent</b> – The research will be undertaken in a transparent manner. The research will be targeted towards key actions identified in recovery

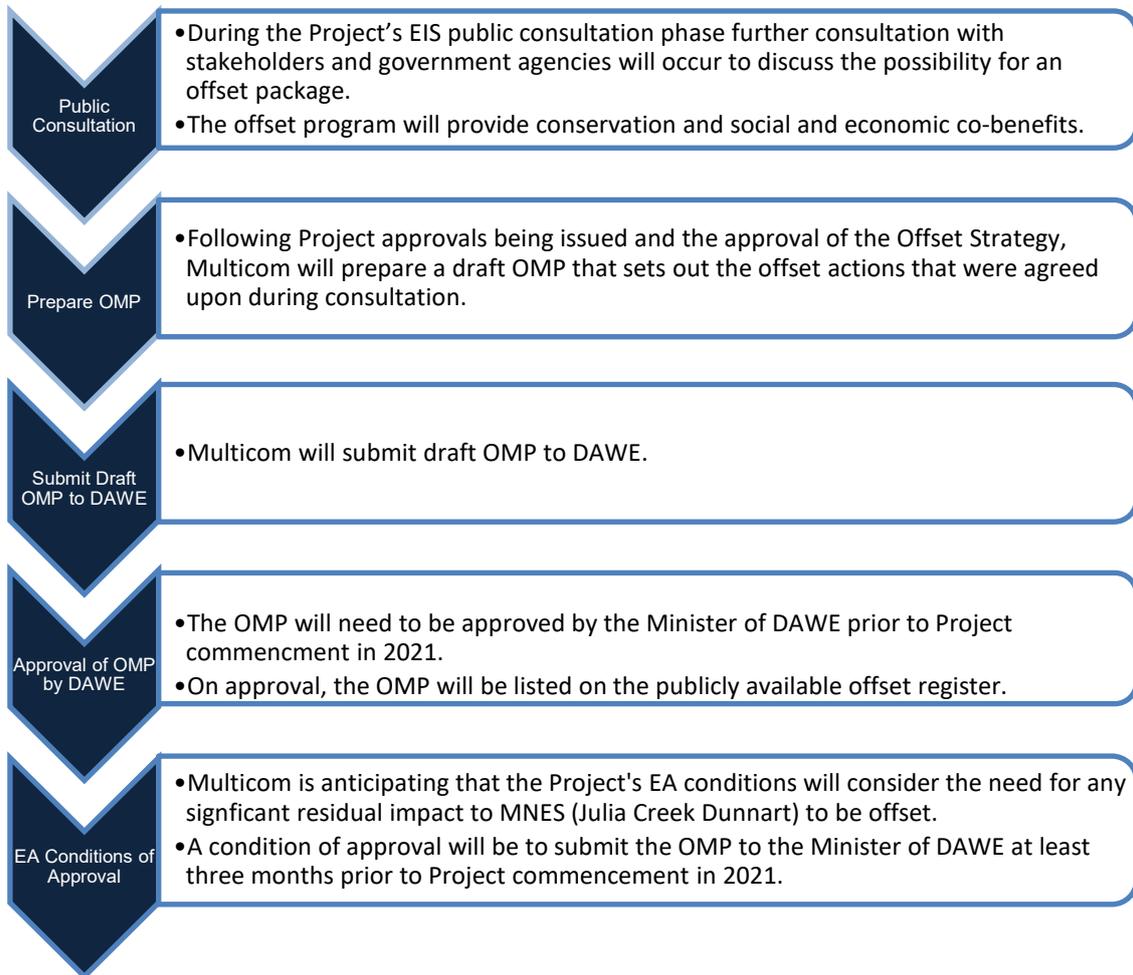
	EPBC Act EOP Principles	Offset Strategy Compliance
		<p>plans, threat abatement plans and management plans. It is anticipated the research will present findings that can be peer-reviewed and published in a peer-reviewed scientific journal. Land secured through direct offsets will be clearly identified and protected under relevant mechanisms.</p> <p><b>Scientifically robust</b> – The proposed offsets will be undertaken in a scientifically robust manner and consider best practice research approaches.</p> <p><b>Reasonable</b> – A conservation benefit to the Julia Creek Dunnart is highly likely to be achieved through the proposed measures.</p>
8	Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	The OMP will detail monitoring, reporting, auditing and continuous improvement systems to ensure the offset requirements are attained and maintained during the action’s period of approval.

## 5.6 Conclusion

The proposed Offset Strategy will contribute to the future viability of Julia Creek Dunnart habitat and deliver an overall conservation outcome as compared to what is likely to have occurred if neither the action nor the Offset Strategy had taken place. Based on prevalence of known threatening processes at and adjacent to the action areas, the combination of direct and compensatory offset management actions will contribute to the following improved conservation outcomes for the species:

- Research into thresholds of threats, alone and in combination, to better understand Julia Creek Dunnart ecology and success criteria for direct land-based offsets;
- Secure land containing suitable Julia Creek Dunnart habitat
  - Land has been identified adjacent an important population (the Julia creek Aerodrome) and in the vicinity of the mining activity; and
- Restoration and maintenance of a captive breeding program, facilitating re-establishment or enhancing of populations.

## 6 Next Steps and Timing



## 7 References

- ALA 2018, *Atlas of Living Australia*, <http://www.ala.org.au>.
- Curry, C, Wharton, P & Maclean, A 2020, *North West Queensland Regional Weed and Pest Animal Management Strategy 2020 – 2024*, Southern Gulf NRM.
- DE 2015, *Threat abatement plan for predation by feral cats*, Department of the Environment, Canberra, available from:  
<http://www.environment.gov.au/biodiversity/threatened/publications/tap/threat-abatement-plan-feral-cats>.
- DEE 2013, *Matters of National Environmental Significance – Significant Impact Guidelines 1.1*, Department of the Environment, Canberra, available from:  
[https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines\\_1.pdf](https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf).
- DERM 2009, *National recovery plan for the Julia Creek dunnart (Sminthopsis douglasi)*, Report to the Department of the Environment, Water, Heritage and the Arts, Canberra, Queensland Parks and Wildlife Service, Department of Environment and Resource Management, Brisbane.
- DSEWPC 2011, *Survey guidelines for Australia’s threatened mammals: guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*, Department of Sustainability, Environment, Water, Population and Communities, Canberra.
- Fischer, J, Lindenmayer, DB & Manning, AD 2006, ‘Biodiversity, ecosystem function, and resilience: ten guiding principles for commodity production landscapes’, *Frontiers in Ecology and the Environment*, vol. 4, pp. 80-86.
- Lundie-Jenkins, G. & Payne, A., 2000, *Recovery plan for the Julia Creek dunnart (Sminthopsis douglasi) 2000–2004*,. Queensland Parks and Wildlife Service, Brisbane, Australia.
- Maxwell, S, Burbidge, AA & Morris, K (eds) 1996, *The 1996 Action Plan for Australian Marsupials and Monotremes*, Environment Australia, Canberra.
- McAlpine, C & Howes, A 2005, *Identification and mapping of critical habitat for the Julia Creek dunnart (Sminthopsis douglasi)*, Report to the Environmental Protection Agency/Queensland Parks and Wildlife Service, Brisbane.
- Mifsud, G 1999, *Ecology of the Julia Creek dunnart Sminthopsis douglasi (Marsupialia: Dasyuridae)*, Masters Thesis, La Trobe University.
- Mifsud, G 2001, *Monitoring of Julia Creek dunnart populations at Bladensburg National Park, April 2001*, Report to the Queensland Parks and Wildlife Service, Brisbane.

- Murphy, H, Liedloff, A, Williams, RJ, Williams, KJ & Dunlop, M 2012, *Queensland's biodiversity under climate change: terrestrial ecosystems*, CSIRO Climate Adaptation Flagship Working Paper No. 12C.
- O'Hara, T, & Rush, E 2015, *Aerodrome survey July 2015: a report for McKinlay Shire Council on the results of the small vertebrate survey conducted in the Julia Creek aerodrome*, Unpublished report, University of Queensland, Gatton.
- QG 2015, *A Biodiversity Planning Assessment for the Gulf Plains Bioregion – Summary Report Version 1.1*, Queensland Government, Brisbane, available from:  
[https://www.qld.gov.au/\\_\\_data/assets/pdf\\_file/0028/93646/bpa-gulf-plains-summary.pdf](https://www.qld.gov.au/__data/assets/pdf_file/0028/93646/bpa-gulf-plains-summary.pdf).
- QG 2020, *Species profile—Sminthopsis douglasi (Dasyuridae)*, Queensland Government, Brisbane,  
<https://apps.des.qld.gov.au/species-search/details/?id=789>
- Smith, CS, Howes, AL, Price, B & McAlpine, CA 2007, 'Using a Bayesian belief network to predict suitable habitat of an endangered mammal – the Julia Creek dunnart (*Sminthopsis douglasi*)', *Biological Conservation*, vol. 139, pp. 333-347.
- TSSC 2016, *Conservation Advice Sminthopsis douglasi Julia Creek dunnart*, Threatened Species Scientific Committee, Department of the Environment and Energy, Canberra, Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/305-conservation-advice-07122016.pdf>. In effect under the EPBC Act from 07-Dec-2016.
- Woinarski, JCZ, Burbidge, AA & Harrison, PL 2014, *The action plan for Australian mammals 2012*, CSIRO Publishing, Collingwood.
- Woolley, PA 1992, 'New records of the Julia Creek dunnart *Sminthopsis douglasi* (Marsupialia: Dasyuridae)', *Wildlife Research*, vol. 19, pp. 779-783.
- Woolley, PA 2015, 'The Julia Creek dunnart, *Sminthopsis douglasi* (Marsupialia: Dasyuridae): breeding of a threatened species in captivity and in wild populations', *Australian Journal of Zoology*, vol. 63, pp. 411-423.

## GLOSSARY

**Table 6: Abbreviations**

Abbreviation	Term
ALA	Atlas of Living Australia
EP Act	<i>Environmental Protection Act 1994</i> (Queensland)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
EO Act	<i>Environmental Offsets Act 2014</i> (Queensland)
EOP	Environmental Offsets Policy
DAWE	Department of Agriculture, Water and the Environment
DBMP	Direct Benefit Management Plan
DE	Department of the Environment
DEE	Department of Environment and Energy (former)
DERM	Department of Environment, Resources and Mining
DES	Department of Environment and Science
DEWHA	Department of the Environment, Water, Heritage and the Arts (Commonwealth)
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (Commonwealth)
ha	Hectares
km	Kilometre
LGA	Local Government Area
m	Metre
MIA	Mine Infrastructure Area
ML	Mining Lease
MLA	Mining Lease Application
MNES	Matters of National Environmental Significance
Offset Strategy	Environmental Offset Strategy
OMP	Offset Management Plan
Project	Saint Elmo Project
RE	Regional Ecosystem
TOR	Terms of Reference
tpa	Tonnes per annum
V <sub>2</sub> O <sub>5</sub>	Vanadium pentoxide
VM Act	<i>Vegetation Management Act 1999</i>

**Table 7: Glossary of Terms**

Term	Definition
Critically Endangered	A listing category defined under the EPBC Act for individual native species and ecological communities.
Ecological Community	An assemblage of species occupying a particular area.
Endangered	A listing category as defined under the EPBC Act, NC Act and/or VM Act.
Environmental offsets	Environmental offsets compensate for unavoidable impacts on significant environmental matters, such as highly valuable species and ecosystems.
Essential Habitat	Essential habitat is an area of remnant vegetation where species listed as endangered, vulnerable, or near threatened under the NC Act have been recorded and are mapped by DES.
Habitat	An area or areas permanently, periodically or occasionally occupied by a species, population or ecological community, including any and all biotic and abiotic features of the area or areas occupied.
Least Concern	Listing category as defined under the VM Act.
Likelihood of Occurrence	<ul style="list-style-type: none"> <li>▪ Known to occur includes species/communities previously recorded in the Project area or directly adjacent to the Project area.</li> </ul>

Term	Definition
	<ul style="list-style-type: none"> <li>▪ Likely to occur includes species/communities previously recorded in proximity to the Project area and suitable habitat features are available in the Project area which support the species.</li> <li>▪ May occur includes species / communities where suitable habitats are present in the Project area, and where the known distribution of the species overlaps the Project area, but where there are no known records in the area.</li> <li>▪ Unlikely to occur includes species / communities for which the Project area offers limited or no potential habitat, is outside their known range and/or is without broader habitat requirements.</li> </ul>
Migratory Species	Species listed as 'migratory' under the EPBC Act. Migratory species are those animals that migrate to Australia and its external territories or pass through or over Australian waters during their annual migrations. All species on the list of migratory species are matters of national environmental significance under the EPBC Act.
Near Threatened	Listing category as defined under the NC Act. Refer to definition of 'NC Act conservation status' for meaning of near threatened under the NC Act.
Project area	The Project area is defined as the Mining Lease area (ML 100162) which is approximately 8,882 ha.
The Project	The Project refers to the Saint Elmo Project, which is located in Julia Creek, Queensland.
Regional Ecosystem	A vegetation community, within a bioregion, that is consistently associated with a particular combination of geology, landform and soil. REs may be classified under the <i>Vegetation Management Regulation 2012</i> as endangered, of concern or least concern.
Remnant Vegetation	Vegetation where the dominant canopy has >70 percent of the height and >50 percent of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy (Neldner et al. 2019).
Significant Residual Impact	<p>As defined in the <i>Environmental Offsets Act 2014</i>, generally, a significant residual impact is an adverse impact, whether direct or indirect, of a prescribed activity on all or part of a prescribed environmental matter that—</p> <ul style="list-style-type: none"> <li>▪ remains, or will or is likely to remain, (whether temporarily or permanently) despite on-site mitigation measures for the prescribed activity; and</li> <li>▪ is, or will or is likely to be, significant.</li> </ul>
Threatened	<ul style="list-style-type: none"> <li>▪ Flora and fauna species which have been designated as extinct in the wild, endangered or vulnerable under the NC Act.</li> <li>▪ Flora and fauna species which have been designated as critically endangered, endangered or vulnerable under the EPBC Act</li> </ul>
Vulnerable	Listing category as defined under the EPBC Act and/or NC Act. Refer to definitions of 'EPBC Act conservation status' and 'NC Act conservation status' for meaning of 'vulnerable' under these Acts.

## **Appendix A *Offset Assessment Guide: Offset Calculator tool***

# Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999  
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Julia Creek Dunnart
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator					
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
<i>Ecological communities</i>					
Area of community	No		Area		
			Quality		
			Total quantum of impact	0.00	
<i>Threatened species habitat</i>					
Area of habitat	Yes		Area	7419	Hectares
			Quality	5	Scale 0-10
			Total quantum of impact	#####	Adjusted hectares
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
Number of features e.g. Nest hollows, habitat trees	No				
Condition of habitat Change in habitat condition, but no change in extent	No				
<i>Threatened species</i>					
Birth rate e.g. Change in nest success	No				
Mortality rate e.g. Change in number of road kills per year	No				
Number of individuals e.g. Individual plants/animals	No				

Offset calculator																											
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source											
<i>Ecological Communities</i>																											
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Risk of loss (%) with offset																			
					Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0																			
					Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)																			
<i>Threatened species habitat</i>																											
Area of habitat	Yes	3709.50	Adjusted hectares		Time over which loss is averted (max. 20 years)	20	Start area (hectares)	48500	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	Raw gain	0.00	Confidence in result (%)	90%	Adjusted gain	0.00	Net present value	0.00	% of impact offset	3728.01	100.50%	Minimum (90%) direct offset requirement met?	Yes		
					Future area without offset (adjusted hectares)	48500.0	Future area with offset (adjusted hectares)	48500.0																			
					Time until ecological benefit	20	Start quality (scale of 0-10)	5	Future quality without offset (scale of 0-10)	5	Future quality with offset (scale of 0-10)	6	Raw gain	1.00	Confidence in result (%)	80%	Adjusted gain	0.80	Net present value	0.77							
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source											
Number of features e.g. Nest hollows, habitat trees	No																										
Condition of habitat Change in habitat condition, but no change in extent	No																										
<i>Threatened species</i>																											
Birth rate e.g. Change in nest success	No																										
Mortality rate e.g. Change in number of road kills per year	No																										
Number of individuals e.g. Individual plants/animals	No																										

Summary							
Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost (\$)		
					Direct offset (\$)	Other compensatory measures (\$)	Total (\$)
Birth rate	0				\$0.00		\$0.00
Mortality rate	0				\$0.00		\$0.00
Number of individuals	0				\$0.00		\$0.00
Number of features	0				\$0.00		\$0.00
Condition of habitat	0				\$0.00		\$0.00
Area of habitat	3709.5	3728.01	100.50%	Yes	\$0.00	N/A	\$0.00
Area of community	0				\$0.00		\$0.00
					\$0.00	\$0.00	\$0.00