epic ENVIRONMENTAL

Multicom Resources Pty Ltd

Saint Elmo Vanadium Project Initial Advice Statement

Multicom Resources Pty Ltd

Saint Elmo Vanadium Project Initial Advice Statement

8 March 2018

Epic Environmental Pty Ltd

Level 6, 193 North Quay,
Brisbane, QLD 4000

Email: enquiries@epicenvironmental.com.au

www.epicenvironmental.com.au

ABN: 54 169 579 275
ACN: 169 579 275

Contents

List of Figures

List of Tables

Document History and Status

Revision	Date Issued	Approved By	Date Approved	Revision Type	Issued To
A	23/10/17	R. Nejad M. Breitfuss	23/10/17	Draft	N. Cammerman
B	01/11/17	M. Breitfuss	01/11/17	Final Draft	N. Cammerman
0	06/11/17	M. Breitfuss	06/11/17	Final	DEHP (former)
1	21/02/18	M. Breitfuss	22/02/18	Revised Final	DES
2	08/03/18	M. Breitfuss	08/03/18	Final	DES

Printed:	13 March 2018
Last saved:	13 March 2018 08:03 AM
File name:	BE180128.01-RPT-IAS-080318-Rev1
Author:	Mark Breitfuss
Project manager:	Mark Breitfuss
Client:	Multicom Resources Pty Ltd
Document Title:	Saint Elmo Vanadium Project Initial Advice Statement
Document version:	Final
Project number:	BE180128.01.01

Executive Summary

This Initial Advice Statement (IAS) provides information in accordance with section 41 of the *Environmental Protection Act 1994* (EP Act). Multicom Resources Pty Ltd (Multicom) must prepare and submit draft Terms of Reference (ToR) for carrying out an Environmental Impact Statement (EIS) for the proposed project to the Department of Environment and Science's (DES) Chief Executive.

Multicom plans to develop the Saint Elmo Vanadium Project (SEVP, the Project), 25 km east of Julia Creek, Queensland. The Project has an eventual target production of 50,000 tonnes per annum of Vanadium Pentoxide (V_2O_5), with the resource exceeding a 30 year mine life. The Project seeks 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 as a revolutionary metal in new technologies.

The Project, located within MLA100162 covers an area of approximately 8,882 ha. Cloncurry lies approximately 140 km to the west, with Richmond approximately 125 km to the east.

The Project will be a shallow (15 m average), open cut mine with associated dump and haul operations. A range of ancillary infrastructure will be required to support the mining activity, including:

- Basic administrative and crib facilities;
- Vehicle storage, maintenance and refueling areas;
- Site water storage and management facilities;
- Overburden storage and management areas;
- Ore processing facilities; and
- Site access road, fencing and related security facilities.

Mining is proposed to be carried out sequentially from mining panels along the north – south axis of the Saint Elmo Block. Once the ore is removed, the panel is able to be back filled with beneficiated gangue material, overburden material, contoured and sheeted with topsoil prior to revegetation with native species or as otherwise determined in conjunction with relevant stakeholders.

Given the size and scope of the Project, further detailed studies are scheduled during early project development phases to assess the effects of the Project on flora, fauna, MNES, water resources, air quality, noise, visual amenity and socio-economics as part of the EIS process.

1 Introduction

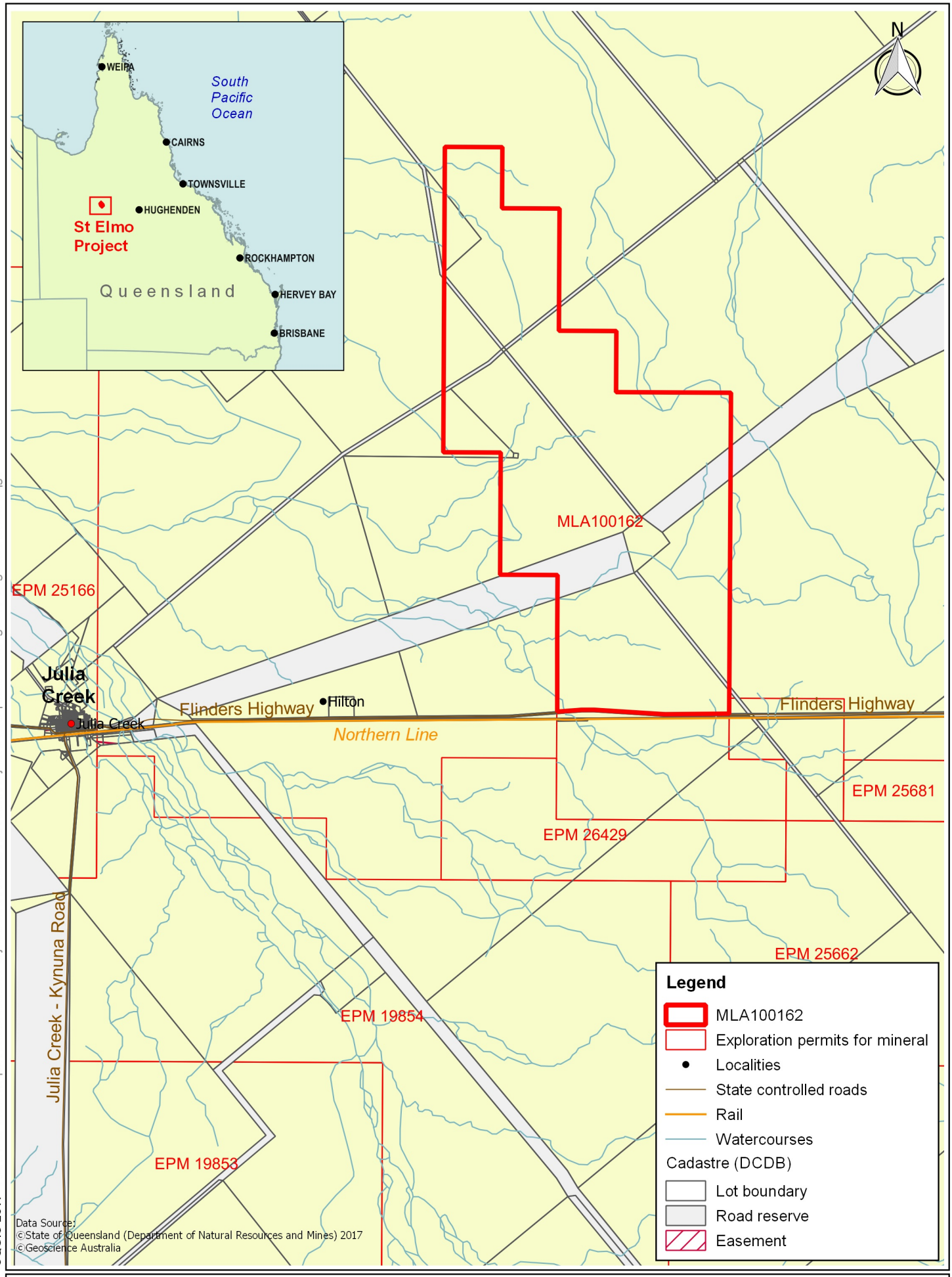
1.1 Background

Multicom Resources Pty Ltd (Multicom) is an exploration and mining company seeking to develop the Saint Elmo Vanadium Project (SEVP, the Project), located approximately 25 km east of Julia Creek, Queensland (MLA100162) (Figure 1). Site coordinates have been included in Figure 2.

The area of MLA100162 and the proposed mine footprint is 8,882 ha, measuring approximately 20 km in length and 8 km in width at its widest boundary. Extensive test drilling and metallurgical test work has been completed, identifying significant Vanadium Pentoxide (V_2O_5) deposits close to the soil surface. The Project has an eventual target production of 50,000 tonnes per annum (tpa) of V_2O_5, with the resource exceeding a 30 year mine life. The mine is expected to be a shallow (15 m average) open cut mine.

On 6 September 2017, the Commonwealth Department of the Environment and Energy (DEE) determined the Project to be a Controlled Action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the controlling provisions being Sections 18 and 18A (listed threatened species and communities).

On 28 November 2017, the DEE decision on assessment approach was finalised with the Bilateral Agreement applying. This means that Multicom will undertake an assessment process in accordance with the Bilateral Agreement between the Commonwealth and the State of Queensland under Section 45 of the *Environment Protection and Biodiversity Conservation Act 1999* Relating to Environmental Assessment. The Bilateral Agreement applies to developments deemed Controlled Actions requiring assessment under Part 8 of the EPBC Act and which are undergoing, in this case, an Environmental Impact Statement (EIS) process under Chapter 3, Part 1 of the *Environmental Protection Act 1994* (EP Act).



 File Path: C:\GIS\Epic Environmental\Projects\BE170006.01 St Elmo Project \Workspaces\IAS\Figure 1 Regional Location.qgs

epic ENVIRONMENTAL

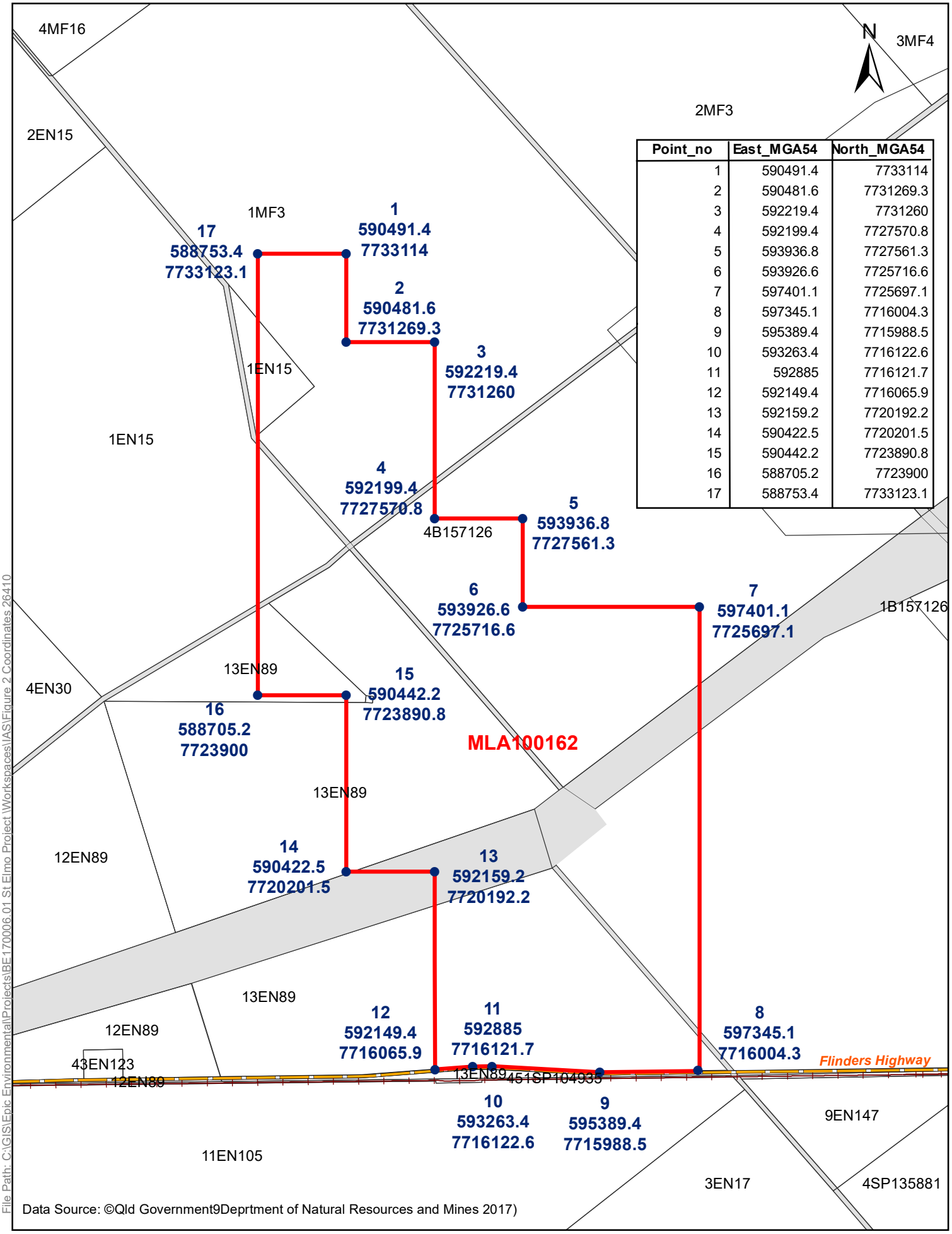
0 2.5 5 7.5 10 km

Scale: 1:150,000 @ A4

Datum: GDA94 Projection: MGA54

St Elmo Project

Figure 1
Regional Location



Point_no	East_MGA54	North_MGA54
1	590491.4	7733114
2	590481.6	7731269.3
3	592219.4	7731260
4	592199.4	7727570.8
5	593936.8	7727561.3
6	593926.6	7725716.6
7	597401.1	7725697.1
8	597345.1	7716004.3
9	595389.4	7715988.5
10	593263.4	7716122.6
11	592885	7716121.7
12	592149.4	7716065.9
13	592159.2	7720192.2
14	590422.5	7720201.5
15	590442.2	7723890.8
16	588705.2	7723900
17	588753.4	7733123.1

epic ENVIRONMENTAL

0 1 2 3 4 Kilometres

Scale: 1:100,000 @ A4
Datum: GDA94 Projection: MGA Zone 54

St Elmo Project

Figure 2
Coordinates of MLA100261

1.2 Purpose and Scope of IAS

This IAS is part of an application made by Multicom which meets the requirements of section 71 of the EP Act for the preparation of a voluntary EIS.

In accordance with section 41 of the EP Act, Multicom must prepare and submit draft Terms of Reference (ToR) for carrying out an EIS to DES' Chief Executive. The purpose of this IAS is to present information to:

- Enable stakeholders (including the general community) to determine the nature and level of their interest in the proposal; and
- Assist DES with the finalisation of ToR for an EIS for the proposed Project.

The IAS provides a preliminary overview of the nature and extent of the potential social, economic and environmental impacts that may be associated with the construction and operation of the SEVP as far as they can be foreseen at this concept stage of project planning. The IAS also identifies the key statutory approvals that may be required for the Project and identifies further studies that may be required to support Project development.

1.3 Proponent

Multicom Resources Pty Ltd (Multicom) is a privately held Queensland based company focused on the development of the SEVP (MLA100162). The relevant proponent and consultant details are summarised in Table 1.

In conjunction with the development of the SEVP, Multicom has also established a subsidiary, named Freedom Energy Pty Ltd (Freedom Energy). Freedom Energy was created with the purpose of exploring various sales and development opportunities for vanadium based battery technology.

As part of the development of the SEVP, Multicom and Freedom are working in partnership with an area of Australian and international partners. These include engineering groups, processing specialists, Queensland government facilitators, local government, academic institutions and vanadium battery specialists.

In November 2017 Multicom and Freedom Energy entered into a binding framework agreement with StorEn Technologies, a US based vanadium battery company, to develop a "low cost manufacturing, sale and distribution" supply chain for StorEn's "increased power" vanadium batteries.

Freedom Energy is currently investigating suitable locations within Australia and across Asia for the establishment of assembly and distribution centers for StorEn batteries to service the Asia Pacific market. As well its partnership with StorEn Technologies, Multicom is in progressing discussions with potential offtake partners in the steel industry.

It should be noted that Multicom (and its executive officers) have not been convicted of an environmental offence under any Queensland or Australian Government legislation.

Table 1: Proponent and Consultant Details

Details	Proponent – Project Director	Consultant
Entity	Multicom Resources Pty Ltd	Epic Environmental Pty Ltd
ABN	51 605 352 690	54 169 579 275
Contact	Mr Nathan Cammerman	Dr Mark Breitfuss
Address	Level 8, 46 Edward Street Brisbane, QLD 4000	Level 6, 193 North Quay Brisbane, QLD 4000
Phone	+61 437 119 017	+61 400 412 212
Website	www.mcres.com.au	www.epicenvironmental.com.au
Email	nathan@mcres.com.au	mbreitfuss@epicenvironmental.com.au

1.4 Project Need and Benefit

The SEVP will eventually produce approximately 50,000 tonnes per annum (tpa) of Vanadium Pentoxide (V_2O_5) product. Vanadium is a soft, ductile, silver-grey metal that is used primarily to make high strength steel. Additionally, vanadium is used in the production of vanadium redox batteries which have the capacity to supply multi-megawatt scale base load storage. There is currently an increasing global demand for lighter weight and higher strength steels as well as an increasing global demand for renewable and reliable energy, making vanadium a valuable resource.

The current global demand for Vanadium Pentoxide is 180,000 tpa (equivalent to 100,000 tonnes of contained vanadium) (Independent Investment Research 2016). Supply is concentrated, with over 90% of vanadium products produced in South Africa, China and Russia. Vanadium's main use is as an additive in the manufacture of high grade steel (approximately 92% of current global demand). It is also consumed in the manufacture of chemicals, catalysts and the newly emerging market of large scale storage batteries. Whilst acknowledging that vanadium based storage batteries may only account for a fraction of the broader energy storage market, even a modest market share could add potentially tens of kilotonnes of demand to the market (Roskill 2016).

1.5 Project Timing and Workforce

Subject to appropriate approvals including financial feasibility, it is anticipated mining will commence at the SEVP in late 2019. The Project has an estimated operational mine life of 30 years. The Project is anticipated to directly employ up to 250 people during the construction phase and up to 100 people once fully operational.

Construction duration is expected to be approximately 12-18 months. A more detailed labour profile for construction and operation will be developed during the feasibility studies.

In addition to local employment opportunities, Multicom will work with Indigenous stakeholders to identify workforce capacity, skills and experience in an attempt to match skills and capacity to

employment on the Project. Construction will use local and regional contractors, labourers and suppliers where feasible. The construction workforce will be supplemented with a fly-in fly-out contingent from Cairns and other regional Queensland centres via Mount Isa. Bus transport between Mount Isa and the site will be utilised.

The offsite workforce prior to commencement of construction will include professional staff undertaking detailed design of all components, securing approvals, appointing contractors and procuring materials and equipment.

Operations staff will be encouraged to be residentially based in Julia Creek. Multicom will ensure its contractors provide reasonable opportunity for locals to gain the necessary knowledge, skills and experience to be competitive in the labour market for the Project.

2 Legislative Context

2.1 Commonwealth Legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important aspects of the Australian environment including its biodiversity and heritage places. The EPBC Act has been established to:

- Provide for the protection of the environment, especially Matters of National Environmental Significance (MNES);
- Promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources;
- Promote the conservation of biodiversity;
- Provide for the protection and conservation of heritage;
- Promote a cooperative approach to the protection and management of the environment involving governments, the community, landholders and Indigenous peoples;
- Assist in the cooperative implementation of Australia's international environmental responsibilities;
- Recognise the role of Indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and
- To promote the use of Indigenous peoples' knowledge of biodiversity with the involvement of, and in cooperation with, the owners of the knowledge.

Multicom submitted a referral to the Department of the Environment and Energy (DEE) for the Project on 4 August 2017 (2017/8007). The Project was determined a Controlled Action under the EPBC Act by the Commonwealth Minister for the Environment and Energy on 6 September 2017. Controlling provisions applicable to the Project were sections 18 and 18A (listed threatened species and communities). On 28 November 2017, the DEE decision on assessment approach was finalised with the Bilateral Agreement applying.

2.2 State Legislation

2.2.1 Aboriginal Cultural Heritage Act 2003

The *Aboriginal Cultural Heritage Act 2003* (ACH Act) binds all persons to provide recognition, protection and conservation of Aboriginal cultural heritage. The Cultural Heritage Duty of Care (section 23 of the ACH Act) states:

> *'a person who carries out an activity must take all reasonable and practical measures to ensure the activity does not harm Aboriginal cultural heritage'.*

Multicom will work together with Traditional Owners through comprehensive stakeholder engagement and will seek employees from within the local Indigenous population if suitable candidates are available.

2.2.2 Mineral Resources Act 1989

The *Mineral Resources Act 1989* (MR Act) provides for the assessment, development and utilisation of mineral resources. The MR Act establishes a framework to facilitate mining-related activities, through the leasing of prospecting, exploration, mineral development and mining tenure. The MR Act is administered by the Department of Natural Resources, Mines and Energy (DNRME).

On 27th October 2017 Multicom applied for a Mining Lease Application (MLA100162) with DNRM (now DNRME). A mining lease provides entitlements to:

- Enter and be on the mining lease area for mining purposes or transportation through land to access the mining area;
- Use any sand, gravel and rock within lease area for mining activities;
- Prospecting, exploring or mining;
- Processing a mineral won or extracted by the mining;
- An activity that is directly associated with, or facilitates or supports, the mining or processing of the mineral; and
- Rehabilitating or remediating environmental harm because of a mining activity.

The MR Act also sets royalty payments, rents, landholder compensation and notification requirements which Multicom must comply with.

Section 4A of the MR Act precludes the application of the *Planning Act 2016* to activities undertaken for purposes of the mining tenure, with the exception of provisions in relation to the *Queensland Heritage Act 1992*. The MR Act also makes building work controlled under the *Building Act 1975* self-assessable development within the lease.

Pursuant to the *Mineral Resources Regulation 2013*, various restricted areas have been declared across parts of Queensland that limit exploration and mining activities. Restricted areas are areas of land identified as restricted in a gazette notice made by the Minister. It is noted there are no unavailable or restricted areas within the proposed ML boundaries.

2.2.3 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) provides the key legislative framework for environmental management and protection in Queensland. The objective of the EP Act is to: *"Protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains ecological processes on which life depends"* (Section 3 of the EP Act). Under the EP Act, Multicom must comply with the general environmental duty not to undertake an: *"Activity that causes, or is likely to cause, environmental harm unless all reasonable and practicable measures to prevent or minimise the harm are taken"* (Section 319 of the EP Act).

Once the voluntary EIS process has been completed the proponent may apply for a site-specific Environmental Authority (EA) and appropriate tenure to carry out the resource activity.

2.2.4 Environmentally Relevant Activities

Pursuant to the EP Act, activities that will, or have the potential to, release contaminants into the environment and which may cause environmental harm are defined as Environmentally Relevant Activities (ERAs). In accordance with the *Environmental Protection Regulation 2008* (EP Regulation) (Schedule 6, Item 5), the development will be a site-specific EA mining project for mining metal ore.

The activities associated with the Project will require a number of ERAs, including ERAs for particular resource activities (defined under Schedule 2A of the EP Regulation) and prescribed ERAs (defined under Schedule 2, EP Regulation). The EA allows for the carrying out of multiple ERAs that are part of a project, all ERAs must be listed and described in the EIS for inclusion in the EA. The EA is expected to provide approval conditions for each of the required ERAs.

The particular resource activity triggered by the Project is ERA 19 (mining metal ore). Additionally, the following prescribed ERAs will potentially also be triggered by the Project:

- ERA 8 – Chemical Storage;
- ERA 14 – Electricity Generation;
- ERA 31 – Mineral Processing;
- ERA 33 – Crushing, Milling, Grinding or Screening;
- ERA 50 – Bulk Material Handling; and
- ERA 63 – Sewage Treatment.

The location of some these activities will likely take place within the mine industrial area and Run of Mine (ROM) pad shown in Figure 3.

2.2.5 Notifiable Activities

Land contamination and activities that have been identified as likely to cause land contamination are listed as notifiable activities in Schedule 3 of the EP Act. Any person undertaking these notifiable activities must notify DES and the land is recorded on the Environmental Management Register (EMR). Potentially notifiable activities associated with the Project are listed in Table 2.

Table 2: Anticipated notifiable activities for the Project

Item Number (Schedule 3 EP Act)	Description of Activity
7	Chemical storage of more than 10 tonnes of chemicals that are dangerous goods under the dangerous goods code.
24	Mine wastes – a) Storing hazardous mine or exploration wastes, including, for example, tailings dams, overburden or waste rock dumps containing hazardous contaminants; and b) Mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants.
29	Petroleum product or oil storage in above ground tanks.
37	Waste storage, treatment or disposal – storing, treating, reprocessing or disposing regulated waste including operating a sewage treatment facility with onsite disposal facilities.

2.3 Land Access Agreement

Multicom will put in place a comprehensive land access agreement with the relevant landholders. This land access agreement will be discussed with landholders prior to finalisation and will take into account the wishes of the landholders where applicable.

3 Project Description

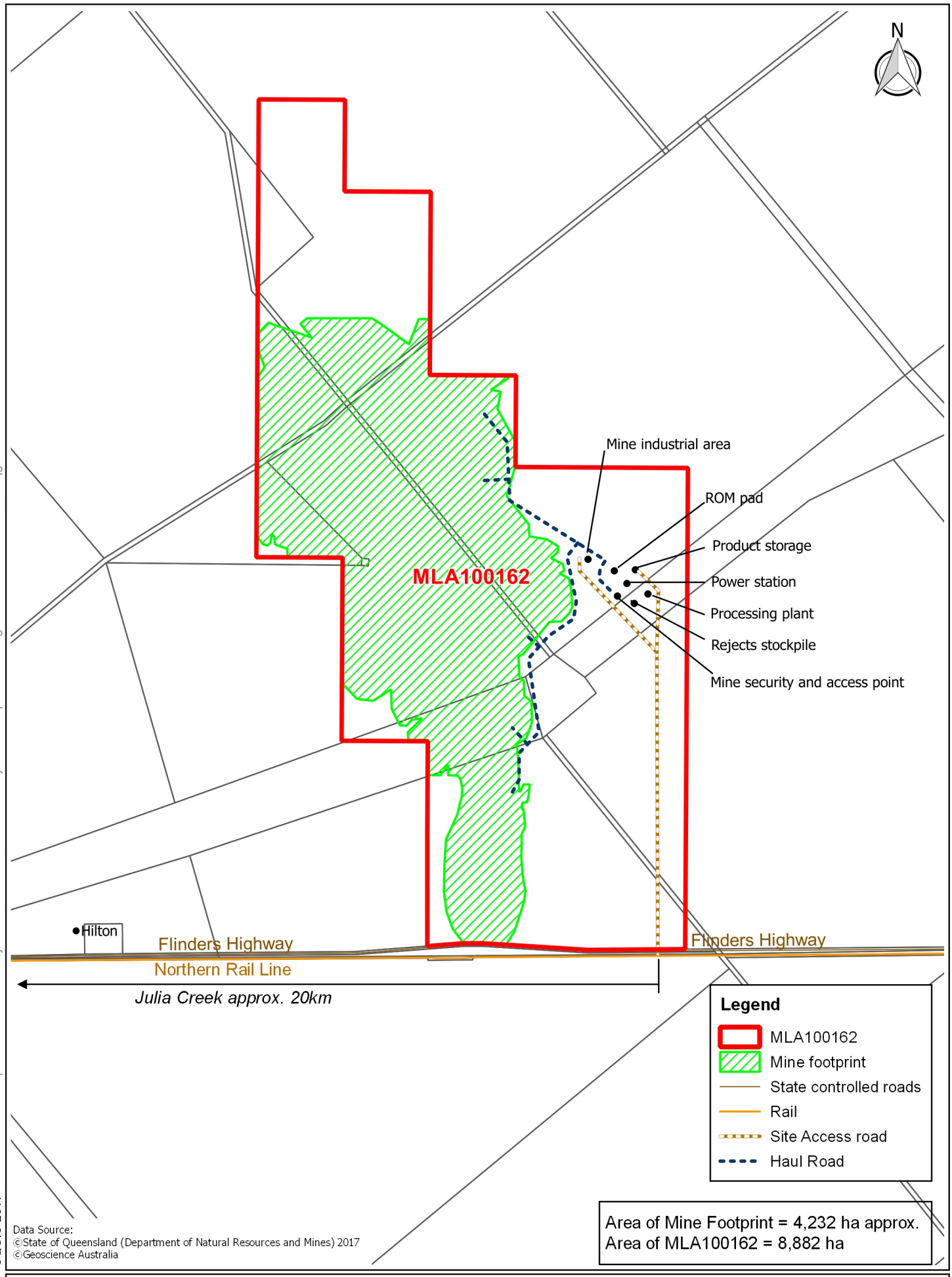
Multicom is seeking to develop the SEVP for the purposes of mining and processing vanadium. The proposed activity involves the development of an intrusive resource harvesting facility, incorporating shallow (<20 m deep) strip mining (strip ratios: 0/1 – 2/1) practices, in order to obtain access to large known deposits of vanadium. The SEVP will be an open cut mine with associated dump and haul operations. An early and indicative mine plan for the SEVP is shown in Figure 3.

The SEVP will produce up to 50,000 tpa of Vanadium Pentoxide product which can be used to make metal alloys for high strength steel production and in the production of vanadium redox batteries which have the capacity to supply multi-megawatt scale base load storage. Run of Mine (ROM) operations to produce the 50,000 tpa will be in the order of 25-30 Mtpa.

3.1 Project Location

MLA100162 is located approximately 25 km east of Julia Creek in north western Queensland. The proposed mine footprint is 8,882 ha and adjoins the Flinders Highway.

Julia Creek is a regional service town located within the Shire of McKinlay. Julia Creek has a population of 519 (Australian Bureau of Statistics 2016). The main local industries are cattle and sheep raising. The town also services BHP's underground silver and lead mine at Cannington.



 File Path: C:\GIS\Epic Environmental\Projects\BE170006.01 St Elmo Project \Workspaces\IAS\Figure 3 Indicative Mine Plan.qgs

Data Source:

0 1 2 3 4 5 km

Scale: 1:100,000 @ A4

Datum: GDA94 Projection: MGA54

St Elmo Project

Figure 3
Indicative Mine Plan

3.2 Land Use

The SEVP area is in a largely disturbed state, situated across seven tenures. The area has been historically exploited for cattle grazing on unimproved pastures. A local stock route intersects MLA100162 and several vehicular tracks and fencing lines exist within its area.

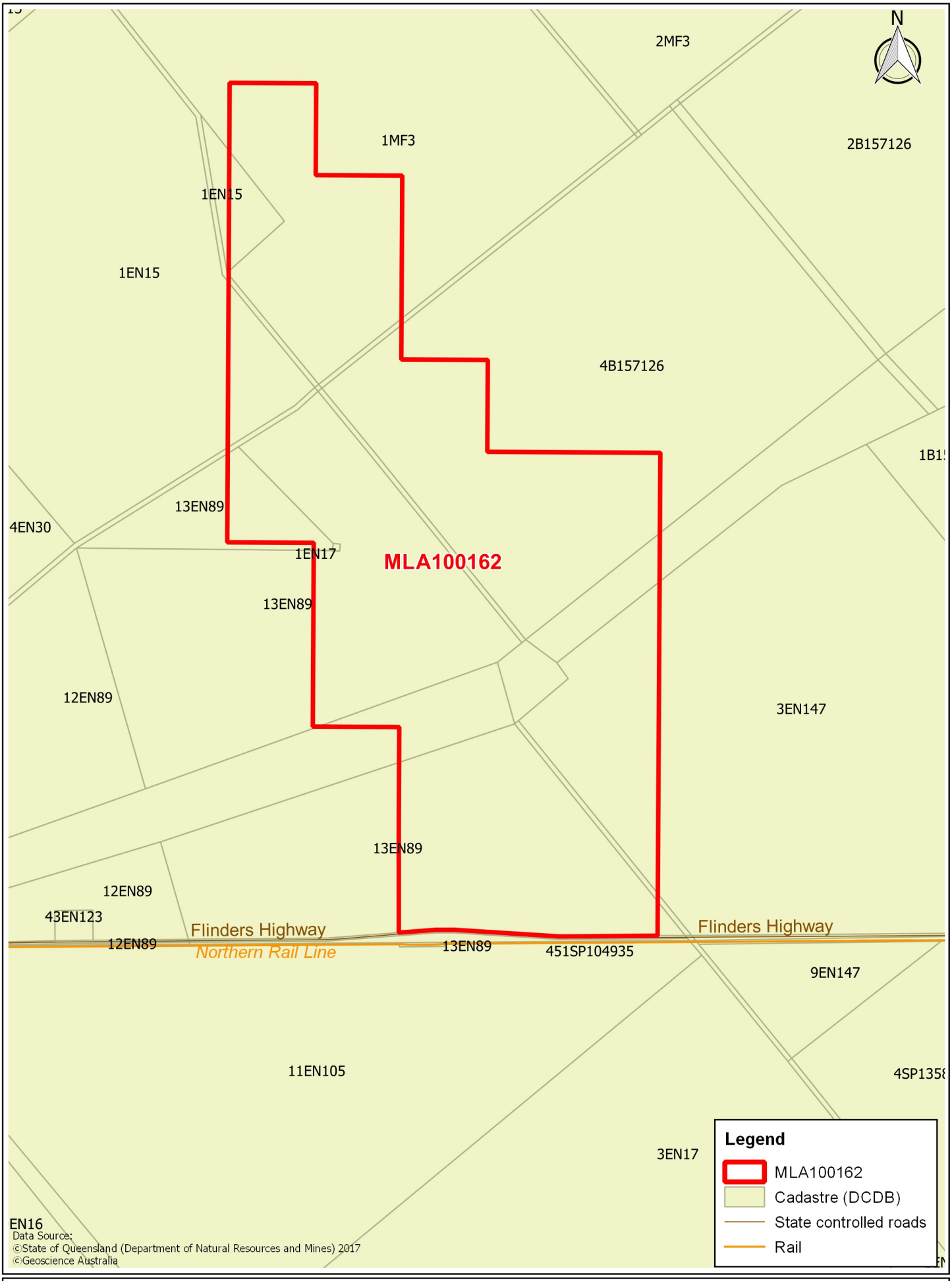
Exploration activities, including historical drilling, associated access track development and construction of borrow pits have taken place throughout the Project.

3.3 Tenure

3.3.1 Existing Tenure

There are multiple tenures within MLA100162 (Figure 4), namely:

- Lot 13 on Plan EN89 - Freehold;
- Lot 1 on Plan EN15 - Lands Lease;
- Lot 1 on Plan MF3 - Lands Lease;
- Lot 3 on Plan EN147 - Lands Lease;
- Lot 208 on MLAY - Stock Route;
- Lot 4 on Plan B157126 - Lands Lease; and
- Lot 1 on Plan EN17- Reserve.



ENVIRONMENTAL

0 1 2 3 4 5 km

Scale: 1:100,000 @ A4

Datum: GDA94 Projection: MGA54

St Elmo Project

Figure 4
Tenements across MLA100162

3.3.2 Native Title

The Native Title Determination Areas (NTDA) adjacent to Julia Creek, extracted from the Queensland NTDA map available in the public domain, indicates that there are no active Native Title claimants over land within the SEVP.

3.4 Vanadium Resource

The following summary has been taken from the *Geological Report and Joint Ore Reserves Committee (JORC) Resource Estimate: St Elmo Toolebuc Formation Oxide: Vanadium and Calcium Carbonate*, dated March 2017 (Resolve Geological 2017). Given the sensitive commercial and confidential nature of the report and resource estimate, Multicom will not release the full report.

The Vanadium Pentoxide (V_2O_5) enriched oxidised units of the Toolebuc Formation show that the resource endowment is widespread and has excellent continuity within the exploration tenement. A broad, low amplitude, north-south trending anticline has resulted in the target formation being exposed and weathered over a 15 km x 5 km region, with strip ratios varying from near 0/1 to 2/1.

Two programs of drilling have been completed in the area of the current resource (Whitcher 1993; Fimiston 2000). Both programs have used rotary air blast (RAB) drilling to complete the work using a custom built RAB rig. The rig completed the drilling with an average of 310-350 m drilled per day.

The vast majority of drilling was dry, with approximately 10 holes in the fresh rock, recording minor water inflows. The water all occurred below the base of oxidation and the maximum number of wet samples per hole was three. The water was generally found below the Coquina at the base of the oil shale proper. The water when encountered was generally a dark brown colour with oily overtones. The drilling was of good quality with layering of the sample often observed in the bags reflecting the original geology. The overlying overburden was very often the still clayey Allura formation with little potential for contamination down the hole.

The weathered units host a JORC (2012) compliant high grade (~0.355% V_2O_5) Inferred, Indicated and Measured resource of 63 Mt, 135 Mt and 5 Mt respectively (Table 3). A large low grade (0.26% V_2O_5) resource has also been identified.

Table 3: JORC Resource Estimate

Classification	MATERIAL	V_2O_5: cut-off 0.2%				$CaCO_3$: cut-off 80% / <0.2 V_2O_5)	
		THICKNESS	TONNES (Mt)	DENSITY	V_2O_5(%)	TONNES (Mt coquina)	$CaCO_3$ (%)
Inferred	Oxide Shale	3.86	63	1.44	0.36	-	-
Inferred	Oxide Coquina	1.42	30	2.13	0.25	30.3	84.9
Inferred	Fresh Coquina	2.03	220	2.30	0.25	65.9	84.7
Indicated	Oxide Shale	4.29	135	1.44	0.35	-	-
Indicated	Oxide Coquina	1.31	48	2.13	0.25	64.5	84.7
Indicated	Fresh Coquina	2.05	35	2.30	0.25	9.7	83.5
Measured	Oxide Shale	2.63	5	1.44	0.35	-	-
Measured	Oxide Coquina	2.22	6	2.13	0.26	3.2	86.0
Measured	Fresh Coquina	2.65	4	2.30	0.28	0.5	83.7
Inferred	total		313	2.11	0.27	96	84.74
Indicated	total		219	1.73	0.31	74	84.19
Measured	total		15	1.94	0.30	4	85.18
All Resources	Total		546	1.95	0.29	174	84.52

*1 - Measured Resources - 120m radius from central south area - holes containing grade data and demonstrated continuity.
*2 - Indicated Resources - 550m radius from all holes containing grade data, with the exception of the northern holes which are not supported laterally.
*3 - Inferred Resources - All remaining areas in the tenement - extrapolated to a maximum of 6km. Supported by regional geology and robust ranges of continuity up to 10km

3.5 Proposed Mining Strategy

The Project will be a shallow (15 m average), open cut mine with associated dump and haul operations. Mining is proposed to be carried out sequentially from mining panels along the north – south axis of MLA100162. Once the ore is removed, the panel is able to be back filled with beneficiated gangue material, overburden material, contoured and sheeted with topsoil prior to revegetation with native species or as otherwise agreed with relevant stakeholders.

The proposed activity involves the development of an intrusive resource harvesting facility, incorporating shallow strip mining (strip ratios: 0/1 – 2/1) practices, in order to obtain access to large known deposits of vanadium. The Project is not anticipated to cause serious or material environmental harm or environmental nuisance due to the shallow nature of the mining and somewhat isolated location of the Project.

3.6 Initial Works

Vegetation will be progressively removed ahead of operations to ensure that the disturbed areas are minimised. Prior to clearing, any trees that are suitable for selective felling, to be reused as nesting or tree-hollow sites, will be marked and individually felled and stored. Once cleared, vegetation will be inspected by environmental staff to identify vegetation suitable to be placed directly onto rehabilitated areas to provide initial habitat and assist with soil erosion control purposes. Some vegetation may also be wood-chipped to provide base organic material for a trial composting process. Vegetation that is not

used in the rehabilitation or waste management processes will be windrowed and burnt, with the burnt material incorporated into topsoil stockpiles.

Following clearing, topsoil will be collected where available and either used directly for rehabilitation purposes or placed into clearly marked topsoil stockpiles. This material will then be progressively replaced onto the post-mining rehabilitation landform. The mine plan is designed to maximise the amount of topsoil that can be placed directly, without stockpiling.

3.7 Site Access

Access to the SEVP will be from the Flinders Highway. From the ML boundary, an access road will be constructed with a hardstand plant area enabling all-weather access for personnel, delivery of reagents and product delivery.

3.8 Processing

A number of leach tests have been undertaken to identify various routes to extract the vanadium from the concentrate with the most viable method involving a caustic soda and sodium carbonate reagent solution combined with temperature and pressure leach method. Resultant recoveries are in the order of 85%. The pregnant leach solution was subject to further purification using solvent extraction resulting in a 99.6% premium V_2O_5 product. This process will be refined and optimised as feasibility studies progress.

The reagents are the most significant operating cost for the processing plant and will be the subject and focus of further metallurgical test work and flow sheet optimisation. Alternative options exist where the vanadium within the ore is recovered via a heap leaching process. This process offers the potential for a significantly reduced operating and capital cost for an operation. Multicom is partnering with global experts in this area and further evaluation of this process route will be undertaken as the feasibility studies progress.

3.8.1 Access to Processing Plant

The plant will require access by semi or B-doubles for the delivery of reagents, diesel fuel, gas and product shipping. Plant will be arranged for efficient product flow to minimise double handling and allow for maintenance access.

Rejects from the process will be a combination of coarse rejects from the front end of the plant, and finer wet tails in slurry form. A combination of backfilling of the mine and pumping by pipe to a tailings storage facility (TSF), will be used.

3.8.2 Tailings

It is anticipated that all + 4 mm coarse limestone gangue produced by the beneficiation plant will be returned to the mined pits and or stockpiled for later re-sale. The < 4 mm fine limestone gangue will be dewatered and slurried to the tailings dam and is expected to total approximately 400,000 tpa. The very fine nature (P80 <5 micron) of this material will take time to settle and desiccate for which the initial settled dry density would be less than 1.0 t/m^3. A final dry density of 1.1 t/m^3 is assumed in keeping with tailings for pressure leach processes of silicate clays such as the nickel laterites.

3.9 Product Transport

Options for transportation include:

- Place product in high strength bulk bags and transport by road; and
- Place product in drums / containers and transport by road.

Due to the climate and rain patterns in the region, particularly in December to March, the transport systems may be disrupted and so onsite storage of approximately two weeks may occur. Therefore, storage of 200 tonnes will need to be incorporated in plant infrastructure by means of a shed with packing unit and storage racking.

3.10 Mine Waste

Plant water consumption and water availability are the major considerations in the selection of the most appropriate method of tailings disposal. The method of reject and tailings disposal will be ascertained in conjunction with the water resource study as part of the EIS assessment.

3.11 Non-Mine Waste

General and regulated wastes will be generated during the construction and operational stages of the Project. A waste identification and management strategy will be developed as part of the feasibility study and EIS stage of the Project.

A water treatment facility will be established to treat waste water generated from the mine infrastructure area such as sewage and washdown water. The facility will be designed in accordance with local and statutory requirements and will be finalised as part of the feasibility study.

3.12 Mine Infrastructure

The Project is likely to consist of the following infrastructure:

- A ROM, with adequate area to stockpile at least three days mine production to cover the 5-2 mine shift and any plant shutdowns;
- An area for blending stockpiles to minimise feed grade variation through the plant;
- An operations area, including:
  - Administration office
  - Plant Control Room and warehouse
  - Communications facility
  - Ablutions and shower facilities
  - Geotech sample store and laboratory
  - Laydown area, equipment quarantine for incoming / outgoing equipment
  - Security gatehouse
  - Crib room and First Aid Station
  - Sewerage treatment plant and effluent disposal area
  - Reverse Osmosis (RO) Plant, as required, and potable water storage
- Access for semi or B-double trucks to deliver reagents to areas on the process plant; and
- A power station, located to minimise distance to major power demand elements and allow access for fuel delivery. If solar is chosen, prevailing winds will be considered to reduce dust from the operation.

3.13 External Infrastructure Requirements

3.13.1 Roads

The tenement adjoins Flinders Highway and is dissected by Punchbowl Road in the north. There is a large road reserve that crosses the entire width of MLA100162. The Flinders Highway will be used for access and haulage associated activities at the SEVP.

3.13.2 Port

It would be anticipated that the product will be containerised at the port to minimise hiring costs of containers if loaded in containers onsite.

Townsville is the closest port, and it is anticipated that this would be the most economic point of export. Given that volumes are not large, economic consideration could be given to trucking to Darwin if the additional haulage cost is offset by reduced shipping costs. Transport to port will be arranged to coincide with shipment to minimise size of port storage facilities.

3.14 Construction and Operational Processes

3.14.1 Water Supply

There will be several requirements in terms of volume and quality for water including:

- Dust suppression;
- Plant raw water for initial scrubbing;
- Analysis of available water for chemical content and volumes will be required as the process of high quality product is dependent on low calcium content. This will be critical as supply will be from the Central Eromanga section of the great artesian basin;
- Operations water for drinking, safety showers and toilets; and
- Firefighting.

The source of water is anticipated to be bore water as availability of mine dewatering is unlikely due to pit depth and presence of underlying shale deposits with low groundwater potential.

Preliminary review indicates that there will be a daily requirement of 50 kl/d. This is not a high volume but will require raw water tanks located at the process plant of approximately 200 kl.

Subject to detailed analysis of bore water quality, it is possible that an RO plant of approximately 10 kl/d will be required however if high quality water is required for process this will increase to approximately 30 kl/d. Potable water storage for operations area is anticipated to be 100 kl. Firefighting storage will be required and can use raw water and will require separate storage.

3.14.2 Power Supply

Power to the area is via transmission lines from Townsville. A 66 kv line runs from Townsville to Hughenden, and then a 33 kv line runs to Julia Creek. Future options for further power sources include transmission from Mount Isa, local renewable energy sources, and connection of power via a 66 kva line from Cloncurry. It is assumed the power network at Julia Creek may not have capacity to extend the network and is not cost effective, therefore a power station will be required to support mine and plant operation. Solar diesel is currently providing a cost-effective solution to provide power to remote mining operations. Such a system, combined with a vanadium battery system, would be the most likely source of power for the Project. A fuel farm will be required to support the power station and mining fleet, if feasible this will be a common facility but may require a separate fuel farm for mining operations.

The power supply to the site, using the above technology, can be delivered as a Build Own Operate (BOO) or Build Own Operate Transfer (BOOT) contract from multiple contracting sources which will remove the need for high capital investment by Multicom.

3.14.3 Lighting

Artificial lighting will be designed, installed, operated and maintained in accordance with AS4282:1997 Control of the Obtrusive Effects of Outdoor Lighting, to minimise the amount of light spill associated with the Project. Controls stipulated in this standard include consideration of the location and orientation of lighting as well as the selection and maintenance of luminaries. Any further mitigation (e.g. shielding, further restricting the use of lighting) will be implemented on an as needs basis, through consultation with adjoining property users and statutory agencies.

3.15 Socio-Economic Conditions

The initial mine location is situated in a rural area with the mine centre approximately 25 km west of Julia Creek. The proposed mine is expected to employ approximately 500 to 600 people indirectly. A number of accommodation alternatives will be considered including accommodation villages and housing, taking into account responsible safe post-work travel distances.

3.15.1 Workforce and Accommodation

Multicom estimates that there will be 100 ongoing operational jobs for the life of the SEVP. In addition, there will be an estimated 250 construction jobs. These estimates will be considered during the EIS.

The proximity of the Project to Julia Creek will facilitate benefits for the township from the stimulus to local businesses and other indirect flow on of economic activity. It is also likely that there would be benefits to supply chains and flow on impacts for service hubs across the north-west region including Mount Isa and Cloncurry. The following section details Project accommodation in both construction and operational phases:

Construction Phase

Julia Creek has residential accommodation vacancy rates significantly higher than the Queensland average. The SEVP workforce will be able to seek accommodation from this pool of available dwellings.

Operations Phase

It is anticipated that personnel will seek accommodation in Julia Creek or nearby towns. Preliminary review indicates rental properties are available in Julia Creek. Multicom may provide compensation incentives to its workforce to take up residence in Julia Creek by way of some form of rental subsidy or home ownership scheme.

3.15.2 Cultural Heritage Values

Significant previous ground disturbance has occurred within the SEVP area. However, no detailed archaeological surveys have been conducted across the mining footprint area. Additional studies would be required to assess potential Cultural Heritage values and to develop mitigation strategies.

3.16 Rehabilitation

Following the removal of vanadium, Multicom aims to return the SEVP area to a locally native ecological community that is progressing, credibly, towards a state resembling the vegetation that occurred onsite prior to mining. Where this cannot be achieved, Multicom will seek to return the mined area/s to a standard that resembles adjacent ecological communities. The final form of rehabilitation will be determined in conjunction with the landowners, local Council and following community consultation.

The objectives of mine rehabilitation are to:

- Create a landscape safe for humans and wildlife into the foreseeable future;
- Create a stable landscape with natural rates of erosion;
- Establish vegetation communities that resemble those originally found onsite, which blend visually with the surrounding landscape and vegetation;
- Establish functional, self-sustaining vegetation communities;
- Re-establish key flora and fauna culturally important to Traditional Owners;
- Establish ecosystems that resemble neighbouring unmined woodlands in their ability to respond to fire, termites, droughts and cyclones; and
- Ensure minimal post-mining impacts on surface catchments, water quality and volume.

4 Environmental Values

4.1 Climate

The Julia Creek region has a hot, semi-arid climate with an average of 470 mm of rain per annum, with 80% falling in the summer months, during which the area is subject to monsoonal influences from the Gulf of Carpentaria (BOM 2017). Typically, the wettest month is January (116.5 mm) which accounts for nearly 30% of rainfall (BOM 2017).

Annual evaporation significantly exceeds precipitation by a factor of 5 and creeks are dry for the majority of the year. Livestock rely predominantly on artesian bore water. Mean daily maximum temperatures range from 38.7°C in December to 25.9°C in July. Daily minimums vary from 8.3°C in July to 22.8°C in January and February (BOM 2017).

4.2 Land

4.2.1 Land Use

Most of the site is comprised of remnant vegetation however all of this vegetation is subject to grazing pressure. The SEVP area largely consists of *Astrebla* dominated tussock grassland. The SEVP area is in a largely disturbed state, situated across several rural properties. The area has been historically used for cattle grazing on unimproved pastures. Several vehicular tracks and fencing lines occur within MLA100162.

4.2.2 Topography

The tenement is dominated by flat lying black soil plains, gently incised by predominantly north west flowing creeks, with smaller east west flowing streams. Relief across MLA100162 is generally less than 1 m. Subtle topographic highs are generally consistent with outcropping Toolebuc Formation rather than the predominantly weathered and subdued Allaru Mudstone.

The major regional surface drainage systems flow to the north west with minor local streams in the Project area flowing east west. These rivers and streams flow infrequently, usually during the summer months.

4.2.3 Geology

The SEVP area contains sediments of the Eromanga Basin, a marine basin that formed between the Late Triassic to Early Late Cretaceous. MLA100162 contains sediments deposited in the Late Early Cretaceous, comprising the Toolebuc Formation, and the overlying Allaru Mudstone. No subsidence was noted at the site.

Underlying the Toolebuc Formation is the Wallumbilla Formation, the most widespread marine unit within the Eromanga Basin. The Allaru Mudstone is generally 200 – 300 m thick and formed in a quiet shallow to basinal marine setting. The Toolebuc Formation is a widespread cocquinite and underlying oil shale, varying between 6 to 45 m thick basin wide. The unit presents as a vanadium enriched 6 m cocquinite with an average 12 m thick underlying vanadium enriched calcareous oil shale unit within the tenement area. The structural geology within the tenement is benign, with a gentle anticlinal structure on both an east west and north south axis, known as the Saint Elmo Anticline.

The vanadium occurs within the unit as Vanadium Pentoxide (V_2O_5) and is found within organic compounds (kerogen and vanadyl porphyrins), within clays, and also within pyrites (within the fresh portion of the unit) and associated goethite within the oxidised units. In the oxidised rocks, vanadium within the organic compounds is unbound, which typically enhances metalliferous recovery and mining/beneficiation properties of the ore.

4.2.4 Soils

The SEVP area is dominated by black soil plains characteristic of the Mitchell Grass Downs Bioregion. Under the Australian Soil Classification system, the area is dominated by Epicalcareous to Epihypersodic, self-mulching brown vertosols. The texture is non-gravelly to very fine.

4.2.5 Contaminated Land

There is no evidence to suggest that past activities at the site may have had the potential to contribute towards land contamination.

The SEVP area where infrastructure exists, including the Saint Elmo homestead, cattle yards and storage facilities, is not included on the DES Environmental Management Register or the Contaminated Land Register.

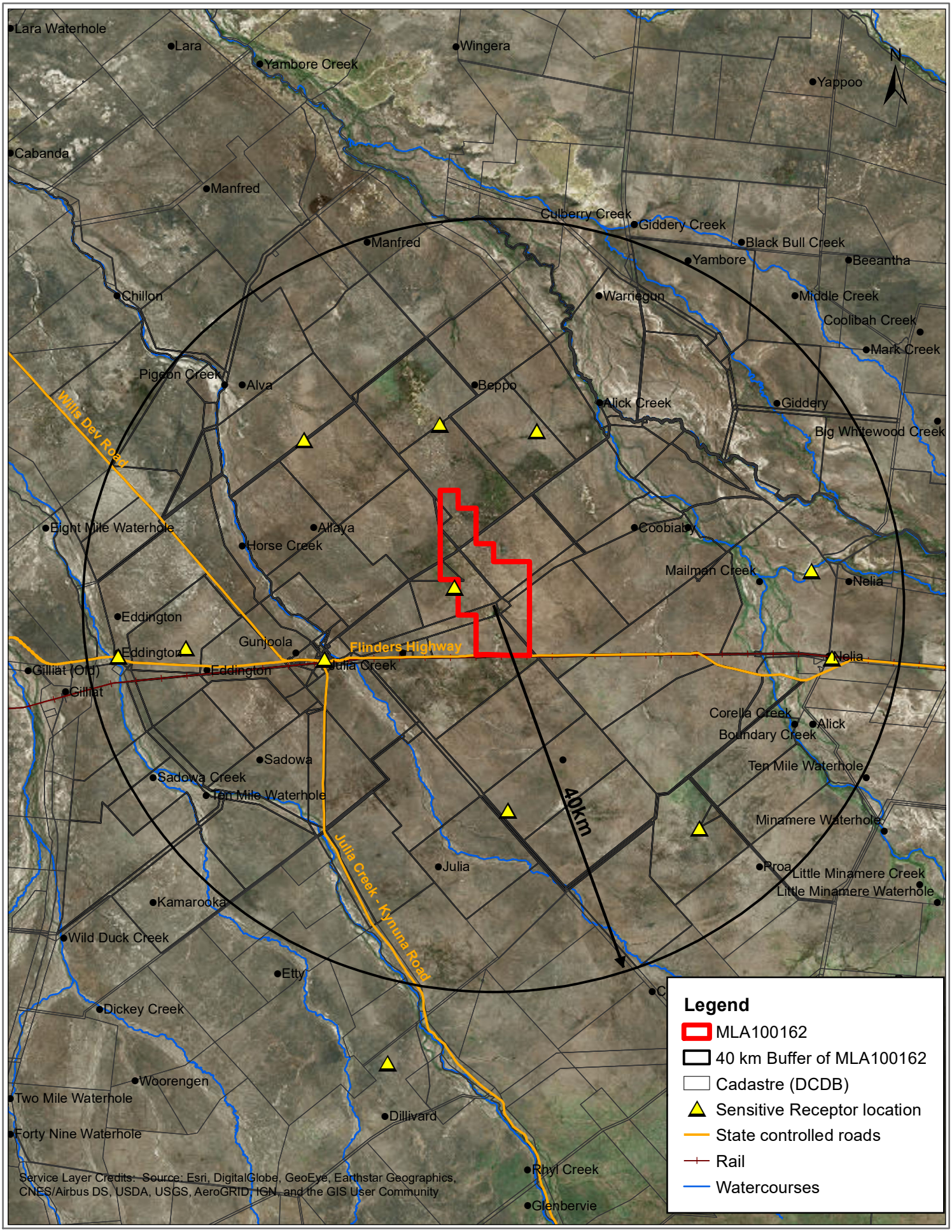
4.2.6 Strategic Cropping Land

There is no Strategic Cropping Land (SCL) located within the ML, therefore the requirements of the strategic cropping area regional interest under the *Regional Planning Interests Act 2014* do not apply.

4.3 Landscape and Visual Amenity

There are 13 sensitive receptors within a 40 km radius of the Project (refer Figure 5), a majority of which are homesteads, including; Saint Elmo, Argyle, Oxton Downs and Osbert. The town of Julia Creek is the most populated sensitive receptor and is located approximately 25 km from the SEVP. Given the distance, infrastructure from the Project is not expected to be visible from Julia Creek. The Saint Elmo Homestead, located 5 km from the centre of the ML, is the closest of the 13 sensitive receptors.

The most significant vantage point for visual amenity impacts will be from the Flinders Highway. Currently there are no visual amenity values for the site other than rural landscapes. Visual amenity will be formally assessed as part of the EIS process.



File Path: C:\GIS\Epic Environmental\Projects\BE170006.01 St Elmo Project \Workspaces\Figure 3 Tenements across EPM

epic ENVIRONMENTAL

0 5 10 20 Km

Scale 1:500,000 @ A4
Datum: GDA94 Projection: MGA 54

St Elmo Project

Figure 5
Sensitive Receptors

4.4 Matters of National Environmental Significance (MNES)

4.4.1 Threatened Ecological Communities

The field survey identified that no Threatened Ecological Communities (TECs) protected under the EPBC Act occur within the SEVP area. It is noted however that the EPBC Act Protected Matters Search identified one TEC, the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin, within a 50 km radius of the SEVP. This TEC is not within or adjacent to the SEVP and no impacts are considered to be likely to occur as a result of the Project.

4.4.2 Threatened and Migratory Species

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a Matter of National Environmental Significance (MNES) are controlled actions and require approval from the Commonwealth Government. Using the DEE EPBC Act Protected Matters Report, one listed Threatened Ecological Community was identified along with 12 Listed Threatened Species and nine Listed Migratory Species.

The limited diversity of flora species and vegetation communities, and relatively uniform landform topography and substrate in the Project area supports a low diversity of fauna species. A total of 91 fauna species were found within the SEVP area during the March and July 2017 ecological surveys. Of these 91 species, two species of national and/or state-level conservation significance were recorded within the SEVP area; Glossy Ibis (*Plegadis falcinellus*) and Sharp-tailed Sandpiper (*Calidris acuminate*). Whilst not observed during the two fauna surveys, the Julia Creek Dunnart (*Sminthopsis douglasi*), a Vulnerable species under the EPBC Act, is restricted to the Mitchell Grass downs country of north-west Queensland and known historically from the vicinity of the Project.

4.5 Matters of State Environmental Significance (MSES)

4.5.1 Regional Ecosystems

The SEVP area is dominated by Mitchell grass (*Astrebla* spp.) tussock grasslands on rolling plains (downs). The plains are interspersed with drainage lines, supporting open grasslands, herblands or eucalypt woodlands and isolated remnant plateaus (Sattler and Williams 1999).

Field assessment undertaken as part of the baseline surveys confirmed the presence of six of the mapped Regional Ecosystems (REs) mapped under Queensland State legislation (Figure 6). The remainder occurred in patches that are too small (<4 ha in area) to be mapped at the scale (1:100,000) applied to certified mapping or were misidentified from satellite imagery used in the certified mapping.

The Queensland Herbarium Regional Ecosystem mapping was generally found to be accurate with large areas of the northern area being correctly mapped as a mosaic of RE 4.9.1c and RE 4.9.2b. Some large and obvious areas of RE 4.9.2b have been mapped out as homogenous polygons where possible. Much

of the balance of the central area is correctly mapped as RE 4.9.1c areas immediately south of the highway including the wide road reserve area mapped as non-remnant due to the dominance of introduced grasses and the very dense invasion of Prickly Acacia *Vachellia nilotica* deemed to constitute the ecological dominant layer in these areas.

None of the REs recorded onsite are listed as Endangered under the VM Act. Furthermore, none have an Endangered biodiversity status (Table 4).

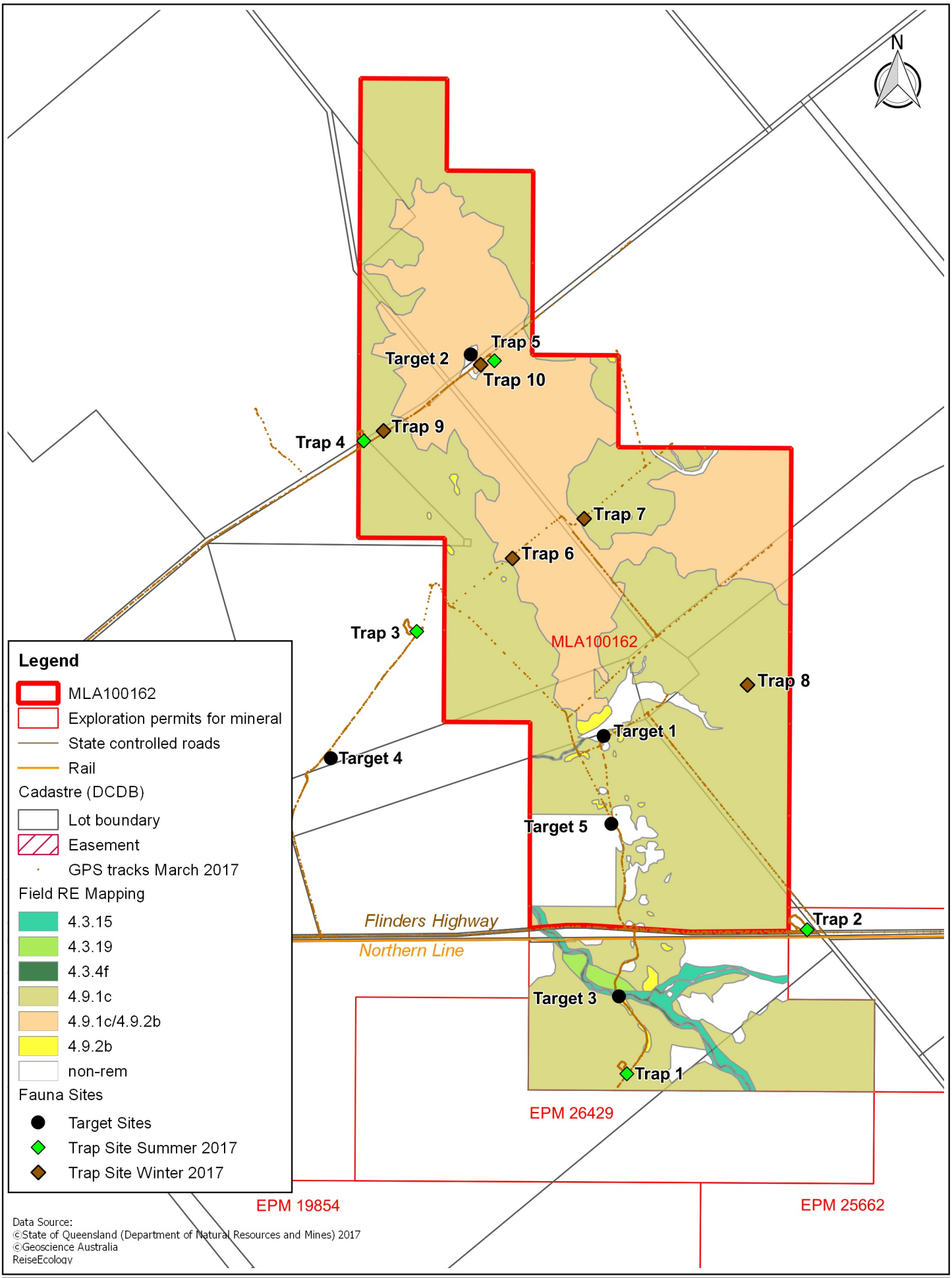
Table 4: Regional Ecosystems Recorded within the SEVP Project Area

Regional Ecosystem	Brief Description	VM Act* Status	Biodiversity Status	Total Area (ha)
RE 4.3.15	*Astrebla squarrosa* +/- *Dichanthium spp.* +/- *Eulalia aurea* grassland on alluvium	LC	NC	139
RE 4.3.4f	*Eucalyptus coolabah* and/or *E. microtheca* low open woodland. Occurs on drainage lines on *Astrebla spp.* undulating plains and braided channels on alluvial plains, particularly north-east Riverine wetland or fringing riverine wetland	LC	NC	34
RE 4.3.19	*Dichanthium spp., Eulalia aurea*, *Astrebla spp.* grassland on alluvium	LC	NC	43
RE 4.9.1c	*Astrebla lappacea* +/- *Aristida latifolia* +/- *Panicum decompositum* grassland on Cretaceous sediments	LC	NC	6,647
RE 4.9.2b	Mixed tussock grassland, with combinations of the species *Astrebla spp.*, *Aristida latifolia, Enneapogon sp.* mixed tussock grassland. Emergent *Atalaya hemiglauca, Ventilago viminalis* and *Corymbia* terminalis commonly occur. Occurs on rises of exposed Cretaceous shale and limestone with rocks to the surface. Cracking clay soils	LC	NC	68
RE 4.9.1c/ 4.9.2b	The patches of 4.9.2b that occur within the mosaic of 4.9.1c are slight rises with surface limestone rocks. It was not possible to map them all out without walking the entire polygon therefore this particular polygon needs to remain mixed. RE 4.9.1c Occurs on level to gently undulating downs derived from Cretaceous mudstones (predominantly Allaru Mudstone) in the north of the bioregion (BVG1M: 30b). RE 4.9.2b occurs on rises of exposed Cretaceous shale and limestone with rocks to the surface. Cracking clay soils. (BVG1M: 30b)	LC	NC	2,970

*VM Act = *Vegetation Management Act 1999*; LC = Least Concern, NC = No Concern

4.5.2 State Significant Flora

The field surveys undertaken in March and July 2017 detected a total of eighty-one (81) species of vascular plant. Species communities were generally representative of the Mitchell Grass Downs region, with most species widespread across the bioregion. All species recorded in the current survey were already known to occur within the region. These results were also consistent with the findings from the EISs undertaken for the Northern Gas Pipeline Project and the CopperString Project. No threatened flora species or flora species of scientific or bioregional significance were recorded during the surveys.



0 1 2 3 4 5 km

Scale: 1:100,000 @ A4

Datum: GDA94 Projection: MGA54

St Elmo Project

Figure 6
Vegetation Map and Survey Sites

4.5.3 State Significant Fauna

An area that contains habitat for an animal that is listed as endangered, vulnerable or special least concern under the NC Act is a Matter of State Environmental Significance (MSES). The Queensland Government Wildlife Online database identified 12 vulnerable or endangered fauna species, listed under the NC Act and/or EPBC Act that have been previously recorded or are predicted to occur within 50 km of the SEVP area.

4.5.4 Essential Habitat

No essential habitat as mapped by DNRME is located within or adjacent to the SEVP area.

4.5.5 Weeds and Pests

Weeds

Eight species of weeds were recorded within the SEVP area (Table 5).

Table 5: Weeds Recorded in the SEVP Area

Family	Species	Common name
Amaranthaceae	*Aerva javanica*	Kopak Bush or Desert cotton
Amaranthaceae	*Gomphrena celosioides*	Gomphrena Weed
Apocynaceae	*Calotropis gigantea*	Giant Milkweed
Caesalpiniaceae	*Parkinsonia aculeate*†*	Jerusalem thorn or jelly bean tree
Malvaceae	*Sida spinose*	Indian Mallow
Mimosaceae	*Vachellia nilotica*†*	Gum Arabic Tree
Poaceae	*Cenchrus ciliaris*	Buffel grass
Portulacaceae	*Portulaca oleracea*	Pigweed

*Species listed in Biosecurity Act 2014. †WoNS refers to weeds of national significance classified by the Australian Government.

Two introduced plant species detected onsite are declared under the *Biosecurity Act 2014* (Class 3); *Parkinsonia aculeate* and *Vachellia nilotica* are also listed as Weeds of National Significance (WoNS).

Pest Animals

Database searches using the Queensland Government Department of Agriculture and Fisheries Pest Distribution Mapping was undertaken to assess pest animals that may occur within the area (Table 6).

Table 6: Pest Animals

Scientific Name	Common Name	Likelihood of Occurrence[1]
Rhinella marina	Cane Toad	Common and widespread
Felis catus	Feral Cat	Common and widespread
Oryctolagus cuniculus	Rabbit	Occasional and localised
Vulpes vulpes	Fox	Occasional and widespread
Sus scrofa	Pig	Occasional and localised
Camelus dromedarius	Camel	Absent
Passer domesticus	House Sparrow	Common and widespread

1 Derived from Queensland Government Department of Agriculture and Fisheries Pest Distribution Mapping

4.5.6 Waterways or Wetlands

No essential wetlands or waterways mapped by DNRME are located within or adjacent to the study area.

4.6 Potential Impacts to MNES/MSES

Direct Impacts

Clearing of regrowth and sparse remnant native vegetation will be necessary for the mine, and associated infrastructure. During the mine life, it is intended that grazing will continue on those parts of the SEVP Area which are not required by mining operations. Much of the proposed SEVP area has been extensively grazed by cattle for many years and is infested by Prickly acacia. Of the REs to be cleared, none are listed as Of Concern. The area to be cleared does not include any TECs. Clearing of vegetation would occur in stages as mining progresses, followed by rehabilitation.

The clearing of vegetation is the most significant and direct impact of the SEVP on ecological values of the site. Land clearance is listed as a key threatening process under the EPBC Act. The removal of habitat reduces the size of local populations of flora and fauna dependent on that habitat. These impacts are immediate and significant in the short-term. Impacts may persist in the long-term if habitat created during mine rehabilitation does not closely resemble pre-mining ecosystems. In addition, if sufficient habitat refuges are not maintained locally prior to the maturation of rehabilitated land, local extinction of certain species may occur. Connectivity across the broader Project area has been considered in terms of habitat connections and broader corridors with regional linkages beyond the boundaries of the Project area. Vegetation will be removed to accommodate mining, demountables, minor roads and other infrastructure associated with the SEVP.

Clearing of vegetation for the SEVP presents a risk of direct mortality or injury to fauna. Increased traffic and noise also presents risk to fauna during the construction and operation of the SEVP. Fauna of low mobility are at risk of injury or death from heavy machinery during the construction and operation of the SEVP. The small scale and staged expansion of SEVP operations is likely to reduce the risk of these impacts.

In addition, clearing will only occur within designated areas and only during designated time periods. The presence of qualified Fauna Spotter-Catcher/s during initial clearing will decrease incidences of fauna mortality. Educating and training employees and contractors on threatened species of flora and fauna identification will further reduce direct mortality as part of the SEVP.

Indirect Impacts

Indirect impacts as a result of the SEVP may include habitat fragmentation and degradation, traffic and noise impacts and changes to local fire regimes. Highly fragmented habitats support fewer species than connected blocks of habitat of the same size. This is because fragmentation restricts dispersal of fauna and plant seeds between available habitat. The impacts of habitat fragmentation depend on the degree to which dispersal is inhibited by habitat gaps, the size of the remaining habitat fragments, and ecological attributes of the species. The size of the SEVP, coupled with the retention of vegetation corridors along drainage lines within the site, means that there are negligible anticipated impacts of the SEVP as a result of habitat fragmentation.

In general, the SEVP is not expected to cause substantial changes to local fire regimes. The most likely change is the reduced frequency of fire as a result of fuel load reduction from clearing. This is likely to benefit the fire-sensitive vegetation occurring along the periphery of drainage lines. Any change is expected to be short-term, as rehabilitated sites are expected to develop a grass layer with the potential to support fire within the first 1-2 years of development. Active fire exclusion from rehabilitated sites will be practiced for at least ten years, to allow for the establishment of trees and shrubs.

Earthworks and vehicular traffic associated with mining can generate substantial amounts of dust during dry weather. The moving nature of the proposed earthworks means that any one block of vegetation will only be exposed to significant levels of dust for a short period. Impacts from noise will be mitigated by adhering to sound construction principles as well as managing the activity appropriately.

4.7 Marine Ecology

As the SEVP is located in central Queensland, impacts to marine ecology have been excluded.

4.8 Aquatic Ecology

Freshwater bodies are limited across the site. Seasonal inundation fills some water storage areas, however there is a lack of permanent freshwater across the SEVP site.

4.9 Surface water

The Project area consists of undulating plains, with no noticeable topographic features. There are several rural water storages within the Project area and two braided drainage lines occur in the

southern portion of the site. Part of this network bi-sects the Flinders Highway. There is a small, unnamed creek toward the middle of the site. Inferred surface water flow is generally in the westerly/north-westerly direction. One medium sized water body exists in the centre of the SEVP and serves as the receiving waters for several onsite tributaries.

Potential impacts

Further hydrology studies are required to determine potential impacts.

4.10 Groundwater

The SEVP is located within the extensive area of the Great Artesian Basin (GAB). The GAB occupies 1.7 million m^2 and consists of a multi-layered confined aquifer system. The SEVP lies within the northern part of the Eromanga Basin which overlies the north-western Galilee Basin and connects the Euroka Arch to the Carpentaria Basin. Some information exists with respect to groundwater within the northern part of the Great Artesian Basin. A study by Fimiston Mining was conducted in 1999 as part of pre-feasibility study of water supply.

Two registered groundwater bores exist within the Project's footprint (Bore RN3540 and Bore RN72). It was noted in 1999, that bore pressures had been in decline for many decades mainly due to excess abstraction, especially from free-flowing bores, likely associated with grazing in the region.

Potential impacts

Further studies will be undertaken to increase the understanding of the local and regional groundwater systems. Further studies will also include groundwater-dependent ecosystems and their applicability to the site, if relevant. Studies will likely include:

- Review of the local GAB aquifers in terms of depth, thickness, transmissivity, storage coefficient, temperature, watery quality, and current extraction rates;
- A data search of registered bores within a 50 km radius of the SEVP to obtain borehole information, water depth and flow rates;
- Preliminary discussions regarding licensing requirements;
- An assessment of the radius of potential bore field; and
- Provision of cost estimates for borehole construction, pumps, power and pipelines.

4.11 Air Quality

There is limited air quality data currently available for the local area. Existing air quality in the Julia Creek region is generally characteristic of a largely undeveloped rural environment. Local sources of

particulates are expected to include general rural and residential activities, use of local roads and bushfires.

Wind roses for the Mount Isa weather station demonstrate the annual mean wind direction is predominantly a south-easterly. Seasonally, winds tend from east to south east and rarely blow from the north or west (Figure 7).

Potential Impacts

Additional studies would be required to assess potential noise issues and to develop mitigation strategies particularly given the proximity of the Project to the Julia Creek township.

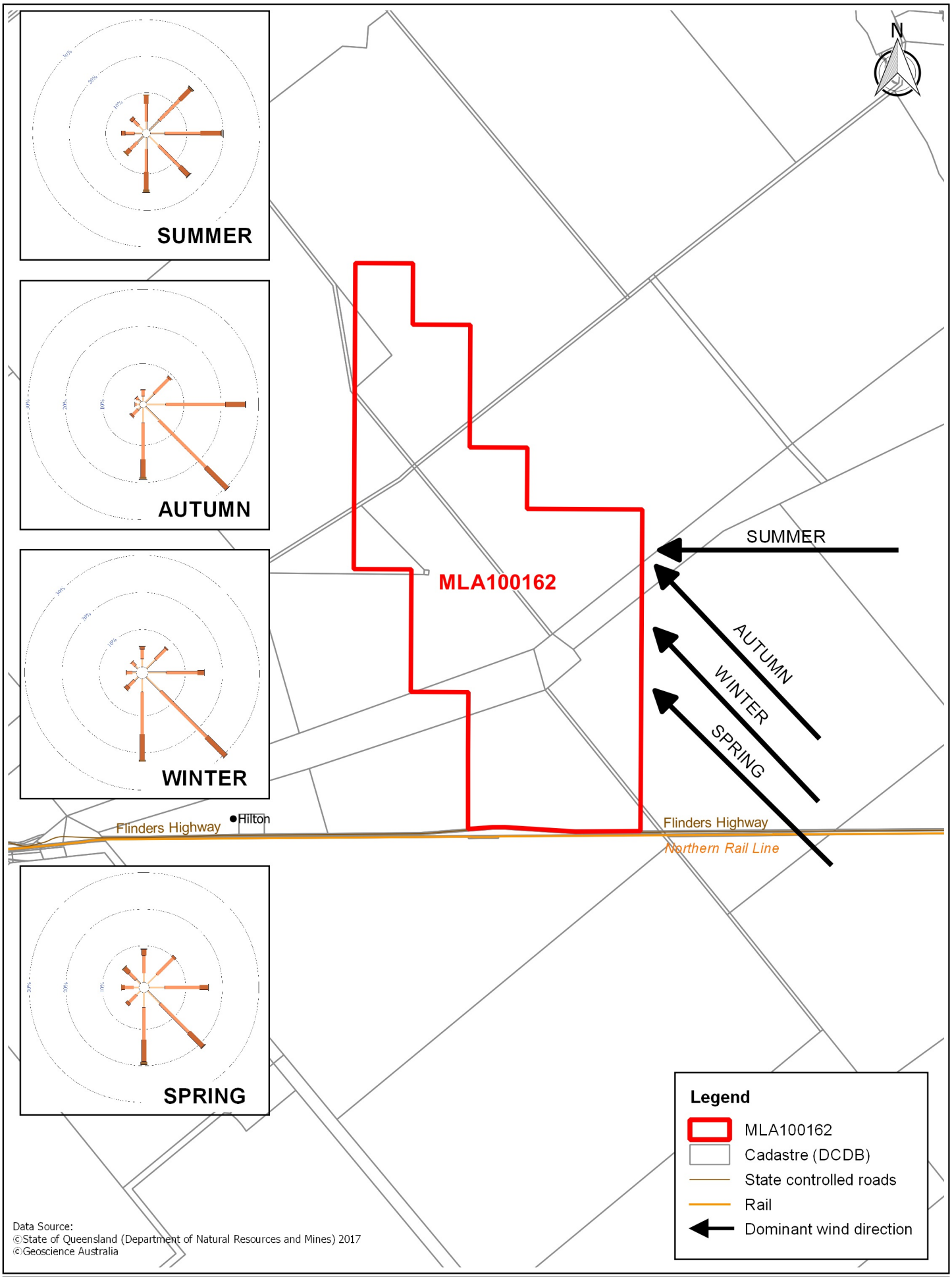
4.12 Noise and Vibration

There is limited noise data currently available for the local area. Background noise levels in the existing environment would be typical of most rural areas. These would vary from 30-40 dB(A) at night to 50–60 dB(A) during the day depending on the extent of traffic, machinery operations, drilling and general activity in the area.

Potential Impacts

The nearest sensitive receptor to the Project is the Saint Elmo Homestead located approximately 5 km from the centre of MLA100162. Noise impacts would typically be associated with mine operations and hauling of vanadium. The proposed operation will be required to meet noise standards for occupational health and safety, and environmental standards determined in accordance with the EP Act. Detailed noise and vibration studies will be undertaken as part of the EIS process.

Additional studies would be required to assess potential noise issues and to develop mitigation strategies particularly given the proximity of the Project to the Julia Creek township.



 File Path: C:\GIS\Epic Environmental\Projects\BE170006.01 St Elmo Project \Workspaces\IAS\Figure 7 Seasonal Wind Direction.qgs

Data Source:

0 2.5 5 7.5 10 km

Scale: 1:150,000 @ A4

Datum: GDA94 Projection: MGA54

St Elmo Project

Figure 7
Seasonal Wind Direction

4.13 Cultural Heritage

4.13.1 Indigenous Cultural Heritage

A search of the Australian Heritage Place Inventory and Aboriginal Cultural Heritage Database and Register did not identify any listed areas within the immediate Project area. The Project is located within the McKinlay Shire Council area and no cultural heritage overlays are available under the current McKinlay Shire Council Planning Scheme.

Detailed archaeological cultural heritage surveys of the Project area have not yet been undertaken by Multicom. These will be undertaken as part of the Cultural Heritage Management Plan (CHMP) implementation and prior to the commencement of construction. Multicom will be actively engaged with Traditional Owners and will continue to maintain formal communications leading up to the commencement of mining.

4.13.2 Non-Indigenous Cultural Heritage

Non-Indigenous cultural heritage values include items and places of social value to the local community and places of historic, architectural or scientific significance. Non-Indigenous cultural heritage is generally associated with human activities since the beginning of non-Indigenous settlement of an area, as well as natural places which have meaning for people of the current day.

There are no listed non-Indigenous heritage sites in the Project area. McKinlay Shire Council lists one non-Indigenous cultural heritage site as the 'Cobb & Co. Overshot' at Julia Creek. This will not be impacted as part of the SEVP construction or operation.

Potential Impacts

Based on database search results, it is considered unlikely Indigenous or non-Indigenous cultural heritage will be impacted by the Project. Items of unrecorded cultural heritage may occur within the SEVP area and without appropriate site management initiatives, may be threatened by construction impacts. The conduct of the cultural heritage assessments and the implementation of site protection or remediation measures will be specified in the CHMP.

4.14 Transport (Land and Air)

4.14.1 Land Transport

There are no new or alterations planned to public road infrastructure during the construction and operational phases of the Project. Access to the Project area will be via Flinders Highway only and will be controlled and monitored.

4.14.2 Air Transport

The use of Fly-in Fly-out (FIFO) workers will likely utilise either the Julia Creek Airport, Cloncurry Airport or the Mount Isa Airport before transiting via automobile or bus to site.

Potential Impacts

The main mode of transport that will be used during all Project phases (construction, operation and decommissioning) will be land transport. The use of local and state roads will be required to access the site. An increase in the volume of traffic will be generated from the mining activity.

4.15 Transport (Shipping)

Whilst beyond the scope of this IAS, shipping will likely be out of the Port of Townsville, within Queensland state waters. Multicom will abide by all relevant international, national and state laws associated with shipping activities, including;

- The International Convention for the Prevention of Pollution from Ships (MARPOL);
- The International Convention for the Safety of Life at Sea (SOLAS); and,
- Port Procedures for the Port of Townsville.

Potential Impacts

Shipping is beyond the scope anticipated with this IAS. It is anticipated that potential impacts to the environment as a result of the Project will be minimal. Some low level, persistent effects will exist, all of which are unavoidable results of shipping operations, none of which are considered likely to present any tangible or unacceptable risks to the environment.

4.16 Waste

Construction and operation activities associated with the SEVP will increase the volume of waste materials from the Project area. Waste materials have the potential to impact the receiving environment through contaminating soil, habitat and water resources, in addition to having the potential to harm or injure neighbouring communities and fauna and flora species. While waste produced during the construction phase will be of a relatively short duration (in comparison to the operational phase of the Project), waste will continue to be produced during the operation and decommissioning phases of the Project.

Waste streams from construction and operation will be managed in accordance with a Waste Management Hierarchy. The strategy will identify controls, which target the reduction of generated wastes and ensure that onsite wastes do not enter the environment and minimise subsequent impacts.

Sources of waste to be generated by the Project include:

- Non-mining wastes:
  - Regulated Wastes (waste hydrocarbons, batteries, tyres) from maintenance activities
  - General wastes (wood, food scraps, paper and plastic not suitable for recycling)
  - Recyclable general wastes (aluminium cans, plastics, paper, glass)
  - Recyclable scrap metal
  - Sewage effluent from portable facilities
- Mining wastes:
  - Screening waste
  - Tailings

4.17 Hazards and Safety

The probability of accidents associated with the development and implementation of the SEVP will be as low as reasonably practicable, given that the design, operating and control measures adopted by Multicom will focus on their prevention. Natural events that could cause significant damage and pose serious safety risks have a very low probability of occurring during operation of the Project. Complete hazard analyses will be completed as part of Project initiation and will ensure all hazards are appropriately assessed and mitigated.

5 Community and Stakeholder Consultation

No public consultation for the Project has been undertaken to-date. The purpose of community and stakeholder consultation during the EIS process is to ensure that all relevant stakeholders are aware of the Project and have the opportunity to comment on issues of relevance to them. As part of the EIS process for the SEVP, it is proposed that consultation will be conducted with the local community and other relevant stakeholders. A 'Community Engagement Plan' for the SEVP will be developed accordingly. The aim of this plan will be to:

- Provide the community with information regarding the Project;
- Provide a mechanism for community contact with the Project team;
- Identify any issues and concerns that the community may have with the Project; and
- Ensure feedback provided by the community can be used in relevant studies being completed during the EIS.

There are substantial regional benefits that will be derived from the SEVP. The Project is within the North West Minerals Province (NWMP). The NWMP has been identified as an area of focus by the Queensland Government to stimulate mining and industry development and job creation. The Queensland Outback is a priority region for the JARG Fund as the region has an unemployment rate of 11.5% which was the highest in Queensland for the December 2016 period (D17/30007).

Julia Creek has limited other employment opportunities. Julia Creek is a small, outback town within the McKinlay Local Government Area (LGA). The McKinlay LGA has a total resident population of 1,062 as at 30 June 2015. The SEVP would be a major economic boost to Julia Creek and the region.

6 Environmental Management and Monitoring

An Environmental Management System (EMS) for both the construction and operational phases of the Project will be developed based on the principles of the AS/NZS ISO 14001:2015 Environmental Management Systems. An Environmental Management Plan (EMP) will be prepared for implementation by Multicom (and its contractors) at the SEVP as part of the EMS. The EMP applies to all contractors and visitors that are conducting activities at the SEVP site.

The purpose of the EMP is to establish the framework for environmental management of Project activities, and will include the following:

- Identify the potential for environmental harm;
- Provide mitigation measures to minimise the potential for environmental harm;
- Document operating criteria for the site to minimise environmental harm;
- Provide corrective actions to be implemented in the event of environmental harm; and
- Comply with the conditions of the Environmental Authority.

l Management and Monitoring

Multicom will develop measures that will be undertaken to prevent or mitigate any potential adverse impacts on the environment. These measures will be documented in the SEVP's EMP.

7 Conclusion

This IAS provides information in accordance with section 41 of the *Environmental Protection Act 1994*. Multicom plans to develop the SEVP, 25 km east of Julia Creek, Queensland. The Project has an eventual target production of 50,000 tonnes per annum of Vanadium Pentoxide (V_2O_5), with the resource exceeding a 30 year mine life. The Project seeks to take advantage of the emerging supply gap associated with high-strength steel production and the growth market of vanadium batteries.

The Project will be a shallow (15 m average), open cut mine with associated dump and haul operations. A range of ancillary infrastructure will be required to support the mining activity. This IAS has outlined potential impacts for the area based on proposed Project activities. Given the size and scope of the Project, further detailed studies are required during early Project development phases to assess the complete effects of the SEVP on flora, fauna, MNES, water resources, air quality, noise, visual amenity and socio-economics as part of the EIS process.

8 References

Australian Bureau of Statistics (ABS) 2016. Census of Population and Housing: Selected Characteristics for Urban Centres and Localities (Cat no. 2016.0-7), http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/2016.3Main+Features11996?OpenDocument.

Bureau of Meteorology (BOM) (2017). *Climate statistics for Australian locations*. Commonwealth of Australia, Bureau of Meteorology, Canberra. http://www.bom.gov.au/climate/dwo/201703/html/IDCJDW4067.201703.shtml.

Fimiston (2000). CR 31620. *Combined annual and final report for the Julia Creek Oil Shale and Vanadium Project, EPM 11057 & EPM 11847*. Submitted to the Queensland Department of Natural Resources and Mines, February 2001.

Independent Investment Research (2016). Report prepared for Australian Vanadium Limited, November 2016.

Resolve Geological (2017). *Geological Report and JORC Resource Estimate: St Elmo Toolebuc Formation Oxide: Vanadium and Calcium Carbonate*.

Roskill (2016). *Vanadium: Markets and Outlook to 2026*, viewed online, https://roskill.com/product/vanadium-market-outlook-2026/.

Sattler, P. and Williams, R. (1999). *The conservation status of Queensland's bioregional ecosystems*. Environmental Protection Agency, Queensland Government.

Whitcher, I.G., (1993). *A chronological resume of exploration and technological research conducted on the Julia Creek oil shale deposit northwest Queensland between 1967 and 1988.* In CR24927A, CRA Exploration Final QLD Mines Dept Report, Thomas, G and Shirley, J. 1993.

GLOSSARY

Acronym	Definition
ACH Act	*Aboriginal Cultural Heritage Act 2003*
BOM	Bureau of Meteorology
BOO	Build Own Operate
BOOT	Build Own Operate Transfer
CHMP	Cultural Heritage Management Plan
DEE	Department of the Environment and Energy
DES	Department of Environment and Science
DNRME	Department of Natural Resources, Mines and Energy
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMR	Environmental Management Register
EMS	Environmental Management System
EP Act	*Environmental Protection Act 1994*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERA	Environmentally Relevant Activity
FIFO	Fly-in Fly-out
GAB	Great Artesian Basin
IAS	Initial Advice Statement
JORC	Joint Ore Reserves Committee
Kl	Kilolitre
LGA	Local Government Area
ML	Mining Lease
MNES	Matters of National Environmental Significance
MR Act	*Mineral Resources Act 1989*
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992*
NTDA	Native Title Determination Areas
NWMP	North West Minerals Province
RE	Regional Ecosystem
ROM	Run of Mine
SEVP	Saint Elmo Vanadium Project
SCL	Strategic Cropping Land
TEC	Threatened Ecological Community
tpa	Tonnes per annum
ToR	Terms of Reference
TSF	Tailings Storage Facility
VM Act	*Vegetation Management Act 1999*
WoNS	Weeds of National Significance