

ASSESSMENT REPORT 83

TELLUS HOLDINGS LTD CHANDLER FACILITY PROJECT

November 2017

Environmental impact assessment process timelines

Date	Progress stage
23/11/2012	Receipt of Notice of Intent
07/03/2013	NT EPA decision Environmental Impact Statement issued
21/06/2013	Draft Terms of Reference (ToR) released for public comment
19/07/2013	Final ToR issued to proponent
21/04/2016	Receipt of clause 14A notification
10/05/2016	Decision of clause 14A notification
21/09/2016	Updated ToR issued to proponent
18/02/2017	Draft EIS released for public comment
08/05/2017	NT EPA direction to prepare EIS Supplement issued
24/07/2017	EIS Supplement received
30/11/2017	Assessment Report issued



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Contents

Abbreviations and glossary	4
Summary and recommendations.....	7
1 Introduction and background	17
1.1 Purpose of this report.....	17
1.2 Scope of the assessment.....	17
1.3 Approval and regulatory framework	18
2 The project	19
2.1 Proponent	19
2.2 Project description	19
2.3 Chandler project area	21
2.4 Apirnta Facility	23
3 Key environmental factors	28
4 Environmental impact assessment	29
4.1 Terrestrial environmental quality	30
4.2 Inland water environmental quality	37
4.3 Hydrological processes	46
4.4 Terrestrial flora and fauna	52
4.5 Social, economic and cultural surroundings	59
4.6 Air quality	63
5 Whole-of-project considerations	66
5.1 Australia's first deep geological repository	66
5.2 Regulation of the Project.....	67
6 Conclusion	74
7 References	76
Appendix 1	78

Abbreviations and glossary

Advisory bodies	Agencies having administrative responsibilities in respect of the proposed action
bgl	below ground level
draft EIS	draft Environmental Impact Statement
Deep geological repository	a facility constructed deep underground in a salt bed, used to permanently isolate waste. It relies on both natural geological barrier (salt) and man-made engineered barriers to form a multi-barrier system that is internationally recognised for its permanent isolation capabilities
DENR	Department of Environment and Natural Resources
DoEE	Department of Environment and Energy
DPIR	Department of Primary Industry and Resources
EA Act	<i>Environmental Assessment Act</i>
EAAP	Environmental Assessment Administrative Procedures
EC Decision 2003/33/EC	European Council Decision 2003/33/EC
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
Environment	All aspects of the surroundings of man including the physical, biological, economic, cultural and social aspects (Section 3 of the <i>Environmental Assessment Act</i>)
ESCP	Erosion and Sediment Control Plan
EPA	Environment Protection Approval under the <i>Waste Management and Pollution Control Act</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environment Protection Licence under the <i>Waste Management and Pollution Control Act</i>
FIFO	Fly-in fly-out
Hazardous waste	Hazardous Waste is waste that poses substantial or potential threats to public health or the environment. It generally relates to materials that are known or tested to exhibit one or more of the following four hazardous traits: (i) ignitability, (ii) reactivity, (iii) corrosivity, and (iv) toxicity. All listed wastes as defined under NT regulation would be considered hazardous wastes
Listed waste	The wastes specified in Schedule 2 of the Waste Management and Pollution Control (Administration) Regulations are prescribed wastes for the purposes of the

	definition of listed waste. These wastes would also be considered hazardous wastes
MM Act	<i>Mining Management Act</i>
NEPM	National Environment Protection Measure
NPI	National Pollutant Inventory
NT EPA	Northern Territory Environment Protection Authority
NTG	Northern Territory Government
Operator	the operator for a mining site referred to in section 9(1) of the <i>Mining Management Act</i> and/or the operator of a facility which has an approval and/or a licence under Part 5 of the <i>Waste Management and Pollution Control Act</i>
Permanent isolation facility	a facility in which waste can be permanently isolated from the biosphere without the need for any ongoing management
Process safety	a blend of engineering and management skills (exceeding workplace safety skills) focused on preventing catastrophic incidents and near misses, particularly where there is a loss of control of material with potential for high consequences (explosions, spills of hazardous waste, hydrocarbons and fire)
Responsible Minister	Northern Territory Minister for Primary Industry and Resources
The Minister	Northern Territory Minister for Environment and Natural Resources
The Project	Chandler Facility Project; this includes the Chandler Facility, The Apirnta Facility, Chandler Haul Road and Henbury Access Road
The Proponent	Tellus Holdings Ltd
The Supplement	The Supplement to the draft EIS
the/this Report	This Assessment Report 83, for the Chandler Facility Project
ToR	Terms of Reference
TPWC Act	<i>Territory Parks and Wildlife Conservation Act</i>
WAC	Waste Acceptance Criteria
WAP	Waste Acceptance Procedure
WZG	Waste Zoning Guide

WHS Act	<i>Work Health and Safety (National Uniform Legislation) Act</i>
WMPC Act	<i>Waste Management and Pollution Control Act</i>

Summary and recommendations

Environmental Impact assessment (EIA) is a process for identifying the potential environmental impacts and risks of a proposed action, evaluating the significance of those impacts and risks and determining appropriate avoidance, minimisation/mitigation measures to reduce those potential impacts and risks to acceptable levels. This Assessment Report (the Report) examines the EIA of the Chandler Facility Project proposed by Tellus Holdings Ltd (the Proponent). This report marks the end of the assessment process by the Northern Territory Environment Protection Authority (NT EPA).

This Report is provided to the Northern Territory Minister for Environment and Natural Resources (the Minister) who must take the Report into account in decisions under environmental legislation, and also provide the report to the Minister for Primary Industry and Resources (the responsible Minister) to be taken into account in all other decisions made by the Northern Territory Government. This Report is not intended to provide an environmental approval although it will guide the decision for a mining authorisation (by the responsible Minister), the NT EPA's approval and licensing decisions under the *Waste Management and Pollution Control Act* (WMPC Act) and the decision for an approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act* (EPBC Act).

The Proponent is proposing to develop the Chandler Facility Project (the Project). The Project is located approximately 120 km south of Alice Springs and includes hazardous waste storage facilities (surface and deep geological repository), an underground salt mine and associated infrastructure (access/haul roads, salt stockpiles). The concept for a deep geological repository relies on both a natural geological barrier (salt) and man-made engineered barriers that together form components of a multi-barrier system with the objective of permanent isolation of the enclosed hazardous waste from the biosphere.

The NT EPA initially identified that potential environmental impacts and risks to the environment were: potential contamination of terrestrial environment quality from loss of containment during transport or storage; potential impacts to groundwater and surface water quality including through saline runoff; potential impacts to groundwater through abstraction; potential impacts to terrestrial flora and fauna; and potential impacts to historic and culturally significant sites and socio-economic environment. These potential impacts and risks contributed to the decision to assess the Project at the level of an EIS.

The Project was determined to be a controlled action under the EPBC Act for likely significant impacts on listed threatened species and communities. The NT EPA has assessed the Project on behalf of the Australian Government in accordance with the bilateral agreement.

In making this Report, the NT EPA had regard to the information provided by the Proponent, submissions on the draft EIS and Supplement, advice from specialists from the NT Government and independent experts as well as relevant guidelines and standards. The NT EPA has assessed the Project against the NT EPA's objectives for the key environmental factors of: Terrestrial environmental quality; Inland water environmental quality; Hydrological processes; Terrestrial flora and fauna; Air quality and Social, economic and cultural surroundings.

The Project would comprise of the largest hazardous waste surface storage facility and the first deep hazardous waste geological repository in Australia. While the Proponent presents the Project as a partial solution for managing Australia's hazardous waste, the NT EPA remains concerned with the risks and potential impacts associated with storing large volumes of hazardous waste at surface, particularly before the deep geological

repository has been proven or constructed. To address these risks, the NT EPA recommends that conditions of approval and licences issued under the WMPC Act specify risk-based limits on the type and quantity of waste, and ensure that these align with construction milestones.

While deep geological repositories may provide best practice infrastructure to safely dispose of hazardous waste, this Project comes with environmental and financial risks to government and the community. To address these risks the NT EPA makes recommendations consistent with the Proponent's commitment to ensure appropriate **financial assurance** provisions are provided upfront to the NTG over the life of the project. A **whole-of-project financial assurance** would ensure that unacceptable environmental impacts and risks are acknowledged, and financial risk to NTG is avoided, covering all financial obligations under the appropriate regulatory regime.

The NT EPA supports the concept of a deep geological repository that, with appropriate site selection, design, construction and operation, can safely capture and isolate existing and future hazardous waste. There is however a considerable amount of site-specific information (including baseline data) to be provided by the Proponent and review by regulatory authorities before approvals can be issued for the Project. The NT EPA has made recommendations in this report for future work to provide greater certainty that the long-term safety assessment of this Project is achievable and is the best option for disposing of Australia's hazardous waste, without unacceptable environmental impacts now and for future generations.

In assessing this Project, the NT EPA has considered the design, operation, regulation and learnings of other deep geological waste repositories internationally. The NT EPA has made recommendations in this Report with the objective of achieving the best practicable environmental outcome and in consideration of the current regulatory capacity and technical expertise available in the NT. This includes recommendations for transparent and rigorous regulatory decision making and separating responsibilities of regulatory oversight and independent scientific review of supporting documentation as key recommended approval conditions. The NT EPA supports the 'user pays' principle in requiring the Proponent or Operator to fund an **independent auditor**, an **expert advisory group** and independent **process safety** expertise to ensure that approval and licensing decisions are transparent, robust and based on the best available scientific and technical advice, and are independent of influence of the Proponent/operator.

The NT EPA is aware that there is likely to be considerable local and national interest in the Project. The Project's 'social licence to operate' and the regulator's 'social licence to regulate' will need to be developed through a high level of transparency about government decisions and approvals and by genuine on-going engagement by the Proponent with its stakeholders. To promote transparency, the NT EPA makes recommendations for public disclosure of the **independent auditor** and **process safety** oversight reports and **financial assurance** amounts.

The NT EPA considers the appropriate mechanism to address the uncertainties around the final emplacement of waste and ensuring permanent isolation from the biosphere (including groundwater) is for the Proponent to conduct a **safety assessment** for acceptance of waste in underground storage in accordance with Appendix A of the European Council Decision 2003/33/EC. The **safety assessment** requires a long-term assessment to ascertain that no pathways to the biosphere would be generated during the long-term post-operation of the deep geological repository. As part of this assessment, the man-made barriers of the geological repository, the performance of the host rock, surrounding strata and overburden, are to be quantitatively assessed over the long term and evaluated on the basis of site-specific data. The NT EPA considers this information is essential to demonstrate that the right site selection was made and that

the repository is isolated from the biosphere so that the residual impacts and risks of the Project are not a burden for future generations.

The NT EPA makes 19 recommendations as an outcome of this EIA. These recommendations are for the Proponent and decision-makers to consider in future approval processes and for the execution of the proposed action. The NT EPA emphasises that the environmental commitments, safeguards and recommendations outlined in the EIS, this Assessment Report and in the final management plans, must be implemented to deliver acceptable environmental outcomes.

The NT EPA considers that subject to the implementation of the recommendations, the Project can be managed in manner that is likely to meet the NT EPA's objectives and avoids significant or unacceptable environmental impacts.

List of recommendations

Recommendation 1

Approvals and decisions for the Project by the Northern Territory Government and the Northern Territory Environment Protection Authority shall ensure that binding legal obligations are imposed on the Proponent and Operator such that the Chandler Facility Project is implemented in accordance with all environmental commitments and safeguards and mitigation measures which are:

- identified in the Environmental Impact Statement for the Chandler Facility Project (draft Environmental Impact Statement and Supplement); and
- recommended in this Assessment Report 83.

To the extent that coordination is required in order to achieve this recommendation, the Northern Territory Government and the Northern Territory Environment Protection Authority must agree in writing as to the coordination arrangements among Northern Territory Government agencies and Northern Territory Environment Protection Authority.

Recommendation 2

The Proponent and Operator shall provide written notice to the Northern Territory Environment Protection Authority and the responsible Minister if it alters or proposes to alter the Project, environmental commitments, safeguards or mitigation measures in the EIS in such a manner that the environmental significance of the action may change, in accordance with clause 14A of the Environmental Assessment Administrative Procedures.

Recommendation 3

Approvals and decisions in relation to Apirnta will include conditions that:

- a) require an independent expert peer review of the proposed waste acceptance criteria
- b) stipulate all waste streams accepted to be stored at Apirnta meet the relevant waste acceptance criteria and are suitable and intended for permanent disposal in the deep geological repository and represents international best practice for final disposal of that waste stream
- c) require only wastes generated within the Northern Territory and other Australian States and Territories, and from Australia's Exclusive Economic Zone to be accepted at Apirnta unless otherwise approved by the NT EPA
- d) require an independent expert peer review of proposed storage parameters and handling requirements specific for each waste stream stored at Apirnta
- e) require an independent expert peer review that confirms the disposal of each waste stream represents international best practice and that there is no alternative best practice proven technology to treat the waste stream
- f) permit the volume of waste to be transported and stored during any licensing period to accord with construction milestones of the deep geological repository
- g) during construction, require the Proponent or Operator to provide an annual report to the responsible Minister and the Northern Territory

Environment Protection Authority on the progress of the construction of the deep geological repository, and after completion of the decline, demonstrate the anticipated capacity of the deep geological repository

- h) require the Proponent or Operator to notify the responsible Minister and the Northern Territory Environment Protection Authority within 30 days if progress on the construction of the deep geological repository is likely to result in the delay or inability to permanently store the accumulated waste at Apirnta**
- i) the maximum waste storage capacity at Apirnta at any point in time will not exceed 400 000 tonnes**

Permitted storage of waste (all waste streams combined) at Apirnta in any given approval period should not exceed the total anticipated storage capacity at the deep geological repository within the period.

Recommendation 4

The Proponent or Operator must provide, as part of its applications for relevant approvals and decisions, a financial assurance/security proposal which covers the Apirnta Facility and justification that includes:

- a) description of how the financial assessment was conducted and the specific calculations used**
- b) a third party independent peer review of the financial assessment by a qualified person approved by the Northern Territory Environment Protection Authority**
- c) details on how costings and principles are in accordance with best practice standards.**

Approvals and decisions for the Project by the Northern Territory Government and the Northern Territory Environment Protection Authority shall ensure financial assurance/security conditions are imposed which cover the Apirnta Facility. Such approvals and decisions shall require that before any approved activities may commence, the requisite financial assurance/security must be provided by the Proponent or Operator.

Recommendation 5

Approvals and decisions in relation to the Project will include conditions to:

- a) record and report the movement of listed waste within the Northern Territory and to and from Apirnta and Chandler facilities**
- b) record and report the movement of waste from the point of origin into the Northern Territory in an approved manner within timeframes prescribed by the Northern Territory Environment Protection Authority**
- c) require transport of waste into or within the Northern Territory by an Operator who is licensed or authorised to transport controlled waste.**

Recommendation 6

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide to the Northern Territory Environment Protection Authority and responsible Minister a site-specific risk assessment as part of the safety assessment for acceptance of waste at the deep geological repository. The safety assessment shall be in accordance the European Council Decision 2003/33/EC that includes the following provisions:

- a) waste only to be accepted if it is: compatible with a site-specific safety assessment as per section 1.2 of Appendix A of the EC Decision 2003/33/EC; and subject to the acceptance criteria in Section 2 of Appendix A and procedures listed in Section 1 of the EC Decision 2003/33/EC
- b) a long-term risk assessment that quantitatively assesses the barriers of the deep geological repository and performance of the host rock, surrounding strata and overburden and is evaluated on the basis of site specific data as per section 1.2.7 of the EC Decision 2003/33/EC.

The above safety assessment is to undergo a scientific review and endorsement by the independent expert advisory group outlined in Recommendation 7. The safety assessment is to be subject to endorsement by the NT EPA and made available to the public.

Recommendation 7

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall establish and provide funding to resource an independent expert advisory group to provide:

- a) objective and independent expert review to the Northern Territory Environment Protection Authority and responsible Minister on the site-specific risk assessment documentation required for the overall safety assessment (in accordance with Recommendation 6) for acceptance of waste in the deep geological repository
- b) objective and independent advice on the adequacy of the site-specific information and data presented by the Proponent or Operator and any recommendations relating to management and regulation of the deep geological repository that may be required as a result of that review.

The expert advisory group will be appointed by the Minister responsible for the WPMC Act and be made up of Northern Territory Government representatives and independent subject matter experts. As applicable, it will also include the Proponent and Operator's representatives.

Terms of Reference for the expert advisory group shall be developed to the satisfaction of the Northern Territory Environment Protection Authority.

Recommendation 8

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide an updated erosion and sediment control plan for the Project. The plan should outline all permanent and temporary erosion and sediment control measures proposed to be installed at the site. The updated plan should be prepared by a suitably qualified person and in accordance with the international standards for erosion and sediment control (as amended from time to time) or higher standard.

Recommendation 9

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide to the Northern Territory Environment Protection Authority and the responsible Minister an updated Water Management Plan for the Chandler Facility. The Water Management Plan must, at a minimum:

- a) provide details of additional groundwater monitoring programs to inform groundwater level trigger values that will be used to trigger management responses
- b) include a review of the proposed groundwater level triggers to ensure their appropriateness to inform management response
- c) provide details of the development of a class 1 groundwater numerical model consistent the Australian Groundwater Modelling Guidelines to estimate groundwater flow responses during construction, operations and post-closure scenarios
- d) include an independent peer review of the updated Water Management Plan by a suitably qualified independent professional.

Recommendation 10

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide the following to the Northern Territory Environment Protection Authority and the responsible Minister:

- a) an assessment of groundwater inflows and underground flooding risk from intercepted aquifers
- b) design of seals to ensure seal design is of a standard to minimise the ingress of water during the operational phase
- c) measures to manage groundwater inflow into the shafts, including the design, capture and management of this water
- d) details of management triggers and mitigation measures in the event of significant groundwater inflow into areas along the decline, shafts and production bores.

Recommendation 11

The Proponent or Operator must provide, as part of its applications for relevant approvals and decisions, a financial assurance/security proposal which covers the Chandler Facility and justification that includes:

- a) how the financial assessment was conducted including the specific calculations used to fund a permanent barrier to water and isolate waste from the biosphere
- b) details on the proposed future research program for design of seals for ultimate replacement to demonstrate how closure can be effected after the operational phase.
- c) a third party independent peer review of the proposed financial assessment and proposed permanent seal design by a qualified person approved by the Northern Territory Environment Protection Authority

- d) details on how the proposed permanent seal design and financial assurance costings and principles are in accordance with best practice standards.

Approvals and decisions for the Project by the Northern Territory Government and the Northern Territory Environment Protection Authority shall ensure financial assurance/security conditions are imposed which cover the Chandler Facility. Such approvals and decisions shall require that before any approved activities may commence, the requisite financial assurance/security must be provided by the Proponent or Operator.

Recommendation 12

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide to the Northern Territory Environment Protection Authority and the Responsible Minister a Biodiversity Management Plan for the Project. The Biodiversity Management Plan must, at a minimum contain:

an identification of project risks, mitigation measures and preventative actions for biodiversity values and habitat for threatened species

- a) a procedure for pre-clearance surveys for threatened species
- b) commitment(s) to prepare species specific management plans in the event that *Amytornis modestus indulkana* and/or *Liopholis slateri* are detected
- c) the scope, standards and timeframes for a flora and fauna monitoring program
- d) procedures for managing fire risk from the Project on habitat for threatened species
- e) *weed hygiene* and control procedures for avoiding the introduction and/or spread of weeds into habitat for threatened species
- f) procedures for avoiding and/or managing the risk of introduced fauna on threatened species
- g) measures and goals for the rehabilitation of habitat for threatened species following the closure and decommissioning of the Project.

Recommendation 13

The Proponent shall establish the Community Reference Group as a forum to engage with stakeholders on the broader environmental management of the Project's operations and the outcomes of the safety assessment prior to approval of the safety assessment by the relevant regulatory authority.

Recommendation 14

Prior to the commencement of any construction, the Proponent must establish, and thereafter maintain, a database that documents the pre-disturbance state and fate of Aboriginal artefacts within the Project area. The database should be submitted to the Minister responsible for administering the *Heritage Act* prior to commencing construction.

Recommendation 15

Prior to the commencement of any construction, the Proponent must obtain relevant authorities and consents to disturb any/all sites of historical and cultural significance that may be disturbed by the Project.

Recommendation 16

The Proponent or Operator shall commission an independent auditor to conduct an environmental audit of the waste-related operations of the Project. The audit must:

- a) be conducted on an annual basis commencing 12 months from the date construction starts**
- b) be led by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Northern Territory Environment Protection Authority**
- c) audit the Proponent or Operator's compliance with all approvals and licences for waste-related activities**
- d) recommend appropriate measures or actions to improve the environmental performance of the Project**
- e) provide an independent assessment of the Project's waste operations in an annual report to the Northern Territory Environment Protection Authority and responsible Minister and the Proponent or Operator**
- f) provide the annual report to the Northern Territory Environment Protection Authority and the responsible Minister and the Proponent or Operator within eight weeks of its completion**
- g) provide the annual report to the public with the stakeholders from the Community Reference Group, identified in Recommendation 13, briefed on the results of the report.**

Recommendation 17

Before approvals or decisions are given or made for the Project, the Proponent must provide a whole-of-project financial assurance/security proposal that describes:

- a) the amount of financial assurance/security for each component of the Project from time to time throughout the Project**
- b) how the financial assurance assessments were or would be conducted for any specific components of the Project (e.g. there may be different approaches in relation to different components of the Project) and the specific calculations and tools used**
- c) the regulatory agency the Proponent understands is accountable for holding any specific components of the financial assurance/security over time**
- d) an independent third-party assessment of the proposed financial assurance/security by a qualified person approved by the Northern Territory Environment Protection Authority and responsible Minister**

- e) details on how financial assurance/security costings and principles are in accordance with best practice standards
- f) suggested triggers and identified statutory mechanisms for varying the financial assurance/security for different project components as required over time.

Recommendation 18

Public disclosure of any financial assurance/security held in respect of the Project shall be provided on the websites of (as applicable), the Proponent, Operator and relevant regulatory authorities.

Recommendation 19

The Proponent shall engage an independent process safety expert, endorsed by the NT EPA and DPIR, to:

- a) develop a process safety plan that details how process safety systems would be implemented to prevent the occurrence of a major process safety incident
- b) provide oversight of the implementation of process safety via regular inspections
- c) provide reporting of process safety oversight to the regulatory agencies responsible for administering the WMPC Act and MM Act.

The process safety plan must:

- a) identify major process safety hazards at Apirnta and Chandler including the risks associated with transport, storage and disposal of wastes and underground mining
- b) document the risks and controls and identify critical controls
- c) provide bowtie diagrams to present risks and controls for the identified process safety hazards in a graphical form
- d) document the controls and associated accountabilities and active monitoring responsibilities
- e) monitor and report on the effectiveness of the controls, identifying areas for improvement and actioning
- f) document the independent process safety expert's oversight inspection schedule that would report on whether process safety systems are embedded into the culture of the organisation
- g) provide provisions for publicly reporting the independent process safety oversight reports.

1 Introduction and background

1.1 Purpose of this report

Tellus Holdings Ltd (the Proponent) is proposing to construct and operate an underground salt mine and a temporary hazardous waste storage and permanent waste isolation facility, approximately 120 km south of Alice Springs.

The Project has been assessed by the Northern Territory Environment Protection Authority (NT EPA) at the level of Environmental Impact Statement (EIS) under the *Environmental Assessment Act* (EA Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in accordance with the bilateral agreement between the Australian and Northern Territory governments.

The NT EPA has prepared this Assessment Report (this Report) in accordance with section 7(2)(g) of the EA Act and clause 14(3) of the Environmental Assessment Administrative Procedures (EAAP). The purpose of this Report is to ensure that matters affecting the environment to a significant extent are fully examined and reported. This Report is provided to the Northern Territory Minister for Environment and Natural Resources (the Minister) who must take the Report into account in decisions made under environmental legislation, and also provide the report to the Minister for Primary Industry and Resources (the responsible Minister) to be taken into account in all other decisions made by the Northern Territory Government (NTG). This Report is not intended to provide an environmental approval although it will guide the decision for a mining authorisation (by the responsible Minister), the NT EPA's approval and licensing decisions under the *Waste Management and Pollution Control Act* (WMPC Act) and the decision for an approval under the EPBC Act (by the relevant delegate).

1.2 Scope of the assessment

The NT EPA assessed the potential environmental impacts and risks associated with the Project in accordance with the requirements under the EA Act, the EPBC Act and the bilateral agreement.

The matters relating to the environment that the NT EPA considered necessary to be dealt with in the EIS for the Project were identified in the Terms of Reference (NT EPA, 2016; NT EPA, 2013) in accordance with clause 8(3) to (6) of the Environmental Assessment Administrative Procedures. As the Project was determined to be a controlled action under the EPBC Act, the potential impacts and risks to listed threatened species and communities (Sections 18 & 18A) have been included in the scope of this assessment.

The draft EIS for the Project underwent a six-week public exhibition period between 18 February 2017 and 31 March 2017. A total of 13 submissions were received from Government agencies, seven from members of the public, two from non-government organisations and one from the Central Land Council. Two of the submissions included petitions with a total of 88 signatures. All submissions were forwarded to the Proponent and were responded to individually in the Supplement to the draft EIS.

In preparing this Report, the NT EPA has considered each of the submissions where the comments related to the Project's potential environmental impacts and risks.

1.3 Approval and regulatory framework

The Project will require approval and regulation by the Northern Territory and Australian Governments. The framework for approval and regulation of the Project is provided in Volume 1, Chapter 4 of the draft EIS and is summarised below, with an emphasis on the obligations and requirements of the NTG.

Mining components of the Project, including below ground salt mine, surface infrastructure and accommodation village will be regulated under the *Mining Management Act* (MM Act), while aspects associated with the Proponent's waste business will be regulated under the WMPC Act. The key regulatory instruments for the Project are:

- an environment protection approval(s) (EPA) to construct facilities for the storage, treatment and disposal of listed wastes, and an environment protection licence(s) (EPL) for collecting, transporting, storing, recycling, treating or disposing of listed wastes under the WMPC Act. This activity is currently the responsibility of the NT EPA
- an authorisation under the MM Act. This authorisation is currently the responsibility of the Department of Primary Industry and Resources
- a licence and Safety Case to operate the Project as a Major Hazard Facility under the *Work Health and Safety (National Uniform Legislation) Act* (WHS Act). This activity is currently the responsibility of the Department of Attorney General and Justice
- an approval under the Australian Government EPBC Act.

The NT EPA provides this Report to the Minister. The Minister is required to provide a copy of the Report to the responsible Minister (the Minister for Primary Industry and Resources). The responsible Minister, taking into consideration this Report, will then make a decision as to whether or not the Project should be authorised under the MM Act and if so, the conditions that may be applied.

The NT EPA will provide this Report to the Australian Government Minister for the Environment and Energy to inform a decision as to whether or not the Project should be approved under the EPBC Act and for consideration in any approval conditions under the EPBC Act.

Section 8A(2) of the EA Act requires the responsible Minister to give the NT EPA notice of the decision as soon as practicable, but within seven days, after making the decision. Alternatively, if the decision by the responsible Minister is contrary to this Report, the responsible Minister must comply with reporting obligations to the NT EPA and the Legislative Assembly in accordance with Section 8A(3) of the EA Act.

The making of this Report and providing it to the Minister and the Australian Government Minister marks the completion of the examination of the EIS by the NT EPA. The EIS and supporting documents, can be viewed on the Project page on the NT EPA's website.

2 The project

2.1 Proponent

The Proponent is Tellus Holdings Ltd, (ABN:97 138 119 829). It is a private company that has been active in Australia since 2009 and is in the business of developing projects for the management and disposal of waste including hazardous waste.

The Proponent has proposed an underground salt mining and waste storage and isolation business, 120km south of Alice Springs. The Project would be the first facility developed by the Proponent. The Proponent is also seeking to develop the Sandy Ridge Project in Western Australia, a dual kaolin clay mine and waste storage facility.

The Proponent states that it has not been subject to any proceedings under Australian Government, State or Territory law with respect to the protection of the environment or the conservation and sustainable use of natural resources.

2.2 Project description

The Project is presented as a concept for the construction, operation and permanent closure of a deep geological repository for the disposal and permanent isolation of waste, including hazardous waste. The deep geological repository would be located in the voids resulting from an underground mining campaign targeting rock salt. The salt bed is deliberately targeted as the location for the deep geological repository due to its stability and isolating properties.

Prior to constructing the deep geological repository, the Proponent proposes to commence the temporary storage of hazardous waste at a surface storage facility (Apirnta). The Proponent has identified it would need to stockpile up to 400 000 tonnes of hazardous waste for a period of four years at Apirnta before the deep geological repository would be sufficiently constructed to commence receiving waste for permanent isolation.

The Project is located on NT Portion 810 (Maryvale Station) (Chandler Project Area) and NT Portion 657 (Henbury Station) (Apirnta). The Project is 120 km south of Alice Springs and 25km from the nearest community, Titjikala.

Project components are listed in Table 1 and shown in Figure 1. The boundary of the Project is delineated by the coordinates provided in Appendix 1 of this Report.

Table 1. Project components

	Component	Area/capacity	Authorisation
Chandler Project Area ML30612	Total surface area	219 ha	MM Act
	Underground rock salt mine Two vertical shafts (820 m and 860 m deep)	361 ha up to 750 000 tonnes per annum	MM Act
	Mine access decline (5-6 km)	Mining activities – to access and mine salt rooms Waste activities – main transport route for waste containers entering underground mine	MM Act WMPC Act - EPL
	Hydraulic backfill plant	Mixing waste for	WMPC Act –

		emplacement underground	EPA/EPL
	Deep geological repository	Up to 400 000 tonnes per annum 8.5 million tonnes over life of project	WMPC Act - EPL
	Salt stockpile	25 ha, 3.5 million cubic metres	MM Act
	Above ground mining infrastructure and overburden stockpiles	85.5 ha	MM Act
	Solar/diesel power plant	2 MW solar + 3 MW diesel	MM Act
	Accommodation village	16 ha	MM Act
	Groundwater abstraction	54 ML (construction) 113 ML (operation)	MM Act
Apirnta	Total surface area	170 ha	WMPC Act- EPA/EPL
	Temporary waste storage and transfer hardstand and warehouse	30 ha 400 000 tonnes	WMPC Act- EPA/EPL WHS Act
	Administration, laboratory, maintenance and other supporting infrastructure		WMPC Act- EPA/EPL
	Rail siding – waste in and salt out	~ 2 km length (9 ha)	MM Act WMPC Act
Chandler Haul Road	Private unsealed haul road linking the Chandler and Apirnta facilities	~31 km 310 ha total disturbance (93 ha permanent disturbance)	MM Act WMPC Act <i>Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act</i>
Henbury Access Road	Private unsealed access road linking Apirnta with the Stuart Highway	~60 km 600 ha total disturbance (180 ha permanent disturbance)	MM Act WMPC Act <i>Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act</i>
Titjikala Access Road	Private access road linking the Chandler Facility to Maryvale Road, via Chambers Pillar Road.	Existing	

2.3 Chandler project area

2.3.1 Underground rock salt mine and supporting infrastructure

The Project would target high-grade (80-95%) sodium chloride (salt) from the Chandler formation, to supply various industrial applications and human consumption. The Chandler formation lies approximately 800 m below ground level (bgl), and comprises a 200 to 300 m thick salt bed. The Proponent states its measured salt resource estimate is 309 million tonnes.

The underground mine would be supported by an accommodation village, internal roads, solar/diesel hybrid power plant, borefield, clean and raw water dams, water and sewage treatment facilities, a fuel storage facility and supporting administration and operational infrastructure (Figure 2).

An accommodation village for the Project's workforce (270 construction, 180 operation) would be constructed approximately two kilometres north-east of the Chandler Facility. The fly-in fly-out (FIFO) workforce is expected to fly-in to Alice Springs airport and be conveyed to the Project by weekly coaches.

Power for the proposed Chandler Facility would be generated at the hybrid solar/diesel power plant. The accommodation village and Apirnta would require standalone power supplies.

The Project's raw water demand would be sourced from a borefield to the north-east of the Chandler Facility and a series of production bores along the Chandler Haul Road. Potable water would be sourced from two production bores constructed near the proposed accommodation village and piped to a water treatment plant. It is proposed that grey water would be reticulated back through the water treatment plant to meet a 50% recycled water target.

2.3.1.1 Construction

All construction traffic would be conveyed to the Chandler Project Area via the Maryvale Road and Titjikala access road. Early works would involve the construction of the accommodation village, internal roads and services before commencing construction of the mine access decline (approximately 5.5 km in length). The decline would be constructed by drill and blast from a box cut at a rock outcrop at the Maryvale Hills. Two vertical shafts would be installed, terminating at the underground mine, to allow for personnel riding, downcast and upcast (exhaust) ventilation and salt hoisting. Construction of the decline and vertical shafts is scheduled to be completed at the end of construction stage 5 (48 months after the start of construction).

Material excavated during the construction of the decline would be segregated and stockpiled.

2.3.1.2 Operation

Mining of salt is scheduled to commence approximately four years after the start of construction. Following excavation, run of mine salt would be hoisted to the surface via the main vertical shaft at a rate of up to 750 000 tonnes per annum. Excavation of salt would result in 'room and pillar' voids or rooms, approximately 240 m long, 10-15 m wide and 6 m high, arranged on a single level. Completed rooms would be constructed at a rate of approximately 12 rooms per year. Once mining of a room has been completed, the entrance of the room would be barricaded, marking the end of mining activity at that room. Completed rooms would form the infrastructure for the deep geological repository.

Once at surface, run of mine salt product would be stockpiled on clay-lined pads until year six, when it would be optically sorted, transported by road to Apirnta, and transported by train to market.

2.3.1.3 Decommissioning and closure

Mining would cease when no more rooms were required for the deep geological repository (nominally in year 25 of operation). Once the rooms of the deep geological repository have been sealed for permanent isolation, permanent closure of the deep geological repository would occur using backfilling and sealing mining methods.

Closure activities would need to meet design requirements for the deep geological repository. In addition to leaving the underground workings in a safe and stable condition, the workings would be required to demonstrate isolation from the biosphere with appropriate engineered seals to prevent water ingress and ensure permanent encapsulation of the disposed hazardous waste. Closure activities would include backfilling of the remaining excavated rooms with waste material, finely crushed salt and engineered barriers followed by demobilisation of underground equipment to the surface. All components of the underground mine would then be backfilled, including the access decline and vertical shafts with bulk salt, rock and soil from overburden stockpiles. The Proponent states that mine closure decommissioning activities would be supported through a financial security established under the MM Act.

The Proponent proposes that decommissioning and rehabilitation of the surface would return the site to its original condition as far as practicably possible.

2.3.2 Deep geological repository

The Proponent presents its concept for a deep geological repository as a safe, stable and permanent (in a geological time perspective) solution to isolate hazardous waste from the biosphere.

The Proponent described the geology of the site as old and geologically stable, distant from areas of tectonic activity and with low potential for seismic events. The Chandler salt bed is described as a 500-million-year-old, substantial (200 to 300 m thick) salt deposit, lying approximately 800 m underground. The presence of the substantial salt bed indicates little potential for it to be connected to groundwater.

The deep geological repository would be constructed as a result of mining activity that would leave design specification 'rooms' in the voids left behind after salt has been mined out (described in 2.3.2.1).

2.3.2.1 Operation

Waste is proposed to be placed in the deep geological repository from year five. Waste would be delivered to the deep geological repository by truck down the decline (for dry packaged wastes), or by hydraulic backfill (as a slurry).

A hydraulic backfill plant located on the surface would supply and hydraulically deliver mixtures of liquid wastes and thickening agents to the engineered rooms, where they would solidify over several days. The mixtures would be described in 'recipes' developed through detailed laboratory work and in accordance with 'safety systems'. Gas emissions arising from chemical reactions would be monitored.

The Proponent proposes that the deep geological repository could operate as a temporary storage facility, where stored waste remains accessible during the operational life of the facility. Ultimately, to achieve the status of a permanent disposal facility it would need to be closed to the biosphere. Permanent isolation of waste would be achieved by filling any empty space in the room with fine salt, and constructing an

engineered barrier at the entrance of the room before fully backfilling and appropriately sealing the decline and shafts to surface.

2.3.2.2 Decommissioning and closure

Closure of the deep geological repository would need to ensure that waste was permanently isolated from the biosphere. While backfill and closure would be undertaken using mining methods (described above in section 2.3.1.3), the performance criteria would need to meet the outcomes specified for disposing of hazardous waste in permanent isolation.

The Proponent proposes that surface monuments would be installed over the rehabilitated Chandler Facility to identify the isolation/disposal area (discussed further in 4.2.2.3).

2.3.2.3 Post closure

Following closure, the Proponent proposes a program to monitor groundwater quality and performance of revegetation. After an agreed period of monitoring, the Proponent proposes to hand the site over to an appropriate authority for an Institutional Control Period.

2.4 Apirnta Facility

The Apirnta Facility (Apirnta) is proposed for the temporary storage of hazardous waste (Figure 3). Ultimately it will support the logistics of the deep geological repository as a reception and staging facility, though for the first four years it is proposed to store up to 400 000 tonnes of hazardous waste at the facility before the deep geological repository has been constructed.

2.4.1.1 Construction

Construction of Apirnta would occur over a six-month period, following three months of enabling works such as surveying, fencing and headworks. Testing and commissioning of Apirnta would occur over a period of three months, post construction. The completed Apirnta would comprise:

- engineered hardstand area of 198 000 square metres (m²), where dry/solid waste would be stored in ISO 20-foot shipping containers (up to 20 600) stacked four high
- warehouse of 6 600 m²
- liquid waste storage tank with 40 000 litre capacity
- laboratory, administration, maintenance and storage infrastructure
- stormwater drainage and bunding with oil/water separator(s)
- vehicle wash down facility and weighbridge
- rail siding and interchange
- road interchange and truck driver amenities.

2.4.1.2 Operation

The Proponent proposes to commence receiving waste for temporary storage at the completion of construction (start of year two). Initially, the Proponent proposes that the hazardous waste stockpile would accumulate at Apirnta while the underground mine is being constructed and mining has created voids that can be used as the deep geological repository (year five). Once the deep geological repository is constructed, the volume of waste received at Apirnta would roughly equate to the volume being received at the deep geological repository.

Operation of Apirnta would be underpinned by Waste Acceptance Criteria (WAC), specifying those wastes that could be received at the facility.

Waste materials would be transported to Apirnta predominantly by rail (about 90%) but in some instances by road companies licensed to transport dangerous goods (Figure 5-12, Supplement). Waste transported to the site would predominantly originate from New South Wales, Queensland and Victoria (Figure 5-11, Supplement). The Proponent has stated the method of transporting waste to Apirnta would be at the discretion of the waste producer who must meet Tellus' WAC.

Reception of waste at Apirnta would be tracked and logged through the Proponent's traceability process. The key components of this process are:

- customer enters into a Waste Supply Agreement with the Apirnta operator
- dispatch notice is issued by the customer to the Apirnta operator before the delivery leaves its place of origin. The customer will secure all required approvals for transportation, arrange packaging and provide accredited transporters
- dispatch confirmation is issued by the Apirnta operator to the customer, confirming the dispatch may proceed
- arrival notice is issued by the Apirnta operator to the customer
- received waste is verified by weighing, visual inspection and sampling at the on-site laboratory. Waste is either accepted (waste acceptance certificate) and stored in appropriate waste zones, or rejected (rejection notice) and returned to the customer at the customer's expense.

2.4.1.3 Decommissioning and closure

Closure of Apirnta is not described specifically in the EIS but would be similar to the Chandler Facility and include demolition of surface infrastructure and buildings, removal of utilities, remediation of any identified contaminated areas where leaks or spills may have occurred and general site clean-up. Following decommissioning of Apirnta, the site would be rehabilitated to achieve the same or similar land use capabilities as existed prior to the disturbance, unless other beneficial land uses are agreed. The closure objectives also include creating a stable, self-sustaining landform and maintenance of pre-existing surface and groundwater quality. Financial security for decommissioning has not been specified.

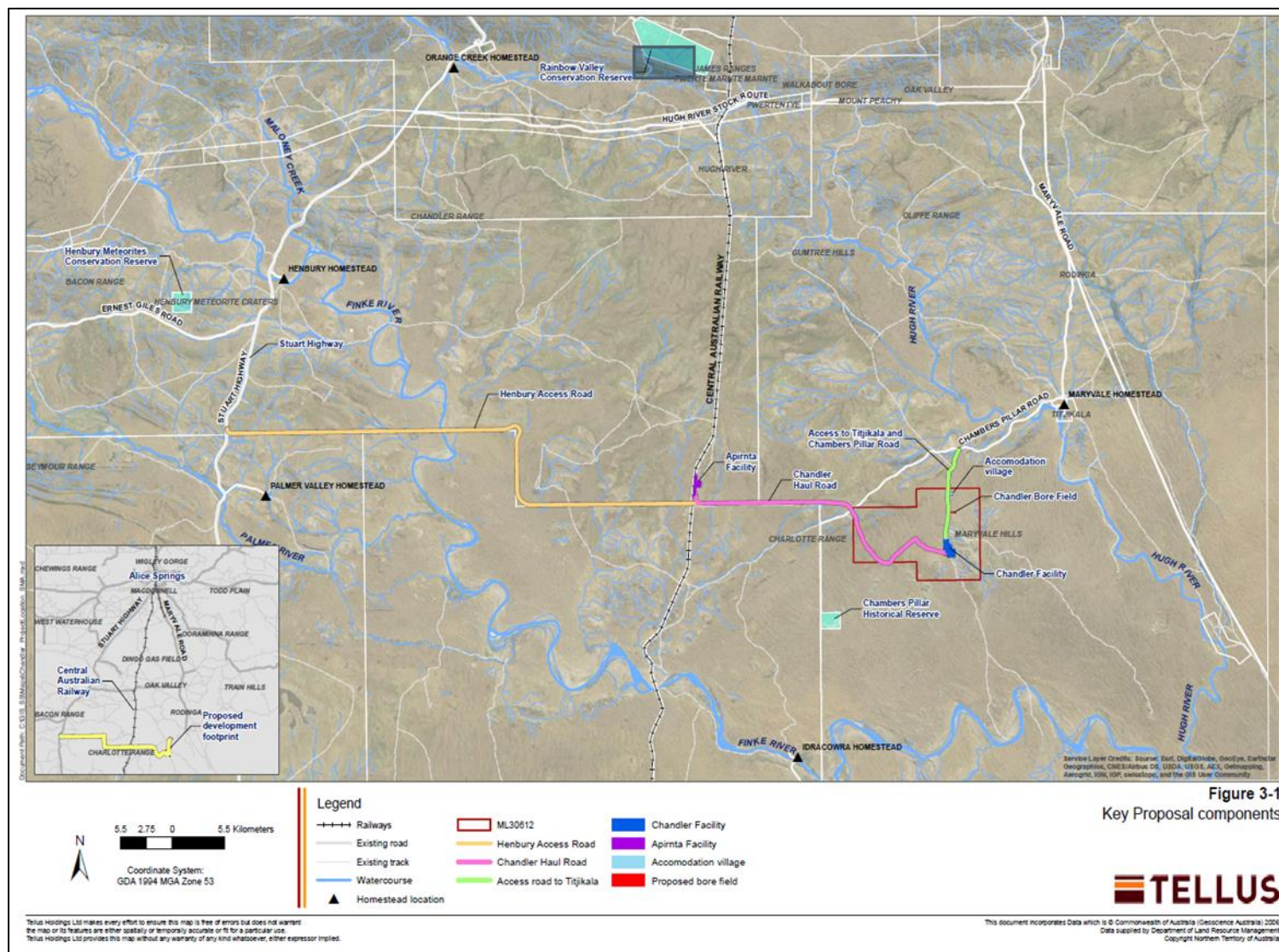
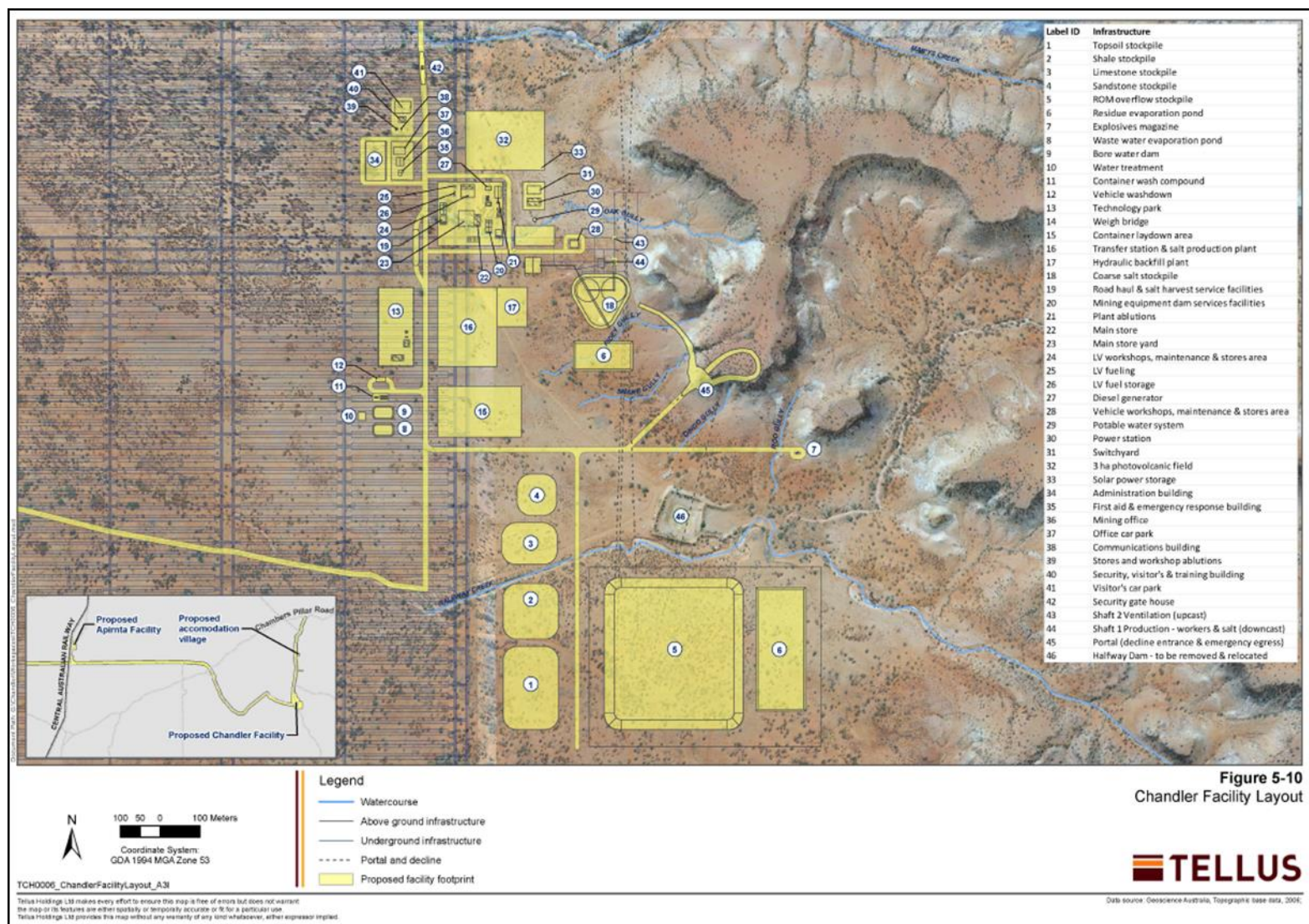


Figure 1. Project location and components (source draft EIS)



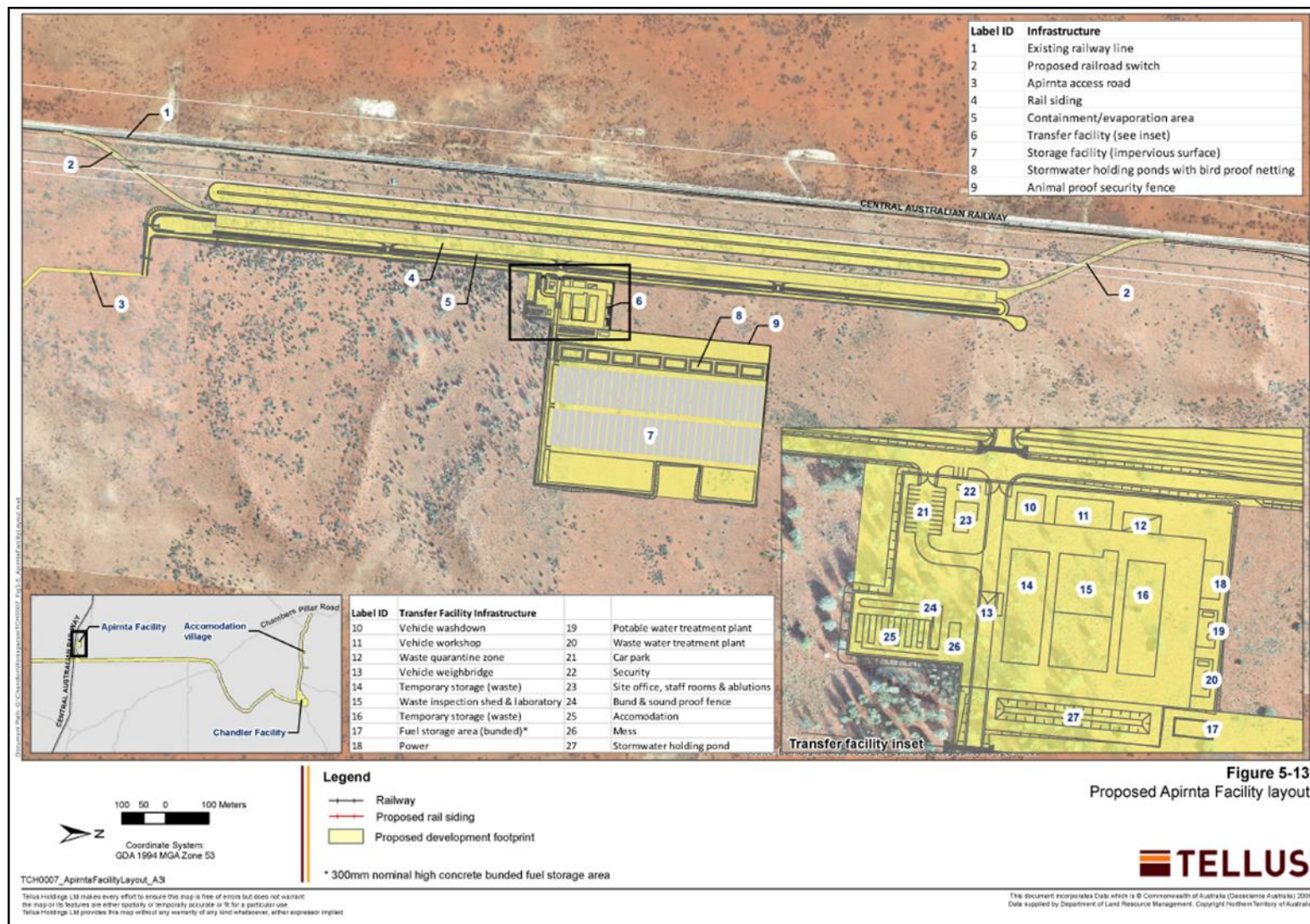


Figure 3. Schematic of proposed Apirnta layout (source: draft EIS)

3 Key environmental factors

Having regard to the Notice of Intent, the draft EIS and Supplement, and comments from the public and advisory bodies during the EIS review, the NT EPA identified the following key environmental factors that may be impacted by the Project:

- Terrestrial environmental quality
- Inland water environmental quality
- Hydrological processes
- Terrestrial flora and fauna
- Social, economic and cultural surroundings
- Air quality.

The key environmental factors are discussed in sections 4.1 to 4.6 of this Report. The description of each factor shows why it is relevant and how it would be affected by the Project. The assessment of the factors is where the NT EPA decides whether or not the Project has met the NT EPA's environmental objective for each factor.

The NT EPA identified the following potential environmental impacts and risks that contributed to the decision to assess the Project at the level of an EIS:

- the potential for contamination of land, water and air due to a loss of containment of waste on the surface and/or underground during transport and storage
- uncertainty around the scope of the project in relation to the scale, size and complexity of all components
- potential impacts to groundwater resources through the abstraction of water
- the potential for land degradation and impacts associated with the management and disposal of brine, wastewater and other contaminants
- potential impacts to biodiversity and habitat for threatened species
- the potential for construction, operation and visual impacts to sites with Aboriginal and cultural or historical significance
- potential social and economic impacts associated with the transportation and use of existing roads/rail infrastructure and the proximity to local communities.

Information requirements based upon identified potential impacts and risks were described in the Terms of Reference for the Project (NT EPA, 2016). The Proponent submitted the EIS to address the NT EPA's requirements.

4 Environmental impact assessment

The purpose of this section is to evaluate the Project and to present the view of the NT EPA on the environmental acceptability of the Project. The environmental acceptability of this Project is based on an analysis of:

- the proposed action (particularly which components or activities are likely to significantly impact the environment)
- the existing environment (particularly environmental values and sensitivities)
- the potential environmental impacts and risks of the Project and the evaluation of the significance of those impacts and risks
- proposed avoidance or minimisation/mitigation measures to reduce potential impacts and risks to acceptable levels and to meet NT EPA objectives.

Conclusions drawn and recommendations made in this Report are derived from consultation on the final EIS with advisory bodies, the NT EPA's examination of the EIS and responses from the Proponent to comments/consultation. Recommendations are made in this Report to add, emphasise or clarify any commitments made by the Proponent, where the proposed avoidance or minimisation/mitigation measures are considered insufficient or where a safeguard is deemed particularly important.

In this Report, the recommendations (in **bold**) are preceded by text that identifies issues and undertakings associated with the Project. For this reason, the recommendations should not be considered or read in isolation.

The NT EPA acknowledges that detailed design and operational plans for the Project have not been finalised and the final characteristics and quantities of hazardous wastes to be stored and disposed of at Apirnta and the Chandler Facility (including the deep geological repository) are unknown. This report will inform regulatory decisions and licence conditions for construction and operation during the approvals stages.

It is likely that there will be minor and insubstantial changes to the Project following the conclusion of the EIA process. It will be necessary for approval mechanisms to accommodate subsequent changes to the environmental safeguards described in the final EIS and recommendations in this Report. Provided the Proponent is able to demonstrate that changes are unlikely to significantly increase potential impacts on the environment, an adequate level of environmental protection can still be achieved by modifying the conditions attached to relevant statutory approvals governing the Project. Otherwise, further environmental assessment may be required.

Recommendation 1

Approvals and decisions for the Project by the Northern Territory Government and the Northern Territory Environment Protection Authority shall ensure that binding legal obligations are imposed on the Proponent and Operator such that the Chandler Facility Project is implemented in accordance with all environmental commitments and safeguards and mitigation measures which are:

- **identified in the Environmental Impact Statement for the Chandler Facility Project (draft Environmental Impact Statement and Supplement); and**

- recommended in this Assessment Report 83.

To the extent that coordination is required in order to achieve this recommendation, the Northern Territory Government and the Northern Territory Environment Protection Authority must agree in writing as to the coordination arrangements among Northern Territory Government agencies and Northern Territory Environment Protection Authority.

Recommendation 2

The Proponent and Operator shall provide written notice to the Northern Territory Environment Protection Authority and the responsible Minister if it alters or proposes to alter the Project, environmental commitments, safeguards or mitigation measures in the EIS in such a manner that the environmental significance of the action may change, in accordance with clause 14A of the Environmental Assessment Administrative Procedures.

The remainder of this section of this Report discusses the key environmental factors and potential impacts and risks to those factors based on likely significance, and the Proponent's investigations and studies and/or commitments to identify, avoid, mitigate, monitor and manage the potentially significant environmental impacts and risks. For each key environmental factor, the NT EPA assesses whether the Project is likely to meet its environmental objective for that factor.

4.1 Terrestrial environmental quality

4.1.1 NT EPA objective

To maintain the quality of land and soils so that environmental values are protected.

4.1.1.1 Environmental values

The Chandler and Apirnta Facilities overlie nine broad land systems and seven distinct soil types that are largely intact with minimal human disturbance or contamination. Some disturbance of soils is associated with grazing by cattle and feral camels. Vehicle tracks have interrupted natural drainage lines and formed preferential pathways for the flow of surface waters.

A desktop classification of soils was completed in 2012 utilising the Atlas of Australian Soils. A soil survey was conducted in 2013 to determine the validity of the desktop classification and to provide more site-specific information. The spatial extent of the survey was limited to eight locations within the Chandler Project area (ML30612) with no sites surveyed for Apirnta. The survey identified that soils were slight to moderately alkaline and there was no evidence of soil salinity (Appendix E, draft EIS). There was evidence of localised water erosion at some sites, indicating potential for further soil erosion with disturbance.

The main soils within the Chandler Project area are Rudosols and these are characterised as loamy sand with little structure or stability. The main soil type at Apirnta are Tenosols, which are typically very sandy with low chemical fertility, poor structure and low water holding capacity. The high permeability of these soils may have the potential to result in groundwater contamination (Appendix L, draft EIS).

4.1.1.2 Potential impacts

Apirnta, with a maximum storage capacity of 400 000 tonnes, would be Australia's largest temporary surface storage facility for hazardous waste. There is potential for contamination of land and soil at Apirnta and the surrounding area as a result of loss of containment of hazardous waste during the storage and handling of hazardous waste to permanent disposal in the deep geological repository.

The Project has the potential to result in soil contamination off-site of Apirnta from incorrect packaging and handling or unforeseen accidents along transportation routes.

The Project has potential to result in soil salinity impacts at Chandler from salt stockpiles and the application of saline water for dust suppression. These impacts are discussed further in section 4.2.3.3 (surface water impacts to inland water quality).

4.1.1.3 NT EPA assessment

Waste would be transported to site by rail and road and stored in either a warehouse, in an open hardstand storage yard in sealed shipping containers or within a liquid storage tank bunded to applicable Australian Standards. The Proponent has committed to constructing the Apirnta storage yard with suitable sub-base and appropriately engineered surface. The Proponent has identified that all surface water at Apirnta will be contained on-site in a bunded drainage system. The NT EPA will require that infrastructure is designed and constructed to relevant standards, including: impermeable base; spill containment and management systems; bunding; fire management; and contingency plans. The details of the infrastructure design must be provided to the NT EPA in the application for an Environment Protection Approval (EPA).

The loss of containment of hazardous waste at Apirnta has potential to occur either through spills during operation or there is potential for loss of containment and site contamination risks associated with unforeseen closure.

Loss of containment of hazardous waste - operations

The acceptance of waste at Apirnta will be in accordance with proposed waste acceptance procedures (WAP) to confirm that incoming waste meets the waste acceptance criteria (WAC) for the deep geological repository. The Proponent has provided broad WAC that refers to the European Union Council Decision 2003/33/EC¹ for establishing criteria and procedures of waste acceptance in deep geological repositories. The WAC outline the waste types that are not suited to storage and permanent isolation underground and therefore would not be accepted in the deep geological repository (Appendix C, EIS). Excluded waste includes those wastes that may undergo undesired physical, chemical or biological transformation after being emplaced in the deep geological repository, making them unsuitable for permanent isolation. These include liquids, explosive materials, highly flammable and reactive materials, gases, biodegradable materials and nuclear material.

The proposed WAC do not identify the nature and type of wastes that would be stored at Apirnta (for final emplacement in the deep geological repository), other than referring to the *National Environment Protection Measure (Controlled Waste between States and Territories) Measure* (NEPM) 1998 waste codes and Naturally Occurring Radioactive Materials (up to exemption level). According to the WAC, only waste that

¹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:011:0027:0049:EN:PDF>

is intended for permanent disposal in the deep geological repository would be accepted at Apirnta. The final WAC would be endorsed by the NT EPA prior to issuing the Environment Protection Licence (EPL) for Apirnta.

To mitigate potential impacts and risks associated with the loss of containment at Apirnta, the Proponent has proposed measures which include ensuring that each waste is contained in multiple barriers (or skins) during transport, storage and disposal operations. During transport, wastes would be placed in specified Dangerous Good code rated containers and placed in shipping containers, providing primary and secondary containment. The waste arriving at Apirnta would undergo verification testing to ensure it meets the WAC and unloaded and stored in accordance with the appropriate standards, codes and regulations. In addition, Apirnta would require a Major Hazard Facility licence under the WHS Act to address operational risks associated with the temporary storage of hazardous wastes.

With appropriate regulatory oversight, including licence conditions for spill prevention, containment of stormwater, and emergency management plans for spills, explosions, fire, and contamination of stormwater, the NT EPA considers that the Proponent has presented a case for appropriate mitigation measures to address the potential impacts and risks associated with a loss of containment during temporary storage of hazardous waste. The NT EPA also makes Recommendation 19, discussed in section 5.2, as an additional layer of regulatory oversight of process safety systems to ensure the Proponent implements controls that prevent major incidents (including spills) from occurring.

Loss of containment of hazardous waste – unforeseen closure

Apirnta would receive up to 400 000 tonnes of waste in the first four years of operation prior to the deep geological repository being constructed and made available for receipt of waste from Apirnta. The NT EPA considers that this time lag has the potential to result in significant environmental impacts with financial implications for the NTG - particularly in the event of cessation of mining activities and/or closure. If unforeseen business complications or time delays occur during construction and operation that result in business failure or premature closure, the NTG may be left with an abandoned hazardous waste facility.

A detailed analysis of potential Project failure scenarios was not provided in the EIS. In the event that unforeseen closure results in cessation of mining before the deep geological repository is constructed and the site is abandoned, there is a high risk of a legacy hazardous waste stockpile (up to 400 000 tonnes - equivalent to 20 600 shipping containers) requiring management and disposal. Without appropriate arrangements in place, including provisions for ongoing management and remediation, there is a high likelihood that the containment of the waste would eventually deteriorate and fail. If this were to occur, Apirnta and potentially surrounding areas would become a contaminated site – the magnitude of which would be on an international scale.

This presents a situation that has not been tested in similar deep geological repositories overseas where cavities already exist for final emplacement of hazardous waste (e.g. Winsford Rock Salt Mine, UK). The Proponent presents its intention to construct the underground mine and subsequent deep geological repository as sufficient certainty to ameliorate the risk of an abandoned facility at Apirnta. The NT EPA recognises underground declines are constructed using standard mining methods, however, unexpected ground conditions, groundwater inrush or engineering problems may occur during both the construction and mining phase. The current lack of site specific geophysical information on geology, aquifers

and groundwater inflows to inform the construction of the five to six-kilometre decline has the potential to impact on timeframes or, in the worst case scenario, present engineering difficulties that are unable to be resolved without significant time delays and cost.

The NT EPA is of the opinion that considerable potential impacts and risks at Apirnta can be avoided by not accepting waste until the deep geological repository is constructed and the waste is able to be permanently placed underground. However, the Project schedule suggested by the Proponent indicates that this may not be a viable option with waste proposed to be permanently placed in the deep geological repository in year five (Table 5.33, Supplement).

The environmental and financial risks presented by the surface storage of waste prior to the repository being constructed can be mitigated by imposing a proportional regulatory response. The EPL for the operation of Apirnta could be conditioned in a number of ways to minimise potential impacts and risks to the environment and to the NTG. This includes adopting regulatory approaches used at similar international waste repositories and authorise acceptance of waste types and volumes for storage at Apirnta based on risk. Approval to allow new waste streams at Apirnta would require the Proponent to provide a risk assessment to the NT EPA, to add new waste streams to the EPL.

The NT EPA considers that some waste streams could be suitable for direct emplacement in the deep geological repository but may be considered unsuitable for temporary storage at Apirnta (before the deep geological repository is constructed), based on the level of risk that particular waste stream poses if stored on the surface. To assist the regulator in assessing an application the Proponent would be required to include a third party independent peer review of the proposed storage parameters and handling requirements specific to each new waste stream. In addition, the independent peer review would be required to demonstrate that the disposal of the waste stream in the deep geological repository is recognised internationally as best practice for disposal of that waste stream.

The Proponent proposes a licensed capacity to store up to 400 000 tonnes at Apirnta, and proposes staging the volume of waste stored while the deep geological repository is being constructed (beginning with 30 000 tonnes in the first year, increasing to 90 000 tonnes per annum in years 2-4) (Table 3.14, draft EIS). To reduce the risks associated with a legacy stockpile, the NT EPA considers the EPL should include conditions for the acceptance of waste against the achievement of construction milestones for the deep geological repository rather than an open licence that allows a maximum capacity of 400 000 tonnes.

Recommendation 3

Approvals and decisions in relation to Apirnta will include conditions that:

- a) require an independent expert peer review of the proposed waste acceptance criteria**
- b) stipulate all waste streams accepted to be stored at Apirnta meet the relevant waste acceptance criteria and are suitable and intended for permanent disposal in the deep geological repository and represents international best practice for final disposal of that waste stream**
- c) require only wastes generated within the Northern Territory and other Australian States and Territories, and from Australia's Exclusive**

Economic Zone to be accepted at Apirnta unless otherwise approved by the NT EPA

- d) require an independent expert peer review of proposed storage parameters and handling requirements specific for each waste stream stored at Apirnta**
- e) require an independent expert peer review that confirms the disposal of each waste stream represents international best practice and that there is no alternative best practice proven technology to treat the waste stream**
- f) permit the volume of waste to be transported and stored during any licensing period to accord with construction milestones of the deep geological repository**
- g) during construction, require the Proponent or Operator to provide an annual report to the responsible Minister and the Northern Territory Environment Protection Authority on the progress of the construction of the deep geological repository, and after completion of the decline, demonstrate the anticipated capacity of the deep geological repository**
- h) require the Proponent or Operator to notify the responsible Minister and the Northern Territory Environment Protection Authority within 30 days if progress on the construction of the deep geological repository is likely to result in the delay or inability to permanently store the accumulated waste at Apirnta**
- i) the maximum waste storage capacity at Apirnta at any point in time will not exceed 400 000 tonnes**

Permitted storage of waste (all waste streams combined) at Apirnta in any given approval period should not exceed the total anticipated storage capacity at the deep geological repository within the period.

The draft EIS states that the responsibility of the waste would not transfer to the Proponent or Operator until the hazardous waste is emplaced in the deep geological repository. If received waste at Apirnta does not meet the WAC, is inappropriately packed or are excluded wastes, the waste would be quarantined and returned to the waste generator. If the waste cannot be safely or legally returned, the relevant regulatory authority would be contacted (Chapter 3, EIS).

The NT EPA considers as the licence holder for Apirnta, the Operator would be responsible for the waste once accepted for storage at Apirnta. The scenario of waste being transported back to the waste generator (customer) at their own expense – whether at the gate prior to acceptance or in the event of unforeseen closure, seems unlikely. The NT EPA is of the opinion the risk of temporarily storing hazardous waste at Apirnta is significant based on this logistical and financial difficulty of returning it to the waste generator.

Conditioning of the EPL can minimise the potential environmental impacts associated with unforeseen closure, but cannot completely remove the risk to the NTG of being responsible for a large hazardous waste storage facility in the future. This risk can only be managed by having an appropriate financial assurance in place for Apirnta.

To address residual risks associated with temporary storage of waste at Apirnta before the deep geological repository is complete, the NT EPA identifies that it is

necessary to ensure that appropriate financial assurance provisions are in place. The Proponent has proposed principles for financial assurances, including ensuring a relevant amount of financial assurance is provided upfront to the NTG over the life of the Project. The NT EPA supports this approach and an appropriate financial assurance provision for Apirnta would be required to mitigate the environmental and financial risk to the NTG. The financial assurance for Apirnta would be provided under the relevant provisions of the WMPC Act or a subsequent regulatory regime, as the NTG progresses its regulatory reform program.

A financial assurance is intended to provide a guarantee that the costs of remediation, site closure and post-closure liabilities are not borne by the NTG and community in the event of the operator abandoning the site, becoming insolvent, or incurring clean-up costs beyond their financial capability. To ensure the NTG does not assume liability for a potentially contaminated site, the NT EPA expects a financial assurance to be provided as a condition of the EPL for Apirnta.

The financial assurance would be calculated based on the volume of each specific waste stream to be accepted at Apirnta and the contingency arrangement costs for third party removal of each waste stream to an alternate facility. While the deep geological repository is being constructed, financial assurance would be based on the volume of specific waste types stored at Apirnta for that licence period. When there is a change to the licence conditions such as an application to increase the volume of waste or accept a specific waste type, the financial assurance amount would need to be amended.

Recommendation 4

The Proponent or Operator must provide, as part of its applications for relevant approvals and decisions, a financial assurance/security proposal which covers the Apirnta Facility and justification that includes:

- a) description of how the financial assessment was conducted and the specific calculations used**
- b) a third party independent peer review of the financial assessment by a qualified person approved by the Northern Territory Environment Protection Authority**
- c) details on how costings and principles are in accordance with best practice standards.**

Approvals and decisions for the Project by the Northern Territory Government and the Northern Territory Environment Protection Authority shall ensure financial assurance/security conditions are imposed which cover the Apirnta Facility. Such approvals and decisions shall require that before any approved activities may commence, the requisite financial assurance/security must be provided by the Proponent or Operator.

Consistent with current regulatory arrangements for security payments under the MM Act, the NT EPA expects financial assurance for Apirnta under the WMPC Act to have similar requirements. This would require the financial assurance to be calculated based on 100% of the costs for rehabilitation of Apirnta including the removal of wastes stored, removal of infrastructure and any site remediation that may be required. Similar to the mining securities, the financial assurance under the EPL is to be provided as bank guarantees or cash.

The NT EPA's approach to calculating financial assurance for Apirnta would be consistent with the Victoria EPA's guidelines based on itemised costs for hazardous waste disposal from storage (EPA Victoria, 2017). A financial assurance for Apirnta would be based on the expectation that the Operator would comply with its licence conditions. Therefore, financial assurance for Apirnta would focus on costs of alternative removal and disposal of stored waste. This is in recognition that assurance is generally provided for quantifiable known scenarios (e.g. volume of stockpiled waste) compared to insurance that is provided for events that are unknown (e.g. spills resulting in land contamination).

A requirement for the Proponent or Operator to provide a whole-of-project financial assurance is discussed further in section 5.2.

Loss of containment of hazardous waste – transportation

Transport of hazardous waste would occur by third party operators between Apirnta and Chandler and would require a licence issued under the WMPC Act. Conditions of the licence will apply in terms of reporting and ensuring appropriate measures are in place to prevent, mitigate and respond to loss of containment during transport between the facilities. In addition, licence conditions would require the third party transporter to provide waste tracking to ensure all intra-territory wastes are delivered to Apirnta. All movements of controlled waste interstate would require a Waste Transport Certificate (WTC) from the point of origin to storage at Apirnta in accordance with the *National Environmental Protection (Movement of Controlled Waste between States and Territories) Measure*.

These licensed operators currently transport volumes of hazardous waste around Australia and must comply with certain emergency response and spill prevention requirements. The NT EPA considers the risks of transport incidents are well known with recognised controls to prevent spills from occurring and detailed emergency response and clean up procedures in the event spills do occur. In addition, as a licence condition of the EPL, any licensed transporter within the NT, requires an Emergency Response Plan. The Emergency Response Plan would identify the reporting requirements to relevant State/Territory Emergency Services as well as the notification requirements of any incidents in accordance with clause 14 of the WMPC Act.

Recommendation 5

Approvals and decisions in relation to the Project will include conditions to:

- a) record and report the movement of listed waste within the Northern Territory and to and from Apirnta and Chandler facilities**
- b) record and report the movement of waste from the point of origin into the Northern Territory in an approved manner within timeframes prescribed by the Northern Territory Environment Protection Authority**
- c) require transport of waste into or within the Northern Territory by an Operator who is licensed or authorised to transport controlled waste.**

4.1.1.4 NT EPA conclusion

Apirnta and the transport of waste has potential to impact land and soil as a result of loss of containment of hazardous waste during storage, handling and transport of waste prior to long term disposal in the deep geological repository. The NT EPA considers the proposed mitigation measures including the multi-barrier approach to

containment, adherence to the WAC and requirement to store waste in accordance with appropriate standards, codes and regulations (including a Major Hazard Facility licence) is sufficient to adequately manage the risk and potential impacts of spills.

The proposed four-year timeframe for acceptance of waste at Apirnta prior to permanent disposal in the deep geological repository has potential to result in significant environmental impacts with financial implications for the NTG - particularly in the event of cessation of mining activities and/or premature closure. While the NT EPA's preference is not to store waste at Apirnta until the deep geological repository is constructed, the NT EPA considers adherence to stringent EPL conditions outlined in Recommendation 3 of this Report would limit the risk of a legacy waste stockpile resulting in potential environmental impacts if the site was abandoned and containers left to deteriorate and fail.

An appropriate **financial assurance will be required** for Apirnta in the event of unforeseen closure to ensure the costs of remediation, site closure and post-closure liabilities are covered. The NT EPA makes Recommendation 4 to ensure the NTG does not assume financial liability for a potentially contaminated site.

With the implementation of the recommendations identified above, the NT EPA is satisfied that its objective for terrestrial environmental quality is likely to be met.

4.2 Inland water environmental quality

4.2.1 NT EPA objective

To maintain the quality of groundwater and surface water so that environmental values including ecological health, land uses, and the welfare and amenity of people are protected.

4.2.2 Groundwater quality

4.2.2.1 Environmental values

The main groundwater bearing units that overlie the Chandler Formation (salt deposit) are the Horseshoe Bend Shale Formation, Langra Formation and Stairway Sandstone. The shallow alluvial aquifer accessed by the community of Titjikala for water supply is located 18 km to the north-east of the Chandler Facility and water quality is generally potable.

A groundwater monitoring network comprising of six groundwater bores (four nested sites) and two production bores was installed in 2015 to investigate the local hydrogeological conditions across the project area and vicinity. An initial round of groundwater quality monitoring was undertaken in June 2015 during installation, and the bores were sampled again in May 2016. These bores accessed the Horseshoe Bend Shale and Langra Formations.

Average results from the two rounds of sampling conducted in 2015 and 2016 found that water quality at all locations was dominated by sodium and chloride with minor calcium and sulfate ions (Table 7.1, Appendix P). The groundwater is slightly alkaline (averaging pH 8) and saline (electrical conductivity ranged between 12 600 and 21 000 microseimens per centimetre).

Groundwater quality results taken from three landholder bores indicated variable groundwater quality ranging from fresh (bores targeting the Titjikala aquifer) to saline (bores targeting the deeper Stairway Sandstone).

4.2.2.2 Potential impacts

The Project has the potential to impact on the quality of groundwater from the ingress of water into the deep geological repository, interacting with waste stored in the deep geological repository. Potential pathways for water to reach the deep geological repository include the shafts and decline, fractures (natural or mining activity) and human intrusion post closure. Water has the potential to dissolve the salt barrier, if it comes into contact with it. Should this occur, water has the potential to interfere with embedded wastes, potentially resulting in a contaminated groundwater plume leaving the deep geological repository.

4.2.2.3 NT EPA assessment

The Proponent conducted an operational and post closure risk assessment as preliminary work to inform the final safety assessment prior to acceptance of waste in the deep geological repository (Metcalf, et al., 2016). The work included quantitative modelling of the potential risks associated with an underground contamination event and potential impacts on overlying groundwater (Appendix H, EIS). Scenarios identified by the Proponent for ways in which contaminated groundwater might leave the deep geological repository and be transported to potential receptors included:

- connected porosity through the halite roof of the deep geological repository
- roof collapse of the deep geological repository (post-closure phase)
- impaired shaft seal (water inflows to the deep geological repository shaft and transports contaminants via the impaired shaft seals to the overburden aquifers).

The Proponent constructed numerical models to analyse the scenarios listed above (Appendix H, EIS). These models were 'assessment level' models which the Proponent notes are developed in safety assessments (e.g. Robinson & Hooker; Quintessa et al., 2011). These models are not predictive models but rather are used to place limits on impacts for a given set of assumptions. The quantitative models are designed to inform judgements about risks rather than to output risk estimates directly.

The report concluded that the risk to contamination of the overlying groundwater resource was low due to the natural impermeability of the salt resource located 800 m below surface. In the event of a groundwater contamination plume from the deep geological repository, there would need to be pathways (e.g. impaired shafts, boreholes, faults) encountered that could transport contaminants upwards from the Stairway Sandstone, with any contaminants diluted and dispersed to some degree during this process. The Proponent noted that under the above scenarios, the contaminated groundwater may travel upwards only as far as the aquifers in the Stairway Sandstone which is at substantial depth (>390 m) and contains saline water (Total Dissolved Solids = 15 000 g/L; (Douglas Partners, 2013)). The Proponent attests that should a contamination event occur, it is unlikely that the aquifer would be used as a water resource in the future and unlikely that near-surface receptors, including humans, would be exposed to the peak contaminant concentrations estimated for the Stairway Sandstone aquifer.

The NT EPA notes that the scenarios are not predictions of future events that may occur at the deep geological repository; rather they should be used to illustrate alternative ways in which contaminated water might leave the facility and be transported through the surrounding geological system to potential receptors in the event of water ingress. While the Proponent states it has treated uncertainties in the

assessment by using conservative values of relevant parameters, there are uncertainties about the release, migration and attenuation of contaminants and the Proponent highlighted the following knowledge gaps:

- behaviour of the wastes under the conditions within the deep geological repository (notably the chemical forms in which contaminants occur and their solubilities)
- driving force provided by the creep (self-sealing) of the halite in the post-closure period
- magnitudes of processes controlling retardation of migrating contaminants (sorption, diffusion into parts of the rock matrix where there is no advection)
- hydraulic conductivities of the different rock formations
- porosities of the different rock formations
- groundwater head gradients
- groundwater recharge rates
- dispersivity of the aquifers
- lateral connectivity of the aquifers.

With the current highlighted knowledge gaps and limited baseline data, the NT EPA considers the indicative results from the modelling are conceptual. Further modelling informed by site specific information would be required before the NT EPA can be satisfied that the waste can be permanently isolated from the biosphere in the deep geological repository. Similar European deep underground waste facilities recommend the use of analytical calculations and numerical simulations based on site specific local conditions to provide additional insights into the mechanisms that may impair the barrier function of the hosting salt rock (Chapter 3, EIS).

There is no precedent for permanent isolation of hazardous waste in a deep geological repository in Australia. The Proponent refers to lessons learnt from long-term waste storage in deep geological repositories in Europe that have largely been incorporated into section 1 of the European Council Decision 2003/33/EC (Council Decision, 2003/33/EC) as the procedures it would adopt for the Waste Acceptance Criteria.

The Council Decision 2003/33/EC establishes criteria and procedures for the acceptance of waste in underground storage sites. It requires a site-specific **safety assessment** to be carried out prior to waste being emplaced in the deep geological repository (Appendix A, EC Decision 2003/33/EC). The **safety assessment** sets criteria that must be met prior to acceptance of waste underground. It includes the requirement to conduct site-specific and multi-discipline risk assessments taking into account the overall system of waste, engineered structures and the host rock body to demonstrate waste would be isolated from the biosphere.

The requirements of the EC Decision have been adopted in licence conditions for the Winsford rock salt underground repository² in the UK. Waste is only accepted if it is compatible with the site-specific **safety assessment** and compliant with the

² https://www.veolia.co.uk/sites/g/files/dvc636/f/assets/documents/2014/10/Minosus_Variation.pdf

provisions of Appendix A of the Council Decision 2003/33/EC. The NT EPA supports this approach to waste acceptance and recommends the EPL for the deep geological repository replicates the requirements of the EC Decision 2003/33/EC. In addition, prior to approval for underground disposal, the Proponent would need to demonstrate that the wastes, whether disposed in barrels, bags or as hydraulic backfill, have been assessed against the site specific **safety assessment** and meets the criteria of the EC Decision 2003/33/EC.

The NT EPA considers the appropriate mechanism to address the uncertainties associated with the final emplacement of waste and ensuring permanent isolation from the biosphere (including groundwater) is to include a requirement in the EPL for the deep geological repository for the Proponent to conduct a **safety assessment** for acceptance of waste in underground storage in accordance with Appendix A of the European Council Decision 2003/33/EC. The **safety assessment** requires a long-term assessment to ascertain that no pathways to the biosphere would be generated during the long-term post-operation of the deep geological repository to ensure the risk to groundwater contamination is low. As part of this assessment, the barriers of the geological repository (waste quality, engineered structures, backfilling and sealing of shafts and drillings), the performance of the host rock, surrounding strata and overburden, are to be quantitatively assessed over the long term and evaluated on the basis of site-specific data. The **safety assessment** should be provided to the NT EPA to inform the NT EPA's approval or licensing decisions.

Recommendation 6

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide to the Northern Territory Environment Protection Authority and responsible Minister a site-specific risk assessment as part of the safety assessment for acceptance of waste at the deep geological repository. The safety assessment shall be in accordance the European Council Decision 2003/33/EC that includes the following provisions:

- a) waste only to be accepted if it is: compatible with a site-specific safety assessment as per section 1.2 of Appendix A of the EC Decision 2003/33/EC; and subject to the acceptance criteria in Section 2 of Appendix A and procedures listed in Section 1 of the EC Decision 2003/33/EC**
- b) a long-term risk assessment that quantitatively assesses the barriers of the deep geological repository and performance of the host rock, surrounding strata and overburden and is evaluated on the basis of site specific data as per section 1.2.7 of the EC Decision 2003/33/EC.**

The above safety assessment is to undergo a scientific review and endorsement by the independent expert advisory group outlined in Recommendation 7. The safety assessment is to be subject to endorsement by the NT EPA and made available to the public.

The Project would be the largest and first national waste repository of its type in Australia and regulatory approvals for this type of facility would require review of a large amount of technical and scientific information. This information would include additional details on the **safety assessment**, including the long-term risk assessment for the deep geological repository and acceptance of wastes. Compiling a **safety assessment** for a deep geological repository involves a range of scientific disciplines as well as the principles and mathematics of engineering and design (OECD, 2017).

It is imperative the regulator has access to different sources of expertise to enhance its technical knowledge and capacities and to obtain independent advice on information that would inform regulatory decisions. This use of independent experts within the regulatory framework further promotes a transparent and robust decision-making process based on the best available scientific and technical information.

The NT EPA recommends the appointment of an **expert advisory group** for the Project to provide independent, expert, technical advice to the NT EPA to ensure that the NT EPA's regulatory decisions are underpinned by sound scientific evidence and analyses. The **expert advisory group** would be formed to provide technical and scientific review of the documentation required for issuing regulatory approvals for the deep geological repository. The **expert advisory group** would provide advice to the regulator on the adequacy of the information and data presented by the operator and any recommendations that may be required as a result of that review.

The NT EPA recommends the **expert advisory group** comprise people with the relevant skills including expertise in waste management and permanent isolation of waste in deep geological repositories, to provide advice to regulators during the approvals process for the Project. The form and composition of the expert advisory group will need to be agreed with the NT EPA and the Proponent prior to lodgement of the application for the EPL for the deep geological repository. Executive support shall be provided to the group by departmental officers from DENR. It is expected the expert panel model used in Chevron's Gorgon Project³ could be used for this Project.

Recommendation 7

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall establish and provide funding to resource an independent expert advisory group to provide:

- a) **objective and independent expert review to the Northern Territory Environment Protection Authority and responsible Minister on the site-specific risk assessment documentation required for the overall safety assessment (in accordance with Recommendation 6) for acceptance of waste in the deep geological repository**
- b) **objective and independent advice on the adequacy of the site-specific information and data presented by the Proponent or Operator and any recommendations relating to management and regulation of the deep geological repository that may be required as a result of that review.**

The expert advisory group will be appointed by the Minister responsible for the WPMC Act and be made up of Northern Territory Government representatives and independent subject matter experts. As applicable, it will also include the Proponent and Operator's representatives.

Terms of Reference for the expert advisory group shall be developed to the satisfaction of the Northern Territory Environment Protection Authority.

Human intrusion

The drilling of bores or exploration cores in the future, post-closure of the repository has the potential to provide a path for water to enter the repository and result in

³ https://www.chevronaustralia.com/docs/default-source/default-document-library/expert_panel_web_page_overviewF3951E77FA72.pdf?sfvrsn=0

waste contaminating groundwater. To reduce the risk of unintentional human intrusion the Proponent has committed to mark the site with permanent monuments once closed and has proposed an Institutional Control Period, for which it will make financial provision for post closure care and monitoring. Details on how the site would be permanently marked would be provided as a condition of the EPL prior to closure of the deep geological repository.

The NT EPA recognises that the depth and design of the deep geological repository should prevent a connected pathway post closure. However, the Proponent plans to leave the groundwater monitoring bores, which extend to the base of the Lower Langra/top of the Stairway Sandstone, open during the Institutional Control Period for post closure monitoring. There is a risk that if these boreholes are not correctly sealed at the end of the institutional control period (yet to be agreed with the NTG) they could potentially form pathways via which any contamination that unexpectedly reaches the Stairway Sandstone could be conducted to the shallower formations (Appendix H, EIS).

The Proponent has provided examples of similar overseas facilities that do not require post closure monitoring once permanently closed due to there being little practical value in monitoring groundwater quality when it has been demonstrated through the **safety assessment** that there is no credible pathway for contaminants to migrate out. The NT EPA considers a post closure groundwater monitoring program (if required) would need to be finalised with the appropriate regulatory agencies prior to commencement of the Institutional Control Period to ensure that a potential connected pathway (via monitoring bores) is not possible post-closure.

4.2.2.4 NT EPA conclusion

The Proponent has referred to the procedures in the Council Decision 2003/33/EC to be adopted for its Waste Acceptance Criteria for emplacing waste in the deep geological repository. The NT EPA supports this approach and acknowledges the Proponent is continuing to collect site specific data that would contribute to providing additional information into the long-term **safety assessment** prior to final emplacement of waste.

The **safety assessment** will require a depth of understanding and technical information, including assessment of reliable mathematical models and site-specific data. The NT EPA makes Recommendation 7 for an independent **expert advisory group** to be formed to review the large volume of technical information that would need to be provided for the **safety assessment**.

The NT EPA considers the hazardous nature of wastes emplaced in the deep geological repository needs to be protected from unintended human disturbance in the long term. The **safety assessment** would need to demonstrate the post closure groundwater monitoring system would not provide a potential pathway for groundwater contamination and a post closure groundwater monitoring program would need to be finalised prior to commencement of the Institutional Control Period.

The NT EPA is satisfied that the potential impacts and risks to groundwater can be managed through provision of the **safety assessment** reviewed and endorsed by the **expert advisory group** to demonstrate no groundwater pathways to the biosphere would be generated during the operation and long-term post-operation of the deep geological repository. The NT EPA is therefore of the opinion that the NT EPA objective for inland water environmental quality (groundwater) is likely to be met.

4.2.3 Surface water quality

4.2.3.1 Environmental values

There is limited water quality data for the region due to the lack of permanent surface water, occasional surface flow events and remoteness of the site. Generally, water quality in the region depends on the intensity and duration of rainfall events. During flooding flows, water quality is driven by the amount of runoff. These events typically entrain organic carbon/nutrients from floodplain areas. Runoff during flooding events may contain high mineral turbidity due to the local geology and land use resulting in the suspension of fine clays.

During periods of low flow, surface water would contract to waterholes. The water quality during these times would be driven by evaporation, groundwater influence and the concentration and precipitation of compounds.

The topography of the region results in surface water being retained in ephemeral pools throughout the landscape. Under extreme flood events there is potential for surface waters from the Project area to discharge into the Hugh River (30 km south-east of the Chandler Facility) and potentially the Finke River (20 km south of Apirnta). These river systems are major drainages in central Australia and are ephemeral with the occasional large permanent pool. The Proponent states that anecdotal evidence and reconnaissance studies suggest the Project area is unlikely to be hydraulically connected to these major water courses (Figure 9-11, draft EIS).

4.2.3.2 Potential impacts

The construction and operation of the Project may have the following potential impacts and risks to surface water quality:

- contaminated surface run-off during significant rainfall events
- salt dissolution and transport off site
- sediment loading from erosion due to land disturbance and redirection of surface water.

4.2.3.3 NT EPA assessment

Contaminated surface water run-off

Spillage of products, wastes and hydrocarbons across the Project area have the potential to contaminate surface water where water comes in contact with contaminated surfaces (often during significant rainfall events), and subsequently, the contaminated water is not prevented from leaving the Project area. As discussed in section 4.1, the loss of containment of waste would be mitigated by ensuring waste storage is in accordance with Australian standards, codes and regulations, including bunding, and appropriate clean-up procedures to reduce the potential for surface water contamination.

The Proponent has committed to undertaking a range of avoidance/mitigation measures to avoid the interaction between contaminants/toxicants and surface water. Areas where there is potential for hydrocarbon spills would be bunded to contain any spills and avoid interaction with surface water run-off. The Proponent has prepared a Water Management Plan which identifies three water quality monitoring sites and site trigger values. In the event that any water quality exceedances are identified, contingency measures have been specified. An updated Water Management Plan

would be a requirement for approvals under the WMPC Act for Apirnta and MM Act for the Chandler salt mine.

Salt dissolution and transport off site

The use of saline water for dust suppression and the stockpiling of salt at the Chandler Facility have the potential to impact water quality. The saline water that is proposed to be used for dust suppression typically has a moderate to high level of salinity. The application of the water for dust suppression has potential to increase the salinity of surface water run-off.

Compacted road surfaces are likely to be a source and pathway of surface water flow during rainfall events. Salt-laden surface water runoff would drain into table drains/culverts resulting in local pools of water with elevated salinity.

The NT EPA considers the use of saline waters for dust suppression may result in localised changes to surface water quality but are unlikely to significantly impact water quality in more permanent pools in the Hugh/Finke River. This is due to the extreme flows that would be required for surface flows to firstly reach the rivers but also the amount of dilution of accumulated salts that would occur during such flood events.

The NT EPA acknowledges that the use of saline water for dust suppression would largely be restricted to the roads and operational areas. The potential for the use of saline water to impact on soils and surface water should be considered in the development of decommissioning and rehabilitation plans and during the calculation of the security bond for the Project under the MM Act.

The salt stockpile at the Chandler Facility presents a risk to water quality. The stockpile would have a maximum capacity of 3.5 million cubic metres (m³) of salt with the amount stored fluctuating due to supply and demand. The stockpile would be established on an impervious clay base to prevent saline leachate into the groundwater. Dish drains would be constructed around the salt stock piles to control runoff. Any surface run-off would be captured and isolated from the stockpile.

Salt would be mined and stored at a rate of 750 000 tonnes per annum. As the disposal of waste in the deep geological repository is dependent on the excavation of salt, there is potential that the rate of extraction may exceed the storage capacity of the stockpile through either a lack of demand or excessive costs making transportation to customers uneconomical. If this occurs, there is an increased risk that the stockpile would become a legacy stockpile and a potential source of pollution. The NT EPA considers the water management plan and security bond calculations under the mining authorisation subject to the MM Act would cover the management of salt impacts from the stockpile and incorporate the costs of removal of a legacy salt stockpile. The capture and management of surface water at Chandler and Apirnta is discussed further in section 4.3.3.3

Erosion and sedimentation

Construction activities associated with the Project would require the removal of vegetation and disturbance of soils and expose soils to erosion and rain. The mobilisation of soils would result in the sedimentation of watercourses, generate dust and alter or remove the soil structure.

The Project is located in an arid climate zone, with a very low annual rainfall recorded each year (average of 205 mm/year). When precipitation does occur, it is mainly low intensity rainfall events with the occasional high intensity event which occurs over a

short duration. All of the soil types identified on the site are considered to be susceptible to erosion under different hydrological conditions.

The Proponent predicts that runoff from the site is likely to occur as sheet flow near Apirnta and the haul road. The Chandler Facility would have a higher erosion risk due to the higher gradients at the site. Runoff from the Maryvale Hills to the east of the Chandler Facility would generally have a high velocity and energy resulting in a higher risk of erosion. To address this risk, the Proponent has prepared a draft Erosion and Sediment Control Plan (ESCP). The Plan identifies the areas at most risk of erosion and provides a conceptual overview of the control measures that would be implemented.

An updated ESCP should be prepared by a suitably qualified person in accordance with the international standards for erosion and sediment control planning (IECA, 2008) as amended from time to time (or higher standard). The updated ESCP, to be provided as part of the mining authorisation for Chandler and the EPA/EPL for Apirnta and is to also include details of permanent and temporary erosion and sediment control measures that would be implemented during the Project. The updated ESCP is to include:

- details around the timing and duration of works including vegetation clearance
- management of stormwater flows including external catchment contributions, site drainage and the separation of run off and mine/process waters
- specific details around the channel and surface protection/stabilisation, sediment control traps, filters/basins and revegetation.

Recommendation 8

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide an updated erosion and sediment control plan for the Project. The plan should outline all permanent and temporary erosion and sediment control measures proposed to be installed at the site. The updated plan should be prepared by a suitably qualified person and in accordance with the international standards for erosion and sediment control (as amended from time to time) or higher standard.

4.2.3.4 NT EPA conclusion

The NT EPA is satisfied that the potential impacts and risks to inland waters environmental quality (surface water quality) can be avoided or managed appropriately.

The NT EPA makes Recommendation 8 to minimise potential impacts and risks associated with saline runoff/pollutants and sedimentation. The NT EPA considers the impacts of water runoff from the salt stockpile are likely to be mitigated provided surface run-off is captured and appropriately managed. The potential impacts of use of saline water on soils and surface water should be considered in the decommissioning and rehabilitation plans and during the calculation of the security bond.

The NT EPA is satisfied that its objective for inland water environmental quality is likely to be met.

4.3 Hydrological processes

4.3.1 NT EPA objective

To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.

4.3.2 Groundwater hydrology

4.3.2.1 Environmental values

The conceptual groundwater model produced for the Chandler Facility identifies three main aquifer zones (Horseshoe Bend Shale, Langra, Stairway Sandstone) between 140–350 m below ground level (bgl), and minor perched groundwater systems above the regional water table (31–88 m bgl).

The main aquifer occurrences appear to be located in discrete horizontal zones of relatively high hydraulic conductivity which occur at varying depths throughout the lower Langra Formation.

Groundwater recharge does not appear to be strongly driven by local infiltration, with the majority of recharge most likely occurring remote to the site. The low hydraulic conductivity observed in shallower zones (less than 140 m bgl) and the depth of the piezometric surface (at about 90 m bgl) was interpreted to indicate that the near surface is relatively dry with little surface recharge to groundwater locally.

Groundwater users in the vicinity of the project are the community of Titjikala (200 residents) and pastoral bores. In total, there are 36 landholder production bores within 25 km of the project (five landholder bores within a 10 km radius). These bores access the shallow near-surface sediment groundwater systems or the deeper groundwater system associated with Stairway Sandstone (300 m).

4.3.2.2 Potential impacts

Construction and operation of the Project has the potential to result in the following direct impacts on groundwater hydrology:

- groundwater abstraction used for construction and mining operations resulting in drawdown of aquifers
- drawdown of aquifers from changes to flow paths (as a result of construction of the decline and shafts) and from water use.

4.3.2.3 NT EPA assessment

Groundwater abstraction

The Project would require water for construction activities, mining operations, dust suppression, wash-down facilities and as potable water. The Proponent estimates that the maximum water requirement during construction of the Project would be 50 ML/year. The predicted water use during operation would be 113 ML/year.

Water for the Project is planned to be sourced from a borefield that would comprise approximately 15 bores that target the upper/middle Langra groundwater system. Additional bores are planned to be constructed along the Chandler Haul Road and would provide a source of water for Apirnta. These bores would target the Langra and Stairway Sandstone systems.

The Proponent has assessed the potential impacts to groundwater hydrology and noted that the drawdown from abstraction would be minor. In particular, the extraction from bores for the Chandler Facility/accommodation village and Apirnta would result in an estimated drawdown of 0.4 m over 1 km (based on de Glee analytical model calculation). A total of 15 months of groundwater level data was collected at monthly intervals from six nested monitoring bores. For each of the assessed monitoring bores, preliminary groundwater level triggers based on the standard deviation from the mean with an arbitrary 20% buffer was applied to the natural variability range observed. The Proponent noted ongoing collation of groundwater data would be required to further develop these groundwater level triggers to inform management response. These would be provided in an updated Water Management Plan.

The Proponent acknowledges the assessment is based on one test bore and has committed to conducting additional monitoring and pumping tests within the Langra and Stairway Sandstone groundwater systems.

The expanded stage II groundwater program includes 20 nested bore installations in the deeper systems of the Stairway Sandstone, Jay Creek Limestone and Giles Creek Dolostone (350 m–700 m) (Appendix Q, EIS). Groundwater level monitoring and reporting would be compared to the results of the numerical model (yet to be developed) to determine if drawdown exceeds the conceptual model predictions. The ongoing collection of baseline groundwater data is required to further develop groundwater trigger levels and appropriate management responses. The Proponent has provided mitigation measures for sustainable use of groundwater, including further investigations and these are to be provided in an updated Water Management Plan.

The Proponent has committed to reporting the rates of groundwater extraction as necessary under the provisions of the MM Act and if required under the *Water Act* in an annual groundwater report. The NT EPA considers that the estimated rates of extraction and the quantity would be unlikely to result in significant drawdown and changes to the regional groundwater hydrology.

Recommendation 9

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide to the Northern Territory Environment Protection Authority and the responsible Minister an updated Water Management Plan for the Chandler Facility. The Water Management Plan must, at a minimum:

- a) provide details of additional groundwater monitoring programs to inform groundwater level trigger values that will be used to trigger management responses
- b) include a review of the proposed groundwater level triggers to ensure their appropriateness to inform management response
- c) provide details of the development of a class 1 groundwater numerical model consistent the Australian Groundwater Modelling Guidelines to estimate groundwater flow responses during construction, operations and post-closure scenarios
- d) include an independent peer review of the updated Water Management Plan by a suitably qualified independent professional.

Changes to groundwater flow paths

Construction of the shafts and decline to reach the Chandler salt deposit would require tunnelling through and intercepting groundwater aquifers. The interception of aquifers may create a new 'path' for groundwater to flow into the decline/shafts. If the flows are not contained or managed there is a potential that the uncontained flows would adversely affect the hydrology of the aquifer as well as the structural integrity of the deep geological repository. These potential impacts and risks of the deep geological repository being compromised are discussed in section 4.2.2 of this Report.

The Proponent has identified that the management of groundwater flow requires an engineering solution to prevent groundwater ingress into the shafts/decline. During construction of the underground salt mine/deep geological repository, the Proponent would seal the decline and shafts using grout (via deep injection wells) and by sprayed concrete lining (shotcrete). The intent of the seal would be to create an impermeable barrier while still allowing groundwater flows to pass around the shafts/decline. The seals would need to be of a high standard to minimise the ingress of water during the operational life of the Project (25 years). Mitigation of significant inflows must be addressed by sealing and not rely on the management of large quantities of water bypassing the seals.

There are uncertainties associated with the volumes of water that would require management during construction of the shafts/decline. The Proponent committed to drill additional bores for the stage II drilling program and conduct additional transmissivity investigations to target the Stairway Sandstone and Jay Creek Formations and capture more information about the aquifer systems. This work is to provide greater detail on the geological information and if major faults or other discontinuities are encountered, the potential implications on sealing methods and mine design would need to be addressed during the feasibility stage and prior to mining approvals.

For the purposes of integrity and ongoing operation of Chandler, a rigorous assessment of potential groundwater inflows and underground flooding risk from intercepted aquifers is required. The NT EPA considers it appropriate that the Proponent provide estimates of maximum groundwater volumes to be produced from the mine and how this water will be managed in an updated water balance prior to mining authorisation. The NT EPA notes that controlling groundwater ingress is essential to maintain operability of Chandler and to meet the requirements of a permanent isolation facility.

Recommendation 10

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide the following to the Northern Territory Environment Protection Authority and the responsible Minister:

- a) an assessment of groundwater inflows and underground flooding risk from intercepted aquifers**
- b) design of seals to ensure seal design is of a standard to minimise the ingress of water during the operational phase**
- c) measures to manage groundwater inflow into the shafts, including the design, capture and management of this water**
- d) details of management triggers and mitigation measures in the event of significant groundwater inflow into areas along the decline, shafts and production bores.**

Decommissioning and post-closure management of groundwater

The success of a deep geological repository relies on both a natural geological barrier (salt) and human-made engineered barriers that both form part of a multi-barrier system with permanent isolation capabilities (Chapter 3, EIS). The successful sealing of the shafts/decline from groundwater ingress for an indefinite period is essential and must be demonstrated as part of the long-term risk assessment for the **safety assessment**. The closure and decommissioning phase of the Project would require the sealing of the shafts/decline to seal the repository from the biosphere, prevent unauthorised access and prevent groundwater ingress. Sealing of the shafts/decline would be through a multi-barrier approach involving the following:

- decline seal (concrete bentonite plug)
- shaft seals (concrete bentonite plug)
- backfilling of the shaft/decline.

The engineering design of the shaft seals for the closure of the facility are yet to be finalised and would be engineered based on experience from international examples such as the Waste Isolation Pilot Plant (WIPP) in New Mexico and facilities in Germany. Those operations use a variety of cement-based materials (asphalts and concretes) and natural materials (salt and bentonite) (Hansen & Knowles, 2000). Bulkhead-type seals in the shafts and at the entry to waste disposal rooms are primary features of the conceptual seal designs.

The long-term success of the seals is essential for avoiding water ingress which may potentially alter the groundwater hydrology of the region. The NT EPA acknowledges that design of the seals as outlined in the EIS is preliminary and that further research and engineering design taking into account site specific conditions would be required. Ensuring the design and effectiveness of the seal is essential as identifying and rectifying any design faults once the seal is installed would be difficult, if not impossible. Given that the regulatory responsibility for final acceptance of waste in the deep geological repository would be through the WMPC Act, the NT EPA considers that it would be appropriate for the **expert advisory group** to review the design of the seals and provide advice to the NT EPA on their effectiveness.

The NT EPA notes that the costing of the permanent seals would need to be considered and included in the calculation of the **financial assurance** for the deep geological repository. The **financial assurance** would need to be adequate to fully fund the permanent sealing of the deep geological repository should there be an unforeseen closure or if the site is abandoned. The NT EPA acknowledges that further work on the permanent sealing can be provided during the operational phase and the financial assurance adjusted to reflect the proposed design.

Recommendation 11

The Proponent or Operator must provide, as part of its applications for relevant approvals and decisions, a financial assurance/security proposal which covers the Chandler Facility and justification that includes:

- a) **how the financial assessment was conducted including the specific calculations used to fund a permanent barrier to water and isolate waste from the biosphere**

- b) details on the proposed future research program for design of seals for ultimate replacement to demonstrate how closure can be effected after the operational phase.
- c) a third party independent peer review of the proposed financial assessment and proposed permanent seal design by a qualified person approved by the Northern Territory Environment Protection Authority
- d) details on how the proposed permanent seal design and financial assurance costings and principles are in accordance with best practice standards.

Approvals and decisions for the Project by the Northern Territory Government and the Northern Territory Environment Protection Authority shall ensure financial assurance/security conditions are imposed which cover the Chandler Facility. Such approvals and decisions shall require that before any approved activities may commence, the requisite financial assurance/security must be provided by the Proponent or Operator.

4.3.2.4 NT EPA conclusion

The NT EPA considers the proposed groundwater abstraction rates are unlikely to result in significant drawdown and impact groundwater hydrological processes. In recognition of the limited available baseline groundwater data and testing on estimated groundwater flow rates, the NT EPA makes Recommendation 11 to inform groundwater trigger values and appropriate management responses.

The Project has the potential to alter the groundwater hydrology of the region by the construction of the shafts/declines through the groundwater aquifer systems. The NT EPA is satisfied that there is sufficient avoidance/mitigation measures proposed to avoid groundwater ingress although further work is required on estimating volumes of groundwater inflows requiring management in an updated water balance model prior to issuing mining approvals. The NT EPA makes Recommendations 10 and 11 to ensure the potential impacts and risks associated with groundwater inflows are managed for the life of operation and for the long-term integrity of the deep geological repository.

Provided those seals are designed in a manner that is durable and effective at avoiding groundwater ingress, the NT EPA considers that the environmental objective for this factor is likely to be met.

4.3.3 Surface water hydrology

4.3.3.1 Environmental values

The major surface water features within the vicinity of the Project area are the Hugh River and the Finke River. Both rivers are dry for long periods of time and flow following heavy rainfall events in the region. Permanent pools in the Finke River provide a critical source of water and support aquatic and terrestrial biodiversity. The Hugh River provides good quality water to the aquifer that provides water supply to Titjikala and Maryvale Homestead.

The ephemeral watercourses associated with components of the Project are largely confined to channels and do not flow into the Hugh or Finke Rivers except possibly under extreme rainfall events.

4.3.3.2 Potential Impacts

Construction of the site has the potential to result in the following direct impacts on surface hydrology:

- changes to the hydrology of watercourses within and adjacent to the Project area
- changes to natural drainage patterns from construction of impervious hardstands and re-contouring land for proposed infrastructure could alter the amount of water in downstream environments.

4.3.3.3 NT EPA assessment

Construction of the Project would require the installation of new hardstand areas and the redirection of surface water flows resulting in an increase of surface water runoff. The Proponent provided a preliminary assessment of the likely impacts of the Project on the regional surface hydrology. The hardstand surfaces constructed at both Apirnta and Chandler are relatively small compared to the surface catchment areas. The assessment concluded changes in runoff from both Apirnta and Chandler are unlikely to have a detectable impact on the hydrology of the Hugh River or the Finke River.

The Proponent proposes to divert clean water around project infrastructure to ensure ephemeral flows are maintained. These diversion channels would be designed to best practice guidance including sizing and lining type (IECA, 2008). The Proponent also commits to collecting all stormwater runoff from site for reuse. The capacity of the stormwater drainage system would be designed to accommodate a 1 in 100-year rainfall event over a 24-hour period. The NT EPA notes that the requirements for handling and storing rainfall events of this magnitude would require substantial capacity and well-informed engineering design.

There are still uncertainties around the design of stormwater capture and storage infrastructure, and the NT EPA expects that more detailed designs are to be submitted as part of mining authorisation for Chandler and the EPA/EPL for Apirnta. The design of the infrastructure for Apirnta and management of stormwater to prevent offsite contamination and runoff would be an EPA/EPL licence condition for Apirnta. A Stormwater Management Plan would be submitted to the NT EPA with the application for the EPA/EPL for Apirnta.

The assessment of the local hydrology provided in the EIS is largely conceptual and further studies are required to inform the flood and hydrological modelling to ensure surface water impacts are managed during flooding events. To address the uncertainty, the Proponent has committed to further data collection, additional monitoring and investigations including:

- stormwater models of Apirnta and the Chandler Facility, including management of runoff and diversion of floodwaters from upstream catchments around the sites
- 2-D modelling of flow paths and inundation of the Chandler Facility, including the washout area to better understand the potential for floodwaters to reach the Hugh River near Titjikala
- modelling flood risk and scour protection at the Finke River crossing
- modelling flood risk of haul crossings at drainage lines.

The hydraulic modelling would include various flood scenarios including extreme events such as the Probable Maximum Flood and would allow mitigation measures to be progressed to a more detailed design stage (Chapter 9, draft EIS). The commitment by the Proponent to undertake further modelling and monitoring would inform design of drainage, site layout and water/flood management structures that would maintain surface hydrology of the region and protect the Project site from flooding impacts.

4.3.3.4 NT EPA conclusion

The NT EPA considers that impacts on surface water flows are unlikely to be significant and can be managed and mitigated through site layout and engineering informed by further studies. Well informed engineered design and construction of stormwater and storage infrastructure should attenuate surface flows, manage flow velocities and contain surface water during peak rainfall events. The NT EPA considers that the environmental objective for hydrological processes (surface water) is likely to be met.

4.4 Terrestrial flora and fauna

4.4.1 NT EPA objective:

Protect the NT's flora and fauna so that biological diversity and ecological integrity are maintained.

4.4.2 Terrestrial flora and vegetation

4.4.2.1 Environmental values

Six vegetation surveys were undertaken between 2012 and 2016 in accordance with the Northern Territory Guidelines and the Field Methodology for Vegetation Survey (Brocklehurst, et al., 2007). Six native plant community types were identified within the proposed development footprint and vicinity. These communities consist of *Triodia* hummock grasslands, open and sparse *Acacia* shrubland and saltbush/bluebush open shrubland.

Vegetation within the Project area is largely in moderate to good condition with no anthropogenic disturbance and limited degradation associated with grazing livestock. The vegetation communities on the site are common throughout central Australia and are not threatened or considered to be significant from a biodiversity perspective.

A total of 192 plant species (185 native and seven introduced) from 37 families were recorded within the Project vicinity. No threatened flora species listed under the *Territory Parks and Wildlife Conservation Act* (TPWC Act) and/or the EPBC Act were recorded or are predicted to occur within the project area or adjacent areas.

4.4.2.2 Potential impacts

Approximately 397 hectares of native vegetation is proposed to be cleared for the construction of the following components:

- Chandler Facility (85.5 ha)
- Henbury Access Road (180 ha)
- Apirnta (39 ha)
- Chandler Haul Road (93 ha).

There is potential for indirect impacts on vegetation through:

- erosion and sedimentation
- dust from construction and transport
- changes to the existing fire regime
- introduction and spread of weeds

4.4.2.3 NT EPA assessment

Direct impacts - clearing of native vegetation

Construction of the Project would result in the direct removal of approximately 397 ha of vegetation.

The Project will require the clearing of the following vegetation types:

- *Triodia* low hummock grassland (type 83) – 206.78 ha
- *Maireana* low open chenopod shrubland (type 110) – 85.92 ha
- *Maireana* low open chenopod shrubland (type 108) – 47.2 ha
- *Triodia* low hummock grassland (type 82) – 35.14 ha
- Mulga tall sparse shrubland with low sparse shrubland (type 70) – 17.4 ha
- Acacia tall open shrubland (type 66) – 4.54 ha.

The vegetation communities proposed for clearing are common throughout central Australia and are not considered to be sensitive and/or significant vegetation types. The NT EPA considers that the loss of vegetation through the construction of the Project is unlikely to have a significant residual impact.

Indirect impacts

Seven introduced flora species were recorded within the Project area and adjacent vegetation. All occurrences (with the exception of buffel grass) were in low densities. One species (Athel pine – *Tamarix aphylla*) found on the site is a declared weed under the *Weeds Management Act*. The Proponent has identified weeds as a risk to vegetation and has committed to preparing and implementing a Weed Management Plan.

Mapping of the fire history of the site suggests that the majority of the site has not been burnt for more than 14 years. Some vegetation along the Chandler Haul Road/Henbury Road appears to have been burnt approximately five years ago. The Proponent has committed to managing fire in the region through the implementation a Bushfire Management Plan.

There is potential for additional impacts through the smothering of vegetation by dust and sediment. These risks would be managed through the implementation of environmental management plans. These environmental management plans would be provided as part of the mining authorisation under the MM Act. Further discussion with regards to the proposed management and mitigation measures is provided in sections 4.2.3 and 4.6 of this Report.

4.4.2.4 NT EPA Conclusion

The NT EPA has considered the potential impacts and risks of the Project on terrestrial flora and vegetation. The Project is unlikely to have a significant impact through the clearing of suitable habitat or indirect impacts associated with fire, weeds, dust, erosion and changes to hydrology.

The implementation of environmental management plans for fire, weeds and dust would further avoid/manage indirect impacts to vegetation. The NT EPA considers that the objectives for this factor in relation to Terrestrial flora are highly likely to be met.

4.4.3 Terrestrial fauna and matters of national environmental significance

4.4.3.1 Environmental values

Targeted fauna surveys were undertaken between October 2012 and May 2016 in accordance with the NT EPA and Australian Government guidelines for surveying for biodiversity and threatened species (DEWHA, 2010; DSEWPaC, 2011a; DSEWPaC, 2011b).

The surveys were conducted at six locations within the mining lease area and the haul/access roads. A total of 69 sites were actively searched for secondary signs with 32 sites trapped for threatened fauna species. The surveys found evidence of the following threatened species within suitable habitat adjacent to the Project area:

- southern marsupial mole – (*Notoryctes typhlops* – Vulnerable TPWC Act, unlisted EPBC Act)
- mulgara – (*Dasyercus* sp.) – the specific species was not determined and suitable habitat for both brush-tailed mulgara, *D. blythi*, (Vulnerable- TPWC Act), and crest-tailed mulgara, *D. cristicauda* (Vulnerable- EPBC Act and TPWC Act) is present.

N. typhlops was delisted under the EPBC Act while this Project was being assessed (3 December 2015). The NT EPA notes that the Proponent has not sought a reconsideration of the controlled action decision to remove *N. typhlops* from being considered in the assessment. As such, the species has been included in this assessment consistent with Australian Government policy (DSEWPaC, n.d.).

While not detected during the surveys, advice from the DENR indicates that there is a low to moderate likelihood of occurrence within the proposed road access corridor, suitable habitat was identified for the following threatened species that would be cleared and/or impacted indirectly by the Project:

- Slater's skink – (*Liopholis slateri* – Vulnerable TPWC Act, Endangered EPBC Act)
- princess parrot – (*Polytelis alexandrae* – Vulnerable TPWC Act/EPBC Act)
- thick-billed grasswren – (*Amytornis modestus indulkana* – Critically Endangered TPWC Act, Vulnerable EPBC Act).

The following species were surveyed for but not detected. The NT EPA, in consultation with the DENR, considers that they are likely to have a low likelihood of occurrence in the Project Area, and are unlikely to be impacted by the Project:

- great desert skink (*Liopholis kintorei* – Vulnerable TPWC Act/EPBC Act)
- desert sandskipper (*Croitana aestivalis* – Endangered EPBC Act)
- Australian painted snipe (*Rostratula australis* – Vulnerable TPWC Act/Endangered EPBC Act)
- night parrot (*Pezoporus occidentalis* – Critically Endangered TPWC Act/Endangered EPBC Act)
- black-footed rock-wallaby (*Petrogale lateralis*, MacDonnell Ranges race – Vulnerable EPBC Act)
- central rock-rat (*Zyzomys pedunculatus* – Endangered TPWC Act/EPBC Act)
- greater bilby (*Macrotis lagotis* – Vulnerable TPWC Act/EPBC Act).

4.4.3.2 Potential impacts

Suitable habitat for threatened species occurs throughout much of the Project area. Construction and operation of the Project would require the clearing of suitable habitat.

The Project has the potential to have the following indirect impacts on listed threatened species:

- changes to the fire regime
- introduction and spread of weeds
- competition and predation by introduced fauna.

4.4.3.3 NT EPA assessment

The NT EPA has assessed this factor to address the requirements of the EA Act and the EPBC Act in accordance with the Bilateral Agreement. In preparing this Report, the NT EPA has given consideration to the following plans and policies:

- EPBC Act Environmental Offsets Policy (DSEWPaC, 2012)
- National Recovery Plan for the great desert skink (*Liopholis kintorei*) (McAlpin, 2011)
- National Recovery Plan for the thick-billed grasswren (eastern subspecies) *Amytornis textilis modestus* (NPWS, 2002)

- National Recovery Plan for marsupial moles (*Notoryctes typhlops* and *N. caurinus*) (Benshemesh, 2004)
- The following conservation advices and threat abatement plans relevant to this Project:
 - Approved Conservation Advice for *Liopholis slateri slateri* (Slater's skink, floodplain skink)
 - Approved Conservation Advice for *Amytornis modestus* (thick-billed grasswren)
 - Commonwealth Conservation Advice on *Polytelis alexandrae* (princess parrot)
 - Commonwealth Conservation Advice for *Dasycercus cristicauda* (crest-tailed mulgara)
 - Threat abatement plan for competition and land degradation by rabbits (DSEWPaC, 2011c)
 - Threat abatement plan for predation by European red fox (DSEWPaC, 2011d)
 - Threat abatement plan for predation by feral cats (DoE, 2015).

The NT EPA has prepared this assessment using the information provided by the Proponent in the EIS (the draft EIS and Supplement). Additional resources have been considered in assessing the impacts of the Project and have been referenced where relevant.

Direct impacts - clearing of habitat for threatened species

Suitable habitat for threatened species occurs throughout much of the Project area. The Project would require the clearing of the following amount of suitable habitat for threatened species:

- 286.26 ha of habitat for *P. alexandrae*
- 229.44 ha of habitat for *D. blythi*
- 161.52 ha of habitat for *N. typhlops*
- 159.42 ha of habitat for *D. cristicauda*
- 75.11ha of habitat for *L. slateri*
- 36.63 ha of habitat for *A. m. indulkana*

The NT EPA has considered the direct impact of the Project on each species in relation to the likelihood of the habitat being occupied and the amount of habitat being cleared relative to the known occurrence/availability of habitat offsite.

The NT EPA agrees with the Proponent's and DENR's assessment that there is a low to moderate likelihood of *A. m. indulkana*, *L. slateri* and *P. alexandrae* occupying suitable habitat on the site. Furthermore, the area of habitat being impacted is relatively small in comparison to the known occurrence and distribution of these species.

While the NT EPA considers that there is a low likelihood that *L. slateri* or *A. m indulkana* occurs on the site, the Proponent has committed to undertaking a pre-clearance survey for these species. If either species is found, the Proponent would avoid impacts by realigning the Henbury Access Road.

Comments from DENR highlight the significance of any records of *A. m indulkana* within the Northern Territory. If either species is detected during the pre-clearance surveys, the DENR should be notified immediately for advice prior to any clearing works.

The threatened species that have the highest potential to occur on the site (*N. typhlops* and *D. cristicauda/D. blythi*) were identified through secondary signs (footprints and a mole hole). The absence of any individual animals during targeted surveys suggests that the species either occur at low densities or may have been misidentified when interpreting the secondary signs.

The NT EPA considers that the lack of individuals found in surveys and low number of secondary signs (a footprint and a mole hole) during surveys and searches suggests that the site does not provide habitat for important populations of these species and there is low potential for a significant residual impact. Furthermore, the clearing of suitable habitat would be relatively small in comparison to the known occurrence and area of suitable habitat offsite.

Indirect impacts – invasive flora, fire, and feral animals

Construction activities across the Project area are likely to increase the opportunity for weeds to establish. The introduction and spread of weeds would result in the degradation of suitable habitat through competition with native flora species. Furthermore, some weeds increase the risk of higher intensity fires through high fuel loads. This can result in the loss of large areas of native vegetation and/or mortality of threatened species through injury, loss of resources and increased risk of predation.

To manage the potential impacts and risks associated with weeds, the Proponent has committed to preparing and implementing a Weed Management Plan for the Project area. The Plan would include appropriate weed hygiene measures as well as regular monitoring for weeds with follow up weed control, if required.

Changes to the fire regimes are considered to be a key threat to the threatened species. Most of the species prefer a patch- burning regime with areas that are subjected to large-scale wildfires considered to be largely unsuitable. This is due to large-scale fire events increasing the risk of mortality through the removal of vegetative cover and the loss of food resources.

The NT EPA notes that the Bushfire Management Plan provided with the EIS appears to focus on the protection of the Project from bushfires rather than demonstrating that off-site impacts from controlled burns would not have adverse impacts to habitat for threatened species. The NT EPA considers that it would be appropriate for the Proponent to provide an updated Bushfire Management Plan to identify biodiversity goals in relation to the management of habitat for threatened species to the Department responsible for administering the MM Act. The revised plan should identify key habitats for threatened species and outline how the implementation of the Bushfire Management Plan would maintain, protect or enhance the suitability of habitat for threatened species.

The area contains populations of feral cats (*Felis catus*), red fox (*Vulpes vulpes*), rabbit (*Oryctolagus cuniculus*) and other introduced grazing herbivores. These species prey on threatened species and/or compete for resources and are listed as key threatening processes under the EPBC Act (DoE, 2015; DSEWPaC, 2011c; DSEWPaC, 2011d).

While it is acknowledged that these threats currently exist in the region, the Project may introduce new resources (food/water sources) to the landscape, potentially increasing predator/competitor densities. This may increase the rate of predation and/or level of competition for listed threatened species. The Proponent proposes to prepare and implement a Pest Fauna Management Plan as part of an overarching Biodiversity Management Plan. This plan would outline the monitoring and control measures for avoiding and managing the risks to biodiversity.

Recommendation 12

Before approvals or decisions are given or made for the Project, the Proponent or Operator shall provide to the Northern Territory Environment Protection Authority and the Responsible Minister a Biodiversity Management Plan for the Project. The Biodiversity Management Plan must, at a minimum contain:

- a) an identification of project risks, mitigation measures and preventative actions for biodiversity values and habitat for threatened species**
- b) a procedure for pre-clearance surveys for threatened species**
- c) commitment(s) to prepare species specific management plans in the event that *Amytornis modestus indulkana* and/or *Liopholis slateri* are detected**
- d) the scope, standards and timeframes for a flora and fauna monitoring program**
- e) procedures for managing fire risk from the Project on habitat for threatened species**
- f) weed hygiene and control procedures for avoiding the introduction and/or spread of weeds into habitat for threatened species**
- g) procedures for avoiding and/or managing the risk of introduced fauna on threatened species**
- h) measures and goals for the rehabilitation of habitat for threatened species following the closure and decommissioning of the Project.**

The NT EPA notes that the submission of the Biodiversity Management Plan under the *Mining Management Act* would protect threatened species from the mining aspects of the Project. To ensure threatened species and biodiversity are protected during the construction and operation of the remaining components of the Project, the NT EPA considers that it would be appropriate for the Minister for the Environment and Energy to require that the Biodiversity Management Plan is submitted for approval under the EPBC Act.

4.4.3.4 NT EPA conclusion

The NT EPA has considered the potential direct impacts of the Project on six threatened species and considers significant impact to these species is highly unlikely. This is due to an absence of important populations of threatened species on the site as well as the small amount of habitat being cleared compared to the known occurrence of habitat for each species.

Furthermore, the implementation of the Biodiversity Management Plan with the relevant management plans (Bushfire Management Plan, Weed Management Plan) would contribute to avoiding or mitigating the potential indirect impacts of the Project on threatened species.

In preparing this advice, the NT EPA has given consideration to the recovery actions and objectives identified in the National Recovery Plans relevant to this Project. The NT EPA considers that should the Project proceed, it would be consistent with those actions and objectives.

The NT EPA is satisfied that the environmental objective for this factor is highly likely to be met.

4.5 Social, economic and cultural surroundings

4.5.1 NT EPA objective

To protect the rich social, economic, cultural and heritage values of the Northern Territory.

4.5.2 Socio-economic considerations

4.5.2.1 Environmental values

The region has significant social, economic and cultural values which are associated with the historical, cultural and pastoral use by residents and visitors. The Project is located in a remote area with closest population centres being the communities of Titjikala, Santa Teresa and Finke (900 people). The nearest community is Titjikala (200 people) and it is linked to the regional centre of Alice Springs via the Maryvale Road (an unsealed road about 120 km in length). Project areas are located on Henbury and Maryvale Stations which are pastoral leases under the *Pastoral Land Act* and predominantly used for cattle grazing.

4.5.2.2 Potential impacts

The construction and operation of the Project would have the following potential impacts and risks to the environmental values for economic, social and cultural surroundings:

- potential positive and negative social and economic impacts to the region
- construction traffic impacting on users of the Maryvale Road
- potential impacts to Aboriginal artefacts
- potential impacts to local tourism and the amenity of historic sites.

4.5.2.3 NT EPA assessment

The construction and operation of the Project would provide local economic benefits to businesses as well as employment opportunities through the provision of resources, staff and services. The Proponent indicates a capital expenditure of \$676 million over a four-year construction period and \$80 million per year over operations, of which a large proportion (approximately 30%) is expected to be spent within the Northern Territory (Chapter 12, EIS)

During construction, the Project would employ 270 full time equivalent staff (2018-2021) and approximately 160 staff per year during operation (2021-2041) (EIS Supplement). During construction of the Project, the Proponent estimates that 90% of the employees would be FIFO. During operations, approximately 75% of staff would be FIFO with the overall aim of increasing the local staff to drive-in drive-out from Alice Springs and surrounding areas. The Proponent has committed to sourcing staff from the local region as well as having a target of 10% Aboriginal employment. The NT EPA supports the Proponent's commitment to employing local and Aboriginal staff.

Impacts are expected to the Titjikala community through the use of the Maryvale Road to access the Project area until the Henbury Access Road and Chandler Haul Road have been constructed. The use of the road for construction activities would increase the number of vehicles using the road as well as the amount of heavy vehicle traffic.

The use of Maryvale Road during construction would increase wear and tear on the road surface, reduce road safety and potentially result in increased travel time for other road users. Submissions made on the draft EIS included a petition signed by residents at Titjikala, requesting that the Proponent seal the Maryvale Road for the potential socio-economic and human health benefits for Titjikala residents and tourists visiting the region. The Proponent has identified in the EIS (Appendix U pg-47) that a 60 km section of the Maryvale Road may be upgraded following regulatory approval (but not sealed) to provide improved access to the Project.

The NT EPA has considered the potential impacts to other road users from the use of Maryvale Road for the Project. To manage the potential impacts, minimise disruptions from the Project and provide benefits to local residents and tourists using the road, the Proponent should consider including the sealing of Maryvale Road as an option if it becomes the preferred access route. Any use of the Maryvale Road would be managed by the Department of Infrastructure, Planning and Logistics under the *Control of Roads Act*.

The Proponent has developed a Social Impact Management Plan (SIMP) (EIS, Appendix V) which summarises the potential social impacts of the Project and identifies the measures and plans/policies that would be implemented to avoid or manage the identified potential impacts. The Proponent has committed to the implementation of a stakeholder engagement strategy and a community reference group to provide stakeholders the opportunity to voice concerns and ensure transparency with respect to management of the Project.

The Titjikala community is 25 km from the Project and the NT EPA considers it is important that the local community has a clear understanding of the potential impacts, risks and benefits of the Project and how they will be managed by the Proponent over the life of the Project. The communication of risk involves stakeholder engagement and should occur early, often and with a genuine intent to listen, participate and seek acceptable compromises where possible (Wilkinson & King, 2016). The NT EPA considers the proposed community reference group is an

appropriate forum for the Proponent to communicate to stakeholders about the Project and the real and perceived levels of risk associated with it. This includes communicating the outcomes of the **safety assessment** in plain language which accurately reflects the results of the future technical studies, analyses and information.

Recommendation 13

The Proponent shall establish the Community Reference Group as a forum to engage with stakeholders on the broader environmental management of the Project's operations and the outcomes of the safety assessment prior to approval of the safety assessment by the relevant regulatory authority.

4.5.2.4 NT EPA conclusion

The Proponent has adequately identified and assessed the potential social and economic impacts and risks associated with the Project. The Project would provide economic and social benefits to the region, and implementation of the SIMP would provide for the mitigation and management of potential impacts.

With the establishment of the community reference group to ensure effective communication with stakeholders and the management of social and economic impacts, the NT EPA is satisfied that the environmental objective for this factor, as it applies to social and economic impacts is likely to be met.

4.5.3 Cultural heritage values

4.5.3.1 Environmental values

A search of the NT Heritage Register indicates that there are no heritage items/places registered under the *Heritage Act* on the Project site. The Proponent engaged an archaeologist to survey the site for items and places that may have heritage significance (R, Gregory & Associates, 2016). The report identified 51 individual sites of which 30 were part of eight larger site 'complexes'. Outside of the complexes, nine background scatters and 26 isolated finds were identified.

4.5.3.2 Potential impacts

Construction and occupation of the site has the potential to result in the disturbance and removal of Aboriginal artefacts and impact on the understanding of those items in the landscape.

4.5.3.3 NT EPA assessment

The Proponent has identified that at least three site complexes, 11 other sites, three background scatters and 11 isolated finds would need to be disturbed by the Project. Aboriginal artefacts at the 'Tellus Site Complex' and the 'Railway Background Scatter' would be relocated to areas outside of the construction zone and adjacent to the original site. Other artefacts that are vulnerable to disturbance by the Project would be fenced to avoid impacts and cultural heritage exclusion zones will be marked.

Aboriginal artefacts in the Northern Territory with cultural significance are protected under the *Heritage Act* and it is an offence to disturb/remove items with heritage significance without prior approval. The Proponent has committed to obtaining consent under the *Heritage Act* prior to disturbing any items.

The Proponent has prepared a Heritage Management Plan to manage the potential impacts to Aboriginal artefacts and outline the procedures if additional Aboriginal sites/items are discovered. In addition, the Plan proposes to establish a database of cultural heritage places and objects. The database will include documentation of all actions taken and will include a photographic record. The database of Aboriginal artefacts should be submitted to the Heritage Branch of the Department of Tourism and Culture prior to commencement of construction for each component of the Project.

Recommendation 14

Prior to the commencement of any construction, the Proponent or Operator must establish, and thereafter maintain, a database that documents the pre-disturbance state and fate of Aboriginal artefacts within the Project area. The database should be submitted to the Minister responsible for administering the *Heritage Act* prior to commencing construction.

Recommendation 15

Prior to the commencement of any construction, the Proponent or Operator must obtain relevant authorities and consents to disturb any/all sites of historical and cultural significance that may be disturbed by the Project.

4.5.3.4 NT EPA conclusion

The NT EPA considers that the Proponent has adequately identified the cultural heritage items (Aboriginal artefacts) and documented their location and archaeological significance. These items are protected under the *Heritage Act* and the Proponent would require approvals prior to relocating or removing any Aboriginal artefacts.

The NT EPA considers that the implementation of a Heritage Management Plan which protects and records Aboriginal sites and artefacts would ensure that the NT EPA's objective for this factor, as it applies to Aboriginal heritage, is highly likely to be met.

4.5.4 Chambers Pillar Historical Reserve

4.5.4.1 Environmental values

Chambers Pillar Historical Reserve is located approximately 6.8 km south of the Project area. The reserve was declared under the *Territory Parks and Wildlife Conservation Act* to protect the unique heritage and cultural values associated with the site. The site is visited by approximately 6500 visitors each year for walking, photography and the cultural and historic heritage values of the reserve.

4.5.4.2 Potential impacts

The Project has the potential to degrade the visual amenity of the Chambers Pillar Historical Reserve through the construction of Project components that may be visible from Chambers Pillar.

4.5.4.3 NT EPA assessment

Construction of the Project would result in visual impacts through the exposure of soils, the movement of machinery and equipment and the construction of buildings and infrastructure. The Project would not directly impact on the heritage values of the reserve but is located in an area that could potentially impact on the visual amenity for visitors. The Proponent has prepared a visual assessment of the Project

components from several viewpoints in the landscape, including Chambers Pillar and the Chambers Pillar Historical Reserve. The assessment was prepared in accordance with the Guidelines for Landscape and Visual Impact Assessment (IEMA, 2008).

The Proponent has concluded that based on the visual assessment that the Apirnta and Chandler Facilities will not be visible from the Chambers Pillar Historical Reserve or from the Chambers Pillar. The location of the Maryvale Range and the Charlotte Range block the viewshed from Chambers Pillar to the Project area. The accommodation village may be visible to vehicles that are travelling along the Chambers Pillar Road. The views would likely be of a short duration and largely screened by existing vegetation.

4.5.4.4 NT EPA conclusion

The visual assessment provided by the Proponent in the EIS suggests that the visual amenity of the Chambers Pillar and the Chambers Pillar Historical Reserve is unlikely to be degraded by the Project. The NT EPA considers that the objective as it applies to cultural surroundings is likely to be met.

4.6 Air quality

4.6.1 NT EPA objective

To maintain air quality and minimise emissions so that environmental values are protected.

4.6.2 Environmental values

The project is located in a remote location with no significant industry. The region is predominately used for pastoral and tourism land uses and has generally high air quality. Air quality in the region may at times be affected by smoke from wildfires and windborne dust. No baseline air quality monitoring was conducted by the Proponent and the Proponent used Darwin air quality monitoring data performed by the NT EPA. It was assumed air quality pollutant concentrations at the Project area would be lower than those measured in Darwin.

An air quality risk assessment was performed for the construction and operational phases. A dispersion modelling study was conducted for the operational phase to estimate the impact of new or existing sources of pollution on ambient air quality levels using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD).

The Proponent identified 29 sensitive receptor locations in the air quality risk assessment with the closest receptor located at the Chambers Pillar Campground, approximately 15 km away from Chandler and approximately 21 km away from Apirnta. The nearest permanent residence is Titjikala, which is located approximately 25 km from the Chandler facility and 44 km from Apirnta. A workers accommodation is located 2 km north of the Chandler Facility.

4.6.3 Potential impacts

The Project has potential to impact air quality due to contaminants in the emissions from the backfilling plant and mine ventilation system. The air quality may also be impacted through dust or smoke in the event of a fire at the facilities.

4.6.4 NT EPA assessment

Dust

Dust may be generated by increased by land clearing and construction activities. The main source of dust from the Project would be generated by vehicle movements along unsealed roads. The Proponent has committed to dust management measures within the EIS. In particular, the Proponent has committed to undertaking clearing and construction activities in stages to reduce the amount of area that would be vulnerable to wind erosion. Water trucks would be used to suppress the generation of dust on unsealed roads (refer to section 4.2.3).

The management of dust during construction and operation of the Project would be outlined in the Air Quality Management and Monitoring Plan for the Project. The Proponent has committed to establishing a dust monitoring network (including fine particulate matter) with the installation of dust monitors at Chandler, accommodation village, Titjikala community and Apirnta. The NT EPA considers that it would be appropriate that measures for managing, monitoring and reporting air quality emissions be addressed in the Air Quality Management and Monitoring Plan submitted as part of the mining authorisation and EPA and EPL applications for the Project.

Smoke and toxic emissions from fires of hazardous waste

Unanticipated fires at the Project may produce smoke and toxic emissions to the air. The toxicity and amount of smoke produced would depend on the size of the fire as well as the type/amount of material being burnt. To reduce the level of risk, the Proponent has committed to only accepting waste in accordance with the WAC and WZG which requires that wastes are tested and if deemed flammable are not accepted at Apirnta.

In addition to the WAC, the implementation of an Emergency Response Management Plan as committed to by the Proponent would reduce the likelihood of a fire occurring as well as the duration and impact of any fire events. The Emergency Response Management Plan should acknowledge the remoteness of the Project and the distance to the nearest Emergency Response Group (Alice Springs). The Project has potential to impact response time and regulatory emergency resources required to maintain the Emergency Response Area coverage. Given this, it is important that the Plan demonstrate that the Proponent has sufficient local capacity and resources to respond quickly and effectively to a fire emergency. The Proponent would be required to seek input from the Northern Territory Fire and Rescue Service to ensure planning for emergencies is in accordance with Australian Standards and is in compliance with the NT *Fire and Emergency Act*.

The NT EPA also makes Recommendation 19, discussed in section 5.2, for the requirement of a **process safety plan** that ensures the Proponent implements controls that prevent major incidents (including fires). Provided the WAC, Emergency Response Management Plan and the **process safety plan** are of an acceptable standard and are implemented effectively, the NT EPA considers that the impacts from smoke and toxic emissions would only have a temporary impact on regional air quality.

Toxic and odorous gas emissions from the hydraulic backfilling plant

A hydraulic backfill plant located at the surface of Chandler is proposed to dispose of suitable and compatible wastes to the salt rooms in the deep geological repository either via gravity fed saturated brine or pumped slurry. Odour and gases may be

released when wastes are mixed with liquids in the backfill plant. While most of the gases would be released during mixing at the plant, there is potential for gases to continue to be emitted from the backfill after deposition into the underground rooms that would need to be released via the mine ventilation system.

The Proponent has not provided any estimates of the amount of contaminants in emissions to air from the backfill plant due to the uncertainty of what wastes would be mixed in the backfill plant. The NT EPA notes that the operation of the hydraulic backfill plant would likely require an EPL under the WMPC Act. The application for the EPL would include an Air Quality Management Plan outlining (but not limited to) baseline information from the site, the types of wastes that would be used in backfill, estimates of emissions from the backfill plant, the location/risks to sensitive receptors, modelling of the odour/emissions plumes from the plant and measures to mitigate emissions and manage potential impacts. The Proponent has committed to developing a detailed Air Quality Management and Monitoring Plan to Australian Standards and this plan would be provided to the NT EPA in support of the EPL application.

Emissions from the backfill plant may also trigger reporting requirements to the National Pollutant Inventory (NPI) under the National Environment Protection (National Pollutant Inventory) Measure (NEPM).

The Proponent has identified that the hydraulic backfilling operations may produce flammable/toxic gases and that gas monitoring would be undertaken in the plant and salt mine rooms to manage this risk. Other underground waste repositories have demonstrated that gas formation can be monitored and managed safely so as to not risk the long-term isolation of waste from the biosphere. Prior to acceptance of hydraulic backfill waste in the deep geological repository, the Proponent would need to demonstrate that it can operate the backfill plant in accordance with the acceptance criteria in the **safety assessment** (Recommendation 6).

4.6.5 NT EPA conclusion

The NT EPA notes that there are uncertainties in relation to the potential impacts and risks with operating the hydraulic backfill plant. To address these uncertainties would require additional baseline information, modelling and operational information to be included in the Air Quality Management Plan.

The NT EPA acknowledges that there are likely to be aspects of the Project that are required for both the waste storage and mining components (diesel generators, etc.). Given this, the NT EPA considers that it would be appropriate that the Proponent prepare a whole-of-Project Air Quality Management Plan which would be provided to as part of the mining authorisation under the MM Act and to the NT EPA in support of the EPL application for Chandler.

Provided the uncertainties around the hydraulic backfill plant are resolved and there are sufficient monitoring and management provisions to maintain air quality, the NT EPA is satisfied that the environmental objective for this factor is likely to be met.

5 Whole-of-project considerations

5.1 Australia's first deep geological repository

The amount of hazardous waste in Australia continues to increase each year, outpacing the rate of population growth (Latimer, 2017). In 2014-15 Australia produced around 5.6 million tonnes of hazardous waste, which is about 9% of all waste generated (64 million tonnes) in this period. In addition, there are also large volumes of 'legacy wastes' that persist due to infrastructure, technology, regulatory or market/economic shortcomings. These legacy waste stockpiles are temporarily stored across Australia and amount to approximately 725 million tonnes and predominantly consist of aluminium smelting waste, fly ash from coal fired power stations and red mud from alumina refining (Latimer, 2017).

The Proponent has highlighted the advantages of a deep geological repository for managing Australia's hazardous waste. The Chandler deep geological repository is proposed as a solution that relies on both a natural geological barrier (salt bed) and human-made engineered barriers for permanently isolating up to 8.5 million tonnes of hazardous waste. Advantages include the distance between the waste and biosphere and the passive safety of geological barriers. The Proponent has cited other deep geological repositories used around the world that are internationally recognised for their permanent isolation properties and considered 'best practice' for hazardous waste disposal. However, geological and site specific conditions are different between deep geological repositories and the Chandler site must be evaluated according to its specific situation.

The NT EPA supports the concept of a deep geological repository that, with appropriate site selection, design, construction and operation, can safely capture and isolate existing and future hazardous waste streams. The NT EPA recognises advantages in managing and storing the large volumes of hazardous waste in appropriate infrastructure and controlled in a tightly regulated environment rather than stored around Australia in temporary or insufficient infrastructure that may create contaminated sites or pose environmental hazards.

The NT EPA is of the opinion that there are legacy waste stockpiles that should not be identified for permanent isolation at the Chandler Facility. This includes wastes for which international best practice for disposal is by destruction rather than permanent placement underground. An example includes the scheduled waste hexachlorobenzene (HCB). HCB is classified as a Persistent Organic Pollutant (POP) and is listed in the annexes of the Stockholm Convention – a global treaty, of which Australia is a signatory that aims to protect the environment and human health from the effects of POPs. Where there is an alternative disposal option for a particular waste that is recognised as best practice, the NT EPA does not support the disposal of that waste at the deep geological repository at Chandler. The NT EPA makes Recommendation 3 to enable the regulator to control the waste streams accepted for the deep geological repository at the Chandler Facility, informed by independent expert peer review and in consideration of international best practice.

While deep geological repositories may provide best practice infrastructure to safely dispose of some hazardous wastes, an approval of this Project comes with uncertainties with respect to how it would be operated during its project life and its performance in the long term. There needs to be recognition and acceptance by the NTG that deep geological repositories are expensive to construct, any capacity for long term monitoring is limited, and long-term maintenance and repair (if required) would be impossible once the repository is permanently sealed. If errors are made

during construction, operation or closure or if there are unexpected flaws in the repository, the removal of the waste to a better location is unlikely to be economically feasible. If it is identified that the wrong site selection was made, it cannot be corrected after waste emplacement/closure- effectively making the decision irreversible (Appel, 2010).

The NT EPA considers the community and future generations should not be burdened if it is discovered that the wrong site selection was made or the repository is not isolated from the biosphere. The NT EPA makes recommendations for the provision of **financial assurance**, an **expert advisory group** and the **independent auditor** to assist in the delivery of transparent and effective regulation to ensure acceptable long-term environmental and community outcomes.

5.2 Regulation of the Project

The large scale and nature of this Project requires an appropriate, transparent and flexible regulatory framework to mitigate the potential impacts and risks identified in this EIS. Regulatory capacity needs to be considered for administration, ensuring compliance with the relevant licence conditions and also for sufficient regulatory resources on the ground to ensure the Proponent or Operator is adhering to its own procedures and plans. Minimising potential impacts to the environment through responsible storage and handling of hazardous waste relies on the Proponent or operator implementing and adhering to:

- Waste Acceptance Criteria (WAC), Waste Acceptance Procedures (WAP) and Waste Zoning Guide (WZG)
- Environment Protection Approval and Licence conditions.
- Legislation, industry regulations, codes and standards
- Emergency Response Management Plan
- Operating Environmental Management Plans.

Significant regulatory resources and systems will be required to ensure the Proponent complies with the above requirements and manages the Project's waste operations in accordance with its WAC, commitments, licence conditions and management plans. The NT EPA supports the Proponent's commitment to establish a monitoring and auditing program during construction, operation and closure and rehabilitation of the Project.

Independent auditor

The NT EPA is cognisant that there is likely to be considerable national and community interest in relation to the Project. The Project's 'social licence to operate', and the regulator's 'social licence to regulate' will need to be developed through a high level of transparency about NTG decisions, approvals and environmental performance by the Operator. To mitigate the risks a Project of this type and scale poses and the significant regulatory scrutiny that will be required, the NT EPA recommends the appointment of an **independent auditor** for the life of the Project. The purpose of the **independent auditor** is to undertake an independent assessment and audit of the waste components of the Project without interference from the Operator or regulator. It supports the user pays principle and provides transparency about the environmental regulation of the Project. The **independent auditor** would be in addition to the Proponent or Operator's and the regulatory agency's respective obligations and statutory responsibilities in relation to the Project.

The **independent auditor** would conduct an independent annual audit of the Project's waste operations and the NT EPA's regulatory activities. The **independent auditor** would provide feedback to the NT EPA on compliance with the licence conditions and provide advice and facilitate any modification of those licence conditions, if required, to achieve better environmental outcomes. The requirement for an **independent auditor** is to be outlined in the EPL conditions for both Apirnta and the deep geological repository at the Chandler Facility. Oversight by the **independent auditor** would not be required for the underground salt mine Project components as the NT EPA considers standard mining activities are able to be regulated under the MM Act.

The NT EPA expects the **independent auditor** to provide independent scientific assessment of the Project's waste operations and the regulatory agency's compliance activities every year in an annual report. The **independent auditor** is to engage with the local community on the results of the report.

The annual report from the **independent auditor** is to inform the NT EPA on how the waste components of the Project and its regulation are performing and is to be made public to the local and wider community every year.

The NT EPA refers to the Independent Monitor framework used by DPIR⁴ as an appropriate model for the conditioning of an **independent auditor**. This includes procurement of the **independent auditor** being the responsibility of the NT EPA with the Proponent responsible for the costs of the **independent auditor**.

Recommendation 16

The Proponent or Operator shall commission an independent auditor to conduct an environmental audit of the waste-related operations of the Project. The audit must:

- a) **be conducted on an annual basis commencing 12 months from the date construction starts**
- b) **be led by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Northern Territory Environment Protection Authority**
- c) **audit the Proponent or Operator's compliance with all approvals and licences for waste-related activities**
- d) **recommend appropriate measures or actions to improve the environmental performance of the Project**
- e) **provide an independent assessment of the Project's waste operations in an annual report to the Northern Territory Environment Protection Authority and responsible Minister and the Proponent or Operator**
- f) **provide the annual report to the Northern Territory Environment Protection Authority and the responsible Minister and the Proponent or Operator within eight weeks of its completion**

⁴ https://dpiir.nt.gov.au/_data/assets/pdf_file/0007/255985/MRM_Independent_Monitoring_Assessment_Conditions.pdf

- g) provide the annual report to the public with the stakeholders from the Community Reference Group, identified in Recommendation 13, briefed on the results of the report.

Financial assurance

The NT EPA notes that the provision of financial assurances and insurances does not diminish the Proponent or Operator's responsibility, but is intended to protect the NTG in the event that the site is abandoned or should the Proponent or Operator fail to meet its obligations. Costs that could potentially fall to the NTG, and which need to be covered by financial assurance include:

- Costs for unforeseen closure – Recommendation 4 provides for financial assurance in the event waste temporarily stored at Apirnta requires third party transport and disposal to an alternative facility
- Closure and Rehabilitation – there are two aspects of the proposal that requires consideration:
 - Mine closure and rehabilitation – closure and rehabilitation of the salt mining aspect of the proposal will be required. Under the MM Act, the Proponent or Operator would be required to provide a calculation for the security bond to be utilised by NTG, if required, to prevent, minimise or rectify environmental harm caused by mining activities or for completion of rehabilitation. Mining securities are based on the amount of disturbance likely to be caused by the authorised mining activities and rehabilitation costs.
 - Chandler facility decommissioning and closure – once waste is placed into the deep geological repository, the voids become waste cells and would not be covered by the MM Act. Separate financial assurance would be required for this aspect and NT EPA makes Recommendation 11 to ensure adequate financial assurance is provided for final permanent sealing and closure of the deep geological repository.
- Institutional Control Period costs to cover monitoring, site inspections, administration and potential remedial actions. The costs should be sufficient to demonstrate the repository is performing as predicted that the wastes are permanently isolated.

The Proponent has identified the need for appropriate financial assurance provisions to be provided upfront to the NTG over the life of the project. Financial assurance will be required for different components of the Project and under different legislation. The NT EPA considers it is necessary for the Proponent to provide a **whole-of-project financial assurance** that clearly set outs the relevant financial assurance for each specific component of the Project. The **whole-of-project financial assurance** would ensure that unacceptable environmental impacts and risks are acknowledged, and financial risk to the NTG is avoided, covering all financial obligations under the appropriate regulatory regime. This would also prevent double counting of financial liability between the relevant regulatory agencies and ensure remediation costs for all components of the Project are adequately covered. The **whole-of-project financial assurance** should also allow for appropriate review and adjustment by regulatory NTG agencies based on level of disturbance, activities and level of risk.

Recommendation 17

Before approvals or decisions are given or made for the Project, the Proponent must provide a whole-of-project financial assurance/security proposal that describes:

- a) the amount of financial assurance/security for each component of the Project from time to time throughout the Project**
- b) how the financial assurance assessments were or would be conducted for any specific components of the Project (e.g. there may be different approaches in relation to different components of the Project) and the specific calculations and tools used**
- c) the regulatory agency the Proponent understands is accountable for holding any specific components of the financial assurance/security over time**
- d) an independent third-party assessment of the proposed financial assurance/security by a qualified person approved by the Northern Territory Environment Protection Authority and responsible Minister**
- e) details on how financial assurance/security costings and principles are in accordance with best practice standards**
- f) suggested triggers and identified statutory mechanisms for varying the financial assurance/security for different project components as required over time.**

The NTG has adopted a policy of disclosure for mining security bond amounts against individual mining projects, including for exploration, extractives and mines. The NT EPA supports an open and transparent regulatory regime and recommends the public disclosure of all financial assurances held for the Project.

Recommendation 18

Public disclosure of any financial assurance/security held in respect of the Project shall be provided on the websites of (as applicable), the Proponent, Operator and relevant regulatory authorities.

The NT EPA emphasises financial assurance does not replace sound environmental management by the operator and it should not be relied on by the regulator to guarantee risks can be managed. The provision of financial assurance is only intended as a safety net to cover costs incurred to prevent environmental harm should the operator fail to meet its environmental obligations. The regulator plays a key role in ensuring that the operator is managing its potentially significant environmental impacts and risks to agreed standards. The regulatory oversight of process safety is an additional tool the regulator can use to ensure catastrophic incidents do not occur such that the environment and communities are protected.

Process safety

Process safety is a blend of engineering and management skills focused on preventing catastrophic incidents (process safety hazards). These catastrophic incidents are also referred to as process safety incidents that may include structural collapse, explosions, fires and toxic releases associated with loss of containment of energy, hazardous waste, chemicals, hydrocarbons and petroleum products. Process

safety incidents have the potential to impact humans, the community, environmental values, company reputation and financial losses. Process safety skills exceed those required for managing workplace safety as it considers how major hazards (rather than human safety hazards) are assessed and controlled⁵. With effective implementation of the principles of process safety, the Proponent or Operator is better positioned to prevent major incidents occurring.

The oversight of process safety systems for the Project's waste and mining operations would strengthen regulation to prevent occurrence of catastrophic major accidents that may impact the environment (Wilkinson & Murphy, 2017). The NT EPA recognises the Proponent has committed to operating environment management systems in line with industry standards as well as finalising an Emergency Response Management Plan in the event of an emergency such as spill, fire, explosion or gas leak. The regulation of process safety provides additional certainty that the Proponent is managing its significant risks by preventing catastrophic incidents. The NT EPA recommends a **process safety plan** that provides additional detailed information on both the preventative and mitigating controls in the event of a serious incident. This **process safety plan** would encompass both the waste and mining components since a catastrophic incident in either business would have whole-of-project impacts.

The NT EPA considers regulatory oversight of process safety at the Apirnta and Chandler facilities is an additional layer of oversight that enables the Proponent or Operator to demonstrate risks at the site have been reduced to a level that is as low as reasonably achievable (ALARA). With a clearly documented **process safety plan** that includes identified hazards, threats and controls to prevent major incidents (emergencies) from occurring, the regulatory agencies (DPIR and NT EPA) can focus on ensuring the operator implements those critical controls (ICMM, 2017). Critical controls are those controls that would have the greatest impact on preventing the risks relating to a major process safety incident (e.g. spill) from occurring or would provide the greatest mitigation of the potential consequences. Focusing on how the operator implements critical controls, allows the regulator to demonstrate that finite regulatory resources are targeting the high-risk issues in a consistent and transparent way.

Recommendation 19

The Proponent shall engage an independent process safety expert, endorsed by the NT EPA and DPIR, to:

- a) **develop a process safety plan that details how process safety systems would be implemented to prevent the occurrence of a major process safety incident**
- b) **provide oversight of the implementation of process safety via regular inspections**
- c) **provide reporting of process safety oversight to the regulatory agencies responsible for administering the WMPC Act and MM Act.**

The process safety plan must:

- a) **identify major process safety hazards at Apirnta and Chandler including the risks associated with transport, storage and disposal of wastes and underground mining**

⁵ <https://www.energyinst.org/technical/safety/process-safety>

- b) document the risks and controls and identify critical controls**
- c) provide bowtie diagrams to present risks and controls for the identified process safety hazards in a graphical form**
- d) document the controls and associated accountabilities and active monitoring responsibilities**
- e) monitor and report on the effectiveness of the controls, identifying areas for improvement and actioning**
- f) document the independent process safety expert's oversight inspection schedule that would report on whether process safety systems are embedded into the culture of the organisation**
- g) provide provisions for publicly reporting the independent process safety oversight reports.**

Interstate waste transport

During the operation of the Project, waste would be transported predominantly from interstate to Apirnta. Wastes would be collected by a licensed third party and moved to a licensed transit hub (location was not specified in the EIS) prior to scheduling transport to the Project. From the transit hub, most of the waste would be transported along the central Australia railway or by road to Apirnta. Once at Apirnta, the waste would either be stored at the facility or trucked by road train to the deep geological repository for disposal.

The increased movement of controlled waste (type and volume) into the NT poses a heightened potential for accidents and spills of hazardous waste. Very little waste is currently transported into the NT and the majority of waste generated in the NT is exported to other states such as South Australia, New South Wales and Queensland. Transport of controlled waste in the NT requires a licence issued under the WMPC Act. A Controlled Waste Consignment Authorisation from the receiving state is required prior to the interstate movement of controlled waste from another jurisdiction under the *National Environmental Protection (Movement of Controlled Waste between States and Territories) Measure* (Controlled Waste NEPM). Reporting requirements are stipulated in licences. Recording and reporting on interstate movement of controlled waste is a requirement under NEPM.

The Proponent states that waste would be transported by third party operators that would be licensed to transport dangerous goods. The transportation of dangerous goods by road and rail would be regulated by NT Worksafe which administers the *Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act* and regulations. Each Emergency Response Plan/Guide would need to be prepared and implemented to the satisfaction of NT Worksafe.

Conditions of the EPL issued to third party transporters licensed in the NT will apply in terms of waste tracking, reporting and ensuring appropriate measures are in place to prevent, mitigate and respond to emergencies including loss of containment during transport.

The Australian Government is a signatory to the Basel Convention (Regulation of Transboundary Movements) and implements its responsibilities through the *Hazardous Waste (Regulation of Exports and Imports) Act* and the NEPM. This Act regulates the export, import and transit of hazardous waste to ensure that it is managed in a manner that protects humans and the environment from the harmful

effects of waste. There is the potential for waste to be shipped within Australia to the Darwin Port (or other licensed transit hub) and the NT EPA expects transport of this waste would be in accordance with the Basel Convention obligations.

It should be noted that there are environmental risks associated with the use of the Port of Darwin for waste transport. Those risks were not assessed in this Report. If waste which is destined for the Chandler were to be transported through the Port of Darwin, the contractor/Proponent would be required to advise the NT EPA and would require a licence under the WMPC Act.

Waste levy

There is no legislation in the NT that applies levies for disposal of waste, and no plan to introduce a waste levy in the NT at this time. Landfill waste levies are imposed under other State legislation, however, under current provisions; interstate waste would not be subject to a levy when disposed to Chandler. The NT EPA notes that a situation could arise where there are suitable disposal facilities in the State or Territory where waste is generated but disposal to Chandler is more economic based on the waste levy in the State or Territory of origin.

Regulatory resources

There needs to be a clear recognition of the extensive regulatory resources that will be required for the regulation of this Project. In line with regulation of similar international facilities, there is the public expectation for transparent and rigorous decision making as well as separate responsibilities of regulatory oversight and independent scientific review of supporting documentation for the **safety assessment** and other key approval conditions. The NT EPA supports the 'user pays' principle and has made recommendations for an **independent auditor**, an **expert advisory group** to provide transparency in how the Project is regulated. The NT EPA considers the availability of independent regulatory reviews (**independent auditor**) and access to independent experts (**expert advisory group**) provides the community with assurances that cannot be provided by the operator or regulatory agency alone. These recommendations were made with the objective of achieving the best practicable environmental outcome and in consideration of the current regulatory capacity and technical expertise available in the NT for regulation of an activity that has never been undertaken previously in Australia.

There is still a considerable amount of information to be provided by the Proponent and work for regulatory authorities prior to approval of the Project. This future work is essential to provide assurance to the public that the long-term **safety assessment** of this Project is achievable and that the Project is the best option for dealing with Australia's hazardous waste – without unacceptable environmental impacts now and for future generations.

Institutional control period

The Chandler Facility would operate for a nominal 25-year period and permanently emplace waste up to a maximum capacity of 10 million tonnes. The Proponent proposes a potential post closure monitoring period from year 29 to 45. Following this post closure monitoring period, an Institutional Control Period of 30 years is proposed that transfers management of the Chandler Facility to the NTG. The NT EPA considers an appropriate Institutional Control Period should be established based on technical and international comparisons in addition to meeting agreed closure, monitoring and relinquishment criteria rather than a specified timeframe proposed at the environmental assessment stage.

The Institutional Control Period must be agreed to by the regulator at a later date and prior to acceptance of the final rehabilitation and closure plan. The Institutional Control Period would be based on consideration of evidence provided by the Proponent to the regulator as part of the **safety assessment** that waste stored in the Chandler Facility would be permanently physically isolated from the biosphere, is passively safe and there is no need for monitoring or human intervention to maintain safety.

The NT EPA acknowledges that there are risks associated with the Institutional Control Period and the isolation of the waste material through human intrusion. The most significant way to reduce the likelihood of an intrusion event is by placing the waste at depth, at a site with no known water or mineral resources (ICRP, 2013; IAEA, 2012). Based on current knowledge, the NT EPA considers the site selection of the Chandler Facility reflects this international assessment for minimising human intrusion scenarios for deep geologic repositories.

6 Conclusion

In making this Report, the NT EPA had regard to the information provided by the Proponent, submissions on the draft EIS and Supplement, advice from specialists from the Northern Territory Government and independent experts as well as relevant guidelines and standards. The NT EPA has assessed the Project against the NT EPA's objectives for the key environmental factors of: Terrestrial environmental quality; Inland water environmental quality; Hydrological processes; Terrestrial flora and fauna; Air quality and social, economic and cultural surroundings.

The Project would comprise the largest hazardous waste surface storage facility and the first deep hazardous waste geological repository in Australia. While the Proponent presents the Project as a partial solution for managing Australia's hazardous waste, the NT EPA remains concerned with the risks and potential impacts associated with storing large volumes of hazardous waste at surface, particularly before the deep geological repository has been proven or constructed. To address these risks, the NT EPA recommends that conditions of approval and licences issued under the *Waste Management and Pollution Control Act* specify risk-based limits on the type and quantity of waste, and ensure that these align with construction milestones.

The NT EPA supports the concept of a deep geological repository that, with appropriate site selection, design, construction and operation, can safely capture and isolate existing and future hazardous waste streams. There is however a considerable amount of site-specific information (including baseline data) to be provided by the Proponent and review by regulatory authorities before approvals can be issued for the Project. The NT EPA has made recommendations in this report for future work to provide greater certainty that the long-term safety assessment of this Project is achievable and is the best option for disposing of Australia's hazardous waste, without unacceptable environmental impacts now and for future generations.

In assessing this Project, the NT EPA has considered the design, operation, regulation and learnings of other deep geological waste repositories internationally. The NT EPA has made recommendations in this Report with the objective of achieving the best practicable environmental outcome and in consideration of the current regulatory capacity and technical expertise available in the NT. This includes recommendations for transparent and rigorous regulatory decision making and separating responsibilities of regulatory oversight and independent scientific review of supporting documentation as key recommended approval conditions. The NT EPA supports the 'user pays' principle in requiring the Proponent or operator to fund an

independent auditor, an **expert advisory group** and independent **process safety** expertise to ensure that management decisions are transparent, robust and based on the best available scientific and technical advice, and that is independent of influence by the Proponent/operator or the regulator.

The NT EPA is aware that there is likely to be considerable local and national interest in the Project. The Project's 'social licence to operate' and the regulator's 'social licence to regulate' will need to be developed through a high level of transparency about government decisions and approvals and by genuine on-going engagement by the Proponent with its stakeholders. To promote transparency, the NT EPA makes recommendations for public disclosure of the **independent auditor** and **process safety** oversight reports and **financial assurance** amounts.

While deep geological repositories may provide best practice infrastructure to safely dispose of hazardous waste, this Project comes with environmental and financial risks to NTG and the community. To address these risks the NT EPA makes recommendations consistent with the Proponent's commitment to ensure appropriate **financial assurance** provisions are provided upfront to the NTG over the life of the project. A **whole-of-project financial assurance** would ensure that unacceptable environmental impacts and risks are acknowledged, and financial risk to NTG is avoided, covering all financial obligations under the appropriate regulatory regime.

The NT EPA considers the appropriate mechanism to address the uncertainties around the final emplacement of waste and ensuring permanent isolation from the biosphere (including groundwater) is for the Proponent to conduct a **safety assessment** for acceptance of waste in underground storage in accordance with Appendix A of the European Council Decision 2003/33/EC. The **safety assessment** requires a long-term assessment to ascertain that no pathways to the biosphere would be generated during the long-term post-operation of the deep geological repository. As part of this assessment, the man-made barriers of the geological repository, the performance of the host rock, surrounding strata and overburden, are to be quantitatively assessed over the long term and evaluated on the basis of site-specific data. The NT EPA considers this information is essential to demonstrate that the right site selection was made and that the repository is isolated from the biosphere so that the residual impacts and risks of the Project are not a burden for future generations.

The NT EPA makes 19 recommendations as an outcome of the EIA. These recommendations are for the Proponent and decision-makers to consider in future approval processes and for the execution of the proposed action. The NT EPA emphasises that the environmental commitments, safeguards and recommendations outlined in the EIS, this Assessment Report and in the final management plans, must be implemented to deliver acceptable environmental outcomes.

The NT EPA considers the Project can be managed in manner that is likely to meet the NT EPA's objectives and avoids significant or unacceptable environmental impacts.

7 References

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Appendix 1

Table 2. Coordinates for the Project Area

Point	Latitude	Longitude
1	24° 43' 56.589" S	133° 41' 16.551" E
2	24° 45' 8.973" S	133° 41' 9.492" E
3	24° 45' 7.499" S	133° 50' 42.347" E
4	24° 45' 19.547" S	133° 50' 57.910" E
5	24° 46' 57.379" S	133° 51' 37.870" E
6	24° 46' 24.860" S	133° 53' 26.531" E
7	24° 44' 58.403" S	133° 53' 27.299" E
8	24° 44' 59.680" S	133° 56' 23.741" E
9	24° 44' 44.912" S	133° 56' 44.622" E
10	24° 44' 19.002" S	133° 56' 47.229" E
11	24° 43' 46.573" S	133° 57' 8.903" E
12	24° 43' 22.222" S	133° 57' 7.441" E
13	24° 37' 38.268" S	134° 0' 21.029" E
14	24° 36' 56.591" S	134° 0' 16.582" E
15	24° 36' 32.520" S	134° 0' 46.361" E
16	24° 36' 39.971" S	134° 3' 0.399" E
17	24° 35' 50.586" S	134° 4' 38.881" E
18	24° 36' 17.830" S	134° 4' 55.427" E
19	24° 37' 12.721" S	134° 3' 4.413" E
20	24° 37' 3.302" S	134° 1' 1.110" E
21	24° 37' 10.903" S	134° 0' 51.408" E
22	24° 37' 40.718" S	134° 0' 57.489" E
23	24° 43' 25.757" S	133° 57' 43.349" E
24	24° 43' 50.817" S	133° 57' 44.820" E
25	24° 44' 31.790" S	133° 57' 20.381" E
26	24° 44' 59.266" S	133° 57' 23.040" E
27	24° 45' 10.473" S	133° 57' 8.124" E
28	24° 46' 23.842" S	133° 57' 8.943" E
29	24° 47' 43.670" S	133° 56' 56.792" E
30	24° 48' 0.720" S	133° 56' 59.518" E
31	24° 48' 24.390" S	133° 57' 12.236" E
32	24° 49' 5.060" S	133° 57' 20.506" E

33	24° 53' 28.753" S	133° 59' 50.573" E
34	24° 54' 17.315" S	133° 59' 50.181" E
35	24° 54' 16.953" S	133° 58' 56.640" E
36	24° 50' 38.877" S	133° 57' 23.334" E
37	24° 49' 4.676" S	133° 56' 25.965" E
38	24° 48' 27.874" S	133° 56' 9.055" E
39	24° 48' 19.738" S	133° 55' 30.374" E
40	24° 47' 50.680" S	133° 54' 57.616" E
41	24° 48' 59.434" S	133° 53' 25.156" E
42	24° 47' 1.539" S	133° 53' 26.205" E
43	24° 47' 39.309" S	133° 51' 15.967" E
44	24° 46' 14.039" S	133° 50' 39.206" E
45	24° 45' 40.196" S	133° 50' 17.548" E
46	24° 45' 44.332" S	133° 40' 30.809" E