HASTINGS
Technology Metals Limited

APPENDIX 1-5

Flora and Vegetation

Environmental Management Plan

YANGIBANA RARE EARTHS PROJECT

FLORA AND VEGETATION ENVIRONMENTAL MANAGEMENT PLAN

DOCUMENT NO. YGB-72-000-HSE-PRJ-PLN-0001

REVISION HISTORY

Revision	Date	Issued for	Prepared By	Reviewed By	Approved By
A	12/06/18	Issued for stakeholder review	Lara Jefferson	Stefan Wolmarans COO	Stefan Wolmarans COO
B	25/08/18	Issued for stakeholder review	Lara Jefferson Kellie Bauer-Simpson		Lara Jefferson

CHANGE HISTORY

Revision	Date	Change Description	Updated by
A	12/06/2018	First Draft for Stakeholder Review Rev A	Lara Jefferson Environmental Manager
B	25/08/2018	Revised following EPA Services review comments	Lara Jefferson Environmental Manager

TABLE OF CONTENTS

SUMMARY

Hastings Technology Metals Limited has prepared this Environmental Management Plan (EMP) to meet the requirements of the Environmental Scoping Document for the Yangibana Rare Earths Project (the Proposal) as summarised below:

Title of proposal	Yangibana Rare Earths Project
Proponent Name	Hastings Technology Metals Limited
EPA assessment number	2115
Purpose	The purpose of this EMP is to meet the requirements of the Environmental Scoping Document (work program # 11): Provide a Flora and Vegetation management plan to address significant residual impacts to flora and vegetation. The following should be addressed in the plan: • Invasive species control - control of weeds, in particular through construction of infrastructure, transport and/or entry and exit points, riparian and GDE areas, vegetation units considered to have high local significance (e.g. rare units, habitat for conservation significant species) and in areas identified as in 'Excellent condition'. • Monitoring program - to monitor the significant flora and vegetation communities identified. • Management program - develop adaptive management actions to be triggered should monitoring show a decline as a result of implementing the proposal. • Management of offset (if applicable).
Key Environmental Factor	Flora and Vegetation
Objective	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Outcome	To ensure that the Proposal avoids and minimises any adverse effects on flora and vegetation beyond the predicted impacts presented in the Environmental Review Document.

Corporate Endorsement

I hereby certify that to the best of my knowledge, the EMP provisions within this Flora and Vegetation Environmental Management Plan are true and correct and address the requirements of the Environmental Scoping Document for the Yangibana Rare Earths Project (Assessment number 2115).

[Signature of duly authorised proponent representative]

Name: Signed:

Designation: Date:

1. CONTEXT, SCOPE AND RATIONALE

1.1 PROPOSAL

Hastings Technology Metals Limited (Hastings) proposes to develop the Yangibana Rare Earths Project (the Proposal), located approximately 150km northeast of Gascoyne Junction, in the Upper Gascoyne region of Western Australia (Figure 1).

Rare Earth Elements (REE) will be mined from four deposits. During mining the REE ore will be taken to the ROM pad in preparation for processing, whereas waste rock will be deposited in waste rock landforms, alongside each respective pit. A processing plant, consisting of a beneficiation process and a hydrometallurgical process, will produce a mixed rare earths carbonate product. Tailings will be disposed in three tailings storage facilities (TSFs). Support infrastructure will include, but is not limited to, power, water, accommodation facilities, airstrip and linear infrastructure. Figure 2 shows the Project layout.

1.2 KEY ENVIRONMENTAL FACTOR

This EMP specifically addresses the Key Environmental Factor: Flora and Vegetation. The implementation of the Proposal will result in clearing of no more than 1,000 Ha of vegetation within a Development Envelope of 13,373 Ha.

1.2.1 PROPOSED ACTIVITIES

Key activities that have the potential to affect flora and vegetation include:

- Ground disturbance activities.
- Increased fire hazards as a result of mine site activities resulting in potential for fire to temporarily impact vegetation. It should be noted that this may positively impact some flora species.
- Introduction, establishment and spread of weed species.
- Indirect impacts of dust from vehicle movements.
- Water drawdown from water abstraction at the SipHon Well borefield and pit dewatering activities.
- Obstruction of natural surface water flows during flood events.
- Contamination of groundwater by chemical spills.

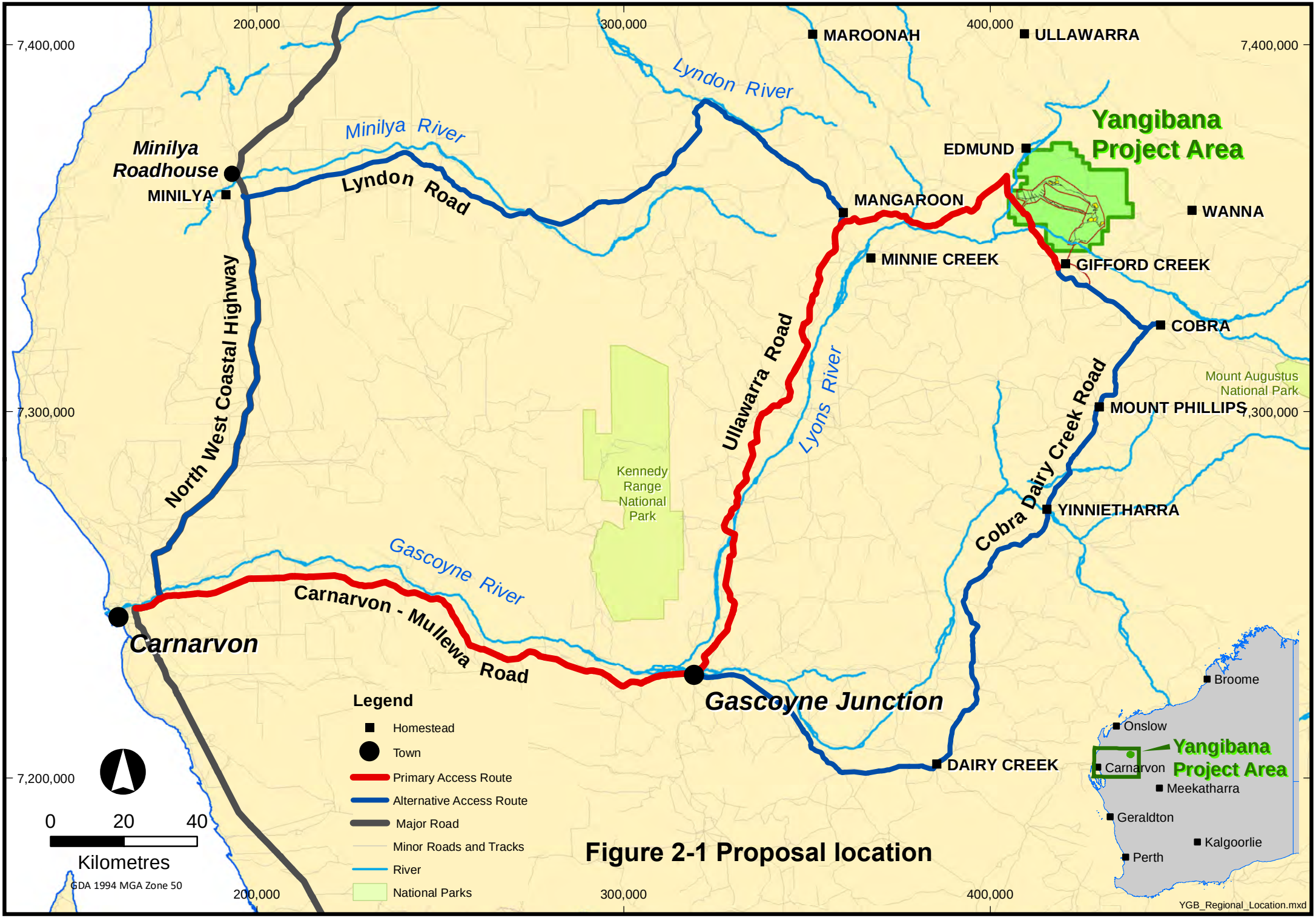
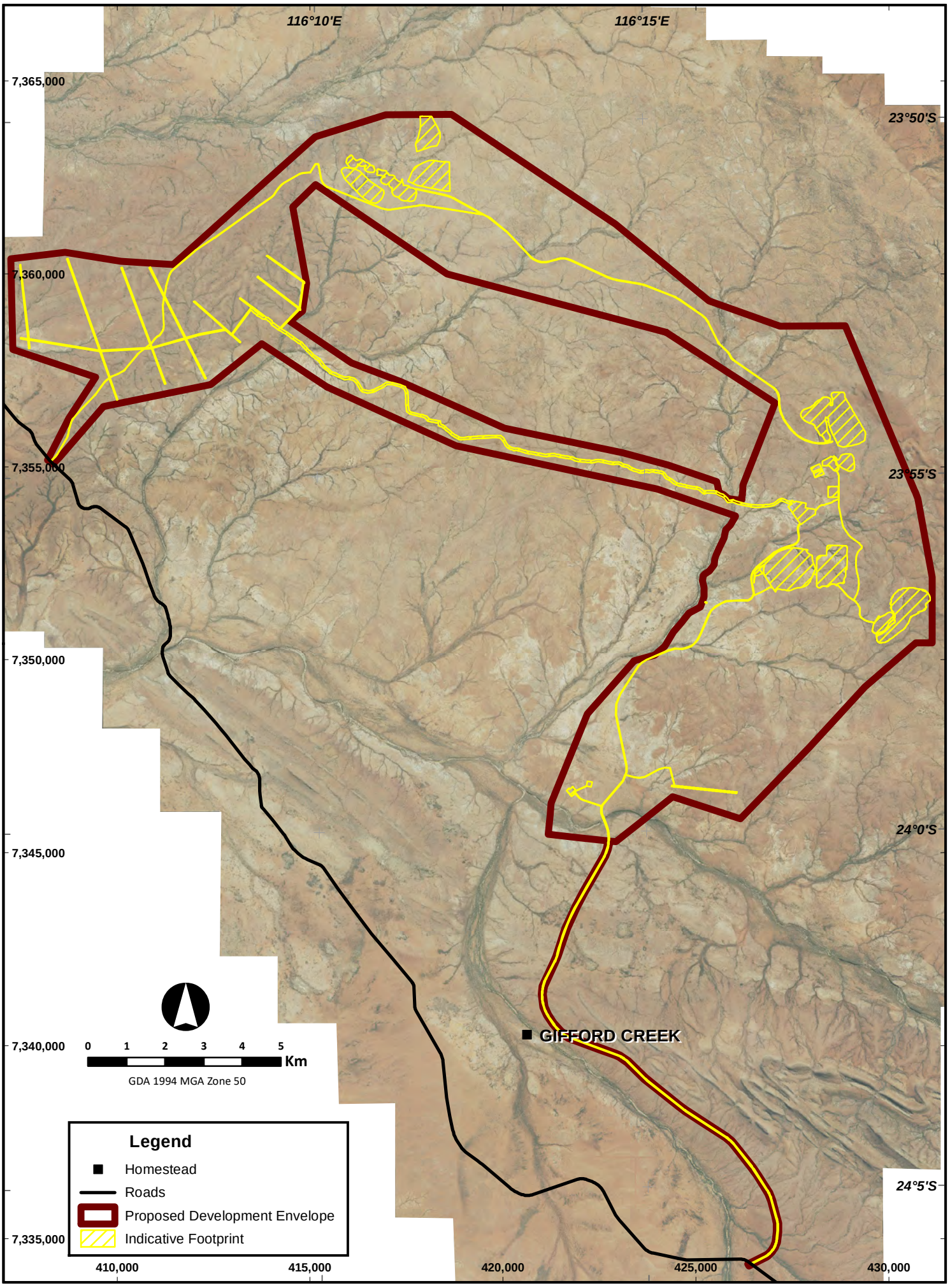


Figure 2-1 Proposal location



HASTINGS Technology Metals Limited

YANGIBANA RARE EARTHS PROJECT

PER_F1-2_Envelope_Footprint.mxd
22 June 2018

Figure 2-2 Development Envelope and Indicative Footprint

1.2.2 SITE SPECIFIC ENVIRONMENTAL VALUE

The majority (~71%) of vegetation is in Excellent condition with native vegetation largely intact. Eight priority flora (Department of Biodiversity Conservation and Attractions (DBCA) listed) were recorded in the study area. Additionally, one undescribed species (*Elacholoma sp.* 'Showy Flowers') was recorded in the survey area but outside the Proposal development envelope.

No Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC), characterised by a vegetation type, were recorded within the study area, and none are listed for the Gascoyne bioregion.

One vegetation type (EcMgCc) associated with the Lyons River represents a Groundwater Dependent Ecosystem (GDE) being characterised by *Eucalyptus camaldulensis*. Other vegetation types are considered potential GDEs due to the presence of *Eucalyptus victrix*.

1.3 CONDITION REQUIREMENTS

This EMP meets the requirements of the Environmental Scoping Document (EPA, April 2017) for the Yangibana Rare Earths Project (EPA Assessment Number 2115):

11. Provide a Flora and Vegetation management plan to address significant residual impacts to flora and vegetation. The following should be addressed in the plan:

- Invasive species control - control of weeds, in particular through construction of infrastructure, transport and/or entry and exit points, riparian and GDE areas, vegetation units considered to have high local significance (e.g. rare units, habitat for conservation significant species) and in areas identified as in 'Excellent condition'.
- Monitoring program - to monitor the significant flora and vegetation communities identified.
- Management program - develop adaptive management actions to be triggered should monitoring show a decline as a result of implementing the proposal.
- Management of offset (if applicable).

The structure and content of this document takes account of the Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans (EPA, 2016).

1.4 RATIONALE AND APPROACH

Results of baseline surveys and identified assumptions and uncertainties inform the management approach for meeting the environmental objective of this EMP. The identified management actions, management targets, monitoring, reporting, and review and revision of management actions are aligned with the overall management approach.

1.4.1 Baseline Surveys

A number of studies (Ecoscape 2015, 2017; Ecological 2018; JRHC Enterprises 2016) have informed this EMP. The historical land use has been pastoral, and evidence of degradation along drainage lines occurs where hooved mammals and weeds are present. Other minor areas are classified as degraded from pastoral activities and exploration tracks and pads (to be rehabilitated at completion of exploration programme). Despite this, the majority (~71%) of the survey area is in Excellent condition with native vegetation largely intact.

1.4.1.1 Flora

A total of 472 vascular flora taxa were recorded in the survey area (55,600 Ha). No threatened flora listed under the EPBC Act (Cwth) and *Wildlife Conservation Act 1950* (WC Act; WA) were recorded in the survey area. Eight priority flora (DBCA listed) were recorded in the survey area (Figure 1):

- *Acacia curryana* (Priority 1 (P1));
- *Rhodanthe frenchii* (P2);
- *Solanum octonum* (P2);
- *Wurmbea fluviatilis* (P2);
- *Gymnanthera cunninghamii* (P3);
- *Sporobolus blakei* (P3);
- *Goodenia berringbinensis* (P4); and
- *Goodenia nuda* (P4).

Additionally, one undescribed species (*Elacholoma sp.* 'Showy Flowers') was recorded in the survey area but outside the Proposal development envelope.

1.4.1.2 Vegetation

Twenty-eight vegetation types were recorded from the tenement areas with 23 vegetation types found within the development envelope. No Threatened Ecological Communities (TEC) or Priority Ecological Communities (PEC), characterised by a vegetation type, were recorded within the study area, and none are listed for the Gascoyne bioregion.

One vegetation type (EcMgCc) represents a Groundwater Dependent Ecosystem (GDE) being characterised by *Eucalyptus camaldulensis*. Vegetation types, EvCc, EvReMg, AcEt and AcAsCc, represent potential GDEs due to the presence of *Eucalyptus victrix*. Only EvReMg and AcAsCc do not occur within the Development Envelope.

1.4.1.3 Introduced Species

Twenty-four introduced plant species exist in the study area. *Malvastrum americanum* (Spiked Malvastrum), rates as 'very high' according to the Weed Prioritisation Process for DPaW (WA)

Midwest rankings summary (2013 in Ecoscape 2015).Two species are listed as Declared Pests under the WA *Biosecurity and Agriculture Management Act 2007* (BAM Act): *Argemone ochroleuca* (Mexican Poppy); and *Datura leichhardtii* (Native Thornapple) are classified as C3 (management) for the Upper Gascoyne. Under the BAM Act, C3 organisms should have some form of management applied that will alleviate the harmful impact, reduce the numbers or distribution, or prevent/contain the spread of the pest.

1.4.2 Key Assumptions and Uncertainties

It is assumed the flora and vegetation surveys conducted to-date have accurately recorded the presence of all conservation significant species, vegetation types and habitat values in the Proposal development envelope and over a regional area of 55,600 ha.

It is uncertain what the cumulative impacts to flora and vegetation are due to historical land use activities such as pastoralism. Given no mining developments occur in the adjacent areas, the cumulative impacts from mining are not considered.

It is assumed that the likelihood of weeds entering and spreading within the Proposal envelope is high due to increased vehicle movement within the development envelope and to and from the Proposal, and that increased disturbance of the Proposal creates suitable habitat for weed establishment.

Hastings has maintained a conservative assessment of potential impacts. A 'worst case' impact scenario includes the following considerations:

- Direct impacts associated with the disturbance footprints
- Indirect impacts assume a 20m buffer around disturbance footprints for:
    - No proactive avoidance of Priority flora during clearing or pipe laying activities.
    - No active management to prevent, manage or monitor weed species allowing introduction of and initial establishment of weed species. Weed species are likely to occur on disturbed areas within the Proposal area without any form of mitigation.
    - Minor incidents associated with 'unauthorised' clearing or driving on undisturbed ground.
    - Dust deposition on areas immediately surrounding roads.
    - Minor hydrocarbon spills.
    - Localised and unanticipated erosion events that require remediation activities involving ground disturbance.
- Possible water drawdown impacts to potential Groundwater Dependent Ecosystems (GDEs) within the drawdown contours of pit dewatering and water abstraction activities. There is a high level of uncertainty as to whether water drawdown will impact the potential GDEs, and thus a conservative approach assumes an impact will occur.

While Hastings intent is to mitigate the likelihood of the occurrence of indirect impacts, the above-listed indirect impacts are common to mine sites in Western Australia and acknowledged with the inclusion of a 20m buffer.

Given there are no other nearby mining developments in the local or regional area, lessons-learnt cannot be applied and an adaptive management approach will be required.

1.4.3 Management Approach

Hastings has adopted a risk-based management approach. The risk management process is based on the approach set out in the *Leading Practice Sustainable Development Program for the Mining Industry - Risk Assessment and Management* (Department of Resources, Energy and Tourism (DRET) 2008).

The risk assessment identifies risk pathways (unwanted event and the associated environmental receptor / factor), which may cause material impact to key environmental factors. It also identifies the level of uncertainty associated with a risk pathway, which are:

- Low certainty: Risk rating is based on subjective opinion or relevant past experience. Limitations in baseline data/information, which results in general conclusions and/or further work is required.
- Moderate certainty: Risk rating is based on similar conditions being observed previously. Baseline data/information has some gaps or minor further work required.
- High certainty: Risk rating is based on testing, modelling or experiments. Baseline data/information is complete and analysis appropriate for level of data.

To focus management efforts, the risk assessment has been used to determine:

- Inherent risk of identified risk pathways;
- Mitigation of risk (using the hierarchy of controls); and
- Assessment of residual risk.

When mitigating inherent risk, treatment measures have been evaluated using the hierarchy of controls:

- Where reasonably practicable, eliminate the risk;
- Reduce the risk by substituting a different activity which poses a lower risk;
- Control the risk with engineered solutions (including physical barriers); and
- Mitigate the risk using administrative controls.

Hastings will demonstrate, throughout all phases of the Project, regular review of the risk assessment by relevant personnel and key stakeholders, progressive implementation of priority treatment measures, and on-going evaluation of performance. An adaptive management approach will be implemented, where performance objectives are not met by mitigation measures or due to change management, as a component of the continual improvement of this EMP.

1.4.4 Rationale for Choice of Management Target/s

Management targets are based on:

- Survey outcomes (local and regional) including:
    - presence of Groundwater Dependent Ecosystems (GDE) or potential GDEs;
    - presence of weed species; and
    - vegetation condition.
- Proposal activities including:
    - construction of mine site infrastructure;
    - road maintenance activities between Gascoyne Junction and the mine site;
    - clearing of 1000 ha of vegetation;
    - storage of topsoil;
    - mining activities; and
    - processing of ore.
- Consideration of inherent risk severity from a risk assessment.
- Consideration of level of uncertainty.
- Industry best-practice.

2. EMP PROVISIONS

2.1 OBJECTIVE

This section of the EMP identifies the legal provisions that Hastings proposes to implement to meet the EPA objective for flora and vegetation.

> *To protect flora and vegetation so that biological diversity and ecological integrity are maintained.*

2.2 OUTCOME

The outcome is to ensure that the Proposal avoids and minimises any adverse effects on flora and vegetation beyond the predicted impacts presented in the Environmental Review Document.

2.3 MANAGEMENT ACTIONS AND TARGETS

It identifies the management target/s that Hastings will use to measure performance and monitoring that will be undertaken in relation to the management target/s. Finally, it identifies how Hastings will review and revise management actions if the management targets are exceeded.

Management-based provisions (Table 2-1), identified through risk assessment, will be implemented to achieve the environmental objective (Section 2.1). These management actions focus the greatest management effort on proposal activities that have the highest likelihood of causing environmental impact or where the consequence of an impact is severe and likely to be irreversible (an inherent risk rating of moderate and above). These management actions were specifically developed to meet the environmental objective for flora and vegetation and will be implemented by Hastings for the Yangibana Rare Earths Project.

Table 2-1 Management based provisions

EPA factor and objective
Flora and vegetation: To protect flora and vegetation so that biological diversity and ecological integrity are maintained

Risks and impacts	Management actions	Management targets	Monitoring	Reporting
Risk 1: Clearing outside of approved disturbance boundary Inherent risk severity: Moderate Level of certainty: Moderate Impacts: • Reduction in quality and fragmentation of significant habitat • Removal of conservation significant species (i.e. priority flora species) • Removal or fragmentation of significant vegetation communities	The Land Clearing and Topsoil Management Procedure and permitting system to be implemented. Delineation of ground disturbance boundaries (implementation of the *Flagging and Demarcation Procedure*). A 150m exclusion zone across Lyons River and Frasers Creek, as per the Native Title Agreement and Pastoral Agreement, will be implemented. Training and awareness with regard to Land Clearing and Topsoil Management Procedure. Site induction highlighting flora and vegetation values, no driving on undisturbed ground, and Hastings procedures for ground disturbance. Develop and implement the *Environmental Specification for Contractors* detailing Hastings environmental policy, minimum standards, and licence conditions.	No clearing outside the approved disturbance boundary.	Monthly audit of Hastings approved *Land Clearing and Topsoil Management Approval Forms* against actual ground disturbance during construction, and quarterly audit thereafter. Annual review of hazard and incident reports. Inspection of demarcation of approved disturbance areas prior to land disturbance activities.	The Annual Environmental Report (AER; to DMP) will include records of clearing areas. Mine Rehabilitation Fund reporting. Incidence records of unauthorised clearing outside approved boundary. Photographic evidence of demarcation of approved disturbance areas prior to land disturbance activities.
Risk 2: Groundwater drawdown Inherent risk severity: Low Level of certainty: 'Low' due to a lack of understanding as to whether potential GDE's are dependent on groundwater but 'High' with respect to having modelled the water drawdown Impacts: • Loss of areas of potential GDEs	Development of trigger levels for groundwater quality.* Development of trigger levels for groundwater drawdown.* Borefield designed to include a contingency water source supply.* Implement an adaptive management program.* Verification of groundwater drawdown modelling.* Develop and implement the Environmental Specification for Contractors detailing Hastings environmental policy, minimum standards, and licence conditions.	No decline in potential GDE vegetation condition beyond natural variability.	Monitoring of the condition of potential GDEs (to be detailed in the Vegetation Condition Monitoring Plan [VCMP], to be developed). Monitoring water abstraction.* Monitoring water quality.*	Annual groundwater monitoring report to DoW. Incidence records and investigation of decline in GDE vegetation condition beyond natural variability (summarised in the AER). Verification report of groundwater drawdown modelling.

Risks and impacts	Management actions	Management targets	Monitoring	Reporting
Risk 3: Introduction of new weed species, or spread of existing weed species, due to vehicles importing seed / plant material from outside or within the Project area. Inherent risk severity: High Level of certainty: Moderate Impacts: • Loss of flora and vegetation from displacement by weed species	The Vehicle Inspection (Weeds and Seeds) Procedure will be implemented to ensure all vehicles and equipment are inspected. Weed recognition will form a component of the environmental awareness program. Annual weed eradication program of existing weed species targeting *Argemone ochroleuca* (Mexican Poppy); *Datura leichhardtii* (Native Thornapple) and *Malvastrum americanum* (Spiked Malvastrum) as described in the Weed Management Procedure. Develop and implement the Environmental Specification for Contractors detailing Hastings environmental policy, minimum standards, and licence conditions.	No increase in composition, distribution and abundance of weed species due to the Proposal activities. Eliminate targeted weed species within Development Envelope over the life of the mine.	Weed mapping/monitoring. Audit of Vehicle Inspection (weeds and seeds) Register	Incidence reports of establishment of new weed species within the Development Envelope. The AER will include a summary of monitoring records and any incidences.
Risk 4: Bush fire because of the Proposal activities Inherent risk severity: Moderate Level of certainty: Moderate Impacts: • Change in structure and composition of vegetation communities • Loss of conservation significant flora species	Implementation of the Hot Work Permit Procedure. Fire extinguishers will be fitted to all vehicles and machinery. The Emergency Response Team will undergo regular training in fire response procedures as detailed in the *Emergency Response Plan*. The site induction will include awareness of fire prevention measures and response. Develop and implement the *Environmental Specification for Contractors* detailing Hastings environmental policy, minimum standards, and licence conditions.	No incidents of fire ignition resulting in bush fire as a result of the Proposal activities.	Audit of fire prevention measures and maintenance of fire extinguishers.	The AER will include a summary of fire ignition incidences as a result of the Proposal activities.
Risk 5: Excessive fugitive dust generation from the Proposal activities Inherent risk severity: Moderate Level of certainty: High Impacts: • Loss of conservation significant flora species due to impacts from dust loading on leaf surfaces • Uptake of radionuclides (in dust from tailings) by flora beyond acceptable levels	Dust suppression measures implemented where dust is generated commensurate with risk (e.g. water application to road surfaces prior to shift changeover). Implement dust suppression measures for mineralised ore or waste containing elevated levels of radionuclides as per that described in the *Radiation Waste Management Plan*.	Dust levels will not exceed thresholds (10 uGy/h) at monitoring locations within the Project / at the Project boundary because of Proposal activities.	Dust monitoring. Visual observations of excessive dust generation during proposal activities (i.e. clearing).	The AER will include a summary of dust monitoring, exceedances as a result of the Proposal activities, and associated investigations.

Risks and impacts	Management actions	Management targets	Monitoring	Reporting
Risk 6: Alteration of surface water drainage flow patterns Inherent risk severity: Low Level of certainty: Moderate Impacts: • Shadow effects resulting in loss of flora and vegetation • Consolidation of water resulting in water inundation impacts to flora and vegetation	Linear infrastructure will incorporate engineering structures (e.g. culverts, drains) to ensure natural surface water flows are maintained. Where pipelines cross drainage channels, they will be either buried or raised above drainage channels.	No impacts to flora and vegetation because of altered surface water flow patterns.	Visual inspection* of linear infrastructure following flood events. Vegetation monitoring upstream and downstream of linear infrastructure (as per the VCMP; to be developed).	The AER will include a summary of the inspection report.
Risk 7: Change in water quality because of release of chemicals Inherent risk severity: Moderate Level of certainty: Moderate Impacts: • Death of flora and vegetation in near vicinity	Diversion bunds will ensure surface water flow does not enter and flow through processing plant areas, the ROM or ore stockpiles. All chemicals will be stored in accordance with Australian Standards as detailed in the *Land Management Plan*. Materials with elevated levels of radionuclides shall be managed in accordance with the *Radiation Waste Management Plan*.	No exceedances in water quality thresholds as a result of proposal activities.*	Water quality monitoring.*	Annual groundwater monitoring report to DWER.

**Refer to the Water Management Plan*

2.3 MONITORING

The purpose of monitoring is to inform, through the management target/s, if the environmental objective is being achieved and when management actions will be reviewed and revised. Table 2-2 summarises the monitoring program to determine whether management targets are achieved.

Table 2-2 Monitoring to measure the efficacy of management actions against the management target

Indicator	Method	Location	Frequency	Review of management actions
Management target 1: No clearing outside the approved disturbance boundary.				
Clearing outside of approved boundaries	Audit of Hastings approved ground disturbance approval forms against actual ground disturbance during construction	N/A	Monthly- construction phase Quarterly- operations phase	Where audits demonstrate non-conformance with procedures
	Review of hazard and incident reports	N/A	Annually	Number of reportable incidents exceed three in any one year
	Inspection of demarcation of approved disturbance areas prior to land disturbance activities	Area demarcated for disturbance	Prior to disturbance occurring	Where demarcation for clearing occurs outside of approved disturbance footprint
Management target 2: No decline in potential GDE vegetation condition beyond natural variability.				
Vegetation condition	Monitoring of the health condition of dominant species comprising potential GDEs within the modelled drawdown impact area. Further methodology will	To be determined and described within a VCMP	Annually, in areas where water abstraction is occurring	Vegetation condition decline beyond natural variability

Indicator	Method	Location	Frequency	Review of management actions
	be described within a VCMP			
	Visual inspection of potential GDEs including photographic records	To be determined within a VCMP	Monthly	Obvious vegetation condition decline beyond natural variability
Management target 3: No increase in composition, distribution and abundance of weed species as a result of the Proposal activities.				
Presence of new weed species. Abundance and distribution of weed species.	Weed mapping / monitoring. Further methodology will be described within a VCMP	Areas in the immediate vicinity of the disturbance footprint Topsoil stockpiles Access roads entering and exiting site Washdown areas Rehabilitation areas Road maintenance areas between Gascoyne Junction and the mine site	Annually or after significant rainfall/ during flowering	Where new weed species are identified Where existing or new weed species establish in areas not previously recorded
	Audit of vehicle and equipment inspection certificates	N/A	Quarterly	Where new weeds establish and/or occur in areas not previously recorded within the Development Envelope despite vehicle hygiene

Indicator	Method	Location	Frequency	Review of management actions
				measures being implemented
Management target 4: No incidents of fire ignition resulting in bush fire as a result of the Proposal activities.				
Bush fire	Audit of fire prevention measures and maintenance of fire extinguishers	N/A	Quarterly	Where fire ignition occurs despite conformance with fire prevention measures
Management target 5: Dust levels will not exceed threshold criteria as a result of the Proposal activities.				
Dust levels	Dust gauges will monitor dust levels	Downwind of dust generating activities: • Mining • ROM • Crushing plant	Monthly	Three successive exceedances at any one location
Management target 6: No impacts to flora and vegetation because of altered surface water flow patterns.				
Erosion Vegetation condition	Visual assessment of linear infrastructure following heavy rainfall events Monitoring of the vegetation condition upstream and downstream of linear infrastructure. Further methodology will be described	Linear infrastructure	Visual assessment: Immediately after each heavy rainfall event Annual vegetation condition monitoring	Erosion events Vegetation condition decline beyond natural variability

Indicator	Method	Location	Frequency	Review of management actions
	within a Vegetation Condition Monitoring Plan (VCMP)			
Management target 7: No exceedances in water quality thresholds as a result of proposal activities.				
Water quality	Water quality monitoring[#]	As detailed in the Water Management Plan	As detailed in the Water Management Plan	Where levels exceed the predetermined threshold levels[#]

[#]Refer to the Water Management Plan.

2.4 REPORTING

2.4.1 Annual Reporting

The Compliance Assessment Report will be submitted to the Department of Water and Environmental Regulation and will demonstrate compliance with conditions of the Ministerial Statement issued under Part IV of the *Environmental Protection Act 1986* (WA).

Annual Environmental Reports shall be submitted to the Department of Mines, Industry Regulation and Safety and Department of Water and Environmental Regulation, and will demonstrate compliance with license conditions, relevant laws and responsible environmental management.

2.4.2 Reporting on Exceedance of the Management Target

Where a management target is exceeded (or not met), the CEO of the EPA Services will be notified within 7 days of identification of the exceedance.

3. ADAPTIVE MANAGEMENT AND REVIEW OF THE EMP

3.1 APPROACH

Hastings will implement adaptive management to learn from the implementation of mitigation measures, monitoring and evaluation against management target/s, to more effectively meet the environmental objective. The following approach will be followed:

- Monitoring data will be evaluated and compared to baseline and reference site data on a annual basis (or more frequently in some instances) in a process of adaptive management to verify whether or not responses to the impact are the same or similar to predictions;
- Address evaluation of assumptions and uncertainties listed in section 2.1;
- Annual review of the risk assessment and revision of risk-based priorities on the basis of monitoring program information, incidences, verification of modelling outcomes and new information;
- Increased understanding of the ecological regime, best practice, new technologies;
- Revision through consideration of incidents and associated investigations, or when management actions are not as effective as predicted or as result of change management (e.g. construction versus operations phases);
- External changes during the life of the proposal (e.g. changes to the sensitivity of the key environmental factor, implementation of other activities in the area, etc.); and
- Annual review of this EMP as a component of the continual improvement process within the Environmental Management System.

3.2 EARLY RESPONSE INDICATORS, CRITERIA AND ACTIONS

Early response indicators are used to:

- Provide information on changes, which are precursors to an environmental impact.
- Support improved understanding and identification of trends in environmental systems (EPA 2018).

The use of early response indicators in certain situations include:

- where loss or mortality is irreversible in human time scales;
- where impacts may not be detected for a prolonged period; and

- complex environmental systems where trends need to be established or where consequences of potential impacts are not well understood (e.g. long-term impacts of dewatering on groundwater systems).

For the Proposal, early response indicators are only considered for the following risk:

Risk:	Risk 2: Groundwater drawdown
Rationale	While the inherent risk severity is low, the level of certainty is also considered to be low due to a lack of understanding as to whether the potential GDE's are dependent on groundwater.
Management target:	No decline in potential GDE vegetation condition beyond natural variability
Early response indicator:	Decline in GDE species health condition
Rationale for the choice of the early response indicator:	If potential GDE's are solely reliant on groundwater levels then lower water levels may result in a decline in their health/condition (e.g. loss of leaves, yellowing of leaves, death of individuals).
Early response criterion:	Visual inspection of potential GDEs, including photographic records, identifies the following evidence of a decline in the health condition: • Obvious loss of leaves, • yellowing of leaves, and/or • death of individuals.
Early response actions:	• Investigate whether this is comparable with GDE condition at control sites. • Determine if the water drawdown trigger has been exceeded. If not, consider revising trigger level. • Reduce or stop water abstraction at this location. • Consult with external stakeholders (GDE-specialist consultants, regulators) of next steps. • Report findings. • Continue to monitor GDE vegetation. Monitoring frequency may increase.

3.3 REVISION OF MANAGEMENT ACTIONS

Where the management target/s is not met or exceeded, Hastings will review and revise the risk assessment, review and revise management actions and identify additional management actions where necessary. The following are examples of revised and additional management actions for each of the risks listed in Table 2-1:

Risk 1: Clearing outside of approved disturbance boundary

- Revised management action 1: Review of ground disturbance procedures, in consultation with land clearing team, to determine components of the procedure that are not clear or are not being interpreted correctly.
- Revised management action 2: Additional training and awareness.
- Additional management action 1: Contractor penalties for non-conformances.

Risk 2: Groundwater drawdown

- Revised management action 1: Revise trigger levels for groundwater quality
- Revised management action 2: Revise trigger levels for water drawdown
- Additional management action 1: Reduce water abstraction across the bore field by identifying other water source areas.

Risk 3: Introduction of new weed species, or spread of existing weed species, due to vehicles importing seed / plant material from outside or within the Project area.

- Revised management action 1: Proactive weed eradication program for non-target weed species.
- Revised management action 2: Proactive weed eradication program along road from Gascoyne Junction to the mine site.
- Additional management action 1: Eradication of weed species along river and creek system if weed seed entry to site occurs via surface water drainage from outside areas and germinate within disturbed areas.

Risk 4: Bush fire because of the Proposal activities

- Revised management action 1: Increased training and awareness
- Revised management action 2: Increase fire prevention measures
- Additional management action 1: Controlled burning, establish fire breaks around high risk areas

Risk 5: Excessive fugitive dust generation from the Proposal activities

- Revised management action 1: Increased water application to roads and/or exposed stockpiles
- Revised management action 2: Increased dust control measures
- Additional management action 1: Activity restrictions during windy weather conditions

Risk 6: Alteration of surface water drainage flow patterns

- Revised management action 1: Modifications to infrastructure – additional engineering controls post-construction.
- Revised management action 2: Dispersion of water flow due to unnatural, concentrated high velocity water movement as a result of diversion channels or culverts.
- Additional management action 1: Create gaps in small safety bunds on the sides of the roads prior to high rainfall events to ensure unrestricted water movement across the roads.

Risk 7: Change in water quality because of release of chemicals

- Revised management action 1: Additional secondary containment bunding beyond Australian standards to ensure containment of any chemicals in the event of a spill or containment failure.
- Revised management action 2: Additional training and awareness procedures.
- Additional management action 1: Substitute chemicals with biodegradable products where possible.

Reviewed and revised management actions will be implemented by Hastings to mitigate and manage risk to ensure the management target is met.

4. STAKEHOLDER CONSULTATION

Hastings consulted with key stakeholders while developing this EMP as is consistent with the EPA's expectations for this EMP to align with the principles of the EIA. Table 4-1 provides a summary of consultation that occurred. The comments raised during consultations with stakeholders were considered in the development of the Condition EMP. The following sections present stakeholders' comments and Hastings responses to those comments.

Table 4-1 Stakeholder consultation

Organisation(s)	Comments	Hastings Response to Comments
Environmental Protection Authority: Response to relevant section of the Environmental Review Document.	Requirement in the ESD for the Flora and Vegetation EMP to be included as a component of the revised version of the Environmental Review Document. Review by EPA Services, Terrestrial Environment Branch: 1. Not consistent with EPA instructions. 2. EMP should not include assessment information nor list all values identified by technical surveys, but instead focus on specific management measures to prevent significant residual impacts. 3. ERD and technical survey reports do not contain sufficient information to determine direct or indirect impact on significant flora that are not listed as priority flora. Once this issue has been addressed, the EMP may require revision to include any species substantially impacted by the proposal. 4. EMP states it will implement an adaptive management approach (p. 19) but does not provide sufficient details of trigger or threshold criteria, or contingency actions.	Production of this EMP. Revised to address EPA Services comments. Detailed Vegetation Condition Monitoring Plan to be developed.

Organisation(s)	Comments	Hastings Response to Comments
	5. EMP includes examples of outcome-based measures that are very broad, unlikely to be important issues during assessment, and for which it would be challenging to demonstrate success, such as "No impact on vegetation", "No new weed species are introduced" (Table 2-1, p 21)	
Department of Biodiversity, Conservation and Attractions (former Department of Parks and Wildlife (DPaW))	A general discussion regarding the environmental values. DPaW no longer meet with Proponents unless through formal EPA processes/requests.	No further action required.
Pastoralist	Discussions and site visit of infrastructure layout and areas of high pastoral values.	Infrastructure layout takes account of pastoral values.
Traditional Owners (TOs)	Lyons River and Fraser Creek have heritage values associated with them. A 150m exclusion buffer occurs on either side of the River and Creek.	Consultation with TO's required for any activities within the 150m exclusion buffer (i.e. monitoring, weed eradication). Hastings will ensure this is included in Construction EMP and Environmental Induction.

5. REFERENCES

Ecoscape Australia (2015). *Yangibana Project Biological Assessment: Flora and Vegetation*, unpublished report prepared for Hastings Technology Metals Limited, December 2015.

Ecoscape Australia (2017). *Impact of post-mining drawdown on groundwater dependent ecosystems*, memo prepared for Hastings Technology Metals Limited, January 2017.

Ecological Australia (2017). *Yangibana Rare Earths Project Flora and Fauna Survey*, unpublished report prepared for Hastings Technology Metals Limited, June 2017.

EPA (2018). *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans.* Published April 2018.

Department of Resources, Energy and Tourism (2008). *Leading Practice Sustainable Development Program for the Mining Industry - Risk Assessment and Management*. Commonwealth of Australia, May 2008.

JRHC and Associates (2016). *Radiation Impact Assessment Report*, unpublished report prepared for Hastings Technology Metals Limited, December 2016