

Volume 2

A5 - Environmental Management Plan Framework



Contents

1	Environmental Management Plan Framework	1
1.1	Project Overview	1
1.2	Proposed Construction Activities	2
1.2.1	Pre-Construction Activities	2
1.2.2	Construction Activities	3
1.2.3	Site Management	4
1.3	Operation Activities	4
1.3.1	Mining and Processing Methodology	4
1.4	Decommissioning and Rehabilitation Activities	5
1.5	Environmental Management Plan Template	6
1.5.1	Introduction	6
1.5.2	Project Description	6
1.5.3	Environmental Policy	6
1.5.4	Objectives of the EMP	7
1.5.5	Commitment	7
1.5.6	Planning	7
1.5.7	Legal and Other Requirements	7
1.5.8	Roles and Responsibilities	7
1.5.9	Hours of Operation	7
1.5.10	Environmental Mitigation Measures	7
1.5.11	Compliance Inspections and Monitoring	9
1.5.12	Environmental Monitoring	9
1.5.13	Non-Conformance, Corrective and Preventative Action	9
1.5.14	Training, Awareness and Competence	9
1.5.15	Communication	9
1.5.16	Emergency Preparedness, Response and Recovery	9
1.5.17	Reporting	10
1.5.18	Document Control	10
1.5.19	EMP Review	10
1.5.20	Appendices to EMP	10
1.5.21	Health and Safety Management Plan	10
1.6	References	10

List of Tables

Table 1.1: Processing Stages (General Overview)	5
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1 Environmental Management Plan Framework

This Chapter provides an outline of the Environmental Management Plans to be prepared for the Saint Elmo Vanadium Project (the Project) prior to the commencement of works. To reflect the differing environmental and legislative requirements to be managed, a Construction Environmental Management Plan (CEMP), Operation Environmental Management Plan (OEMP) and a Progressive Rehabilitation and Closure Plan (PRCP) will be prepared to include recommendations made in the Environmental Impact Statement (EIS). In addition, a Health and Safety Management Plan (HSMP) will be prepared for each stage of the Project.

1.1 Project Overview

Multicom Resources Limited (Multicom) is seeking to develop the Saint Elmo Vanadium Project (the Project) for the purposes of mining and processing vanadium pentoxide and alternative vanadium-based products. The Project 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 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 Project will consist of a shallow open cut mine, ranging in depth from 20 to 40 m (depending on depth of overburden), with associated dump and haul operations in order to obtain access to large known deposits of vanadium bearing sedimentary material. Strip mining is proposed to be carried out sequentially from mining panels along the north-south axis of Mining Lease Application (MLA) 100162, a greenfield site. Once the material is removed, the panel will be back filled with beneficiated gangue and overburden material, then contoured and sheeted with topsoil. Subsequently, revegetation with native species or as otherwise agreed with relevant stakeholders will take place.

The Project has an initial target production of 10,000 tonnes per annum (tpa) for the first two years with a maximum tonnage of up to 20,000 tpa (year 3 onwards) of vanadium pentoxide (V_2O_5) product over at least a 30 year mine life. Run of Mine (ROM) operations to produce the maximum 20,000 tpa will be up to 15 million tpa.

MLA100162 is located approximately 25 kilometres (km) east of Julia Creek in the priority North West Minerals Province of north western Queensland, within the McKinlay Local Government Area (LGA). The area of MLA100162 is approximately 8,882 hectares (ha).

1.2 Proposed Construction Activities

This section outlines the expected pre-construction and construction works to be undertaken. The commencement date for construction is dependent on the timing of the Project's approvals processes, however; it is anticipated that a Mining Lease (ML) and Environmental Authority (EA) will be granted in early to mid-2020. Based on these timeframes, construction is anticipated to start in 2020.

1.2.1 Pre-Construction Activities

Pre-construction activities involve site preparation works which will include, but may not be limited to, the following:

- Installation of boundary and or survey pegs / markers;
- Agree re-routed stock route and access process with tenure owner;
- Establishment of site safety and security measures e.g. fencing, safety signage, contact signage;
- Establishment of temporary amenities e.g. portable toilets;
- Establishment of waste receptacles;
- Installation of erosion and sediment controls;
- Clearing and grubbing of site (vegetation and weeds);
- Topsoil and subsoil removal;
- Earthworks for establishment of:
 - Water management infrastructure e.g. clean water (pit protection levees), dirty water (sedimentation dams used to capture sediment laden stormwater runoff) and mine / process water (raw water dam, pit water used for mine processing);
 - Fire water storage area (will be used for servicing the MIA and process area);
 - Sewage treatment plant and effluent disposal area;
 - MIA, which includes administration offices, amenities, processing facilities, flammable and combustible liquid storage, waste storage area, power station, carpark, vehicle manoeuvre areas, plant / equipment workshop, sewage treatment plant, laboratory, washdown facilities;
 - On-site power facility infrastructure trenches; and
 - Rail spur line that will join onto the Northern Rail Line.
- Grading works for establishment of:
 - Site entrance and access road off Flinders Highway;
 - Internal site access roads;
 - Rail access into site from Northern Rail Line;
 - Water management infrastructure (listed above);
 - MIA (listed above);
 - Laydown and storage areas;
 - Site offices including crib hut and amenities;

- Stormwater management infrastructure e.g. drainage lines / channels; and
- Fire water storage area (will be used for servicing the MIA and process area).
- Establishment of site office: desks, chairs, power and water infrastructure, electrical goods (printers, photocopiers, computers etc), stationery, storage cupboards.

Initial site preparation works will be concentrated in areas where key infrastructure will be located and where access roads, water storages and laydown areas will be required. This staged approach will assist Multicom to manage their environmental requirements, such as minimising dust being generated and control of stormwater runoff.

Where possible, suitable soil resources for use in later rehabilitation activities will be stripped, handled and stored in a manner that aligns with industry best practice. Topsoil and subsoil will be separated during this stage as topsoil contains a higher nutrient content and must be kept separate so that it can be used to promote vegetative growth during rehabilitation. Topsoil can be stored as a berm around active worksites and utilised as an erosion and sediment control measure, provided adequate controls (for example; sediment fence and cover) are in place to manage the erosion risk of the topsoil or bund itself. The mine plan is designed to maximise the amount of topsoil that can be placed progressively, with limited stockpiling.

1.2.2 Construction Activities

Construction activities will include, but may not be limited to the following:

- Construction of processing plant including foundations and associated infrastructure, e.g. electrical supply, lighting, security, water supply;
- Construction of sewage treatment plant, irrigation area and associated infrastructure, e.g. diesel, electrical supply, pump station, alarm, foundations;
- ROM, with area adequate to stockpile at least three days mine production to cover the mine shift and any plant shutdowns. The ROM will be oriented North-South to ensure safe operation when dumping;
- Excavation of shallow open cut pits for ore collection;
- Construction of MIA and associated infrastructure;
- Upgrade to the entrance and access road off Flinders Highway;
- Establishment of internal site access roads designed to accommodate semi-trailer and B-double vehicles;
- Construction of haulage roads into and out of pits and to ROM pad;
- Construction of rail spur line connected to the existing Northern Rail Line and associated infrastructure e.g. level crossing across Flinders Highway, electrical supply, loading yards.
- Construction of tailings storage facility and evaporation pond;
- Construction of water storage and stormwater management system infrastructure;
- Establishment of electrical power supply including electricity transmission infrastructure;

- Diesel (and/or gas) electricity generator located near to primary infrastructure with sufficient access for fuel delivery and storage or appropriate considerations for solar power generation;
- Trenching and laying of reticulated services, e.g. potable water, fire water, raw water, sewage, electrical supply and communications; and
- Establishment of gardens around site office.

No drilling or blasting activities will be required as part of the Project.

1.2.3 Site Management

The Site Senior Executive (SSE) will be responsible for site management during the construction phase. The SSE will be supported by a Senior Site Representative (e.g. Environmental Manager and Health / Safety Manager) from the principal construction contractors. The SSE will oversee the principal contractor during the construction of the Project, including monitoring the principal contractor's performance to ensure that all mitigation measures are implemented and that construction related impacts are minimised.

1.3 Operation Activities

The OEMP will replace the CEMP upon completion of construction. The OEMP will be prepared prior to operations commencing and will include the same elements listed above, however, there will be a heavy focus on management measures surrounding mineral collection, processing and rehabilitation of the site.

The life of mine is planned to be 30 years. Production will have a scaled approach over the life of the mine with production eventually ramping up to a maximum of 20,000 tpa (dependent on demand and other market factors).

No drilling or blasting activities will be required as part of the Project.

1.3.1 Mining and Processing Methodology

A summary of the mining sequence is planned as follows:

1. Clearing of vegetation (largely a weed management exercise) including removal and disposal;
2. Excavation of shallow open cut pits (on average 20 m) whereby native grass-dominated vegetation communities, topsoil and subsoil will be removed and stockpiled adjacent to the void for future re-use (where practicable) during rehabilitation works and on the final landform;
3. Overburden is removed and stockpiled for use during in-pit covering of reject material to final landform level;

4. Ore is mined by utilising hydraulic excavators and off-roads trucks for mining and haulage via road networks to the ROM stockpile areas for processing;
5. Reject material movement has been scheduled using 250 t excavators and D11 sized dozers. A single 250 t excavator can cover mining requirements to meet the 10,000 tpa production output. The additional equipment identified is required as the project ramps up production to 20,000 tpa. These trucks (which are loaded with reject material from the ROM area) then back-haul to dump in the pit, before returning to load again with ore from the nearby active ore loading area;
6. Ore is processed within the MIA until a high purity V₂O₅ flake is produced; and
7. Product is transported to Townsville by rail to reach customer and/or export through the Port of Townsville.

As there are no domestically, well-established vanadium mining models or conceptual designs available, the Project has a processing design based on similar mineral mining processing plants for other mineral ores. This EIS outlines an atmospheric leaching processing method.

An overview of the processing stages has been provided in **Table 1.1**. Diagrams of processing stages have also been provided throughout this description to show the key process stages.

Table 1.1: Processing Stages (General Overview)

Processing Stages	Atmospheric Leaching Method
Stage 1: Beneficiation	Beneficiation
Stage 2: Leach	Roasting
	Atmospheric Leaching
	Filtration
	Concentration Option 1: Solvent Extraction <u>OR</u> Concentration Option 2: Ionic Exchange
Stage 3: Purification	Desilication
	AMV Precipitation
Stage 4: Refining	Deammoniation
	Product Handling
Processing Waste Management	Evaporation
	Reagents
	Waste Handling and Disposal
	Beneficiation Rejects
	Refinery Residues

1.4 Decommissioning and Rehabilitation Activities

The Project will be decommissioned after approximately 30 years of mining or following depletion of the target resource. Progressive rehabilitation will be carried out as operations progress, in that each mining block will be progressively rehabilitated and compliance sought with the EA. Rehabilitation of the MIA will take place once mining is completed and plant and associated infrastructure decommissioned.

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;
- Establish ecosystems that resemble neighbouring unmined areas in their ability to respond to fire, termites, droughts and cyclones; and
- Ensure minimal post-mining impacts on surface catchments, water quality and volume.

A PRCP will be prepared and will outline the proposed program of actions to comply with the EA conditions, including a program to rehabilitate disturbed land. The PRCP ensures the Project has an agreed post mining land use and describes how rehabilitation of the site will be done progressively over the life of the mine. The PRCP outlines the rehabilitation schedule, process, post-closure requirements and ongoing monitoring.

1.5 Environmental Management Plan Template

The following is the proposed template to be used for the CEMP and OEMP. A brief description of what will be included under each heading is provided below. Prior to the completion of construction, the OEMP will be finalised and will replace the CEMP as the implementation tool moving forward in the Project. This template has been prepared with consideration given to Department of the Environment and Energy (DEE) Environmental Management Plan Guidelines 2014.

1.5.1 Introduction

A brief description of the Project, including the particulars on the regional and local areas, potential environmental values, goals and targets for environmental performance set for the project. This section of the document will also include details of the company's environmental policy.

1.5.2 Project Description

Information on the area, project requirements and activities to be undertaken.

1.5.3 Environmental Policy

Outlines the company's commitment to achieving compliance with applicable environmental legislative requirements and overall environmental performance intentions.

1.5.4 Objectives of the EMP

An outline of management strategies for environmental elements relevant to the scope of works, which will aim to avoid, minimise, mitigate or offset the impact of the project on the environment.

1.5.5 Commitment

Statement from all project employees to reduce the risk of adverse environmental impacts.

1.5.6 Planning

A description of all strategies selected to achieve the goals and targets set for the project. This includes all relevant legal requirements, operation requirements and compliance requirements.

1.5.7 Legal and Other Requirements

A list of the requirements imposed by the relevant legislation to adequately manage impacts of the project on receiving environments, includes permits and approvals obtained.

1.5.8 Roles and Responsibilities

Details the personnel responsible for on-site activities and ensuring that management strategies outlined in the EMP, including related documents, are being implemented correctly.

1.5.9 Hours of Operation

Proposed timing to conduct activities to minimise environmental impact.

1.5.10 Environmental Mitigation Measures

- **General** - All environmental controls required for overall operations, including but not restricted to environmental compliance, inductions and weather forecast.
- **Water Quality** - Management to avoid impact on important aquatic values, waterway crossings and operations near water bodies, water quality standards and monitoring frequency. Includes surface water and groundwater quality. Monitoring programs to be attached as an appendix.
- **Erosion and Sediment Control** - Development of site-specific ESC plans indicating standard control measures and diagrams. Overall strategies for ground works and earthworks; maintenance of controls, specific requirements for water crossings and clean water diversions; adequate stockpiling and maintenance; removal of controls and regular monitoring and inspection.
- **Land** - Management strategies for land disturbance activities (site office set up, land contamination, access track construction, geotechnical survey's etc). Details on the site being

left in a stable and adequate environmental condition, including rehabilitation to promote ongoing natural regeneration.

- **Soil** - Management strategies for contaminated material, stockpiles, acid sulphate soils and soil stability.
- **Cultural Heritage** -Appropriate implementation procedure for conducting site investigations and management actions for new finds. Adequate signage of relevant artefacts and areas. Inspection checklist to be attached as an appendix.
- **Noise and Vibration** - Management strategies to assess risk of generating nuisance to sensitive environmental receptors (e.g. nearby houses, environmentally sensitive areas); control measures to minimise noise and vibration during works. Management requirements for complaints. Monitoring requirements in the event of complaints as per relevant government agency requirements.
- **Air Quality** -Management strategies to minimise dust nuisance during earth works and overall construction activities. Additional management required for stockpiles. Restrictions on vehicle/plant speed, movement on public roads and other activities such as burning and clearing specified. Management of complaints and monitoring requirements as per relevant government agency requirements.
- **Contaminated Sites** - Strategies for the management of contaminated sites by spills, unexploded ordnance, contaminated materials (e.g. asbestos) provided. Assessment of potential material is also described. Adequate disposal through relevant licensed contractors is specified.
- **Fauna** - Management measures to minimise negative impact on local fauna. Legal requirements to employ a licensed fauna spotter/catcher are described. Pre-clearance requirements are also specified. Fauna interaction and incident forms to be attached as appendices.
- **Flora (Vegetation)** - Pre-clearance activities and surveys to be conducted and documented prior to any clearing activities. Strategies to avoid and minimise clearing during works are described.
- **Weed and Pest Management** - Management strategies included to avoid introducing new weed species on site and prevent any species already established on site to be spread to surrounding environments. Weed chemical control specified where relevant. Legal requirements for imported materials. Management required in the event of new infestations (both weed and pest) are included.
- **Waste Management** - Details on management of different waste streams and strategies for minimisation. Details on correct disposal, storage and waste transportation included. Details on management of spills and clean up actions also detailed.
- **Chemicals and Fuels** - Management of hazardous substances is detailed. Requirements for design of holding facilities, storage and handling is included if necessary. Additional management for potential risk of spills is detailed. Adequate disposal of hazardous waste is described in further detail.
- **Reinstatement and Rehabilitation** – details the methodology for reinstatement and rehabilitation works to be carried out include stockpiling of topsoil, subsoil, filling of voids,

clean-up of contaminated soil, proposed plant species list, weed management and plant stock management.

1.5.11 Compliance Inspections and Monitoring

- Environmental Compliance Inspections – checklists will be prepared and used when conducting inspections;
 - Weekly;
 - Monthly; and
 - Post incident.
- Audits;
 - Details internal and external audits to be conducted; and
 - Frequency - expected audits to be conducted during the project e.g. within the first month of activities started (internal audit) and three months after construction has started (external audit).

1.5.12 Environmental Monitoring

Monitoring of waterways for values such as temperature, dissolved oxygen, pH, turbidity, and/or salinity; noise and air quality levels, contaminated soil, weed and pest infestations to be included as appendices.

1.5.13 Non-Conformance, Corrective and Preventative Action

- Reporting of Incidents;
- Environmental Non-conformance; and
- Corrective and Preventative Actions.

1.5.14 Training, Awareness and Competence

Details training requirements and details of site induction which includes topics such as emergency response, spill responses, relevant legislation and duty of care, incident response and reporting, protected flora and fauna management, pest management, waste and ESC management.

1.5.15 Communication

Includes internal and external communication methods and requirements for project personnel to implement.

1.5.16 Emergency Preparedness, Response and Recovery

Management strategies including planning for potential emergencies and unforeseen accidents.

1.5.17 Reporting

Progress reports to be maintained regarding EMP revisions, weekly inspections, environmental training, results of audits and non-conformances, incidents and/or rectification measures.

1.5.18 Document Control

Plan and management strategies assessed and updated periodically or after a serious incident and/or after receiving audit results.

1.5.19 EMP Review

Details when the EMP is to be reviewed, who is responsible for conducting the review, amending the EMP and re-issuing the amended EMP to site personnel.

1.5.20 Appendices to EMP

The following documents will be prepared and appended to the EMPs:

- Species Management Plan;
- Social Impact Management Plan;
- Cultural Heritage Management Plan; and
- Monitoring Programs (e.g. Surface water, groundwater, air quality and noise and vibration).

1.5.21 Health and Safety Management Plan

A HSMP will be developed in accordance with the *Mining and Quarrying Safety and Health Regulation 2017* (MQSH Regulation), prior to the commencement of construction activities at the site. The HSMP will include, but not be limited to, the following appendices:

- Emergency Response Plan;
- Bushfire Management Plan;
- Journey Management Plan; and
- Disaster Management Plan.

1.6 References

DEE 2014, *Environmental Management Plan Guidelines 2014*, Department of the Environment and Energy.