

# Appendix 17

## Environmental management plan



## CONTENTS

<b>1</b>	<b>INTRODUCTION AND SCOPE</b>	<b>1</b>
1.1	PROJECT DESCRIPTION	1
<b>2</b>	<b>LEGISLATION, STRATEGIES AND POLICIES</b>	<b>3</b>
2.1	AUSTRALIAN GUIDELINES AND POLICIES	4
2.2	ERA POLICIES	5
<b>3</b>	<b>EXISTING ENVIRONMENTAL MANAGEMENT FRAMEWORK</b>	<b>7</b>
3.1	OVERVIEW	7
3.2	ENVIRONMENTAL MANAGEMENT SYSTEM	7
3.2.1	Air Quality Management Plan	9
3.2.2	Noise and Vibration Management Plan	10
3.2.3	Occupational Health and Safety Management System	10
3.2.4	Ranger 3 Deeps Radiation Management Plan	11
3.2.5	Ranger 3 Deeps Exploration Decline Water Management Plan	13
3.2.6	Land Use Stewardship Summary	13
3.2.7	Cultural Heritage Management System	14
3.2.8	Rehabilitation and Closure	15
<b>4</b>	<b>PROJECT INTEGRATION</b>	<b>16</b>
4.1.1	Implementation timelines and agency responsibilities	17
4.2	HAZARD IDENTIFICATION	18
4.2.1	Emissions	18
4.2.2	Human Health Safety and Radiation	18
4.2.3	Water Management	19
4.2.4	Flora, Fauna and Land Use Stewardship	19
4.2.5	Cultural Heritage	19
4.2.6	Rehabilitation and Closure	19
<b>5</b>	<b>RISK MANAGEMENT</b>	<b>20</b>
5.1	ACTION PLANS	20
5.1.1	Action Plan 1: Air, noise and vibration emissions	21
5.1.2	Action Plan 2: Occupational health and safety	22
5.1.3	Action Plan 3: Radiation protection	24
5.1.4	Action Plan 4: Water management	25
5.1.5	Action Plan 5: Flora, fauna and land use stewardship	26
5.1.6	Action Plan 6: Cultural heritage	27
5.1.7	Action Plan 7: Rehabilitation and closure	28
5.2	CONTINGENCIES AND MITIGATION MEASURES	29
5.3	MEASURING AND MONITORING	29
<b>6</b>	<b>REPORTING PROTOCOLS</b>	<b>31</b>
6.1	EXTERNAL	31
6.2	INTERNAL/EXTERNAL	32

<b>6.3</b>	<b>DOCUMENT CONTROL AND RECORDS</b>	<b>33</b>
<b>6.4</b>	<b>AUDITING AND REVIEW</b>	<b>33</b>

## FIGURES

Figure 1: ERA Health Safety Environment Management System	8
Figure 2: Integration of Project commitments into the ERA environmental management system	16

## TABLES

Table 1: Health and Safety Performance Standards	11
Table 2: New treatments required for the different Project phases	17

## GLOSSARY OF TERMS

<b>Term</b>	<b>Description</b>
AS	Australian Standards
EIS	Environmental Impact Statement
EMPs	Environmental Management Plans
EPA	Northern Territory Environmental Protection Authority
ERA	Energy Resources of Australia
ERISS	Environmental Research Institute of the Supervising Scientist
GAC	Gundjeihmi Aboriginal Corporation
LAA(s)	Land Application Area(s)
MTC	Minesite Technical Committee
NLC	Northern Land Council
NT	Northern Territory
the Project	Ranger 3 Deeps Underground Mine

# 1 INTRODUCTION AND SCOPE

The purpose of this Appendix is to present the new treatments<sup>1</sup> identified during the environmental risk assessment of the Ranger 3 Deeps underground mine (the Project) and outline how they will be incorporated into the existing ERA Environmental Management Plans (EMPs). This EMP will also identify how environmental regulatory requirements and ERA policies apply to the Project and be implemented across Ranger mine. ERA has developed and implemented an extensive suite of EMPs to manage potential environmental impacts associated with the existing Ranger mine (including the Ranger 3 Deeps exploration decline). Existing EMPs are a fundamental element of the Ranger health, safety and environment management system, which is ISO 14001<sup>2</sup> and AS/NZS4801<sup>3</sup> certified.

The Appendix refers to the specific management and monitoring plans identified in the Draft EIS and provides environmental objectives and targets associated with each environmental aspect (e.g. flora and fauna, noise and vibration, air quality).

New treatments (commitments) arising from the social and economic impact assessment are addressed separately in the Social Impact Management Plan (**Appendix 15**). Similarly, new treatments associated with Project design are addressed in the respective chapters and not discussed in this document.

Existing operational EMPs discussed in this Appendix and relevant to the environmental management of the Project can be viewed at: [www.energyres.com.au](http://www.energyres.com.au).

## 1.1 PROJECT DESCRIPTION

The Project will provide access to the Ranger 3 Deeps mineral resource, which has been defined by a series of successive surface drilling programs from 2005 – 2009 and more recently, by resource definition drilling undertaken via the Ranger 3 Deeps exploration decline.

Mining will involve a series of stopes accessed via the existing exploration decline, for which construction commenced in May 2012. Ore will be transported to the surface in trucks and processed through the existing Ranger mine processing plant, together with ore from the existing low-grade stockpiles.

As discussed in **Chapter 3, Section 3.2**, virtually all of the above ground infrastructure is planned to be installed within the current operating area, west of the main mine access road. No new clearing is planned for the Project with the exception of approximately <1 ha of new vegetation clearing for ventilation infrastructure within the Magela land application area (Magela LAA). However, during construction of the decline it is possible that unexpected ground conditions or other engineering difficulties may require some ventilation shafts to be

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<sup>1</sup> For the purpose of this Appendix, the term "new treatments" is used interchangeably with the term "commitments".

<sup>2</sup> ISO 14001 is a set of standards for organisations to design and implement an effective environmental management system. It sets out criteria for an environmental management system which can then be audited and certified.

<sup>3</sup> AS/NZS 4801 is the Australian and New Zealand set of standards for effective occupational health and safety management systems. It specifies requirements for the system to enable organisational certification to set criteria.

relocated. **Chapter 3, Figure 3.2** shows the indicative layout and location of new surface infrastructure for the Project

Detailed information on the aspects of Ranger mine current operations which will be influenced or will form part of the Project is provided in **Chapter 2** and **Chapter 3**.

## 2 LEGISLATION, STRATEGIES AND POLICIES

The Commonwealth and Northern Territory (NT) governments have enacted many acts and regulations relating to the Ranger mine. In addition to legislation covering day to day operations, specific requirements are in place to address potential changes to or, expansions of mining operations.

ERA maintains an operations legal register. The register is updated annually by an external firm under the direction of ERA's legal team. ERA maintains a subscription to SAI Global which provides notification of any changes or updates to Australian and international standards. ERA staff then present any material legislative changes to the ERA Executive Committee to enable decision-making and allocation of resources where required.

Information on key legislation has been provided in **Chapter 1, Section 1.3.4**. The legislative framework applicable to environmental management at Ranger mine includes the following:

- *Aboriginal Land Rights (Northern Territory) Act 1976* (Commonwealth).
- *Aboriginal Land Act* (NT).
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Commonwealth).
- *Aboriginal Sacred Sites Act* (NT); *Aboriginal Sacred Sites Regulations*.
- *Atomic Energy Act 1953* (Commonwealth) including the section 41 Authority.
- *Australian Radiation Protection and Nuclear Safety Act 1998* (Commonwealth).
- *Building Act and Regulations*.
- *Bushfires Act 1980* (NT).
- *Customs Act 1901* (Commonwealth); *Customs (Prohibited Exports) Regulations 1958*.
- *Dangerous Goods Act and Regulations*.
- *Environmental Offences and Penalties Act 1996* (NT).
- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act); *Environment Protection and Biodiversity Conservation Regulations 2000*.
- *Environment Protection (Alligator Rivers Region) Act 1978* (Commonwealth).
- *Environment Protection (Beverage Containers and Plastic Bags) Act 2011* (NT).
- *Environment Protection (Northern Territory Supreme Court) Act 1978* (Commonwealth).
- *Environment Protection (Sea Dumping) Act 1981* (Commonwealth).
- *Environmental Assessment Act* (NT); *Environmental Assessment Regulations*.
- *Heritage Act 2011* (NT); *Heritage Regulations 1991*.
- *Jabiru Town Development Act* (NT).

- *Minerals Titles Act (NT).*
- *Mining Act.*
- *Mining Management Act 2001 (NT) including the Ranger Authorisation "0108".*
- *National Trust Act (NT).*
- *National Greenhouse and Energy Reporting Act 2007 (Commonwealth).*
- *Nuclear Non-Proliferation (Safeguards) Act 1987 (Commonwealth).*
- *Planning Act (NT).*
- *Protection of Movable Cultural Heritage Act 1986 (Commonwealth).*
- *Radiation Protection Act (NT).*
- *Radioactive Ores and Concentrates (Packaging and Transport) Act (NT).*
- *Aboriginal Sacred Sites Act 1989 (NT).*
- *Soil Conservation and Land Utilisation Act 2004 (NT).*
- *Territory Parks and Wildlife Conservation Act 1976 (NT) and supporting regulations.*
- *Waste Management and Pollution Control Act (NT) and supporting regulations.*
- *Water Act (NT) and supporting regulations.*
- *Weeds Management Act 2001 (NT) and supporting regulations.*
- *Work Health and Safety (National Uniform Legislation) Act (NT) and supporting regulations.*

## **2.1 AUSTRALIAN GUIDELINES AND POLICIES**

Australian guidelines and policies listed in **Chapter 1** and applicable to environmental management at Ranger mine include:

- Australia's Uranium Industry Fact Sheet (RET 2012a).
- Code of Practice for Safe Transport of Radioactive Material (2008).
- Code of Practice and Safety Guide on Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005).
- Recommendations for Limiting Exposure to Ionizing Radiation (1995) and the National Standard for Limiting Occupational Exposure to Ionizing Radiation.
- Guide to Safe Transport of Uranium Oxide Concentrate (RET 2012b).
- Leading Practice Sustainable Development in Mining Handbook (RET 2011):
  - Airborne Contaminants, Noise and Vibration.

- Biodiversity Management.
- Community Engagement and Development.
- Evaluating Performance: Monitoring and Auditing.
- Hazardous Materials Management.
- Managing Acid and Metalliferous Drainage.
- Mine Closure and Completion.
- Mine Rehabilitation.
- Risk Assessment and Management.
- Stewardship.
- Tailings Management.
- Water Management.
- Working with Indigenous Communities.

## 2.2 ERA POLICIES

Internal and external stakeholder expectations demand a heightened awareness of environmental practices. This is primarily due to Ranger's location, i.e. being surrounded by Kakadu National Park and the type of commodity (uranium) being mined. As a result Ranger mine has specific policies to address the nature and scale of activities being managed and to establish a clear set of values and objectives for the effective management of health, safety and environmental performance. These include:

- *ERA Diversity Policy*: Outlines the company's commitment and strategies to increase workplace diversity across age, experience, gender and background.
- *ERA Environment Policy*: Describes the company's ongoing commitment to the protection of the natural and cultural values of the surrounding Kakadu National Park.
- *ERA Health and Safety Policy*: Describes the core responsibilities of all company representatives to achieving a zero harm workplace.
- *ERA Radiation Policy*: Describes ERA's core values for the protection of workers, the public and the environment from radiation exposure.

Policies are developed consistent with the intent of the Rio Tinto health, safety and environment policy; Rio Tinto health, safety environment and quality management system standard and ERA standards. In addition, ERA's policies are established consistent with the following standards:

- AS/NZS ISO 14001: 2004 Environmental Management Systems – Requirements with guidance for use.

- AS/NZS 4801: 2001 Occupational Health and Safety Management Systems – Specification with guidance for use.
- Radiation Protection Series: F-1 2014: Fundamentals for Protection Against Ionising Radiation, ARPANSA

The policies are communicated to all employees, contractors and stakeholders during inductions. Policies are also displayed around the mine site and on ERA's website at: [http://www.energyres.com.au/index\\_ourapproach.asp](http://www.energyres.com.au/index_ourapproach.asp).

Policies are reviewed at least every 12 months to assess the continuing relevance of the policy within the context of business objectives, operational activities, broader industry initiatives and stakeholder concerns.

## 3 EXISTING ENVIRONMENTAL MANAGEMENT FRAMEWORK

### 3.1 OVERVIEW

The Project is situated on the existing Ranger Project Area (RPA), adjacent to the current Ranger mine operating area. The Project will be managed through the existing ERA health safety and environment management system. The method for mining proposed by the Project is underground mining, which varies from the historical open pit mining methods utilised at Ranger mine. Through the technical studies documented in the Draft EIS and the Project risk assessment, a range of new environmental controls and commitments to manage hazards associated with underground mining have been summarised herein.

Should the Project be approved and progressed, the commitments from the Draft EIS which are summarised in this EMP will be integrated into the relevant EMPs, risk register and procedures. The existing management systems and plans that will be updated are listed below and an overview of each EMP is provided in **Section 3.2.1 to 3.2.7**, inclusive:

- *Air Quality Management Plan;*
- *Noise and Vibration Management Plan;*
- *Occupational Health and Safety Management System;*
- *Ranger 3 Deeps Radiation Management Plan;*
- *Ranger 3 Deeps Exploration Decline Water Management Plan;* and
- *Land Use Stewardship Summary.*

### 3.2 ENVIRONMENTAL MANAGEMENT SYSTEM

The ERA health, safety and environment management system aligns with the Rio Tinto Management System Standard, and specifically addresses each of the 17 elements shown in **Figure 1**. This system has evolved through 30 years of changing environmental management practices, technology and experience as expected through continual improvement practices. ERA's environmental management system was certified against ISO 14001 in December 2003 and has maintained accreditation since. ERA achieved certification against the Australian Safety Standard AS 4801 in September 2005 and has maintained accreditation since. These standards provide for consistent performance which is verified routinely by external auditors so that landowners, stakeholders and the general public can be confident in the protection of ERA's workers and the surrounding community's health and safety along with the broader environment in which Ranger mine resides.

Existing Ranger mine EMPs have been developed based on statutory requirements, corporate requirements and the evaluation of potential environmental risks and impacts. The plans outline the potential environmental hazards and impacts, and mitigation strategies necessary to manage and minimise the risks.

Health and safety management is based on a number of health and safety performance standards. Rather than having individual management plans each performance standard has a number of documents including procedures and work instructions that ensure hazards and risks to workers are effectively managed.

The current operational management structure at Ranger mine is shown in **Chapter 15, Figure 15-2**. This structure places the responsibility for overseeing health, safety environment and water into a single position reporting to the General Manager of Operations. As the proposed new treatments will be incorporated into the existing occupational health and safety management system and the environmental management system this structure will remain the same with the implementation of the Project commitments fitting into this existing structure.

ERA regularly monitors surface and groundwater, radiation, dust and the ambient atmosphere, as well as managing wet season water flows and dry season burning to ensure that the areas surrounding the operational site remain protected. The requirements of the environmental management and monitoring regime are summarised in the Ranger Authorisation. Results of these monitoring programs are evaluated and reported frequently to the regulators through ERA's statutory reporting processes.



Figure 1: ERA Health Safety Environment Management System

### 3.2.1 Air Quality Management Plan

The *ERA Air Quality Management Plan* details the existing controls implemented to minimise the potential impacts to nearby receptors from air emissions sources at Ranger mine. The plan also discusses how Ranger mine will achieve compliance with relevant legislative requirements and company-wide performance standards pertinent to ambient air quality. The legislation and statutory instruments relevant to this Plan include:

- *Atomic Energy Act (Commonwealth)*.
- *Waste Management and Pollution Control Act (NT)*.
- *Mining Management Act (NT)*.
- Section 41 Authority.
- Ranger Authorisation '0108'.

Studies reported in this EMP discuss regional ambient air quality including the influence of wet and dry season variation in ambient air quality resulting from meteorological characteristics and how this can impact the observed regional air quality.

ERA has identified the surrounding receptors for potential ambient air quality impacts being the township of Jabiru, Ranger mine village - ERA contractor camp, Mount Brockman, Jabiru airport, transient Aboriginal camp known as Camp 009 and Mudginberri Aboriginal community. These receptors have the potential to be impacted by air quality emissions including fugitive emissions from Ranger mines roadways, stockpiles, and point source emissions. One of the biggest contributions to air quality in the region is landscape fires, which occur naturally and as part of the management practices of Kakadu National Park and Ranger mine.

A range of controls are implemented at Ranger mine to minimise ERAs contributions to the regional air quality and to comply with regulatory requirements. Some of these controls include dust extraction equipment, interlocks in the processing plant, regular maintenance and testing of equipment and low sulfur diesel used in the power station.

The EMP outlines the standard methods employed to undertake air sampling, including frequency and sampling locations. The EMP also discusses, for example, the specific responsibilities of employees of ERA in relation to the management of air quality controls; data and records manage; review and audit protocols; incident reporting; and the effect use of change management standard operating procedures necessary to ensure the ongoing effectiveness of the EMP and the activities described within. The results of stationary source emission monitoring are reported quarterly and annually in accordance with the Ranger Authorisation<sup>4</sup> and the National Pollutant Inventory<sup>5</sup>.

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4 Reporting of stack emission sampling is prepared on a quarterly basis in the Radiation Data Report. An annual summary of provided in the Radiation Protection and Atmospheric Monitoring Program Report.

5 Emissions to air are reported via the National Pollutant Inventory on an annual basis. The emission estimates are made publicly available via the NPI website as managed by the Department of the Environment. Emissions data can be sourced from the NPI website located at <http://www.npi.gov.au/>.

### 3.2.2 Noise and Vibration Management Plan

The *ERA Noise and Vibration Management Plan* details the existing controls implemented to minimise the potential impacts to nearby receptors from noise and vibration sources at Ranger mine. The plan also discusses how Ranger mine will achieve compliance with relevant legislative requirements and company-wide performance standards pertinent to noise and vibration risk management. ERA has adopted noise criteria based on the NSW Industrial Noise Policy for intrusive and amenity noise impacts (*New South Wales Industrial Noise Policy Method of Determining Background Noise* (NSW INP)). The legislation and statutory instruments relevant to this Plan include:

- *Mining Management Act (NT)*.
- Ranger Authorisation '0108'.

Acoustically significant noise sources include operation of mobile equipment, crushing and grinding, fixed equipment, surface exploration drilling activities, powerhouse operation and flights to and from the Jabiru airport.

The Ranger mine is located within the Ranger project area which is surrounded by Kakadu National Park. The proximity of the mine to potential sensitive receptors indicates that noise levels, from the mine's operations are not considered a significant risk to the receiving environment. Notwithstanding, noise controls are implemented at the Ranger mine to minimise noise at the source and to comply with legal and other requirements as outlined in the EMP. ERA has identified the surrounding receptors for potential noise and vibration impacts being the Ranger mine village - ERA contractor camp, Jabiru airport, transient Aboriginal camp known as Camp 009 and Mudginberri Aboriginal community. Noise impacts to communities are generally considered a nuisance; nevertheless within a community there is a large range of human reaction to noise.

The EMP also outlines a) the specific responsibilities of employees in relation to the implementation of the plan; b) review and audit protocols; c) incident reporting; and d) the effective use of change management standard operating procedures.

### 3.2.3 Occupational Health and Safety Management System

ERA's Occupational Health and Safety management System is embedded within the overall ERA Health Safety and Environment Management System and is certified to AS 4801 2001 Occupational health and safety management systems. It also complies with the Northern Territory (NT) applicable occupational health and safety legal requirements:

- *Work Health and Safety (National Uniform Legislation) Act 2011*.
- *Work Health and Safety (National Uniform Legislation) Implementation Act 2011*.
- *Work Health and Safety (National Uniform Legislation) Regulations 2011*.

The legal requirements adopt the Safe Work Australia model and include a series of approved codes of practice. ERA does, and will continue to, comply with the codes of practices (and other requirements), as a minimum, for all work activities.

Beneath this broader management system there are also a number of health and safety performance standards. A list of the relevant standards has been provided in **Table 1**.

The management system and performance standards are consistent with the health and safety management systems and standards of our major shareholder Rio Tinto.

Table 1: Health and Safety Performance Standards

Health	Safety
Particulate and gas/vapour exposures	Isolation
Hearing conservation	Electrical safety
Manual handling and vibration	Vehicles and driving
Hazardous substances	Working at heights
Radiation	Confined spaces
Thermal stress	Cranes and lifting equipment
Fitness for work	Aviation safety
Legionnaire's disease	Underground safety
Travel and remote site health	Management of pit slopes, stockpiles, spoil and waste dumps
Occupational exposure limits	

ERA will management health and safety under the extensive documents within Element 10 shown in **Figure 1**.

In order to effectively manage the additional health and safety risk presented by underground mining ERA will develop and implement an underground performance standard. This includes: ground control, hoisting and shaft sinking, in-rush of solids, inflow or inundation of liquids, explosive agents, explosive and hazardous atmospheres, fire precautions, emergency response plan, air blasts and regular review of activities against this standard. This standard will be based on the equivalent Rio Tinto performance standard that has the benefit of their extensive experience in designing, constructing and operating underground mines worldwide, refer **Chapter 7**.

**3.2.4 Ranger 3 Deeps Radiation Management Plan**

The *ERA Ranger 3 Deeps Radiation Management Plan* details the existing controls implemented to minimise the potential health impacts to employees and members of the public from radiation exposure associated with exploration decline. The plan also discusses how the exploration decline will achieve compliance with relevant legislative requirements and company-wide performance standards pertinent to radiation protection. The plan is part of ERA's overall Radiation Protection Program that is implemented under ERA's Radiation Protection Policy and includes other radiation management standards, plans and

procedures. The legislation and predominate statutory instruments relevant to the radiation protection program include:

- Ranger Authorisation '0108'.
- *Radiation Protection Act* (NT) and associated regulations.
- *Radioactive Ores and Concentrates (Packaging and Transport) Act* (NT) and associated regulations.
- Code of Practice for radiation protection and radioactive waste management in mining and mineral processing.
- Recommendations for Limiting Exposure to Ionizing Radiation (1995) and the National Standard for Limiting Occupational Exposure to Ionizing Radiation.
- Code of Practice on the Transport of Radioactive Material

The radiation management plan details ERA's commitment to comply with the Principle of Optimisation of Protection as stated by the International Commission on Radiological Protection. The process of optimisation of radiation protection involves achieving the best level of protection under the prevailing circumstances. Dose constraints are used in conjunction with the optimisation of protection to assist in keeping doses As Low As Reasonably Achievable<sup>6</sup> (ALARA). The application of this process at the exploration decline is described further in the radiation management plan.

Development of the radiation management plan is based on the outcomes of a radiation risk assessment, conducted to identify all the sources of radiation and pathways for exposure, and to evaluate the characteristics of the workplace environment and potential for radiological exposure. A range of controls are identified for the exploration decline including design and administrative controls and trigger action response levels.

The risk based radiation monitoring program described in the radiation management plan is developed to demonstrate compliance with regulatory limits, supply data for dose assessments of works and to confirm the effectiveness of engineering and procedural control measures to keep radiations doses to workers ALARA.

A program of inspections, audits and review is conducted to ensure that the radiation management system is continuously improving and is detailed in the EMP. Inspections will often be incorporated with area monitoring programs for gamma dose rate and surface contamination. The objective of inspections is the early identification and any potential issues with the radiation protection program and the radiation controls.

Management and control of all radiation related records and documents are undertaken in accordance with ERA's internal document control procedures. All radiation monitoring results and dose assessment records are summarised quarterly and reported to stakeholders and the Australian National Radiation Dose Register.

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<sup>6</sup> Economic and societal factors being taken into account.

### 3.2.5 Ranger 3 Deeps Exploration Decline Water Management Plan

The *ERA Ranger 3 Deeps Water Management Plan* details the existing controls implemented to minimise the potential impacts to onsite and offsite water management associated with Ranger 3 Deeps exploration decline. The EMP also discusses how the exploration decline activities will achieve compliance with legislative requirements and company-wide performance standards pertinent to surface and groundwater quality. The legislation and statutory instruments relevant to this EMP include:

- *Atomic Energy Act (Commonwealth).*
- *Mining Management Act (NT).*
- *Waste Management and Pollution Control Act (NT).*
- *Water Act (NT).*
- Ranger Authorisation '0108'.
- Section 41 Authority.

The EMP outlines the existing Ranger surface water catchments and the change that the exploration decline makes to catchment management. A range of water management infrastructure is in place and operating at Ranger mine.

Existing water treatment facilities, frequency of surface and groundwater monitoring, analytical parameters and monitoring locations are also detailed in the EMP. Sources and volume of water required for use underground, including groundwater resources available are also described. Monitoring results are reported quarterly and annually in accordance with the EMP.

### 3.2.6 Land Use Stewardship Summary

The *ERA Land Use Stewardship Summary* (the Summary) collates detailed information on how the potential impacts to surrounding land are minimised. The plan also discusses the implementation of long term legislative requirements and company-wide performance standards. The legislation and statutory instruments relevant to this Plan include:

- *EPBC Act (Commonwealth).*
- *Atomic Energy Act (Commonwealth).*
- *Mining Management Act (NT).*
- *Jabiru Town Development Act (NT).*
- *Soil Conservation and Land Utilisation Act (NT).*
- *Territory Parks and Wildlife Conservation Act (NT).*
- *The Planning Act (NT).*
- *Waste Management and Pollution Control Act (NT)* and supporting Regulations.

- *Weeds Management Act (NT)* and supporting regulations.
- *Environmental Assessment Act (NT)*; and supporting environmental assessment regulations.
- Ranger Authorisation '0108'.
- Section 41 Authority.

The Summary discusses the categories applied to land surrounding the Ranger project area and how the management strategies differ (e.g. Kakadu National Park is used for conservation, tourism and research whereas Jabiru township is mostly residential and recreation). The regional characteristics of the surrounding environment along with the historic and current land stewardship practices are further discussed in the Summary.

In addition to legislative land use classifications, ERA also employs an internal land use classification system. Management actions applied to each internal land use category will form the basis for the appropriate resources and strategies to be applied. ERA employs a permitting system for land disturbance on the Ranger project area, which requires the assessment and approval by relevant ERA departments. As a minimum, review of each permit application is required by the environment and cultural heritage departments. This system is designed to control disturbance activities at ERA and ensure appropriate actions can be identified to appropriately protect land values.

Rio Tinto routinely undertakes internal audits at ERA to ensure the business implements a health safety and environmental management system which achieves compliance with local regulatory requirements and company performance standards. ERA is audited by an external service provider to maintain ISO 14001 certification of its environmental management system.

### **3.2.7 Cultural Heritage Management System**

ERA has a mature cultural heritage management system (the System). Through the Project risk assessment process, a commitment has been made to formalise ERAs existing system into a cultural heritage management plan. The Plan will encompass existing controls identified in the System in addition to the new treatments identified in **Action Plan 6**.

The ERA cultural heritage management system is informed by the requirements of the ERA Gundjeihmi Aboriginal Corporation (GAC) Interim cultural heritage protocol (agreed with Traditional Owners of the RPA in 2006), NT and Commonwealth heritage legislation and Rio Tinto cultural heritage management standards. The System comprises a variety of tools including surveys, approvals, signage and marking, procedures, work instructions, mapping and excavation and disturbance permitting requirements. A key element of the existing system is for cultural heritage surveys to be undertaken prior to the disturbance of land on the RPA as part of a disturbance permitting system. This permitting system enables the stringent control of disturbance to lands preventing damage to any cultural heritage sites located on the RPA.

Further information regarding the management of cultural heritage for the existing Ranger mine is detailed in **Chapter 10**.

The Plan will identify the applicable legislative requirements and company-wide performance standards. The legislation and statutory instruments relevant to this EMP include:

- *EPBC Act (Commonwealth)*;
- *Heritage Act (NT)*;
- *Aboriginal Land Rights Act (NT)*;
- *Sacred Sites Act (NT)* and Aboriginal Areas Protection Authority

### 3.2.8 Rehabilitation and Closure

ERA has developed an "integrated tailings water and closure strategy" to ensure decommissioning and eventual closure of the Ranger Project Area is achieved with due consideration of Traditional Owner, stakeholder and community expectations. This strategy has been developed through the application of best practicable technology within a risk based framework and is the foundation for closure design and planning at Ranger mine. The statutory instruments relevant to this strategy include:

- Ranger Authorisation '0108'; and
- Section 41 Authority.

Further information regarding the management of rehabilitation and closure activities for the existing Ranger mine is detailed in **Chapter 13**. The Chapter discusses that progressive rehabilitation has been ongoing for a number of years including revegetation of unused areas and backfilling of the Pit 1 tailings management facilities. The Chapter identifies that engineering and construction will continue to progress according to the closure schedule in time for the commencement of formal decommissioning in January 2021 and to ensure that all decommission works are completed by January 2026.

Prior to the commencement of each of these closure activities, approval will be obtained from the regulatory authorities through the Ranger Mine Site Technical Committee (MTC).<sup>7</sup> Applications for these approvals are supported by environmental studies to demonstrate that the engineering is to the required standard of environmental protection.

The final closure criteria for the Ranger mine are currently being prepared by the closure criteria working group of the MTC, comprising representatives from Gundjeihmi Aboriginal Corporation, Department of Mines and Energy, Supervising Scientist Division, Department of Industry, the Northern Land Council and Parks Australia. The Alligator Rivers Region Technical Committee is also being consulted as part of the development of these criteria (refer **Chapter 13**).

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<sup>7</sup> The Ranger Minesite Technical Committee (MTC) is the body set up to provide advice on the regulation of Ranger mine to the NT Minister for Mines and Energy. This committee comprises representatives of the Northern Territory Department of Mines and Energy (Chair), Supervising Scientist Division (SSD), ERA, Gundjeihmi Aboriginal Corporation (GAC) and the Northern Land Council (NLC).

## 4 PROJECT INTEGRATION

The intention of this EMP is to outline how the risks and potential impacts specific to the Project will be managed. Should the Project be approved and progressed, the new treatments identified in this document will be managed in accordance with ERA's existing health safety and environment management system (**Figure 2**) and integrated into the existing EMPs. As previously outlined commitments arising from the social and economic impact assessment are discussed in the Social Impact Management Plan (refer **Appendix 15**).

As discussed in **Chapter 15, Figure 15-2** the ERA management structure pertaining to the implementation of occupational health and safety and environmental management systems at Ranger mine is to remain the same post approval with the new treatments being drawn from the Action Plans and integrated into the site Occupational Health and Safety Management System and Environmental Management System.

An operational readiness team will be established to facilitate the integration of the Project into the existing operation. This will establish operational plans, integrate processes and systems including those associated with managing health, safety and environmental practices. The operational readiness process will provide a robust pathway and provide confidence in change management, including the incorporation of new mitigations and controls into the existing EMPs.

It is anticipated that the existing systems and processes will have adequate scope to incorporate and manage the incremental changes associated with the proposed new mining method.

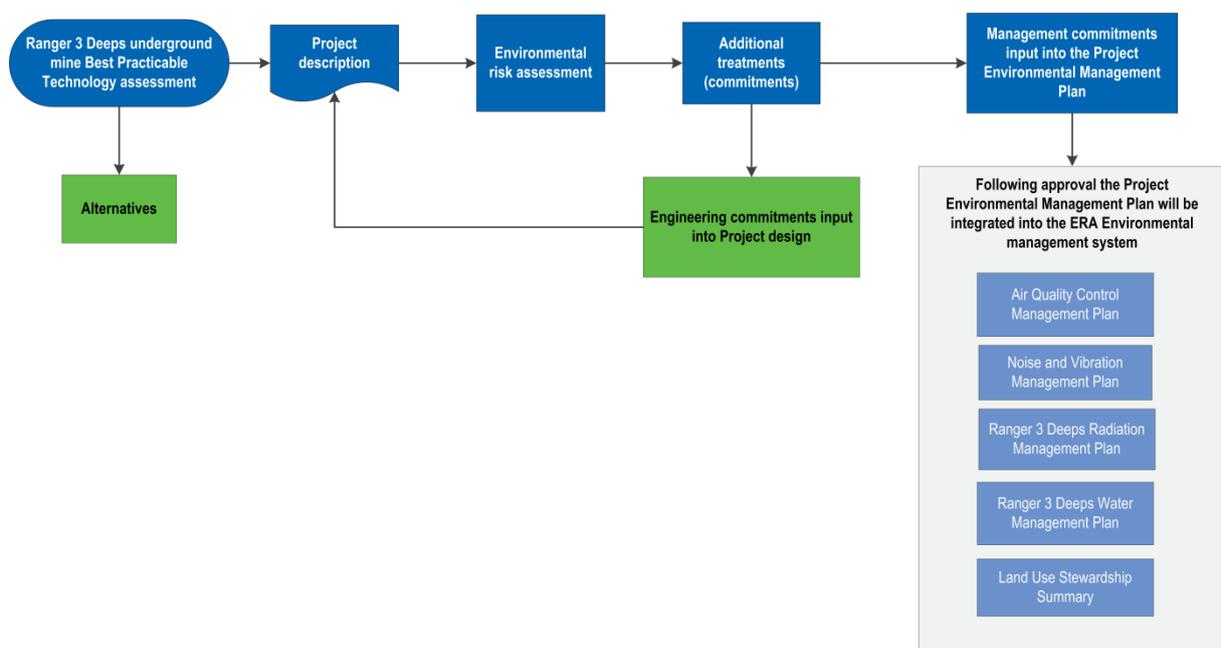


Figure 2: Integration of Project commitments into the ERA environmental management system

#### 4.1.1 Implementation Timelines and Agency Responsibilities

The new treatments (commitments) identified during the Project environmental risk assessment are divided into two categories; those that are inherent in the project design and as such will be implemented in the design and commissioning of equipment. The remaining new treatments required during the operational and decommissioning phases of the Project will be included in various site operational procedures and plans prior to commencing the particular phase.

Each EMP that requires revision has been presented in **Table 2** and includes the Project phases where implementation of these treatments will be most applicable.

Monitoring programs will be developed and implemented at commencement of the Project.

EMPs that require current statutory approval (e.g. water and radiation management plans) will be submitted to the MTC for endorsement prior to implementation. These statutory EMPs would then be included in the Mining Management Plan submitted to the Department of Mines and Energy as required.

Table 2: Summary of Action Plans for implementation during the different Project phases

EMP	Construction	Operation	Decommissioning	New Project monitoring requirements
Air Quality Control Management Plan	✓	✓		✓
Noise and Vibration Management Plan	✓			✓
Ranger 3 Deeps Radiation Management Plan	✓	✓		✓
Ranger 3 Deeps Water Management Plan	✓	✓	✓	
Land Use Stewardship Summary	✓	✓	✓	
Cultural Heritage Management Plan (to be developed)	✓	✓	✓	✓
Closure plans progressively developed and issued to the MTC	✓	✓	✓	

## 4.2 HAZARD IDENTIFICATION

Potential environmental risks and impacts for the Project were formally identified and evaluated through a comprehensive environmental risk assessment process (refer **Chapter 5** and **Appendix 5**). Should the project be approved and progress these risks would be incorporated into the existing Ranger mine risk register, which is reviewed and updated annually to ensure any new risks are captured and controlled. Many of the activities proposed for the Project rely on existing controls identified in several key ERA EMPs, which were discussed previously and are available on the ERA website<sup>8</sup> (<http://www.energyres.com.au>):

The evaluation of risks during the risk assessment produced a number of new treatments required to adequately minimise the potential impacts. These new treatments are commitments ERA intends to implement should the project be approved and progressed. The commitments that relate to the construction, operation and decommissioning phases of the Project or monitoring programs, will be implemented through ERA's existing EMPs respectively and are therefore presented in the Action Plans provided in **Section 6.1**. Where the commitments require implementation through the design phase, these are presented in the Commitments table see **Appendix 18**.

### 4.2.1 Emissions

The Project risk assessment combined greenhouse gas, air, noise and vibration emission risks into a singular risk category (emissions). The Project risk assessment brought forward a total of 8 emission risks. Of these, no inherent Class III (high) or Class IV (critical) greenhouse gas emission risks were identified. One inherent and residual Class III (high) air quality risk was identified and no inherent Class IV (critical) noise or vibration risks were carried forward. There were two risks; one inherent noise and one inherent vibration Class III (high) risks carried forward. These were both reduced to Class II (moderate) residual risks through the inclusion of additional design commitments.

Ten new treatments have been identified and require implementation through the health safety and environment management system; these are presented in *Action Plan 1: Air, noise and vibration emissions*.

### 4.2.2 Human Health Safety and Radiation

The Project risk assessment brought forward a total of 46 health, safety and radiation risks of which 18 Class III (high) and 1 Class IV (critical) inherent risks were identified. This critical risk was subject to a Bow Tie analysis. All remaining risks had either an inherent or residual Class I (low) or Class II (moderate) risk rating. Twenty four new treatments relating to occupational health and safety have been identified and require implementation through the health, safety and environment management system; these are presented in *Action Plan 2: Human health and safety*. Thirteen new treatments were identified for radiation protection and require implementation through the health, safety and environment management system these are presented in *Action Plan 3: Radiation protection*.

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<sup>8</sup> Commercial in confidence material or other details contained in these management plans not directly relevant to the Project, has been protected (e.g. detailed process flow sheets).

### **4.2.3 Water Management**

The Project risk assessment identified 24 surface water and or groundwater risks, of which 5 are inherent Class III (high) risks and 1 is an inherent Class IV (critical) risk. Through the evaluation process a number of design treatments were identified, after these were included in the risk ranking process these risks were reduced to 3 Class I (low) and 3 Class II (moderate) risks. A total of 6 new treatments were identified and require implementation through the environmental management system, these are presented in *Action Plan 4: Water management*.

### **4.2.4 Flora, Fauna and Land Use Stewardship**

The Project risk assessment brought forward 18 flora and fauna risks, of which there were no inherent or residual Class III (high) or Class IV (critical) flora and fauna risks identified. Seven new treatments have been identified and require implementation through the environmental management system; these are presented in *Action Plan 5: Flora, Fauna and Land Use Stewardship*.

### **4.2.5 Cultural Heritage**

The Project risk assessment brought forward 7 Aboriginal or cultural heritage risks, of which 6 were inherent Class III (high) risks. Following evaluation of these risks some design commitments were included in the Project design reducing this number to 3 residual high risks. Seven new treatments have been identified and require implementation through the proposed cultural heritage management plan; these are presented in *Action Plan 6: Cultural heritage*.

### **4.2.6 Rehabilitation and Closure**

The Project risk assessment brought forward 15 rehabilitation and closure risks, of which 3 were inherent Class III (high), and 1 was inherent Class IV (critical). A comparison of the current and residual risk profile shows that these risks have been reduced to 1 Class II (moderate) risk and 3 Class I (low) risks. Four new treatments have been identified and require implementation through the environmental management system; these are presented in *Action Plan 7: Rehabilitation and closure*.

## 5 RISK MANAGEMENT

As previously outlined, ERA has an accredited health safety and environment management system in which many of the risks associated with the Project will be minimised or eliminated due to the established environmental management procedures and physical controls already in place at Ranger mine.

A complete list of Project treatments is provided in the commitments table (**Appendix 18**). New treatments associated with construction, operation and decommissioning phases of the Project are described in the following Action Plans (**Section 5.1**), which also incorporate objectives, monitoring and performance indicators for each treatment.

### 5.1 ACTION PLANS

Existing Ranger mine environmental management targets and objectives are reviewed internally on an annual basis as part of the annual business planning process. Targets and objectives are defined by identification of significant risks/impacts, legal obligations, past incidents and trending information.

In accordance with the EIS guidelines, new targets and objectives have been established based on the outcomes of the environmental Project risk assessment. These targets and objectives are specific to the new treatments identified during the Project environmental risk assessment. These will be incorporated into the existing ERA Mine Management Plan, which is subject to ongoing assessment by the responsible Agency.

The following Action Plans present the commitments, new objectives and targets, additional monitoring programs for the Project and performance indicators suitable for ongoing assessment of performance arising from the Project risk assessment (**Appendix 6**).

### 5.1.1 Action Plan 1: Air, noise and vibration emissions

<p><b>Target/Objective:</b></p> <ul style="list-style-type: none"> <li>To protect the health of workers and community.</li> <li>To comply with all relevant statutory requirements.</li> <li>To protect the environment and nearby sites of cultural heritage from air quality impacts associated with ERA Ranger mine activities</li> </ul>	<p><b>Draft EIS cross reference</b></p>
<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>The final design and construction of the ventilation system will be based on the maximum full mining fleet at maximum production and informed by heat modelling and radon decay product modelling.</li> <li>Continuous ventilation monitoring stations will be installed in underground work areas to confirm that air flow and quality is acceptable.</li> <li>A buffer, consistent with geotechnical and hydrogeological assessments, will be retained between stope development for the Project and Pit 3.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Throughout all project phases, dust suppression techniques will be applied including regular watering of roads and watering of broken rock piles to keep dust concentrations as low as practicable.</li> <li>Underground heaving mining trucks will be equipped with emission control technology.</li> <li>A preventative maintenance program will be established for diesel particulate control systems on vehicles.</li> <li>Refrigerated air will be added to the intake side of the primary ventilation system when required to maintain safe working air temperatures throughout the year.</li> </ul> <p><b>Decommissioning</b></p> <ul style="list-style-type: none"> <li>Existing strategies and controls identified for decommissioning phase of the Project are considered sufficient to ensure impact to air quality is minimised.</li> </ul>	<p>Chapter 7, section 7.3.1</p> <p>Chapter 7, section 7.3.1</p> <p>Chapter 10, section 10.4.2.3</p> <p>Chapter 6, section 6.4.6</p> <p>Chapter 7, section 7.3.3.10</p> <p>Chapter 7, section 7.3.3.10</p> <p>Chapter 7, section 7.3.3.11</p>
<p><b>Measuring and monitoring</b></p> <ul style="list-style-type: none"> <li>Dust deposition monitoring will occur at the R34 cultural heritage site to validate the predictions of air quality modelling which indicate very low levels of incremental impact. Dust suppression will be undertaken on all earthen areas.</li> <li>Nitrogen dioxide monitoring will be undertaken at nearest residential receptor (Ranger mine village contractor camp) until such times as the air modelling outcomes are validated.</li> <li>Surface vibration monitoring will be undertaken at culturally significant locations in the first 12 months of mine development to validate predicted vibration identified in the vibration impact assessment.</li> </ul>	<p>Chapter 10, section 10.4.2.2</p> <p>Chapter 6, section 6.4.6</p> <p>Chapter 10, section 10.4.2.3</p>
<p><b>Performance Indicators</b></p> <ul style="list-style-type: none"> <li>Compliance with all relevant air, noise and vibration statutory requirements.</li> <li>Integration of Project commitments into EMP including any relevant background information drawn from the modelling report.</li> <li>Implementation of Project commitments.</li> </ul>	

## 5.1.2 Action Plan 2: Occupational health and safety

<p><b>Target/Objective:</b></p> <ul style="list-style-type: none"> <li>To eliminate where possible and mitigate/minimise hazards in the workplace</li> <li>To eliminate where possible and minimise any hazards created by ERA operations to members of the public</li> <li>To comply with all relevant Northern Territory and Commonwealth Acts, Regulations and Codes of Practice pertaining to occupational health and safety</li> </ul>	<p><b>Draft EIS cross reference</b></p>
<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>During the construction of ventilation raises, an exclusion zone defined by a physical barrier will be established at the surface and underground to prevent unauthorised entry by people or fauna.</li> <li>The outcome of geotechnical studies undertaken will be incorporated into the design and construction of underground workings (e.g. stope dimensions and access drive locations).</li> <li>Underground emergency infrastructure will comprise a means of secondary egress, to the surface, refuge chambers and a communication system.</li> <li>The final design and construction of ventilation system will be based on the maximum full mining fleet at maximum production, and informed by heat modelling and radon decay product modelling</li> <li>A buffer consistent with geotechnical and hydrogeological assessments, will be retained between stope development for the Project and Pit 3.</li> <li>Vent raises and associated infrastructure will have flood mitigation installed that is appropriate for the level of flood risk.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>The Project will conduct operations in accordance with existing ERA and Rio Tinto policies and standards for environment, safety and radiation protection. The objectives of these policies and standards are to minimise environmental harm, not compromise future land use, not harm anyone while working for ERA and minimising radiation doses with "As low as reasonably achievable".</li> <li>ERA will comply with all necessary legal obligations and internal health, safety, environment and community standards applicable to managing the potential impacts of the Project.</li> <li>To mitigate risks associated with worker safety underground, the Project will comply with and incorporate the Rio Tinto Underground Safety Standard into relevant management plans</li> <li>Throughout all project phases, dust suppression techniques will be applied as required including regular watering of roads and watering of broken rock piles to keep dust concentrations as low as practicable.</li> <li>The trigger action response plan will be established for underground contaminants such as nitrogen dioxide.</li> <li>Refrigerated air will be added to the intake side of the primary ventilation system when required to maintain safe working air temperatures throughout the year.</li> <li>Access by the public to any construction and operational areas will be restricted; however, arrangements and procedures will be established to enable access for Traditional Owners.</li> <li>The current site traffic management plan for surface activities will be extended to include underground traffic coming to the surface.</li> <li>An underground traffic management plan will be developed. Elements will include: speed control, passing bays, driver training and pedestrian protocols.</li> <li>A preventative maintenance program will be established for diesel particulate control systems on vehicles.</li> <li>To minimise the potential for mud rush during stope backfilling, paste backfill procedures will include the partial filling of the stope with paste and allowing material to initially set to create a stable barrier (or plug) at the base of the stope. Once this has occurred, the rest of the stope is filled.</li> <li>Underground heavy mining trucks will be equipped with emission control technology.</li> <li>A trigger action response plan will be established for the management of</li> </ul>	<p>Chapter 7, section 7.3.3.1</p> <p>Chapter 7, section 7.3.1</p> <p>Chapter 7, section 7.4.1.2</p> <p>Chapter 7, section 7.3.3.1</p> <p>Chapter 10, section 10.4.2.3 Chapter 7, section 7.3.3.7</p> <p>Chapter 7, section 7.4.2</p> <p>Chapter 7, section 7.2.3</p> <p>Chapter 7, 7, section 7.4.1</p> <p>Chapter 7, section 7.4.3</p> <p>Chapter 7, section 7.3.1</p> <p>Chapter 7, section 7.3.3.11 Chapter 7, section 7.3.3.1</p> <p>Chapter 7.3.3.5</p> <p>Chapter 7, section 7.3.3.5</p> <p>Chapter 7, section 7.3.3.10 Chapter 7, section 7.3.3.2</p> <p>Chapter 6, section 6.4.6</p> <p>Chapter 7, section 7.3.3.9</p>

<p>underground noise levels</p> <ul style="list-style-type: none"> <li>• To reduce the risk of legionella, all water for underground services will be treated.</li> <li>• Mine rescue personnel will undergo specialist training in underground vehicle fires.</li> <li>• Remote mining equipment used underground will comply with AS/NZS 4240.2.2009 <i>Remote controls for mining equipment – Operation and maintenance for underground metalliferous mining</i>.</li> </ul> <p><b>Decommissioning</b></p> <ul style="list-style-type: none"> <li>• Specific controls to minimise worker health and safety risks for the decommissioning phase of the Project will be assessed and included in Ranger mine closure planning.</li> </ul>	<p>Chapter 3, section 3.7.2.2 Chapter 7, section 7.3.3.6</p> <p>Chapter 7, section 7.3.3.12</p>
<p><b>Monitoring</b></p> <ul style="list-style-type: none"> <li>• Brines from Pit 3 may interact with backfilled stopes and degrade structural integrity. When mining is occurring adjacent to paste fill, it will be inspected for structural integrity.</li> <li>• Continuous ventilation monitoring stations will be installed in underground work areas to confirm that air quality is acceptable.</li> </ul>	<p>Chapter 7, section 7.3.1</p> <p>Chapter 7, section 7.3.1</p>
<p><b>Performance Indicators</b></p> <ul style="list-style-type: none"> <li>• Implementation of Project new treatments.</li> <li>• Compliance with all relevant Northern Territory and Commonwealth Acts, Regulations and Codes of Practice pertaining to occupational health and safety.</li> </ul>	

### 5.1.3 Action Plan 3: Radiation protection

<b>Target/Objective:</b> <ul style="list-style-type: none"> <li>• To comply with all relevant Northern Territory and Commonwealth Acts, Regulations and Codes of Practice pertaining to radiation exposure from uranium mining and processing including all aspects of radiation protection principles.</li> <li>• To integrate the radiation management for the Ranger 3 Deeps underground mine project and associated infrastructure is into the current Ranger operation radiation management system.</li> </ul>	<b>Draft EIS cross reference</b>
<b>Construction and Operation</b> <ul style="list-style-type: none"> <li>• The Project will conduct operations in accordance with the current ERA policies and standards for environment, safety and radiation protection. These commit to minimising environmental harm, not compromising future land use, not harming anyone while working for ERA and minimising radiation doses to ALARA.</li> <li>• A Ventilation Management Plan will be developed and implemented</li> <li>• A sufficient number of suitable qualified ventilation and radiation staff will be employed to manage and monitor the ventilation system and radiation protection program.</li> <li>• Heavy mining equipment will be fitted with air conditioned cabins with filters to reduce the concentration of contaminants in the operators immediate air supply.</li> <li>• A "stope ventilation plan" will be developed and implemented, covering the entire life of the stope (development, operation, closure and filling) and will include: ducting requirements, barricades, area and time restrictions, consideration of adjacent stope impacts, stope specific risk assessment and contingencies.</li> <li>• A trigger action response plan will be established for radon decay products and radioactive dust.</li> <li>• Access to the areas of the underground mine with radon decay product concentrations above the trigger action response plan upper level will be prohibited without the use of a radiation work permit.</li> <li>• Sufficient shotcrete will be applied to underground development areas and clean fill or steel plates placed on the floor in order to reduce the gamma dose rate below 10 µSv per hour in the centre of the drive. Where this is not possible, additional radiation protection measures will be implemented to keep exposures consistent with the ALARA principle.</li> <li>• Stockpiling of ore underground will be minimised to reduce radiation doses.</li> <li>• A trigger action response plan will be established for gamma exposures which will include dose constraints for each shift, month, quarter and annual periods.</li> <li>• Controlled areas, provision of clean/dirty change room and the adoption of hygiene rules will be implemented to minimise the risk of ingesting radioactive materials.</li> </ul> <b>Decommissioning</b> <ul style="list-style-type: none"> <li>• Existing controls undertaken at ERA Ranger mine considered sufficient to ensure flora and fauna and habitats are minimised.</li> </ul>	<p>Chapter 7, section 7.4.2</p> <p>Chapter 7, section 7.4.2 Chapter 7, section 7.4.2</p> <p>Chapter 7, section 7.4.3</p> <p>Chapter 7, section 7.4.3</p> <p>Chapter 7, section 7.3.1</p> <p>Chapter 7, section 7.4.2</p> <p>Chapter 7, section 7.4.2</p> <p>Chapter 7, section 7.4.2 Chapter 7, section 7.4.2</p> <p>Chapter 7, section 7.4.2</p>
<b>Measuring and Monitoring</b> <ul style="list-style-type: none"> <li>• Personal and area monitoring programs will be implemented for radon decay products, gamma radiation and radioactive materials in dust.</li> <li>• Underground workers occupying high gamma exposure areas will be monitored using an electronic personal monitor</li> </ul>	<p>Chapter 7, section 7.4.3</p> <p>Chapter 7, section 7.4.2</p>
<b>Performance Indicators</b> <ul style="list-style-type: none"> <li>• Compliance with all relevant Northern Territory and Commonwealth Acts, Regulations and Codes of Practice pertaining to radiation exposure from uranium mining and processing including all aspects of radiation protection principles.</li> <li>• Implementation of Project new treatments.</li> </ul>	

### 5.1.4 Action Plan 4: Water management

<p><b>Target/Objectives:</b></p> <ul style="list-style-type: none"> <li>To protect the environmental values of aquatic ecosystems downstream of the project.</li> <li>To maintain a reliable supply of process, pond and potable water to the operations.</li> <li>To comply with all relevant statutory requirements.</li> </ul>	<p><b>Draft EIS cross reference</b></p>
<p><b>Construction and Operation</b></p> <ul style="list-style-type: none"> <li>To reduce the risk of Legionella, all water for underground services will be treated.</li> <li>Equipment containing hydrocarbons will be designed and maintained to minimise the likelihood of a hydrocarbon spill.</li> <li>Consistent with existing practice, new water management ponds servicing underground facilities will be acid dosed to maintain pH levels where required.</li> <li>Underground water will be managed in accordance with the existing water management system, including designation and treatment of various water classes dependent on quality.</li> <li>Underground material will be classified in two stages via: (1) grade control as part of the mine design and (2) a surface discriminator that measures gamma emissions, avoiding mis-alignment of ore as waste.</li> </ul> <p><b>Decommissioning</b></p> <ul style="list-style-type: none"> <li>At completion of operations the ventilation shafts and decline will be backfilled with appropriately engineered materials.</li> </ul>	<p>Chapter 3, section 3.7.2.2 Chapter 8, section 8.5.2.5</p> <p>Chapter 8, section 8.5.2.5</p> <p>Chapter 3, section 3.7</p> <p>Chapter 8, section 8.5.2.5</p> <p>Chapter 8, section 8.5.5</p>
<p><b>Measuring and Monitoring</b></p> <ul style="list-style-type: none"> <li>Existing surface and ground water monitoring programs undertaken at Ranger mine are considered sufficient to ensure protection of downstream ecosystems.</li> </ul>	
<p><b>Performance Indicators</b></p> <ul style="list-style-type: none"> <li>Implementation of Project new treatments.</li> <li>Process, pond and potable water quality is maintained in accordance with approved plans.</li> <li>Compliance with all relevant statutory requirements.</li> </ul>	

### 5.1.5 Action Plan 5: Flora, fauna and land use stewardship

<p><b>Target/Objective:</b></p> <ul style="list-style-type: none"> <li>To minimise disturbance to flora and fauna and their habitats during construction and subsequent operations.</li> <li>To minimise impact to remediation schedule during decommissioning phase.</li> </ul>	<p><b>Draft EIS cross reference</b></p>
<p><b>Construction</b></p> <ul style="list-style-type: none"> <li>To limit the need for vegetation clearance and the potential for weeds, where practicable, Project infrastructure will be sited on the existing operational mine footprint and otherwise in an already disturbed area.</li> <li>Bulk air coolers (installed on ventilation intakes) will incorporate engineering controls such as screens and low air velocities to protect inadvertent entry by fauna.</li> <li>Open holes that occur during the construction of ventilation raises, will be physically cordoned off and temporarily capped to prevent fauna access/injury.</li> <li>Directional lighting will be installed, where required, to minimise impacts to fauna.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>The Project will conduct operations in accordance with existing ERA and Rio Tinto policies and standards for environment, safety and radiation protection. The objectives of these policies are to minimise environmental harm, not compromising future land use, not harm anyone while working for ERA and minimising radiation doses to "As low as reasonable achievable" (ALARA).</li> </ul> <p><b>Decommissioning</b></p> <ul style="list-style-type: none"> <li>During rehabilitation and closure, all open surface holes will be made safe to people and wildlife through grouting and capping.</li> <li>Progressive rehabilitation will be prioritised to those areas in the immediate vicinity of new infrastructure to mitigate dust and weeds.</li> </ul>	<p>Chapter 9, section 9.5.1</p> <p>Chapter 9, section 9.5.2</p> <p>Chapter 9, section 9.5.2</p> <p>Chapter 9, section 9.5.1</p> <p>Chapter 3, section 3.5.2.2</p> <p>Chapter 13, section 13.3.5</p> <p>Chapter 9, section 9.5.1</p>
<p><b>Measuring and Monitoring</b></p> <ul style="list-style-type: none"> <li>Existing strategies and controls identified for monitoring for the Project are considered sufficient to ensure impact on flora, fauna and appropriate land use stewardship is minimised.</li> </ul>	
<p><b>Performance Indicators</b></p> <ul style="list-style-type: none"> <li>Implementation of Project new treatments.</li> <li>Long term remediation schedule is maintained.</li> </ul>	

### 5.1.6 Action Plan 6: Cultural heritage

<p><b>Target/Objective:</b></p> <ul style="list-style-type: none"> <li>To ensure the proposed Ranger 3 Deeps underground mine and associated infrastructure has minimal impact on cultural heritage values and landscape within the project area</li> </ul>	<p><b>Draft EIS cross reference</b></p>
<p><b>Construction and Operation</b></p> <ul style="list-style-type: none"> <li>A buffer, consistent with geotechnical and hydrogeological assessments, will be retained between stope development for the Project and Pit 3.</li> <li>Implementation of joint cultural heritage projects on the RPA in collaboration with the Gundjeihmi Aboriginal Corporation and the Northern Land Council. Revise ERA's local communication strategy to promoted improved understanding regarding environmental performance.</li> <li>Where a sensitive anthropological site is encountered, during the mining process, ERA will discuss and negotiate appropriate action with the Traditional Owners and relevant agencies.</li> <li>ERA has an extensive cultural heritage management system. In parallel with and incorporating the Project, this system will be formalised into a cultural heritage management plan for the RPA.</li> </ul> <p><b>Decommissioning</b></p> <ul style="list-style-type: none"> <li>Inclusive of the Project, ERA will continue to incorporate local and traditional indigenous knowledge into the closure planning process</li> </ul>	<p>Chapter 10, 10.4.2.3</p> <p>Chapter 10, section 10.4.5</p> <p>Chapter 10, section 10.4</p> <p>Chapter 10, section 10.5</p> <p>Chapter 10, section 10.4.5</p>
<p><b>Measuring and Monitoring</b></p> <ul style="list-style-type: none"> <li>Dust deposition monitoring will be undertaken at the R-34 cultural heritage site to validate the predictions of air quality modelling which indicate very low levels of incremental impact. Dust suppression will be undertaken on all earthen areas.</li> <li>Surface vibration monitoring will be undertaken at culturally significant locations in the first 12 months of mine development to validate predicted vibration identified in the vibration impact assessment.</li> </ul>	<p>Chapter 10, section 10.4.2.2</p> <p>Chapter 10, section 10.4.2.3</p>
<p><b>Performance Indicators</b></p> <ul style="list-style-type: none"> <li>Implementation of Project new treatments.</li> <li>No long term impact on cultural heritage values and landscape occurs as a result of the Project and associated infrastructure.</li> </ul>	

### 5.1.7 Action Plan 7: Rehabilitation and closure

<p><b>Target/Objective:</b></p> <ul style="list-style-type: none"> <li>To minimise disturbance of existing natural vegetation.</li> <li>To minimise erosion caused by construction and operation activities.</li> <li>To minimise impact to long term rehabilitation strategies</li> </ul>	<p><b>Draft EIS cross reference</b></p>
<p><b>Construction and Operation</b></p> <ul style="list-style-type: none"> <li>Progressive rehabilitation will be prioritised to those areas in the immediate vicinity of new infrastructure to minimise dust and weeds.</li> </ul> <p><b>Decommissioning</b></p> <ul style="list-style-type: none"> <li>During rehabilitation and closure, all open surface holes will be made safe to people and wildlife through grouting or capping.</li> <li>At completion of operations the ventilation shafts and decline will be backfilled with appropriately engineered materials.</li> <li>The Ranger 3 Deeps closure strategy will be integrated into the overall Ranger closure plan.</li> </ul>	<p>Chapter 9, section 9.5.1</p> <p>Chapter13, section 13.3.5</p> <p>Chapter 13, section 13.3.2</p> <p>Chapter 13, section 13.3</p>
<p><b>Measuring and Monitoring</b></p> <ul style="list-style-type: none"> <li>The rehabilitation monitoring program for the existing Ranger mine, including closure criteria is being developed in consultation with stakeholders. The closure criteria and the associated monitoring program currently under development will also apply to the Project.</li> </ul>	
<p><b>Performance Indicators</b></p> <ul style="list-style-type: none"> <li>Implementation of Project new treatments.</li> <li>Minimal impact on long term rehabilitation strategies for the Project.</li> </ul>	

## 5.2 CONTINGENCIES AND MITIGATION MEASURES

As part of the existing health safety and environment system, should an environmental incident occur, the person who discovers the incident is responsible for taking immediate action as required to contain, clean up and report the event. Where there is a threat to the environment, people or property, the person who discovers the incident is responsible for notifying the Emergency Services Officer at the gatehouse. The Manager - Health, Safety and Environment will be contacted in the event of an environmental emergency, and attend if required. All environmental incidents will be reported (refer **Section 7**).

ERA's business resilience system has been developed in accordance with the ERA health, safety environment management system – Element 12 Business Resilience and Recovery, and outlines the following requirements associated with emergency preparedness and response (including environmental emergencies).

- Roles and responsibilities before, during and after an emergency, including responsibilities associated with internal and external communications;
- Training and awareness requirements for personnel involved in emergency response;
- Exercises that are to be conducted in preparation for an emergency; and
- The level of response required for each potential environmental emergency including a checklist for response to each potential emergency identified.

ERA's business resilience system outlines the potential environmental emergencies based on an assessment of risk. Should the Project be approved and progressed the business resiliency and recovery system will be amended to include additional Project specific risks.

## 5.3 MEASURING AND MONITORING

Measuring and monitoring programs have been developed and implemented at ERA in accordance with the ERA health, safety environment management system – Element 13 Measuring and Monitoring Standard and relevant Australian and International Standards. The ERA standard has been developed in accordance with the global Rio Tinto health, safety and environment performance standards. There is an array of environmental monitoring conducted at Ranger mine as part of the existing environmental management of the site. These monitoring activities and other existing controls are discussed in further detail in the existing ERA EMPs available on the ERA website: [www.energyres.com.au/](http://www.energyres.com.au/)

To ensure that monitoring programs reflect ERA's current risk profile and legal requirements and are aligned with significant health, safety, and environment aspects/impacts (hazard/risks), ERA will consult and utilise the ERA risk register, risk assessments and compliance registers in the process of identifying the particular features, parameters or attributes of work activities or processes that require monitoring.

Where relevant, appropriate or required, the monitoring programs include the following elements:

- establishment of appropriate performance indicators and criteria;

- measurement of performance against internal objectives and targets;
- measurement of performance against regulatory requirements;
- measurement against international, national and/or corporate standards;
- a description of how monitoring results will be recorded;
- a description of methods related to data and laboratory analysis;
- a list of equipment and instruments used and their calibration requirements and schedules; and
- a description of any sample preservation techniques used.

All statutory monitoring will be carried out in accordance with relevant Australian or International Standards except where varied by regulatory approval.

Monitoring and measurement programs will use standardised or validated and tested models, and be designed to incorporate routine, non-routine and intermittent events or exposures to enable assessment of the adequacy of implemented controls. Different forms of measurements will be considered in design of monitoring programs, including preliminary, detailed or follow up surveys to match the purpose of the particular program.

Monitoring data will be stored and managed in an appropriate database as is currently established and used by ERA for existing monitoring data storage, review and reporting.

Any additional operational environmental monitoring to be undertaken for risks specific to this Project have been summarised in the Action Plans in **Section 5.1**.

## 6 REPORTING PROTOCOLS

### 6.1 EXTERNAL

**National Pollutant Inventory** – The National Pollution Inventory National Environment Protection Measure provides the framework for the development and establishment of the National Pollution Inventory, which is an internet database designed to provide publicly available information on the types, and amounts of certain substances, being emitted to the air, land, and water.

ERA must estimate and report emissions annually. The National Pollution Inventory program is implemented in the Northern Territory through an Environmental Protection Order established under the Waste Management and Pollution Control Act 2003.

**National Greenhouse Environment Reporting** – Under the *Australian Greenhouse and Energy Reporting Act 2007*, ERA must estimate and report greenhouse gas emissions, energy consumption and production as required to the Australian Government. ERA undertakes greenhouse gas and energy efficiency programs to identify and evaluate threats and the best energy saving opportunity projects implemented across Ranger mine.

**Mine Management Plan Reporting** – ERA must report on specific environmental aspects (as per the Mine Management Plan Guidelines for Mining Operations) directly to the Northern Territory Department of Mines and Energy.

**Ranger Wet Season Report** – This report presents water quality data and a discussion of water-related issues for statutory surface water and groundwater monitoring sites over a reporting year. This report is submitted to the (NT) Minesite Technical Committee for review.

**Annual Environment Report** – This report presents ERA's performance in environmental management for an annual reporting period. The report provides details on various aspects including water management, land application and tailings management. This report is submitted to the (NT) Minesite Technical Committee for review.

**Water Quality Data submission** – This report is provided on a quarterly basis for selected statutory and operational sites with additional sites submitted on an annual basis. This report is submitted to the (NT) Department of Mines and Energy for review.

**Water Quality Reporting** – A water quality database of statutory water quality monitoring data is maintained and is accessible to stakeholders via the internet. Weekly updated data and graphs for key water quality variables are provided to stakeholders to a number of monitoring sites.

**Annual Tailings Dam Inspection Report** – An annual report on the integrity and stability of the tailings dam embankments, written in accordance with the regulator specifications and as amended with the approval of the Director of Mines, is submitted annually to the (NT) Minesite Technical Committee and (NT) Department of Mines and Energy.

## 6.2 INTERNAL/EXTERNAL

**Incidents** - Reporting and responding to environmental incidents will be in accordance with internal incident management standards and guidelines. These documents have been developed to comply with the NT Mining Management Act 2001, the Ranger Authorisation and the internal ERA health safety and environment management system - Element 14 Non Conformance, Incident and Action Management.

All environmental incidents that have an impact (for example spillage or leakage of material outside of a bund) are externally reported to stakeholders. Incidents that qualify as an 'environmental incident' or 'serious environmental incident' are reported in accordance with the NT Mining Management Act to the Chief Executive of the Department of Mines and Energy.

The significance of an environmental incident is determined using the internal Rio Tinto risk assessment matrix, which assesses both the actual consequence of the incident and the maximum reasonable outcome. Records of each incident including any outcomes of investigations are recorded in ERA's electronic system.

The NT Worksafe authority is notified as soon as practicable of any events that cause, or could cause, the death of a person, or certain work-related incidents as detailed in section 64 and 69 (e) of the NT Workplace Health and Safety Act.

**Social & Environment Reporting** - Rio Tinto collects social and environment data on an annual basis to support its internal and external reporting of performance and risks in the health, safety, environment, greenhouse, community and product stewardship areas. Much of the health, safety and environment data used for reporting are collected using the Rio Tinto Social and Environmental Assurance Reporting Tool, which is an internal web-based system. Data collected in the survey is reported internally and externally including:

- Rio Tinto annual report and sustainable development web pages;
- internal reports by inventory, primarily for Rio Tinto Health Safety Environment Community; and
- group Targets reports.

All Rio Tinto business units (including ERA) are required to report on aspects including:

- biodiversity;
- community;
- environment;
- greenhouse;
- health;
- health safety environment and community targets; and
- product stewardship.

### **6.3 DOCUMENT CONTROL AND RECORDS**

The purpose of ERA's document control system is to develop, implement and maintain a system of manuals, procedures and work instructions, and to develop and maintain procedures to control all documents and data relating to the implementation of the system. ERA has a health, safety and environment management system document control system, which tracks revisions to all internal registers, standards, procedures and work instructions.

Documents are stored and maintained through network drives for policies and procedures, current information and for superseded documentation by designated department document and system custodians.

### **6.4 AUDITING AND REVIEW**

The ERA health, safety and environment management system is maintained as a dynamic system, recognising and adapting to the changing health safety and environment risk profile at each stage of the project life cycle. Periodic reviews of the system are completed, to ensure they remain relevant to the operational activity and identified risks as part of the continual improvement process.

A number of internal and external audits, and reviews are completed at ERA. At an operational level, ERA proactively undertakes audits of components of ERA's health safety environment management system. These audits can occur at a range of levels and frequencies for instance; overarching systems, management plans, standard operating procedures, work instructions, equipment, work completion schedules through to one on one safety interactions. An annual review of ERA's health safety and environment risk register is also workshopped.

Rio Tinto performs an audit of ERA's system and operational compliance to the overarching Rio Tinto health safety environment and quality management system standard. A business conformance audit and a corporate health safety and environment review are undertaken.

The Office of the Supervising Scientist leads monthly inspections<sup>9</sup> and meetings at ERA to discuss incidents and issues and ensure actions are completed to rectify any problem identified. An annual stakeholder audit is lead by the office of the Supervising Scientist on selected management plans and other commitments.

An accredited external provider is engaged by ERA to conduct certification audits (certification renewal) and surveillance audits (mid-certification audits for continuous improvement).

Auditing is conducted where required in accordance with the internal ERA health, safety and environment management system – Element 16 Performance Assessment and Auditing, and ISO 14001 requirements. These audits are undertaken to assess and provide feedback to management the extent the environmental management system is implemented onsite. Where gaps are identified, actions are raised in the Rio Tinto Business Solution system and responsible persons tasked to oversee the completion.

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<sup>9</sup> The Minesite Technical Committee's monthly meetings and inspections are identified as "Routine periodic inspections"

The ISO 14001 (Environmental Management System) International Standard identifies a requirement for continual improvement. To achieve conformity with this requirement, ERA's management plans, this EMP and other procedures and plans referenced, are subject to regular review and amendment. Recommendations and relevant feedback from the EIS approval process will be incorporated into the final EIS and Project EMP. Commitments (new treatments) and relevant recommendations will then be incorporated into relevant existing EMPs. This integration will ensure these new treatments and recommendations will be captured within the existing auditing and continual improvement processes of the ERA environmental management system.