The Proposed Chandler Facility

Environmental Impact Statement Supplement Report

Draft Report | July 2017

TELLUS

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PROPOSED CHANDLER FACILITY
SUPPLEMENT REPORT TO THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Draft Report | July 2017

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CERTIFICATION

Submission of Supplement Report to the draft Environmental Impact Assessment

Prepared under Part 3 Sections 18, 18A, 20 and 20A of the *Environment Protection Biodiversity Conservation Act 1999,* under the Northern Territory *Environmental Assessment Act*.

Environmental Supplement prepared by:

Name: Qualifications:	Richard Phillips BEnvSci(Hons) DipAppSci (Landscape Engineering)
Name: Qualifications:	Sophy Townsend BEnvSci(Hons)
Address:	Suite 2 Level 10, 151 Castlereagh Street Sydney, NSW2000
In respect of: **Project to which the *Environmental Assessment Act* applies**	The Chandler Proposal
Applicant name:	Tellus Holdings Ltd
Applicant address:	Suite 2, Level 10, 151 Castlereagh Street Sydney, NSW 2000
Land to which the proposal seeks approval:	Northern Territory Portion 657 and 810
Environment Assessment:	An Environmental Supplement is attached
Certificate	I certify that I have prepared the contents of this document and to the best of my knowledge: • It is in accordance with the requirements of the *Environmental Assessment Act* and Environmental Assessment Regulations and Administrative Procedures. • It contains all available information that is relevant to the Environmental Assessment of the proposed development to which it relates. • The information contained in the document is neither false nor misleading.

ACKNOWLEDGEMENTS

Tellus wishes to thank those who provided information and dedicated time to discussions that assisted in the preparation of this Environmental Supplement report.

The study team also wishes to thank all of those who participated in consultation activities conducted during the preparation of the Environmental Supplement report by email, phone, letter and face to face discussions

SUPPLEMENT REPORT CONTRIBUTORS

Chapter No	Chapter name	Originator / Contributor
1	Introduction	Tellus Holdings Ltd
2	Submissions Received on the draft EIS	Tellus Holdings Ltd / various
3	Stakeholder Consultation	Tellus Holdings Ltd
4	Revisions to the draft EIS	Tellus Holdings Ltd
5	Responses to Submissions on the draft EIS	• Tellus Holdings Ltd • EMM Consulting • HEC Consulting • Low Ecological Services • Northstar Consulting • Toll Group • Trident Project and Mining Services
6	References	Tellus Holdings Ltd

DOCUMENT CONTROL

Revision	Issue date	Description	Originator	Checked	Approved
2	21/7/2017	EIS Supplement Report	Tellus Holdings Ltd		

NOTES ON THE TEXT

Would/will

The word “will” is only used as a commitment of the proponent (Tellus Holdings Ltd) to undertake further work / study as deemed appropriate within a submission to the draft EIS. If all approvals are given for the Proposal to proceed, all “would” references should be interpreted as “will”.

The Proposal

The “Chandler Proposal” includes the construction and operation of the proposed Chandler Facility and Apirnta Facility. It also includes the construction and operation of the proposed Chandler Haul Road and Henbury Access Road.

Proposal description

Development and design of the Proposal remains ongoing throughout the preparation of a Bankable Feasibility Study supported by detailed design. Where detailed figures are provided, they represent the conditions assessed as a *‘reasonable worst case’* or are provided as estimates where the nature of the chapter supports this.

Whilst these figures remain subject to change throughout the detailed design, any changes are not expected to materially affect the outcome of the environmental impact assessment which is based on a realistic worst case.

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ABBREVIATIONS

ALEC	Arid Lands Environment Centre
ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AS	Australian Standard
BAT	Best Available Technology
BMP/BDMP	Biodiversity Management Plan
BFMP	Bushfire Management Plan
BFS	Bankable Feasibility Study
BPM	Best Practice Measures
BTEX	Benzene, toluene, ethylbenzene and xylene
B2B	Back to back
C&I	Commercial and Industrial
C&D	Commercial and Demolition
CEMP	Construction Environmental Management Plan
CLC	Central Lands Council
COMAH	Control of Major Accident Hazards
CPESC	Certified Professional in Erosion and Sediment Control
DEE	Commonwealth Department of Environment and Energy
decaBDE	Decabromodiphenyl ether
DEFRA	Department Environment Food and Rural Affairs
DENR	NT Department of Environment and Natural Resources
DG	Dangerous Goods
DIPL	Department of Infrastructure Planning and Logistics

DLRM	(now DENR) NT Department of Environment and Natural Resources
DMA	Decision Making Authorities
DPIR	NT Department of Primary Industries and Resources
EA Act	NT *Environmental Assessment Act*
EDI	Electronic Data Interchange
ESCP	Erosion and Sedimentation Control Plan
ESM	Environmentally Sound Management
EIS	Environmental Impact Statement
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ESCP	Erosion and Sedimentation Control Plan
EWMA	Exponentially weighted moving average
GDE	Groundwater Dependent Ecosystem
GWA	Genesee & Wyoming Australia
ha	hectares
HBCD	Hexabromocyclododecane
HCB	Hexachlorobenzene
IBC	Intermediate Bulk Containers
K+S	K+S Group
m	metres
mm	millimetres
MMP	Mine Management Plan
HSE	Health Safety and Environment
IECA	International Erosion Control Association
kL	kilo-litre
km	kilometres

LEBRA	Lake Eyre Basin Rivers Assessment
LOD	Limit of detection
LoM	Life of Mine
MHF	Major Hazard Facility
MIA	Mine infrastructure area
MM Act	NT *Mining Management Act*
MMP	Mining Management Plan
MOU	Memorandum of Understanding
MPFS	Major Project Facilitation Service
MSDS	Material Data Safety Sheet
MSW	Municipal Solid Waste
MW	Megawatt
NATA	National Association of Testing Authorities
NORM	Naturally Occurring Radioactive Material
NT	Northern Territory
NT EPA	Norther Territory Environmental Protection Authority
OECD	Organisation for Economic Co-Operation and Development
OEMP	Operational Environmental Management Plan
PCG	Project Control Group
PPE	Personal protective equipment
PFS	Prefeasibility Study
PFOS	Perfluorooctane sulfonate
PMST	Protected Matters Search Tool
POP-BDE	Polybrominated diphenyl ethers
PID	Photoionization detector
QA/QC	Quality Assurance/Quality Control

RCP	Rehabilitation Closure Plan
RFID	Radio-frequency identification
RMP	Radiation Management Plan
ROM	Run of Mine
RPD	Relative percentage difference
RWMP	Radioactive Waste Management Plan
SA	South Australia
SDS	Safety Data Sheet
SMART	Specific, measurable, achievable, results-orientated and time-bound
SPL	Spent potlining
SSTVs	Site-specific Trigger Values
SWS	Südwestdeutsche Salzwerke AG
TAP	Threat Abatement Plan
TARP	Trigger Action Response Plan
Tellus	Tellus Holdings Limited or the proponent
Terms of Reference	*Terms of Reference for the Preparation of an Environmental Impact Statement – Chandler Salt Mine*
TEU	Twenty-foot equivalent unit
TMP	Traffic Management Plan
tpa	tonnes per annum
TPWC Act	NT *Territory Parks and Wildlife Conservation Act 1980*
TSP	Total Suspended Particulates
UTM	Universal Transverse Mercator
UV	Ultraviolet
VBS	Vehicle Booking System
VOCs	Volatile organic compounds

WA	Western Australia
WAC	Waste Acceptance Criteria
WAP	Waste Acceptance Procedure
WHS	Work Health and Safety
WMP	Water Management Plan
WMPC Act	NT *Waste Management Pollution Control Act*
WMPC Regulations	Waste Management Pollution Control (Administration) Regulations
WRINT	Waste Recycling Industry Association Northern Territory
WZG	Waste Zoning Guide
24/7	Twenty-four hours per day, seven days per week

1 INTRODUCTION

Tellus Holdings Ltd (Tellus) is an infrastructure project development company in the business of creating economic, social and environmental value from waste, clay and salt resources. This dual revenue model involves mining for salt and kaolin and backfilling the resulting voids with equipment, archives or waste for storage. Tellus plans to store like-with-like materials, so as to create opportunities for the future long-term storage, treatment and recovery of valuable materials or the permanent isolation of waste. Tellus supports releasing valuable materials back into the circular economy. Tellus' business model mirrors world's best practice solutions operating in the UK, Europe and North America.

Tellus (herein referred to as 'the proponent') propose to construct and operate an underground rock salt mine and storage, recovery and permanent isolation facility (herein referred to as the 'Chandler Facility'). A rail siding and temporary surface storage and transfer facility (herein referred to as the 'Apirnta Facility') is also proposed to support the Chandler Facility by providing temporary storage and a logistical transfer point of salt and/or waste materials.

A private haul road linking the two facilities (herein referred to as the 'Chandler Haul Road') would be constructed. A private access road (herein referred to as 'Henbury Access Road'), would be constructed to link the proposed Apirnta Facility with the Stuart Highway during operation. Collectively, the two proposed facilities and the haul and access roads are referred to as 'the Proposal'.

If approved, the Chandler Facility and the majority of the Chandler Haul Road would be located within a pastoral lease (Maryvale Station) approximately 120 kilometres south of Alice Springs and about 25 kilometres by road from the community of Titjikala in the Northern Territory (NT).

The proposed Apirnta Facility, Henbury Access Road and a portion of the Chandler Haul Road would be located to the west of the proposed Chandler Facility. These pieces of infrastructure would be located on a pastoral lease named Henbury Station.

The proponent submitted a draft Environmental Impact Statement (EIS) to the NT Environmental Protection Authority (EPA) on 10 February, 2017. The draft EIS was prepared to address key approvals under the following Acts of Legislation:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- NT *Environmental Assessment Act* (EA Act).
- NT *Mining Management Act* (MM Act).
- NT *Waste Management Pollution Control Act* (WMPC Act).

The draft EIS was prepared to address the requirements set out in the *Terms of Reference for the Preparation of an Environmental Impact Statement – Chandler Salt Mine* (the 'Terms of Reference')

issued by the NT Environment Protection Authority (NT EPA) on 23 September, 2016, under the EA Act. The draft EIS also addressed construction, operation, and closure and decommissioning of the Proposal. The draft EIS was available for public exhibition from 18 February, 2017, to 14 April, 2017. On 20 April, 2017, the NT EPA directed the proponent to prepare a Supplement Report (herein referred to as 'the Supplement') to the draft EIS.

The Supplement is required for the purpose of responding to issues raised during the eight week public exhibition period. The Supplement is being formally submitted in accordance with the requirements of the NT *Environmental Assessment Act*.

The draft EIS and the Supplement collectively form the EIS for the Proposal and should be read in conjunction. The Supplement addresses the issues raised by stakeholders (government and non-government) in their submissions. It contains responses to individual issues, as well as additional technical information (where appropriate) about potential environmental and social impacts.

The daft EIS also proposes management measures to either avoid or minimise identified impacts that may be regarded as being negative or, to assist in achieving outcomes for impacts that have been identified as having potential environmental or social benefits. The Supplement has been prepared by the proponent. Technical input into the Supplement was provided by specialist consultants including:

- Low Ecological Surveys (biodiversity).
- Ride Consulting (surface water and groundwater).
- EMM Consulting (groundwater).
- HEC Consulting (surface water).
- Toll Group (logistics, transport and traffic).
- Northstar Consulting (climate and air quality).
- Trident Project and Mining Services (mine design).

The Supplement is structured as follows:

- **Chapter 2** provides a list of organisations and individuals/companies who provided submissions on the draft EIS.
- **Chapter 3** describes the stakeholder consultation undertaken in relation to the exhibition of the draft EIS.
- **Chapter 4** details the revisions to the EIS, including additional/supplementary information and an overview of any additional or revised environmental management measures for the Proposal.

- **Chapter 5** provides a response to each of the individual submissions provided on the draft EIS.
- **Chapter 6** provides a list of references for scientific statements made in the Supplement.

2 SUBMISSIONS RECEIVED ON THE DRAFT EIS

A total of 23 submissions resulting in 338 individual questions were received on the draft EIS. Submissions were received from a diverse range of stakeholders as listed in Table 2-1.

Table 2-1 Stakeholders who submitted comments on the draft EIS

Category	Stakeholder	Number of questions raised within a submission
Government	Commonwealth Department of Environment and Energy	25
	NT EPA	75
	NT Department of Primary Industries and Resources.	81
	NT Central Land Council	11
	NT Chamber of Commerce Northern Territory	1
	NT Department of Environment and Natural Resources (Rangelands)	20
	NT Department of Health	1
	NT Department of Tourism and Culture (Parks and Wildlife Commission)	1
	NT Department of Trade, Business and Innovation	1
	NT Department of Infrastructure, Planning and Logistics (Planning)	1
	NT Department of Infrastructure, Planning and Logistics (Transport and Civil Services Division)	1
	NT Department of the Chief Minister.	1
	NT Department of Tourism and Culture (Heritage Branch)	1
	NT Worksafe	4
Public members	Residents of Titjikala	N/A[1]
	Anonymous 1	4
	Anonymous 2	3
	Anonymous 3	1
Non-Government Organisation	Australian Conservation Foundation	6
	Arid Lands Environment Centre, Inc	13
Land owner	Henbury Holdings Pty Ltd	12
Local business	Green Glass Consulting.	1
Traditional Owners	Traditional Owners of the land relating to the Proposal	2
TOTAL		**338**

[1] *Residents of Titjikala submitted three petitions in total. One supported the Proposal. The second supported sealing the Maryvale Road as part of the Proposal. The third supported mining activities and upgrading the Maryvale Road but, rejected the waste storage and isolation aspects of the Proposal.*

A copy of each submission is provided in Attachment A. The issues raised in each submission, as well as a response to each issue raised is provided in Chapter 5. In each submission, stakeholders also indicated whether they support, reject or, require further assessment and information regarding the Proposal (refer to Table 2-2).

Table 2-2 Stakeholder feedback

No.	Stakeholder	Accept	Neutral	Reject	Refine
1	Commonwealth Department of Environment and Energy				✓
2	NT EPA				✓
3	NT Department of Primary Industries and Resources.				✓
4	NT Central Land Council				✓
5	NT Chamber of Commerce Northern Territory	✓			
6	NT Department of Environment and Natural Resources (Rangelands)				✓
7	NT Department of Health		✓		
8	NT Department of Tourism and Culture (Parks and Wildlife Commission)	✓			
9	NT Department of Trade, Business and Innovation	✓			
10	NT Department of Infrastructure, Planning and Logistics (Planning)		✓		
11	NT Department of Infrastructure, Planning and Logistics (Transport and Civil Services Division)		✓		
12	NT Department of the Chief Minister.		✓		
13	NT Department of Tourism and Culture (Heritage Branch)		✓		
14	NT Worksafe				✓
15	Residents of Titjikala	✓		✓	
16	Anonymous 1				✓
17	Anonymous 2				✓
18	Anonymous 3	✓			
19	Australian Conservation Foundation				✓
20	Arid Lands Environment Centre, Inc				✓
21	Henbury Holdings Pty Ltd				✓
22	Green Glass Consulting.	✓			
23	Traditional Owners		✓		
TOTAL		**6**	**6**	**1**	**11**

As indicated in Table 2-1, The NT EPA raised 75 questions in their submission. Each question was given a ranking of either low, medium or high importance. In response, the proponent's efforts in responding to questions ranked as high importance is reflected in the amount of information provided compared to questions that were ranked as either medium or low.

A summary of those questions ranked high, medium or low are provided in Table 2-3.

Table 2-3 NT EPA submission questions ranked as high, medium and low

Questions	Ranking			
	No.	High	Medium	Low
1,2,3,8,9,10,19,22,23,25,26,27,28,29,30,31,33,35,37,44,45,46,47,74, and 75	25	✓		
4,5,6,7,11,14,15,20,21,24,32,34,36,38,42,48,49,50,52,57,61,62, and 64	23		✓	
12,13,16,17,18,39,40,41,51,53,54,55,56,58,59,60,63,65,66,67,69,70,72, and 73	27			✓
TOTAL	**75**			

Further assessment of stakeholders' comments, including a breakdown of issues regarded as most o least important, is provided in Chapter 3.

3 STAKEHOLDER CONSULTATION

3.1 Overview

Chapter 3 describes the stakeholder consultation undertaken in relation to the exhibition of the draft EIS and provides the reader with an overview of issues raised by the government and the community during the review the draft EIS.

3.2 Consultation on the Draft EIS

The draft EIS was placed on public exhibition by the NT EPA between 18 February, 2017, to 31 March, 2017. Prior to and at the beginning of the public exhibition period, a series of public consultation 'drop-in' sessions were held by the proponent on-site, within the community of Titjikala, Alice Springs and in Darwin (refer to Table 3-1).

3.3 Consultation methods and materials

During the community 'drop-in' sessions, information on the Proposal was presented using a combination of materials. These included:

- Hard copies of the draft EIS, including appendices (refer to http://www.tellusholdings.com/project_chandler_environmental_impact_statement.html for more information and see Plate 3-1).
- A1 posters relating to key environmental factors required by the Terms of Reference.
- 20 A4 Fact Sheets summarising the draft EIS (refer to http://www.tellusholdings.com/project_chandler_fact_sheets.html for more information and see Plate 3-1).
- Physical evidence of salt cores from the proposal site (Plate 3-1).
- Physical evidence of waste types that could be accepted (Plate 3-1).
- Stakeholder feedback forms.

During the consultation period, the Tellus team maintained it was very clear that the business model involved a dual revenue business that included mining for salt and backfilling the resulting voids with equipment, archives or waste for storage and that Tellus plans to store like-with-like materials, so as to create opportunities for the future long-term storage, treatment and recovery of valuable materials or the permanent isolation of hazardous waste.

In addition to the key environmental factors described in the Proposal's Terms of Reference (September 2016), the proponent provided communication material for key stakeholders regarding the storage and permanent isolation of hazardous and difficult to manage wastes. The reader is encouraged to read the proponent's website (http://www.tellusholdings.com) for more information.

Hard copy of the draft EIS, as well as Fact Sheets and posters relating to key environmental factors were provided for public members (see below). Stakeholders were encouraged to take-away the proponent's consultation materials.

- Proposal and community benefits.
- Approvals pathway.
- Flora and fauna.
- Cultural heritage.
- Surface water.
- Groundwater.
- Human health.
- Transport of salt and waste materials.
- Mine closure and rehabilitation.
- Waste Acceptance Criteria.
- Environmental management.

The proponent is committed to updating the above Fact Sheets through detailed design and after additional studies / research has been completed (where required). The proponent is an evidence based company and understands the importance of providing 'up to date' scientific data for a unique proposal like the Chandler Facility.

Table 3-1 Summary of meetings held during public exhibition of the draft EIS

Date	Stakeholder	Meeting location
2 February 2017	Local indigenous community and Traditional Owners	Titjikala Recreation Centre
27 February, 2017	Local community, local business, and government departments	Central Australian Development Office, Alice Springs
27 February, 2017	Local government	Alice Springs Town Council
28 February, 2017	Minister Dale Wakefield's Office	Alice Springs
28 February, 2017	Local community, local business, and government departments	Central Australian Development Office, Alice Springs
8 March 2017	Federal Government – Major Projects Group	Darwin
8 March 2017	NT Department of Primary Industries and Resources	Darwin
9 March 2017	NT Environment Centre	Darwin
9 March 2017	Waste Recycling Industry Association (NT) (WRINT) Conference	Darwin
10 March 2017	NT Environmental Assessment Forum	Darwin
14 March 2017	Local indigenous community and Traditional Owners	Titjikala Recreation Centre
15 March 2017	Department of Lands, Planning and the Environment	Alice Springs
25 March	Local community, local business, and government departments	Central Australian Development Office, Alice Springs
27 March 2017	Local community, local business, and government departments	Chamber of Commerce NT - Central Australia Regional Mining Seminar Alice Springs
28-29 March 2017	Local community, local business, and government departments	Annual Geoscience Exploration Seminar (AGES) 2017 Conference, Alice Springs
April 2017	ALEC	ABC Radio
12 April 2017	NT EPA	Chandler site visit
28-30 May 2017	Commonwealth Government Departments (excluding the Department of Environment and Energy)	Canberra
20 June 2017	CLC and Traditional Owners[2]	Halfway Dam, Chandler
6 July 2017	CLC	CLC Office
6 July 2017	Pastoralist	Alice Springs
7 July 2017	Office of the Environment Minister	Chandler site visit
August 2017	Community of Titjikala	Titjikala Recreation Centre

[2] *Please note – future CLC and TO meetings are scheduled for early August 2017.*

The principal aim of the drop-in sessions was to present and explain the technical findings of the draft EIS. In addition, consultations attempted to:

- Identify key issues important to community and government stakeholders.
- Inform and raise awareness within local communities of the Proposal.
- Advise potentially directly affected stakeholders of the Proposal and its potential environmental benefits and risks.
- Record comments and issues about the Proposal and concept design from those who may be affected.
- Seek ideas from interested parties to be considered in finalising the design.
- Advise stakeholders on how they may obtain further information or communicate concerns, complaints or suggestions.

Tools used during consultation included presentations, posters, factsheets and one-on-one consultations tailored toward the stakeholder's specific interests (refer to Plate 3-1 and Plate 3-2). A copy of the posters and factsheets used during public consultation are provided in Attachment B.

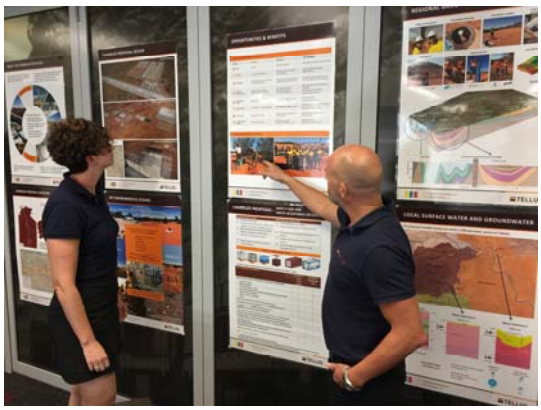

Plate 3-1 Public drop in sessions, Central Australian Development Office, Alice Springs

A key issues management system was used to capture, collate and analyse feedback for its forward engagement program.

The proponent advertised the Proposal in a variety of community forums, including:

- On the company website.
- News releases.
- Local, state and national newspapers.
- Community notices.
- Emails to key local stakeholders.

Plate 3-2 Annual Geoscience Exploration Seminar (AGES) 2017 Conference, Alice Springs

The advertisements noted where copies of the draft EIS could be viewed (in hard copy and soft copy). They also detailed the process for interested parties to make submissions on the draft EIS.

The top five issues raised by members who attended the proponent's public consultation sessions and provided feedback on the Proposal and draft EIS (and in the following order) were:

1. Jobs and training.
2. Flora and fauna.
3. Groundwater.
4. Cultural heritage.
5. Transport of waste.

These issues and others raised during consultation are shown in Figure 3-1.

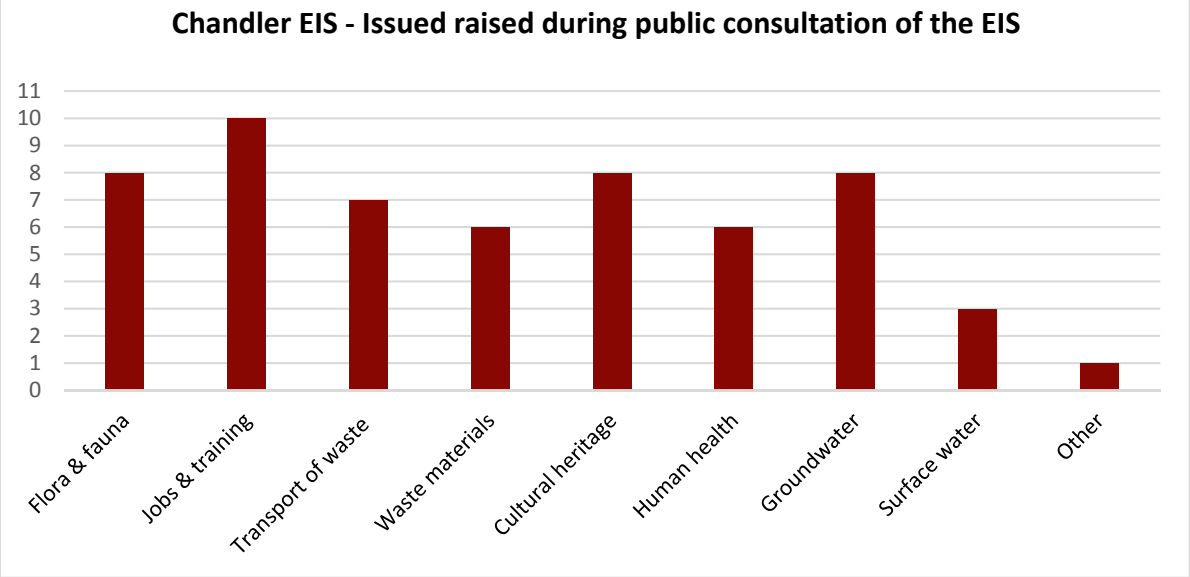

Figure 3-1 Issues raised by the public during the proponent's public consultation sessions

The top five issues raised by stakeholders on the contents of the draft EIS in a formal submission (and in the following order) were:

1. Waste and waste management.
2. Surface water.
3. Groundwater.
4. Flora and fauna.
5. Decommissioning and closure.

These issues and others raised during consultation are shown in Figure 3-2.

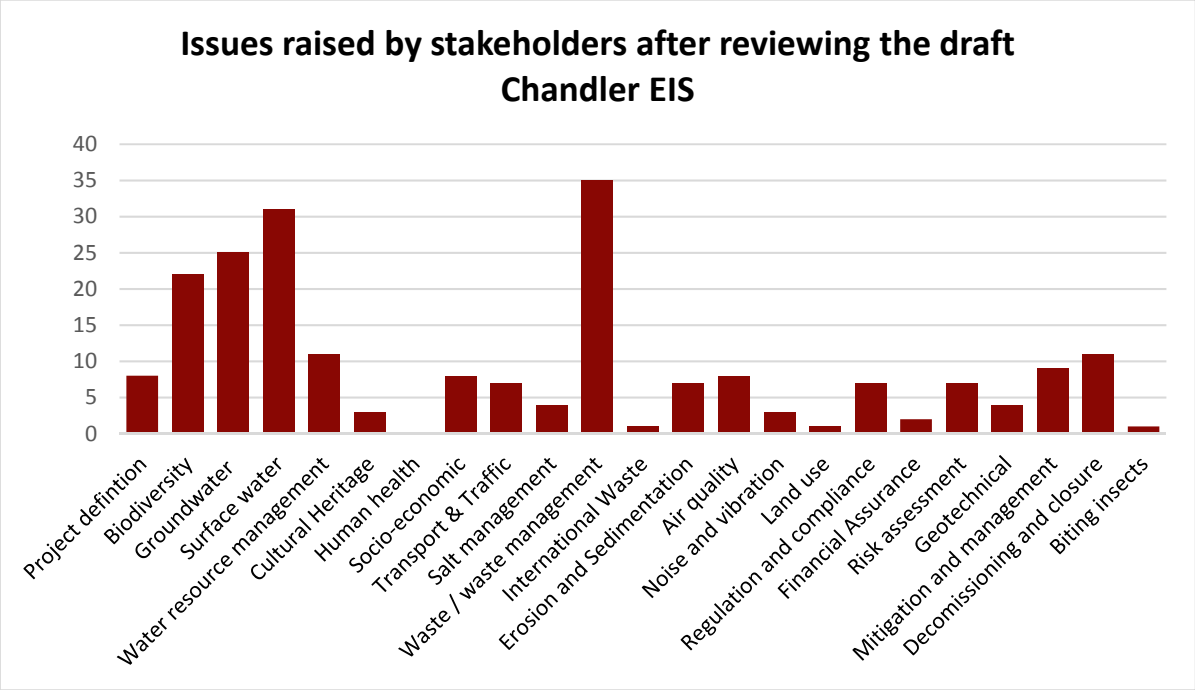

Figure 3-2 Issues raised by all stakeholders on the draft EIS

3.4 Consultation in relation to the Supplement

A series of consultations were held with Decision Making Authorities (DMAs) during the preparation of the Supplement. These consultations are summarised in Table 3-2.

Table 3-2 Summary of consultation during the preparation of the Supplement

Date	Stakeholder	Primary focus	Resolution
April 2017	Commonwealth Department of Environment and Energy (DEE)	Survey methodology for thick-billed grasswren and Slater's skink.	Confirmation and agreement on survey methodology for thick-billed grasswren and Slater's skink.
	NT WorkSafe	NT legislation and off-site transport logistics.	Proponent to provide greater details around transport business model and an update to dangerous goods road and rail legislation.
	DPIR	Water resource management.	Proponent to provide additional technical information (surface water sampling procedures, surface and groundwater monitoring locations, groundwater data loggers, and ongoing chemical water quality data) within the proposed Mine Management Plan and Water Management Plan.
May 2017	NT Project Control Group (PCG)	Project definition / regulation	Proponent and PCG to review dual regulation under MM Act and EA Act.
June 2017	NT EPA	Discussion around NT responses and duplication of questions compared to DPIR submissions	Cross reference DPIR questions raised back to NT EPA questions.
July 2017	NT EPA	Timing of EIS Supplement and project details	Submit EIS Supplement Report between July 14 – 21. Provided NT EPA with update on project details.

4 REVISIONS TO THE DRAFT EIS

4.1 Introduction

This chapter provides an overview of the revisions to the draft EIS.

A number of revisions, updates and commitments are considered necessary in order to address the issues raised by stakeholders. In summary, the revisions/updates/ commitments put forward by the proponent comprise the following:

- **Biodiversity -** Supplementary technical information regarding the presence/absence of Slater's skink (*Liopholis slateri slateri*) and the thick-billed grasswren (*Amytornis modestus indulkana*) within the proposed development footprint or vicinity. In addition, updated mitigation and monitoring measures so that they are specific, measurable, achievable, results-orientated and time-bound (SMART).
- **Surface water -** Supplementary material to the draft EIS surface water assessment, additional field work undertaken since the submission of the draft EIS; planned surface water field work and monitoring; flood assessment and management; and surface water chemistry.
- **Groundwater -** Supplementary material on the groundwater assessment; groundwater chemistry; future groundwater research and monitoring within a proposed Stage II groundwater program.
- **Air quality -** Clarification on the technical assessment undertaken for the draft EIS.
- **Transport** – Additional information required on the overall logistical model for the Proposal.
- **Waste management** – Clarification on matters relating to the proposed hydraulic backfill process and permanent isolation of waste materials. Further details on the transport of waste materials, handling and storage of waste materials.
- **Regulation** – Clarification on how the Proposal would be regulated under two separate Acts of NT legislation.

At this stage of the Proposal's design, issues raised in the submissions have not resulted in any changes to the layout of the Proposal, as presented in the draft EIS. However, a Bankable Feasibility Study (BFS) and detailed design will be prepared for the Proposal following approval of the draft EIS. Issues raised by various government stakeholders are likely to result in minor changes to the current layout and conceptual design drawings provided in the draft EIS. However, these changes are not expected to alter the findings of the draft EIS and the Supplement.

If the proponent does make any significant changes to the current Proposal design and/or configuration during the BFS and detailed design, a variation would be submitted to the NT EPA under the relevant provisions of the Environmental Assessment Act and associated Regulations

4.2 Supplementary technical information

This section presents supplementary technical information in response to the matters raised during the public exhibition period of the draft EIS.

4.2.1 Biodiversity

In response to the submission made by the DEE, additional presence/absense surveys were undertaken post submission of the draft EIS for Slater's skink and the thick-billed grasswren. In addition, the mitigation and monitoring measures presented in the Draft Biodiversity Management Plan were updated so that they are SMART.

Additional presence/absence surveys

Additional surveys were undertaken to confirm the presence/absence of two matters of national environmental significance (threatened species) that were considered to have a low to moderate likelihood of occurrence within the proposed development footprint or vicinity in the draft EIS. These were:

- Slater's skink (*Liopholis slateri slateri*) lised as vulnerable under the NT *Territory Parks and Wildlife Conservation Act 1980* (TPWC Act) and endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Thick-billed grasswren (*Amytornis modestus indulkana*) listed as critically endangered under the TPWC Act and vulnerable under the EPBC Act.

Potential habitat for these species was identified within the vicinity of the proposed Henbury Access Road in the draft EIS.

The additional presence/absence surveys were undertaken by Low Ecological Surveys post submission of the draft EIS in late April 2017. The surveys were undertaken with reference to the *Survey Guidelines for Australia's Threatened Reptiles* (Department of Sustainability, Environment, Water, Population and Communities 2011) and the S*urvey Guidelines for Australia's Threatened Birds (*Department of Environment, Water, Heritage and the Arts 2010) and in consultation with the DEE.

No sign of either species was recorded within the proposed development footprint or vicinity during the additional surveys. There is a very low likelihood that these species occur within the proposed development footprint or vicinity primarily based on a lack of suitable habitat. Therefore, there would be no impact to Slater's skink or the thick-billed grasswren during construction, operation, or closure and rehabilitation of the Proposal.

The full survey report is provided as Attachment C.

Mitigation measures

The mitigation and monitoring measures presented in the Draft Biodiversity Management Plan have been revised so that they are 'SMART' to address the submission made by the DEE. The revised mitigation and monitoring measures are presented in Table 5-12 in Section 5.1.14. and supersede the mitigation measures presented Table 12-1 of the Draft Biodiversity Management Plan provided as Appendix 6 in Appendix O of the draft EIS. An additional column has been added for the goal of each of the proposed mitigation and monitoring measures. A column has been added for trigger levels (thresholds) and the contingency actions have been revised in Table 5-12 to be 'SMART'.

4.2.2 Surface water

Since the submission of the draft EIS, the proponent has undertaken further technical assessment of its baseline surface water data (refer to proponent's responses to NT EPA and DPIR questions in Sections 5.2 and 5.3). In addition, the proponent has undertaken additional field work (river cross sections and environmental traverses) at the following locations (as requested by DPIR):

- x 1 cross section on the Hugh River upstream of the Chambers Pillar Road (see Figure 4-1.
- x 3 cross sections on the Hugh River downstream of the Chambers Pillar Road crossing (see Figure 4-1Figure 4-2).
- Future survey / cross sections on Chambers Pillar Road (see Figure 4-2).
- x 3 cross sections on Halfway Creek (south catchment [see Figure 4-3]).
- x 3 cross sections on Halfway Creek (eastern catchment [see Figure 4-3]).
- x 3 cross section on Halfway Creek west of Halfway Dam (see Figure 4-3).
- x 1 cross section on the Finke River upstream of the confluence with the Hugh River (see Figure 4-4).

Responses to NT EPA and DPIR comments relating to surface water are addressed in Sections 5.2 and 5.3. Supporting figures are also included where appropriate and cross referenced. Additional information includes:

- Total metals and total suspended solids concentrations.
- Chandler Haul Road flood estimates – 1% Annual Exceedance Probability.
- Chandler Haul Road flood estimates – 10% Annual Exceedance Probability.

Additional management commitments have been identified.

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N

50 25 0 50 Meters

Coordinate System:
GDA 1994 MGA Zone 53

TCH00012_HughRiverCrossSections

Legend

- Hugh River cross sections
- Proposed automatic sampler
- Sampled Locations June 2017

Figure 4-1

Hugh River cross sections (2D plan) and future automatic sampler locations

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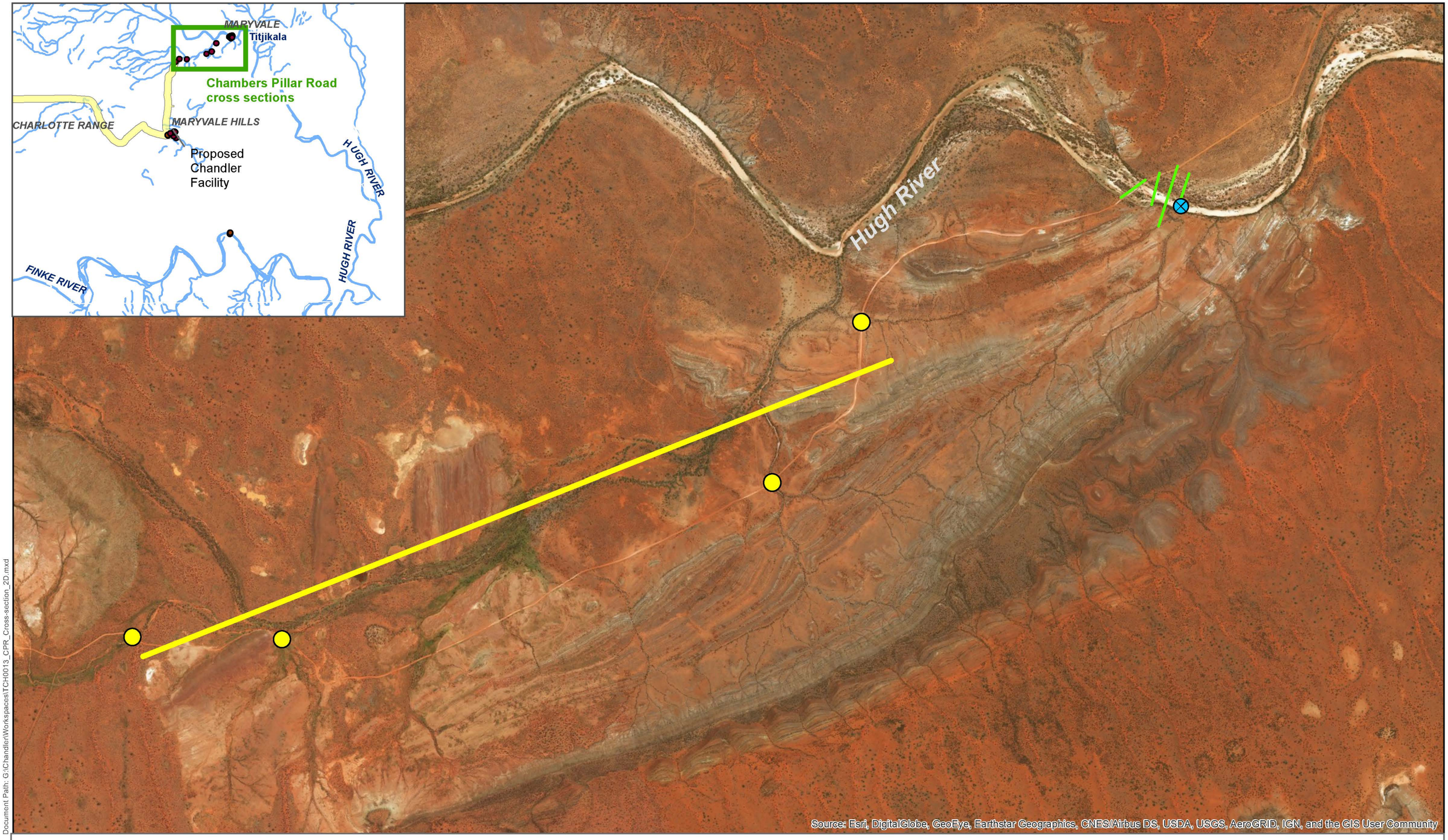

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Coordinate System:
GDA 1994 MGA Zone 53

TCH00013_ChambersPillarRoad_CrossSections

Legend

- Chambers Pillar road sample points
- Proposed automatic samplers
- Chambers Pillar Road cross section
- Hugh River cross sections
- Sampled locations June 2017

Figure 4-2
Chambers Pillar Road future survey and cross section points

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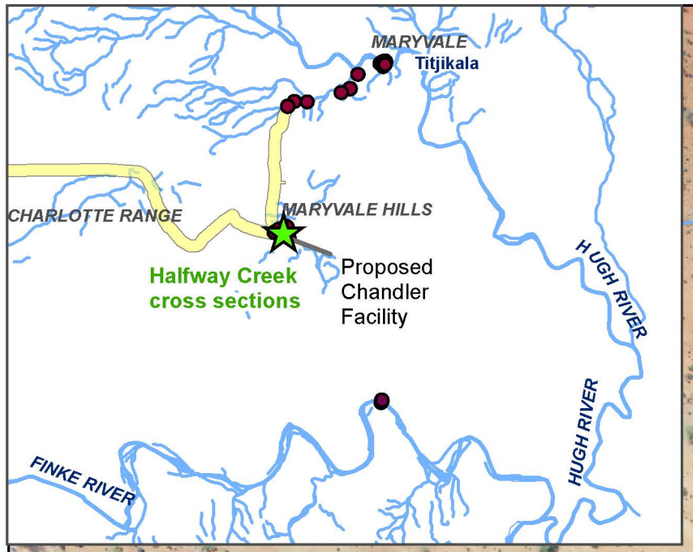

SNAKE GULLY
DINGO GULLY
ROO GULLY
CHECAN
CHECAA
CHECSA
HALFWAY DAM
HALFWAY CREEK EAST
HCWCC
HCWBB
HCWAA
HALFWAY CREEK
HALFWAY CREEK SOUTH
CHHWCAN
CHHWCAA
CHHWCAS

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Coordinate System:
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TCH00014_HalfwayCreek_CrossSections

Legend

- Halfway Creek East
- Halfway Creek South
- Halfway Creek West
- Watercourse
- Proposed automatic samplers
- Sampled locations June 2017

Figure 4-3
Halfway Creek cross sections (2D plan) and future automatic sampler locations

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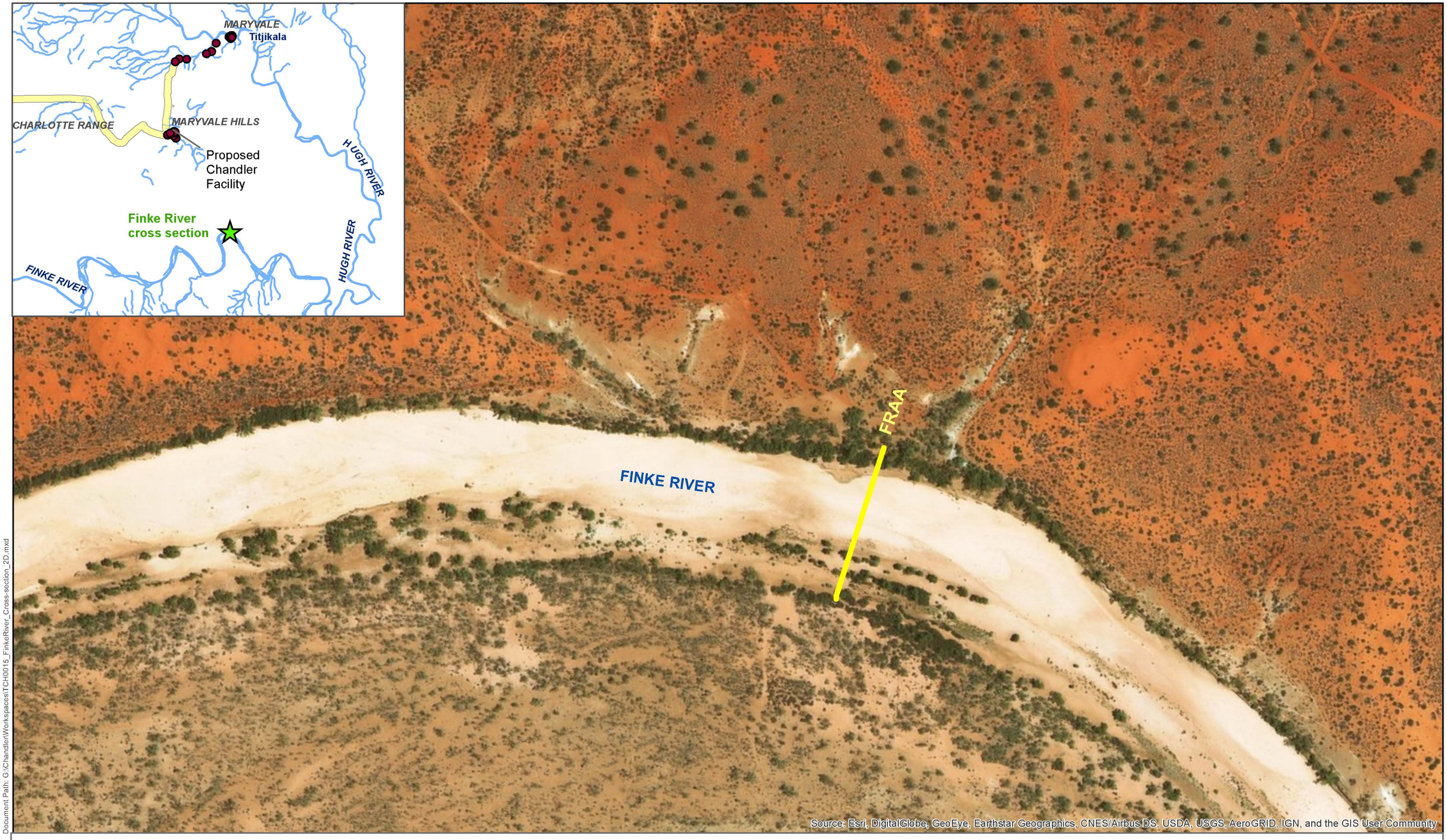

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75 37.5 0 75 Meters

Coordinate System:
GDA 1994 MGA Zone 53

TCH00015_FinkeRiver_CrossSection

Legend

- Finke river cross section
- Proposed automatic samplers
- Sampled locations June 2017

Figure 4-4
Finke River cross section (2D plan) and future automatic sampler locations

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4.2.3 Groundwater

Additional desktop groundwater investigations were undertaken for the Supplement (refer to Attachment E). Future groundwater research proposed for the Chandler Facility are covered in Table 5-30.

4.2.4 Climate

The proponent has provided a detailed update and analysis of climatic data recorded at the Chandler site using the installed Automatic Weather Station (AWS). The period of assessment for the Supplement spans November 2015 to June 30, 2017. Further information is contained within Sections 5.2 and 5.3.

4.2.5 Transport and access

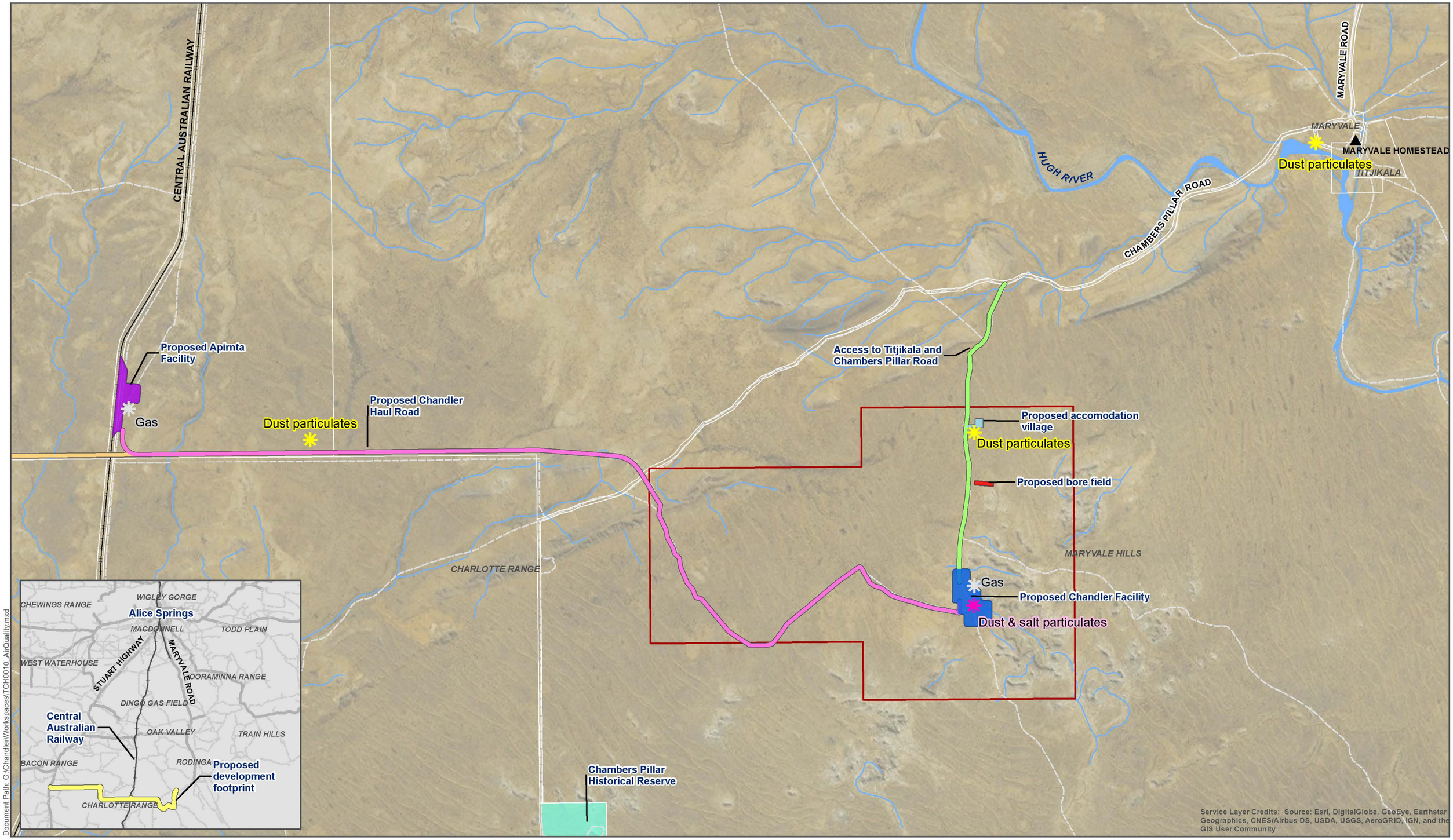
The proponent has provided additional information on the proposed transport model for the Chandler Facility. In addition, an outline Traffic Management Plan has been provided for discussion with the NT Department of Infrastructure Planning and Logistics (refer to Attachment F for more information).

4.3 Revised or additional management measures

Revised or additional mitigation measures that would be included within a Construction Environmental Management Plan (CEMP), Operational Environmental Management Plan (OEMP), and/or Rehabilitation and Closure Plan (RCP) include:

- **Groundwater and surface water -** Additional management commitments made within this document, specifically to address submission comments referenced in Section 5.2 and Section 5.3 have been detailed in Table 4-1. The additional management measures listed in Table 4-1 will be included into the existing draft Water Management Plan (WMP).
- **Biodiversity -** Refer to Table 5-12 in Section 5.1.14.
- **Air quality and climate –** The proponent has considered the impacts of potential adverse effects on human health during construction, operation and post-closure of the Proposal. To ensure adequate baseline air quality data is collated, future dust monitoring and gas emission monitoring locations have been proposed. The locations of these sites are shown on Figure 4-5.

The issues raised in the submissions were reviewed by the proponent and a response to each question (338 in total) is provided in Chapter 5.



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1.5 0.75 0 1.5 Kilometers

Coordinate System:
GDA 1994 MGA Zone 53

Legend

- Railways
- Existing road
- Existing track
- Watercourse
- Homestead location
- ML30612
- Proposed Henbury access road
- Proposed Chandler Haul Road
- Access road to Titjikala
- Proposed Chandler Facility
- Proposed Apirnta Facility
- Proposed accomodation village
- Proposed bore field

Air quality monitoring stations

- Dust & salt particulates
- Dust particulates
- Gas

Figure 4-5
Proposed Air Quality Monitoring Sites

TELLUS

TCH0010_Air_Quality_Monitoring

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Table 4-1 Additional management commitments

Management ID	Measure/requirement	When to implement	Responsibility
WMP 1	Standard reporting of monitoring results will occur bi-annually (or 6 monthly), whilst comprehensive reporting will occur annually. Reporting will include comparisons of baseline water quality and level monitoring data with established site specific trigger values. In addition, the water quality data will be analysed using statistical methods consistent with the requirements of the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ 2000) (see Section 4 for more detail). Data analysis will include the following steps: 1. **Filter**: All data will be filtered to identify analytes for which there were: no detections in any sample; duplicate samples; and those analytes which are considered non-critical. These analytes will not be considered further. 2. **Plot**: Time series plots will be generated showing the concentration of each detected analyte at each monitoring site. A 5th and 95th percentile concentration will be calculated for each time series, for all data prior to the relevant current reporting period. These levels will reflect the variation in the sample analyses and serve as 'indicator thresholds' above (or below) which further assessment of the data may be required. 3. Threshold test: The exponentially weighted moving average (EWMA) will be calculated for each time series. The EWMA is a moving average that is weighted in favour of the most recent sample; the weighting decreases exponentially for progressively older samples. An indicator threshold is triggered if one or more EWMA values for the reporting period (quarter) exceed the 95th percentile value. The trigger simply indicates a potential trend requiring further comment. 4. **Filter**: All data will be filtered to identify analytes for which there were: no detections in any sample; duplicate samples; and those analytes which are considered non-critical. These analytes will not be considered further. 5. **Plot**: Time series plots will be generated showing the concentration of each detected analyte at each monitoring site. A 5th and 95th percentile concentration will be calculated for each time series, for all data prior to the relevant current reporting period. These levels will reflect the variation in the sample analyses and serve as 'indicator thresholds' above (or below) which further assessment of the data may be required. 6. **Threshold test**: The exponentially weighted moving average (EWMA) will be calculated for each time series. The EWMA is a moving average that is weighted in favour of the most recent sample; the weighting decreases exponentially for progressively older samples. An indicator	Pre-construction. Construction. Operation.	Environment Manager

Management ID	Measure/requirement	When to implement	Responsibility
	threshold is triggered if one or more EWMA values for the reporting period (quarter) exceed the 95th percentile value. The trigger simply indicates a potential trend requiring further comment. 7. **Trend test**: The Mann-Kendall rank correlation test (Kendall, 1938) will be applied to each time series to identify if a statistically significant trend (or dependence) exists in the concentration of each analyte with respect to time. A significant trend indicates that further review and comment is warranted. 8. **Action trigger**: On its own, a significant data trend (as determined by the Mann-Kendall test) or an exceedance of a 95th percentile indicator threshold does not necessarily indicate impact from a disturbance activity. Rather, it acts as a trigger for further data review and assessment to determine the cause of the trend. This data review action trigger is different to the primary trigger levels and the thresholds for action that are defined in the project Trigger Action Response Plan (TARP) should there be a perceived risk to the environment. 9. **Response**: Trends that trigger an indicator threshold will be further assessed to determine if: there is sufficient data to adequately define the natural variation in concentrations; or the trends are clearly related to project activities or other factors. If the assessment suggests that the trend is related to project activities then the trend will be tracked more closely before the investigation and action levels in the TARP are triggered and other management responses are required. If it is concluded that the data suggests an adverse trend related to project activities then an investigation and management response will be initiated.		
WMP 2	• The proponent will install cumulative flow meters on all production bores and reconcile cumulative water usage on a weekly basis. • Historic water usage will be included in the comprehensive annual reporting	Construction, Operations	Environment Manager
WMP 3	Tellus will apply for water abstraction licences and permits under the *Water Act 1992*. An application will be submitted post approval and during detailed design in late 2018.	Pre-construction	Environment Manager
WMP 4	Tellus will provide bi-annual (6 monthly) environmental monitoring reports. Bi-annual reports will include presentation and interpretation of water quality, groundwater levels, surface water flow, and water usage. Bi-annual reports will be supplemented by a comprehensive annual report. Shorter reporting cycles may be triggered by water quality exceedances, consistent with the WMP.	Pre-construction, Construction, Operations	Environment Manager
WMP 5	Tellus will develop a Class 1 numerical model post approval, consistent with the *Australian Groundwater Modelling Guidelines* (SKM 2012). The groundwater model will be developed during detailed design and will model construction, operations, and post-closure scenarios	Pre-construction	Environment Manager

Management ID	Measure/requirement	When to implement	Responsibility
WMP 6	All production sources will target the deeper groundwater system. Production bores will be located in areas away from the shallow alluvial deposits. If the shallow system is intercepted during drilling, bores will be designed and constructed to seal off overlying water bearing units.	Pre-construction, Construction	Environment Manager
WMP 7	Tellus will install automatic surface water samples at three strategic locations identified in Figure 4-1 and Figure 4-3.	Pre-construction	Environment Manager
WMP 8	All surface water and groundwater quality samples will be field filtered immediately upon sample collection to accurately determine dissolved metal concentrations.	Pre-construction, Construction, Operations	Environment Manager
WMP 9	Surface water and groundwater samples will be analysed for both total and dissolved metals. The proposed analytical suite will remain unchanged and continue as per the approved WMP.	Pre-construction, Construction, Operations	Environment Manager
WMP 10	Tellus will commission a soil sampling and test program to assess the concentrations of aluminium in the Project area.	Pre-construction	Environment Manager
WMP 11	Site-specific trigger values will be developed for all surface water sites during Pre-construction in advance of construction works. Trigger values will be included in the existing WMP. The revised document will be issued to NT EPA for comment.	Pre-construction	Environment Manager

5 RESPONSES TO SUBMISSIONS ON THE DRAFT EIS

The following sections contain the submissions received by the proponent on the draft EIS. They also provide a response to each of the identified issues. Each submission has been provided verbatim as per the text in the original submission (i.e. no changes to spelling or grammar have been made). Copies of the original submissions are provided in Attachment A.

5.1 Department of the Environment and Energy

Issues identified by the Department of Environment and Energy are provided in Table 5-1. A response to each issue is provided in Section 5.1.1 through Section 5.1.25.

Table 5-1 Issues identified by the Department of Environment and Energy

Issue reference	Issue raised
DEE 1	**Biodiversity (existing environment) –** Please confirm if any of the mapped vegetation communities have been cleared or disturbed (if so, please map). Please describe and map vegetation types that are suitable habitat for matters of national environmental significance and indicate which of those habitats are significant.
DEE 2	**Biodiversity (existing environment)** – For matters listed under the EPBC Act, please confirm: (1) which species and habitat records have resulted from historic records in database searches and literature reviews; and (2) which species and habitat records have resulted from the 2012-2016 field surveys, respectively.
DEE 3	**Biodiversity (existing environment)** – Refer to comment (no. 2) above.
DEE 4	**Biodiversity (existing environment)** – The Department notes the proponent's view that impacts to matters of national environmental significance are not likely to be permanent. Please provide a description of how long it will take matters of national environmental significance to recover from impact and identify how soon restoration of habitat is anticipated to be achieved for the purpose of reinstating ecosystem function. (This may be covered in the Rehabilitation Closure Plan (Appendix J)) where appropriate, but where recovery is aided by measures to be taken by the proponent during the operational phase of the proposal, this should be noted here).
DEE 5	**Biodiversity (risk assessment)** – Please indicate the quality of suitable habitat for the greater bilby in the proposed development footprint and vicinity in Section 7.7.1. (The Department notes that Table 7.6 indicates suitable habitat is present notwithstanding that this species has a low likelihood of occurrence in the proposed development footprint and vicinity).
DEE 6	**Biodiversity (risk assessment)** – As per our comment (no. 2) above, please confirm if this assessment of presence has been made on the basis of database/literature reviews or field surveys.
DEE 7	**Biodiversity (risk assessment) –** Please state the total area (in hectares) of suitable habitat proposed to be cleared for each listed species under the EPBC Act likely to be present in the project area. At this stage, the EIS has not made clear the extent of impacts for each species and thus the Department is unable to agree that there are no significant residual impacts for each species. (This is intended to imply that there may also be a need for an offsets package). Please undertake surveys to confirm the presence/absence of the Slater's skink and thick-billed grasswren within the vicinity of the Henbury Access Road and provide results to the

Issue reference	Issue raised
	Department for consideration as part of this environmental assessment process. (The Department is of the view that the assessment of direct, indirect and consequential impacts of the proposed action on these species should include this information).
DEE 8	**Biodiversity (risk assessment) –** Please provide an assessment of the scale and intensity of the impacts. Please state which of the direct, indirect and consequential impacts are likely to be short-term and long-term impacts.
DEE 9	**Biodiversity (risk assessment) –** Sections 4 and 5 of Appendix O do not appear to identify any unknown, unpredictable or irreversible impacts – please confirm.
DEE 10	**Biodiversity (risk assessment) –** Section 7.2.1 states that 'a list of literature that was reviewed' is provided in Appendix R however the Department notes that this Appendix is a Surface Water Assessment (the Department notes that this information also appears to be missing from Appendix O). Please provide a list of action plans, recovery plans and threat abatement plans that were considered in assessing risks.
DEE 11	**Biodiversity (risk assessment) –** The Department notes that many of the proposed actions are not SMART (specific, measurable, achievable, results-orientated and time-bound). For example, Action Item B28 proposed to 'Stage vegetation removal to reduce total exposed cleared surface at any one time' – How will clearance be staged? What vegetation will be removed, when? Please revise actions in this chapter, and potentially others, to be SMART noting that they may be included in the Biodiversity Management Plan (BMP).
DEE 12	**Biodiversity (risk assessment) –** Please provide an assessment of the expected or predicted effectiveness of the mitigation measures specifically relating to matters of national environmental significance in Table 6.4 of Appendix O.
DEE 13	**Biodiversity (risk assessment) –** Please outline mitigation and monitoring measures for the greater bilby in Table 6.4. Please describe monitoring measures take into account relevant approve plans and recovery plans.
DEE 14	**Biodiversity (risk assessment) –** Please clearly identify the goals (beyond the scope) of each mitigation and monitoring measure proposed in the BMP.
DEE 15	**Biodiversity (risk assessment) –** Please confirm if a suitably qualified expert that has demonstrated experience in the mitigation and monitoring of adverse impacts to biodiversity and threatened species has prepared the management measures in this EIS.
DEE 16	**Biodiversity (risk assessment) –** Please revise Table 6.4 of Appendix O to include a monitoring program for the greater bilby. Please identify clear thresholds and revise contingency actions to ensure that they are SMART. (For example, in Table 12.1 of Appendix O, the contingency action for an increase in pest species is to 'increase pest fauna management' – What is the trigger level? Where will this occur? What will be the methodology? Will monitoring increase to measure the effectiveness of the contingency action? When will escalated action stop?). Please identify clear baselines of introduced fauna populations for the purpose of monitoring. (Table 12.1 identifies a performance standard for increased pest fauna as 'no increase to introduced fauna populations as a result of the proposal' however the size of existing populations is not specified).
DEE 17	**Biodiversity (risk assessment) –** Please insert proposed mitigation and monitoring measures from Chapter 7 (Biodiversity) and Appendix O (Biodiversity Assessment) into Appendix 20 for clarity.

Issue reference	Issue raised
DEE 18	**Other risks (air) –** Section 15.5.3 of Chapter 15 states that 'worst case' pre-mitigated risks associated with the accidental loss of containment of solid wastes (such as beryllium) and sludge/liquid waste (such as formaldehyde) have been modelled across a range of accidental emission scenarios based upon 'industrial accident statistics'. Please confirm the source of these statistics for our information.
DEE 19	**Other risks (air) –** Please confirm why five years has been adopted as an acceptable average against which to measure long term meteorological conditions. Additionally, please confirm why 2015 has been accepted as representative of this five year period.
DEE 20	**Other risks (air) –** Please confirm the chemicals that are proposed to be used in the stabilisation of dust. Ad confirm if these chemicals are likely to have any impacts on matters of national environmental significance.
DEE 21	**Other risks (air) –** Please provide details of proposed air monitoring including technique, location, frequency and details of laboratory undertaking analysis and target parameters for our consideration. Section 15.6 states that 'the air quality risk assessment did not assess risks to air quality and human health during closure and rehabilitation of the proposal'. Please provide justification for this proposed approach.
DEE 22	**Other risks (noise and vibration) –** Please describe any anticipated risks from noise and vibration (particularly from blasting and rock hammering) to matters of national environmental significance for information.
DEE 23	**Environmental offsets –** The Department notes that information regarding the area of habitat (in hectares) for species listed under the EPBC Act has not been provided to date. As per our comment (no. 7) above, please provide this information for our consideration.
DEE 24	**Environmental offsets –** As per our comment (no. 9) above, please confirm if any of the relevant impacts are likely to be unknown, unpredictable or irreversible.
DEE 25	**Environmental offsets –** As per our comment (no. 7) above, please confirm the presence/absence of the Slater's skink and thick-billed grasswren in the vicinity of the Henbury Access Road and specify a suitable route for this road. The Department needs to know whether there are significant residual (unmitigated) impacts on these species prior to a decision on approval. We note that residual significant impacts will arise for these species a compensatory offsets package will be required.

5.1.1 DEE 1

Issue raised

Confirm if any of the mapped vegetation communities have been cleared or disturbed (if so, please map).

Proponent's response

(refer to next page)

Please refer to Section 7.3.2 (Terrestrial flora) of the draft EIS. This section states:

> *'Vegetation within the proposed development footprint and vicinity is generally in moderate to good condition. There is a high level of disturbance as a result of cattle (grazing, trampling and weed invasion) that is confined to watering points, ephemeral watercourses and tracks. Land has also been previously cleared for tracks and a small amount of land has been cleared previously for mining exploration by Central Petroleum.'*

These areas have been mapped on Figure 5-1, Figure 5-2 and Figure 5-3.

Figure 5-1 Cleared and disturbed vegetation communities within the proposed development footprint and vicinity of the Chandler Facility

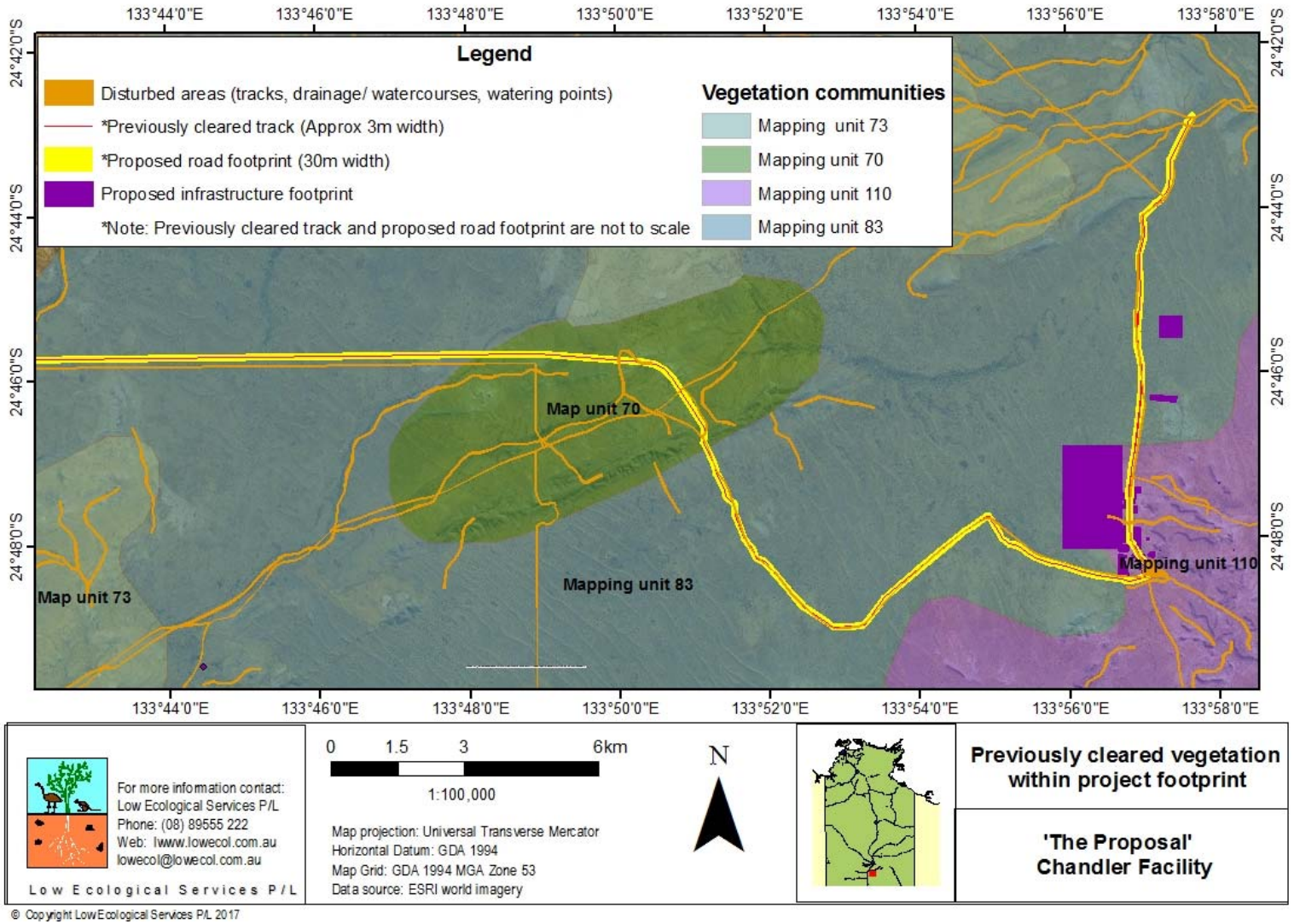


Figure 5-2 Cleared and disturbed vegetation communities within the proposed development footprint and vicinity of the Apirnta Facility and Henbury Access Road (east)

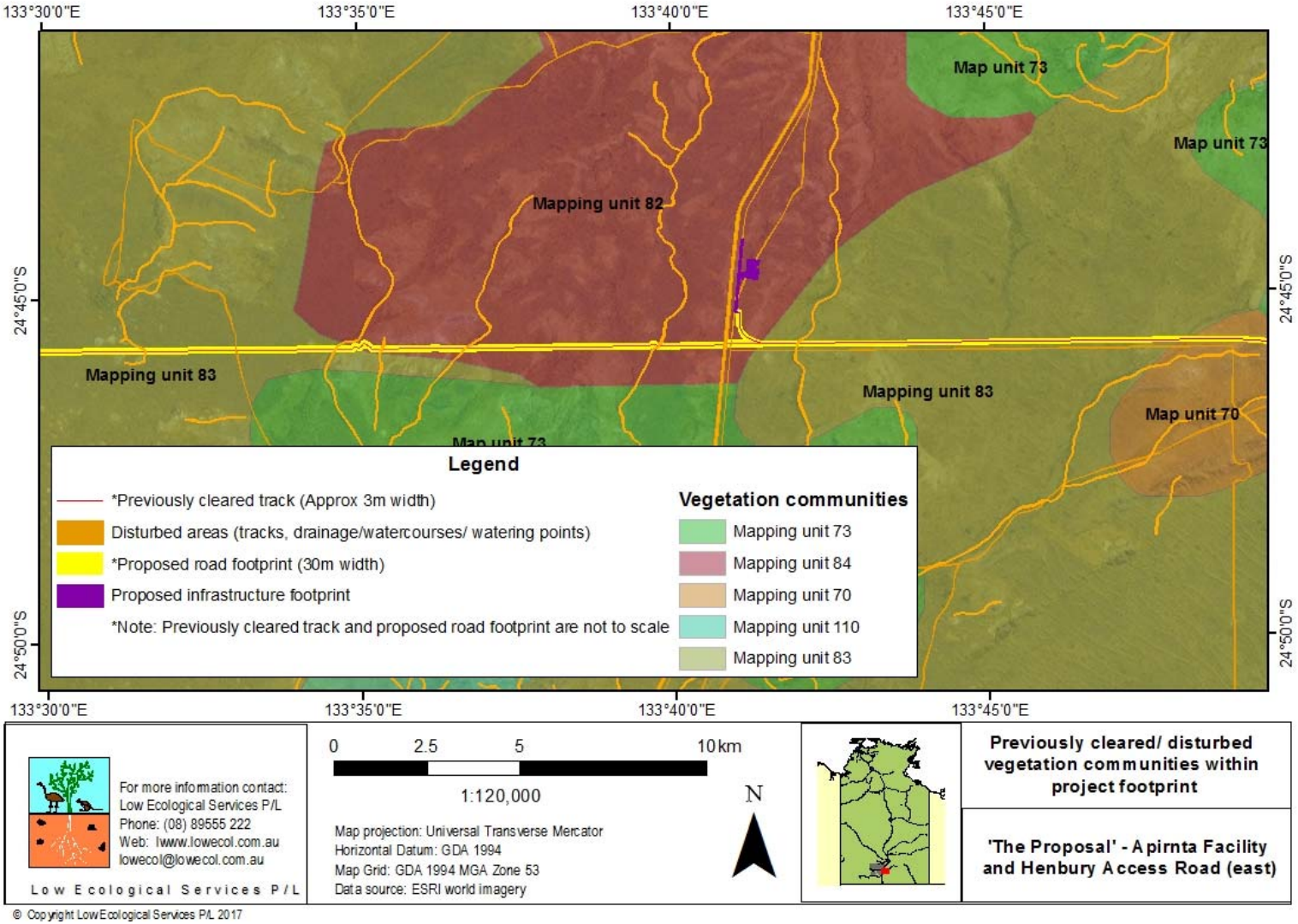
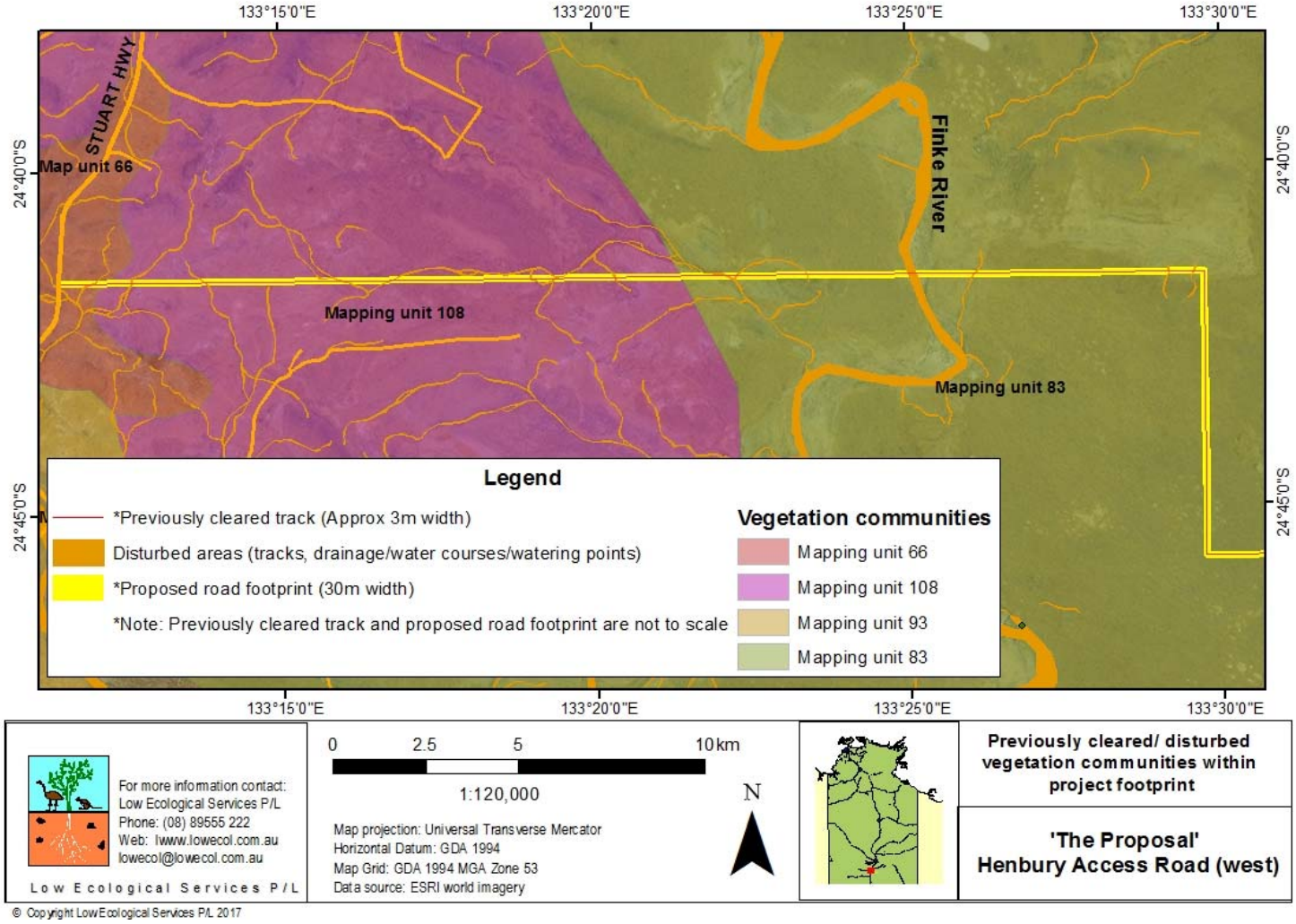


Figure 5-3 Cleared and disturbed vegetation communities within the proposed development footprint and vicinity of the Henbury Access Road (west)



Issue raised

Describe and map vegetation types that are suitable habitat for matters of national environmental significance and indicate which of those habitats are significant.

Proponent's response

Please refer to:

- Section 7.3.3 (Terrestrial fauna), Figure 7-5 (Distribution of fauna habitat within the proposed development footprint and vicinity [Sheet 1 and Sheet 2]) of the draft EIS. Please also refer to Section 3.9.5 and Figure 3-22 in Appendix O.
- Section 7.4.1 (Direct impacts), Table 7-10 (Estimated loss of habitat from construction of the Proposal) of the draft EIS. Please also refer to Section 5.1.1, Table 5-6 in Appendix O.
- Section 7.7.1 (Impacts on matters of national environmental significance). Please also refer to Section 4.2 in Appendix O.

Eleven fauna habitat types were recorded within the proposed development footprint and vicinity. These habitats were described in Section 7.3.3 and their distribution shown in Figure 7-5 of the draft EIS (plus the corresponding sections noted above in Appendix O). The habitat types that potentially support threatened or migratory species (including matters of national environmental significance) were provided in Table 7-10 of the draft EIS (plus the corresponding sections noted above in Appendix O).

Assessments of significance for matters of national environmental significance were prepared for six threatened fauna species and eight migratory bird species in accordance with the *Significant Impact Guidelines 1.1-Matters of National Environmental Significance* (DoE 2013). A summary of the results of the assessments of significance is presented in Section 7.7.1 of the draft EIS (the assessments of significance are also presented in full in Appendix O).

None of the habitats within the proposed development footprint or vicinity were identified as significant to matters of national environmental significance. The assessments of significance concluded that no biodiversity offsets were deemed necessary as there would be no significant impact to matters of national environmental significance during construction, operation, or closure and rehabilitation of the Proposal (refer to Appendix O of the draft EIS). It was noted, however, that surveys would be undertaken prior to construction to confirm the presence/absence of two matters of national environmental significance (threatened species) considered to have a low to moderate likelihood of occurrence within the proposed development footprint or vicinity. These were Slater's skink (*Liopholis slateri slateri*) and the thick-billed grasswren (*Amytornis modestus indulkana*).

To that end, additional presence/absence field surveys for Slater's skink and thick-billed grasswren were undertaken by Low Ecological Surveys post submission of the draft EIS in late April 2017. No sign of either species was recorded within the proposed development footprint or vicinity during the additional surveys. There is a very low likelihood that these species occur within the proposed development footprint or vicinity primarily based on a lack of suitable habitat. The likelihood of

impact on Slater's skink or the thick-billed grasswren during construction, operation, or closure and rehabilitation of the Proposal is considered low (refer to Attachment C for details of the additional field work undertaken to confirm the predicted outcome).

5.1.2 DEE 2

Issue raised

For matters listed under the EPBC Act, please confirm: (1) which species and habitat records have resulted from historic records in database searches and literature reviews; and (2) which species and habitat records have resulted from the 2012-2016 field surveys, respectively.

Proponent's response – conservation-significant flora species

Please refer to Section 7.3.2 (Terrestrial flora, Conservation-significant flora species) and Table 7-5 of the draft EIS. Please also refer to Table 3-4 in Appendix O.

Conservation-significant flora species either recorded (during field surveys) or predicted to occur (from historic records in database searches and literature reviews) are listed in Table 7-5. Conservation-significant flora species recorded during the field surveys are noted in Table 7-5 and are listed in bullet-form in Section 7.3.2. This sections states:

> *'Three conservation-significant flora species were recorded during the field surveys within the vicinity of the proposed development footprint. These included:*
>
> - *Cottony bluebush (Maireana carnosa), listed as near threatened under the TPWC Act. This species was recorded on sandplains approximately 500 metres south of the proposed Apirnta Facility. It was also recorded in the vicinity of the proposed Henbury Access Road.*
> - *Crotalaria eremaea, listed as data deficient under the TPWC Act. This species was recorded in sand dunes within the vicinity of the proposed development footprint, near the proposed Chandler Haul Road.*
> - *Calandrinia remota, listed as data deficient under the TPWC Act. This species has not been previously recorded within the locality (that is, did not appear in any of the database searches – nether the NT DENR Flora Atlas or the DoEE Protected Matters Search Tool). This species was recorded approximately four kilometres north-east of the proposed Chandler Facility.'*

As discussed in Section 7.3.2, ten conservation-significant flora species have been recorded or are predicted to occur within the proposed development footprint or vicinity. Nine species were identified from historic records and in database searches (two of which were also identified during the field surveys). One species was recorded during the field surveys that had not been previously recorded in the locality (that is, did not appear in any of the database searches or literature reviews) – *Calandrinia remota*.

The information presented in Section 7.3.2 and Table 7-5 was also presented in Table 3-4 in Appendix O of the draft EIS. This table has been extracted and is presented below as Table 5-2 which identified in the desktop study, species as potentially occurring within the area of interest and/or recorded on surveys, with status under the TPWC Act (TPWC) and EPBC Act (EPBC); if the species was recorded in the PMST, NT Flora Atlas or during on-ground surveys (on-ground) and the likelihood (likelihood) of occurrence in the Proposal area.

Table 5-2 Flora species of conservation significance

Scientific Name	Common name	TPWC	EPBC	PMST	NT Flora Atlas	On-ground	Likelihood
Ixiochlamys nana	Small fuzzweed	DD	-	-	×	-	Moderate
Brachyscome ciliaris	Variable daisy	DD	-	-	×	-	High
Maireana carnosa	Cottony bluebush	Nt	-	-	×	×	High
Sclerolaena longicuspis	Long spined poverty bush	Nt	-	-	×	-	Moderate
Crotalaria eremaea	Bluebush pea	DD	-	-	×	×	High
Acacia oswaldii	Umbrella wattle	DD	-	-	×	-	High
Acacia latzii	Latz's wattle	Vu	Vu	×	×	-	Low
Potamogeton crispus	Curly pondweed	NT	-	-	×	-	Low
Calandrinia remota	-	DD	-	-	-	×	High
Synapthantha tillaeacea	-	DD	-	-	×	-	Moderate

Note - DD: data deficient, Nt: near threatened, Vu: vulnerable

Proponent's response – conservation-significant fauna species

Please refer to Section 7.3.3 (Terrestrial fauna, Conservation-significant species) and Table 7-6 of the EIS. Please also refer to Table 3-6 in Appendix O.

Conservation-significant fauna species either recorded (during field surveys) or predicted to occur (from historic records in database searches and literature reviews) are listed in Table 7-6. Conservation-significant fauna species recorded during the field surveys are noted in Table 7-6 and are listed in bullet-form in Section 7.3.3. This section states:

> *'Six conservation-significant fauna species were recorded during the field surveys within the proposed development footprint or vicinity. These included:*
>
> - *Australian bustard (Ardeotis australis), listed as near threatened under the TPWC Act. This species was recorded in spinifex hummock grassland in the vicinity of the proposed Chandler Facility.*

- *Bush-stone curlew (Burhinus grallarius) listed as near threatened under the TPWC Act. This species was recorded in spinifex hummock grassland and low sparse shrubland in the vicinity of the proposed Chandler Facility.*
- *Red-tailed cockatoo (Calyptorhynchus samueli) listed as near threatened under the TPWC Act. This species was recorded on the proposed Henbury Access Road.*
- *Emu (Dromaius novaehollandiae), listed as near threatened under the TPWC Act. This species was recorded in spinifex hummock grassland in the vicinity of the proposed Henbury Access Road and Apirnta Facility.*
- *Scarlett chested parrot (Neophema splendida) listed as near threatened under the TPWC Act. This species was recorded in spinifex hummock grassland in the vicinity of the proposed Chandler Facility.*
- *Redthroat (Pyrrholaemus brunneus), listed as near threatened under the TPWC Act. This species was recorded in low sparse-shrubland in the vicinity of the proposed Chandler Facility.*

In addition, secondary signs of three conservation-significant species were also recorded within the vicinity of the proposed development footprint. These included:

- *Brush-tailed mulgara (Dasycercus blythi) listed as vulnerable under the TPWC Act. This species has not been previously recorded within the locality (that is, did not appear in any of the database searches – neither the NT DENR Fauna Atlas nor the DoEE Protected Matters Search Tool). Mulgara (Dasycercus sp.) tracks were observed approximately 0.5 kilometres north of the proposed Chandler Haul Road (about midway along the proposeed route) during the field surveys. The tracks may belong to either this species, or the crest-tailed mulgara (Dasycercus cristicauda).*
- *Crest-tailed mulgara (Dasycercus cristicauda) listed as vulnerable under the TPWC Act and the EPBC Act. As stated above, Dasycercus sp. tracks were observed approximately 0.5 kilometres north of the proposed Chandler Haul Road during the field surveys. The tracks may belong to either this species or the brush-tailed mulgara (Dasycercus blythi).*
- *Southern marsupial mole (Notoryctes typhlops) listed as vulnerable under the TPWC Act. Secondary signs of this species were recorded on the banks of the Finke River (approximately 850 metres north of the proposed Henbury Access Road) (refer to Plate 7- 11).'*

As discussed in Section 7.3.3, 32 conservation-significant fauna species have been recorded or are predicted to occur within the proposed development footprint or vicinity. Thirty-one species were identified from historic records and in database searches (eight of which were also identified during the field surveys). One species was recorded during the field surveys that had not been previously recorded in the locality (that is, did not appear in any of the database searches or literature reviews) – brush-tailed mulgara (*Dasycercus blythi*).

The information presented in Section 7.3.3 and Table 7-6 was also presented in Table 3-6 in Appendix O of the draft EIS. This table has been extracted and is presented below as Table 5-3.

Table 5-3 Fauna species of conservation significance recorded in the proposal area or identified by the EPBC PMST and NT Fauna Atlas as potentially occurring within the area of interest

Group	Species name	Common name	Status		PMST	NT Fauna Atlas	On-ground	Likelihood of occurrence
			TPWC	EPBC				
Bird	*Acanthiza iredalei*	Slender-billed thornbill	ER	Vu	-	×		Low
	Amytornis modestus indulkana	Thick-billed grasswren (north western subspecies)	Cr	Vu	×	-		Low –moderate**
	Amytornis striatus	Striated grasswren	Nt	-	-	×		Moderate
	Ardeotis australis	Australian bustard	Nt	-	-	×	×	High
	Burhinus grallarius	Bush stone-curlew	Nt	-	-	×	×	High
	Calyptorhynchus banksii samueli	Red-tailed black cockatoo	Nt	-	-	×	×	High
	Conopophila whitei	Grey honeyeater	DD	-	-	×		High
	Cinclosoma castanotum	Chestnut quail-thrush	Nt	-	-	×		High
	Dromaius novaehollandiae	Emu	Nt	-	-	×	×	High
	Elanus scriptus	Letter-winged kite	Nt	-	-	×		High*
	Leipoa ocellata	Malleefowl	Cr	Vu	-	× (1930)		Low
	Lophoictinia isura	Square-tailed kite	Nt	-	-	×		High
	Neophema splendida	Scarlet-chested parrot	Nt	-	-	×	×	High*
	Pezoporus occidentalis	Night parrot	Cr	En	×	-		Low
	Polytelis alexandrae	Princess parrot	Vu	Vu	×	-		Moderate*
	Pyrrholaemus brunneus	Redthroat	Nt	-	-	×	×	High
	Rostratula australis	Australian painted snipe	Vu	En	×	-		Moderate*
Invertebrate	*Croitana aestiva*	Desert sand-skipper	En	En	×	-		Low
Mammal	*Antechinomys laniger*	Kultarr	Nt	-	-	×		High
	Dasycercus blythi	Brush-tailed mulgara	Vu	-	-	-	×#	High
	Dasycercus cristicauda	Crest-tailed mulgara	Vu	Vu	×	-	×#	High

Group	Species name	Common name	Status		PMST	NT Fauna Atlas	On-ground	Likelihood of occurrence
			TPWC	EPBC				
	Isoodon auratus	Golden bandicoot	Vu	En	-	×		Low
	Macrotis lagotis	Greater bilby	Vu	Vu	×	-		Low
	Notomys cervinus	Fawn hopping-mouse	ER	-	-	×		Low
	Notoryctes typhlops	Southern marsupial mole	Vu	-	-	×	×	High
	Petrogale lateralis MacDonnell Ranges race	Black-footed rock-wallaby	Nt	Vu	×	-		Low
	Rattus tunneyi	Pale field-rat	Vu	-	-	×		Low
	Zyzomys pedunculatus	Central rock-rat	En	En	×	-		Low
Reptile	*Delma demosa*	Desert delma	DD	-	-	×		High
	Liopholis kintorei	Great desert skink	Vu	Vu	×	-		Low- Moderate
	Liopholis slateri slateri	Slater's skink	Vu	En	×	-		Low-Moderate**
	Pseudechis australis	King brown snake	Nt	-	-	×		High

Notes:

Nt: near threatened, Vu: vulnerable, En: endangered, Cr: critically endangered, ER: extinct regionally Mi: migratory, Ma: marine, *likelihood of occurring after high rainfall, #Tracks of *Dasycercus* sp. Recorded,**Likelihood of occurrence now deemed to be low based on the results of additional presence/absence surveys undertaken by Low Ecological Surveys post submission of the draft EIS in late April 2017.

5.1.3 DEE 3

Issue raised

Refer to comment (no. 2) above.

Proponent's response

Please refer to proponent's response to DEE 2 (Section 5.1.2).

5.1.4 DEE 4

Issue raised

Please provide a description of how long it will take matters of national environmental significance to recover from impact and identify how soon restoration of habitat is anticipated to be achieved for the purpose of reinstating ecosystem function.

Proponent's response

No Matters of National Significance would be significantly impacted as a result of the Proposal. This was confirmed in the draft EIS via the assessments of significance undertaken for several threatened and migratory species listed under the EPBC Act in accordance with the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (DoE 2013). This has also been confirmed via the presence/absence surveys for Slater's skink and the thick-billed grasswren undertaken post submission of the draft EIS in late April 2017. The additional surveys confirmed that these species are not present within the proposed development footprint or vicinity and would, therefore, not be impacted by the Proposal (refer to Attachment C).

5.1.5 DEE 5

Issue raised

Indicate the quality of suitable habitat for the greater bilby in the proposed development footprint and vicinity in Section 7.7.1.

Proponent's response

Please refer to Appendix O of the draft EIS. Specifically, refer to Section 3.9.2 Species of conservation significance – *Macrotis lagotis* (greater bilby). This section states:

> *'Macrotis lagotis is a nocturnal medium-sized marsupial, originally distributed across 70% of the Australian mainland but now restricted to 20% of its former range in south west QLD and an area extending from the western deserts of the NT and WA north to the Pilbara and Kimberly regions (Pavey, 2006d). Macrotis lagotis occurs in a wide variety of habitats that can be classified into three major groups; sparse grassland/forbland on uplands and hill with a low fire frequency, mulga scrub/woodlands on ridges and rises with an infrequent (20-50*

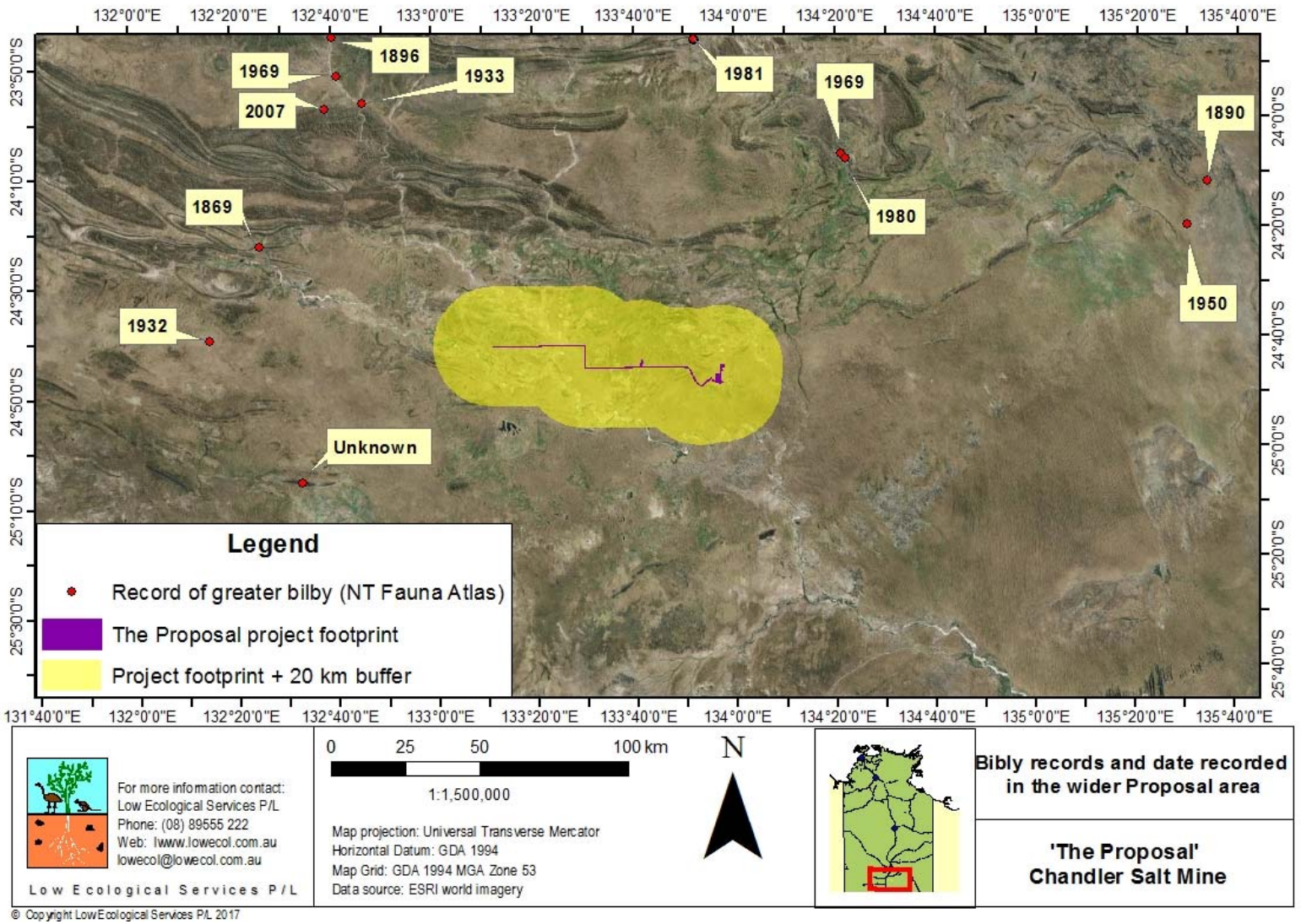
year) fire interval and hummock grassland/mixed shrub or woodland steppe on plains and alluvial areas with a high (4-10 year) fire frequency (Southgate, 1990b).'

And -

'The closest records of M. lagotis to the Proposal area are approximately 80 km north east and 80 km south west. Habitat available in the Proposal area is consistent with those described by (Southgate, 1990b) and, therefore, potentially suitable for M. lagotis. However, the most recent of these records was from 1969. Macrotis lagotis was not recorded during any of the on-ground surveys. It is generally accepted that M. lagotis no longer occurs within this region. Therefore, there is a low likelihood that this species is present in the Proposal area…'

The potential habitat for the greater bilby within the proposed development footprint and vicinity considered only marginally suitable habitat for this species. This marginal habitat is also of low quality due to land degradation as a result of cattle grazing. Regardless of the quality of this habitat, bilbies have never been recorded within the vicinity of the proposed development footprint. Historical records of the greater bilby within the wider region surrounding the proposed development footprint are shown on Figure 5-4.

Figure 5-4 Bilby records including recorded date in the wider region of the proposed development footprint



5.1.6 DEE 6

Issue raised

Confirm if this assessment of presence has been made on the basis of database/literature reviews or field surveys.

Proponent's response

Please refer to Section 7.2.2 (Likelihood of occurrence) of the EIS. This section states:

> *'Following the collation of database records, species and community profiles, and the results of previous ecological assessments within the locality, a 'likelihood of occurrence' assessment was prepared with reference to the habitats contained within the proposed development footprint and vicinity. This was further refined following field surveys and the identification and assessment of the habitats present.'*

The likelihood of occurrence of matters of national environmental significance within the proposed development footprint or vicinity was determined via a desktop assessment followed by a field survey.

5.1.7 DEE 7

Issue raised

State the total area (in hectares) of suitable habitat proposed to be cleared for each listed species under the EPBC Act likely to be present in the project area. At this stage, the EIS has not made clear the extent of impacts for each species and thus the Department is unable to agree that there are no significant residual impacts for each species.

Proponent's response - total area of suitable habitat proposed to be cleared for each listed species under the EPBC Act

Please refer to Section 7.4.1 (Direct impacts, Loss of fauna habitat), Table 7-10 (Estimated loss of habitat from construction of the Proposal) of the draft EIS. Please also refer to Table 5-6 in Appendix O. This information has been reproduced in Table 5-4 and Table 5-5 for threatened and migratory species listed under the EPBC Act. It must be noted that both Slater's skink and the thick-billed grasswren have been removed from Table 5-4. No sign of either species was recorded within the proposed development footprint or vicinity during the additional presence/absence surveys undertaken in late April 2017 by Low Ecological Surveys. There is a very low likelihood that these species occur within the proposed development footprint or vicinity primarily based on a lack of suitable habitat. Therefore, there would be no impact to Slater's skink or the thick-billed grasswren during construction, operation, or closure and rehabilitation of the Proposal (refer to Attachment C).

Table 5-4 Conservation-significant fauna species either recorded or predicted to occur within the proposed development footprint or locality (low to moderate, moderate and high likelihood of occurrence only) and the estimated loss of habitat from construction of the Proposal

Scientific name	Common name	Conservation status (EPBC Act)	Likelihood of occurrence	Estimated loss of habitat from construction of the Proposal (ha)	Result of assessment of significance
Reptiles					
Liopholis kintorei	Great desert skink	Vu	**Low to moderate**. Suitable habitat present within the proposed development footprint and vicinity.	75.11	No significant impact (refer to Section 7.7.1 of draft EIS and Section 4.2.1 and Section 4.2.3 of Appendix O of the draft EIS).
Birds					
Polytelis alexandrae	Princess parrot	Vu	**Moderate.** Suitable habitat is present in the proposed development footprint and vicinity after heavy rainfall (particularly around the Finke River).	286.26	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.1 and Section 4.2.3 of Appendix O of the draft EIS).
Rostratula australis	Australian painted snipe	En	**Moderate**. Suitable habitat is present in the proposed development footprint and vicinity after heavy rainfall.	0	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.1 and Section 4.2.3 of Appendix O of the draft EIS).
Mammals					
Dasycercus cristicauda	Crest-tailed mulgara	Vu	**High**. Suitable habitat present within the proposed development footprint and vicinity. Tracks of *Dasycerus* spp. recorded during field surveys.	159.43	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.1 and Section 4.2.3 of Appendix O of the draft EIS).

Notes: 1. Conservation status: En = Endangered, Vu = Vulnerable.

Table 5-5 Migratory species either recorded or predicted to occur within the proposed development footprint or locality (moderate and high likelihood of occurrence only) and the estimated loss of habitat from construction of the Proposal

Scientific name	Common name	Conservation status (EPBC Act)	International agreements	Likelihood of occurrence	Estimated loss of habitat from construction of the Proposal (ha)	Result of assessment of significance
Apus pacificus	Fork-tailed swift	Mi, Ma	J, C, R	**Moderate**. Suitable habitat is present in the proposed development footprint and vicinity after heavy rainfall.	0	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.5 of Appendix O of the draft EIS).
Ardea alba	Great egret	Mi, Ma	-	**Moderate**. Suitable habitat is present in the proposed development footprint and vicinity after heavy rainfall.	0	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.5 of Appendix O of the draft EIS).
Calidris acuminata	Sharp-tailed sandpiper	Mi, Ma	B, J, C, R	**High**. Species recorded within the proposed development footprint and vicinity during field surveys.	0	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.5 of Appendix O of the draft EIS).
Charadrius veredus	Oriental plover	Mi, Ma	B, J, C, R	**Moderate**. Suitable habitat is present in the proposed development footprint and vicinity after heavy rainfall.	0	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.5 of Appendix O of the draft EIS).
Glareola maldivarum	Oriental pratincole	Mi, Ma	J, C, R	**Moderate**. Suitable habitat is present in the proposed development footprint and vicinity after heavy rainfall.	0	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.5 of

Scientific name	Common name	Conservation status (EPBC Act)	International agreements	Likelihood of occurrence	Estimated loss of habitat from construction of the Proposal (ha)	Result of assessment of significance
						Appendix O of the draft EIS).
Merops ornatus	Rainbow bee-eater	Mi, Ma	-	**High**. Species recorded within the proposed development footprint and vicinity during field surveys.	397.5	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.5 of Appendix O of the draft EIS).
Tringa nebularia	Common greenshank	Mi, Ma	B, J, C, R	**High.** Suitable habitat is present in the proposed development footprint and vicinity. Likely to occur particularly during the non-breeding season.	0	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.5 of Appendix O of the draft EIS).
Tringa stagnatilis	Marsh sandpiper	Mi, Ma	B, J, C, R	**High**. Species recorded within the proposed development footprint and vicinity during field surveys.	0	No significant impact (refer to Section 7.7.1 of the draft EIS and Section 4.2.5 of Appendix O of the draft EIS).

Notes: 1. Conservation status: Mi = Migratory, Ma = Marine. International agreements: J = Japan-Australia Migratory Bird Agreement (JAMBA), C = China-Australia Migratory Bird Agreement (CAMBA), R = Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA), B = Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

Proponent's response - presence/absence surveys of Slater's skink and thick-billed grasswren

Additional surveys have been undertaken to confirm the presence/absence of two matters of national environmental significance (threatened species) that were reported in the draft EIS to have a low to moderate likelihood of occurrence within the proposed development footprint or vicinity. These were Slater's skink (*Liopholis slateri slateri*) and the thick-billed grasswren (*Amytornis modestus indulkana*).

Potential habitat for these species was identified within the vicinity of the proposed Henbury Access Road. The surveys were undertaken by Low Ecological Surveys post submission of the draft EIS in late April 2017. No sign of either species was recorded within the proposed development footprint or vicinity during the additional surveys. There is a very low likelihood that these species occur within the proposed development footprint or vicinity primarily based on a lack of suitable habitat. Therefore, there potential likelihood of impacts to Slater's skink or the thick-billed grasswren during construction, operation, or closure and rehabilitation of the Proposal is considered unlikely with a low impact (refer to Attachment C).

5.1.8 DEE 8

Issue raised

Provide an assessment of the scale and intensity of the impacts. State which of the direct, indirect and consequential impacts are likely to be short-term and long-term impacts.

Proponent's response

Table 5-2 in Appendix O of the draft EIS has been reproduced below in Table 5-6. Additional columns have been added on the right side for the scale, intensity and duration of the impacts, after mitigation.

Table 5-7 provides definitions for the scale of impacts. Impacts have been assessed at a regional scale within an 'area of interest' (defined as the proposed development footprint with an additional 20 kilometre buffer). Table 5-8 provides definitions of the intensity of impacts and Table 5-9 provides definitions for the duration of impacts. The intensity and duration of impacts varies considerably for different habitats and species. For the purpose of assessing intensity and duration of impacts, impacts have been generalised across habitats and species.

Table 5-6 Assessment of risks to the environment that may result from the Proposal (including scale, intensity and duration of impacts)

Hazard identification			Risk analysis			Mitigation and monitoring measures	Residual risk analysis					
Hazard	**Causes**	**Impacts**	**C1***	**L2***	**Risk rating ***		**C1***	**L2***	**Risk rating***	**Scale-regional**	**Intensity**	**Duration**
Vegetation clearing	Removal of large trees. Removal of ground cover. Fragmentation of land types. No erosion or sediment. control devices Insufficient dust control.	Fragmentation of habitat and edge effect.	3	2	6	• Provide workers with an environmental induction prior to starting construction activities. This would include information on the ecological values of the site and protection measures to be implemented to protect biodiversity during construction. A completed signed induction certificate is to be kept on site in the office for every person working on the site. All visitors to complete a visitor induction and to be supervised by a site staff member whilst on site, except where they complete a full induction. • Pre-clearance survey checklist, based on the NT Land Clearing Guidelines (Department of Natural Resources, Environment, The Arts and Sport, 2010) detailing the following: - Confirmed extent of clearing area has required approvals; - Land to be cleared is clearly marked; - Check for signs of threatened species; - Check for fauna, and re-locate if necessary; - Number of mature trees (>5m high), avoid clearing if possible; - Number of large trees with hollows, avoid clearing if possible; - - Number of fallen logs >15 cm in diameter, relocate to surrounding environment; - -Stockpiles within defined areas; - -Topsoil stockpiles <1.5 m in height; - -Clearing is progressive for environmental benefits; - Land clearing supervised; and - Once clearing is completed, the supervisor would register the total cleared area in a cleared area register. • Defer vegetation removal until necessary. • Locate site offices and stockpiles in already cleared and disturbed areas, where possible. • Provide maps to construction staff clearly showing vegetation clearing boundaries. Clearing to remain with strict boundaries as shown in final construction plans. Allow for 5% contingency on site boundaries. • Any extra areas required for temporary access for vehicle turn arounds to be cleared of shrubs and trees only; leaving ground cover and root stock intact. • Stockpile vegetation top soil and spoil separately in low mounds, less than 1.5 m in height. • Delay clearing following exceptionally high rainfall events until the ground is sufficiently dry to hold machinery. • During clearing, construct three separate stockpiles for vegetation, top soil and any sub soil removed. Vegetation to be mulched or burnt in a dedicated burn pit. Top soil should be stockpiled in mounds less than 1.5m in height along the edge of the clearing boundary. • Avoid clearing after rainfall sufficient to cause rutting by vehicle travel. Allow time for the soil to dry out so that ruts greater than 10cm are no longer formed by vehicle travel. • Ensure a detailed construction Erosion and Sediment Control Plan (ESCP) is developed and approved by the NT Government before on-ground works commence. All ESCP measures are to be SMART (specific, measurable achievable, results-orientated and time-based).	2	1	2	Medium	Moderate	Long-term
		Loss of conservation significant flora species.	3	2	8		2	2	4	Small	Low	Long-term
		Loss of conservation significant fauna habitat.	5	3	15		3	1	3	Small	Low	Long-term
		Erosion and sedimentation.	4	3	12		2	2	4	Small	Low	Short-term
		Increased dust and top soil loss.	4	4	16		2	2	4	Small	Low	Short-term
		Altered hydrology.- drainage	4	3	12		2	2	4	Small	Low	Long-term
Habitat loss	Removal of small shrubs, grasses and tree hollows. Removal of fallen logs greater than 10cm in diameter. Soil compaction;	Loss of conservation significant fauna habitat.	4	2	8	• Undertake pre-clearance surveys for threatened species by a qualified ecologist as detailed above in 'Vegetation clearance'. • If a tree must be removed, first inspect the tree to ensure no birds or animals are nesting within. If bird nest or other is detected, relocate it to a similar tree outside the clearing envelope. • Leave fallen logs greater than 15 cm diameter or relocate to surrounding environment. • Relocate bird nests found in trees or shrubs to be cleared to surrounding environment.	2	1	2	Small	Moderate	Long-Term

Hazard identification			Risk analysis			Mitigation and monitoring measures	Residual risk analysis					
Hazard	**Causes**	**Impacts**	**C1***	**L2***	**Risk rating ***		**C1***	**L2***	**Risk rating***	**Scale-regional**	**Intensity**	**Duration**
	Altered surface hydrology. Removal of rocks and rocky outcrops	Loss of fauna habitat.	3	4	12	• If possible avoid removal of mature trees with a trunk diameter greater than 15 cm, especially desert oaks, bloodwoods and bush tucker species. Where this is not possible leave the root stock in ground for later regeneration.	1	3	3	Small	High	Long-term
Fauna strike or injury	Access undisturbed areas. Increased traffic. Heavy vehicle access.	Conservation significant fauna.	4	2	8	• All staff to be inducted into the roles and responsibilities as outlined in the Biodiversity Management Plan (BDMP) and traffic/vehicle management plan. A completed signed induction certificate is to be kept on site in the office for every person working on the site. All visitor to complete a visitor induction and to be supervised by a site staff member whilst on site. Except where they complete a full induction. • Restrict vehicle use around site by filling up vehicles with passengers going to the same destination, all trucks to carry full loads where possible. • Avoid driving during high risk times; dawn, dusk and at night, where possible. • Prohibit off-road driving • Ensure traffic adheres to speed limits and local road rules. • Ensure speed limit and potential fauna crossing signs are clearly displayed on Chandler Haul Road, Henbury Access Road and other access tracks, as necessary. • Develop and maintain a fauna sightings register to be kept on site and filled in daily to report on the location, date, time of day, abundance and description of any fauna seen on site. • See mitigation measures for 'Unauthorised third party access'.	3	1	3	Small	Low	Short-term
		Other fauna.	4	4	16		3	2	6	Small	Low	Short term
Edge effects	Clearing of vegetation. Reducing capacity to resist weeds and other invasive species. Reducing capacity to resist erosion and sedimentation.	Increased weed species.	4	3	12	• See mitigation measures for 'Vegetation clearing' • See mitigation measures for 'Introduction and spread of weeds'. • See mitigation measures for 'Increased pest fauna species'.	2	2	4	Medium	Moderate	Long-term
		Erosion and sedimentation.	4	3	12		2	2	4	Medium	Moderate	Short-term
		Increased pest and predator species.	4	3	12		2	2	4	Medium	Moderate	Short-term
Habitat fragmentation	Clearing of habitat types.	Discontinuous habitat available for conservation significant fauna for foraging and shelter.	4	2	8	• See mitigation measures for 'Vegetation clearing' • See mitigation measures for 'Introduction and spread of weeds'. • See mitigation measures for 'Increased pest fauna species'.	3	1	3	Medium	Low	Short-term
Fauna displacement	Land clearing Construction. works Road development Lighting, noise and vibration.	Distress to conservation significant fauna.	3	3	9	• See mitigation measures for 'habitat loss'. • See mitigation measures for noise, vibration and lighting	3	1	3	Small	Low	Long-term
Hazardous material	Stores of hydrocarbons on site. Spill, leak or accidental release of hydrocarbons.	Contamination of soil.	4	3	12	• An induction will be provided to workers to ensure the safe use, handling and storage of hazardous material on site. Records to show all staff successful completion of induction with a copy of the records kept in the site office. • Chemical and hazardous material ordering to be calculated to have the minimum amount required on-site for operation. Any excess hazardous material to be removed off-site by delivery contractors. A daily register of hazardous material in, used and out to be recorded and kept in eth site office. • All hazardous material and hazardous material wastes are to be stored in bunded areas sufficient to hold a 110% of material stored in case of a spill or leak. The bunded area is to be impervious and strong enough to withstand changing environmental conditions of heat, cold, wind and rain.	2	2	4	Small	Low	Short-term
		Contamination of water.	5	2	10		2	1	2	Small	Low	Short-term

Hazard identification			Risk analysis			Mitigation and monitoring measures	Residual risk analysis					
Hazard	**Causes**	**Impacts**	**C1***	**L2***	**Risk rating ***		**C1***	**L2***	**Risk rating***	**Scale-regional**	**Intensity**	**Duration**
		Contamination of groundwater.	5	2	10	Any rain water is to be removed immediately into sealed containers for disposal off site in the nearest licensed waste disposal facility. Bunded area to be located 10m or outside tree canopy (whichever is greater), 25m of intermittent creek and drainage lines; 50m of intermittent 2nd order stream; 100m 3rd order creek; 250m of 4th order rivers and wetlands where the edge of the riparian vegetation is taken as the watercourse edge. • Any waste resulting from a hazardous remediation to be contained in an impervious container, labelled with type of material and date of incident and removed from site for disposal in the nearest licensed facility. • No open flames or heat sources near flammable material, appropriate signage used. • MSDS, spill kits and appropriate firefighting equipment (water, chemical or foam, etc.) stored next to hazardous material storage and use areas. • Eye and body wash stations located at the Chandler and Apirnta facilities in locations of use, handling and storage of hazardous material.	5	1	5	Small	Low	Short-term
		Contamination of vegetation.	4	3	12		2	1	2	Small	Low	Short-term
		Direct dermal contact with fauna.	4	3	12		3	2	6	Small	Low	Short-term
		Direct ingestion by fauna.	4	3	12		3	1	3	Small	Low	Short-term
Airborne salt	Salt stockpiles. Salt transport. Salt mining activities.	Conservation significant flora.	3	2	6	• Store salt in open stockpile for minimum time required. • All salt to be wet by water spray on the open surface before transport. If water is in short supply a plastic liner or similar is to be used to contain eth salt from blowing off during transport. Monthly inspection of the haul road to be carried out to monitor levels of visual salt accumulating on the surface. If visible salt is noticed then a suitably qualified consultant is to be contracted to conduct annual soil sampling to determine concentrations. • Cover all salt during transport. • A pre-construction and on-gong flora and fauna monitoring site to be established downwind of the salt stockpile. Result of monitoring to be compared to other sites outside of potential influence from salt stockpile.	2	1	2	Small	Low	Long-term
		General vegetation.	2	2	4		2	1	2	Small	Low	Long-term
		Water courses.	2	2	4		2	1	2	Small	Low	Long-term
		Soil.	2	2	4		2	2	4	Small	Low	Long-term
Lighting, noise and vibration	Construction noise, blasting and vibrations. Increased traffic.	Disturbance to local fauna.	2	3	6	• All operations to be restricted to daylight hours, where possible. • Turn off machinery when not in use. • Maintain and regularly service all generators, engines and vehicles on-site in line with manufacturers recommendations. • Ensure vehicles carry full loads, were possible, to limit the number of vehicles on the Chandler Haul Road and Henbury Access Road. • Only have minimal lights on needed for safe operation of facilities. • Turn lights off when not in use. • Use lower intensity lights, e.g. yellow or red lighting, where possible. This would reduce impacts on nocturnal species and limit insect attraction. • All lighting to be angled towards the ground to avoid unnecessary lighting of areas outside the clearing envelope.	2	2	4	Medium	Low	Short-term
Dust	Blasting and underground works. Windblown salt Construction works. Increased vehicle traffic.	Disturbance to local fauna and conservation significant fauna.	3	4	12	• Water trucks to be run daily during construction to limit visible dust levels. Not required after rain events. More water required in sections that turn to bull dust or in winds over 10 km/hr. Water not required if dust produced is lower than face level. Once roads and hardstands are established water truck to be used as needed as determined by the site supervisor taking into consideration local climatic and road conditions. • Avoid clearing during dry windy conditions. • Leave root stock and ground cover on firebreaks and non-crucial tracks (tracks where access is not required everyday e.g. temporary construction tracks). Ground cover should be left to at least 10cm in height. This can be achieved by clearing with the blade up technique. • Stage vegetation removal (clearing) so that each area, Chandler Facility, Chandler Haul Road etc., surface can be completed before the next section of clearing is to begin. For example, access tracks to be cleared and then worked to develop a firm surface before the next area is cleared.	2	2	4	Small-medium	Low	Short-term
		Impacts to vegetation	3	4	12		2	2	4	Small-medium	Low	Short-term
		Water courses.	2	1	2		2	1	2	Small-medium	Low	Short-term
		Conservation significant flora.	2	1	2		2	1	2	Small-medium	Low	Long-term

Hazard identification			Risk analysis			Mitigation and monitoring measures	Residual risk analysis					
Hazard	**Causes**	**Impacts**	**C1***	**L2***	**Risk rating ***		**C1***	**L2***	**Risk rating***	**Scale-regional**	**Intensity**	**Duration**
Fire	Increased ignition sources. Natural events/climatic conditions. Inadequate bushfire management. Vegetation stockpiles. Traffic accidents.	Conservation significant flora.	4	2	8	• Finalise and implement Bushfire Management plan (BFMP). • Daily checking of bushfire websites and weather bureau data including BOM and NAFI websites. Records to show daily check and results. The results of this check used to provide a daily fire risk rating specific to site. • Construct and maintain firebreaks around infrastructure and significant habitats. • No open flames outside of designated areas unless hot works permit is approved. • Install wind socks at each operational area. • Ensure all flammable material is clearly labelled and stored in accordance with their MSDS. Store in bunded impervious area suitable to hold 110% of stored material. Store at distances from trees and watercourse as prescribed in mitigation measures for 'Hazardous Material'. • Ensure firefighting equipment stored on site is suitable for flammable material used on site. Firefighting equipment to be located close to flammable material stores and use locations, within 25m. Staff to be trained in use of firefighting equipment. • Designated smoking areas to be positioned upwind of dominant wind direction greater than 50-100m from any flammable material. Smoking area to be fitted with appropriately designed disposal containers to contain all ash and potential ignition source. Area to be clearly signed and location made aware to all staff and contractors during site inductions. Smoking outside of designated area to be penalised. • Organise and implement strategic controlled burning with traditional owners and Central Land Council.	3	2	5	Small - Medium	Moderate	Short-term
		Conservation significant fauna.	5	4	20		3	2	5	Small - Medium	Moderate	Short-term
		Site personnel safety.	5	3	15		3	1	3	Small	Low	Short-term
		Site infrastructure.	5	3	15		3	1	3	Small	Low	Short-term
		General ecology.	5	4	20		2	2	4	Small - Medium	Moderate	Short-term or long-term (depending on vegetation community)
Waste	Poor domestic waste management. Storage locations not fauna proof or adequately contained. Increased predators and introduced species.	Soil and water contamination.	5	4	20	• Develop and implement a Waste Management Plan. • All domestic and putrescible stored in fauna proof bins. That is, containers that are not easy to tip over, solid, complete without leaks or breaks, and have a heavy or lockable lid. • Waste to be removed on a regular basis, weekly or fortnightly depending on quantity produced, to the nearest license landfill facility. • Ensure any liquid waste is stored on bunding as defined in 'Hazardous Material'. • Implement waste hierarchy system (avoid/minimise, reuse, recycle, recovery, and then disposal) and include in site induction. Have designated storage for reuse, recycle, recovery and disposal. • Ensure waste is disposed off-site by licensed contractor(s). • Maintain records of all waste removed from site including date, time, type of waste, waste disposal contractor and final location. • All hazardous waste stored in accordance with mitigation measures as outlined in 'Hazardous Material'.	3	1	3	Small	Low	Short-term
		Impacts to fauna and conservation significant fauna.	4	4	16		3	1	3	Small	Low	Short-term
		Visual amenity loss.	2	3	6		2	1	2	Small	Low	Short-term
Altered hydrology	Altered surface hydrology. Groundwater drawdown. Artificial surface water sources. Contamination due to spill or uncontrolled. release of hazardous. materials Clearing of large vegetation.	Conservation significant flora.	3	1	3	• Where possible contour cleared surface to match the natural drainage pattern of the pre-cleared surface. Install breaks in the top soil stockpiles where required to allow natural flow to pass uninterrupted. Where not possible install diversion around constructed area so flow will return to downstream receptors. • Adhere to NT land clearing guidelines for any developments near to watercourse (25m for drainage depressions or intermittent 1st order streams, 50m for intermittent 2nd order streams, 100m for 3rd order creeks, 250m for 4th order or higher rivers and 250m from wetlands where edge of the water course is taken from the edge of riparian vegetation). • Any unavoidable creek crossing or drainage depression crossing to be developed to the natural base of the creek. Where an all-weather crossing is required culverts need to be installed to handle peak flow events. All water courses are ephemeral however will often flow in flood with large debris. All weather crossing need to be specifically engineered to meet requirements to handle 1 in 100-year flood events. • Any drain installed to be constructed with a flat bottom and an unobstructed exit to allow surface flow to flood out onto the surrounding area. All drains and water diversion devices to be checked and maintained following significant rainfall events (>10mm). • A pre-construction and ongoing flora and fauna monitoring location to be placed along the Finke river systems to monitor for signs of vegetation stress resulting from Tellus operations. • Follow mitigation measures 'Introduction and spread of weeds and invasive species'.	2	1	2	Small	Low	Long-term
		Conservation significant fauna.	2	1	2		2	1	2	Small	Low	Long-term

Hazard identification			Risk analysis			Mitigation and monitoring measures	Residual risk analysis					
Hazard	Causes	Impacts	C1*	L2*	Risk rating *		C1*	L2*	Risk rating*	Scale-regional	Intensity	Duration
		Downstream receptor impacts.	3	3	9		2	2	4	Small	Low	Long-term
Groundwater drawdown and contamination	Drawdown of aquifer for construction. Road maintenance. Dust suppression. Poor well hygiene.	Surrounding stakeholders utilising the aquifer.	4	3	12	• Groundwater trigger limit guidelines to be referenced include the National Environment Protection Measures (NEPM) (National Environment Protection Council, 2013), Australian Drinking Water Guidelines 2011 (National Health and Medical Research Council, 2011) and the Australian and New Zealand Guidelines for fresh and Marine Waters (Australian and New Zealand Environment and Conservation Council, 2000). • Install well caps on monitoring wells. • Fence off bore field to avoid damage from fauna and large herbivores. • Ensure no spill or contamination enters wells. • Record extraction rate and amount.	2	1	2	Small	Low	Short-term
		Contamination of aquifer.	5	2	10		5	1	5	Small	Low	Short-term
Erosion and sedimentation	Concentration points. Land clearing Inadequate drainage. Inadequate erosion and sediment control devices.	Watercourse direction and sediment load.	3	2	6	• Ensure an ESCP has been developed to the standard of the IECA and the satisfaction of the NT government and is implemented correctly during construction and operation. All temporary erosion and control structures are to be removed once final operation layout has been set. • Leave the top 5-10cm of vegetation and root stock on non-essential roads, e.g. fire trails. • Establish roads along the contour. Large cleared areas to avoid slopes >2%. If unavoidable more detailed erosion control devices will be required to direct the flow. • Ensure all water crossings are developed to base of natural water course or adequate culverts are established to reduce flow constriction of watercourses. • Construct roads without windrows and flat bottom off let drains only. • Inspect the site following a rainfall event greater than 10mm for any signs of erosion. • Limit compacted areas to minimum required. • Pre-construction survey by engineers to determine soil types suitable for construction; utilising existing solid surfaces where possible. Minimise heavily compacted areas to areas of loading and unloading trucks and haul roads. Areas not required for constant access or heavy traffic, e.g. walk ways, bush fire breaks, light vehicle access tracks, offices and camp areas. • Where compacted areas are unavoidable, they need to be clearly illustrated in the ESCP plan before construction begins. ESCP needs to ensure roll-over banks and flow diversions are install in accordance with spacing provided by the NT government soil fact sheets (DLRM).	2	2	4	Small	Low	Long-term
		Drainage line diversion and scour.	3	3	9		3	1	3	Medium	Low	Long-term
		Vegetation loss.	3	3	9		2	1	2	Small	Low	Short-term
		Top soil loss.	4	3	12		2	2	4	Small	Low	Long-term
Introduction and spread of weeds and invasive species	Lack of weed hygiene measures Construction equipment moving from weed infested area to clean area Newly disturbed areas	Infestation of weed or invasive species.	4	4	16	• Develop and maintain a Weed Management Plan (WMP). • Provide workers with an environmental induction prior to starting construction activities. In regards to weeds, the induction would include: • - the roles and responsibilities as outlined in the Weed Management Plan (WMP); • - identification guides and photos for common weeds on site; and • - an introduction to the register for reporting any sightings of weeds or potential weeds. • A completed signed induction certificate is to be kept on site in the office for every person working on the site. All visitors to complete a visitor induction and to be supervised by a site staff member whilst on site. Except where they complete a full induction. • Avoid contact with weed or invasive species seed, plant matter or soil potentially contaminated with weed seeds. • Avoid clearing or removal of any weed or invasive species during seeding, or put plastic bag over seed heads before removing plant. • Driving during muddy conditions or areas avoided, where possible. • Remove seed and mud from vehicle tyres and front grill daily. • All vehicles to be weed free before entering site for the first time. Weed wash down will be required if leaving a contaminated area to an uncontaminated area. • Clearing of any weeds or invasive species to be done when they are not seeding, where possible. • Weed identification is to be conducted annually by a suitable qualified consultant as part of the routine flora and fauna surveys.	3	1	3	Medium	Low	Long-term
		Loss of conservation significant fauna food and habitat.	4	2	8		3	1	3	Medium	Low	Long-term
		Outcompeting native flora.	4	3	12		3	1	3	Medium	Low	Long-term
		Blocking watercourses.	4	3	12		2	2	4	Small	Low	Long-term

Hazard identification			Risk analysis			Mitigation and monitoring measures	Residual risk analysis					
Hazard	**Causes**	**Impacts**	**C1***	**L2***	**Risk rating ***		**C1***	**L2***	**Risk rating***	**Scale-regional**	**Intensity**	**Duration**
						• Remove weeds following specialist advice from qualified ecologist or Weeds Branch, NT Government. Remove weeds before seeding times, where possible. • Undertake annual weed mapping in the vicinity of the proposed development footprint.						
Increased pest fauna species	Increased predators Increased herbivores	Outcompeting or preying on native fauna.	4	4	16	• Develop and implement a no tolerance policy to the introduction of pest species by contractors, suppliers and personnel. • Develop and implement an introduced fauna control program in consultation with stakeholders. • Install fauna proof fence around infrastructure. • Reduce artificial standing water. • Prevent access to artificial water and heat sources through construction of fences. Ensure the top fence wire is not barbed for avifauna. • Place brush or vegetation stockpiles across linear developments no longer required (access tracks etc.) to inhibit movement of predators and introduced herbivores. • Dispose of all waste in predator-proof bins. • No feeding of fauna, native or introduced, on site. • Remove any dead fauna or insects from the Proposal and either dispose off-site or bury > 50cm deep to avoid predators uncovering. • Close off and rehabilitate any cleared areas no longer required for safe operation. • Trap and relocate predator species if they are noticed to have increased in numbers and habituate around facilities. Trapping and relocating of fauna would be undertaken by a qualified ecologist.	3	1	3	Medium	Low	Short-term
		Watercourses destruction and depletion from large herbivores.	4	3	12		3	1	3	Small	Low	Short-term
		Overgrazing.	3	3	9		2	2	4	Medium	Low	Short-term
		Soil degradation.	4	3	12		2	1	2	Medium	Low	Long-term
Increased predator species	Cleared areas. Long linear developments. Wastes and artificial food sources. Artificial water sources. Access into new areas.	Conservation significant fauna.	4	3	12	• Develop and implement an introduced fauna control program in consultation with stakeholders. • Install fauna proof fence around all infrastructure. • Reduce artificial standing water. • Prevent access to artificial water and heat sources through construction of fences. Ensure the top fence wire is not barbed for avifauna. • Place brush or vegetation stockpiles across linear developments no longer required (access tracks etc.) to inhibit movement of predators and introduced herbivores. • Dispose of all waste in predator-proof bins. • No feeding of fauna, native or introduced, on site. • Remove any dead fauna or insects from the Proposal and either dispose off-site or bury > 50cm deep to avoid predators uncovering. • Close off and rehabilitate any cleared areas no longer required for safe operation. • Trap and relocate predator species if they are noticed to have increased in numbers and habituate around facilities. Trapping and relocating of fauna would be undertaken by a qualified ecologist.	3	1	3	Medium	Low	Long-term
		Other fauna.	4	4	16		2	1	2	Medium	Low	Short-term
Soil compaction and top soil loss	Increased run-off and water flow in watercourses Surface difficult for vegetation to establish	Inhibited regrowth potential.	4	3	12	• Ensure an ESCP has been developed to the standard of the IECA and the satisfaction of the NT government and is implemented correctly during construction and operation. All temporary erosion and control structures are to be removed once final operation layout has been set. • Leave the top 5-10cm of vegetation and root stock on non-essential roads, e.g. fire trails. • Establish roads along the contour. Large cleared areas to avoid slopes >2%. If unavoidable more detailed erosion control devices will be required to direct the flow. • Plan roads considering recommendations and identified high risk areas from this biodiversity risk assessment report. • Ensure all water crossings are developed to base of natural water course or adequate culverts are established to reduce flow constriction of watercourses. • Construct roads without windrows and flat bottom off let drains only. • Inspect the site following a rainfall event greater than 10mm for any signs of erosion. • Limit compacted areas to minimum required. • Pre-construction survey by engineers to determine soil types suitable for construction; utilising existing solid surfaces where possible. Minimise heavily compacted areas to areas of loading and unloading trucks and haul roads. Areas not required for constant access or heavy traffic, e.g. walk ways, bush fire breaks, light vehicle access tracks, offices and camp areas.	3	1	3	Small	Low	Long-term
		Loss of seed bank and nutrient rich soil matter.	4	3	12		3	1	3	Small	Low	Long-term

Hazard identification			Risk analysis			Mitigation and monitoring measures	Residual risk analysis					
Hazard	**Causes**	**Impacts**	**C1***	**L2***	**Risk rating ***		**C1***	**L2***	**Risk rating***	**Scale-regional**	**Intensity**	**Duration**
						• Where compacted areas are unavoidable, they need to be clearly illustrated in the ESCP plan before construction begins. ESCP needs to ensure roll-over banks and flow diversions are install in accordance with spacing provided by the NT government soil fact sheets (DLRM).						
Unauthorised third party access	New roads	Increased chance fauna strike or injury.	3	2	6	• Record all access to site in a site register. • Ensure visitors complete induction or are accompanied by Tellus employee whilst on-site, except where they complete a full induction. • Erect clear signage indicating prohibition of unauthorised entry. • Dog leg smaller access tracks when joining larger roads to limit third party access by reducing access tracks visibility from the main road.	2	2	4	Small	Low	Short-term
		Increased wastes.	2	2	4		2	1	2	Small	Low	Short-term
		Weed spread potential.	3	2	6		3	1	3	Small	Low	Long-term
Rehabilitation	Sites not rehabilitated. Improper rehabilitation techniques employed. Inadequate post rehabilitation monitoring.	Conservation significant flora.	2	2	4	• Develop and implement a decommissioning and rehabilitation management plan. • Install erosion and sediment control temporary structures to assist with rehabilitation in accordance with IECA and DLRM guidelines and factsheets. • Respread spoil first, then top soil and last cleared vegetation over surfaces. • Leave any infrastructure, plant or cleared area as so detailed in a land use agreement with the land manager. • Remove all infrastructure, plant, machinery and operational and construction wastes. • Re-contour all cleared surfaces to match surrounding topography, as close as possible. • Rip any compacted area ensuring final surface is rough to increase infiltration. • Block all access points to roads and tracks, unless agreed with land manager. • Fill in sumps or turkey nest, unless agreed otherwise with land manager. • Close off and seal all groundwater wells. • Leave underground salt mine in condition as stipulated in rehabilitation plan.	2	1	2	Small	Low	Long-term
		Conservation significant fauna.	4	2	8		2	1	2	Small	Low	Long-term
		Altered hydrology.	2	3	6		3	1	3	Small	Low	Long-term
		Top soil loss and compaction.	3	2	6		2	1	2	Small	Low	Long-term
		Erosion and sedimentation.	4	2	8		2	1	2	Small	Low	Long-term
		Contamination.	4	2	8		2	1	2	Small	Low	Long-term

*C1: Consequences, L2: Likelihood. Ratings are defined in Table 5-1 in Appendix O of the draft EIS.

Table 5-7 Definition of regional scale levels of area of impact

Scale	Definition
Small	Area <400 ha. Area of impact is likely to be confined to the proposed development footprint (397.5 ha) or less.
Medium	Area 400 – 800 ha. Area of impact is likely to be larger than the proposed development footprint but within immediate contact with the development footprint.
Large	Impact has the potential to affect the entire 'area of interest' (20 km area around the proposed development footprint).

Table 5-8 Definition of levels of intensity

Intensity	Definition
High	Impact is likely to affect all biodiversity in the defined impact area.
Moderate	Impact is likely to affect around half of the biodiversity in the defined impact area.
Low	Impact is likely to affect some or none of the biodiversity in the defined impact area.

Table 5-9 Definition of duration

Duration	Definition
Short-term	Impact is likely to last <25 years (proposed mine life).
Long-term	Impact is likely to last >25 years, beyond the proposed mine life.

5.1.9 DEE 9

Issue raised

Sections 4 and 5 of Appendix O do not appear to identify any unknown, unpredictable or irreversible impacts – please confirm.

Proponent's response

Noted. It is highly unlikely there would be unpredictable or irreversible impacts as a result of the Proposal. Where information is unavailable such that impacts are unknown or unpredictable, a precautionary approach has been taken to estimate potential impacts and management measures have been developed to address the potential impact.

5.1.10 DEE 10

Issue raised

Section 7.2.1 states that 'a list of literature that was reviewed' is provided in Appendix R however the Department notes that this Appendix is a Surface Water Assessment (the Department notes that this information also appears to be missing from Appendix O). Please provide a list of action plans, recovery plans and threat abatement plans that were considered in assessing risks.

Proponent's response

Noted. The reference to Appendix R was an error. This should have been read as Appendix O.

A range of literature was reviewed during the preparation of the biodiversity risk assessment presented in Appendix O of the draft EIS. This literature was referenced throughout the text in Chapter 7 and Appendix O of the draft EIS. References used throughout Chapter 7 are listed in their entirety in Chapter 23 of the draft EIS. References used throughout Appendix O are listed in their entirety in Chapter 10 of Appendix O of the draft EIS.

A list of relevant threat abatement plans, recovery plans and conservation advice used during the preparation of the biodiversity risk assessment was provided in Table 6-4 of Appendix O. These plans have also been referenced in their entirety in Chapter 10 of Appendix O of the draft EIS.

5.1.11 DEE 11

Issue raised

Many of the proposed actions are not SMART (specific, measurable, achievable, results-orientated and time-bound). Please revise actions in this chapter, and potentially others, to be SMART noting that they may be included in the Biodiversity Management Plan (BMP).

Proponent's response

Please refer to the proponent's response to DEE 14 (refer to Section 5.1.14). The mitigation measures presented in Draft Biodiversity Management Plan have been revised so that they are 'SMART' and are presented in Table 5-12 in Section 5.1.14. The revised mitigation measures presented in Table 5-12 supersede the mitigation measures presented Table 12-1 of the Draft Biodiversity Management Plan provided as Appendix 6 in Appendix O of the draft EIS. The mitigation measures listed in Table 7-11 in Chapter 7 of the draft EIS are a summary of the mitigation measures presented in Table 5-12.

5.1.12 DEE 12

Issue raised

Provide an assessment of the expected or predicted effectiveness of the mitigation measures specifically relating to matters of national environmental significance in Table 6.4 of Appendix O.

Proponent's response

Table 6-4 in Appendix O of the draft EIS has been reproduced below in Table 5-10. An additional column has been added on the right side for the predicted effectiveness of the mitigation measures specifically relating to matters of national environmental significance. The effectiveness or confidence in each mitigation measure proposed in Table 5-10 is based on the descriptions provided in Table 5-11.

Other amendments have been made to Table 5-10. These include:

- Both Slater's skink and the thick-billed grasswren have been removed. No sign of either species was recorded within the proposed development footprint or vicinity during the additional presence/absence surveys undertaken in late April 2017 by Low Ecological Surveys. There is a very low likelihood that these species occur within the proposed development footprint or vicinity primarily based on a lack of suitable habitat. Therefore, there would be no impact to Slater's skink or the thick-billed grasswren during construction, operation, or closure and rehabilitation of the Proposal (refer to Attachment C).
- An additional row has been added for the greater bilby to address DEE 13 (refer to Section 5.1.13).
- The column titled 'Relevant Commonwealth TAP, Recovery Plans and Conservation Advice' has been amended to describe how relevant Commonwealth TAP, Recovery Plans and Conservation Advice have been taken into consideration to address DEE 13 (refer to Section 5.1.13).

Table 5-10 Mitigation and monitoring measures for threatened species with a low- moderate, moderate or high likelihood of occurring in the Proposal area with the potential be impacted by the Proposal either as an individual, population or through habitat loss

Species	Potential Impacts from the Proposal	Relevant Commonwealth TAP, Recovery Plans and Conservation Advice	Mitigation measures	Monitoring	Predicted effectiveness
EBPC Act listed threatened species					
Crest-tailed mulgara (*Dasycercus cristicauda*)	*Dasycercus cristicauda* would not be significantly impacted by the Proposal (see Section 4.2.3 crest-tailed mulgara) however individuals may be impacted by the Proposal. Potential impacts from the Proposal may include: • Vehicle strike. • Increased predator species. • Grazing by domestic stock, rabbits and camels. • Bushfires.	The mitigation and monitoring measures take into consideration the 'local priority actions' and aim to mitigate and monitor the 'threats' described in the Approved Conservation Advice for *Dasycercus cristicauda* (Crest-tailed Mulgara) (Threatened Species Scientific Committee, 2013). The mitigation and monitoring measures also take into account the 'objectives and actions' identified in the following Commonwealth TAP's: • Threat abatement plan (TAP) for predation by European red fox (Department of the Environment, Water, Heritage and the Arts, 2008a); • TAP for predation by feral cats (Department of the Environment, 2015); and • TAP for competition and land degradation by rabbits (Department of the Environment, Water, Heritage and the Arts, 2008b).	• Fauna Strike –Table 7-4 Fauna Strike or Injury. • Introduced predators – Table 7-4. • Introduced herbivores – Table 7-4. • Bushfires – Table 7-4 Fires and Bushfire Management Plan Appendix 4.	• Fauna incident register. • Fauna sightings register. • Flora and Fauna Monitoring Program would be conducted six month to annually (See Appendix 6 – Biodiversity Management Plan): - Fauna trapping. - Spotlighting - Track-based monitoring. - Vegetation health - monitoring.	High
Great desert skink (*Liopholis kintorei*)	If the great desert skink is present Proposal area, the species would not be significantly impacted by the Proposal (see Section 4.2.3 great desert skink) however individuals may be impacted by the Proposal. Potential impacts from the Proposal may include: • Vehicle strike. • Increased predator species. • Grazing by domestic stock, rabbits and camels. • Spread of buffel grass.	The mitigation and monitoring plan aims to address and monitor the 'threats' listed in *A recovery plan for the Great Desert Skink* (Egernia kintorei) 2001 – 2011 (McAlpin, 2001); The mitigation and monitoring plan takes into account the 'objectives and actions' identified in the following Commonwealth TAP's: • TAP for predation by European red fox (Department of the Environment, Water, Heritage and the Arts, 2008a); and • TAP for predation by feral cats (Department of the Environment, 2015).	• Pre-construction survey targeting great desert skink to determine the presence or absence of the species. See Flora and Fauna Monitoring Program (within Biodiversity management plan – • Appendix 6). • If the species is found to be present, significant impacts could be avoided through re-positioning of conflicting sites. If significant impacts could not be avoided, the need for offsets would be assessed in consultation with the DoEE. • Fauna Strike –Table 7-4 Fauna Strike o Injury. • Introduced predators – Table 7-4 Increased Pest Fauna. • Introduced herbivores – Table Increased Pest Fauna. • Weed management – Table 7-4 Introduction and spread of weeds.	• Fauna incident register. • Fauna sightings register Flora and Fauna Monitoring Program would be conducted annually (See Appendix 6 - Biodiversity Management Plan): - Fauna trapping and searches for burrows in the warmer seasons when the species is active and detectable. - Track-based monitoring to monitor feral predator species populations. - Vegetation health monitoring to monitor habitat.	High
Greater bilby (*Macrotis lagotis*)	The greater bilby is not present in the Proposal area, therefore, there are no potential impacts to the species as a result of the Proposal.	The proposed mitigation and monitoring plan takes into consideration the relevant 'conservation actions' and aims to mitigate and monitor the 'threats' identified in Table 1 of the Approved Conservation Advice for *Macrotis lagotis* (greater bilby) (Threatened Species Scientific Committee, 2016); The plan also aims to mitigate and monitor the 'threats' identified in the National Recovery Plan for the Greater Bilby *Macrotis lagotis* (Pavey, 2006). Monitoring measures take into consideration the 'outcomes and actions' of the following Commonwealth TAP's: • TAP for predation by feral cats (Department of the Environment, 2015).	• Fauna Strike –Table 7-4 Fauna Strike or Injury. • Introduced predators – Table 7-4 • Introduced herbivores – Table 7-4. • Bushfires – Table 7-4 Fires and Bushfire Management Plan Appendix 4.	• Fauna incident register. • Fauna sightings register. • Flora and Fauna Monitoring Program would be conducted six month to annually (See Appendix 6 – Biodiversity Management Plan): - Fauna trapping. - Spotlighting. - Track-based monitoring.	High

Species	Potential Impacts from the Proposal	Relevant Commonwealth TAP, Recovery Plans and Conservation Advice	Mitigation measures	Monitoring	Predicted effectiveness
		• Threat abatement plan for competition and land degradation by rabbits (Department of the Environment, Water, Heritage and the Arts, 2008b). • Threat abatement plans for predation by European red fox (Department of the Environment, Water, Heritage and the Arts, 2008a).		- Vegetation health monitoring.	
Princess parrot (*Polytelis alexandrae*)	If the Princess parrot is present in the Proposal area, the species would not be significantly impacted by the Proposal (see Section 4.2.3 princess parrot) however individuals may be impacted by the Proposal. Potential impacts from the Proposal may include grazing by domestic stock, rabbits and camels.	The proposed mitigation and monitoring plan takes into consideration the 'local priority actions' and aims to mitigate and monitor the threats discussed in the Approved Conservation Advice *on Polytelis alexandrae* (Princess Parrot) (Threatened Species Scientific Committee, 2008).	• Pre-construction survey targeting Polytelis alexandrae to determine the presence or absence of the species. See Flora and Fauna Monitoring Program (within Biodiversity Management Plan – Appendix 6). • Introduced herbivores – Table 7-4 Increased pet fauna.	• Fauna incident register. • Flora and Fauna Monitoring Program would be conducted six monthly to annually (See BMP): - Area search bird surveys, targeted searches and waterhole watches in late - dry-season conducted annually. - Vegetation health monitoring to monitor habitat.	High
Australian painted snipe (*Rostratula australis*)	If the Australian painted snipe is present in the Proposal area, the species would not be significantly impacted by the Proposal (see Section 4.2.3 princess parrot) however individuals may be impacted by the Proposal. Potential impacts from the Proposal may include increased predator species.	The proposed mitigation and monitoring plan aims to mitigate the 'threats' and takes into consideration the relevant 'regional priority actions' in the *Approved Conservation Advice on Rostratula australis (*Australian Painted Snipe*)* (Threatened Species Scientific Committee, 2013)**.** Monitoring measures also take into consideration the 'outcomes and actions' of the following Commonwealth TAP's: • TAP for predation by European red fox (Department of the Environment, Water, Heritage and the Arts, 2008a). • Threat abatement plans for predation by feral cats (Department of the Environment, 2015).	• Pre-construction survey targeting Australian painted snipe to determine the presence or absence of the species. See Flora and Fauna Monitoring Program (within Biodiversity management plan – Appendix 6). • Introduced predators – Table 7-4 • Increased Pest Fauna.	• Flora and Fauna Monitoring Program would be conducted six monthly to annually (See Appendix 6 – Biodiversity Management Plan): - Area search bird surveys and stationary observations during breeding season. - Track based monitoring to monitor feral predator populations. - Vegetation health monitoring to monitor habitat.	High
EPBC listed migratory and marine species					
Migratory and Marine Species (*Ardea modesta, Calidris acuminata, charadrius veredus, Glareola maldivarum, Merops ornatus, Tringa nebularia* and*, Tringa stagnatilis*)	As habitat within the Proposal area is not in a region that supports an ecologically significant proportion of any migratory species potentially occurring in the Proposal area; is not of critical importance to any of these species at particular life-cycle stages; is not at the limit of the range of any of these species; and is not within an area where any of these species is declining, the Proposal would not significantly impact any migratory species (see Section 4.2.5). However, individuals may be impacted by the Proposal. Potential impacts from the Proposal may include increased predator species.	Monitoring measures take into consideration the 'outcomes and actions' of the following Commonwealth TAP's: • TAP for predation by European red fox (Department of the Environment, Water, Heritage and the Arts, 2008a). • TAP for predation by feral cats (Department of the Environment, 2015).	• Pre-construction survey targeting migratory and marine species to determine the presence or absence of the species. See Flora and Fauna • Monitoring Program (within Biodiversity management plan – Appendix 6). • Introduced predators – Table 7- 4. • Increased Pest Fauna.	• Fauna incident register. • Fauna sightings register. • Flora and Fauna Monitoring Program would be conducted six monthly to annually (See Appendix 6 - Biodiversity • Management Plan). • Area search bird surveys, particularly near water bodies.	High
TPWC Act threatened species					
Brush-tailed mulgara	*Dasycercus blythii* would not be significantly impacted by the Proposal (see Section 4.2.9 brush-	Monitoring measures take into consideration the 'outcomes and actions' of the following Commonwealth TAP's:	• Pre-construction survey targeting Australian painted	• Fauna incident register. • Fauna sightings register.	High

Species	Potential Impacts from the Proposal	Relevant Commonwealth TAP, Recovery Plans and Conservation Advice	Mitigation measures	Monitoring	Predicted effectiveness
(*Dasycercus blythi*)	tailed mulgara), however individuals may be impacted by the Proposal. Potential impacts from the Proposal may include: • Vehicle strike. • Increased predator species. • Grazing by domestic stock, rabbits camels. • Bushfires.	• TAP for predation by European red fox (Department of the Environment, Water, Heritage and the Arts, 2008a). • TAP for predation by feral cats (Department of the Environment, 2015). • TAP for competition and land degradation by rabbits (Department of the Environment, Water, Heritage and the Arts, 2008b). .	snipe to determine the presence or absence of the species. See Flora and Fauna Monitoring Program (within Biodiversity management plan – Appendix 6). • Fauna Strike –Table 7-4 Fauna Strike or Injury. • Introduced predators – Table 7- 4. • Introduced herbivores – Table 7- 4. • Bushfires – Table 7-4 Fires and Bushfire Management Plan Appendix 4.	• Flora and Fauna Monitoring Program would be conducted six monthly to annually (See Appendix 6 - Biodiversity • Management Plan): - Fauna trapping; - Spotlighting; - Track-based monitoring to monitor feral predator populations. - Vegetation health monitoring to monitor habitat condition.	
Southern marsupial mole (*Notoryctes typhlops*)	*Notoryctes typhlops* would not be significantly impacted by the Proposal (see Section 4.2.9 southern marsupial mole), however individuals may be impacted by the Proposal. Potential impacts from the Proposal may include: • Increased predator species; and • Compaction for roads and infrastructure.	Monitoring measures take into consideration the 'outcomes and actions' of the following Commonwealth TAP's: • TAP for predation by European red fox (Department of the Environment, Water, Heritage and the Arts, 2008a); and • TAP for predation by feral cats (Department of the Environment, 2015).	• Fauna Strike –Table 7-4 Fauna Strike or Injury. • Introduced predators – Table 7-4 • Introduced herbivores – Table 7- 4. • Bushfires – Table 7-4 Fires and Bushfire Management Plan Appendix 4.	• Flora and Fauna Monitoring Program would be conducted annually (See Appendix 6 - Biodiversity Management • Plan): - Mole trenches. - rack-based monitoring to monitor feral predator populations.	High

Table 5-11 Effectiveness of, or confidence in the proposed mitigation measures

Effectiveness	Examples
High	• Proven Best Practice Measures (BPM). • Best Available Technology (BAT). • Environmentally Sound Management (ESM). • Policy and guidance.
Moderate	• Effective mitigation strategy and considered standard practice but is not recognised as Best Practice Measures, Best Available Technology/Techniques, Environmentally Sound Management, or satisfying all requirements of policy and guidance.
Low	• Technology has not been demonstrated in industry. • Not yet tried and/or tested.

5.1.13 DEE 13

Issue raised

Outline mitigation and monitoring measures for the greater bilby in Table 6.4. Describe monitoring measures take into account relevant approve plans and recovery plans.

Proponent's response

Please refer to the proponent's response to DEE 12, specifically Table 5-10 (refer to Section 5.1.12). An additional row for the greater bilby monitoring measures has been added. The column 'Relevant Commonwealth TAP, Recovery Plans and Conservation Advice' has been amended to describe how monitoring measures take into account relevant approved plans and recovery plans. It is important to note, however, that the greater bilby has never been recorded within the vicinity of the proposed development footprint. There would be no impacts to this species as a result of the Proposal (refer to the proponent's response to DEE 5, Section 5.1.5).

5.1.14 DEE 14

Issue raised

Identify the goals (beyond the scope) of each mitigation and monitoring measure proposed in the BMP.

Proponent's response

Table 12-1 in the Draft Biodiversity Management Plan (BMP) provided as Appendix 6 in Appendix O (Risks to Biodiversity Report) of the draft EIS has been reproduced below in Table 5-12. An additional column has been added for the goal of each of the proposed mitigation and monitoring measures. A column has been added for trigger levels (thresholds) and the contingency actions have been revised in Table 5-12 to be 'SMART' to address DEE 11 (refer to Section 5.1.11) and DEE 16 (refer to Section 5.1.16).

Table 5-12 Overview of general management plans, preventative and mitigation measures to reduce impacts to the biodiversity

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
Vegetation clearing	• Provide workers with an environmental induction prior to starting construction activities. This would include information on the ecological values of the site and protection measures to be implemented to protect biodiversity during construction. A completed signed induction certificate is to be kept on site in the office for every person working on the site. All visitors to complete a visitor induction and to be supervised by a site staff member whilst on site, except where they complete a full induction. • Pre-clearance survey checklist, based on the NT Land Clearing Guidelines (Department of Natural Resources, Environment, The Arts and Sport, 2010) detailing the following: - Confirmed extent of clearing area has required approvals; - Land to be cleared is clearly marked; - Check for signs of threatened species; - Check for fauna, and re-locate if necessary; - Number of mature trees (>5m high), avoid clearing if possible; - Number of large trees with hollows, avoid clearing if possible; - Number of fallen logs >15 cm in diameter, relocate to surrounding environment; -Stockpiles within defined areas; Clearing is progressive for environmental benefits; - Land clearing supervised; and - Once clearing is completed, the supervisor would register the total cleared area in a cleared area register. • Defer vegetation removal until necessary. • Locate site offices and stockpiles in already cleared and disturbed areas, where possible. • Provide maps to construction staff clearly showing vegetation clearing boundaries. Clearing to remain with strict boundaries as shown in final construction plans. Allow for 5% contingency on site boundaries. • Any extra areas required for temporary access for vehicle turn arounds to be cleared of shrubs and trees only; leaving ground cover and root stock intact. • Stockpile vegetation top soil and spoil separately in low mounds, less than 1.5 m in height. • Delay clearing following exceptionally high rainfall events until the ground is sufficiently dry to hold machinery. • During clearing, construct three separate stockpiles for vegetation, top soil and any sub soil removed.	• No unapproved clearing. • Adhere to buffers around watercourses and boundaries set by the NT Land Clearing Guidelines. • Maintain vegetation buffers. • No threatened flora/ fauna harmed as a result of clearing. • Pre-clearance survey for every clearing event. • All staff inducted into this BMP.	High	C.O.	• Pre-clearance survey checklist. • Staff induction records. • Check cleared area register is consistent with approved cleared area for the annual operations performance reporting.	• Non-compliance with any items on pre-clearing checklist.	• Incident investigation would be raised under Tellus' incident report procedure. • Cause would be investigated as part of the procedure and addressed to ensure the likelihood of reoccurrence is reduced. • If significant incident would, be reported to the DPIR. • Rehabilitation would be commenced immediately.	Environmental manager.

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
	Vegetation to be mulched or burnt in a dedicated burn pit. • Avoid clearing after rainfall sufficient to cause rutting by vehicle travel. Allow time for the soil to dry out so that ruts greater than 10cm are no longer formed by vehicle travel. • Ensure a detailed construction Erosion and Sediment Control Plan (ESCP) is developed and approved by the NT Government before on-ground works commence. All ESCP measures are to be SMART (specific, measurable achievable, results-orientated and time-based).							
Habitat loss and fauna displacement	• Undertake pre-clearance surveys for threatened species by a qualified ecologist as detailed above in 'Vegetation clearance'. • If a tree must be removed, first inspect the tree to ensure no birds or animals are nesting within. If bird nest or other is detected, relocate it to a similar tree outside the clearing envelope. • Leave fallen logs greater than 15 cm diameter or relocate to surrounding environment. • Relocate bird nests found in trees or shrubs to be cleared to surrounding environment. • If possible avoid removal of mature trees with a trunk diameter greater than 15 cm, especially desert oaks, bloodwoods and bush tucker species. Where this is not possible leave the root stock in ground for later regeneration.	Minimal habitat loss and fauna displacement.	Moderate	C	• Pre-clearance checklists • Flora and fauna monitoring survey results	• Non-compliance with any items on pre-clearing checklist. • Significant decrease in fauna species	• Incident investigation would be raised under Tellus' incident report procedure. • Cause would be investigated as part of the procedure and addressed to ensure the likelihood of reoccurrence is reduced. • If significant incident would, be reported to the DPIR. • Rehabilitation would be commenced immediately.	Environmental manager
Introduction and spread of weeds	• Develop and maintain a Weed Management Plan (WWP). • Provide workers with an environmental induction prior to starting construction activities. In regards to weeds, the induction would include: • - the roles and responsibilities as outlined in the Weed Management Plan (WMP); • - identification guides and photos for common weeds on site; and • - an introduction to the register for reporting any sightings of weeds or potential weeds. • A completed signed induction certificate is to be kept on site in the office for every person working on the site. All visitors to complete a visitor induction and to be supervised by a site staff member whilst on site (except where they complete a full induction). • Avoid contact with weed or invasive species seed, plant matter or soil potentially contaminated with weed seeds. • Avoid clearing or removal of any weed or invasive species during seeding, or put plastic bag over seed heads before removing plant. • Driving during muddy conditions or areas avoided, where possible.	• No additional weed species (not previously recorded on site) recorded on site. • No increase to weed spread in the Proposal area. • Manage declared weeds in accordance with the NT Weeds Management Act.	Moderate	C.O.D.R.	• Annual weed mapping of the Proposal area, using GPS, during flora and fauna monitoring survey. • Vegetation health monitoring conducted annually See Flora & Fauna Monitoring Plan). Data would be compared between surveys as part of annual operations performance reporting. • Vehicle wash down weed reports. • Register for reporting weed sightings or potential weed sightings.	• WoNs (Weeds of National Significance) or NT declared weed is recorded on site that was not previously recorded on site. • Vegetation health monitoring results show increase in weed extent (e.g. higher percent coverage at monitoring sites or presence of weed species at an increasing number of monitoring sites). • General observations show extent of existing weeds is spreading. • Note: Baseline weed extent to be determined in baseline Flora and Fauna	• If WoNs or declared weed is recorded on site that was not previously recorded on site, Tellus will inform the relevant government authorities. • Weeds will be managed in accordance with the NT Weeds Management Act. • If the existing extent of weeds spreads, Tellus would increase weed management effort in the affected area. Methodology would be in accordance with advice from DENR or suitably qualified professionals. Monitoring would be increased accordingly	Environmental manager, staff contractors.

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
	• Remove seed and mud from vehicle tyres and front grill daily. • All vehicles to be weed free before entering site for the first time. Weed wash down will be required if leaving a contaminated area to an uncontaminated area. • Clearing of any weeds or invasive species to be done when they are not seeding, where possible. • Weed identification is to be conducted annually by a suitable qualified consultant as part of the routine flora and fauna surveys. • Remove weeds following specialist advice from qualified ecologist or Weeds Branch, NT Government. Remove weeds before seeding times, where possible. • Undertake annual weed mapping in the vicinity of the proposed development footprint.					Monitoring Survey (pre-construction).	to increase the effectiveness of the contingency action. The action will stop when the spread of weeds to baseline extent or less if possible.	
Increased pest fauna species	• Develop and implement a no tolerance policy to the introduction of pest species by contractors, suppliers and personnel. • Develop and implement an introduced fauna control program in consultation with stakeholders. • Install fauna proof fence around infrastructure. • Reduce artificial standing water. • Prevent access to artificial water and heat sources through construction of fences. Ensure the top fence wire is not barbed for avifauna. • Place brush or vegetation stockpiles across linear developments no longer required (access tracks etc.) to inhibit movement of predators and introduced herbivores. • Dispose of all waste in predator-proof bins. • No feeding of fauna, native or introduced, on site. • Remove any dead fauna or insects from the Proposal and either dispose off-site or bury > 50cm deep to avoid predators uncovering. • Close off and rehabilitate any cleared areas no longer required for safe operation. • Trap and relocate predator species if they are noticed to have increased in numbers and habituate around facilities. Trapping and relocating of fauna would be undertaken by a qualified ecologist.	• No additional introduced fauna species (not previously recorded on site) recorded in the Proposal area. • No increase to introduced fauna populations as a result of the Proposal.	Moderate	C.O.D.R.	• Routine weekly inspection of operational areas to include inspection of warm dark places for potential fauna. If fauna is found contact a suitably qualified consultant to remove and consider placement of barrier around area if safe to construct. • Develop, implement and maintain fauna sighting register. • Track-based monitoring, fauna trapping and spotlighting conducted annually (Flora & Fauna Monitoring Plan). • Annually review fauna sightings register to be used in conjunction with annual flora and fauna survey results to assess introduced fauna population change.	• Flora and fauna monitoring results show increase in pest species extent (e.g. presence of a pest species at an increasing number of monitoring sites or increasing numbers of observations). • General observations show increasing numbers of pest species • Fauna register indicates numbers are increasing. • General site observations indicate numbers of introduced fauna are increasing. • Note: Flora and fauna monitoring baseline survey (pre-construction) to determine baseline feral species populations e.g. number of monitoring sites each species is present at.	• If an introduced fauna species is recorded that was not previously recorded on site, Tellus would inform the relevant government authorities. • If there is an increase in pest fauna species, Tellus would increase pest fauna management in the affected areas. Methodology would be in accordance with advice from DENR or suitably qualified professionals. Monitoring would be increased accordingly to increase the effectiveness of the contingency action. The action will stop when the spread of weeds to baseline extent or less if possible. •	Environmental manager, staff, contractors.
Habitat fragmentation and edge effects	• See mitigation measures for 'Vegetation clearing' • See mitigation measures for 'Introduction and spread of weeds'.	• Minimal habitat fragmentation and edge effects	Moderate	C.O.D.R	See 'Vegetation clearing', 'Introduction and spread of weeds' and 'Increased pest fauna species'.	See 'Vegetation clearing', 'Introduction and spread of weeds' and 'Increased pest fauna species'.	See 'Vegetation clearing', 'Introduction and spread of weeds' and 'Increased pest fauna species'.	Staff, contractors and

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
	• See mitigation measures for 'Increased pest fauna species'.							environmental manager.
Fauna strike or injury	• All staff to be inducted into the roles and responsibilities as outlined in the Biodiversity Management Plan (BDMP) and Traffic Management Plan. A completed signed induction certificate is to be kept on site in the office for every person working on the site. All visitor to complete a visitor induction and to be supervised by a site staff member whilst on site. Except where they complete a full induction. • Restrict vehicle use around site by filling up vehicles with passengers going to the same destination, all trucks to carry full loads where possible. • Avoid driving during high risk times; dawn, dusk and at night, where possible. • Prohibit off-road driving • Ensure traffic adheres to speed limits and local road rules. • Ensure speed limit and potential fauna crossing signs are clearly displayed on Chandler Haul Road, Henbury Access Road and other access tracks, as necessary. • Develop and maintain a fauna sightings register to be kept on site and filled in daily to report on the location, date, time of day, abundance and description of any fauna seen on site. • See mitigation measures for 'Unauthorised third party access'.	No fauna strike.	Moderate	C.O.D.R.	• Develop and maintain a fauna sightings register to be kept on site and filled in daily to report on the location, date, time of day, abundance and description of any fauna seen on site. • Develop and maintain a Fauna injury & fatality register. • •	• Fauna injury or fatality as a result of vehicle strike.	• An Incident investigation would be raised under Tellus' incident report procedure. • The cause would be investigated as part of the procedure and addressed reduce the likelihood of reoccurrence. • If significant (i.e. involving > 1 individual or a listed species), incident, would be reported to the appropriate government authorities.	Staff, contractors and environmental manager.
Airborne salt	• Store salt in open stockpile for minimum time required. • Cover all salt during transport. • A pre-construction and on-gong flora and fauna monitoring site to be established downwind of the salt stockpile. Result of monitoring to be compared to other sites outside of potential influence from salt stockpile.	No notable impacts to surrounding vegetation as a result of airborne salt.	High	C.O.D.R	• Vegetation health monitoring conducted annually (See Flora & Fauna Monitoring Plan). • Dust monitoring stations to be set-up down wind of the dominant wind direction from the salt stock pile. A minimum of two dust monitoring stations to be constructed downwind from the salt stockpile, one up wind and several more at locations downwind along the haul route (see Figure 4-5). Final locations to be determined by a suitably qualified consultant once final clearing and	• Vegetation health monitoring results show a significant decrease in vegetation health at monitoring sites downwind of salt stockpile as a result of airborne salt. • Dust monitoring results show significant amount of airborne salt.	• An incident investigation would be raised under Tellus' incident report procedure. The cause would be investigated as part of the procedure and addressed to ensure the likelihood of reoccurrence is reduced. • If significant, the incident would be reported to the relevant government authorities. Monitoring would increase in frequency if appropriate.	Staff, contractors, environmental manager.

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
					construction plans are finalised.			
Lighting, noise and vibration	• All operations to be restricted to daylight hours, where possible. • Turn off machinery when not in use. • Maintain and regularly service all generators, engines and vehicles on-site in line with manufacturers recommendations. • Ensure vehicles carry full loads, were possible, to limit the number of vehicles on the Chandler Haul Road and Henbury Access Road. • Only have minimal lights on needed for safe operation of facilities. • Turn lights off when not in use. • Use lower intensity lights, e.g. yellow or red lighting, where possible. This would reduce impacts on nocturnal species and limit insect attraction. • All lighting to be angled towards the ground to avoid unnecessary lighting of areas outside the clearing envelope.	Reduce noise and vibration.	Moderate	C.O.D.R.	• Establish and maintain a noise complaints register. • Vehicle & generators and service logbooks.	• Noise complaints. • Non-compliance with vehicle & machinery servicing.	• Incident investigation would be raised under Tellus' incident report procedure. • The cause would be investigated as part of the procedure and addressed reduce the likelihood of reoccurrence.	Staff, contractors, environmental manager.
Hazardous material	• An induction will be provided to workers to ensure the safe use, handling and storage of hazardous material on site. Records to show all staff successful completion of induction with a copy of the records kept in the site office. • Chemical and hazardous material ordering to be calculated to have the minimum amount required on-site for operation. Any excess hazardous material to be removed off-site by delivery contractors. A daily register of hazardous material in, used and out to be recorded and kept in the site office. • Store hazardous material and hazardous material wastes in bunded areas sufficient to hold a 110% of material stored in case of a spill or leak. The bunded area is to be impervious and strong enough to withstand changing environmental conditions of heat, cold, wind and rain. Any rain water is to be removed immediately into sealed containers for disposal off-site in the nearest licensed waste disposal facility. Bunded area to be located 10m or outside tree canopy (whichever is greater), 25 m of intermittent creek and drainage lines; 50m of intermittent 2nd order stream; 100m 3rd order creek; 250m of 4th order rivers and wetlands where the edge of the riparian vegetation is taken as the watercourse edge. • Any waste resulting from a hazardous remediation to be contained in an impervious container, labelled with type of material and date of incident and removed from site for disposal in the nearest licensed facility.	Minimal spills or leak of hazardous material into surrounding environment.	High	C.O.D.R.	• Hazardous material storage log. • Incident log. • Bund integrity would be monitored weekly by the Environmental Manager or delegated staff.	• Hazardous material spill or leak. • Break in bund integrity.	• Any break in bund integrity to be immediately remediated and actions recorded in incident log. • A record of any spill including details on the location, time, date, material type, amount of spill and remediation carried out to be kept and submitted to the site supervisor. An incident report is to be generated and the incident investigated to ensure it does not reoccur • Any spill greater than 300L or 500m3 (for gas) is to be reported to the NT DPIR as soon as possible. For spills of this size a suitable qualified third-party consultant will be contracted to ensure the spill is remediated effectively. National Environmental	Staff, contractors and environmental manager.

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
	• No open flames or heat sources near flammable material, appropriate signage used. • MSDS, spill kits and appropriate firefighting equipment (water, chemical or foam, etc.) stored next to hazardous material storage and use areas. • Eye and body wash stations located at the Chandler and Apirnta facilities in locations of use, handling and storage of hazardous material.						Protection Measure (NEPM) 2012 guidelines to be used in performing any remediation on site. • An incident investigation would be raised under Tellus' incident report procedure. • The cause would be investigated as part of the procedure and addressed to ensure likelihood of re-occurrence is reduced. • If the spill quantity is over the reportable quantities for spills set by the NT Worksafe, the incident would be reported to the department immediately.	
Waste	• Develop and implement a Waste Management Plan. • All domestic waste stored in fauna proof bins. That is, containers that are not easy to tip over, solid, complete without leaks or breaks, and have a heavy or lockable lid. • Waste to be removed on a regular basis, weekly or fortnightly depending on quantity produced, to the nearest license landfill facility. • Ensure waste stored is stored in appropriately labelled containers. • Ensure any liquid waste is stored on bunding as defined in 'Hazardous Material'. • Ensure hazardous waste and hydrocarbons are stored separately in bunding, with appropriate signage. • Implement waste hierarchy system (avoid/minimise, reuse, recycle, recovery, and then disposal) and include in site induction. Have designated storage for reuse, recycle, recovery and disposal. • Ensure waste is disposed off-site by licensed contractor(s). • Maintain records of all waste removed from site including date, time, type of waste, waste disposal container and final location. • All hazardous waste stored in accordance with mitigation measures as outlined in 'Hazardous Material'.	No construction or operational waste left uncontained in the Proposal area.	High	C.O.D.R.	• Records of all waste removed by site including date, time, type of waste, waste disposal contractor and final location. • Have daily and weekly register of goods incoming, used and disposal to constantly improve ordering effectiveness. • Weekly checks of bins by environmental manager to ensure they are secure and fauna proof.	• Uncontained waste in the Proposal area. • Bins are found to be not sufficiently fauna proof.	• If uncontained waste as a result of the Proposal is found in the Proposal area, the cause would be investigated and the problem rectified. • If bins were found to be not sufficiently fauna proof, this would be fixed.	Environmental manager, staff, contractors.

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
Dust	• Water trucks to be run daily during construction to limit visible dust levels. Not required after rain events. More water required in sections that turn to bull dust or in winds over 10 km/hr. Water not required if dust produced is lower than face level. Once established, water truck to be used as needed as determined by the site supervisor taking into consideration local climatic and road conditions. • Avoid clearing during dry windy conditions. • Leave root stock and ground cover on firebreaks and non-crucial tracks (tracks where access is not required everyday e.g. temporary construction tracks). Ground cover should be left to at least 10cm in height. This can be achieved by clearing with the blade up technique. • Stage vegetation removal (clearing) so that each area, Chandler Facility, Chandler Haul Road etc., surface can be completed before the next section of clearing is to begin. For example, access tracks to be cleared and then worked to develop a firm surface before the next area is cleared.	No significant increase in dust in the Proposal area.	Moderate	C.O.D.R	• Dust monitoring results to be analysed every month during construction period and every 3 months during operation period. • Vegetation health monitoring conducted annually (See Flora & Fauna Monitoring Plan). Data would be compared between surveys.	Significant increase in dust levels. Note: baseline levels will be determined during pre-construction dust monitoring).	• An incident investigation would be raised under Tellus' incident report procedure. • The cause would be investigated as part of the procedure and addressed to ensure likelihood of re-occurrence is reduced. • If significant, incident it would be reported to the appropriate government authorities.	Staff, contractors, environmental manager
Fire	• Finalise and implement Bushfire Management plan (BFMP). • Daily checking of bushfire websites and weather bureau data including BOM and NAFI websites. Records to show daily check and results. The results of this check used to provide a daily fire risk rating specific to site. • Construct and maintain firebreaks around infrastructure and significant habitats. • No open flames outside of designated areas unless hot works permit is approved. • Install wind socks at each operational area. • Ensure all flammable material is clearly labelled and stored in accordance with their MSDS. Store in bunded impervious area suitable to hold 110% of stored material. Store at distances from trees and watercourse as prescribed in mitigation measures for 'Hazardous Material'. • Ensure firefighting equipment stored on site is suitable for flammable material used on site. Firefighting equipment to be located close to flammable material stores and use locations, within 25m. Staff to be trained in use of firefighting equipment. • Designated smoking areas to be positioned upwind of dominant wind direction greater than 50-100m from any flammable material. Smoking area to be fitted with appropriately designed disposal containers to contain all ash and potential ignition source. Area to be clearly signed and location made aware to all staff and contractors during site inductions. Smoking outside of designated area to be penalised.	No bushfires as a result of the Proposal.	High	C.O.D.R.	• Site manager/ environmental manager to keep up to date with bushfire warnings • Routine checks to ensure all flammable material is labelled. • Weekly check of firefighting equipment during fire season. • Implement and carry out annual fuel load surveys before high risk fire season.	Bushfire as a result of the Proposal	• Incident investigation would be raised under Tellus' incident report procedure. • The cause would be investigated as part of the procedure and addressed reduce the likelihood of reoccurrence. • The bushfire would be reported to the appropriate government authorities as soon as possible.	Staff, contractors, environmental manager, site manager.

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
	• Organise and implement strategic controlled burning with traditional owners and Central Land Council.							
Groundwater drawdown and contamination	• Groundwater trigger limit guidelines to be referenced include the National Environment Protection Measures (NEPM) (National Environment Protection Council, 2013), Australian Drinking Water Guidelines 2011 (National Health and Medical Research Council, 2011) and the Australian and New Zealand Guidelines for fresh and Marine Waters (Australian and New Zealand Environment and Conservation Council, 2000). • Install well caps on monitoring wells. • Fence off bore field to avoid damage from fauna and large herbivores. • Ensure no spill or contamination enters wells. • Record extraction rate and amount.	• No drawdown significant to impact on surrounding properties. • No contamination of groundwater as a result of the Proposal.	High	C.O.D.R	• Refer to Water Management Plan.	• Complaints from surrounding properties about water drawdown. Water drawdown impacts on surrounding properties. • Groundwater contamination (baseline water quality will be determined in pre-construction water sampling).	In the unlikely event groundwater is contaminated as a result of the Proposal, this would trigger: • Activity resulting in groundwater contamination to stop. • Suitably qualified professional to develop remediation plan. • An incident investigation would be raised under the proponent's incident report procedure. • The cause would be investigated as part of the procedure to reduce the likelihood of reoccurrence. • The groundwater contamination would be reported to the relevant government departments and rectified immediately.	Staff, contractors, environmental manager, site manager.
Erosion and sedimentation	• Ensure an ESCP has been developed to the standard of the IECA and the satisfaction of the NT government and is implemented correctly during construction and operation. All temporary erosion and control structures are to be removed once final operation layout has been set. • Leave the top 5-10cm of vegetation and root stock on non-essential roads, e.g. fire trails. • Establish roads along the contour. Large cleared areas to avoid slopes >2%. If unavoidable more detailed	No significant increase in erosion and sedimentation as a result of the Proposal.	High	C.O.D.R	• Environmental manager would undertake Monthly site inspection for any signs of erosion including checking watercourse and drainage depression crossings for signs of sediment accumulation.	Significant erosion and sedimentation observed as a result of the Proposal.	• An incident investigation would be raised under Tellus' incident report procedure. • The cause would be investigated as part of the procedure and addressed to reduce the likelihood of reoccurrence.	Environmental manager, site manager, staff, contractors

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
	erosion control devices will be required to direct the flow. • Ensure all water crossings are developed to base of natural water course or adequate culverts are established to reduce flow constriction of watercourses. • Construct roads without windrows and flat bottom off let drains only. • Inspect the site following a rainfall event greater than 10mm for any signs of erosion. • Limit compacted areas to minimum required. • Pre-construction survey by engineers to determine soil types suitable for construction; utilising existing solid surfaces where possible. Minimise heavily compacted areas to areas of loading and unloading trucks and haul roads. Areas not required for constant access or heavy traffic, e.g. walk ways, bush fire breaks, light vehicle access tracks, offices and camp areas. • Where compacted areas are unavoidable, they need to be clearly illustrated in the ESCP plan before construction begins. ESCP needs to ensure roll-over banks and flow diversions are install in accordance with spacing provided by the NT government soil fact sheets (DLRM).				• Environmental manager would routinely monitor erosion control devices to ensure integrity.		• The issue would be rectified as soon as possible.	
Altered hydrology	• Where possible contour cleared surface to match the natural drainage pattern of the pre-cleared surface. Install breaks in the top soil stockpiles where required to allow natural flow to pass uninterrupted. Where not possible, install diversion around constructed area so flow will return to downstream receptors. • Adhere to NT land clearing guidelines for any developments near to watercourse (25m for drainage depressions or intermittent 1st order streams, 50m for intermittent 2nd order streams, 100m for 3rd order creeks, 250m for 4th order or higher rivers and 250m from wetlands where edge of the water course is taken from the edge of riparian vegetation). • Any unavoidable creek crossing or drainage depression crossing to be developed to the natural base of the creek. Where an all-weather crossing is required, culverts need to be installed to handle peak flow events. All water courses are ephemeral, however, will often flow in flood with large debris. All weather crossing need to be specifically engineered to meet requirements to handle 1 in 100-year flood events. • Any drain installed to be constructed with a flat bottom and an unobstructed exit to allow surface flow to flood out onto the surrounding area. All drains and water diversion devices to be checked and maintained following significant rainfall events (>10mm).	No long term alterations to hydrology as a result of the Proposal.	High	C.O.D.R.	• Routine inspection and maintenance of drains and water courses, particularly following major rainfall and run-off. • Vegetation health monitoring conducted annually (See Flora & Fauna Monitoring Plan). Data would be compared between surveys to monitor any change as a result of altered surface flows.	Significant change in surface hydrology as a result of the Proposal	• An incident investigation would be raised under Tellus' incident report procedure. The cause would be investigated as part of the procedure and addressed to reduce the likelihood of reoccurrence. • The issue would be rectified as soon as possible.	Staff, contractors, environmental manager, site manager.

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
	• A pre-construction and ongoing flora and fauna monitoring location to be placed along the Finke River systems to monitor for signs of vegetation stress resulting from Tellus operations. • Follow mitigation measures 'Introduction and spread of weeds and invasive species'.							
Unauthorised third party access	• Record all access to site in a site register. • Ensure visitors complete induction or are accompanied by Tellus employee whilst on-site, except where they complete a full induction. • Erect clear signage indicating prohibition of unauthorised entry. • Dog leg smaller access tracks when joining larger roads to limit third party access by reducing access tracks visibility from the main road.	No unauthorised third party access	Moderate	C.O.D.	• Weekly routine site inspections to make note of any sign of unauthorised entry or use within the site boundary. • Fortnightly inspections of signs.	Any unauthorised third party access.	• An incident investigation would be raised under Tellus' incident report procedure. The cause would be investigated as part of the procedure and addressed to reduce the likelihood of reoccurrence.	Staff, contractors, environmental manager, site manager.

Risk	Mitigation measure	Goal	Effectiveness of measure	Timing*	Monitoring actions	Trigger level	Contingency actions	Responsibility
Rehabilitation	• Develop and implement a Decommissioning and Rehabilitation Management Plan. • Install erosion and sediment control temporary structures to assist with rehabilitation in accordance with IECA and DLRM guidelines and factsheets. • Respread spoil first, then top soil and last cleared vegetation over surfaces. • Leave any infrastructure, plant or cleared area as so detailed in a land use agreement with the land manager. • Remove all infrastructure, plant, machinery and operational and construction wastes. • Re-contour cleared surfaces to match surrounding topography, as close as possible. • Rip any compacted area ensuring final surface is rough to increase infiltration. • Block access points to roads and tracks, unless agreed with land manager. • Fill in sumps or turkey nest, unless agreed otherwise with land manager. • Close off and seal groundwater wells. • Leave underground salt mine in condition as stipulated in Closure and Rehabilitation plan.	• The Proposal area is rehabilitated in accordance with agreements with future land managers. • Soil is stable and relatively uniform with surrounding topography. • No new weeds or additional spread of existing weeds as a result of the Proposal. • No waste left behind as a result of the Proposal. • All infrastructure removed.	High	D.R	• Site manager/ Environmental manager would ensure performance standards are met. • Third party rehabilitation audit.	Non-conformance with goals set out in decommissioning and rehabilitation management plan.	If results of audit show non-conformance against goals, the issues will be resolved.	Environmental manager, site manager.

*C – Construction phase; O – Operation phase; D – Decommissioning phase; & R – Rehabilitation phase.

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Issue raised

Confirm if a suitably qualified expert that has demonstrated experience in the mitigation and monitoring of adverse impacts to biodiversity and threatened species has prepared the management measures in this EIS.

Proponent's response

Please refer to Appendix B of the draft EIS. The biodiversity mitigation and monitoring measures in the draft EIS have been prepared by suitably qualified experts that have demonstrated experience in the mitigation and monitoring of adverse impacts to biodiversity and threatened species. The management measures were prepared by local ecological consultants, specialising in arid land - Bill Low, Jeremy Snowdon-James, Lauren Young, and Katie Degnian. A brief summary of their relevant qualifications and experience is reproduced below from Appendix B of the draft EIS. Curricula vitae are provided in Attachment D.

Dr. Bill Low

Dr. Bill Low has a diverse experience in arid land ecology and environmental impact assessment and management extending from 11 years as Research Scientist with CSIRO working on ecosystem dynamics related to pastoral land management and cattle productivity and behaviour, 35 years environmental consulting and business ownership conducting numerous research and applied environmental and biodiversity monitoring projects in central and northern NT and adjacent states. Extensive work with Pastoral lessees, petroleum and mining companies and government and NGOs minimising environmental impacts and preparation of approvals including NOIs, EMPs, land subdivision.

Bill is a graduate and post grad of University of British Columbia with extensive field research in BC, south Texas and central Australia. Active member of EIANZ, Rangelands Soc, Mammal Soc, Wildlife Soc.

Jeremy Snowdon-James

Jeremy Snowdon-James is an environmental consultant with four years of arid land experience working with Low Ecological Services. As an environmental consultant, he has worked on a diverse range of projects including mining, petroleum, agriculture and developments; involved in environmental site assessments, GIS mapping, environmental management plan development, compliance auditing, risk assessment and evaluation and required Territory and Commonwealth statutory approvals.

Jeremy is double degree graduate with honours from the University of New South Wales Sydney, in Civil and Environmental Engineering.

Lauren Young

Lauren Young is an arid zone ecologist based in central Australia with particular expertise in small mammal ecology and distribution. She has been working as a consultant with Low Ecological Services for the past five years and has experience in biodiversity surveys, preparation of environmental management plans and audits of operations against environmental management plans.

Lauren has a Bachelor of Conservation Biology and Ecology from La Trobe University, a Bachelor of Science (Honours) from Charles Darwin University and is currently a PhD candidate with the University of Sydney and CSIRO studying the threatened plains Mouse in relation to refuge habitat in the Simpson Desert.

Katie Denigan

Katie is an ecological consultant, based in central Australia, with Low Ecological Services. Previous employment roles as a Science Technical Officer with the Batchelor Institute of Indigenous Tertiary Education. Specialising in arid land ecology, she has experience in conducting biodiversity surveys, environmental assessment, GIS mapping and preparing approvals documents for development applications in central Australia.

Katie is a Graduate of Southern Cross University and a Member of the Golden Key Honours Student Society.

5.1.16 DEE 16

Issue raised

Revise Table 6.4 of Appendix O to include a monitoring program for the greater bilby.

Proponent's response

Please refer to the proponent's response to DEE 12, specifically Table 5-10 (refer to Section 5.1.12). An additional row for the greater bilby monitoring measures has been added. The column 'Relevant Commonwealth TAP, Recovery Plans and Conservation Advice' has been amended to describe how monitoring measures take into account relevant approved plans and recovery plans. It is important to note, however, that the greater bilby has never been recorded within the vicinity of the proposed development footprint. There would be no impacts to this species as a result of the Proposal (refer to the proponent's response to DEE 5, Section 5.1.5).

Issue raised

Identify clear thresholds and revise contingency actions to ensure that they are SMART.

Proponent's response

Please refer to the proponent's response to DEE 14, specifically Table 5-12 (refer to Section 5.1.14). A column has been added for trigger levels (thresholds) and the contingency actions have been revised to be 'SMART'.

Issue raised

Identify clear baselines of introduced fauna populations for the purpose of monitoring.

Proponent's response

Please refer to the proponent's response to DEE 14, specifically Table 5-12 (refer to Section 5.1.14). Please also refer to Section 14 (Flora and Fauna Monitoring Program) within the Draft Biodiversity Management Plan presented as Appendix 6 in Appendix O of the draft EIS. Populations of feral fauna species (e.g. cats, foxes, rabbits, camel, donkey, etc) would be determined during baseline surveys undertaken as part of the Flora and Fauna Monitoring Program prior to construction of the Proposal.

5.1.17 DEE 17

Issue raised

Insert proposed mitigation and monitoring measures from Chapter 7 (Biodiversity) and Appendix O (Biodiversity Assessment) into Appendix 20 for clarity.

Proponent's response

The proponent assumes that the DEE are referring to Chapter 20 (Environmental Management) of the draft EIS.

The revised mitigation measures presented in DEE 14, specifically Table 5-12 (in Section 5.1.14) supersede Table 12-1 of the Draft Biodiversity Management Plan provided as Appendix 6 in Appendix O of the draft EIS. The mitigation measures listed in Table 7-11 in Chapter 7 and the biodiversity mitigation measures listed in Table 20-1 in Chapter 20 of the draft EIS are a summary of the mitigation measures presented in Table 5-12.

5.1.18 DEE 18

Issue raised

Section 15.5.3 of Chapter 15 states that 'worst case' pre-mitigated risks associated with the accidental loss of containment of solid wastes (such as beryllium) and sludge/liquid waste (such as formaldehyde) have been modelled across a range of accidental emission scenarios based upon 'industrial accident statistics'. Please confirm the source of these statistics for our information.

Proponent's response

As the waste composition and volumes are inherently variable, the assumed emissions to air associated with an accidental loss of containment have been derived from a number of published sources. The statement in Section 15.5.3 of Chapter 15 referencing 'industrial accident statistics' refers to the derived definitions of multiple and simultaneous breach events. (i.e. larger and more substantial loss of containment incidents).

As presented in Appendix X, Part B, Section 4.5.2, and Appendix X, Part C, Section 4.5.2 of the draft EIS, the basis of that incident hierarchy was derived from the UK Health and Safety Executive (HSE) (2012) *Safety Report Assessment Guide.* That report is a component of the overarching approach underpinning the Control of Major Accident Hazards (COMAH) Regulations.

Evidently that report now appears to have been withdrawn, but the specifications for incident hierarchy have been retained by the HSE, and an example may be referenced on page 19 of the following Safety Report Assessment Guide: http://www.hse.gov.uk/Comah/sragexp/srag-explosives.pdf

5.1.19 DEE 19

Issue raised

Confirm why five years has been adopted as an acceptable average against which to measure long term meteorological conditions. Additionally, please confirm why 2015 has been accepted as representative of this five year period.

Proponent's response

The Air Quality Risk Assessment presented in Appendix X of the draft EIS is underpinned by an atmospheric dispersion model, which requires one year of hourly meteorological data (8,760 hours) to run in order to make predictions comparable to all relevant air quality standards. To avoid criticism of using selective meteorological data in the Air Quality Impact Assessment, it is common practice to evaluate a number of years to ensure that the meteorological data used in the atmospheric dispersion model is sufficiently complete (data capture), recent, and not atypical of conditions at the Proposal site.

As described in Appendix X, Part A, Section 4 of the draft EIS, meteorological observation data collected by the Australian Bureau of Meteorology at Alice Springs Airport over the period from 2011 to 2015 were evaluated for this purpose.

In the NT, there is no published guidelines for the preparation of an Air Quality Risk Assessment and, therefore, no specification for the extents of data required to be evaluated to derive a representative data period. In lieu on specific NT guidance, five-years of meteorological data was evaluated which is in line with Australia-wide industry-standard practice, including NSW EPA (2016) *Approved methods for the Modelling and Assessment of Air Pollutants in NSW*:

"*the site-representative data should be… correlated against a longer-duration site-representative database of at least five years (preferably five consecutive years) to be deemed acceptable.*"

Part A, Appendix A within Appendix X of the draft EIS presents a summary of the inter-year meteorological data variability (as temperature, relative humidity, wind speeds) and this determined that a number of meteorological years were sufficiently representative of the longer-term trends to be used in the assessment and that 2015, being the most recent, would be used in the assessment. Where the evaluation of multi-year data identifies that multiple years are acceptable, the common-practice is to select the most recent appropriate year.

It is not considered that selecting an alternative, representative meteorological period would make a difference to the conclusions drawn from the Air Quality Impact Assessment.

5.1.20 DEE 20

Issue raised

Confirm the chemicals that are proposed to be used in the stabilisation of dust and confirm if these chemicals are likely to have any impacts on matters of national environmental significance.

Proponent's response

It is assumed that the issue raised refers to Table 15-11 in Chapter 15 of the draft EIS which identifies a number of mitigation and management measures relating to air quality management during pre-construction, construction and operational phases of the Proposal. Mitigation and management measure AQ.11 presented in that table relates to an outcome requirement of "*minimisation of dust and associates human health risks*", with an identified measure of "*enforce vehicle speed restrictions, undertake surface improvements or surface treatments (including wet suppression and chemical stabilisation).*"

Surface treatments, including wet suppression and/or chemical stabilisation are (globally) commonly applied dust mitigation techniques for unsealed road surfaces and would form a component of mitigation and management controls implemented through the Air Quality Management Plan. The range of chemical additives that have been demonstrated to be effective in dust control include hygroscopic salts, lignosulphates, sulphonated petroleum resins, tar / bitumen emulsions, and polymer emulsions, and these additives are used routinely across Australia and globally.

The efficacy and applicability of those options may vary depending upon site-specific considerations, including the rate of traffic on the surface, surface composition, compaction and grading, rate of application, rainfall and environmental considerations.

At this time, the specification of chemical additives for surface treatments has not been provided. This requirement and specification would be determined through progressive consultation with the relevant stakeholders (including the DEE) to determine an efficient measure(s) that have negligible effect on matters of national environmental significance.

5.1.21 DEE 21

Issue raised

Provide details of proposed air monitoring including technique, location, frequency and details of laboratory undertaking analysis and target parameters for our consideration.

Proponent's response

The identified requirement for an air quality management and monitoring program is presented in Section 5.4, Part A in Appendix X of the draft EIS and would be fully documented in the Air Quality Management Plan.

The objective is to provide effective and proactive management of emissions to air during the construction and operational phases of the entire Proposal, including the Chandler Facility, Apirnta Facility and transport infrastructure. All monitoring locations would be identified and selected in accordance with Australian Standard / New Zealand Standard (AS/NZS) 3580.1.1 "*Methods for sampling and analysis of ambient air – guide to siting air quality equipment*", allowing for any constraints such as safety, site security and power availability, and the program would be provided to NT EPA for review and approval.

It is anticipated that the monitoring of fine particulate matter (PM_{10} and/or $PM_{2.5}$) and nuisance dust (TSP and/or dust deposition) would be performed at locations that might include (but not be limited to):

- Chandler Facility (proximal to the already installed meteorological monitoring station).
- Titjikala School.
- Apirnta Facility.

All equipment would be operated in accordance with the relevant Australian Standard / New Zealand Standard, and any off-site analysis would be performed using a suitable NATA Accredited laboratory.

Issue raised

Section 15.6 states that 'the air quality risk assessment did not assess risks to air quality and human health during closure and rehabilitation of the proposal'. Please provide justification for this proposed approach.

Proponent's response

Section 15.6 states: "*the air quality risk assessment did not assess risks to air quality and human health during closure and rehabilitation of the Proposal. It is anticipated that the risks would be similar to those presented for construction*".

The closure of the Proposal will involve short-term and very low potential for emissions to air, and certainly present a lower risk than those presented in the construction risk assessment. It is therefore deemed reasonable to conclude that the mitigation and management measures presented for the construction phase would be sufficient to adequately address air quality matters during closure. Any further measures would be outlined in the Mine Closure Environmental Management Plan.

5.1.22 DEE 22

Issue raised

Describe any anticipated risks from noise and vibration (particularly from blasting and rock hammering) to matters of national environmental significance for information.

Proponent's response

Please refer to Section 7.4.2 (Indirect impacts; Light, noise and vibration) of the draft EIS. This section addresses potential indirect impacts to fauna (which encompasses matters of national environmental significance) associated with increased light, noise and vibration. This section states:

> *'An increase in light within the proposed development footprint and vicinity from vehicles and machinery could affect nocturnal fauna, potentially disrupting movement and behaviour. An increase in light would likely increase the number of insects within the vicinity of the proposed development footprint, attracting native and introduced fauna to the proposed development footprint and vicinity (insects provide a valuable food source for many native and introduced fauna species). An increase in light may attract more predator fauna species, increasing the pressure on native prey.*
>
> *Construction activities would also result in an increase in noise levels within the proposed development footprint and vicinity, which may affect fauna species. Some fauna species would likely tolerate an increase in noise, while others may not, causing them to leave the affected area or making the area less desirable for foraging, nesting and breeding.*
>
> *Vibration from construction activities such as from blasting and heavy vehicle movements may deter native fauna from using the area near the vibration sources. This may potentially interrupt dispersal within the vicinity of the proposed development footprint if an individual is unwilling to travel through an area where vibration is detectable, or may cause some species to abandon an area in search of areas where vibration is not detectable.'*

Mitigation measures to avoid or reduce these impacts were discussed in Section 7.9 of the draft EIS. These mitigation measure have been refined so that they are 'SMART" - refer to the proponent's response to DEE 14, specifically Table 5-12 in Section 5.1.14.

5.1.23 DEE 23

Issue raised

The Department notes that information regarding the area of habitat (in hectares) for species listed under the EPBC Act has not been provided to date. As per our comment (no. 7) above, please provide this information for our consideration.

Proponent's response

Please refer to the proponent's response to DEE 7 (Section 5.1.7).

5.1.24 DEE 24

Issue raised

As per our comment (no. 9) above, please confirm if any of the relevant impacts are likely to be unknown, unpredictable or irreversible.

Proponent's response

Please refer to the proponent's response to DEE 9 (Section 5.1.9).

5.1.25 DEE 25

Issue raised

As per our comment (no. 7) above, please confirm the presence/absence of the Slater's skink and thick-billed grasswren in the vicinity of the Henbury Access Road and specify a suitable route for this road. The Department needs to know whether there are significant residual (unmitigated) impacts on these species prior to a decision on approval. We note that residual significant impacts will arise for these species a compensatory offsets package will be required.

Proponent's response

Additional presence/absence field surveys for Slater's skink and thick-billed grasswren were undertaken by Low Ecological Surveys post submission of the draft EIS in late April 2017. No sign of either species was recorded within the proposed development footprint or vicinity during the additional surveys. There is a very low likelihood that these species occur within the proposed development footprint or vicinity primarily based on a lack of suitable habitat. Therefore, there would be no impact to Slater's skink or the thick-billed grasswren during construction, operation, or closure and rehabilitation of the Proposal (refer to Attachment C). Therefore, there would be no need to realign the proposed Henbury Access Road.

Based on the results of the additional presence/absence surveys discussed above, and the assessments of significance presented in Section 7.7.1 (and in full in Appendix O) of the draft EIS, no biodiversity offsets are deemed necessary as there would be no significant impact to matters of

national environmental significance during construction, operation, or closure and rehabilitation of the Proposal.

5.2 NT EPA

Issues identified by the NT Environmental Protection Authority are provided in Table 5-13. A response to each issue is provided in Section 5.2.1 through Section 5.2.75.

Table 5-13 Issues identified by the NT Environmental Protection Authority

Issue reference	Issue raised
NT EPA 1	**Context and background information - viability of Project and uncertainties of future demand –** The proposed project is significant in terms of volumes of hazardous waste relative to the total generation of hazardous waste across Australia. It is assumed that if the Chandler Facility is not able to attract these volumes, there is a risk that the project will not be viable. In the Supplement, discuss the viability thresholds of the project. Identify contingency measures for achieving lower than expected volumes of waste. Describe any uncertainty relating to projected growth of hazardous waste production in Australia. Demonstrate the demand for the facility to store/dispose of existing and expected future volumes of hazardous waste, given existing and planned infrastructure across Australia (e.g. through providing letters of intent from specific generators of hazardous waste to provide material to the facility, and that no other commercially viable and appropriate disposal option is available).
NT EPA 2	**Context and background information - current and future options for recycling –** The draft EIS identifies that there is likely to be around 900 000 000 t of legacy waste stored nationally. Not all of this waste would meet the Acceptance Criteria to be removed to the Chandler Facility. Of the waste streams that are suitable for storage at the Chandler Facility, current disposal and recycling options may exist. Development of the project has the potential to divert volumes of hazardous waste from existing appropriate recycling, treatment and disposal facilities, which may potentially undermine their viability and/or impede the development of future recycling/treatment technologies for hazardous waste. In the Supplement discuss how the project will contribute to driving the development of recycling technology, including identifying the incentives unique to the project. Consider how the project might respond to perceived or actual disincentives to invest in the development of recycling technology. Demonstrate that the project would not affect the viability of existing higher order recycling, or treatment options. Furthermore, demonstrate how the project would be developed such that it would not impede on the use or development of alternative recycling or treatment technologies.
NT EPA 3	**Context and background information - regulatory context –** The draft EIS does not identify any existing or proposed regulatory drivers for the establishment of a facility for hazardous waste, or the ongoing supply of hazardous waste to the facility. In the Supplement, please outline if Tellus Holdings Ltd will be reliant on the development of State/Commonwealth regulatory drivers or requirements on hazardous waste producers that would enable it to secure hazardous waste volumes nominated in the draft EIS.
NT EPA 4	**Potential impacts and risks relating to mine and service infrastructure – key infrastructure (page 48) –** The Draft EIS states that salt processing and sales would be deferred for the first five years of salt mining. It is not clear in the draft EIS how the mined salt (~2 240 000t) will be stored and managed. Please outline how the salt will be stored. In particular, please outline the size of the stockpile area; the design of the stockpile area (including bunding, drainage areas, coverage, etc.).

Issue reference	Issue raised
NT EPA 5	**Potential impacts and risks relating to mine and service infrastructure (Chapter 3.2.1) –** Figure 3-4 of the draft EIS does not show the location of the entrance of the decline or the location of the two ventilation shafts. This information should be provided in an updated map in the Supplement.
NT EPA 6	**Potential impacts and risks relating to mine and service infrastructure – aboveground infrastructure (Chapter 3.4.3) –** In the Supplement provide more information on the salt mining, sorting and storing, such as, but not limited to, timeframes for each phase, area required, site construction (e.g. non-permeable pad), water requirements, run off containment, treatment and bunding, etc. The Waste Water Evaporation pond is located next to the Bore water dam. In the Supplement, clarify whether there is a risk of cross contamination. Will the pond be lined? Explain the need for a bore water dam. Is a tank a better option?
NT EPA 7	**Potential impacts and risks relating to mine and service infrastructure (Chapter 3.2.8) –** The draft EIS notes that the underground storage facilities shall maintain a minimum offset of 45 metres from any deep borehole. It is not clear how Tellus has concluded that an offset of 45 metres is sufficient. In the Supplement please discuss why Tellus is proposing to offset deep boreholes by a minimum of 45 metres.
NT EPA 8	**Potential impacts and risks relating to mine and service infrastructure (chapters 3.4.1 & 18.4) –** The draft EIS notes that the proposal may represent a significant beneficial opportunity to improve existing road surface conditions for the entire length of Maryvale Road. It is not clear whether the project will be reliant on upgrades of the Maryvale Road for construction and operation traffic. In the Supplement please clarify the upgrades to the Maryvale Road that will be required to service each stage of the Chandler Facility, and what the improvements Tellus Holdings Ltd is intending to do to improve the road surface conditions.
NT EPA 9	**Potential impacts and risks relating to mine and service infrastructure (Chapter 3.10.1) –** The proponent proposes to construct a 30km haul road from the Stuart Highway to the Apirnta facility and then to the Chandler facility crossing the railway line and major watercourses, such as the Finke River. Additional internal roads have the potential to impede surface flows. Culverts or weirs may not be feasible for the Finke River crossing (and other major creeks) given that high intensity flash flooding is an identified hazard in the area. Access to the site could be restricted for several weeks or months after a major flood event. Also, culverts and weirs affect river flow and downstream habitats. The effect of these constructions must be considered. Permanent bridges may provide a safer and improved environmental solution and reduced erosion and sediment control costs. Justify selected methods for water crossings and areas of surface water flows. Provide a detailed construction plan and discussion on potential impacts from the construction and ongoing use of the road.
NT EPA 10	**Potential impacts and risks relating to mine and service infrastructure – general –** The project will facilitate the transport of a significant volume of hazardous waste on national road and rail networks. While it is accepted that the Project will rely on a third party to transport the waste and that the risks of transportation are not the responsibility of the proponent, the waste will be under contract for the project and the project is not viable without the transport of those wastes, therefore the NT EPA considers that it must assess the bulk transport of waste in its assessment.

Issue reference	Issue raised
	In the Supplement, describe the expected number and frequency of hazardous waste transport vehicles (truck and train) for the first five years of waste storage operation of the project with respect to: • the originating State or Territory • the most likely routes of transport • the frequency and location of arrival at the project.
NT EPA 11	**Potential impacts and risks relating to mine and service infrastructure (Chapter 3.4.3) –** It is not clear in the draft EIS how water will be supplied to the Apirnta Facility. Provide further detail in the Supplement as to whether water will be sourced from the bores and treated at the Chandler Facility before being transported to the Apirnta Facility. Will the Apirnta Facility have a separate supply of water?
NT EPA 12	**Potential impacts and risks relating to mine and service infrastructure (Chapter 3.5.6) –** The draft EIS states that construction materials would be sourced from excavations associated with the mine access decline and vertical shafts or from borrow pits located along Maryvale Road. Please provide further details with respect to identification of volumes and location of where the material would be extracted from. Furthermore, outline the expected amount of traffic associated with extraction and identify the proposed transport route for the material and how impacts to existing road users would be managed.
NT EPA 13	**Potential impacts and risks relating to mine and service infrastructure (Chapter 6) –** A range of hazards were identified by the NT EPA through a preliminary assessment of the proposal as 'risks' including changes to surface water hydrology. *Altered hydrology surrounding the mine infrastructure area*. This risk is categorised as 'beneficial.' In the Supplement, clarify how "Altered hydrology" may be beneficial.
NT EPA 14	**Potential impacts and risks relating to mine and service infrastructure (Chapter 6 & Appendix R) -** *Table 6-10 Risk assessment* Hazard identified by the Proponent in the EIS: *Flash flooding into mine infrastructure area Mitigation - Storm water drains / flood relief* *Appendix R Surface Water Baseline conditions Executive Summary* *Water quality data is limited but suggests a system characterised by low frequency/large magnitude floods...At this point, no numerical flood modelling has been conducted. Instead, a conceptual hydrological model has been prepared.* Flood modelling must be conducted prior to designs of "Storm water drains/flood relief" and should include the haul road and Apirnta site. In the supplement, outline how Tellus Holdings intends to acquire sufficient understanding of the hydrology of the site to inform the detailed planning and design of surface infrastructure.
NT EPA 15	**Potential impacts and risks relating to mine and service infrastructure (Chapter 6) –** The crossing of the Finke River (between Apirnta and the Stuart Highway) could require a bridge, if the intention is to keep that section of road open at all times. Please provide detail on the type of crossing planned for construction across the major rivers (Finke) and the possible effect on the river and other watercourses downstream from the

Issue reference	Issue raised
	crossing during and post construction. The construction proposed must be adequate not to restrict water flow during flood events. Provide more detail on the anticipated vehicle usage of the roadway (numbers and type of vehicle – peak usage times etc.).
NT EPA 16	**Potential impacts and risks relating to mine and service infrastructure (Chapter 17.5.1) -** The outline of the Apirnta Facility in Figure 3-4 of the draft EIS does not show any power generators. It is noted that section 18.3.4 refers to the use of solar energy to supplement power, however it is not clear what will be the primary source of power for the Apirnta Facility. Please outline if the main source of power will be provided through a diesel powered generator or if the site will be connected to the proposed Chandler generator/power plant.
NT EPA 17	**Potential impacts and risks relating to mine and service infrastructure (Chapter 18.1.8) –** The draft EIS identifies fuel storage areas at the Chandler Facility and notes that approximately 5-10 ML of diesel will be required for generators. The diagrams of the Apirnta Facility do not show where fuel (above ground and underground) is to be stored. This is despite section 18.1.8 noting that fuel will be stored in a designated bunded area at the Apirnta Facility. In the Supplement please provide an updated figure showing the location of the fuel storage tank/s.
NT EPA 18	**Potential impacts and risks relating to mine and service infrastructure (Appendix K) –** Recommendations have been made by Atkins (2016) to reduce the width of the current design of the waste emplacement rooms (currently 15 metres wide). The proponent is committed to undertaking further geotechnical drilling and analysis of the Chandler Halite Formation. In the Supplement please provide further detail with respect to when further geotechnical drilling/analysis of the formation will be undertaken and how the information will be collected. If Tellus Holdings Ltd intends to still construct room widths of 15m, please discuss whether other engineering solutions will be used to ensure the rooms are structurally stable.
NT EPA 19	**Potential impacts and risks relating to types of waste (Chapters 1.4.2 & 1.7.21 & 2.2.1) –** The Apirnta storage facility is significant in area and capacity compared to other Australian facilities storing hazardous waste. Depending on the characteristics of wastes and the method and timeframes for storage, it could be expected that as the volume of waste increases, so does the magnitude of the potential impacts relating to an explosion or fire event, loss of containment, or loss of identity or provenance. The NT EPA requires a more thorough understanding of these risks and potential impacts (or consequences). The Supplement should provide detail on the specific sequencing of planned waste reception and storage at the Arpirnta facility, to demonstrate how it accounts for the range of risks. This may include limiting storage initially to a specific subset of wastes; or initially limiting the volumes of high-risk wastes (particularly during the period that wastes are not being transported underground). For each waste, identify volume and how it will be stored (e.g.in drums, bulk packages or in shipping containers) and whether containment packaging would be under cover, or exposed to UV light and rain. In the Supplement, please list the types, sources and quantities of waste being proposed for transport to and storage at the facility. Furthermore, please nominate the methods of transport for and containment of the listed waste types above during transport. The Supplement should include further clarification around which wastes and what volumes will be stored in shipping containers. If waste is to remain in shipping containers, please identify the DG Class of the waste and how it will be managed in terms of risk management in the event of adverse occurrences.

Issue reference	Issue raised
NT EPA 20	**Potential impacts and risks relating to types of waste – key features of the Proposal (Chapter 1.4), Chandler Facility (Chapter 1.4.1) -** *Storage, recovery and permanent isolation of materials would involve: Once full, sealing the underground voids permanently with an engineered barrier...* *The facility would be designed and managed to allow for future waste recovery opportunities, that is, wastes would be stored like-with-like and the final disposal locations of all waste would be tracked and logged for future reference. At some point in the future, a technology recovery park would be established to support research and development into ways to release waste materials back into the circular economy…* In the Supplement, please clarify these conflicting statements.
NT EPA 21	**Potential impacts and risks relating to types of waste – key features of the Proposal (Chapter 1.4), Apirnta Facility (Chapter 1.4.2) -** The surface storage and transfer facility would provide for the temporary storage of up to 400,000 tonnes of waste per annum… In the Supplement, describe how long materials will be in 'temporary storage' before being transported for storage in the underground 'rooms'? It is assumed that the disposal of waste in the Chandler Facility would take some time due to inventory and segregation purposes. Will the warehouse be able to cope with incoming waste if underground waste disposal is at a slower rate than incoming waste or if mining is temporarily suspended or under care and maintenance and there is no capacity to store waste underground? Under what scenarios will the proponent suspend accepting external waste?
NT EPA 22	**Potential impacts and risks relating to types of waste (Chapter 3.2.6) -** The draft EIS suggests that a wide variety of wastes could be accepted at the facility (e.g., liquid corrosives, oil, solvents, etc.). The wide variety of wastes that are listed as being potentially accepted imply that there is an additional processing facility (apart from hydraulic backfill) required to somehow solidify or otherwise stabilise corrosive, liquid or hydrocarbon wastes. There is no information in the draft EIS as to how this will happen. Furthermore, processing facilities are likely to be a source of potential emissions which have not been identified in the draft EIS or the risk assessment by Quintessa. There is also the risk of operator exposure to chemicals in such a facility. In the Supplement, please provide details of how non-solid, non-neutral, potentially hydrocarbon-containing wastes are to be treated given that they cannot be disposed of directly. Note that the Quintessa risk assessment has made some commentary around such wastes as not being suitable for hydraulic backfill.
NT EPA 23	**Potential impacts and risks relating to types of waste (Appendix C, Appendix G) –** The draft EIS includes a comprehensive waste acceptance procedure and presents both a list of excluded items and a list of potentially accepted wastes. Tellus Holdings Ltd further proposes that some wastes that are on the excluded list could be accepted for disposal since they could be treated to make them suitable for disposal. No information is given as to the potential processes that might be employed for on-site treatment nor the tests or parametric limits the treated waste will be subject to before disposal. In the Supplement, please provide more information about what processes are proposed to be carried out on-site to make waste acceptable for disposal. The Proponent should also describe and specify the facilities required to perform such treatments. The Proponent should also specify the tests employed and the parameters to be used to determine whether a treated waste is suitable for disposal. It is possible that the tests proposed in each Gate are the tests to be used for evaluation of the treated product, but this is not explicit. If there are going to be

Issue reference	Issue raised
	excluded wastes, then they should be listed and procedures described that show how such wastes will be dealt with.
NT EPA 24	**Potential impacts and risks relating to types of waste (Chapter 3.2.7) -** It is likely that loss of containment of the waste cargo will occur during the life of the project. Provide a clear set of guidelines and processes on how the resultant wastes from spillages would be handled and treated. Describe treatment provisions of resultant wash waters. This is especially important given the wide variety of waste proposed to be accepted.
NT EPA 25	**Potential impacts and risks relating to types of waste (Chapter 3.1.3) -** The Draft EIS documents a considerable delay between the commencement of waste storage at Arpirnta and the commencement of waste placement in the underground caverns Please clarify whether the waste accumulated at the Arpirnta facility will be prioritised for placement once the underground phase of the project starts (i.e. first in, first out).
NT EPA 26	**Potential impacts and risks relating to types of waste (Chapter 3.2.7) -** While waste is stored above ground and exposed to elements (mainly UV and water) degradation of packaging materials can proceed apace. The timeline of the operations indicates that above-ground storage of the waste could be up to two years if there are no delays. Even over this period there will likely be considerable deterioration of the packaging and labelling. Thus, there could be a loss of containment and provenance. In the Supplement, please provide greater detail around the processes that will be put in place to combat deterioration of packaging and labelling of stored waste. Furthermore, please clarify if Tellus Holdings Ltd is proposing to store waste in shipping containers. Identify contingency measures for unexpected delays to placing wastes underground.
NT EPA 27	**Potential impacts and risks relating to types of waste (Appendix G, Appendix C) -** The draft EIS does not set out what processes could be employed when non- conforming waste arrives at the site. In theory, any non-conforming waste is ultimately a problem for the producer. Given the remote location and the cost of returning non-conforming wastes, there remains the possibility that non- conforming wastes could remain on site. The Supplement should clarify what is meant by “appropriate management techniques”. This should include, but not be limited to, consideration of the processes used by transporters to consolidate waste for containerisation to identify non-conforming waste prior to it being transported to Apirnta. If it is proposed that either Apirnta or Chandler be used for any neutralisation, immobilisation or encapsulation then this should be stated. Further, if it is proposed that these wastes be incorporated into hydraulic backfill, then the Proponent should identify processes to be used to evaluate risk to the environment in line with EC Decision 2003/3 [3].
NT EPA 28	**Potential impacts and risks relating to types of waste (Appendix G) -** The Facility will be dealing with waste products that are no longer virgin. The Safety Data Sheet (SDS) should reflect the nature of the waste otherwise workers will be exposed to unknown risks. Chemical wastes may be the result of the use of one or more chemicals in a process which produces one or more waste streams. In some instances, a new chemical may be formed as a waste product. The WHS (National Uniform Legislation) Regulations [1] (Reg 331) require wastes to have an SDS. Further reference may be made to the Code of Practice – Labelling of Workplace Hazardous Substances [2]. While the Regulations require the manufacturer or producer of the waste to create the waste SDS and the transporter to attach the waste SDS to a manifest, the Proponent will invariably find that waste will be sent to the facility with only its pure form listed on the SDS or no listing. Given this, it will be the responsibility of Tellus Holdings Ltd to somehow obtain or create a relevant SDS for the waste. This is particularly pertinent because

Issue reference	Issue raised
	of the large amount of waste proposed to be stored and the potentially extended period between the receipt and actual disposal of the waste. Furthermore, where wastes are received that have been excluded by the Waste Acceptance Criteria for disposal/storage but that may be acceptable for incorporation into hydraulic backfill, the SDS becomes highly relevant to determine the potential risks in the production of the hydraulic backfill and its ultimate performance. In the Supplement, please outline how Tellus Holdings Ltd will comply with Reg 331 of the Regulations in the process of initial assessment (from the producer), transport and receipt. This relates not only to the creation and maintenance of the SDS but also the labelling of the substances. Consideration should be given to how shipping containers containing wastes are to be labelled and in the case of multiple wastes within one shipping container, how the multiple wastes are labelled and identified.
NT EPA 29	**Potential impacts and risks relating to types of waste (Appendix C) -** Whilst it is understood that waste for direct disposal will be transported down the decline via shipping container on the back of a truck/trailer, it is not clear how waste is stored at the Apirnta facility i.e. is it removed from the shipping container or not? Further, given that wastes on the exclusion list may in fact be accepted (including hydrocarbon-containing liquids), it is not clear how these will be separated and bunded at the Apirnta facility. AS 3833 provides for the storage of mixed classes of dangerous goods and gives guidance on several issues. It makes clear that transit storage is limited to 200 tonnes. The standard also provides guidance on stormwater and firewater and spillages. Please clarify how waste materials are to be stored at the Apirnta facility with reference to the use, or otherwise, of shipping containers. If shipping containers are to be used, then the Proponent should clarify how compliance with S5.9 of the standard will be achieved and maintained. Note esp 5.9 b), c), d), e).
NT EPA 30	**Potential impacts and risks relating to types of waste (Chapter 6) –** In the Supplement clarify the provisions made for the storage of waste liquids in relation to containment of spills and firewater. There should also be clarification on the containment of firewater and stormwater with attention given to potential cross contamination. It would help if you could also provide some indication of the storage layout with reference to segregation distances in relation to the proposed volumes to be stored at the facility especially in the period between commencement of acceptance of waste and the beginning of waste placement. Given that the facility will be accepting hydrocarbon containing wastes, the Supplement should include some explanation as to the firefighting provisions being made in the storage area.
NT EPA 31	**Potential impacts and risks relating to types of waste (Appendix H) –** The Risk Assessments do not address operations at the Apirnta storage facility where up to 400,000 t of waste are stored. This poses a large potential risk from loss of containment. There is also no risk assessment of the facilities or processes employed when non-complying wastes are accepted and treated prior to disposal. In the Supplement, please provide an expanded risk assessment that includes consideration of the Apirnta storage facility.
NT EPA 32	**Potential impacts and risks relating to hydraulic backfill (Chapter 2.2.3) -** The Proponent documents a large storage facility at Apirnta and a smaller facility at Chandler that will include the plant for making the hydraulic backfill. If the storage conditions for the waste at Apirnta result in spillage and leakages of waste and resultant stormwater is used in the backfill production process, there is a significant possibility that undesirable wastes could be incorporated into the backfill material. Appendix Q of the draft EIS (S4.3.1) notes that site controls will minimise the escape of contaminants into the local environment. In the Supplement, please detail the responses to

Issue reference	Issue raised
	loss of containment scenarios which take into consideration the size and nature of the spill. The responses should detail how contaminated materials and water and waste are to be managed.
NT EPA 33	**Potential impacts and risks relating to hydraulic backfill – Hydraulic Backfill Report (Appendix I) (Chapter 3) –** The draft EIS includes discussion of the release of trapped gases or volatile compounds. In particular, the draft EIS includes a statement which assumes that no trace volatile components will remain in the backfill. Describe how the waste acceptance criteria account for the mixing of wastes for hydraulic backfill, including products and noxious emissions. Furthermore, on page 77 a contradictory statement is made: "*Some gas formation from the emplaced hydraulic wastes in the storage and disposal rooms would be normal and could be managed safely by:* • *Monitoring of gas formation during backfill preparation.* • *Adjusting retaining time in the homogenisation tank accordingly.* • *Ample ventilation of the waste emplacement rooms in the mine*." Please provide further information on how this risk is managed both during placement and during convergence where further consolidation of the placed wastes may occur prompting a delayed release of volatiles.
NT EPA 34	**Potential impacts and risks relating to hydraulic backfill (Chapter 3) -** It appears that risk has mostly been assessed in terms of the backfilling composition. Provide an environmental risk assessment of the two hydraulic backfilling methods taking into consideration the above-ground risks, such as the plant and transport of the backfilling material.
NT EPA 35	**Potential impacts and risks relating to hydraulic backfill – Waste Acceptance Criteria – Final Report (Appendix C) -** The draft EIS indicates that liquid wastes that cannot undergo solidification/stabilisation or be incorporated into the hydraulic backfill mixtures will not be accepted for permanent isolation due to the risk of seepage and potential dissolving of the salt walls. However, the listed waste *waste oil/water, hydrocarbons/water mixtures or emulsions and Waste mineral oils unfit for their original intended use are listed in Table 2-2: Example chemical wastes likely to be suitable for permanent isolation at Chandler.* Explain how the above mentioned liquid wastes are suitable to undergo solidification/stabilisation or be incorporated into the hydraulic backfill mixtures?
NT EPA 36	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Chapter 2.2.1) -** In the Supplement, discuss the risk of dissolution of the natural salt barriers. Discuss the stability and integrity of the waste packaging in contact with the salt barriers i.e. potential for deterioration over time.
NT EPA 37	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Appendix C) -** Hazardous Waste Storage, Permanent Isolation and Disposal are the terms used by the proponent throughout the document. Permanent Isolation is defined in Appendix C as "*indefinite below ground storage or disposal of wastes determined suitable for acceptance*". At what stage/after what length of time does storage of material become permanent isolation? Is there a difference between permanent isolation and disposal?
NT EPA 38	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Chapter 3) -** The stability of the Chandler formation and its suitability for storage and containment of waste through the isolation from the biosphere is both inferred and positively stated. The characteristics of the formation and potential pathways for release (and their control or containment) are described and discussed in the supporting appendices. These

Issue reference	Issue raised
	characteristics are fundamental to use of the facility for storage and containment yet a concise summary of this aspect is missing from the overall project description. The proponent should provide in the project description a concise statement and summary of why the Chandler Formation provides a suitable opportunity for waste storage and containment.
NT EPA 39	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Chapter 3.6.5) -** In terms of the dry packaged waste backfill, discuss the potential for wastes to react with the salt barrier if unintentionally released.
NT EPA 40	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Chapter 3.6.5) -** The draft EIS notes that there may be some free liquid (brine) present in the mine post-closure. Describe the effects of free water on the stability of the facility including containment of stored wastes. Are there any contingencies for removing free liquids before the rooms are sealed and the mine is closed?
NT EPA 41	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Chapter 3.6.5) -** The draft EIS states: in German Law that the saline host rock functions as the only barrier rock and the long-term safety documentation in principle has to be provided for the saline rock as a barrier rock. In the Supplement it would be beneficial if you could provide a summary of the German Law and some background behind why saline rock is sufficient as a barrier rock. In the Supplement, provide further detail about any standards prescribed in the law that may be applicable to the Chandler Facility. In particular, does the law provide any guidance around the physical composition of the deposit for storing waste? For example, is there guidance around the minimum width of the deposit or the percentage of halite?
NT EPA 42	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Chapter 3.6.5) -** The lessons learnt regarding long-term waste storage in underground storage facilities in Europe, has been largely incorporated into European Directives and respective Member State Law. German law contains a very detailed description of all aspects concerning the safe and efficient long-term storage of wastes. In the Supplement, please outline if there have been any failings identified with the operation of existing waste storage facilities in Europe in accordance with German Law and aspects of safe and efficient long-term storage of wastes. The Supplement should include a discussion around the applicability of any identified failings and whether these are relevant to the Chandler Facility.
NT EPA 43	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Chapter 13) -** Given the facility will store waste permanently for long periods has there been any consideration of gas produced through the microbial degeneration of organic waste/anoxic corrosion of steel drums and metallic waste? Will the rooms be sealed in a manner that allows for the medium-long term release of gases produced during waste disposal? In the Supplement, please discuss if this an issue for the long-term disposal of waste and the stability of the facility?
NT EPA 44	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Appendix J) -** Assessment has assumed that the overlying formation is free of faults or discontinuities. In the Supplement, describe the likely implications on the development of the project should a discontinuity be discovered by geophysical work during operation and mining extent is adjusted to avoid this discontinuity.
NT EPA 45	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Appendix J) -** Previous experience from Europe is stated as a reason for confidence and exercise of professional judgment. Positive statements are made without a focus on the learnings from failures or issues encountered that may be important to this project. For

Issue reference	Issue raised
	example, offsets of 150m Horizontally and 20m vertically are proposed to the edge of the formation and discontinuities. In the Supplement, provide examples that illustrate the potential spatial variability of the resource examples cited used to provide these separation guidance distances. Given that salt mines that have been used as references already had operating histories prior to development for waste storage and containment, can the Proponent comment on the time required to gain a sufficient understanding of the spatial variability and behaviour of the Chandler Formation.
NT EPA 46	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Appendix J) -** Assumed waste and backfill properties provide support with limited compression. The performance required for the waste stiffness was not described. Bulk bags, drums, hydraulic materials are proposed. Please provide an example of how this uncertainty is managed in another facility. To what extent does the proposal rely on provision of passive support to prevent destabilising the Jay Creek Sandstone formation or a discontinuity within this formation?
NT EPA 47	**Potential impacts and risks relating to proposed long term storage of hazardous wastes (Appendix J) -** The zone between the seals which comprises backfill will be permeable. The general fill provides a preferential pathway to the chandler formation via the decline. The seals are critical for an effective seal for post closure / abandonment. Provide an example of the design of the proposed sealing methods and outline how the design is engineered for robustness and long term performance in post closure phase over the timescales discussed in the risk assessment.
NT EPA 48	**Potential impacts and risks relating to future recovery of stored waste (Chapter 3.2.7) -** The draft EIS implies that the emplacement of fine salt eliminates the possibility of future recovery, which appears contradictory to other parts of the draft EIS. One of the points made in the draft EIS is that isolated material may be recovered at some future point where recovery of a component material of a waste is commercially viable. The process of progressively backfilling and sealing rooms and then finally the decline and shafts seems to remove the possibility of economically retrieving such waste in the future. In the Supplement, please provide scenarios of how material could be reclaimed or state explicitly that once the rooms are closed there is no subsequent economical or practical opportunity to reclaim the material.
NT EPA 49	**Potential impacts and risks relating to future recovery of stored waste (Chapter 3.2.8) -** The draft EIS notes that potential recovery of waste must occur prior to decommissioning. Decommissioning results in permanent isolation containment that would need to be breached to allow for future access. Deferment of decommissioning is not desirable from a risk management perspective since the risks of exposure to the environment are highest during operational phase while the shaft is open. In the Supplement, please clarify the triggers and timeline for decommissioning of access to the storage rooms and the circumstances under which an extension may be sought to enable recovery.
NT EPA 50	**Potential impacts and risks relating to future recovery of stored waste (Appendix J) -** Segregation of wastes for potential recovery or isolation from other material is likely to result in partially filled storage areas requiring continued access for the life of the facility as surrounding rooms are sealed and the facility expands. This may lead to voids being maintained for longer than planned without backfill to provide support.

Issue reference	Issue raised
	In the Supplement, please provide information on how the decision to close a room will be made: a) how the materials are deemed not to have future potential use; b) should reduction in accepted waste quantities being segregation and monofilled occur to prevent unstable conditions. The response should include information on how this issue will be managed when the acceptance of multiple waste types requires operation of multiple segregated rooms.
NT EPA 51	**Other potential impacts and risks (Chapter 7.3.2) -** *Land has also been previously cleared for tracks and a small amount of land has been cleared previously for mining exploration by Central Petroleum.* In the Supplement, identify the location of land disturbed by other Operators.
NT EPA 52	**Other potential impacts and risks (Chapter 8.1.3) -** Frequent Groundwater monitoring is required during the pre-mining and construction phase of the project to ensure that data can be used to ascertain background water quality and ensure that no groundwater impacts are occurring during the operation of the project. Initial monitoring should have already commenced and needs to be undertaken on a regular basis. In the Supplement, provide sufficient evidence that groundwater quality results obtained through quarterly monitoring are representative of pre-mining water. A discussion outlining the potential risks of less frequent monitoring, for example a delay in identifying groundwater contamination should be included. To satisfy the requirement that background water quality has been adequately assessed, QA and QC procedures should be detailed, potential temporal changes in water quality should be discussed, and the statistical confidence in the results presented
NT EPA 53	**Other potential impacts and risks (Chapter 8.1.4) -** *GW. 4 Develop of detailed groundwater quality database* *Report groundwater quality results to the DPIR and the NT EPA every four months (April, August and December) to compare seasonal data against project activities.* Please describe the components of the 'groundwater quality' sampling being undertaken.
NT EPA 54	**Other potential impacts and risks (Chapter 8.1.4) -** *GW. 5 Undertake a hydro-census (condition) survey of local groundwater users prior to construction to ascertain bore condition and current status of the bores located within a 25 kilometre spatial buffer around the proposed Chandler Facility.* Please explain how/why 25km was chosen? Will the same be done for the Apirnta facility?
NT EPA 55	**Other potential impacts and risks (Chapter 8.1.4) -** *GW. 7 Develop a detailed groundwater database. Complete a groundwater isotope study for monitoring bores prior to construction.* Provide further details in the Supplement including when this is planned, and whether this will be done for both the Chandler and Apirnta facility area?
NT EPA 56	**Other potential impacts and risks (Chapter 8.3.4) -** *Overall, there is minimal response to rainfall recharge in the piezometric surfaces monitored, indicating the aquifer is dominated by lateral flow rather than vertical flow. In the uppermost formation, the Horseshoe Bend Shale Formation, there is a minor and delayed response (a 0.06 metre rise over 15 days) to rainfall recharge at WT2 and WT6a only.*

Issue reference	Issue raised
	The response from WT6a has not been plotted, is this WT6? indicating the aquifer is dominated by lateral flow rather than vertical flow. In the uppermost formation, the Horseshoe Bend Shale Formation, there is a minor and delayed response (a 0.06 metre rise over 15 days) to rainfall recharge at WT2 and WT6a only. In the Supplement please clarify whether WT6 and WT6a are the same. (WT6a has not been plotted).
NT EPA 57	**Other potential impacts and risks (Chapter 8.3.4) -** Calculations of the expected time for groundwater levels to rebound back to pre- mining levels on completion of mining need to be included. All stakeholders that use or rely on groundwater from potentially impacted bores need to be consulted and briefed on the potential impacts (or lack thereof). In the Supplement, please map the extent of groundwater drawdown, ideally with contours, and identify potentially impacted bores.
NT EPA 58	**Other potential impacts and risks (Chapter 8.4.4) -** Table 8-3 Water balance (average rainfall per year) shows there will be 0 inflows into the shaft and therefore 0 inputs into the water balance. In the Supplement, provide detailed calculations showing potential maximum inflows for completeness and to provide a clear picture of the potential worst- case scenario risks.
NT EPA 59	**Other potential impacts and risks (Chapter 8.5.2) -** *There is the potential for low to moderate impacts to River Red Gum and Coolabah vegetation proximal to the Proposal area, as these ecosystems are considered to be partially dependent on groundwater.* *As discussed in Section 8.3, two ecological communities (Eucalyptus camaldulensis var. Obtuse and Eucalyptus coolabah subsp. Arida) have been identified by DENR to persist within the riparian corridors of the Finke and Hugh Rivers. The root structure is considered to be shallow (less than 15 metres) and dependent on the perched shallow groundwater systems (i.e. near-surface alluvial sources) associated with ephemeral creeks, rather than the water table at about 80 metres depth.* In the Supplement, please verify these assumptions. Please outline the low to moderate impacts. Describe how the mine may affect the "perched shallow groundwater systems" and associated vegetation. Please clarify "partial dependence" vs "dependence". Outline the risks including, but not limited to, excessive groundwater drawdown, drainage of the perched groundwater systems, contamination, etc.
NT EPA 60	**Other potential impacts and risks (Chapter 8.6) -** *Table 8-6 Operation raw water demands Process Water - Saline 45ML/y. Re- use from hydraulic backfill process and Langra formation.* In the Supplement, please clarify how much water is reuse vs abstraction.
NT EPA 61	**Other potential impacts and risks (Chapter 9) -** The water quality results, analysis, and discussion within both the main document and the appendix (appendix R) are lacking a substantial amount of detail. The report does not explain: • the observed elevated concentrations of metals, • no mention of filtered and total metal concentration variations, • explain any management strategies relating to the livestock exclusion, or • the potential for site-specific guidelines.

Issue reference	Issue raised
	In the Supplement, please provide additional available data to address the gaps identified above.
NT EPA 62	**Other potential impacts and risks -** The water quality results obtained for the Chandler project area contain substantial concentrations of metals contaminants. The highest value for copper observed is 70 times the recommended ANZECC 95% species protection trigger value. The values presented are not clearly labelled as filtered or total components; this should be included in the results for better interpretation. Presumably, no filtered metal data has been presented. All conclusions and interpretations are therefore unreliable for aquatic ecosystem protection. Further sample collection and data interpretation is required.
NT EPA 63	**Other potential impacts and risks (Chapter 9.2.4) -** *In this study, bulk sediment samples have been collected and analysed for metal concentrations and percentage < 63 µm grain size. In this instance, a very simple form of normalisation was suitable whereby bulk sediment concentration data (expressed as mg/kg dry weight) was divided by the percentage '< 63 µm % passing' (expressed as a decimal) (Simpson et. al. 2013). Bulk metal concentrations for the current dataset can then be compared on a spatial basis in order to evaluate sediment enrichment, independent of differences in particle size in different creeks.* This is not an appropriate approach given that smaller particles (such as clays) contain negatively charged surface sites, which positive metal ions are able to bind to, while larger sized particles (such as sands) do not contain a charged surface and therefore generally do not bind metal ions.
NT EPA 64	**Other potential impacts and risks (Chapter 9.3.7) -** *No breakthrough to the dune area to the north of the sub-catchment is observed, with water in this area locally-derived from runoff from the adjacent dune system. Furthermore, no connectivity between the dune area and the Hugh River to the north is anticipated. No assessment downstream from the confluence between the Hugh and the Finke is deemed necessary because the flow contribution from the Proposal area to flows below this point is considered to be insignificant.* The comment that contributions from the proposed area will not be significant below the confluence of the Hugh and Finke Rivers has not been substantiated. In the Supplement, please discuss how the impacts of the proposal area on the reach downstream of the Hugh and Finke confluence were assessed. Please provide additional available information to justify this rationale.
NT EPA 65	**Other potential impacts and risks – Figure 9-15 Conceptual Site Hydrological Model (Chapter 9.3.7) -** The Figure shows that the ROM area will be located adjacent the Halfway Creek flow path. During high rainfall events, is there the potential for stockpiled material to be carried downstream, potentially resulting in altered water chemistry of the downstream environment? Please describe how this risk has been assessed.
NT EPA 66	**Other potential impacts and risks (Chapter 9.3.8) -** In the Supplement, please provide the following additional information: • the Surface water discussion includes results that have been presented in text format. Please provide graphical representation of the data, where appropriate • discuss various potential influences to surface water quality in relation to the results observed • the location coordinates associated with the data should be presented in Latitude and Longitude or UTM and not only mine grid values • the discussion should contain at least two distinct sections, one for aquatic ecosystem protection and one for livestock drinking water comparison.

Issue reference	Issue raised
	• if there are more uses of water within the project-impacted region these should also be included for discussion.
NT EPA 67	**Other potential impacts and risks (Chapter 9.4.1) -** *The current plan is to relocate Halfway Dam…further down the creek line and utilise its current site as the salt stockpile. Therefore, further detailed investigation is required to:* • *Find a suitable location for a new dam;* • *Assess the effect of any mine activity in the catchment upstream on flow yield / reliability; and* • *Inform the dam location, intake structure and dam capacity.* This statement implies that a dam in (or near) a creek will be used as a salt stockpile area. In the Supplement please clarify this statement and outline any risks from stockpiling salt in a dam or in this area.
NT EPA 68	**Other potential impacts and risks (Chapter 9.4.2) -** *Using an Initial Loss of 40 mm, rainfall depths would result in no runoff for the majority of design events of 5 years ARI or less. While selecting a higher ongoing loss is expected to result in no effective rainfall from much of the longer- duration storm profiles.* In the Supplement, please provide calculations using the worst possible conditions (a higher ARI and lower initial loss) to enable an assessment of the extent of potential environmental impact.
NT EPA 69	**Other potential impacts and risks (Chapter 9.7) –** *SW 16 Additional monitoring. Catchment drainage* *SW17 & 18 Additional investigations during detailed design. Develop two- dimensional modelling of flow paths and inundation in the mine lease area,* *SW19 Model flood risk and scour protection at the crossing of the Finke River.* *SW20 Model flood risk1 of haul crossings (bridges, culverts, causeways) of drainage lines.* *SW21 Develop site specific water quality guidelines. SW23 Preventing erosion and sedimentation* In the Supplement, confirm these measures are in progress or provide timelines for these studies to commence.
NT EPA 70	**Other potential impacts and risks – Emergency response Plan (Chapters 4.4.1 & 4.4.2) -** Chapters 4.4.1/4.4.2 of the Emergency Response Plan refers to the reporting requirements under the *Environment Protection and Biodiversity Conservation Act*. These sections should be updated to note that the only reporting requirements that apply to the Project are those that are specified on an approval under Part 9 of the Act. The reporting provisions with respect to permits are only applicable to works that happen within areas owned or leased by the Commonwealth.
NT EPA 71	**Other potential impacts and risks (Chapter 15.3.2) -** The draft EIS notes that air quality data by the NT EPA in Darwin has been used to represent the baseline conditions at the Proposal site. Air quality data from Darwin is likely to be very different to Central Australia and the Chandler site. In the Supplement, provide justification for the use of Darwin air quality data as a baseline for the Chandler Facility. Further discussion should be provided with respect to how Tellus Holdings Ltd has accounted for the effect of existing industry in Darwin and whether this affects the ability to obtain a meaningful baseline for the Chandler Site.
NT EPA 72	**Other potential impacts and risks (Chapter 18.5) -** The relocation of threatened species is not considered an acceptable measure for avoiding significant impacts. With respect to Liopholis slateri, the species lives in a communal warren. The relocation of a single individual away from the alignment of the road would have minimal conservation benefit for the species and would likely result in the death of the individual skink. If a communal warren is identified within the

Issue reference	Issue raised
	road alignment, it is preferable that Tellus Holdings Ltd realigns the section of the access road to avoid impacts. Furthermore, it is noted that the thick billed grasswren (*Amytornis modestis indulkana*) is listed as extinct in the Northern Territory. If a population or individual birds are found during pre-clearance surveys, it is requested that the Flora and Fauna Division of the Department of Environment and Natural Resources be contacted to obtain further information about how to proceed. It should be noted that the capture and relocation of any birds from the area will require the use of mist nests which can result in serious injury and death of the bird if used by unqualified or trained persons. To ensure there is sufficient detail to assess the likely risks and potential impacts to both species, provide maps and an estimate of how much habitat for the two species is likely to be impacted. This information will ensure the Australian Government has sufficient information to calculate possible offsets under the EPBC Act if it considers that offsets are necessary.
NT EPA 73	**Other potential impacts and risks (Appendix J) -** Figure 9-1 in Appendix J is referred to in the draft EIS but was not provided. Please provide this figure in the Supplement.
NT EPA 74	**Other potential impacts and risks – Emergency Response Plan (Appendix T) -** The Emergency Response Plan should include details around the transportation of waste to the site. It is understood that Tellus Holdings has contracted Toll to transport waste material to the site, outline the proposed emergency procedures and the preferred sub-contractors that will be engaged if there is a truck accident/derailment and waste is no-longer contained during transportation to Apirnta and/or the Chandler Facility.
NT EPA 75	**Other potential impacts and risks – Emergency Response Plan (Appendix T) -** While identified in the risk assessment, incidents at another geological storage facility (the Waste Isolation Pilot Plant (WIPP)) in New Mexico highlight the risks with incorrect waste handling/ characterization and unforeseen incidents (fires). While it is acknowledged that the Chandler Facility differs from the WIPP in that it will not store high level radioactive wastes, will the Chandler Facility have any protocols and/or engineering solutions specifically designed into the declines/shafts or rooms for ensuring that if an unforeseen incident occurs, hazardous waste can be isolated and contained underground?

5.2.1 NT EPA 1

Issue raised

The proposed project is significant in terms of volumes of hazardous waste relative to the total generation of hazardous waste across Australia. It is assumed that if the Chandler Facility is not able to attract these volumes, there is a risk that the project will not be viable.

In the Supplement, discuss the viability thresholds of the project. Identify contingency measures for achieving lower than expected volumes of waste. Describe any uncertainty relating to projected growth of hazardous waste production in Australia.

Demonstrate the demand for the facility to store/dispose of existing and expected future volumes of hazardous waste, given existing and planned infrastructure across Australia (e.g. through providing letters of intent from specific generators of hazardous waste to provide material to the facility, and that no other commercially viable and appropriate disposal option is available).

Proponent's response

Through the development of Tellus' business plan and feasibility studies for the proposed Chandler Facility, Tellus has undertaken the following to ensure the long term viability and sustainability of the project:

- Extensive internal and independent external market research.
- Peer review by subject matter experts of Tellus' key waste market assumptions.
- Entered into commercial arrangements directly with Customers.

The collation and consideration of this data over many years as articulated in the table and graphs below and signed agreements with Customers have allowed the company to understand the large demand for services and the limited supply of cost effective options.

This assisted Tellus' in developing a realistic operational waste volume capacity that reflects clearly understood market volumes, pricing points, value add propositions and existing capacity within Australian's and the NT's hazardous waste infrastructure that is required to meet the rapidly growing market demand. Tellus typically takes a conservative approach to project development and a detailed risk assessment has been undertaken to take into account key market, design, logistical, operational and financial parameters that may affect the projects viability.

Underpinning the viability thresholds of the project and Tellus' assumptions are the following key trends:

- Australian's are the one of the world's highest producers of hazardous waste per capita;
- Waste production has grown at six times population growth. Australia's population is predicted to grow even more over the life of the project (29 years: 4 year build and 25 year operations), so we will be producing more hazardous waste at the same time that much of the existing infrastructure supplying services to this sector are reaching the end of their life or capacity;
- In other words, we do not have enough infrastructure at cost effective pricing points that are easy to use that deal effectively with what we produce today, let alone what we will be producing over the next 29 years;
- Add on top of this problem, Australia has a massive legacy waste stockpile of over 900 million tonnes of reported hazardous waste. This stockpile is growing every year because we do not have enough cost effective infrastructure. If you begin to calculate unreported waste, the volumes are even bigger;
- Australia has typically viewed hazardous waste through the lens of the linear economy business model.
    - Namely, "take or mine raw materials, manufacture products we use in society and then dispose of the products usually in a mixed manner (example landfill) that

makes future recovery of valuable materials very difficult at the end of the products useful life";

- Hazardous waste is beginning to be seen through the lens of a more sustainable circular economy business model that Tellus strongly supports.
    - Namely, waste should be seen as a valuable resource and we should "take or mine raw materials, manufacture products we use in society, then when the products are at the end of their useful life, we should either recover valuable materials this generation and push those materials back into the circular economy, or
    - in the scenario that we do not have the tools this generation, or
    - it does not make economic or environmental sense this generation, then
    - we should store "like with like" materials in a safe and sustainable manner for the next generation to recover, or
    - using environmentally sound management principals we should permanently isolate or destroy those materials that can damage the environment and people's health".

Describe any uncertainty relating to projected growth of hazardous waste production in Australia.

In assisting Tellus to remove uncertainty relating to projected growth of hazardous waste production in Australia the table below identifies the history and timelines on how Tellus has reached its business assumptions on hazardous waste volumes, price, trends, opportunities and threats and channels to market, using both top down and bottom up methodology. The due diligence and independent integrity of data captured and considered within this process has consistently provided a high level of confidence in the viability of the Chandler project.

Table 5-14 Market assumption development history

Date	Detail
October 2011	• Tellus tasked an independent Consultant to prepare a hazardous waste market report for the Tellus' Chandler Facility. • Consultant A contacted 45 waste generators, 8 waste management companies and 14 government regulators to investigate the Australian hazardous waste market, legislation and strategy and to introduce the Chandler salt mine project to stakeholders in order to identify their commercial interest. • Clear commercial interest was identified. • Tellus requested Consultant A to keep in contact with companies that had expressed interest.
By April 2012	• The Consultant in conjunction with Tellus staff had contacted over 50 mining, heavy industry, oil gas and manufacturing companies to seek their further interest in the Chandler project.

Date	Detail
During 2013- 14	• Tellus contacted an additional 50 companies and also began to actively engage with both Federal, State and Territory Governments meeting with Regulators (States & Territories) and emergency response groups. Tellus also met with, Government owned enterprises. • Tellus has focused on engaging with regulators to educate them on the benefits of geological storage / permanent for the range of businesses.
Jan 2014	• Consultant updates their 2011 waste market report with clear commercial interest reconfirmed from existing and new parties.
Sep 2014	• Consultant provides independent opinion on Tellus waste volume, mix, price and trend assumptions used in the Project DCF model (Chandler).
April 2015	• Consultant prepares a detailed report covering waste marketing, legislation and strategy and a review of key assumptions for Tellus Facilities" (Chandler focused)
May 2015	• Tellus expands business development team.
Sep 2015	• Another waste expert consultancy peer reviews the April 2015 waste market report and confirms the key assumptions and demand for the Chandler Facility and identifies new opportunities.
Nov 2015	• Consultant prepares a new report looking at market gap analysis and augmentation and a closer look into Tellus' key wastes and market assumptions
May 2016	• Tellus signs MOU with Toll which gives Tellus access to a much bigger sales team and understanding of the logistic and market opportunities.
July 2016	• Detailed internal and independent Consultant's review of publicly available Australian Government reports released and related to hazardous waste in Australia.
Aug 2016	• Consultant prepares a new report on Government policy and Tellus strategy to meet Governments own policy guidelines. • Tellus secures national storage and transfer facility footprint through long term. • Agreement with Toll.
Sep 2016	• Tellus has identified opportunities with many of Australia's big blue chip companies and Government. • Tellus has active commercial discussions going with many organisations. • Tellus has signed MOU's, Waste Supply Agreements and Collaboration Agreements with many companies that have given investors' confidence. • Completed national roadshow with major top tier accounting and legal firms on Environmental Contingent Liability Reduction and Tellus' value add proposition confirmed the demand for Tellus' services. • Tellus completes first phase of an ongoing multi-phase roadshow with Federal and State and Territory regulators
Oct 2016	• Tellus lodges Chandler draft EIS for preliminary review by the NT EPA. • Actively engaged with Federal and NT regulators for months prior to lodgement

Date	Detail
February 2017	• Tellus lodges Chandler draft EIS for public review.
May 2017	• Tellus' Projects (including Chandler) Awarded Major Project Facilitation Service (MPFS) by the Australian Government. MPFS is granted to projects that have significance to Australia or regional Australia
July 2017	• Consultants complete 2017 hazardous waste market assessment reports that continue to confirm Tellus' projects are commercially viable and identifies new opportunities.

Identify contingency measures for achieving lower than expected volumes of waste

Whilst not anticipated, Tellus has built in project flexibility and contingency measures to mana*ge market change. These include:*

- Opportunities to increase / decrease salt extraction and therefore available void capacity across the Life of Project timeframe.
- Sell higher value salt products (second revenue stream).
- Attract higher value lower volume waste streams with additional recovery and sales potential of valuable materials at Tellus' sustainability park.
- Long term availability, reliability and market pricing consistency available to customers has given customers confidence to enter into long term contracts under "give or pay" commercial arrangement that support the commercial viability and bankability.
- Reduction in operational expenditure if lower than expected volumes of waste. With existing technology today, to remain viable Tellus can automate up to 60% of the salt mining and underground warehouse business. This will materially improve productivity and cost on a per unit basis.
- Develop a portfolio of projects in Tellus with different service offerings in different parts of the market that in the event that one facility does not achieve its volumes, the other revenue streams from the other parts of the business can compensate and hence not affect the overall viability of the Company.

Demonstrate the demand for the facility to store/dispose of existing and expected future volumes of hazardous waste, given existing and planned infrastructure across Australia

The national hazardous waste market as identified through Australian Government and independent market summary reports is described below.

- Assuming the market is growing at approximately ("~") 3% pa then by 2017 Australia would produce ~56.3 M tpa total waste of which ~10.3% or ~5.8 M tpa would be hazardous waste.
- Tellus' target share is 4.9% per annum of the total hazardous waste market.

- If you ignore "excluded" hazardous wastes that do not meet Tellus' Waste Acceptance Criteria (WAC) such as tyres, abattoir effluent, grease trap, sewage, clinical wastes then Tellus is targeting ~ 10.3%. This is split at ~ 2.4% for the Sandy Ridge Facility and ~ 7.9% Chandler facility (CH).
- If you add in legacy waste volumes Tellus market share is smaller than stated above (see Hazardous legacy waste note below).
- If you add in unreported waste volumes Tellus market share is smaller than stated above.

The bar graph identified in the Figure below identifies Tellus' proposed market share against the National hazardous waste forecast. Independent reviews have confirmed the size of the actual waste market that meets Tellus WAC.

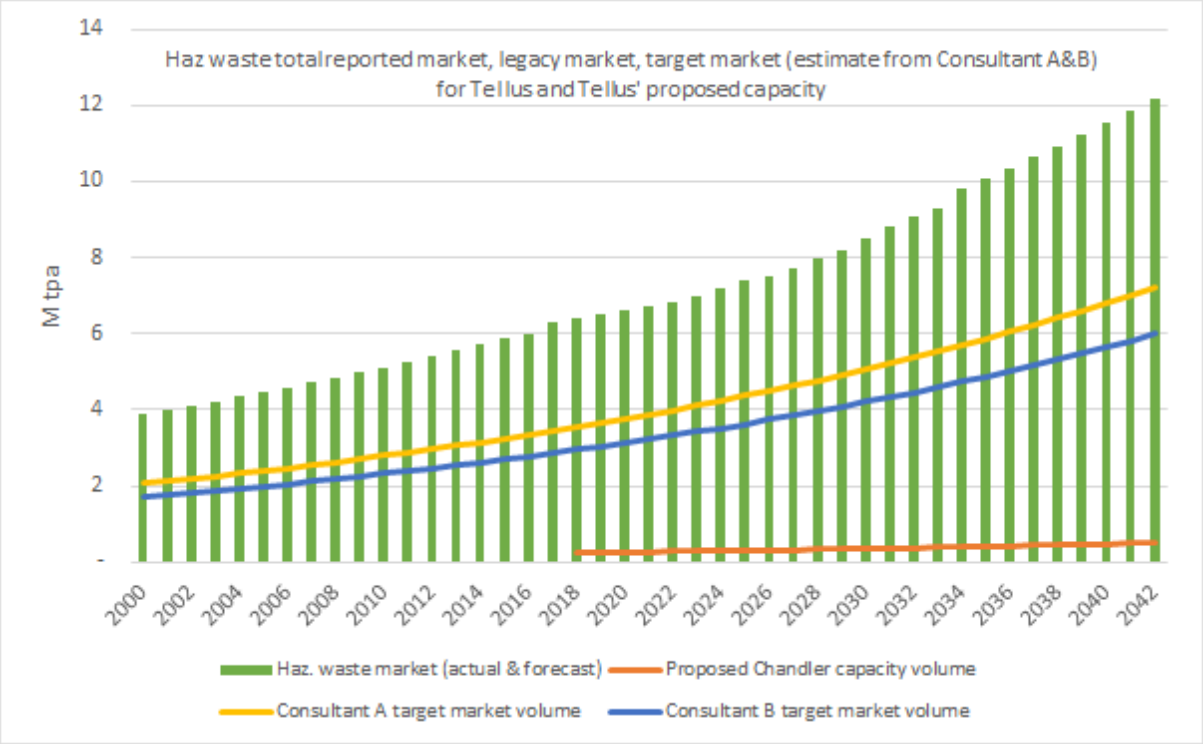


Figure 5-5 Hazardous waste market size and Tellus proposed target capacity

Hazardous legacy waste

At the Federal, State and Territory government level the regulation and tracking of waste relies on a system for 'cradle to grave' tracking of the movement of each consignment of hazardous waste from point of generation to final treatment and/or disposal. These tracking systems have been used for recent bottom-up compilations of hazardous waste arisings in Australia.

A substantial quantity of hazardous waste is generated and managed onsite in industrial settings that is unrecognised in government data as they do not move on public roads etc, despite that fact that the characteristics that cause a material to be hazardous exist regardless. These 'legacy wastes' that are 'missing' from tracking data can be present in very large volumes and as regulatory or

market conditions change (such as Chain of Responsibility), they represent a potential and extremely large market for Tellus that is currently dormant. In undertaking the national hazardous waste market assessment, Tellus has identified significant volumes (c. 900,000,000 tonnes or 900 M t) currently stockpiled in Australia and this stockpile is getting larger every year.

If even a small proportion (example 0.5% per annum) of legacy wastes began to respond to market intervention, due to future regulatory, health and safety, environmental or market pressure and positive price signals, Australia does not have enough existing infrastructure to deal with it. A number of independent consultants have estimated that Tellus attainable volume models would materially increase if these legacy wastes began to move off Customers site where most of the waste is dealt with in a temporary manner (sometimes with heightened risk to people and the environment) and into Australian waste infrastructure where they can be dealt with permanently or more sustainably with the recovery of valuable materials. Figure 5-6 illustrates a possible scenario that if 0.5% of the 900 M t legacy waste stockpile entered the existing Australian infrastructure market it would add another 4 M tonnes per annum (M tpa) to an already stretched infrastructure supply. Even if we added another 4 M tpa of existing infrastructure when Chandler comes on line, it would take 225 years to draw this stockpile down, assuming no new forecast waste is added to the stockpile.

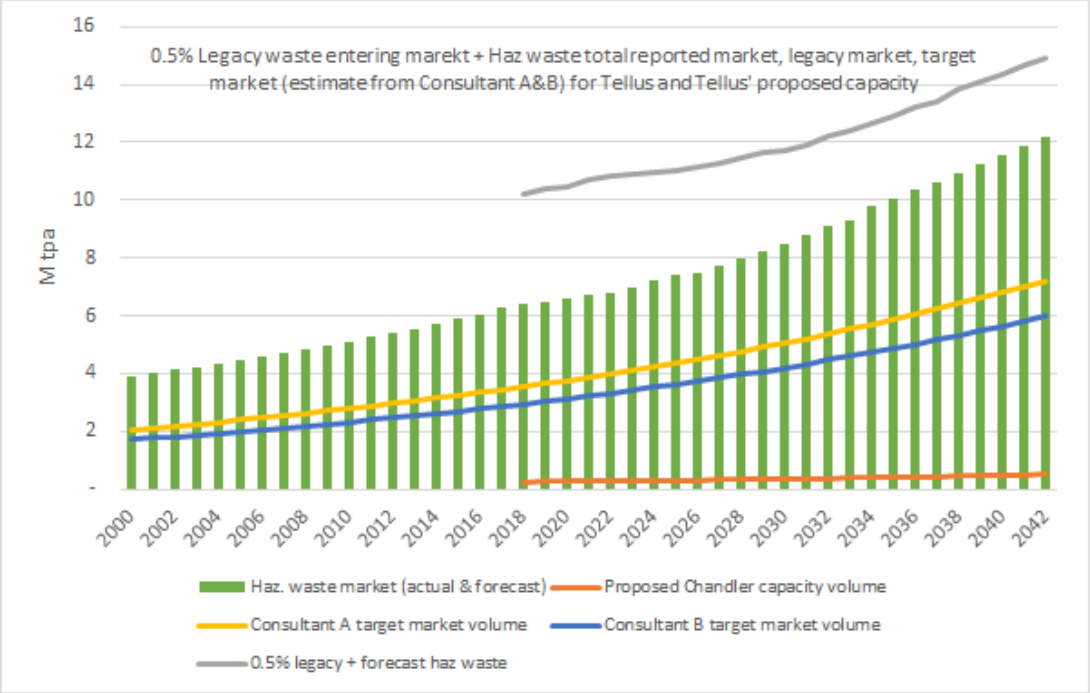


Figure 5-6 Impact of 0.5% of the 900 M t legacy waste stockpile entered the existing Australian infrastructure market per annum

Commercial Progress

Due commercial confidentiality Tellus is unable to provide specific company details, letters of intent or contracts. We can confirm that the implementation of a detailed integrated communications and

marketing strategy that is updated every year based on actual commercial opportunities with Customers has developed a broad spectrum of clients across multiple sectors including:

- Oil & Gas.
- Mining.
- Heavy Industry.
- Manufacturing.
- Government (State or Territory Emergency Service (SES or TES) for man-made or natural disasters that requires hazardous waste management.
- Agriculture.
- Utilities (power, water, telecommunications utilities including waste utilities that captures residential hazardous waste management).

This has resulted in multiple commercial opportunities.

- Tellus has identified opportunities with many of Australia's big blue-chip companies and Government.
- Tellus has active commercial discussions going with many organisations.
- Tellus has signed MOU's, Waste Supply Agreements and Collaboration Agreements with many companies that have given investors' confidence, most of the agreements are long term (5,8, 10 year agreements with one agreement being 30 years) to match the production profile of the Customer.
- Completed national roadshow with major top tier accounting and legal firms on Environmental Contingent Liability Reduction and Tellus' value add proposition.
- Tellus completes first phase of an ongoing multi-phase roadshow with Federal and State and Territory regulators.
- Tellus' Projects (including Chandler) Awarded Major Project Facilitation Service (MPFS) by the Australian Government. MPFS is granted to projects that have significance to Australia or regional Australia.

Securing project approval will significantly increase customer confidence into entering into additional contractual arrangements with Tellus that will further improve the commercial viability of the Chandler Project.

5.2.2 NT EPA 2

Issue raised

The draft EIS identifies that there is likely to be around 900 000 000 t of legacy waste stored nationally. Not all of this waste would meet the Acceptance Criteria to be removed to the Chandler Facility. Of the waste streams that are suitable for storage at the Chandler Facility, current disposal and recycling options may exist.

Development of the project has the potential to divert volumes of hazardous waste from existing appropriate recycling, treatment and disposal facilities, which may potentially undermine their viability and/or impede the development of future recycling/treatment technologies for hazardous waste.

In the Supplement discuss how the project will contribute to driving the development of recycling technology, including identifying the incentives unique to the project. Consider how the project might respond to perceived or actual disincentives to invest in the development of recycling technology. Demonstrate that the project would not affect the viability of existing higher order recycling, or treatment options. Furthermore, demonstrate how the project would be developed such that it would not impede on the use or development of alternative recycling or treatment technologies.

Proponent's response

Put simply the proposed Chandler Facility will not make a material dent in Australia's legacy stockpile or undermine the viability and/or impede the development of future recycling/treatment technologies for hazardous waste. In fact, it is the opposite, the Chandler Facility can be a material enabler due to economies of scale

A large amount of the c. 900,000,000 t of legacy waste stored nationally would not meet the Chandler's Waste Acceptance Criteria (WAC) which in addition to the nationally reported generation (5.6 Mtpa) is 2,250 times larger than Chandler's average modelled annual volume and 129 times the modelled life of project volume.

The most common legacy wastes are red mud, fly ash, PFOS wastes (including PFOS-contaminated soils), oil and gas industry high-salt wastes, contaminated soils containing asbestos and spent pot liner (SPL). All of these wastes are clearly within Tellus WAC. For most of the waste types that have a contaminated soil component (most of them), there are no large scale commercially viable projects that Tellus is aware of that do not rely on extensive tax payer funding.

For some of these wastes, and other 'NEPM wastes' within the Chandler WAC, current disposal and recycling options do exist, and for most waste types they do not. Tellus believes that the scale of the reported market, the actual extent of its target share of that, and the massive potential of the legacy market demonstrate that the presence of the Chandler Facility will not curtail recycling opportunities in the market. In fact, it is the opposite.

Recycling and recovery – supporting the circular economy

Tellus clearly and outwardly supports and promotes the circular economy including planning the development of a sustainability park at the proposed Chandler Facility. The ability of proposed Chandler Facility to safely store 'like-for-like' hazardous wastes to generate economies of scale, look at materials on a molecular level, identify and secure market outlets for recovered products and allow for the development of appropriate technologies supports future recovery and recycling opportunities on or off site.

Tellus' facilities will be designed to look for where these 'development of alternative recycling or treatment technologies' opportunities may exist. Tellus is not a recycle/ recovery technology provider, and therefore by encouraging and attracting these companies and their technologies to site where economies of scale play a massive advantage, we grow these opportunities.

Figure 5-7 and Figure 5-8 below identifies where Tellus believes it is positioned to support the waste hierarchy, where using environmentally sound management principals waste types that are of medium to high risk to people's health and the environment should be permanently isolated in a geological repository and where valuable materials are of low risk to people's health and the environment then they should be recovered or recycled and pushed back into the circular economy.

Figure 5-7 Waste hierarchy

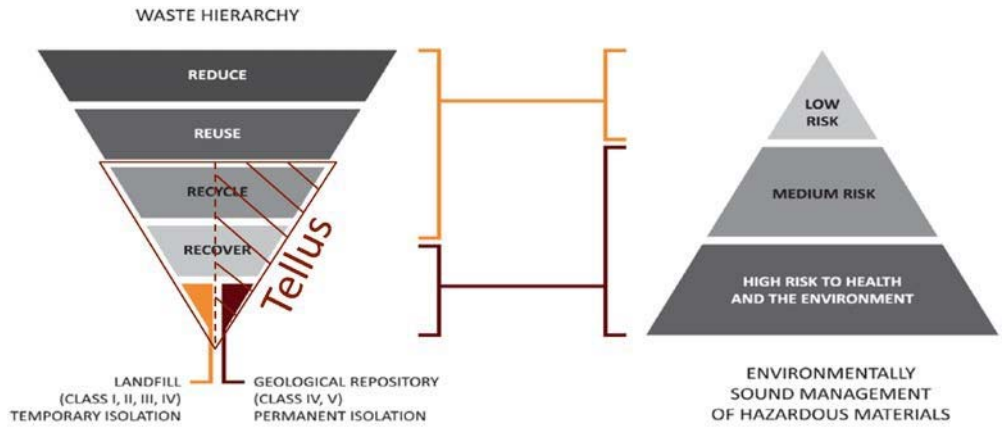
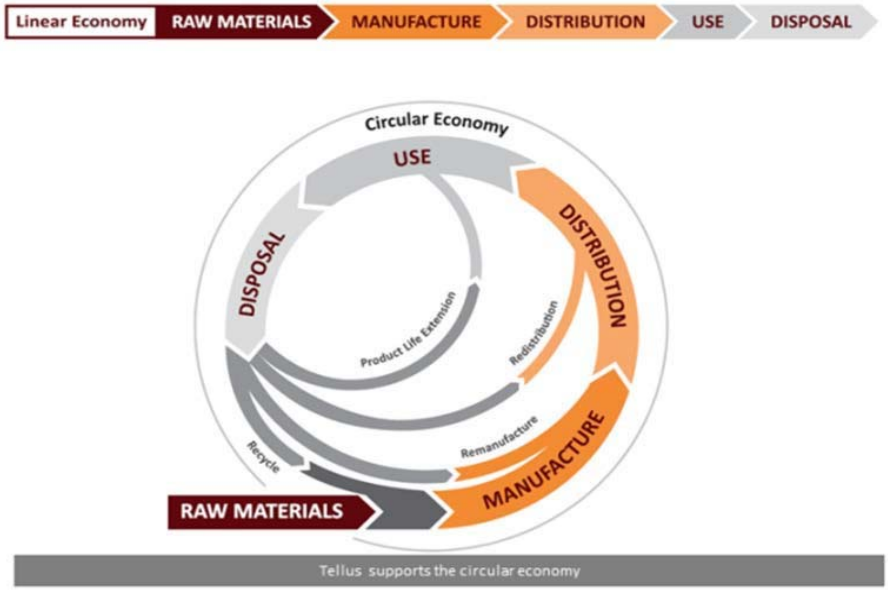


Figure 5-8 Tellus support to the circular economy



Environmentally Sound Management

There is sometimes confusion within the diverse group of stakeholders Tellus engages with between the difference between landfills and geological repositories and where they sit on the waste hierarchy and what functions they serve. They are very different pieces of infrastructure solving very different problems.

Landfill disposal typically services class I, II and III waste types like municipal solid waste (MSW), commercial and industrial (C&I) and construction and demolition (C&D) waste that is relatively low to medium risk to the environment and people's health. Landfills typically do not solve the problem permanently and are not passively safe (can leach when the man made liner breaks, assuming the landfill has a liner and most of the older smaller landfills in Australia do not). Therefore, they require ongoing human intervention and management long after they close. Therefore, encouraging recovery, recycling and reuse of materials that are relatively low to medium risk to the environment and people's health makes perfect sense from a waste hierarchy perspective.

Geological repositories on the other hand service the class IV and V waste type like hazardous waste that is medium to high risk to the environment and people's health. Therefore, there is a competing balance between getting hazardous materials that are high risk to the environment and people's health out of communities, the environment and temporary infrastructure into world's best practice multi barrier thick, dry, stable geological clay or salt bed repositories that can permanently isolate the problem.

Geological repositories solve hazardous waste problems permanently and are passively safe (the natural thick, flat, stable in terms of millions of years and dry geology (salt or clay) is the liner). Therefore, they do not require ongoing human intervention and management after they close.

However, as Tellus stores like with like and some of the low to medium risk waste types have material value and using sustainable infrastructure principals, these materials should be recovered or recycled. That is why Tellus is building a sustainability park at the Chandler facility to do just that.

In summary, for hazardous wastes (higher risk Class IV and V waste), to focus only on the waste hierarchy as an environmental assessment framework ignores the very real competing tension between hazard protection and resource efficiency that is not the case with non-hazardous wastes (low to medium risk Class I, II and III waste). This dilemma is represented in Figure 5-9.

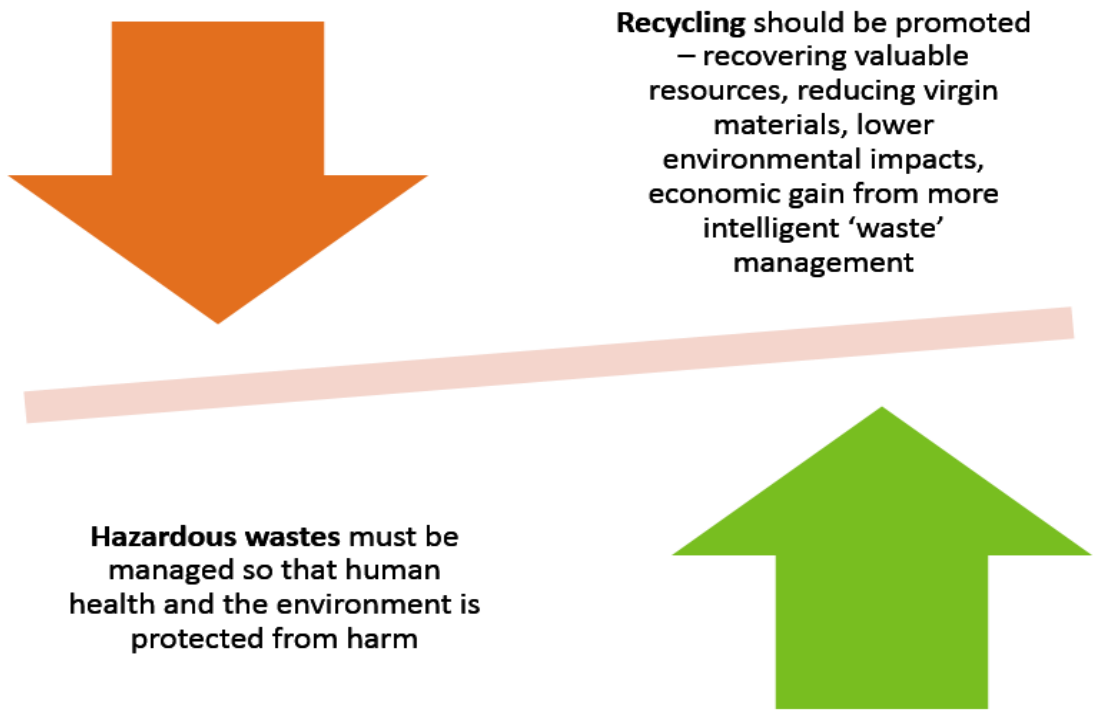


Figure 5-9 The hazardous waste 'recover' versus 'protect' dilemma

A strict interpretation of the waste hierarchy favours recycling and recovery over containment. However, the waste hierarchy is silent on the issue of protection from harm, which makes it less relevant as a decision tool for hazardous wastes. This limitation is recognised by the Department Environment Food and Rural Affairs (DEFRA) in the UK, through specific guidance on applying the

waste hierarchy to hazardous waste[3], which has been written to assist compliance with the Waste (England and Wales) Regulations 2011.

DEFRA's advice and the regulations themselves require waste management that "takes into account the resource value of the hazardous wastes and the need for health and safety to be maintained", which "may result in a lower option in the hierarchy being chosen but results in a better overall environmental outcome." Clause 12(3) of the Regulations also require "technical feasibility (such as lack of infrastructure availability) and economic viability" to be considered when applying the hierarchy.

In the Australian context, when working through the hierarchy to determine preferred management (post avoidance and reuse opportunities), significant quantities of wastes such as Persistent organic pollutant (POP) wastes, red mud and fly ash could not be recycled variously on health, safety, technical and economic viability grounds.

POP's are organic compounds that are resistant to environmental degradation through chemical, biological, and photolytic processes. Because of their persistence, POPs bioaccumulate with potential adverse impacts on human health and the environment.

However, SPL 'recycling' in Australia is questionable in an integrated assessment, since one of the primary hazards (fluoride) is not destroyed or altered, exposing an uncontrolled risk of harm downstream in the overseas supply chain of the 'product' however it does contain metals (Aluminum) that is valuable and should be recycled.

Summarising this issue, for hazardous wastes, the focus on environmentally sound management (ESM), or protection from the hazard posed by the waste, may be a more important environmental management priority than resource efficiency, particularly for high-hazard wastes. The waste hierarchy is most applicable to non-hazardous waste, where cost and efficiency are the main drivers (and not protection from hazard). However, Tellus remains focused on supporting the circular economy and recycling and recovery activities where safe and commercially viable operational practices allow.

5.2.3 NT EPA 3

Issue raised

The draft EIS does not identify any existing or proposed regulatory drivers for the establishment of a facility for hazardous waste, or the ongoing supply of hazardous waste to the facility. In the Supplement, please outline if Tellus Holdings Ltd will be reliant on the development of State/Commonwealth regulatory drivers or requirements on hazardous waste producers that would enable it to secure hazardous waste volumes nominated in the draft EIS.

[3] *DEFRA (2011), Guidance on applying the waste hierarchy to hazardous waste: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69457/pb13687-hazardous-waste-hierarchy-111202.pdf*

Proponent's response

Tellus has undertaken extensive internal and independent (consultant) analysis of existing and proposed legislation at a Federal, State and Territory level.

In addition, Tellus has undertaken a consultation process with the Federal, State and Territory Regulators advising them of the project development with consideration to regulatory implications.

The results of our detailed analysis and consultation have concluded that Tellus **will not** be reliant on the development of State/Commonwealth regulatory drivers or requirements on hazardous waste producers in order for the company to secure hazardous waste volumes nominated in the draft EIS.

However, Tellus believes that a more stringent regulatory trajectory is likely and is what is happening in Europe and North American trends, and that could significantly expand the available hazardous waste market. These are not expectations that manifest in Tellus' modelling, but they are considered as very possible upside in our business planning.

For example, we believe the near-future market is likely to see significant change due to both emerging wastes and the potential for 'leakage' of legacy waste volumes into the market. A range of wastes do not appear in national data collations because they arise outside of the waste tracking systems used to derive them. This is due to issues such as large-scale onsite or offsite storage (stockpiling), historical consideration outside of the hazardous waste framework, relatively recent convergence of the science relating to their risk or because a particular waste has only recently started to arise in significant quantities.

Some of these wastes, to an extent, represent a potentially accessible and additional market right now, such as PFOS-contaminated soil, the HCB stockpile, SPL, oil and gas industry mercury wastes and dieldrin impregnated timber wastes. Stronger incentives to identify, monitor and drawdown these volumes could be expected in future as more environmentally sound and acceptable waste management capacity comes online (such as Tellus' facilities), in the form of more stringent regulation and/or market incentives.

Other wastes, such as those deriving from any future Australian Government ratification of new Stockholm Convention POPs (POP-BDE wastes, HBCD wastes and decaBDE wastes), will take longer to emerge into the market. However, should such ratification occur, current methods of management will no longer be permitted, creating a new stream of hazardous wastes requiring environmentally sound management.

Then there is the recent increasing federal government interest in bringing storage and stockpiled waste issues out in the open, forcing a conversation about long-term drawdown plans, such as has been the case in the first instance with SPL waste.

It is therefore not difficult to foresee a different regulatory future with tighter management requirements on these large-scale legacy wastes, including incremental stocks drawdown, particularly where industries may be in decline or sites are closing and require post-closure 'make good' provisions and site rehabilitation.

5.2.4 NT EPA 4

Issue raised

The draft EIS states that salt processing and sales would be deferred for the first five years of salt mining. It is not clear in the draft EIS how the mined salt (~2 240 000t) will be stored and managed. Please outline how the salt will be stored. In particular, please outline the size of the stockpile area; the design of the stockpile area (including bunding, drainage areas, coverage, etc.).

Proponent's response

During the first few years Tellus plans to grade the salt, develop different salt products and enter into commercial arrangements across the low, medium and high value salt market. The larger salt buyers that Tellus has either commenced discussions or entered into commercial arrangements already often enter a longer-term contract and at a higher price if they can see a stockpile as it gives them certainty around supply.

Run of mine salt would be hoisted to surface by shaft from the underground mine where it would be stockpiled. Salt would be temporarily stockpiled during construction of the mine decline and then dry processed to become product salt (as discussed in section 3.2.4 of the draft EIS).

Table 3-8 of the draft EIS provides indicative dimensions of land take required for infrastructure, the run of mine salt stockpile would require 25 ha of land, over a 500m by 500m area (refer to Figure 3-18 of the draft EIS). This is based on the maximum case scenario of stockpiling 3,500,00 tonnes of mine salt at a 20m stockpile height.

Section 3.4.3 describes that the size of the salt stockpile may fluctuate during operation according to supply and demand but would have a volume of approximately 3.5 million cubic metres and a height of about 20 metres (Table 3-11 of the draft EIS).

During construction (Section 3.5.6 of the draft EIS) the salt stockpile base would be established. Salt stockpiles would be established on an impervious base to block saline leachate from draining into groundwater. Clay material would be sourced from excavation of the mine access decline.

During rainfall, the surface of the salt stockpiles would naturally form a crust that would protect the surrounding environment from saline runoff. As such, sheltering structures or sheeting are not proposed, however, alternative bases such as a black poly liner, or a self-contained lined structure providing structural containment and bunding would be considered during feasibility studies and influenced by final engineering design and material selection. Although saline runoff is not expected, measures such as dish drains or alternate bunding methods would be constructed around the perimeter of the run of mine stock piles to control any runoff.

Please note - the Air Quality Risk Assessment presents an emissions estimation of emissions from salt mining activities. This assumes a ROM salt stockpile of 33% of the annual output of 625,479 tonnes = 206,408 tonnes (~10% of that estimated above) covering an area of 1.72 ha.

5.2.5 NT EPA 5

Issue raised

Figure 3-4 of the draft EIS does not show the location of the entrance of the decline or the location of the two ventilation shafts. This information should be provided in an updated map in the Supplement.

Proponent's response

The updated map showing location of mine decline entrance and ventilation shafts is provided in Figure 5-10

5.2.6 NT EPA 6

Issue raised

In the Supplement provide more information on the salt mining, sorting and storing, such as, but not limited to, timeframes for each phase, area required, site construction (e.g. non-permeable pad), water requirements, run off containment, treatment and bunding, etc.

The Waste Water Evaporation pond is located next to the Bore water dam. In the Supplement, clarify whether there is a risk of cross contamination. Will the pond be lined? Explain the need for a bore water dam. Is a tank a better option?

Proponent's response

As indicated in the draft EIS (Section 3.6.4) salt mining would be regulated by the Mining Management Act and would involve:

- Deep mining of rock salt using a 'room and pillar' system of mining
- Rate of 750,000 tonnes per annum.
- Transport of salt via shaft hoisting to the surface.
- Stockpiling of rock salt for processing and packaging.
- Transport of rock salt to domestic and overseas market:
    - Domestic market (via road and rail) - road transport via truck on federal and state highways. Rail transport via a proposed new railway siding located at the Apirnta Facility.
    - Overseas market (via rail) - rail transport also via the proposed new railway siding located at the Apirnta Facility, predominantly south to a port facility in South Australia (Tellus is currently completing a trade off study between Adelaide and Port Pirie). From there, rock salt would be shipped to overseas markets predominantly in Asia.

Mined salt would be temporarily stockpiled (refer to Figure 5-10). Salt processing would be undertaken, as follows:

- The rock salt extracted by continuous miner would be hauled to a feeder breaker located underground (the position of the feeder breaker would be confirmed subject to geotechnical stability confirmation during detailed design of the Proposal).
- Salt screened out at less than two millimetres would be stockpiled underground and used as room backfill material.
- Salt can be sold as is or, dry optical sorting can occur onsite. There is no requirement for evaporative ponds to manage the salt once it has been mined.
- Product salt would be either filled into bulk bags or bulk filled into lined shipping containers before being transported by road train to the proposed Apirnta Facility via the Chandler Haul Road. The containers would be unloaded and temporarily held at the Apirnta Facility before being loaded onto trains for transport to Adelaide via the Central Australian Railway. Product salt stored in bulk bags prior to being loaded into a shipping container.

The offtake of salt is not restricted to any particular timeframe and will be dependent on the proponent's timelines of securing offtake agreements. Offtake agreements are dependant on the proponent acquiring project approval.

The area require for salt stockpiling is approximately 25 ha (refer to Figure 5-10 [Stockpile number 5 (ROM), = 13.3ha and Coarse salt stockpile- Number 18 = 1.5ha plus buffer area and drainage requirements]). The salt run of mine stockpile area would be prepared prior to any salt being brought to the surface for temporary storage. Preparation would involve using clay materials gained from the construction of the decline and shafts to provide a lining / barrier to salts leaching into the alluvial sub-surface.

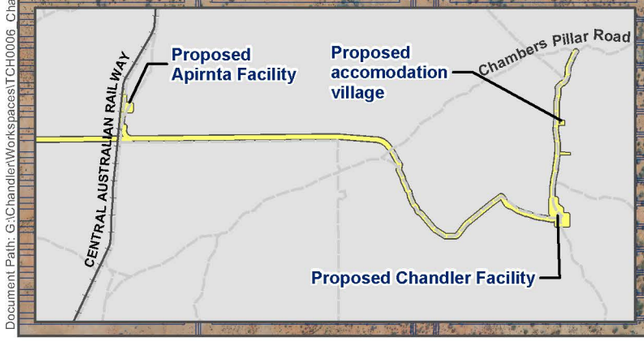
Surrounding the run of mine salt stockpile, clay lined and vegetated dish drains would be constructed to capture any potential run-off. Given evaporation rates at the site exceed 3000 mm per annum, any water that is collected in the drainage swales would be left to evaporate.

The current location of the proposed waste water evaporative pond is subject to further assessment in the BFS and detailed design. The proponent would locate the pond in the final design away from local drainage lines (e.g. 25 m). The size of the pond will be determined once detailed design has been completed. Furthermore, the sizing and requirements for lining would be undertaken in line with industry best practice guidelines.

The need for a bore water dam is not something the proponent is committed to. Optimisation of design through the BFS and detailed design will determine the best methods for water containment. The advantages and disadvantages of these management principles would be qualified and quantified before a preferred option is selected. The preferred option will be carried into the WMP and Mine Management Plan.

Label ID	Infrastructure
1	Topsoil stockpile
2	Shale stockpile
3	Limestone stockpile
4	Sandstone stockpile
5	ROM overflow stockpile
6	Residue evaporation pond
7	Explosives magazine
8	Waste water evaporation pond
9	Bore water dam
10	Water treatment
11	Container wash compound
12	Vehicle washdown
13	Technology park
14	Weigh bridge
15	Container laydown area
16	Transfer station & salt production plant
17	Hydraulic backfill plant
18	Coarse salt stockpile
19	Road haul & salt harvest service facilities
20	Mining equipment dam services facilities
21	Plant ablutions
22	Main store
23	Main store yard
24	LV workshops, maintenance & stores area
25	LV fueling
26	LV fuel storage
27	Diesel generator
28	Vehicle workshops, maintenance & stores area
29	Potable water system
30	Power station
31	Switchyard
32	3 ha photovolcanic field
33	Solar power storage
34	Administration building
35	First aid & emergency response building
36	Mining office
37	Office car park
38	Communications building
39	Stores and workshop ablutions
40	Security, visitor's & training building
41	Visitor's car park
42	Security gate house
43	Shaft 2 Ventilation (upcast)
44	Shaft 1 Production - workers & salt (downcast)
45	Portal (decline entrance & emergency egress)
46	Halfway Dam - to be removed & relocated

MARYS CREEK
OAK GULLY
RIDEY GULLY
SNAKE GULLY
DINGO GULLY
ROO GULLY
RALFWAY CREEK



Document Path: G:\Chandler\Workspaces\TCH0006_ChandlerFacilityLayout.mxd

Legend

- Watercourse
- Above ground infrastructure
- Underground infrastructure
- Portal and decline
- Proposed facility footprint

N

100 50 0 100 Meters

Coordinate System:
GDA 1994 MGA Zone 53

TCH0006_ChandlerFacilityLayout_A3l

Figure 5-10
Chandler Facility Layout

TELLUS

Tellus Holdings Ltd makes every effort to ensure this map is free of errors but does not warrant the map or its features are either spatially or temporally accurate or fit for a particular use.
Tellus Holdings Ltd provides this map without any warranty of any kind whatsoever, either expressor implied.

Data source: Geoscience Australia, Topographic base data, 2006;

5.2.7 NT EPA 7

Issue raised

The draft EIS notes that the underground storage facilities shall maintain a minimum offset of 45 metres from any deep borehole. It is not clear how Tellus has concluded that an offset of 45 metres is sufficient. In the Supplement please discuss why Tellus is proposing to offset deep boreholes by a minimum of 45 metres.

Proponent's response

Rock salt mines are designed with safety pillars around drill holes to mitigate the potential risk of inflow of water from exploration drillings, by providing for protection of the mine against potential inflow. Furthermore, exploration drill holes have to be closed or sealed in a way that no water can leak into the drill hole. The radius of the drill hole safety pillar depends on the knowledge about the kind of sealing and the age of the drill hole.

Two exploration drill holes were previously drilled by the proponent in the area of the proposed mine development. At completion, the drill holes were fully cemented to seal off any potential water bearing strata that was intersected by the drill hole. Offsets radii can vary considerable from a few meters to 100m, based on site conditions (such as amount and salinity of intersected water bearing strata) and knowledge of the drill hole completion method. In this case, a 45 m offset was proposed as a conservative radius that would provide adequate salt thickness between the drill hole and mined areas and mitigate potential risk of inflow to the mine.

For benchmarking purposes, a number of the German salt mines that Tellus management have visited have a 20 m distance from the drill hole to the mine workings and they have been operating safely since the 1970's with large aquifers sitting above the salt.

5.2.8 NT EPA 8

Issue raised

The draft EIS notes that the proposal may represent a significant beneficial opportunity to improve existing road surface conditions for the entire length of Maryvale Road. It is not clear whether the project will be reliant on upgrades of the Maryvale Road for construction and operation traffic.

In the Supplement please clarify the upgrades to the Maryvale Road that will be required to service each stage of the Chandler Facility, and what the improvements Tellus Holdings Ltd is intending to do to improve the road surface conditions.

Proponent's response

During construction, the Maryvale Road would be used as primary access for construction materials entering the proposed site and for personnel. Construction and operation traffic management plans (TMP) will be developed should the Proposal be approved. The TMP would be continually reviewed and revised as required during feasibility and final design of the Project and into construction.

During construction, heavy vehicles bringing construction equipment to the site would have to utilise the existing Maryvale Road. The proponent is not intending to upgrade the Maryvale Road to service periodic construction vehicle deliveries to the Chandler site. Instead, the draft EIS proposes a private access road known as the Henbury Access Road. Environmental impact assessment against key environmental factors including cultural heritage, surface water, groundwater and biodiversity have been undertaken along the proposed route of the Henbury Access Road.

Prior to or during operations, if the Maryvale Road becomes the preferred access route for site worker access, salt export and/or the delivery of waste products, then significant upgrades to the Maryvale Road would be required to ensure (a) the road meets the necessary specifications required by the NT Department of Infrastructure Planning and Logistics (DIPL) for heavy vehicles and (b), is in a condition that ensure the safety for all road users. A road study would be completed as part of the BFS with engineering completed during final design.

5.2.9 NT EPA 9

Issue raised

The proponent proposes to construct a 30 km haul road from the Stuart Highway to the Apirnta facility and then to the Chandler facility crossing the railway line and major watercourses, such as the Finke River. Additional internal roads have the potential to impede surface flows.

Culverts or weirs may not be feasible for the Finke River crossing (and other major creeks) given that high intensity flash flooding is an identified hazard in the area. Access to the site could be restricted for several weeks or months after a major flood event. Also, culverts and weirs affect river flow and downstream habitats. The effect of these constructions must be considered.

Permanent bridges may provide a safer and improved environmental solution and reduced erosion and sediment control costs.

Justify selected methods for water crossings and areas of surface water flows. Provide a detailed construction plan and discussion on potential impacts from the construction and ongoing use of the road.

Proponent's response

The proponent is not intending to construct bridges over the Finke or Hugh Rivers. The BFS will confirm this current view. Hard engineering structures, such as significant bridges that would have to span a great distance across these two rivers, may result in significant alterations to in-stream and in-channel hydrology.

This would be particularly relevant under high flow conditions which may result in scouring around bridge pillars and on adjacent embankments, adverse downstream impacts on water quality and in-stream habitats for macro invertebrates. In addition, high flows in these two rivers carry very large amounts of organic matter in the form of tree trunks and large boulders. The proponent does not consider it appropriate to construct in-stream engineered structures that are highly likely to result in

unnecessary downstream impacts and are likely to suffer significant structural damage. This would also result in unnecessary and significant operational costs.

The proponent is of the opinion that existing gravel beds or, upgraded gravel beds, would be sufficient structures to cater for heavy vehicle crossings at these locations. This has been tested when transporting heavy drill rigs and other plant to site during the exploration phase and Stage I groundwater drilling program. The two rivers are ephemeral in nature and rarely flow. If the rivers are experiencing high flow conditions, it would be prudent to avoid these areas until such time that it is deemed safe to cross. Mining and waste emplacement operations at the proposed site can continue under these circumstances.

5.2.10 NT EPA 10

Issue raised

The project will facilitate the transport of a significant volume of hazardous waste on national road and rail networks. While it is accepted that the Project will rely on a third party to transport the waste and that the risks of transportation are not the responsibility of the proponent, the waste will be under contract for the project and the project is not viable without the transport of those wastes, therefore the NT EPA considers that it must assess the bulk transport of waste in its assessment.

In the Supplement, describe the expected number and frequency of hazardous waste transport vehicles (truck and train) for the first five years of waste storage operation of the project with respect to:

- the originating State or Territory
- the most likely routes of transport
- the frequency and location of arrival at the project.

Proponent's response

The originating State or Territory

The originating State or Territory that Tellus is using for planning purposes is illustrated in Figure 5-11.

The most likely routes of transport

The most likely routes of transport through the States and Territories that Tellus is using for planning purposes is illustrated in Figure 5-12.

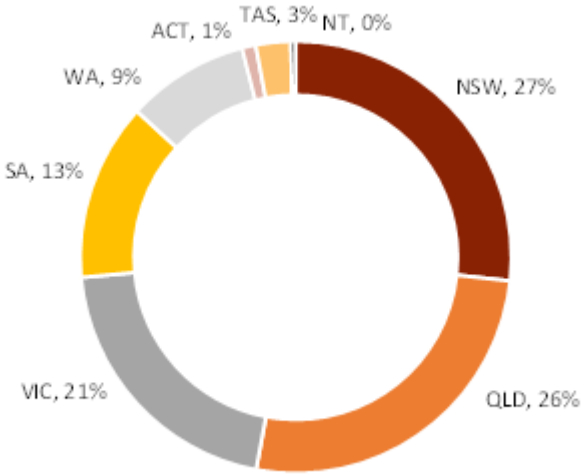


Figure 5-11 Originating State or Territory

Alice Springs

Stuart Highway

Maryvale Road

Owen Springs Reserve Tounst Drive

1029 m

Finke Gorge National Park

912 m

701 m

Hugh Creek

Rainbow Valley Conservation Reserve

CHANDLER RANGE

Henbury Meteorites Conservation Reserve

Henbury Access Road

Proposed Apirnta Facility

MARYVALE

Chambers Pillar Road

Access to Chambers Pillar road

Proposed Chandler Facility

Chandler Haul Road

Chambers Pillar Historical Reserve

293 m

Ghan

Central Australian Railway

Finke River

480 m

Proposed Chandler Facility

Legend

Major rail routes

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25 12.5 0 25 Km

Coordinate System:
GDA 1994 MGA Zone 53

TCH0008_MajorTransportRoutes

Legend

- Railways
- Maryvale Road (construction)
- Stuart Highway (operation)
- Existing road
- Reserves NT
- Henbury Access Road
- Chandler Haul Road
- Access to Chambers Pillar road
- Chambers Pillar Road

Figure 5-12

Major transport routes to/from the proposed Chandler Facility

TELLUS

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The frequency and location of arrival at the project

The consideration of truck movements from the Apirnta Facility to the Chandler Facility along the haul road, and the potential for loss of containment of waste materials is a component of the Air Quality Risk Assessment, which considers the risks associated with loss of containment.

Appendix X, Part B (Chandler Facility) of the draft EIS considers the movement of vehicles on unpaved road surfaces at the Chandler Facility, and Appendix X, Part D (Transport Infrastructure) of the draft EIS considers the movement of materials between Apirnta Facility and Chandler Facility and the accidental loss of containment along that route, and was based on the following assumptions:

- Five (5) trucks available for haulage to/from Apirnta Facility and Chandler Facility.
- Each truck would be capable of transporting three (3) TEU per trip.
- The trucks would operate for 12 hours per day.
- Average daily traffic movements would be seven (7) trips per day per truck, moving 105 TEU per day.

A number of scenarios for loss of containment were considered in Appendix X, Part D (Table 13) of the draft EIS. This table has been reproduced below as Table 5-15.

Table 5-15 Definitions of accident likelihood

Likelihood	Definition	Indicative frequency band (per year)	Loss of Containment Volumes (as TEU Units)
Likely	Likely to occur a few times in the lifetime of the Proposal	$10 > F > 10^{-1}$	Loss of containment of up to 1 TEU
Occasional	Could occur in Proposal lifetime; root causes likely to have occurred at the Proposal site	$10^{-1} > F > 10^{-3}$	Loss of containment of 3 TEUs, representing a 'truck-load'
Unlikely	Unlikely; incidents known to have occurred in the industry but would require at least two failures	$10^{-3} > F > 10^{-5}$	Loss of containment of 6 TEUs, representing an incident involving two 'truck-loads'

5.2.11 NT EPA 11

Issue raised

It is not clear in the draft EIS how water will be supplied to the Apirnta Facility.

Provide further detail in the Supplement as to whether water will be sourced from the bores and treated at the Chandler Facility before being transported to the Apirnta Facility. Will the Apirnta Facility have a separate supply of water?

Proponent's response

The rate of water consumption anticipated at the proposed Apirnta Facility would be relatively low, and limited to dust suppression during the construction phase, and vehicle wash-down water, spill wash-down and domestic consumption during the operational phase.

Water supplies are detailed on Table 8-3 of Chapter 8 of the draft EIS. Raw water supplies would be provided through rainwater harvesting, 150m BGL bores that are fed to a water storage retention dam, as illustrated in Figure 3-1 of the draft EIS and a series of production bores located along the Chandler Haul Road for dust suppression requirements.

The potable water supply would be provided by two (2) 250mm diameter production bores, and treated to Australian Drinking Water Guidelines.

5.2.12 NT EPA 12

Issue raised

The draft EIS states that construction materials would be sourced from excavations associated with the mine access decline and vertical shafts or from borrow pits located along Maryvale Road. Please provide further details with respect to identification of volumes and location of where the material would be extracted from. Furthermore, outline the expected amount of traffic associated with extraction and identify the proposed transport route for the material and how impacts to existing road users would be managed.

Proponent's response

Section 3.5.6 'Internal roads' states that construction materials would be sourced from excavations associated with the mine access decline and vertical shafts or from existing or proposed borrow pits located along Maryvale Road. This refers to material required for internal road development. The location of the borrow pits would be subject to the final alignment of the roads and geotechnical assessment and, thereafter, a site selection protocol to avoid environmental impacts.

Section 3.5.6 'construction materials' describes that the proponent would aim to source fill material for construction of the proposed Chandler Haul Road and Henbury Access Road from a series of borrow pits along the alignments of Chandler Haul Road and Henbury Access Road.

The location of the borrow pits would be subject to the final alignment of the roads and geotechnical assessment and, thereafter, a site selection protocol to avoid environmental impacts. The construction methodology would be agreed with the proponent's contractors during detailed design but would be conventional and in line with industry best practice.

Vehicle movements would not be significant given that the proponent is aiming to source the majority of fill material from on-site. Additionally, TMP will be developed should the Proposal be approved. The TMP would be continually reviewed and revised as required during feasibility and final design of the Project and into construction.

5.2.13 NT EPA 13

Issue raised

A range of hazards were identified by the NT EPA through a preliminary assessment of the proposal as 'risks' including changes to surface water hydrology.

Altered hydrology surrounding the mine infrastructure area. This risk is categorised as 'beneficial.'

In the Supplement, clarify how "Altered hydrology" may be beneficial.

Proponent's response

The proponent has robust hydrology studies since 2013 that have included quantified assessment of risk at the following locations:

- The MIA
- Chandler Haul Road
- Henbury Access Road
- Apirnta Creek
- Finke River – upstream and downstream of the MIA
- Hugh River upstream and downstream where it crosses the Chambers Pillar Road.

Assessment of baseline hydrological studies within the MIA have identified a series of small gullies and creeks that have varying catchment sizes. The draft EIS makes reference to the fact that prior land use practices and existing land use practices upstream and downstream of Halfway Dam have altered the original hydrological conditions of this environment.

The creation of Halfway Dam in its current location as well as the creation of internal access roads have redirected natural drainage courses. This has led to significant gully erosion and dieback of Red Bloodwoods within what has been described in the draft EIS as the 'alluvial wash out zone' located immediately downstream of Halfway Dam.

The proponent considers that an opportunity exists to restore natural drainage conditions and, is committed to investigating this potential beneficial opportunity during the BFS and detailed design.

5.2.14 NT EPA 14

Issue raised

Table 6-10 Risk assessment

Hazard identified by the Proponent in the EIS:

Flash flooding into mine infrastructure area Mitigation - Storm water drains / flood relief

Appendix R Surface Water Baseline conditions Executive Summary

Water quality data is limited but suggests a system characterised by low frequency/large magnitude floods...At this point, no numerical flood modelling has been conducted. Instead, a conceptual hydrological model has been prepared.

Flood modelling must be conducted prior to designs of "Storm water drains/flood relief" and should include the haul road and Apirnta site.

In the supplement, outline how Tellus Holdings intends to acquire sufficient understanding of the hydrology of the site to inform the detailed planning and design of surface infrastructure.

Proponent's response

The proponent acknowledges the request for additional flood modelling in addition to the modelling already completed in the draft EIS. The proponent also acknowledges that future modelling must be completed prior to the design of all onsite storm water drains / flood relief structures / haul and access roads.

The proponent is also committed to gathering additional surface water baseline data, as indicated in Table 4-1, to gain a more detailed understanding of site hydrology so more informative information can be passed on during detailed design of the above referenced structures. This includes the installation of automatic samplers at key locations along the Hugh River, Mary's Creek, Halfway Creek and the Finke River to improve knowledge of bed loads and to capture first flush water quality.

In June, the proponent commenced work on completing a suite of river cross sections and environmental traverses at key locations to increase its knowledge of baseline hydrological conditions (refer to DPIR 26 for more information).

5.2.15 NT EPA 15

Issue raised

The crossing of the Finke River (between Apirnta and the Stuart Highway) could require a bridge, if the intention is to keep that section of road open at all times.

Please provide detail on the type of crossing planned for construction across the major rivers (Finke) and the possible effect on the river and other watercourses downstream from the crossing during and post construction. The construction proposed must be adequate not to restrict water flow during flood events.

Provide more detail on the anticipated vehicle usage of the roadway (numbers and type of vehicle – peak usage times etc.).

Proponent's response

As indicated in the response to NT EPA 9, the proponent does not intend to construct bridges to cross the Finke or Hugh Rivers. The results of existing field work and future modelling will determine the requirement for such structures.

Section 18.4 of the EIS provided an assessment of potential traffic movement and impacts during construction and operation of the Proposal. In summary:

Maryvale Road

Site access in the initial months of construction would be via the existing Maryvale Road. Traffic volumes would be periodic due to the nature of the construction works. During peak construction periods, traffic volumes could be approximately five to 10 heavy vehicle movements per day (or one every hour on average) and 10 to 20 light vehicle movements per day (or two every hour on average).

Given the Maryvale Road already has regular *changing road surface conditions* (Territory Asset Management Services 2015), the predicted number of heavy and light vehicle numbers is not anticipated to lead to a significant deterioration of existing road surface conditions.

If approved, the Proposal may represent a significant beneficial opportunity to improve existing road surface conditions for the entire length of Maryvale Road. This could lead to significant beneficial opportunities to improve road safety for vehicle users in Titjikala and, for tourists travelling to and from Chambers Pillar Nature Reserve along Maryvale Road.

Chambers Pillar Road

Chambers Pillar Road would only be accessed for about 25 kilometres from Maryvale. The vehicle numbers during construction would be the same as Maryvale Road.

Works to a section of Chambers Pillar Road would be undertaken during construction to create a crossing where the proposed Chandler Haul Road meets Chambers Pillar Road. At the time of submitting the draft EIS, AADT data was not available for this section of road. However, after conducting four years of field work, average traffic numbers along Chambers Pillar are generally low (less than 100) and tend to peak in in the dry months (May to September and when the Finke Desert Race occurs). Impacts to Chambers Pillar Road are considered negligible.

Chandler Haul Road

As the initial site establishment works are progressed, construction access to the proposed Apirnta Facility would be developed along an existing access track (the alignment of the proposed Chandler Haul Road).

Traffic volumes would be periodic due to the nature of the construction works. During peak periods, traffic volumes could be between five to 10 heavy vehicle movements per day (on average) and five

to 10 light vehicle movements per day (on average) during construction of the proposed Chandler Haul Road.

Henbury Access Road

As construction progresses, permanent access to the proposed Apirnta Facility would be developed along an existing access track that connects to the Stuart Highway (the alignment of the proposed Henbury Access Road). It is anticipated that construction of the Henbury Access Road would occur across two fronts, with one crew moving east from the Stuart Highway and a second crew moving west from the Apirnta Facility.

Traffic volumes would be periodic due to the nature of the construction works. During peak periods, traffic volumes could be between five to 10 heavy vehicle movements per day (on average) and 10 to 20 light vehicle movements per day (on average) during construction of the proposed Henbury Access Road.

Stuart Highway

The Stuart Highway would not be utilised for access during construction.

Rail traffic and transportation

No equipment or materials would be delivered to site via rail during construction of the Proposal. There would also be no need to rail closures during construction of the Proposal. Therefore, there would be no impact on the Central Australian Railway during construction of the Proposal.

Assessment of risk during operation

This section discusses the increased road and rail traffic and the use of existing road and rail transportation networks during operation of the Proposal.

Road traffic and transportation

This section discusses road traffic on the proposed Chandler Haul Road and Henbury Access Road during operation of the Proposal. There would be minimal traffic and transportation impacts on the existing Maryvale Road, Chambers Pillar Road and the Stuart Highway during operation of the Proposal.

Maryvale Road

Access via Maryvale Road would slowly be phased out during operation of the Proposal as the bulk of movements for waste deliveries would occur via rail and along the private Chandler Haul Road. There would be minimal increase in traffic volumes along Maryvale Road during operation of the Proposal.

Chambers Pillar Road

The main risks arising on Chambers Pillar Road would be vehicle collision at the intersection of the private Chandler Haul Road. Without adequate road safety measures in place, and an effective Operation Traffic Management Plan, the impact to humans is considered a high risk.

Chandler Haul Road

Once construction has been completed and commissioning and operational ramp up commences, the Chandler Haul Road would be used for the transfer of waste materials via truck from the Apirnta Facility to the Chandler Facility, and the backhaul of salt product from the Chandler Facility to the rail siding at the Apirnta Facility. Traffic volumes would likely be between 15 to 25 heavy vehicle movements and five to 10 light vehicle movements per day (on average) along the Chandler Haul Road.

Henbury Access Road

Once construction has been completed and commissioning and operational ramp up commences, long-term site access would move from Maryvale Road (used during construction) to the proposed Henbury Access Road from a new intersection with the Stuart Highway. The vast majority of waste deliveries and salt exports would be via rail therefore, road traffic volumes would likely be low along the proposed Henbury Access Road. Traffic volumes would likely be between one to two heavy vehicle movements and two to five light vehicle movements per day (on average) along the proposed Henbury Access Road.

Stuart Highway

The Proposal assumes 90 % of all waste would be delivered to the proposed Apirnta Facility. This leaves 10 % to be delivered by road (the Stuart Highway). If this were to occur, this equates to approximately one truck per week.

Workers from Alice Springs would access the Stuart Highway to reach the proposed Henbury Access Road. The Stuart Highway is considered to have ample carrying capacity to adsorb drive-in-drive-out worker shifts per week.

5.2.16 NT EPA 16

Issue raised

The outline of the Apirnta Facility in Figure 3-4 of the draft EIS does not show any power generators. It is noted that section 18.3.4 refers to the use of solar energy to supplement power, however it is not clear what will be the primary source of power for the Apirnta Facility. Please outline if the main source of power will be provided through a diesel powered generator or if the site will be connected to the proposed Chandler generator/power plant.

Proponent's response

The Air Quality Risk Assessment presented in Appendix X, Part B (Chandler Facility) of the draft EIS includes a range of potential sources of operational emissions to air. Included within that assessment is the following assumption of local power generation:

- 8.75 MW diesel-generated power at the Chandler Facility
- 0.9 MW diesel-generated powered at the accommodation village (near the Chandler Facility).
- 0.9 MW diesel-generated power at the Apirnta Facility.

As described in Appendix X, Part B, Section 4.1 of the draft EIS: "*Power generation at both the accommodation camp and Apirnta Facility have been included in the emissions estimation and dispersion modelling assessment covering the Chandler Facility. Emissions of combustion gases have been included in the same stage of the assessment to appropriately consider cumulative emissions impacts.*"

Further to the above considerations associated with the Air Quality Risk assessment, the Greenhouse Gas Assessment assumes that a 2 MW solar farm will be operated to reduce demand on the diesel generators. As part of the BFS Tellus will be evaluating increasing the potential solar farm capacity and reducing the amount of diesel-generated power.

Currently, it is not proposed to transmit power between the Apirnta Facility and the Chandler Facility.

5.2.17 NT EPA 17

Issue raised

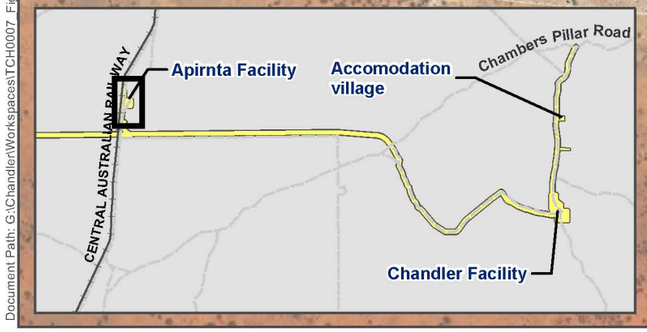
The draft EIS identifies fuel storage areas at the Chandler Facility and notes that approximately 5-10 ML of diesel will be required for generators. The diagrams of the Apirnta Facility do not show where fuel (above ground and underground) is to be stored. This is despite section 18.1.8 noting that fuel will be stored in a designated bunded area at the Apirnta Facility. In the Supplement please provide an updated figure showing the location of the fuel storage tank/s.

Proponent's response

Fuel, oil or hazardous materials would be stored on-site for general construction and operational activities. These materials would be stored in designated bunded area at the proposed Chandler Facility and at the proposed Apirnta Facility. These materials would be stored and handled on-site in accordance with AS 1940-2004 Storage and Handling of Flammable and Combustible Liquids. Figure 5-13 provides the proposed location of the fuel storage tank at the Apirnta Facility.

Label ID	Infrastructure
1	Existing railway line
2	Proposed railroad switch
3	Apirnta access road
4	Rail siding
5	Containment/evaporation area
6	Transfer facility (see inset)
7	Storage facility (impervious surface)
8	Stormwater holding ponds with bird proof netting
9	Animal proof security fence

CENTRAL AUSTRALIAN RAILWAY



Label ID	Transfer Facility Infrastructure		
10	Vehicle washdown	19	Potable water treatment plant
11	Vehicle workshop	20	Waste water treatment plant
12	Waste quarantine zone	21	Car park
13	Vehicle weighbridge	22	Security
14	Temporary storage (waste)	23	Site office, staff rooms & ablutions
15	Waste inspection shed & laboratory	24	Bund & sound proof fence
16	Temporary storage (waste)	25	Accomodation
17	Fuel storage area (bunded)*	26	Mess
18	Power	27	Stormwater holding pond

Transfer facility inset

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus

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Coordinate System:
GDA 1994 MGA Zone 53

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Legend

- Railway
- Proposed rail siding
- Proposed development footprint

* 300mm nominal high concrete bunded fuel storage area

Figure 5-13
Proposed Apirnta Facility layout

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5.2.18 NT EPA 18

Issue raised

Recommendations have been made by Atkins (2016) to reduce the width of the current design of the waste emplacement rooms (currently 15 metres wide). The proponent is committed to undertaking further geotechnical drilling and analysis of the Chandler Halite Formation. In the Supplement please provide further detail with respect to when further geotechnical drilling/analysis of the formation will be undertaken and how the information will be collected. If Tellus Holdings Ltd intends to still construct room widths of 15m, please discuss whether other engineering solutions will be used to ensure the rooms are structurally stable.

Proponent's response

The proponent will complete a BFS and, part of the initial study phase will include collection of additional geotechnical information, specifically:

- Deep diamond drilling and core collection.
- Geotechnical logging and analysis of the core.
- Downhole wireline geophysical survey.
- Salt creep testing of the core.

This information is required to provide the mine design parameters, including mine room and mine pillar widths. Stability of the rooms is related to the pillar width between the rooms and is a function of the strength of the pillars.

Salt creep testing and geotechnical analysis of the core will provide the parameters for calculation of the room pillar widths required to provide stability for rooms of 15 m. Alternatively if a different room width is required, the corresponding room pillar width would be calculated and considered during mine design.

5.2.19 NT EPA 19

Issue raised

The Apirnta storage facility is significant in area and capacity compared to other Australian facilities storing hazardous waste. Depending on the characteristics of wastes and the method and timeframes for storage, it could be expected that as the volume of waste increases, so does the magnitude of the potential impacts relating to an explosion or fire event, loss of containment, or loss of identity or provenance.

Proponent's response

As identified by the NT EPA, the draft EIS recognises that there is a sequentially higher potential consequence (and resultant risk) associated with the loss of containment from larger volumes of stored wastes, and this has been addressed.

The risks of loss of containment from various materials stored at the Apirnta Facility is presented in Appendix X, Parts A and C of the draft EIS. Table 21 presented in Section 4.5.2 of Part C in Appendix X in the draft EIS presents the adopted hierarchy of loss of containment scenarios considered at the Apirnta Facility in the draft EIS. Table 21 is reproduced below as Table 5-16.

Table 5-16 Definition of accident likelihood

Likelihood	Definition	Indicative frequency band (per year)	Loss of containment volumes (as TEU and FIBC/ IBC Units)	
			Dry wastes	Sludge wastes
Frequent	Event would occur regularly on the Proposal site	F > 10	<1 FIBC Incidental spillage	<1 IBC Incidental spillage
Likely	Likely to occur a few times in the lifetime of the Proposal	$10 > F > 10^{-1}$	1 FIBC Rupture of FIBC	1 IBC Rupture of IBC
Occasional	Could occur in Proposal lifetime; root causes likely to have occurred at the Proposal site	$10^{-1} > F > 10^{-3}$	1-17 FIBC Equivalent to up to 1 TEU	1-12 IBC Equivalent to up to 1 TEU
Unlikely	Unlikely; incidents known to have occurred in the industry but would require at least two failures	$10^{-3} > F > 10^{-5}$	18 – 34 Equivalent to up to 2 TEU	13 – 24 Equivalent to up to 2 TEU
Remote	Highly unlikely, but may exceptionally occur; would require multiple failures	$10^{-5} > F > 10^{-7}$	35 – 1,700 Equivalent to 2-100 TEU	25 – 1,200 Equivalent to 2-100 TEU
Incredible	Extremely unlikely that the event would ever occur	$F < 10^{-7}$	1,701 – 18,823 TEU site capacity[(a)]	1,201 – 19,047 TEU site capacity[(b)]

Adopted from: UK Health and Safety Executive – "*Safety Report Assessment Guide*"

Notes (a) the site capacity is noted as being 400,000 tonnes in total. Based upon a TEU containing solid waste material stored in FIBCs in TEUs at a capacity of 21,250 kg·TEU^{-1}, this would equate to a notional site capacity of solid wastes of (400,000 t x 21.250 t·TEU^{-1}) 18,823 TEUs containing solid wastes in FIBCs

(b) the site capacity is noted as being 400,000 tonnes in total. Based upon a TEU containing sludge waste material stored in IBCs in TEUs at a capacity of 21,000 kg·TEU^{-1}, this would equate to a notional site capacity of sludge wastes of (400,000 t x 21.000 t·TEU^{-1}) 19,047 TEUs containing sludge wastes in IBCs.

Appendix X, Part C in the draft EIS presents a summary of those determined impacts (consequences) and resultant risks.

The proponent has had detailed consultations with NT WorkSafe who have advised the proponent to submit a notification for the proposal to be assessed as a Major Hazard Facility (MHF). A MHF deals with risks associated with the temporary storage of hazardous wastes.

In addition, the proponent has submitted a suite of documents known as Waste Acceptance Criteria (see Appendix C in the draft EIS) which outline policies, criteria, procedures and zoning for hazardous wastes to avoid and reduce the threat of significant risks to human health and the receiving environment. The proponent considers these documents and commitments to the MHF process suitable management measures when dealing with large volumes of waste.

Issue raised

The NT EPA requires a more thorough understanding of these risks and potential impacts (or consequences). The Supplement should provide detail on the specific sequencing of planned waste reception and storage at the Arpirnta facility, to demonstrate how it accounts for the range of risks. This may include limiting storage initially to a specific subset of wastes; or initially limiting the volumes of high-risk wastes (particularly during the period that wastes are not being transported underground).

For each waste, identify volume and how it will be stored (e.g.in drums, bulk packages or in shipping containers) and whether containment packaging would be under cover, or exposed to UV light and rain.

Proponent's response

Waste receipt and storage arrangements are discussed in the Section 3.7 of the draft EIS. The proposed arrangements for the storage of dry and solid waste materials, and liquid waste materials are presented in Section 3.7.2 and Section 3.7.3 of the draft EIS respectively. Prior to incoming waste materials being accepted at the Apirnta, all incoming waste materials must pass through the quarantine zone, as described in Section 9.7.5 of the draft EIS:

> *"A quarantine zone would be constructed where waste materials that is transferred from trains would be stored prior to inspection and testing at the laboratory. Once tested, the waste would be moved and appropriately stored within the site (either in the warehouse or in the storage yard)."*

Once the waste has been accepted (including passing the relevant Waste Acceptance Criteria) it is transported to the relevant segregated temporary storage facility.

Section 3.7.2 of the draft EIS discusses the temporary storage and transfer plans for dry and solid waste materials within a 6,600m^2 warehouse and a 198,000m^2 storage yard:

> *"Warehouse*
>
> *Waste materials to be stored in the warehouse would be sealed in appropriate waste packages on wooden pallets then stacked in high-bays… The waste would be segregated as necessary in designated areas in accordance with appropriate Australian standards, codes and guidelines, particularly the Dangerous Goods Code as detailed in the WZG (refer to Appendix C). The warehouse would be fitted out with safety equipment such as emergency showers, an eye wash station and spill kits… Attached to the warehouse would be a laboratory and an office building… Rainwater tanks would be installed adjacent to the warehouse for various purposes such as for vehicle wash down and dust suppression during construction…"*
>
> *"Storage Yard*

An open storage yard would be constructed to store 20-foot shipping containers that would be stacked four high. This activity would involve preparing a suitable sub-base and appropriately engineered surface. The yard would be used for the temporary storage of waste that would be sealed in the shipping containers.

At capacity, the storage yard would be approximately 198,000 square metres in size and would occupy the majority of the site. The storage yard would be capable of housing about 20,600 shipping containers (up to 400,000 tonnes of waste, for which approval is being sort).

The shipping containers would be segregated into 'like for like' waste categories and in accordance with the appropriate Australian standards, codes and guidelines including Dangerous Goods Code as detailed in the WZG (refer to Appendix C [of the draft EIS]*).*

An internal road network would be constructed within the storage yard. The road network would be strictly one-way and would be used by authorised personnel operating forklifts"

Section 3.7.3 of the draft EIS discusses the temporary storage and transfer plans for liquid waste materials within a 40 kL storage tank.

Issue raised

In the Supplement, please list the types, sources and quantities of waste being proposed for transport to and storage at the facility. Furthermore, please nominate the methods of transport for and containment of the listed waste types above during transport. The Supplement should include further clarification around which wastes and what volumes will be stored in shipping containers. If waste is to remain in shipping containers, please identify the DG Class of the waste and how it will be managed in terms of risk management in the event of adverse occurrences.

Proponent's response

Potential types, sources and quantities of waste proposed for the Chandler Facility

The proponent has modelled potential in bound waste/storage volumes based on the following assumptions:

Waste Types and quantities based on the Apirnta and Chandler Facility's Waste Acceptance Criteria (WAC)

Tellus has used the NEPM 75 classification system to define the waste type. The average volume (tpa) over 25 years is illustrated in the figure below.

Refer to Tellus' detailed waste acceptance criteria for what waste types can be accepted on the surface and what can be accepted underground post treatment. In summary, the following waste types using the NEPM 75 codes are likely to be accepted as they do meet the Facility's Waste Acceptance Criteria (WAC).

Figure 5-14 shows proposed waste type volume (all NEPM categories) for Chandler.

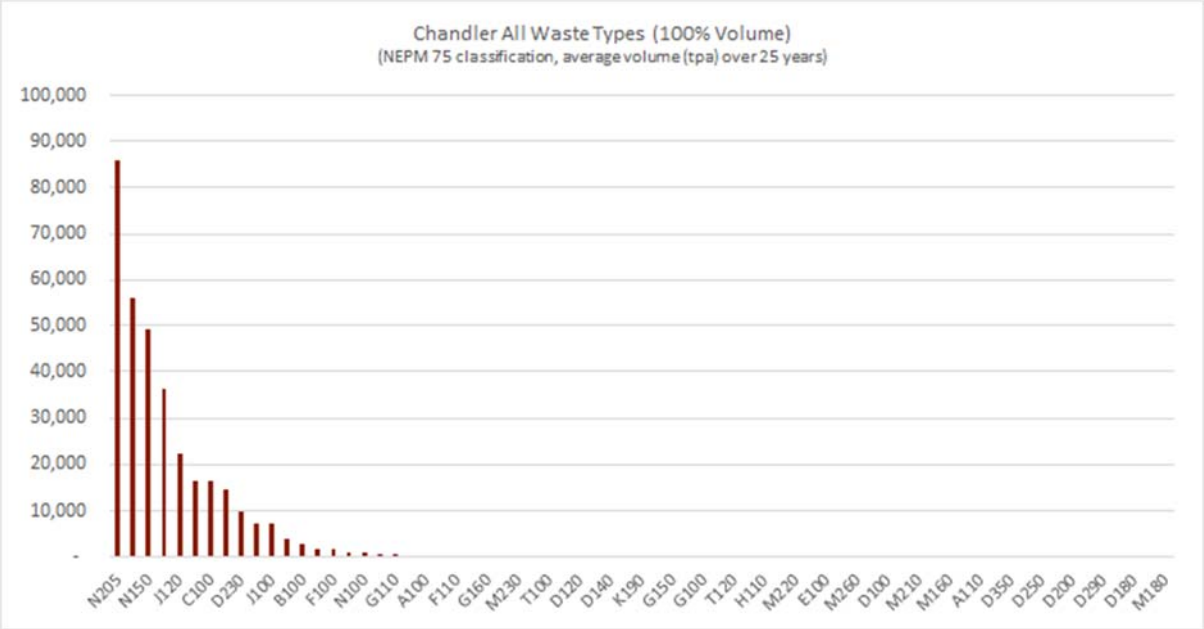

Figure 5-14 Proposed waste types by volume against all NEPM categories

The following waste types using the NEPM 75 codes are unlikely to be accepted as they do not meet the Facilities Waste Acceptance Criteria (WAC).

- K100 Animal effluent and residues (abattoir effluent, poultry and fish processing wastes)
- K110 Grease trap waste
- K130 Sewage sludge and residues including nightsoil and septic tank sludge
- R100 Clinical and related wastes
- NORM waste above exempt level

As can be seen in the figure above the top 20 waste types occupy 99% of the assumed waste volume. The figure below focuses on the top 20 Waste Types (99% Volume) using the (NEPM 75 classification, average volume (tpa)over 25 years.

Figure 5-15 shows the proposed top 20 Chandler waste types by volume.

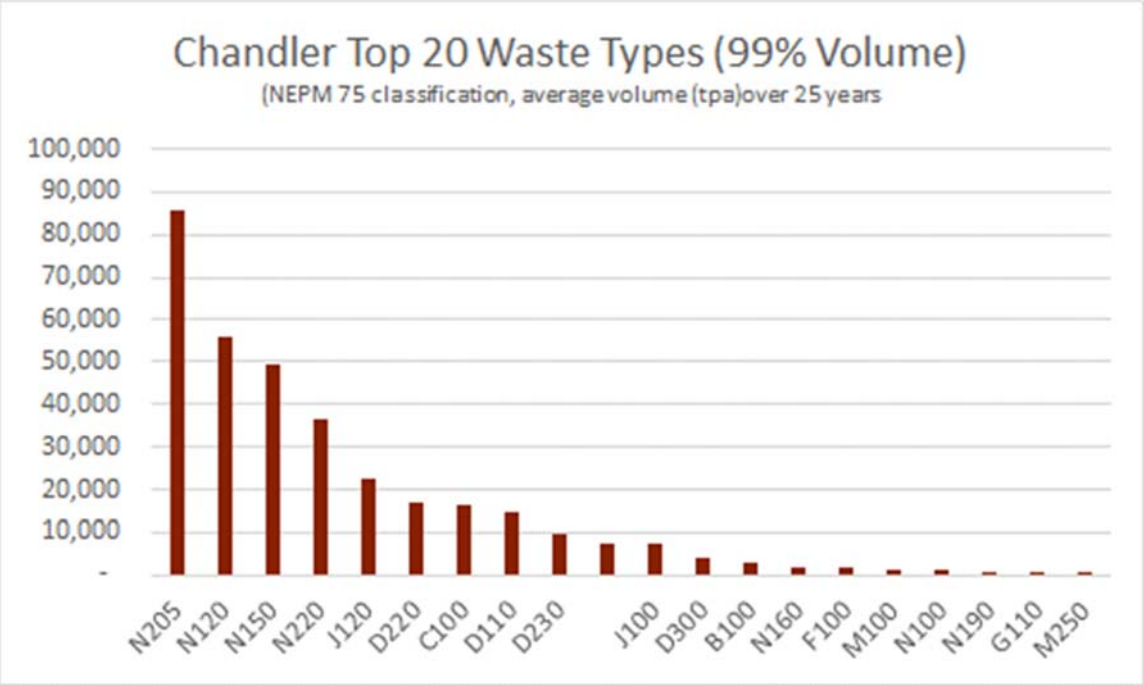

Figure 5-15 Chandler proposed waste type volume (top 20 waste types).

Waste volume over the first 10 years

Tellus has generally assumed the same volume mix per waste type over life of project supported by the following key assumptions:

- Tellus assumptions are based on the average waste mix over a 29 year period. This is based on a reflection on what waste types Australian society produces today;
- Tellus is well aware that during the project life that some waste types will increase, others will decrease, others will remain relatively constant, new waste types will drop in and existing waste types will drop out.
- Waste volumes will generally increase over time due to increased population growth, GDP growth and tightening regulation and community expectations
- Tellus plans to ramp up its waste volume in stages (see figure below):
    - Stage 1: Year 1-4 – starting with a lower volume and then ramping up, store waste materials in shipping containers on the surface at the Apirnta Facility while the Chandler Facility is being built (planning 300 k t) at the end of year 4
    - Stage 2 Year 5 when the Chandler underground facility is operational, remove the Year 1-4 waste stored at Apirnta and place the waste underground
    - Stage 3 Year 5 onwards starting with a lower steady state volume and then ramping up, but having a Facility volume that can deal with spikes (400 k tpa maximum). For example, a natural disaster can push a large volume of waste into the Facility in a relatively short period of time while the effected communities are being cleared.

Figure 5-16 shows the proposed Chandler volumes in the first 10 years of operation.

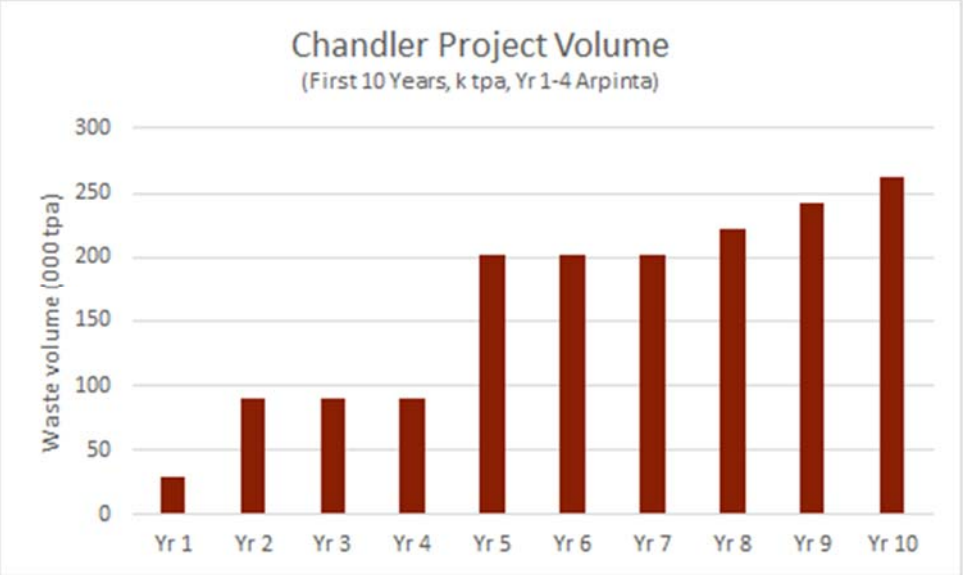

Figure 5-16 Projected waste volumes for the first 10 years of operation at Chandler

Waste source by sector

The table below details the Projects assumptions of waste source by sector. Each sector produces hazardous waste that depending on the waste type varies in its risk to the environment and human health and the ability to recover valuable materials.

Table 5-17 Waste source by sector

Sector	Waste Volume	Haz. waste risk to environment and health
Utilities (power, water, waste)	High	Low to high
Mining	High	Low to high
Oil and gas	High	Low to high
Construction	High	Low to high
Manufacturing (Chemicals)	Med	Low to high
Government - Local, State and federal	Med	Low to high
Manufacturing (Heavy Industry)	Med	Low to high
Agriculture, forestry and Fishing	Low	Low to high
Health care	Low	Low to high
Media, Telecoms, IT	Low	Low to high
Scientific, technical	Low	Low to high

Methods of transport

Predominantly by rail (figure 5-12). On behalf of Tellus, Toll has modelled numerous scenarios during the preparation of the draft EIS. A national framework is critical in understanding the structure and reasoning behind the proposed network.

The logistics task is summarised as follows:

- Integrated logistics management of up to 400,000tpa of waste materials from anywhere in Australia utilising the Australian rail freight and road networks
- Integrated logistics management of up to 750,000tpa of salt product export from Chandler to Adelaide in 20' containers, to be exported in containers or as a bulk commodity via the Adelaide/Darwin rail corridor
- Waste storage product bagged or drummed at customer's site, and delivered in standard 20' containers, or 20' Isotainers for liquid wastes.
- Waste transported from customers in 20' containers internally packaged 'like for like'.
- Waste materials transported to Chandler via the proposed Apirnta rail siding.
- Waste containers cleaned, bulk container liner installed and filled with salt product via onsite horizontal container stuffer. Or alternatively they are returned empty to the closest desired point.
- Item level tracking will be required on all incoming waste materials freight, including tracking of containers and individual bulker bags or drums within each container. Item level tracking will need to provide visibility of shipment status from the customer to Chandler.
- Where possible, all long haul transport services to Tellus facilities will be via existing network rail services. This is due to Tellus' waste acceptance criteria built around 20' enclosed containers, the remoteness of the Chandler facility, the relative safety of rail vs road, and the overall network cost differential.

The method of transporting waste to the proposed Chandler Facility is ultimately at the discretion of the waste producer who must meet Tellus' strict Waste Acceptance Criteria.

The waste will be collected from waste producers and consolidated at licensed transit hubs for temporary storage or scheduled onto a direct regular transport service. The integrated transport, operational and regulatory reporting requirements for the waste operation will be assisted through the use of a suitably equipped and trained transport provider. All movements of waste require item level tracking, reporting, accounting and Quality Assurance and Chain of Responsibility requirements from the point of origin to the storage facility as a minimum standard.

The most efficient haulage mode to Chandler will be by rail, as such this proposal has focussed on utilising existing network rail services. The Adelaide to Darwin rail line currently runs six regularly schedule trains per week with capacity for additional freight on the existing services. Genesee & Wyoming Australia (GWA) owns and operates the 2,200-km Tarcoola-to-Darwin railway and therefore operates an effective monopoly for rail operation on the rail line although 3rd party access is provided to other rail haulage operators.

Due to the disparity of volume travelling northbound versus southbound, the market rate to send freight from Adelaide to Darwin is multiples higher than the cost of Darwin to Adelaide. This disparity has a material impact on the cost of moving materials in and out of the Chandler facility.

Table 5-18 Transport tasks and responsibilities associated with waste movements

Transport Task	Tellus	Waste Customer
Initial Testing, Packing and Consolidation of Waste		✓
Transport of Waste to Apirnta Rail Siding		✓
Transport of Waste from Apirnta to Chandler	✓	
De-stuffing of container underground	✓	
Container Backhaul to Apirnta Siding	✓	
Container Backhaul to de-hired location		✓
Container De-Hire		✓
Loading of salt product at Chandler	✓	
Transport salt Product to Apirnta Rail Siding	✓	
Transport salt Product from Apirnta to port	✓	
Port handling charges for salt product	✓	

Once containers arrive at the Facility they will be inspected and tested, prior to being driven into the mining void for decanting. Once decanted they will be driven to the surface and sent for cleaning/decontamination (where required). Containers will either be shipped back to the waste producer for re-use, which in this case is Adelaide Freight Terminal.

For waste producers that have less than container loads, there will be a requirement for storage/consolidation off site. Under this scenario, Toll or another transport provider would transport the palletised/bagged waste to an approved waste/dangerous goods handling facility and store until a sufficient quantity of like for like waste is available to fill a 20' container. This would then be loaded and transported to Chandler.

Tellus is working with Toll to provide integrated transport and logistics, both for its own purposes as well as the waste producers. Toll are able to provide temporary storage and transfer facilities for hazardous waste in Australian capital cities and major centres. Temporary storage can be provided either for a contracted period or for a short period to manage the difference in the transport schedules between the waste producers and the scheduled services to the proposed Apirnta and Chandler facilities.

Road and rail waste movements to the proposed Chandler Facility

Table 5-19 Full 20' container load movements into Chandler facility based on 400, 000 tonnes of inbound waste per annum (maximum capacity)

Waste 20' Container Movement Totals	Chandler
Stuart Highway Northbound (Ex ADL)	0
Stuart Highway Southbound (Ex DWN)	0
Central Australia Railway Northbound (Ex ADL)	19,926
Central Australia Railway Southbound (Ex DWN)	130
Total	**20,056**

Transport from rail head to Chandler Facility

This activity involves managing the throughput of 18,500 TEU per annum. out of the Chandler facility to the Apirnta rail siding and 15,000 TEU per annum. of waste from the Apirnta rail siding to the Chandler facility.

As a result, and given the relatively modest commercial tonnages of material being transported standard container freight will be utilised to allow the transport infrastructure to cater for a multitude of waste types from a multitude of sources, ensuring that the waste can be handled at each transfer point.

Waste product transported to site will be contained in multi-barrier isolation within a 20 foot shipping container, ISO container (liquid wastes) or equivalent. The containers will be transported to site on a road train with a maximum payload of 116T, or 4 x 20 foot containers. This solution is consistent with the logistics studies carried out during the proposal's Pre-Feasibility Study to determine the most cost effective logistics model.

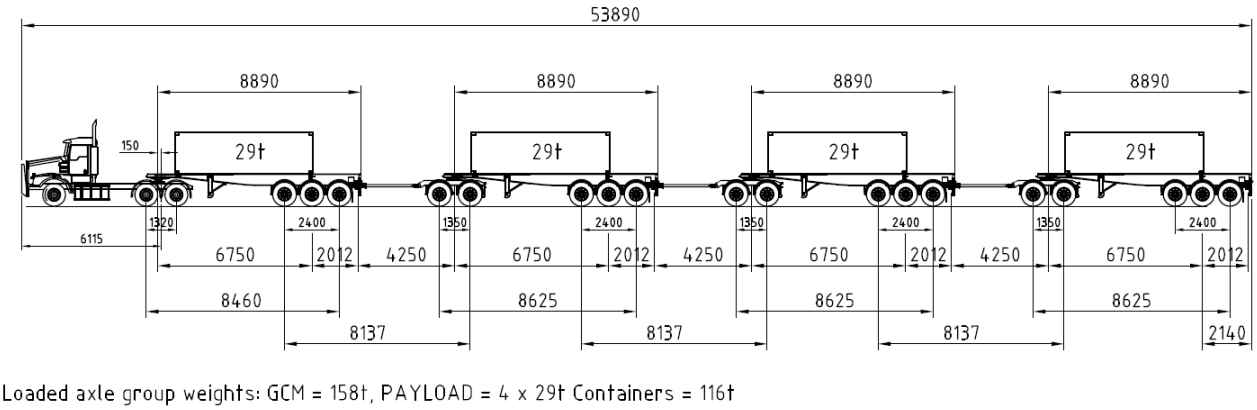

Figure 5-17 Proposed road train configuration for Chandler facility

- The operation assumes 18,500 of salt TEU's from Chandler to the Apirnta rail siding per annum.
- The operation assumes 15,000 of TEU of waste and 3,500 empty TEU from the Apirnta rail siding to the Chandler mine per annum.

- The Tellus is proposing to build two high capacity quad road train combinations (refer to Figure 5-6) capable of transporting 4 x 29 tonne TEU per trip.
- The Tellus is proposing to operate two 40 tonne container forks at Apirnta and one at Chandler.
- The Tellus proposes to operate 24/7 and will operate under basic fatigue management on 12/12 rosters. On the proposed volumes two vehicles will operate during the day and a single vehicle will operate on night shift with the capability to increase this shift as required, taking into account vehicle maintenance downtime.
- The Tellus proposes a multi skilled workforce where fork operators will be licensed and skilled to cover for a shuttle driver on their fatigue rest day required under fatigue management laws.
- The Tellus has proposed all direct staff will be on a 12/12 roster with the Operations Supervisor and Mechanic on a 14/14 roster HSEQ, Senior Management and Administration support would be from the Adelaide office combined with undertaking regular visits to site.

Operational solution

- The Tellus is proposing an onsite Operations Supervisor based at Apirnta on a 14 day on 14 day off roster.
- This role will have an equivalent back to back (B2B) person. The Operations Supervisor role will be supported by the Toll Regional structure which includes the Regional Manager, HSEQ and Administration to support this operation who will regularly attend the site as required.
- All onsite roles will have a B2B. The assumption has been made that they will be fly in fly out from Adelaide to Alice Springs if there are not suitably qualified people available locally. They will transfer from Alice to Apirnta by light vehicle.
- There will be 3 forklift operators based at Apirnta on a 12/12 roster. Two on day shift one on night shift.
- There will be 2 forklift operators based at Chandler on a 12/12 roster. One on day shift and one on night shift.
- There will be 3 road train shuttle drivers based at Apirnta. Two on day shift one on night shift.
- There will be 1 mechanic based at Apirnta to support the Toll heavy and light vehicle equipment.
- The proposed direct labour per roster will be 5 forklift drivers and 3 shuttle drivers and 1 mechanic.

Plate 5-1 Example of a container fork to be used at Apirnta and Chandler

Operational Process

It is proposed to receive 18,500 TEU per annum from the Apirnta rail siding with 6 rail services per week. These inbound TEU will be a combination of waste and empty TEU to support the 18,500 TEU required for salt transport from the Chandler mine.

On receipt of the TEU from rail, the TEU will be staged at the Apirnta container park until they are required at Chandler. From Apirnta, shuttles will be loaded with waste or empty TEU for Chandler and travel a 30 km journey. On arrival at Chandler, the TEU will be staged ready for Tellus staff to load or decant. TEU that have been loaded with salt by Tellus will be loaded onto the shuttle for return to Apirnta where they will be staged ready to be loaded onto rail.

Critical to ensuring the productivity assumptions can me met is the availability of TEU for loading shuttles at both Apirnta and Chandler ensuring optimum utilisation of people and equipment.

Wastes and volumes that will be stored in shipping containers.

Most waste will be transported in sealed shipping containers (transport container) and shown in Figure 5-18.

Figure 5-18 Common package types detailed in Tellus WAC

Most waste is safely packaged and on pallets (waste container) in the shipping container. The type of waste container used is influenced by the Dangerous Goods Transport codes and on the different forms of the waste. The different forms of waste that may arrive at Chandler are shown in Figure 5-19.

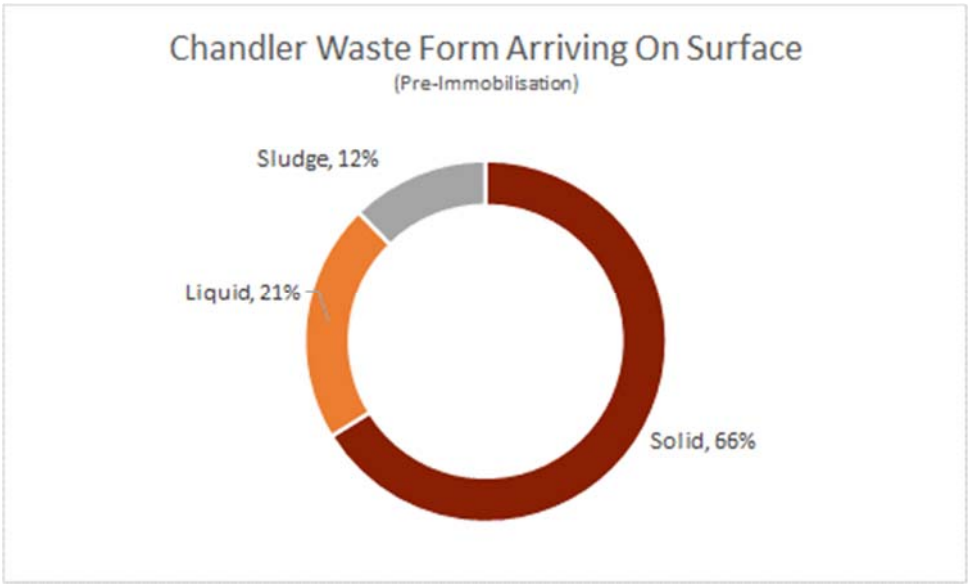

Figure 5-19 Waste forms

Package/ container types

The table below describes Tellus' assumptions used for planning.

Table 5-20 Waste form, waste container and transport container assumptions

Waste form	Waste containers	Transport container
Solid, semi-solid, dust-like	1T bulker bags, 1T, 3T, 5T steel containers	20 or 40 ft shipping container
Sludge or liquid	Barrels, IBC tote, liquid ISO container, silo tanker	Liquid ISO container
Odd shape (solid-example contaminated machinery or equipment)	Special packages or cut into pieces to fit into container	20 or 40 ft shipping container or cut into pieces to fit into special transport container

A large amount of detail on waste packaging and loading can be found in Appendix C of the draft EIS WAC. As a brief overview, packaging of waste bound for Chandler will focus on a three (3) layer containment. Plate 5-2 to Plate 5-4 provides some examples of waste packaging requirements at Chandler.

Plate 5-2 Double lined hazardous waste rated 1 tonne bulka-bag (layer 1 and 2).

Plate 5-3 Heavy duty PVC bag (layer 1) placed into 205 litre steel drum (layer 2).

Plate 5-4 Small steel containers – 1, 3 or 5 tonne (layer 1).

Bulka-bags and drums will be placed on pallets, on a solid board (to prevent nails passing through pallet during transport), strapped with heavy duty fibre and cling wrapped. Where required, bunding will be placed under containers. Bulk bags and drums on pallets and smaller steel containers to be placed in 20' shipping containers (layer 3).

Waste to be unloaded underground

For waste which is due to be unloaded underground in the Chandler Facility, only standard hard sided 20' containers will be utilised. Prior to loading, all containers will need to be inspected to ensure they are cargo worthy, i.e. in sound, safe and weatherproof condition fitted with good door gaskets, functional door securing & sealing components.

These containers can also be lined for backhauling salt. To make containers suitable for salt transport and to protect against corrosion, a bulk container liner would be installed. The only liner type suitable for standard 20' GP containers is an End Fill Bulk Container Liner. The liner takes 30 minutes to fit inside the container and is sacrificial; they are usually cut and tipped at point of unloading.

Liquid Waste for surface blending

Liquid Wastes bound for the blending plant at Chandler will be transported in bulk form using Isotainers. These may also be used for fine powder waste such as fly ash which is also destined for the blending plant. Any of these wastes which are to be unloaded underground will need to be packaged in lined drums or bags and loaded into standard 20' containers.

If waste is to remain in shipping containers, please identify the DG Class of the waste and how it will be managed in terms of risk management in the event of adverse occurrences.

- Table 5-21 below illustrates the waste type and the DG Code:
- Tellus will have adequate assurance and insurance;
- Tellus will adhere to the NT Work Safe regulations;

For additional information, please refer to Chapter 6 Risk of the draft EIS.

NEPM Code	Waste code name	Phase/ Form	Poss DG Class
A100	Waste from surface treatment of metals & plastics	S	9
A110	Cyanide waste from heat treatment & tempering operations	S	6.1
A130	Cyanides (inorganic)	L OR S	6.1 and 9
B100	Acidic solutions or acids in solid form	S	
C100	Basic solutions or bases in solid form	L OR S	4 OR 8
D100	Metal carbonyls	S	8 CARC
D110	Inorganic fluorine compounds excluding calcium fluoride	S	6.1
D120	Mercury; mercury compounds	S	6.1
D130	Arsenic; arsenic compounds	S	6.1
D140	Chromium compounds (hexavalent and trivalent)	S	6.1
D150	Cadmium; cadmium compounds	S	9
D160	Beryllium; beryllium compounds	S	6.1
D170	Antimony; antimony compounds	S	6.1
D180	Thallium; thallium compounds	S	6.1
D190	Copper compounds	S	6.1
D200	Cobalt compounds	S	6.1
D210	Nickel compounds	S	6.1
D220	Lead; lead compounds	L& S	8
D230	Zinc compounds	S	9
D240	Selenium; selenium compounds	S	6.1
D250	Tellurium; tellurium compounds	S	6.1
D270	Vanadium compounds	S	6.1
D290	Barium compounds (excluding barium sulphate)	S	6.1
D300	Non toxic salts	S	4.3 & 9
D310	Boron compounds	S	6.1
D330	Inorganic sulfides	S	6.1
D340	Perchlorates	S	5.1
D350	Chlorates	S	5.1
D360	Phosphorus compounds excluding mineral phosphates	S	4, 6.1
E100	Waste containing peroxides excluding hydrogen peroxide	S	5.1
E120	Explosive waste not subject to other legislation	S	1, 4.2
F100	Waste ink, dye, pigment, paint, lacquer & varnish	L & S	3, 4.1
F110	Waste resin, latex, plasticiser, glue & adhesive	L & S	3, 4.1
G100	Ethers	L	3
G110	Organic solvents excluding halogenated solvents	L	3
G150	Halogenated organic solvents	L	3, 6.1
G160	Waste from production formulation & use of organic solvents	L & S	3, 4.1
H100	Waste biocides and phytopharmaceuticals	L & S	3, 6.1
H110	Organic phosphorous compounds	L & S	3, 6.1
H170	Waste wood-preserving chemicals	L & S	6.1
J100	Waste mineral oils	L	COMB
J120	Waste oil/hydrocarbons mixtures/emulsions in water	L	COMB
J160	Waste tarry residues	L & S	COMB
K140	Tannery waste incl. leather dust/ash/sludge/flour	L	
K190	Wool scouring wastes	L	
M100	Waste substances & articles cnt PCB, PCN, PCT, PBB	L	9
M150	Phenols, phenol compounds including chlorophenols	L & S	
M160	Organohalogen compounds not elsewhere listed	S	9
M170	Polychlorinated dibenzo-furan (any congener)	L & S	6.1, 9
M180	Polychlorinated dibenzo-p-dioxin (any congener)	L & S	6.1, 9
M210	Cyanides (organic)	L & S	6.1, 9
M220	Isocyanate compounds	L & S	6.1
M230	Triethylamine catalysts for setting foundry sands	S	4.1, 8
M250	Surfactants containing principally organic constituents	L & S	9
M260	Odorous organic chemicals incl. mercaptans & acrylates	L	3
N100	Containers & drums containing controlled waste residues	L & S	3, 4 ,5 6.1, 8, 9
N120	Soils contaminated with a controlled waste	S	9
N140	Fire debris and fire washwaters	L	9
N150	Fly ash	S	
N160	Encapsulated, chemically-fixed, solidified, polymer wastes	S	3, 4, 5, 6.1, 8, 9
N190	Filter cake	S	6.1, 9
N205	Industrial waste treatment/disposal residues	S	8, 9
N220	Asbestos	S	9
N230	Ceramic-based fibres similar to asbestos	S	9
R100	Clinical and related wastes	S	6.2
R120	Waste pharmaceuticals, drugs and medicines	S	6.1
R130	Cytotoxic	S	6.1
R140	Waste from prod & prep of pharmaceutical products	S	6.1
T100	Waste arising from R&D or teaching activities	L & S	3, 4, 5, 6.1, 8, 9
T120	Photographic chemicals & processing waste	L	9
T140	Tyres	S	
R150	Quarantine waste	L & S	3, 4, 5, 6.1, 8, 9
T200	Dangerous goods nos	L & S	1
Z100	Organic compounds nos	L & S	3, 6.1, 9
Z110	Inorganic compounds nos	S	6.1, 8, 9
Z120	Industrial waste nos	L & S	3, 4, 8, 9
Z130	Inert sludges or slurries	L & S	
Z140	Non-controlled liquids	L & S	
Z990	Not characterised	L & S	?
X900	Reserved	L & S	?

Table 5-21 Waste type (NEPM 75) and DG Class classification

5.2.20 NT EPA 20

Issue raised

Storage, recovery and permanent isolation of materials would involve: Once full, sealing the underground voids permanently with an engineered barrier...

The facility would be designed and managed to allow for future waste recovery opportunities, that is, wastes would be stored like-with-like and the final disposal locations of all waste would be tracked and logged for future reference. At some point in the future, a technology recovery park would be established to support research and development into ways to release waste materials back into the circular economy…

In the Supplement, please clarify these conflicting statements.

Proponent's response

The Proposal presents a draft EIS for the development and operation of an underground salt mine and a complimentary storage, recovery and permanent isolation facility.

Materials recovery is discussed in Section 1.2.2 of the draft EIS:

> "*A range of materials could be safely and securely stored (either temporarily or permanently) inside the void spaces that are left behind from the salt mining operations at the proposed Chandler Facility. The space mined affectively acts as a safe dry underground warehouse in salt. Typical materials that may be stored (and retrieved at a later date) include document archives, film archives, museum artefacts, computer servers, and a host of other valuable documents and equipment.*
>
> *A range of hazardous wastes produced mostly by the mining, oil and gas, chemical, manufacturing, agricultural, site remediation, utilities (power, water and waste which also captures household collection) and government (State Emergency Service - man made or natural disaster) industries could be stored either temporarily (until recovery and treatment is possible) or permanently inside the void spaces left from the salt mining operations at the proposed Chandler Facility. These same waste materials could also be stored temporarily at the Apirnta Facility prior to being transported to the Chandler Facility*."

With foresight, and an eye on responsible material stewardship, the hazardous waste materials deposited within the Chandler Facility would be segregated, stored and managed in such a way that should appropriate resource recovery technologies become economically, technologically and environmentally viable in the future, that there is potential for sections of the deposited waste materials to be recovered as a resource.

Whether this becomes feasible, or the associated environmental risks become manageable would be subject to an entirely separate and detailed feasibility study, EIS study, commercial agreements, and the case for that is not presented in the draft EIS as it is too early in Tellus' planning stage. The Proposal presented is one for a permanent containment facility, complete with geological and

engineered containment barriers, but one operated and managed in such a way that it does not create further constraints for future resource recovery through lack of responsible stewardship or foresight

5.2.21 NT EPA 21

Issue raised

The surface storage and transfer facility would provide for the temporary storage of up to 400,000 tonnes of waste per annum…

In the Supplement, describe how long materials will be in 'temporary storage' before being transported for storage in the underground 'rooms'?

Proponent's response

As outlined in the NT EPA Question 19 above, Tellus plans to ramp up its waste volume in stages (see figure below):

- Stage 1: Year 1-4 – starting with a lower volume and then ramping up, store waste materials in shipping containers on the surface at the Apirnta Facility while the Chandler Facility is being built (planning 300 k t) at the end of year 4
- Stage 2 Year 5 when the Chandler underground facility is operational, remove the Year 1-4 waste stored at Apirnta and place the waste underground
- Stage 3 Year 5 onwards starting with a lower steady state volume and then ramping up, but having a Facility volume that can deal with spikes (400 k tpa maximum). For example, a natural disaster can push a large volume of waste into the Facility in a relatively short period of time while the effected communities are being cleared.

Figure 5-20 shows the projected volumes at Chandler in the first 10 years.

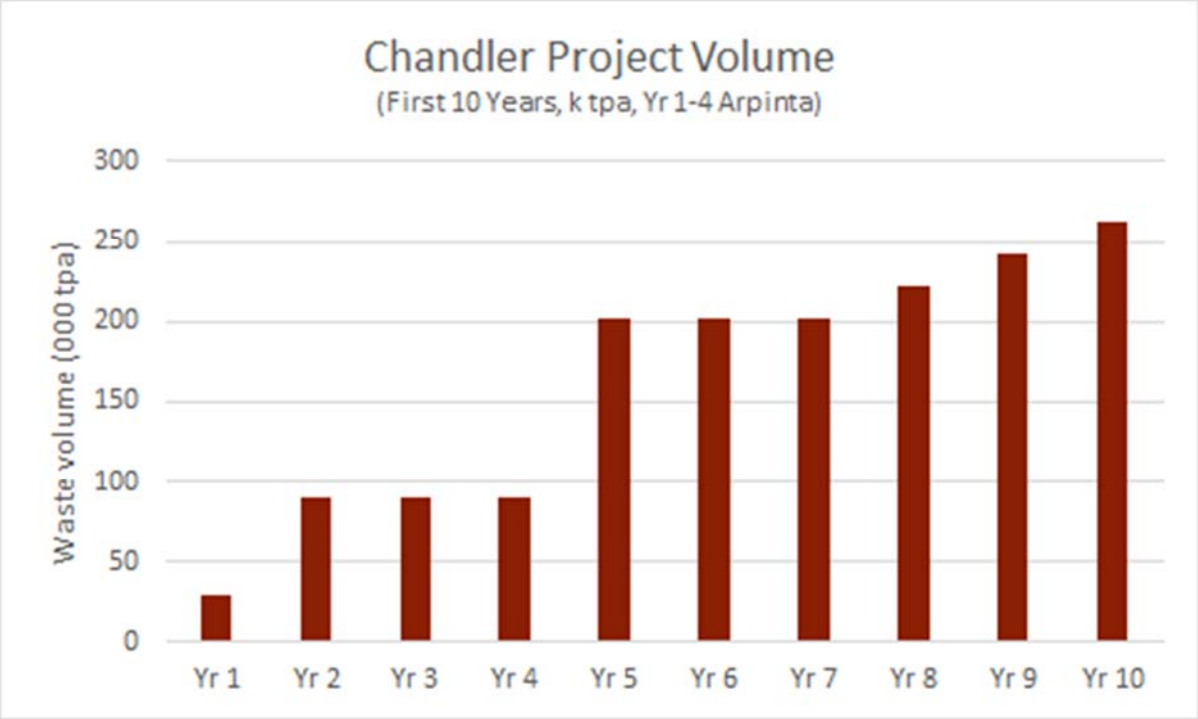

Figure 5-20 Chandler project volume in the first 10 years

Issue raised

It is assumed that the disposal of waste in the Chandler Facility would take some time due to inventory and segregation purposes. Will the warehouse be able to cope with incoming waste if underground waste disposal is at a slower rate than incoming waste or if mining is temporarily suspended or under care and maintenance and there is no capacity to store waste underground?

Proponent's response

It is anticipated that the storage capacity at Apirnta Facility and Chandler Facility would be sufficient to manage fluctuations in the rate of emplacement. With a relatively modest start volume, ramp up schedule, average over life of project of 340,000 tpa and an assumption Tellus will hit the proposed licenced capacity of 400,000 tpa only towards the end of the project life (exception being a short term peak due to a natural disaster that may push peak demand to the site), there is sufficient spare capacity on site to accommodate normal year to year fluctuations.

In the event that onsite capacity is strained due to one off events, if the waste is already inbound, there are 3rd party logistics providers who can assist and slow down or hold the waste in their storage and transfer stations until the Facility is available, or as per the commercial arrangements with the Customers, if the waste is still at the Customers site, then Tellus can delay the arrival of the waste on site with the Customer (so it remains on the Customers site until the Tellus facility is available).

Tellus is planning on developing a portfolio of geological repositories (example Sandy Ridge in WA) with a supporting hub and spoke logistical network and if the Chandler facility is not available, Tellus can then send the in-bound materials to an alternate facility

Issue raised

Under what scenarios will the proponent suspend accepting external waste?

Proponent's response

The proponent will suspend accepting external waste under the following scenarios:

- Wastes that are unidentified or otherwise do not meet Tellus' strict Waste Acceptance Criteria will not be accepted.
- If the waste does not meet the Facility's licence requirements.
- A Force Majeure event is triggered as defined in the waste supply contract (WSC).
- Customer does not meet the terms of the WSC.
- The waste is not contracted (WSC).

5.2.22 NT EPA 22

Issue raised

The draft EIS suggests that a wide variety of wastes could be accepted at the facility (e.g., liquid corrosives, oil, solvents, etc.). The wide variety of wastes that are listed as being potentially accepted imply that there is an additional processing facility (apart from hydraulic backfill) required to somehow solidify or otherwise stabilise corrosive, liquid or hydrocarbon wastes. There is no information in the draft EIS as to how this will happen. Furthermore, processing facilities are likely to be a source of potential emissions which have not been identified in the draft EIS or the risk assessment by Quintessa. There is also the risk of operator exposure to chemicals in such a facility.

In the Supplement, please provide details of how non-solid, non-neutral, potentially hydrocarbon-containing wastes are to be treated given that they cannot be disposed of directly. Note that the Quintessa risk assessment has made some commentary around such wastes as not being suitable for hydraulic backfill.

Proponent's response

Some wastes delivered to the Facility may require treatment or conditioning in order to meet the Waste Acceptance Criteria (WAC) for placement underground. In general, Tellus is not aiming to become a waste treatment contractor or service provider and therefore pushes this back as much as possible onto the Customer to get the waste in a form and in containers that meet Tellus' WAC off site (at the Customers site or a third party service providers site). That way Tellus does no or limited treatment at the Facility. pre-treat liquid Offsite processes may include:

- Neutralisation (from acid or alkaline pH);
- Precipitation;
- Filtration;
- Evaporation or distillation; or
- Biological degradation.

If yet still further processing is required for the waste to meet the underground WAC, Tellus will consider if these materials are suitable for hydraulic backfill.

Tellus has completed and has ongoing test work commissioned with European and Australian specialists in the area of non–solid waste solidification and stabilisation for hydrocarbon wastes for its Sandy Ridge project (see Figure 5-21). The completed work has already proven we can do it safely and cost effectively.

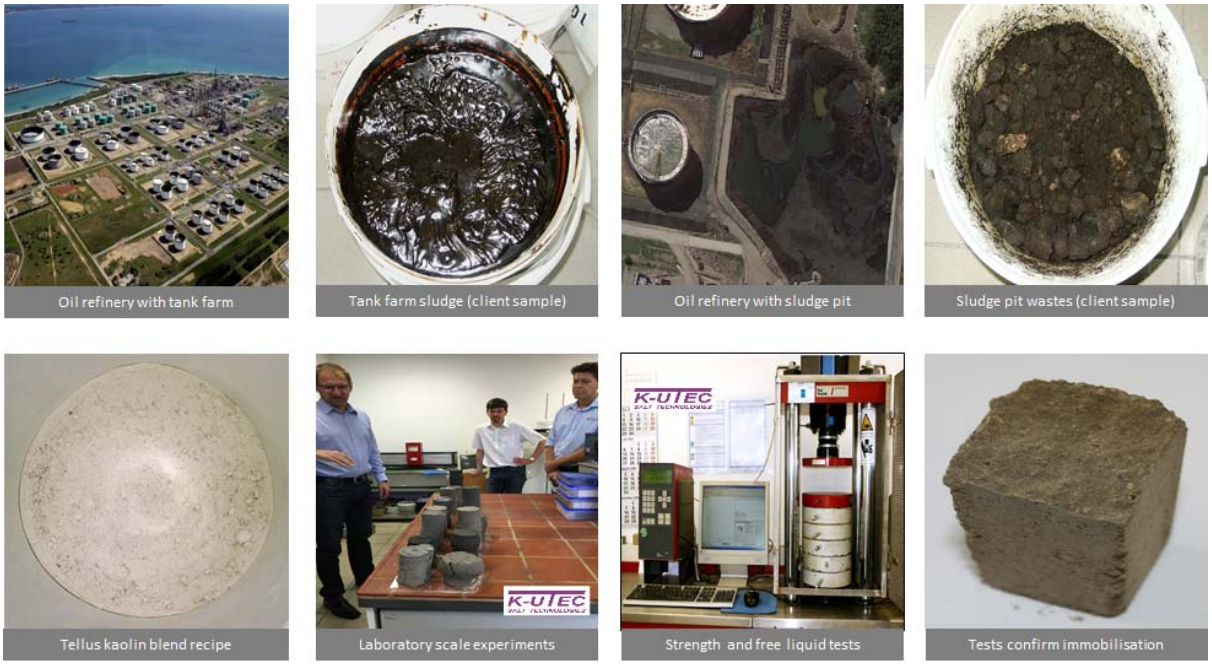

Figure 5-21 Tellus successful immobilisation tests performed in Germany and Australia

Tellus plans to commission similar work for Chandler as part of the next stage of feasibility study. Tellus is already working successfully with K-UTEC in Germany who is one of the worlds leading experts in immobilisation and blends. The aim of this work will be to confirm the performance of various waste blends with a range of liquid and paste waste types, which would guide the design of the hydraulic backfill plant.

Oily sludge

Hydrocarbon sludges containing NORM and/or heavy metals cannot always be recovered or safely disposed of using existing treatment processes such as biodegradation, oxidisation, stabilisation or incineration. Tellus will be investigating methodologies for the processing/mixing of such sludge using pozzolanic waste materials in the next stage of study.

Oily sludges would be delivered in either drums or Intermediate Bulk Containers (IBC) inside sea containers, or as bulk liquids in tanks, with the former being more likely. Tellus would store the oily sludge until such time as they are ready to be placed underground. The oily sludge would then be mixed in the hydraulic backfill plant with controlled measures of dry wastes to produce a cement–like paste which would be reticulated directly underground via a pipeline. The pumped paste would then set in-place in the underground room.

Non–oily liquid and sludge

Other wastes in either liquid or sludge form would ideally be reduced in volume, filtered or dried before delivery to Chandler, preferably by an existing waste management contractor. In the event of some liquid wastes not being able to be treated or only being partially treated (to a sludge), Tellus would mix those wastes using pozzolanic waste materials such as fly ash before being pumped underground for placement.

Source of potential emissions which have not been identified in the draft EIS.

Solution mined salt caverns are used extensively in North America and Europe for strategic petroleum reserve storage (storage of oil) and for midstream gas storage (to balance supply and demand pressures in the distribution network)as the salt traps and isolate gases, liquids and solids. This is part of a multi-billion dollar industry that has been in place since the 1970's.

On a similar basis waste placed underground thick salt beds, backfilled with salt and rooms sealed can permanently trap emissions.

Tellus appointed a leading Australian greenhouse gas (GHG) emissions advisory company to assist Tellus in identifying the correct emissions factor to apply per waste type and volume that Tellus is accepting and then what tonne CO2 equivalent (tCO2e) would be abated if placed underground for permanent isolation, verse being left to vent into the atmosphere.

Tellus then went one step further and said if we recycled and recovered valuable materials (e.g. Metals) at between 5-15 % recovery rates, what would be the additional GHG saving (tCO2e) if new raw materials (like metals) did not have to be mined.

This produced a model that is still being independently audited, but the initial Tellus results based on the assumption that 2/3 of the tCO2e comes from permanent isolation, 1/3 from recovery of valuable materials (15% recovery assumption) and Tellus' own carbon footprint (that accounts for a 7 MW power station with 2 MW's of solar and 5 MW's diesel and truck movement etc) results in a very positive GHG impact. Therefore, the Chandler facility becomes a major GHG abatement sink to

the equivalent of taking 13,535 cars off the road, building a 16 turbine wind farm, or building a 32 MW's solar farm and at the same time creating more jobs in the circular infrastructure economy (see Figure 5-22).

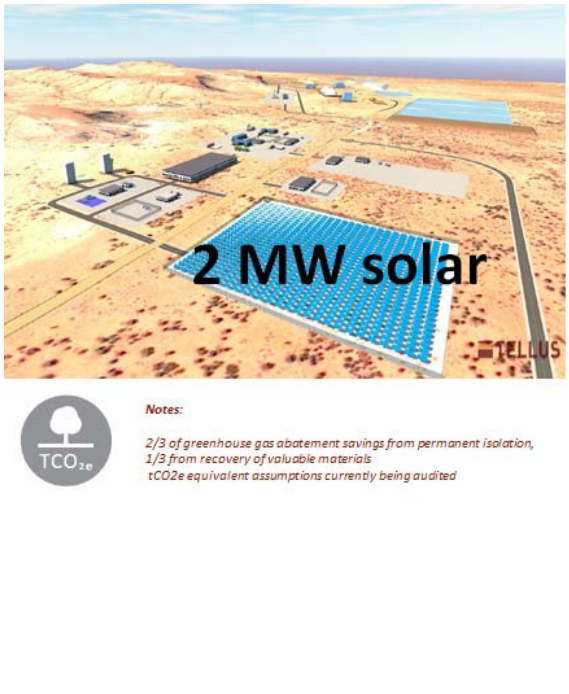

Figure 5-22 Benchmark comparisons on Tellus Chandler carbon sink

5.2.23 NT EPA 23

Issue raised

The draft EIS includes a comprehensive waste acceptance procedure and presents both a list of excluded items and a list of potentially accepted wastes. Tellus Holdings Ltd further proposes that some wastes that are on the excluded list could be accepted for disposal since they could be treated to make them suitable for disposal. No information is given as to the potential processes that might be employed for on-site treatment nor the tests or parametric limits the treated waste will be subject to before disposal.

In the Supplement, please provide more information about what processes are proposed to be carried out on-site to make waste acceptable for disposal. The Proponent should also describe and specify the facilities required to perform such treatments. The Proponent should also specify the tests employed and the parameters to be used to determine whether a treated waste is suitable for disposal. It is possible that the tests proposed in each Gate are the tests to be used for evaluation of the treated product, but this is not explicit. If there are going to be excluded wastes, then they should be listed and procedures described that show how such wastes will be dealt with.

Proponent's response

Process and test methodology are described in Waste Acceptance Criteria (WAC) of the draft EIS. If a waste is accepted on site and treatment is required, the tests listed in the WAC would still apply before the material is accepted as suitable for disposal.

Refer to NT EPA 22.

5.2.24 NT EPA 24

Issue raised

It is likely that loss of containment of the waste cargo will occur during the life of the project. Provide a clear set of guidelines and processes on how the resultant wastes from spillages would be handled and treated. Describe treatment provisions of resultant wash waters. This is especially important given the wide variety of waste proposed to be accepted.

Proponent's response

What emergency response plans would be established to support transport to the Facility?

- In the unlikely event of a spill as a result of an accident, the material would be collected by trained personnel and repackaged.
- Tellus' preferred transport providers have decades of experience in the safe handling and transportation of dangerous goods and waste materials.
- Using experience gained from many thousands of transport movements and many years of safe operation, the service provider has put into place a number of controls and initiatives to improve both the safety of transport as well as emergency preparedness and response to transport incidents.
- Tellus looks for the following controls and initiatives in its transport service providers:
- 24-hour emergency telephone service to report any transportation-related incidents.
- Retaining of the services of a professional spill response organization, available to provide initial response services and support local emergency response organisations within urban and rural areas.
- A process where the transport companies local manager and Occupational Health and Safety Officer immediately depart to the spill site.
- A process where the spill gets escalated immediately to senior management at both the transport company and at Tellus.
- A process where the authorities get notified immediately: example local government authorities, police, Main Roads, FESA and other state and federal agencies like the EPA to ensure a fully coordinated response.

- Tellus reserves the right to refuse deliveries from transport contractors who do not meet Tellus' standards.
- Agreement on the selection of transport contractor would take place prior to commencement of the waste transport.
- Tellus would maintain an active register of transport contractors who have been regularly audited and confirmed as meeting Tellus' standards.
- Once operational Tellus will also have its own first responders program.
- This program will involve Tellus specialists working and training with both professional and volunteer emergency response crews on simulators and along the main transport routes to practice appropriate first response spill containment and clean-up measures.
- Tellus will also conduct our own spill response exercises in conjunction with emergency services to trial spill response procedures.

The proponent will ensure site staff will be trained and assigned to manage chemical spills and similar emergencies to limit the risk of environmental harm.

In the event of a spill, absorbent materials such as sand or inert porous material (such as 'kitty litter') will be kept on-site to assist clean-up of any chemical spills. Sawdust will not be used because it presents a fire hazard.

Spilt fluids will be initially recovered using absorbent matter, prior to any floor wash down. Used litter would be assessed against the proponent's WAC for temporary storage and eventually, permanent isolation within the Chandler Facility.

The proponent commits to preparing a detailed Spill Response Management Plan that will cover construction and operational aspects (training, equipment, operational readiness etc) associated with the Proposal.

Treatment provisions of resultant wash waters

Wash down facilities at the Apirnta or Chandler facilities would not be located close to sensitive water resources including the following drainage lines identified in Chapter 9 of the draft EIS:

- Apirnta Creek
- Halfway Creek
- Dingo Gully
- Roo Gully
- Snake Gully
- Ridey Gully
- Mary's Creek
- Oak Gully.

Waste water would not be discharged to waterways because when under flow conditions, toxic residues in local drainage lines are likely to result in harm water birds and aquatic ecology.

It is likely that resultant wash waters and residues could be re-used in the hydraulic process which avoids any effluent discharge to the receiving environment. If effluent discharge is likely, it would confirm to national water quality (ANZECC) to maintain local water quality criteria.

Wash down areas and associated drainage facilities will have a minimum vegetated separation distance from water bodies as described by DPLRM. Retaining natural vegetation buffers can help ensure a separation of clean and potentially dirty water. They are particularly useful in preventing the discharge of petroleum hydrocarbons to the environment (Department of Water, 2013).

Further flood modelling is proposed in the BFS. The results would be used to ensure wash down areas will not be located on areas subject to periodic flooding or within defined flood plains.

The wash down and all associated equipment will be contained on an impervious pad, with a permitter kerb or bund wall. It is likely that the wash down areas would not have a roof and as such, the surface area would be kept to the smallest practical surface area to minimise stormwater access and contain wash down residue. The wash down pad will drain to a collector pit.

Any water collected from the wash down pad will drain from the collector pit via a pipe or culvert into a sediment basin to settle and allow removal of soil and other solid contaminants. The basin will provide for effective gravity settling of solids with a minimum water detention capacity of one hour under peak flow conditions.

The proponent is not anticipating to use quick-break emulsion cleaning agents. This will avoid the need to manage oily wastes that may be floating on the surface and having to construct a de-emulsification basin. However, if organic solvents or chemical coagulation products are used to break oily emulsions, coagulated effluent may need further treatment such as pH adjustment and solids separation prior to effluent disposal.

Petroleum hydrocarbons recovered by oil separators will be collected, analysed in line with the proponent's WAC and, where appropriate, re-used in the hydraulic backfill process. If this is deemed to be inappropriate, they will be securely stored and assessed against the proponent's WAC for permanent isolation at the Chandler Facility.

Sediment traps, soak pits or water treatment vessels will have an impervious lining and minimum freeboard to contain wash-water and any captured stormwater from a minimum two-year return frequency, 24-hour storm. Methods to calculate runoff from storms will be taken from best practice in Australian rainfall and run-off.

Any soak pits will be designed to foster aerobic biological breakdown of residual petroleum hydrocarbons. Small quantities of garden fertiliser (typically 50 g/m2 of open pit base, applied once a year in early summer) could be mixed with damp oil stained soils to improve microbial oil breakdown.

The proponent commits to the following criteria for discharged waters (refer to Table 5-22).

Table 5-22 Indicative wastewater discharge criteria

Measured component	Limiting criteria
pH	Within the range 5.5 to 8.5
Salinity (measured as electrical conductivity)	1800 µS/cm (maximum)
Surfactants (detergents)	5 mg/L (maximum)
Total petroleum hydrocarbons	15 mg/L (maximum)
BTEX (benzene, toluene, ethyl benzene and xylene)	10 µg/L (cumulative maximum)
Other toxic soluble contaminants	Ten times the guidelines criteria or investigation trigger for local water values (see WMP) or values described in the National water quality management strategy guideline criteria assessed against site trigger values to protect local water resource values.

A maintenance inspection of wastewater treatment and disposal systems associated with the Chandler Facility will occur at least weekly. The waste treatment system's operating performance will be checked every three months to ensure optimum operational performance. Any necessary remedial action should be taken immediately.
All inspection results, analytical data, and corrective actions will be recorded in an operating log. This data will be retained on-site for a minimum of two years in a running operations logbook.

Where required by regulatory authorities, the proponent will take representative samples at six-monthly minimum intervals of any liquids discharged to the environment. These liquids will be analysed onsite in line with the proponents WAC. If required by the regulator, the liquids can be tested by a National Association of Testing Authorities (NATA) accredited laboratory for the relevant test parameters, such as pH, electrical conductivity, suspended solids, biochemical oxygen demand, chemical oxygen demand, total petroleum hydrocarbons, BTEX and surfactants.

5.2.25 NT EPA 25

Issue raised

The Draft EIS documents a considerable delay between the commencement of waste storage at Arpirnta and the commencement of waste placement in the underground caverns

Please clarify whether the waste accumulated at the Arpirnta facility will be prioritised for placement once the underground phase of the project starts (i.e. first in, first out).

Proponent's response

Yes, the Apirnta waste will be prioritised and first in and first out is Tellus' operating assumption.

5.2.26 NT EPA 26

Issue raised

While waste is stored above ground and exposed to elements (mainly UV and water) degradation of packaging materials can proceed apace. The timeline of the operations indicates that above-ground

storage of the waste could be up to two years if there are no delays. Even over this period there will likely be considerable deterioration of the packaging and labelling. Thus, there could be a loss of containment and provenance.

In the Supplement, please provide greater detail around the processes that will be put in place to combat deterioration of packaging and labelling of stored waste. Furthermore, please clarify if Tellus Holdings Ltd is proposing to store waste in shipping containers. Identify contingency measures for unexpected delays to placing wastes underground.

Proponent's response

The proponent is proposing to store waste materials in suitable packaging as described in Appendix C Waste Acceptance Criteria of the draft EIS. Waste material will predominantly be stored in shipping containers, which are resistant to the elements for the proposed storage period.

Bulka bags would be placed within a warehouse or into a shipping container within bunded areas. Any temporary storage of bulka bags in the open, would be within bunded areas with ongoing visual monitoring for signs of deterioration.

Package labels would be printed on a tough waterproof material, suitable for exposure to water, UV and harsh environmental conditions.

Waste containers and labels will be inspected on a regular basis and any containers that have deteriorated will be pulled and repackaged by specially trained personnel in controlled situations. Tellus will also have mobile hand held gas monitoring equipment and fixed gas monitoring equipment strategically located around the Facility that will be connected to a central SCADA system that will notify site management and head office of any problems.

5.2.27 NT EPA 27

Issue raised

The draft EIS does not set out what processes could be employed when non- conforming waste arrives at the site. In theory, any non-conforming waste is ultimately a problem for the producer. Given the remote location and the cost of returning non-conforming wastes, there remains the possibility that non- conforming wastes could remain on site.

The Supplement should clarify what is meant by "appropriate management techniques". This should include, but not be limited to, consideration of the processes used by transporters to consolidate waste for containerisation to identify non-conforming waste prior to it being transported to Apirnta. If it is proposed that either Apirnta or Chandler be used for any neutralisation, immobilisation or encapsulation then this should be stated. Further, if it is proposed that these wastes be incorporated into hydraulic backfill, then the Proponent should identify processes to be used to evaluate risk to the environment in line with EC Decision 2003/3 [3].

Proponent's response

All wastes accepted at site will be in accordance with strict Waste Acceptance Criteria. Appendix C of the draft EIS details the WAC and Waste Acceptance Procedure (WAP) that must be satisfied in order for waste to be accepted at the Apirnta and Chandler Facilities.

Tellus have adopted a three-stage approach to waste characterisation:

- **Level 1: Basic characterisation**. This is a thorough determination, according to standardised analysis and behaviour-testing methods, of the characteristic properties of the waste. This is the key decision step in determining whether a waste can or cannot be accepted. This stage takes place at the waste supplier site and only if the waste passes all of the WAC gates can Tellus agree to accept the waste at the Chandler Facility.
- **Level 2: Compliance testing**. After a waste stream has been accepted as meeting the Chandler WAC Level 2 compliance testing is then periodically performed on regularly arising wastes by simpler standardised analysis and behaviour-testing methods to determine whether a waste complies with licence conditions and whether a waste with known properties has changed significantly. The tests focus on key variables and behaviour identified by basic characterisation.
- **Level 3: On-site verification**. This constitutes rapid check methods to confirm that a waste is the same as that which has been subjected to compliance testing and that which is described in the accompanying documents.

Level 1 and 2 testing would normally be carried out at the waste producers site. Level 3 would take place on delivery at Apirnta.

Each load of waste delivered to Apirnta shall be visually inspected before and after unloading, and the required documentation shall be checked. The waste may be accepted at the Facility, if it is the same as that which has been subjected to basic characterisation and compliance testing, and which is described in the accompanying documents. If this is not the case, then the proponent has two choices:

- Accept the waste, (issue the Customer a Waste Acceptance Certificate), but immediately then send the waste to a designated quarantine area where a **Quarantine Notice** gets issued to the Customer while the issue is being sorted out. For example, packaging problems, or additional off site Level 1 characterisation is required and samples need to be sent off site for extra analysis to confirm waste type. If the additional analysis resolves the issue then the waste will move from the quarantine area to the:
    - long term storage area and a Storage Certificate will be issued to the Customer; or
    - final resting place for permanent isolation and permanent Isolation Certificate will be issued to the Customer.
- Waste is rejected and a **Rejection Notice** gets issued to the Customer and the waste is sent back to the Customer at the Customers expense.

Wastes that do not meet the acceptance criteria will be rejected. This should not occur frequently due to the first two Levels, basic characterisation and compliance testing that will take place. Level 3 on-site verification may occasionally identify wastes that need to be rejected or some wastes may fail waste packaging criteria tests.

In the event that waste that cannot be accepted arrives at the site it will be placed into a specifically identified quarantine area until arrangements can be made to modify it into a waste form suitable for storage and disposal or to safely return it to the customer.

If waste assessed as suitable for hydraulic backfill, the proponent would conduct a risk assessment reflective of the material composition, storage and isolation method proposed. The risk assessment would be conducted in line with the proponent's risk assessment methodology, incorporating local site / environmental conditions, and in line with the EC decision 2003/33 waste acceptance criteria guidelines and site specific risk assessment relating to acceptance of certain wastes on a case-by-case basis where acceptance would not present additional risk to the environment according to a risk assessment.

5.2.28 NT EPA 28

Issue raised

The Facility will be dealing with waste products that are no longer virgin. The Safety Data Sheet (SDS) should reflect the nature of the waste otherwise workers will be exposed to unknown risks. Chemical wastes may be the result of the use of one or more chemicals in a process which produces one or more waste streams. In some instances, a new chemical may be formed as a waste product.

The WHS (National Uniform Legislation) Regulations [1] (Reg 331) require wastes to have an SDS. Further reference may be made to the Code of Practice – Labelling of Workplace Hazardous Substances [2]. While the Regulations require the manufacturer or producer of the waste to create the waste SDS and the transporter to attach the waste SDS to a manifest, the Proponent will invariably find that waste will be sent to the facility with only its pure form listed on the SDS or no listing. Given this, it will be the responsibility of Tellus Holdings Ltd to somehow obtain or create a relevant SDS for the waste. This is particularly pertinent because of the large amount of waste proposed to be stored and the potentially extended period between the receipt and actual disposal of the waste. Furthermore, where wastes are received that have been excluded by the Waste Acceptance Criteria for disposal/storage but that may be acceptable for incorporation into hydraulic backfill, the SDS becomes highly relevant to determine the potential risks in the production of the hydraulic backfill and its ultimate performance.

In the Supplement, please outline how Tellus Holdings Ltd will comply with Reg 331 of the Regulations in the process of initial assessment (from the producer), transport and receipt. This relates not only to the creation and maintenance of the SDS but also the labelling of the substances. Consideration should be given to how shipping containers containing wastes are to be labelled and in the case of multiple wastes within one shipping container, how the multiple wastes are labelled and identified.

Proponent's response

Tellus will comply with Reg 331 of the Regulations in the process of initial assessment (from the producer), transport and receipt through adherence to the Company's own. draft Waste Acceptance Policy which is presented in Appendix C of the draft EIS. Contained within the Tellus Waste Acceptance Policy are the Chandler and Apirnta Waste Acceptance Criteria (WAC), the draft Waste Acceptance Procedure (WAP)

The draft WAP presented in Appendix C provides an outline of the procedures to identify and characterise the incoming waste materials:

> *As part of the WAP it is necessary to first characterise the waste material. Tellus have adopted a three-stage approach to waste characterisation, which is summarised below. The most detailed characterisation takes place to determine if waste meets the overarching criteria and licence conditions of the site, followed by further ongoing testing at levels 2 and 3 described below.*
>
> *Pre-Gate testing (pre-transport and at the Customers site) to determine the SDS and compliance with Reg 331*
>
> - ***Level 1: Basic characterisation.*** *This is a thorough determination, according to standardised analysis and behaviour-testing methods, of the characteristic properties of the waste.*
> - ***Level 2: Compliance testing****. This is periodic testing of regularly arising wastes by simpler standardised analysis methods to determine whether a waste complies with licence conditions and whether a waste with known properties has changed significantly.*
>
> *At the Tellus-Gate testing (post-transport) to confirm the SDS obtained from Level 1 and 2 Testing matches what actually arrives at the Facility*
>
> - ***Level 3: On-site verification****. This constitutes rapid check methods to confirm that a waste is the same as that which has been subjected to compliance testing and that which is described in the accompanying documents.*

- In the event that the ***Level 3 On-site verification*** test confirms that the waste sent is different to the label and the supporting SDS obtained by the Customer when they did ***Level 1 Basic characterisation*** and/or ***Level 2 Compliance testing*** *at their site*, then Tellus has two options:
  - Accept the waste, (issue the Customer a Waste Acceptance Certificate), but immediately then send the waste to a designated quarantine area where a **Quarantine Notice** gets issued to the Customer while the issue is being sorted out. For example, packaging problems, labelling problems or additional off site Level 1 characterisation is required and samples need to be sent off site for extra analysis to confirm waste type. If the additional analysis resolves the issue then the waste will be issued a new SDS and label and then will move from the quarantine area to the:
    - long term storage area and a Storage Certificate will be issued to the Customer; or

- final resting place for permanent isolation and a Permanent Isolation Certificate will be issued to the Customer.

- Waste is rejected and a **Rejection Notice** gets issued to the Customer with a report describing that the waste sent to the Facility with the "in dispute" SDS and labels does not meet Tellus' Waste Acceptance Criteria, and the waste is relabelled using Tellus supplied labels with the correct SDS and sent back to the Customer at the Customers expense.
- The proponent intends to implement the WAVE TME Pro container park management system which will be reinforced by the WAC. Refer to the NT EPA question 29 below for additional information.

The intention of the above is to ensure the safety of the people and operational integrity of the facility and geological repository by always storing like with like with a proper SDS, labels (which capture key data that includes a unique consignment and package identifier, waste owner's name, material description/name on opposite sides of the waste package), tracking and waste zoning policy that starts at the customer during waste characterisation and packaging, continues during transport and ends when the waste finally comes to rest at the Facility.

5.2.29 NT EPA 29

Issue raised

Whilst it is understood that waste for direct disposal will be transported down the decline via shipping container on the back of a truck/trailer, it is not clear how waste is stored at the Apirnta facility i.e. is it removed from the shipping container or not? Further, given that wastes on the exclusion list may in fact be accepted (including hydrocarbon-containing liquids), it is not clear how these will be separated and bunded at the Apirnta facility.

AS 3833 provides for the storage of mixed classes of dangerous goods and gives guidance on several issues. It makes clear that transit storage is limited to 200 tonnes. The standard also provides guidance on stormwater and firewater and spillages.

Please clarify how waste materials are to be stored at the Apirnta facility with reference to the use, or otherwise, of shipping containers. If shipping containers are to be used, then the Proponent should clarify how compliance with S5.9 of the standard will be achieved and maintained. Note esp 5.9 b), c), d), e).

Proponent's response

Most waste arriving within 3rd party owned shipping containers at the proposed Apirnta Facility would not be removed from the shipping containers until they are moved to the Chandler Facility when it is ready. At the Chandler Facility, they will be emptied underground, returned to the surface, washed and then returned back to the shipping container owner by rail where they re-enter into the national shipping container pool.

In the situation where the 3rd party owned shipping container needs to be returned back to their owner (and typically back into the national pool), shortly after arrival at Apirnta, the waste materials in their own sealed waste containers and on pallets will be removed from the transport shipping container by forklift and immediately placed into an Apirnta based shipping container owned by Tellus. At the end of the proposed four-year Chandler Facility build time where there is an accumulation of shipping containers, and the Chandler Facility is now open to take materials underground, the containers will be transported to Chandler, unpacked underground, most of the containers will be washed, some may remain underground, but the rest will be returned back into the national shipping container pool.

The proponent's Waste Zoning Guide ensures that all wastes would be appropriately separated in line with dangerous goods codes to ensure the Facility and the workers within it, always operate under the highest level of safety.

Separation of waste will be governed by site specific dangerous goods checklists, policies and procedures that adopt the principles outlined in AS 3833 and the information contained within Figure 5-23.

It is the proponent's intent is to implement a robust waste management and emergency response strategies, where waste will be managed to avoid adverse impacts on the life, amenity, health and wellbeing of people and receiving environments.

All waste streams will undergo risk assessments and appropriate controls will be identified and implemented in line with the proponent's WAC. The risk associated with each stream shall be assessed following implementation of controls to determine acceptability of residual risk. In line with Tellus' Waste Acceptance Policy, all waste streams will be tested at the producer's facility prior to transport being arranged to ensure that appropriate licenses and procedures are in place throughout the planned transit path.

The logistics proponent will require all waste transport requests to be accompanied by a composition analysis, material safety data sheet and complete dangerous goods paperwork. The proponent's WAC will then determine the appropriate method of packaging and mode of transport to ensure compliance with regulatory requirements, Toll policies and Tellus' waste acceptance criteria.

The proponent intends to implement the WAVE TME Pro container park management system which will be reinforced by the WAC. Combined, this will safeguard:

- Waste streams are identified and segregated as required.
- Adequate waste storage facilities are available and clearly identifiable within sites.
- Ensure that regulatory requirements are met for the storage of general and controlled wastes.
- Ensure that weekly, quarterly and annual inspections are conducted and recorded (and include monitoring of waste storage).

- Ensure that corrective and preventative actions to address non-conformances are registered and actioned.

TOLL	Dangerous Goods Segregations Chart - **ADG Code Table 9.1 Incompatibility based on Classification**	Doc No. TG G 3-13-007-04 Version: 001 Date: 01/01/2014

Goods are considered incompatible if, in this table, any of the following conditions are met:
(a) the primary hazard of one is incompatible with the primary hazard of the other; or (b) the primary hazard of one is incompatible with a subsidiary risk of the other; or
(b) a subsidiary risk of one is incompatible with a subsidiary risk of the other.

CLASS or DIVISION	1	2.1	2.2	2.3	3	4.1	4.2	4.3	5.1	5.2	6	7 (7)	8	9	Food or Food empties	Fire-risk substance or Combustible liquids
1 Explosives	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
2.1 Flammable gas	(1)	Yes	(3)	Yes	(2)	No	No	No	No	No	Yes	No	Yes	Yes	Yes	Yes
2.2 Non-flammable non-toxic gas	(1)	(3)	Yes	(4)	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
2.3 Toxic gas	(1)	Yes	(4)	Yes	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	(8)	Yes
3. Flammable liquids	(1)	(2)	Yes	No	Yes	Yes	No	Yes	No	No	(6)	No	Yes	Yes	Yes	Yes
4.1 Flammable solids	(1)	No	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes
4.2 Spontaneously combustible	(1)	No	No	No	No	No	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes
4.3 Dangerous when wet	(1)	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	Yes	Yes	Yes
5.1 Oxidizing substances	(1)	No	Yes	No	No	No	No	No	(6)	No	(5)	No	No	(5)	Yes	No
5.2 Organic peroxides	(1)	No	No	No	No	No	No	No	No	Yes	(5)	No	No	(5)	Yes	No
6 Toxic or Infectious substances	(1)	Yes	Yes	Yes	(6)	Yes	Yes	Yes	(5)	(5)	Yes	Yes	(6)	Yes	(8)	Yes
7 Radioactive material (7)	(1)	No	Yes	Yes	No	No	No	No	No	No	Yes	Yes	No	Yes	(8)	Yes
8 Corrosive substances	(1)	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	(6)	No	(6)	Yes	(8)	Yes
9 Miscellaneous dangerous substances and articles	(1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	(5)	(5)	Yes	Yes	Yes	Yes	Yes	Yes

Figure 5-23 Dangerous goods waste separation classification system proposed for the Apirnta Facility and Chandler Facility

The proponent intends to install the WAVE TME system to manage containers at the Apirnta Facility and Chandler Facility in line with s5.9 of AS 3833s (refer to Figure 5-24).

Key features of the system are:

- Bulk Cargo Management for Bulk Terminals.
- Yard Management, including yard queues, container lists, yard location filters etc.
- Segregation management for dangerous goods containers.
- Yard Equipment Control & Management System, incorporating advanced features such as equipment pooling and cycling, twin-lift capability on yard equipment etc.
- Integrated EDI processing and translation system, with large number of message formats.
- Extensive report generation capabilities, incorporating operational, management and KPI reports.
- Handheld PC (Windows Mobile) solutions, capable of providing real time information anywhere in the terminal.
- Web based application (Portal) for customer access to various modules including Vehicle Booking System (VBS), Storage Calculator, Container Reporting.
- Integration with Third Party / hardware system including Weighbridge and Digital Scales, RFID tags etc.

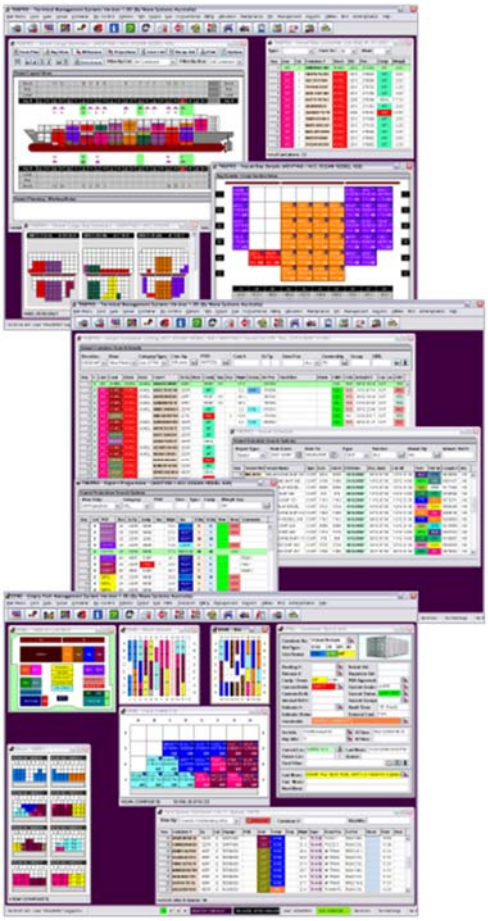

Figure 5-24 WAVE TME system outputs

5.2.30 NT EPA 30

Issue raised

In the Supplement clarify the provisions made for the storage of waste liquids in relation to containment of spills and firewater. There should also be clarification on the containment of firewater and stormwater with attention given to potential cross contamination. It would help if you could also provide some indication of the storage layout with reference to segregation distances in relation to the proposed volumes to be stored at the facility especially in the period between commencement of acceptance of waste and the beginning of waste placement. Given that the facility will be accepting hydrocarbon containing wastes, the Supplement should include some explanation as to the firefighting provisions being made in the storage area.

Proponent's response

The proponent recognises the draft EIS did not contain sufficient discussion and evidence on what provisions would be in place for the storage of liquid wastes in relation to containment of spills and firewater. National and Territory guidelines indicate that even at trace concentrations in groundwater, soil and air, these pollutants may represent a risk to human health and the environment. A number of pollutants, may be found in liquid wastes and, in the opinion of the proponent, are listed below from highest to lowest priority:

- Hydrocarbons (solids and liquids) from fuel installations and equipment.
- Pollutants that may be generated in the event of fire-fighting /suppression activities.
- General waste including grease traps created during activities within the living quarters and messes.
- Batteries used for maintenance, communications equipment and components or parts.
- Copper chromium arsenic treatments from wood preservation.
- Solvents and volatile organic compounds used within laboratory and maintenance usage situations.
- Heavy metals found in maintenance, weapons ranges and burning grounds.
- Corrosives (acids/alkalis) used during maintenance activities, laboratories and within batteries.
- Paints used in building and automotive maintenance.
- Resins from maintenance activities.
- Pesticides, biocides and persistent organic pollutants from workshops.

The key risk of an operational failure or incident during liquid waste handling and storage activities are impacts to air quality, soil, groundwater and surface water quality. The fluid nature of the waste means that any leaks/spills are highly mobile and may cause pollution of the atmosphere, soil, creeks and shallow groundwaters.

Table 5-23 details the pollution prevention guideline requirements associated with the operation of liquid waste storage and handling facilities. For above-ground storage facilities for liquid waste, the operational and design requirements outlined in a performance standard yet to be determined by the proponent but, would meet the classification and compliance of liquid waste stored onsite and meeting applicable legislation and Australian standards (i.e. AS:4681:2000).

Table 5-23 Pollution prevention guidelines for handling and storing liquid waste

No.	Category	Guideline
1	Management and administration controls	Liquid waste storage area complies with supporting documentation requirements e.g. operational management plan and required inspections and management reviews deemed necessary within applicable legislation and Australian Standards.
2	Waste classification	The classification of liquid waste stored onsite complies with requirements outlined within applicable legislation and Australian Standards
3	Drainage systems	Drainage systems at the facility comply with maintenance and monitoring requirements and appropriately manage pollution risks associated with the discharge of water as outlined within applicable legislation and Australian Standards
4	Storage equipment	Operation/design of the liquid waste storage equipment/facility complies with requirements outlined within applicable legislation and Australian Standards.
5	Transport	Transport of liquid waste complies with requirements outlined within applicable legislation and Australian Standards to prevent pollution
6	Treatment and / or disposal	Operation and procedures for treatment and/or disposal of liquid waste complies with requirements outlined within applicable legislation and Australian standards
7	Emergency response and clean-up	Emergency response and clean-up procedures and actions for liquid waste handling activities comply with requirements outlined within applicable legislation and Australian Standards

With respect to fire-fighting provisions, the Apirnta and Chandler facilities would be equipped to meet Australian standards and tailored for different waste types. For example, the firefighting system is tailored to the waste type, some waste types can have a water based fire protection system over them, others require a NON-water based fire protection system. The Facilities (Apirnta and Chandler) staff will have training, clear signs and in some cases physical barriers (example ramps where the forklift has to go over as it moves from one zone that can store a certain waste type with its own acceptable firefighting system into another zone with a different firefighting protection system.

With respect to the containment of firewater and storm water, and potential cross contamination of the two, adequate spillage containment is essential. All handling and storage of liquid wastes will be undertaken within an area of secondary containment such as a bund. This includes any transfer of waste via pumping, as well as any potential filling of transport containers.

Depending on the material stored within the bund the capacity, according to the Australian Standard, may be required at least 100 % of the maximum tank volume. The Australian Standards recommend that spill compound capacities be about 110%, to facilitate the management of spill emergencies. The capacity of the bund will be reassessed where a hazardous material is stored to account for any firefighting water that may be released into the bund.

A liquid storage facility that is outside will have the bund volume increased to account for any rain water that enters the bund. The bund will be made from an impervious material that is resistant to the chemical waste stored within the bund. The bund will be sealed and all piping should enter or exit the bund over the wall. If only a small quantity of liquid waste is stored temporarily the waste may be stored in a single drum with a drum sump or drip tray and then taken to the Chandler Facility for permanent isolation.

Regarding segregation distances the proponent recognises the request from the NT EPA on further information on the proposed storage layout and Tellus plans to provide this information that will be compliant with the relevant DG storage regulations during the detailed BFS stage where FEL 3 and FEL 4 designs are finalised.

5.2.31 NT EPA 31

Issue raised

The Risk Assessments do not address operations at the Apirnta storage facility where up to 400,000 t of waste are stored. This poses a large potential risk from loss of containment. There is also no risk assessment of the facilities or processes employed when non-complying wastes are accepted and treated prior to disposal. In the Supplement, please provide an expanded risk assessment that includes consideration of the Apirnta storage facility.

Proponent's response

In specific response to the issue raised, the risks associated with various loss of containment scenarios from waste materials stored at the Apirnta Facility is assessed in Appendix X, Part C of the draft EIS. The Air Quality Risk Assessment presents predicted impacts and associated risks with a range of loss of containment scenarios over the following range as specified in Appendix X, Part C, Table 21 of the draft EIS. This table has been reproduced below as Table 5-24.

Table 5-24 Definition of accident likelihood

Likelihood	Definition	Indicative frequency band (per year)	Loss of containment volumes (as TEU and FIBC/ IBC Units)	
			Dry wastes	Sludge wastes
Frequent	Event would occur regularly on the Proposal site	F > 10	< 1 FIBC Incidental spillage	<1 IBC Incidental spillage
Likely	Likely to occur a few times in the lifetime of the Proposal	$10 > F > 10^{-1}$	1 FIBC Rupture of FIBC	1 IBC Rupture of IBC
Occasional	Could occur in Proposal lifetime; root causes likely to have occurred at the Proposal site	$10^{-1} > F > 10^{-3}$	1-17 FIBC Equivalent to up to 1 TEU	1-12 IBC Equivalent to up to 1 TEU
Unlikely	Unlikely; incidents known to have occurred in the industry but would require at least two failures	$10^{-3} > F > 10^{-5}$	18 – 34 Equivalent to up to 2 TEU	13 – 24 Equivalent to up to 2 TEU
Remote	Highly unlikely, but may exceptionally occur; would require multiple failures	$10^{-5} > F > 10^{-7}$	35 – 1,700 Equivalent to 2-100 TEU	25 – 1,200 Equivalent to 2-100 TEU
Incredible	Extremely unlikely that the event would ever occur	$F < 10^{-7}$	1,701 – 18,823 TEU site capacity[(a)]	1,201 – 19,047 TEU site capacity[(b)]

Adopted from: UK Health and Safety Executive – "*Safety Report Assessment Guide*"

Notes (a) the site capacity is noted as being 400,000 tonnes in total. Based upon a TEU containing solid waste material stored in FIBCs in TEUs at a capacity of 21,250 kg·TEU^{-1}, this would equate to a notional site capacity of solid wastes of (400,000 t x 21.250 t·TEU^{-1}) 18,823 TEUs containing solid wastes in FIBCs

(b) the site capacity is noted as being 400,000 tonnes in total. Based upon a TEU containing sludge waste material stored in IBCs in TEUs at a capacity of 21,000 kg·TEU^{-1}, this would equate to a notional site capacity of sludge wastes of (400,000 t x 21.000 t·TEU^{-1}) 19,047 TEUs containing sludge wastes in IBCs.

The risks associated with the predicted impacts of the above scenarios are presented as risks in Appendix X, Part C of the draft EIS.

As stated in Section 3.6.5 of the draft EIS, non-complying wastes would not be accepted on site and therefore the risk is managed through the principal of exclusion.

5.2.32 NT EPA 32

Issue raised

The Proponent documents a large storage facility at Apirnta and a smaller facility at Chandler that will include the plant for making the hydraulic backfill. If the storage conditions for the waste at Apirnta result in spillage and leakages of waste and resultant stormwater is used in the backfill production process, there is a significant possibility that undesirable wastes could be incorporated into the backfill material.

Appendix Q of the draft EIS (S4.3.1) notes that site controls will minimise the escape of contaminants into the local environment. In the Supplement, please detail the responses to loss of containment

scenarios which take into consideration the size and nature of the spill. The responses should detail how contaminated materials and water and waste are to be managed.

Proponent's response

In the event that the site controls designed and installed to contain spills do fail, the following responses to loss of containment scenarios are discussed.

Firstly, spill prevention is key to safeguarding against a loss of containment at either site (Apirnta or Chandler). Regular maintenance and inspections will be undertaken to ensure site controls are (a) in place and, (b) are in good working order.

In the event of a spill and loss of containment, the spill will be managed with the following key actions:

- Locate spill source.
- Contain in agreement with approved procedures.
- Isolate from any drains and/or water courses.
- Absorb / recover pollutant or contamination as efficiently as possible.
- Classify spill incident severity.

A spill kit including drain covers and absorbent material (as per the Australian Standard) will be maintained at all times within all areas where liquid wastes are used, handled or stored. The pill kit should contain covers to protect access to drains and absorbent material for containing the spill. Any material used to contain the spill could be isolated inside the Chandler Facility. Training records will demonstrate that staff are trained to install spill response equipment.

If contaminated water is to be used in the hydraulic backfill process, it would first have to pass the proponent's WAC for the hydraulic backfill constituents. The final constituents of the hydraulic backfill waste mix is still under investigation by the proponent and will be verified by International sources (i.e. consultants that provide this technology in Germany).

Any uncontained spills less than 50 L will be reported to the NT EPA / DPIR. For spills that have spread or, have the potential to spread beyond the boundary of the installation, the appropriate authority will be notified within 24 hours.

Following notification of a potential spill or leak a full assessment of the leak or spill will be carried out. The assessment of leak or spill, where necessary, may include an intrusive soil and groundwater investigation.

5.2.33 NT EPA 33

Issue raised

The draft EIS includes discussion of the release of trapped gases or volatile compounds. In particular, the draft EIS includes a statement which assumes that no trace volatile components will remain in

the backfill. Describe how the waste acceptance criteria account for the mixing of wastes for hydraulic backfill, including products and noxious emissions.

Furthermore, on page 77 a contradictory statement is made: "*Some gas formation from the emplaced hydraulic wastes in the storage and disposal rooms would be normal and could be managed safely by:*

- *Monitoring of gas formation during backfill preparation.*
- *Adjusting retaining time in the homogenisation tank accordingly.*
- *Ample ventilation of the waste emplacement rooms in the mine."*

Please provide further information on how this risk is managed both during placement and during convergence where further consolidation of the placed wastes may occur prompting a delayed release of volatiles.

Proponent's response

Some gas formation from the emplaced hydraulic wastes in the storage and disposal rooms would be expected and would *be* managed safely by:

- Diverting contaminated materials from backfill application to disposal by encapsulation emplacement.
- *Adjusting retaining time in the homogenisation tank accordingly* and monitoring the formation of off-gas by observation (odour observation) and monitoring of VOCs using a hand-held PID analyser as appropriate.
- *Monitoring of gas formation during backfill preparation* by observation and monitoring of VOCs using a hand-held PID analyser as appropriate.
- *Ample ventilation of the waste emplacement rooms in the mine* and confirmation by observation and monitoring of VOCs using a hand-held PID analyser as appropriate.

Through the above management, it is not expected that the concentration of volatile components in the backfill materials or rate of off-gassing would be significant, and any residual emissions would be controlled through the operation of the ventilation system

5.2.34 NT EPA 34

Issue raised

It appears that risk has mostly been assessed in terms of the backfilling composition.

Provide an environmental risk assessment of the two hydraulic backfilling methods taking into consideration the above-ground risks, such as the plant and transport of the backfilling material.

Proponent's response

The proponent provides the following comparative details on the two forms of potential hydraulic backfill methods (flushing and viscous) (refer to Table 5-25). Discussion of risks associated with the hydraulic backfill process, as required by the NT EPA, is also provided.

Table 5-25 Hydraulic backfill comparisons

	Flushing	Viscous
Pre-mix time	1 hr	4 hrs
Cleaning time	1 hr	1 hr
Personal preparation time	1 hr	1 hr
Actual backfilling time within two shifts	13 hrs	10 hrs
Total backfill amount	128,500 t/a	70,000 t/a
Solid amount	38,500 t/a	35,000 t/a
Liquid amount	90,000 t/a	35,000 t/a
Liquid to be recycled	58,500 t/a	Not applicable

As indicated in Table 5-25, viscous hydraulic backfill does not emit a liquid in the drying process, unlike flushing backfill. However, the flushing backfill methodology allow for approximately 1.8 times the volume of waste to be backfilled when compared to viscous hydraulic backfill.

For hydraulic backfill to work, distinct 'recipes' have to be applied. Deviations from the recipes can, for example, lead to hydraulic problems including mixtures that settle in the pipes and unwanted gas formation. To avoid these unwanted risks and issues, all waste batches that are to be used for hydraulic backfill must have a complete deceleration and, they must be analysed according to specified tests.

Wastes containing organic compounds are considered to have a negative effect on hydraulic backfill mixtures as:

- Hydrophobic particles or drops will separate in the mixture and might create problems in the backfill lines and during placing of the backfill.
- foam might generate.
- these compounds are generally combustible.
- some organic substances exhibit an unpleasant odour, which should be avoided underground.

For the reasons explained above, these wastes are not included in any further considerations. Waste types listed under the NEPM code that do not pose unwanted risks and could be used in hydraulic backfill are listed in Table 5-26.

Release of gases

When certain wastes are mixed with liquids, gases like H2 and NH3 as well as unpleasant odours can be released. This naturally also happens during the production of hydraulic backfill. Preferably most

of the gases are released above ground during mixing where they can be collected and expelled through a ventilation system.

This can't always be ensured though and gas release has to be accounted for also underground. The mine air system has to be planned accordingly so that no thresholds are exceeded. The areas for hydraulic backfilling should be located close to the mine air exhaust shaft because of these hazardous gases but also due to the mine air taking up moisture from backfill materials that are still damp.

Separated disposal of different waste types

Hydraulic backfills work with the incorporation of liquids. Both flushing backfill and viscous slurry backfill include physically bound liquid that can be pressed out of the matrix after the backfill's setting. The pressure that causes this, could for example be the surrounding rock's convergence.

The liquid that is set free in such an instance should not be able to reach other wastes that had been disposed in the same mine. On one hand, the free liquid could destroy receptacles like steel barrels and, on the other hand, the liquid might react with wastes and release hazardous gases.

During disposal operation, the different waste types, dry and wet, should be spatially separated that no interaction is possible. Before the underground disposal is closed the two areas must be closed off from each other by dam constructions that ensure the long-term separation of the liquids from the dry wastes.

Safety concept and long-term safety

To be able to achieve permission for underground disposal in Germany, it is necessary to assess the site-specific safety and to make a long-term safety evaluation. This verifies that the waste will be separated from the biosphere permanently and reliably. The evaluation has to show this for wastes disposed in barrels, in big bags, as bulk or as hydraulic backfill equally. As hydraulic backfills include fluids the proof that the host rock's permeability is low enough to separate these fluids permanently from the biosphere has to be made additionally.

The safety concept is based on the geological, hydrogeological and waste data and it comprises the plans of process engineering and site-specific data (e.g. local rock stress tensors).

For the long-term safety evaluation, the natural and technical barriers have to be assessed as well as the impact of any possible event (scenario). The results of all analysis have to be combined in an examination of the overall system.

Quintessa have provided an overall operational and post-closure performance risk assessment confirming the passive safety of the proposed Chandler Facility over geological time (refer to Appendix H for more information that quantifies and qualifies this safety assessment).

Table 5-26 NEPM wastes that do not pose unwanted risks

General description of waste types	NEPM Code	Listed waste types	Potential tonnes per annum	Comment
Wastes (currently Immobilised ex soils	D130	Arsenic, or Arsenic compounds	5,000	might need treatment/processing
Wastes (currently) Immobilised ex soils; Other solid wastes going to hazardous waste landfill; Other mining wastes	D150	Cadmium, or cadmium compounds	15,000	might need treatment/processing
Metal smelter and refinery waste; Petroleum refining wastes	D220	Lead, or lead compounds	21,000	grain size suitable for hydraulic backfill has to be generated/ensured
CSG wastes (dirty salt and brine)	D300	Non-toxic salts	35,000	suitable as brine saturated in NaCl; bigger amounts possible
Contaminated soils - Cat A, B, C	N120	Soils contaminated with a listed waste listed in this Schedule	25,000	might need treatment/processing
Metal smelter and refinery wastes	D230	Zinc compounds	35,000	grain size suitable for hydraulic backfill has to be generated/ensured

5.2.35 NT EPA 35

Issue raised

The draft EIS indicates that liquid wastes that cannot undergo solidification/stabilisation or be incorporated into the hydraulic backfill mixtures will not be accepted for permanent isolation due to the risk of seepage and potential dissolving of the salt walls. However, the listed waste *waste oil/water, hydrocarbons/water mixtures or emulsions and Waste mineral oils unfit for their original intended use are listed in Table 2-2: Example chemical wastes likely to be suitable for permanent isolation at Chandler.*

Explain how the above mentioned liquid wastes are suitable to undergo solidification/stabilisation or be incorporated into the hydraulic backfill mixtures?

Proponent's response

KU-Tech's report on hydraulic backfill (Appendix I of the draft EIS) provides justification on what waste types have been and have not been recommended for use in the proposed hydraulic backfill process.

Table 5-26 lists wastes that are considered appropriate in the blending of hydraulic backfill because they do not have wastes containing organic compounds which KU-Tech consider to have negative effects on hydraulic backfill mixtures.

These wastes would not:

- Create problems in the backfill lines and during placing of the backfill.
- Foam would not generate.
- Would not combust.
- Would not result in an unpleasant odour, which should be avoided underground.

Therefore, it is appropriate for the proponent to undertake further investigation of these waste types for the purpose of use in hydraulic backfill. This will occur once the proponent consolidates its waste supply agreements with the waste producer, has the producers SDS, has sent samples of the waste products to leading international experts like KU-Tech to confirm the suitability and if suitable, the optimal hydraulic backfill recipe to ensure safe operations.

5.2.36 NT EPA 36

Issue raised

In the Supplement, discuss the risk of dissolution of the natural salt barriers. Discuss the stability and integrity of the waste packaging in contact with the salt barriers i.e. potential for deterioration over time.

Proponent's response

Salt is an ionic solid that can be dissolved by water. The Chandler salt formation is approximately 500 million years old, well defined over the project area by interpretation of seismic survey lines. Interpretation of the chandler formation conducted by the proponent and international consultant RPS examined the seismic data and did not identify any dissolution features within the Chandler Formation.

During mining and waste placement activities, the risk of dissolution of the salt is considered low. Water entry into the mine is unlikely due to the mitigation measures in place during construction and operations (refer to chapter 6 of draft EIS).

The underground mining rooms would be dry with low humidity, the salt barrier would not increase the rate of deterioration of waste packaging.

5.2.37 NT EPA 37

Issue raised

Hazardous Waste Storage, Permanent Isolation and Disposal are the terms used by the proponent throughout the document. Permanent Isolation is defined in Appendix C as "*indefinite below ground storage or disposal of wastes determined suitable for acceptance*". At what stage/after what length of time does storage of material become permanent isolation? Is there a difference between permanent isolation and disposal?

Proponent's response

Hazardous waste may be designated for either "storage" or "permanent isolation". Waste storage is the storage of waste [either above or below ground] on a non-permanent basis.

On the other hand, hazardous waste permanent isolation is the permanent storage of the waste below ground.

A more detailed explanation of each of the storage and permanent isolation concepts is set out in the following paragraphs.

Hazardous waste *storage* is a term that can capture a number of different scenarios depending on the commercial arrangements. Examples of those scenarios include the following.

- The short-term storage of hazardous material on the surface where title stays with the Customer. At the end of the storage term, the materials are returned to the Customer (similar to any surface DG warehouse business found in Australia).
- The long-term storage of hazardous material below ground where title stays with the Customer. At the end of the storage term, the materials are returned to the Customer (similar to any underground warehouse business found in North America and Europe).
- The long-term storage of hazardous material below ground where title transfers to Tellus at the Facility Gate after the issuing of a waste Acceptance Certificate. Tellus stores the

materials in designated zones with the objective of future retrievability as the waste may have valuable materials suitable for a recycle or recovery event.

- The short-term storage of hazardous material on the surface before it is moved underground at the Chandler Facility for long term storage or permanent isolation inside the deep geological repository.

Permanent isolation is not the temporary storing or transferring wastes. As defined in Appendix C of the draft EIS, it is "*indefinite below ground storage or disposal of wastes determined suitable for acceptance*". This effectively means the permanent isolation of waste materials over geological time.

Waste that has been designated for permanent isolation under the WAC, WAP and WZG are deemed "permanently isolated" as soon as it is placed in its permanent location within the Chandler Facility.

In distinguishing the term "disposal" from "permanent isolation", in its simplest form permanent isolation is a form of disposal. However, the term "disposal" is used in landfill contexts and the term "permanent isolation" is used in geological repository contexts.

Why do we use different terms? The draft EIS draws comparisons between what is a landfill site and what is a deep geological repository (refer to the Executive Summary). The difference between landfills and geological repositories is illustrated in Figure 5-25, the key difference being that even with a well-engineered landfill site, the artificial liner usually only isolates hazardous waste for 10- 30 years before degradation of the liner creates a contamination risk, whereas a geological repository is passively safe on a geological timescale. As a result, international regulators are restricting landfill development and their use for most hazardous waste types. Accordingly, a landfill site cannot permanently isolate waste and waste placed into a landfill site cannot be issued a "Permanent Isolation certificate", but a geological repository can do both.

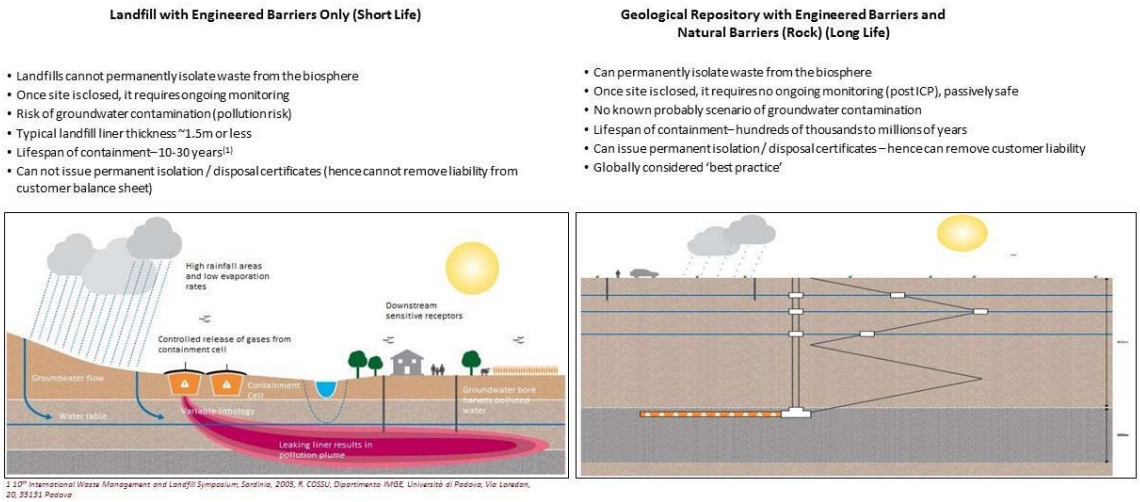

Figure 5-25 Difference between landfill and a geological repository

5.2.38 NT EPA 38

Issue raised

The stability of the Chandler formation and its suitability for storage and containment of waste through the isolation from the biosphere is both inferred and positively stated. The characteristics of the formation and potential pathways for release (and their control or containment) are described and discussed in the supporting appendices. These characteristics are fundamental to use of the facility for storage and containment yet a concise summary of this aspect is missing from the overall project description.

The proponent should provide in the project description a concise statement and summary of why the Chandler Formation provides a suitable opportunity for waste storage and containment.

Proponent's response

A concise statement in one paragraph is the following:

The Chandler Formation provides a suitable opportunity for waste storage and permanent isolation as it meets world's best practice site selection criteria for the development of a deep geological repository. Waste can be stored or permanently isolated from the biosphere in an impermeable, geologically stable, easy to mine salt bed that is 800m deep, 250m thick and 18km wide. There is no plausible risk of groundwater contamination as no aquifers have passed through the salt bed over the last 500 million years. The site is located in a remote and an arid area. Once the site is closed, it requires no ongoing monitoring as the natural salt barrier is passively safe.

Summary below:

The following information, whilst contained in other sections of the draft EIS (Executive Summary and Chapter 2) is now considered to form part of the Project Description.

A deep underground geological repository that safeguards human health and the environment from harm over geological time. This can be achieved by applying proven scientific and environmentally sound management principles.

A geological repository is an underground storage or disposal facility of hazardous waste that relies on both a natural geological barrier (e.g. a salt bed) and man-made engineered barriers that both form part of a multibarrier system as part of an overall safety case that is globally recognised for its permanent isolation capabilities.

The natural geological barrier isolates waste from the biosphere safely and permanently. Once the repository is closed, it requires very little ongoing monitoring during the institutional control period which is the period that confirms the multi barrier system is working as it should and no monitoring after that as the geological barrier is viewed as passively safe. Salt beds have a natural feature called salt creep where they have the ability to self-heal. Even if a major earthquake rippled through the salt bed, salt would absorb most of the shock. The lifespan of containment is in the hundreds of

thousands to millions of years. As a result, geological repositories that can permanently isolate materials, such as chemical hazardous materials, are globally considered 'best practice' for hazardous waste.

5.2.39 NT EPA 39

Issue raised

In terms of the dry packaged waste backfill, discuss the potential for wastes to react with the salt barrier if unintentionally released.

Proponent's response

Please refer to NT EPA 36.

5.2.40 NT EPA 40

Issue raised

The draft EIS notes that there may be some free liquid (brine) present in the mine post-closure. Describe the effects of free water on the stability of the facility including containment of stored wastes. Are there any contingencies for removing free liquids before the rooms are sealed and the mine is closed?

Proponent's response

During the hydraulic backfill process, any brine that is present would be decanted from the slurry mixture and pumped out of the mine to be recycled and reused in the hydraulic backfill process.

The free liquid will be saline and present as a saturated brine.

The mine design would include contingencies for removing the brine. The design would include room 3D dimensions to ensure fluid flows/decants to designed area for collection and pumping to the surface before the rooms are sealed and before the mine is closed.

5.2.41 NT EPA 41

Issue raised

The draft EIS states: in German Law that the saline host rock functions as the only barrier rock and the long-term safety documentation in principle has to be provided for the saline rock as a barrier rock. In the Supplement it would be beneficial if you could provide a summary of the German Law and some background behind why saline rock is sufficient as a barrier rock. In the Supplement, provide further detail about any standards prescribed in the law that may be applicable to the Chandler Facility. In particular, does the law provide any guidance around the physical composition of the deposit for storing waste? For example, is there guidance around the minimum width of the deposit or the percentage of halite?

Proponent's response

The IAEA guidelines relating to development of geological repositories have been adapted and used internationally as a guideline to best practice. The prime safety requirement of a geological repository is to satisfy the protection objectives. These technical objectives can generally be achieved by an iterative process that integrates the detailed technical information collected through the various phases of investigation, detailed design, performance assessment and construction, where the design is brought into balance with the characteristics of the chosen site.

The main objective of a repository is to achieve the desired degree of safety for the final disposal of the waste.

Requirement 7 of SSR-5[4]: Multiple safety functions states:

The host environment shall be selected, the engineered barriers of the disposal facility shall be designed and the facility shall be operated to ensure that safety is provided by means of multiple safety functions. Containment and isolation of the waste shall be provided by means of a number of physical barriers of the disposal system. The performance of these physical barriers is achieved by means of diverse physical and chemical processes together with various operational controls. The capability of the individual barriers and controls together with that of the overall disposal system to perform as assumed in the safety case shall be demonstrated. The overall performance of the disposal system shall not be unduly dependent on a single safety function.

There is a broad scientific and technical consensus that geologic disposal is an appropriate and safe means of long-term waste management.[5]

The main types of formation that have been studied for geologic disposal are salt, sedimentary formations such as clay and shale, crystalline formations such as granite and gneiss, and volcanic formations such as basalt and tuff.

Salt formations are many millions of years old, and, since salt dissolves easily in water, their very existence indicates that there has been little flow of water for very long periods. Salt creeps under pressure, so any fissures tend to be self-sealing. The formations are mechanically strong, so the construction of large caverns and tunnels without roof supports is straightforward.

Rather than prescriptive criteria, site selection criteria exist as a guide to selecting a suitable site and includes assessment of the host rock, which in the case of the proposed facility would be within the 500 million year old, stable, flat lying Chandler salt Formation. Studies and assessment included in the draft EIS (refer to Appendix H and K) have assessed the suitability of the proposed facility design as a geological repository.

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[4] INTERNATIONAL ATOMIC ENERGY AGENCY, Disposal of Radioactive Waste, IAEA Safety Standards Series No. SSR-5, IAEA, Vienna (2011)

[5] https://www.oecd-nea.org/cen/publications/2458-geologic-disposal-rwm.pdf

5.2.42 NT EPA 42

Issue raised

The lessons learnt regarding long-term waste storage in underground storage facilities in Europe, has been largely incorporated into European Directives and respective Member State Law. German law contains a very detailed description of all aspects concerning the safe and efficient long-term storage of wastes. In the Supplement, please outline if there have been any failings identified with the operation of existing waste storage facilities in Europe in accordance with German Law and aspects of safe and efficient long-term storage of wastes. The Supplement should include a discussion around the applicability of any identified failings and whether these are relevant to the Chandler Facility.

Proponent's response

There are extensive mining works in Germany from active salt mining industry and historic salt mines. As a result of the depth, age and extent of the mine workings, mine cavities have been shown to pose a potential risk to overlying infrastructure on the surface. Subsidence resulting from overmined areas are of demonstrated concern in some areas.

The backfilling ordinance was passed on 30th October 2002, when standardized requirements were introduced in Germany. The backfilling ordinance determines certain requirements for waste management as well as the requirements of environmental protection with recycling wastes for backfilling. This was confirmed by the sentence of the European Court of 27th February 2002. The European Court states in its sentence that it is usually considered to be a recycling measure if natural resources are substituted by recycling waste.

One of the most important backfill mines is the mine in Sondershausen, which has been backfilling industrial waste since 1996. Industrial waste is backfilled into the mine using three methods; hydraulic, big bag or drop (bulk goods) backfilling. The effectiveness of the inserted backfill is regularly measured as to the stability of the safety pillars and by observing the development of subsidence on the surface.

The proposed Chandler Facility, has the advantage of being designed for both extraction of salt as a commodity and for waste backfill. Considerable experience exists in the UK, Europe and North America with regards to salt (and potash) mining and design considerations in relation to long term stability. Lessons learnt from historic mine workings (which may have been active for hundreds of years) include long term stability of rooms and overall subsidence effects, demonstrate that backfilling void space (mine cavities) is a positive approach to long term stability.

5.2.43 NT EPA 43

Issue raised

Given the facility will store waste permanently for long periods has there been any consideration of gas produced through the microbial degeneration of organic waste/anoxic corrosion of steel drums

and metallic waste? Will the rooms be sealed in a manner that allows for the medium-long term release of gases produced during waste disposal? In the Supplement, please discuss if this an issue for the long-term disposal of waste and the stability of the facility?

Proponent's response

The issue of waste stability and containment was addressed in Table 5-3 presented in Section 5.2 of the Risk Assessment, presented in Appendix H of the draft EIS. This table has been reproduced below as Table 5-27.

Table 5-27 Phenomena that could initiate loss of control over the hazard and activation of one or more pathways between the hazard and one or more potential receptors

Cause of Loss of Control	Description	Treatment
Waste degradation and gas generation	Corrosion of metals (H_2) generation and build up of gases (e.g. methane) due to organic waste degradation, possible pressurisation in vaults	Not considered explicitly within a scenario. Waste degradation and gas generation during the operational phase unlikely to be significant. Most degradation processes that can be envisaged require a source of water, but conditions within the CF [containment facility] will be dry. The only source of water will be any residual moisture within the wastes themselves. Such moisture will be present in limited quantities, with the result that any waste degradation and gas generation in the operational phase will be limited.

Issue raised

Will the rooms be sealed in a manner that allows for the medium-long term release of gases produced during waste disposal? In the Supplement, please discuss if this an issue for the long-term disposal of waste and the stability of the facility?

Proponent's response

The long-term stability and containment of the stored materials is an integral consideration of the Chandler Facility. As described in the Executive Summary of the draft EIS:

> '*a geological repository is an underground storage or disposal facility of hazardous waste that relies on both a natural geographical barrier (e.g. a salt bad) and man-made engineered barriers that both form part of a multibarrier system as part of an overall safety case that is globally recognised for its permanent isolation capabilities. The natural geological barrier isolates waste from the biosphere safely and permanently. Once the repository is closed, it requires very little ongoing monitoring as the geographical barrier is passively safe. The lifespan of containment is in the hundreds of thousands to millions of years. As a result, geological repositories that can permanently isolate materials are globally considered 'best practice' for hazardous waste*.'

The definition for 'best practice' is provided in the Risk Assessment presented as Appendix H of the draft EIS:

> '*here "best practice" refers to the well-established approaches and methodologies that are widely applied throughout the world for assessing the performance and safety of various kinds of underground waste disposal and storage facilities. These approaches and methodologies have been developed over several decades during many projects, including ones concerned with radioactive waste disposal, CO_2 storage, natural gas storage, and hazardous waste disposal. No single document describes this best practice, but rather the approaches and methodologies are documented in numerous reports by international agencies such as the International Atomic Energy Agency (IAEA), Nuclear Energy Agency (NEA), International Energy Agency (IEA), International Standards Organisation (ISO), national regulator, and project implementers.*'

In regard to the release of off-gases, the facility is designed for stabilised containment, and as such there is no identified capacity for the medium-term release of gases.

Section 4.2.2 of Appendix H (p13) describes the identification of hazards associated with the waste emplacement strategy, and specifically addresses the restrictions that would be imposed to manage the risks associated with for wastes with an elevated potential for reactivity and off-gas generation:

> *'It should be noted that Waste Acceptance Criteria (WAC) will be developed and adopted that are consistent with European legislation (specifically Appendix A of Council Directive (EC) 2003/33/EC and article 5(3) of the Landfill Directive, Council Directive (EC) 1999/31/EC, which deals with underground disposal of wastes in salt mines). Accordingly, a number of waste types / forms will not be permitted:*
>
> - *Wastes listed in Article 5(3) of the Landfill Directive:*
> - *liquid waste;*
> - *Waste which, in the conditions of landfill, is explosive, corrosive, oxidising, highly flammable or flammable (as defined in Annex III to directive 91/689/EEC);*
> - *hospital and other clinical wastes arising from medical or veterinary establishments, which are infectious as defined by (property H9 in Annex III) Directive 91/689/EEC);*
> - *whole used tyres and shredded used tyres;*
> - *wastes and their containers which might react with waster or with the host rock under the storage conditions and lead to:*
> - *Generation of auto-flammable or toxic or explosive substances or gases; or*
> - *Any other reactions which could endanger the operational safety and/or integrity of the barrier.*
> - *Wastes which might react with each other must be defined and classified in groups of compatibilities (the different groups of compatibilities must be physically separated in the storage);*
> - *Wastes that are biodegradable;*
> - *Wastes that have a particularly pungent smell;*

- *Wastes that can generate a gas-air mixture which is toxic or explosive;*
- *Wastes with insufficient stability to correspond to the geo-mechanical conditions;*
- *Wastes that are auto-flammable or liable to spontaneous combustion under the storage conditions, gaseous products, volatile wastes, wastes coming from collections in the form of unidentified mixtures; and*
- *Wastes that contain, or could generate, pathogenic germs of communicable diseases.'*

As described in the Executive Summary of the draft EIS, '*Waste Acceptance Criteria (WAC) have been established for the Proposal to determine waste types which could and could not be accepted in order to achieve safe operation and environmental protection in the longer term at the proposed Chandler Facility. The facility has been designed and would be located in a host geological environment that would be capable of storing and disposing of the majority of the NEPM 75 chemical wastes subject to them meeting strict WAC. These criteria were developed following internationally recognised best practice and set out waste characteristics that would be not be suitable for storage or disposal in a geological repository.*

Wastes that are gases, highly corrosive, highly oxidising, infectious or uncertified would not be accepted under any circumstances. Wastes that are liquids or sludges, explosive, flammable liquids or solids, self-combusting, generate a gas-air mixture which is toxic or explosive, biodegradable, tyres, could release free liquid or react with the host geology would not normally be accepted unless they could be stabilised, solidified or modified in such a way that they would not affect the operational or post closure safety of the proposed Chandler Facility.'

5.2.44 NT EPA 44

Issue raised

Assessment has assumed that the overlying formation is free of faults or discontinuities.

In the Supplement, describe the likely implications on the development of the project should a discontinuity be discovered by geophysical work during operation and mining extent is adjusted to avoid this discontinuity.

Proponent's response

Geological interpretation of seismic, intrusive drilling and non-intrusive methods show no evidence of faults or discontinuities over the project area. Additionally, no evidence of faulting in the surrounding Maryvale Hills or Charlotte Range. Drilling programs conducted by the proponent did not encounter any evidence of faulting or discontinuities in the core samples. Regional correlation between historic oil wells (Magee 1 and Mt Charlotte 1) and Tellus drill holes, show a high level of continuity over many kilometres.

Tellus has shown the geological results to Canadian, German and Australian shaft and decline sinking experts, underground mining experts, dual use salt and geological repository experts and they have not raised any concerns.

It is not considered likely that a material discontinuity would be encountered, however additional field investigations are proposed by the proponent during the next stage of feasibility including drilling and geophysical surveys. This work will provide a greater detail of geological information and if a major discontinuity was encountered, potential implications to mine design would be considered and addressed during the feasibility study.

5.2.45 NT EPA 45

Issue raised

Previous experience from Europe is stated as a reason for confidence and exercise of professional judgment. Positive statements are made without a focus on the learnings from failures or issues encountered that may be important to this project. For example, offsets of 150m Horizontally and 20m vertically are proposed to the edge of the formation and discontinuities.

In the Supplement, provide examples that illustrate the potential spatial variability of the resource examples cited used to provide these separation guidance distances. Given that salt mines that have been used as references already had operating histories prior to development for waste storage and containment, can the Proponent comment on the time required to gain a sufficient understanding of the spatial variability and behaviour of the Chandler Formation.

Proponent's response

German potash and salt mines have pioneered underground isolation of hazardous wastes, after they had commenced salt and potash mining as the primary business. Comprehensive site-specific safety assessments have validated short- and long-term performance for each facility. Adherence to strict site prerequisites and waste-acceptance criteria combined with the reliance on enclosure inside multiple barriers justify confidence in the retention capacity of the total system. Underground waste isolation has been proven to be a success in Germany.[6]

The proposed Chandler Facility has the advantage of being designed with its dual purpose in mind. Internationally recognised consultants with experience in salt mining and waste disposal within salt mines have been engaged by the proponent during exploration and development of the Proposal. As the Proposal develops, from exploration and feasibility through to construction and operations, new knowledge and understanding will increase relating to the spatial variability and behaviour of the Chandler Formation, as would occur with any mine development.

Reference to international experience, particularly from German is a result of the documented studies available demonstrating long term safety at various facilities. Underground waste disposal and reutilization has been a complementary part of German salt and potash mining for approximately 40 years. K+S Group (K+S) and Südwestdeutsche Salzwerke AG (SWS) currently

[6] *Behnsen, H, 2008. Underground repositories for chemically toxic waste in German salt and potash mines. The Geological Society of America Reviews in Engineering Geology XIX 2008*

operate a total of eight underground waste isolation facilities (refer to Figure 5-26). The facilities are listed in Table 5-28 and Table 5-29. Long-term safety has been demonstrated for all of the repositories listed.

For easy to read well illustrated brochures, fact sheets, technical documents and a video please refer to: http://www.ks-entsorgung.com/en/dokumente/informationsmaterial/

The web site has useful information on the following;

VIDEO

http://www.ks-entsorgung.com/en/about/

BROCHURES

Company Brochure; Underground Waste Disposal; Underground Recovery; Underground Waste Disposal at a Glance; Underground Recovery at a Glance; REKAL and Prognos Study on Underground Waste Disposal.

SITE PROCESSES

Underground Waste Disposal; Underground Recovery Plant Hattorf;Underground Recovery Plant Wintershall; Underground Recovery Plant Unterbreizbach; Underground Recovery Plant Zielitz; Underground Recovery Plant Bernburg and REKAL.

GENERAL INFORMATION

Exclusion criteria; Standard Terms and Conditions and Technical Data Sheet Montanal.

Table 5-28 Underground waste disposal mines

Name	State	Host rock	Company
Herfa-Neurode	Hessen	Potash, salt	K+S
Zielitz	Sachsen-Anhalt	Potash, salt	K+S
Heilbronn	Baden-Württemberg	Rock salt	K+S

Table 5-29 Underground waste reutilization mines

Name	State	Host rock	Company
Bernburg	Sachsen-Anhalt	Rock salt	K+S
Hattorf	Hessen	Potash, salt	K+S
Kochendorf	Baden-Württemberg	Rock salt	SWS
Unterbreizbach	Thüringen	Potash, salt	K+S
Wintershall	Hessen	Potash, salt	K+S

Figure 5-26 Outlook for underground waste management in Germany

Figure 5-27 Stacking of waste and backfilling with salt

Figure 5-28 Locations of underground waste disposal and re-use in Germany.

Red denotes disposal plant. Black denotes reuse plant.

Herfa-Neorode

The inactive potash mine at Herfa-Neorode has been permitted to accept waste since 1972. The successful operating record and the results of a careful geological and technical re-examination that focused on long-term environmental safety led state authorities to grant open-ended approval in 1977 and to permit hazardous waste disposal in the whole west field of the mine (refer to Figure 5-29, Figure 5-30 and Figure 5-31).

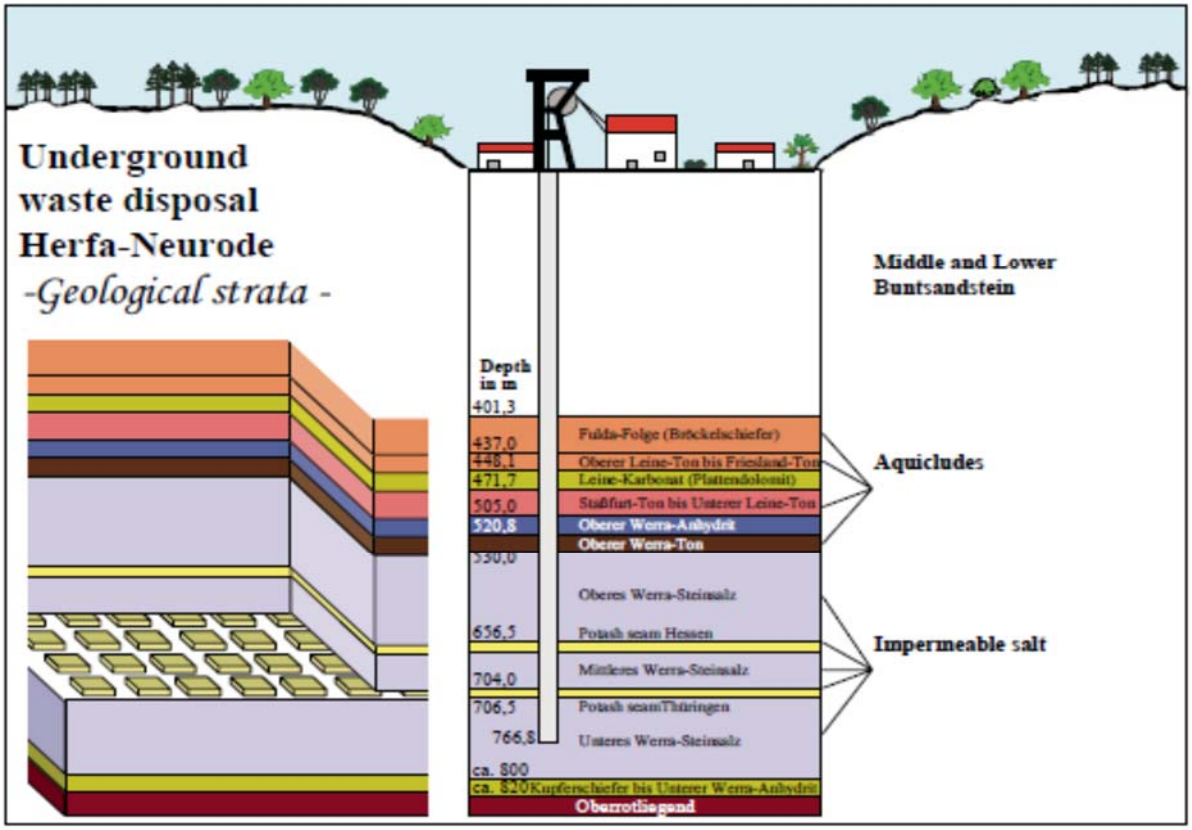


Figure 5-29 Stratigraphy for Herfa-Neurode

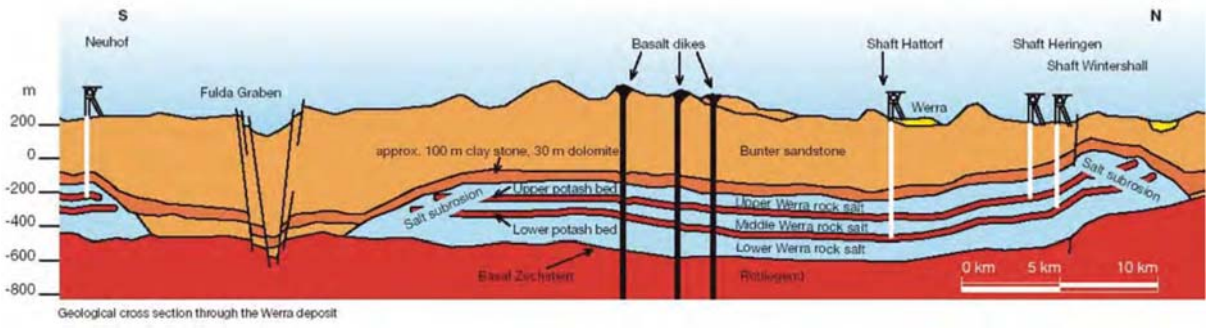


Figure 5-30 Herfa-Neurode cross section

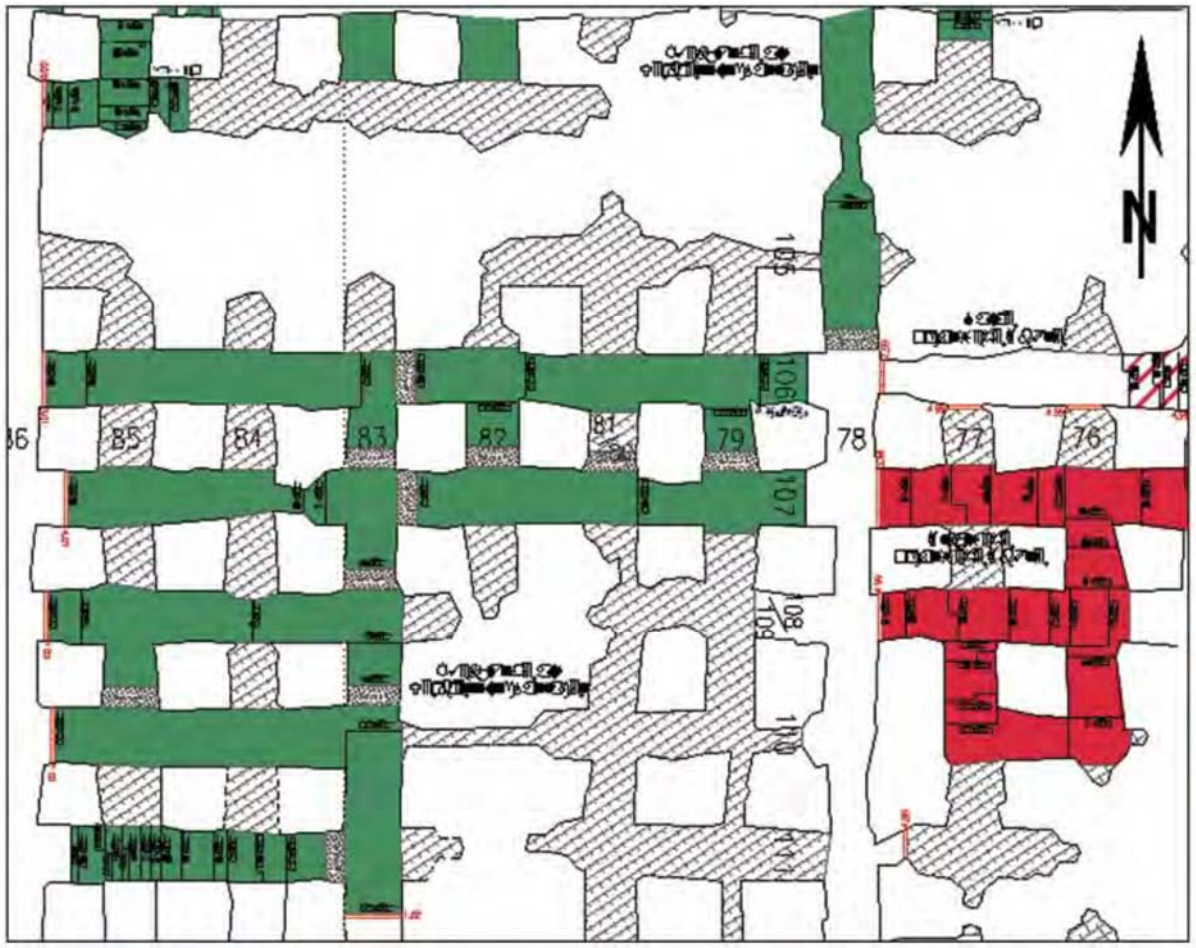


Figure 5-31 Herfa-Neurode waste disposal map

Asse Salt Mine

In the Asse salt mine, a system with relatively small pillars and stopes was excavated between 1909 and 1964. From 1965 until 1978, low- and intermediate-level radioactive wastes were disposed there permanently. Most of the chamber volume (~3.5 million m^3) was exposed to free convergence until 1995, when a backfilling campaign was started using pneumatic transportation of granular salt material. The barrier to the overburden rocks is formed by rock salt that has a minimal thickness of only 15 m in the upper part. The flank dips ~70°SW.

The Asse site has been monitored for decades by displacement observations, stress and strain measurements in the pillars, and recording of the backfill pressure built up in the chambers. Softening and damaging in the pillars and stopes of the mining horizon have led to stress redistributions into the overburden rocks, where rupture processes have occurred. Hence, because of the small dimension of the bearing elements on the southern flank and the close distance to the

overburden, far-reaching geomechanical interactions exist[7] (refer to Figure 5-32, Figure 5-33, Figure 5-34 and Figure 5-35).

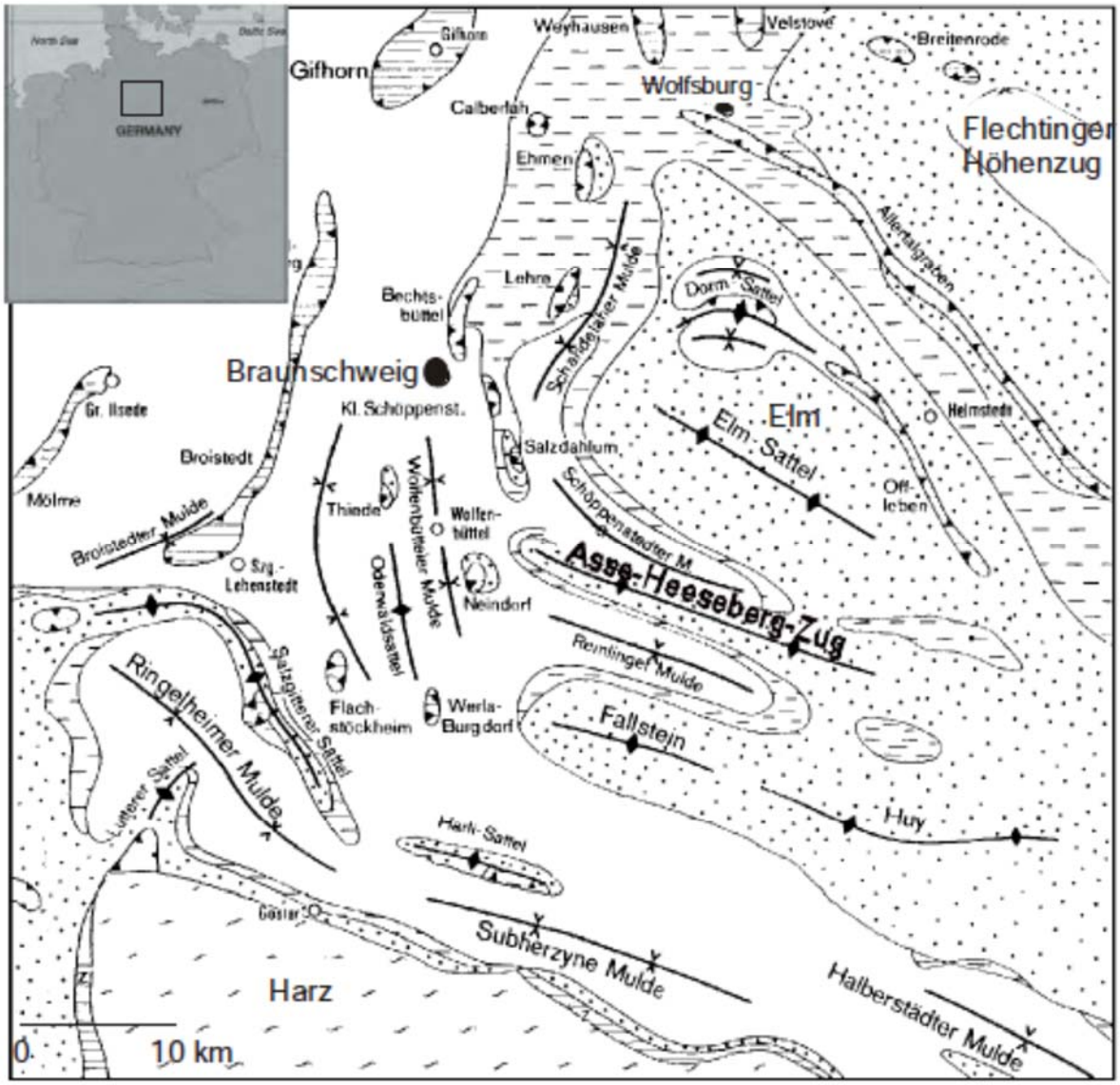


Figure 5-32 Structural overview of the northern foreland of the Harz Mountains and the Asse structure (after H. Jordan in E.,R Look, 1984)

[7] Gartner, G et al, 2008. Geological characterization of the Asse salt mine for mining, disposal of radioactive waste, and proof of long-term safety. The Geological Society of America Reviews in Engineering Geology XIX 2008

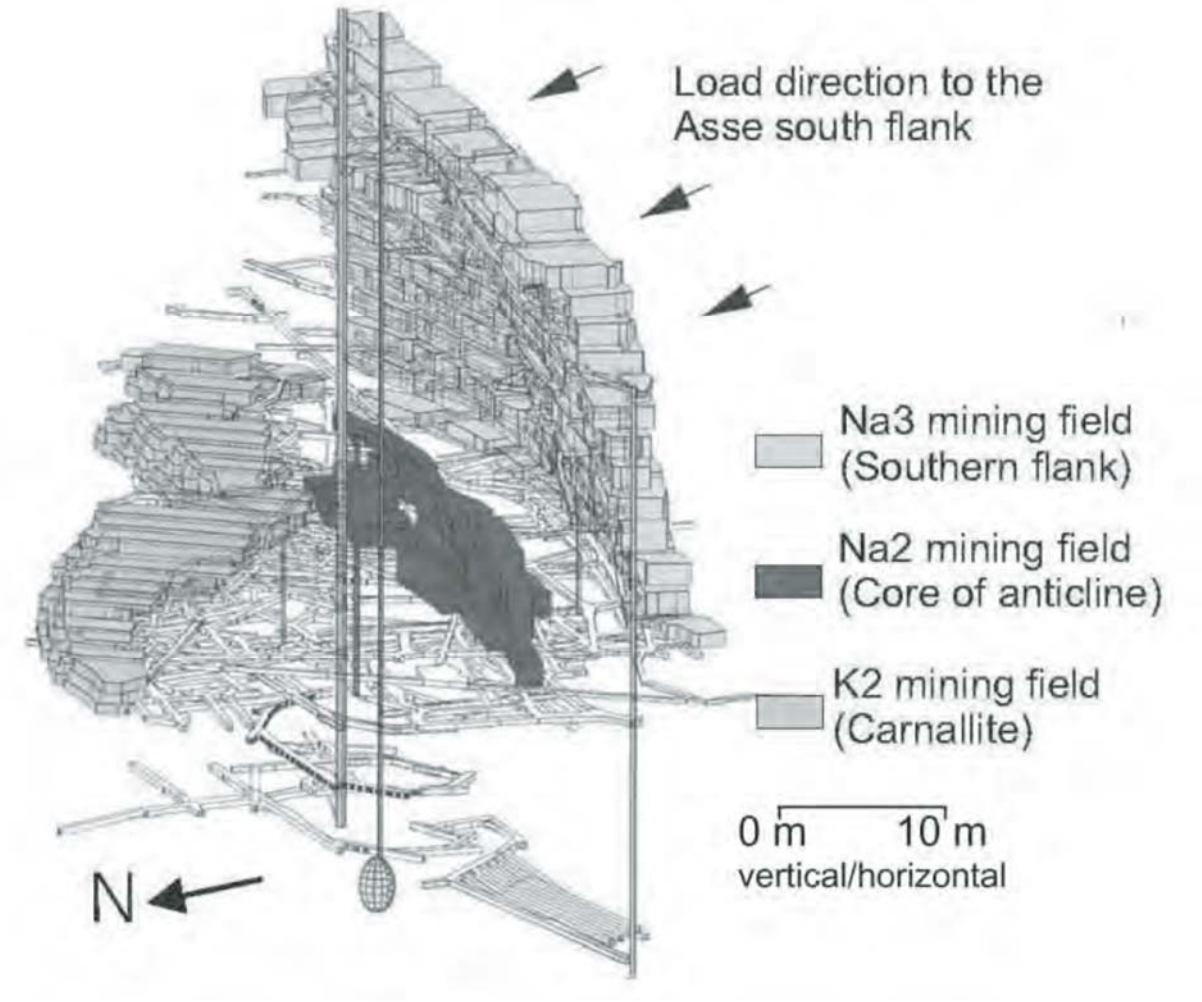


Figure 5-33 Mining sections of the Asse from 1909 until 1964. This figure shows a view roughly from west to east of the three working sections. The oldest working section is the potash section (lower left) on the northern flank at about the 750 m level.

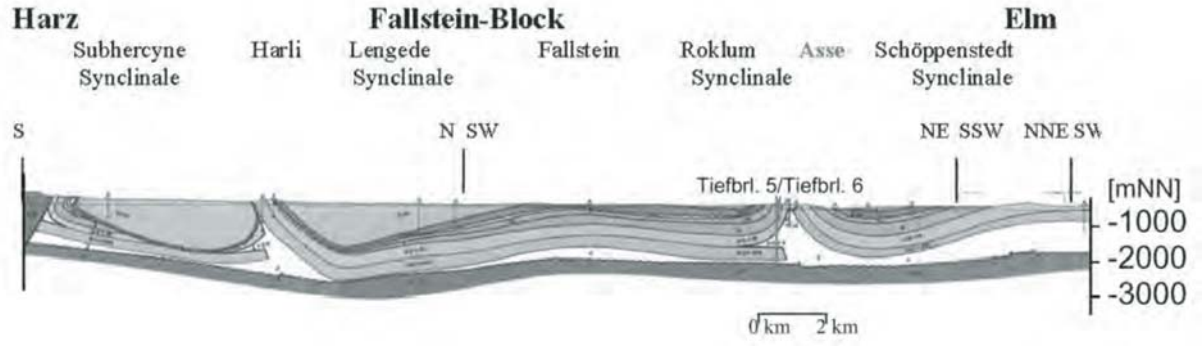


Figure 5-34 Geological profile of Harz-Elm (after Baldschuhn et al., 1996). This figure shows a cross section through the salt structures between Harz and Elm and their geologic-tectonic attributes

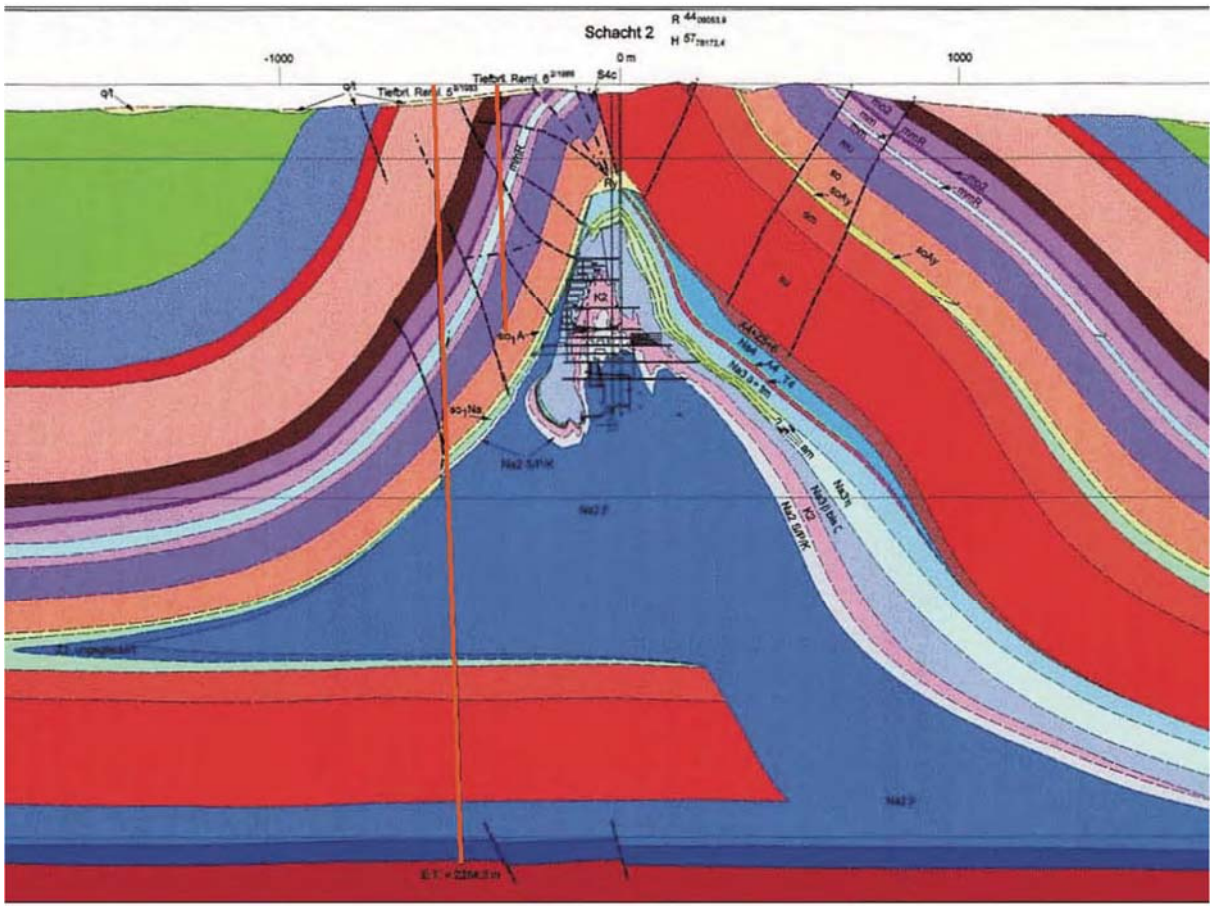


Figure 5-35 Reinterpreted SW-NE cross section in the middle of the E-W extension of the mine (cross section 2 through the Asse shaft 2[Schacht 2]). Also, this figure shows the deep wells 5 and 6 (vertical lines toward center of figure).

5.2.46 NT EPA 46

Issue raised

Assumed waste and backfill properties provide support with limited compression. The performance required for the waste stiffness was not described. Bulk bags, drums, hydraulic materials are proposed.

Please provide an example of how this uncertainty is managed in another facility. To what extent does the proposal rely on provision of passive support to prevent destabilising the Jay Creek Sandstone formation or a discontinuity within this formation?

Proponent's response

The German Sondershausen mine has demonstrated numerous technical possibilities of applying wastes as backfill materials since 1996. Studies[8] show that backfill is effective as a method of decreasing mine subsidence rates (refer to Figure 5-38). Recycling wastes for backfilling in German mines as well as waste management have achieved a great importance in Germany and in some neighbouring countries.

Figure 5-36 shows how the bulk bags are used as an effective method of decreasing or stopping mine subsidence rates

Figure 5-36 The front of the depository: Big bags are sprayed with salt to fill gaps and to connect them to the surrounding rock

The Figure below shows the impact of the bulk bag placement and salt creep over decades and how that acts to stop mine subsidence rates

[8] K-UTECH, 20015. Substantial Aspects of the Recycling of Industrial Wastes as Backfilling Material in Salt Mines. 20th World Mining Congress & Expo 2005, Mining and Sustainable Development

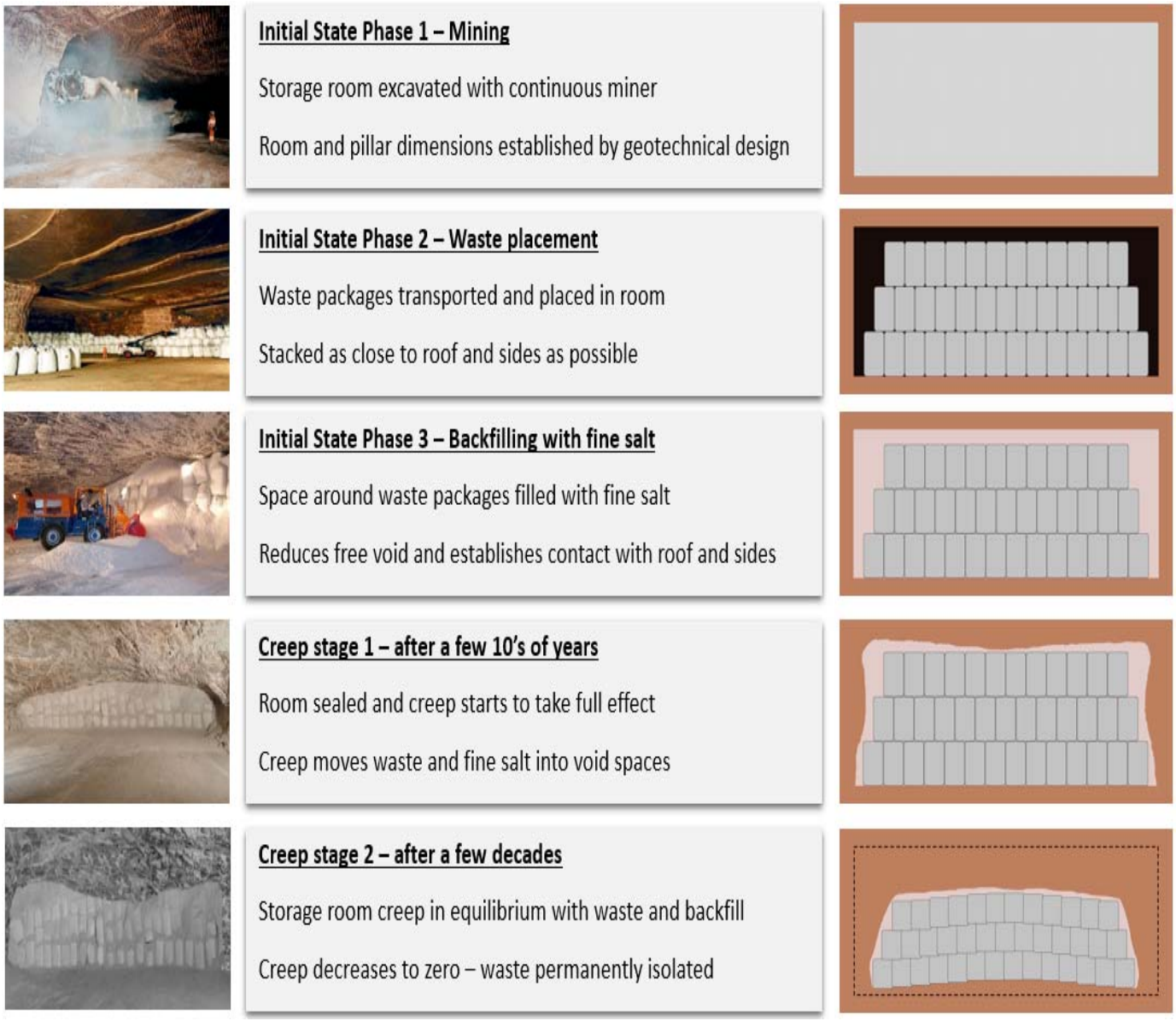


Figure 5-37 Big bags connect to the surrounding rock and the positive impact of salt creep

At Sonderhausen the following backfilling methods are applied:

- Hydraulic backfilling.
- Big Bag-backfilling.
- Drop backfilling (backfilling with bulk goods).

Convergence of rooms can be related to the efficiencies of how a room is packed, by using a large percentage of the available space, limited compression can occur because of its extraordinary effectiveness hydraulic backfilling is the dominant method of backfilling in the Sondershausen mine.

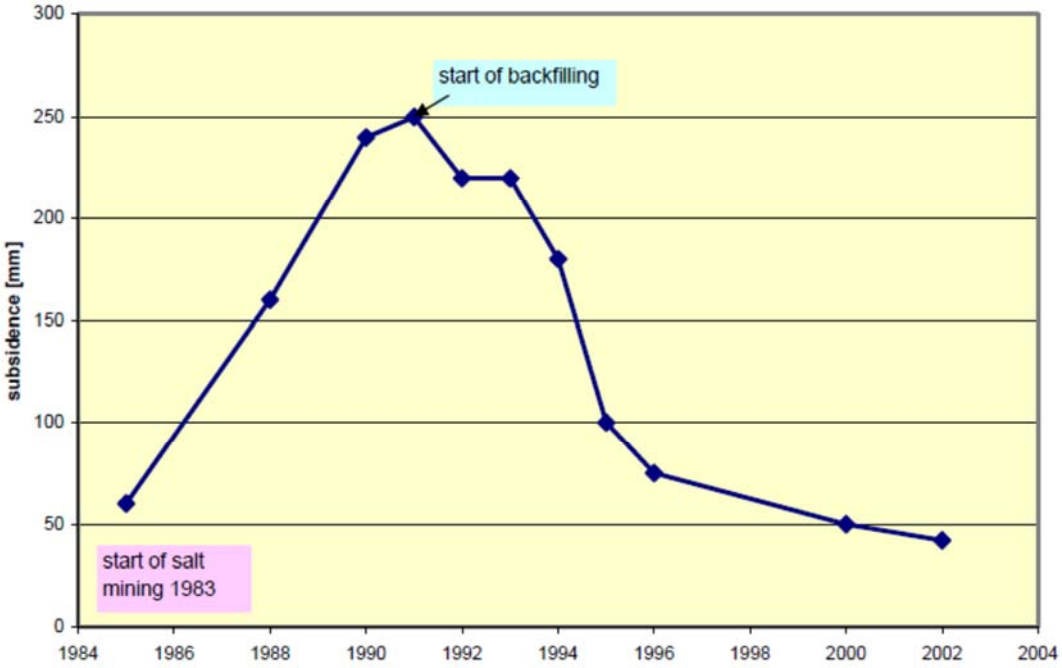


Figure 5-38 Development of subsidence on surface in Sondershausen

5.2.47 NT EPA 47

Issue raised

The zone between the seals which comprises backfill will be permeable. The general fill provides a preferential pathway to the chandler formation via the decline. The seals are critical for an effective seal for post closure / abandonment. Provide an example of the design of the proposed sealing methods and outline how the design is engineered for robustness and long term performance in post closure phase over the timescales discussed in the risk assessment.

Proponent's response

The decline and shafts will be sealed during construction by grout (via deep injection wells) and by sprayed concrete lining. The proposed sealing design will result in a barrier to groundwater flow into the decline and shaft, with groundwater continuing to flow around them (refer to Figure 5-39). The sealing has been designed for performance greater than the anticipated mine operation timespan of 25 years. During operations, continued monitoring of performance will occur.

During mine closure, concrete sealing bulkheads will be inserted to provide and effective seal between mining horizon and overlying water bearing strata. The grouted decline and shaft cavities will be filled with compacted fill. The proposed sealing methodology is in accordance with geological repository closure guidelines to provide high degree of sealing capacity over geological time. A risk assessment on sealing scenario was conducted by Quintessa and provided in Appendix H Section 8.3.4 of the draft EIS.

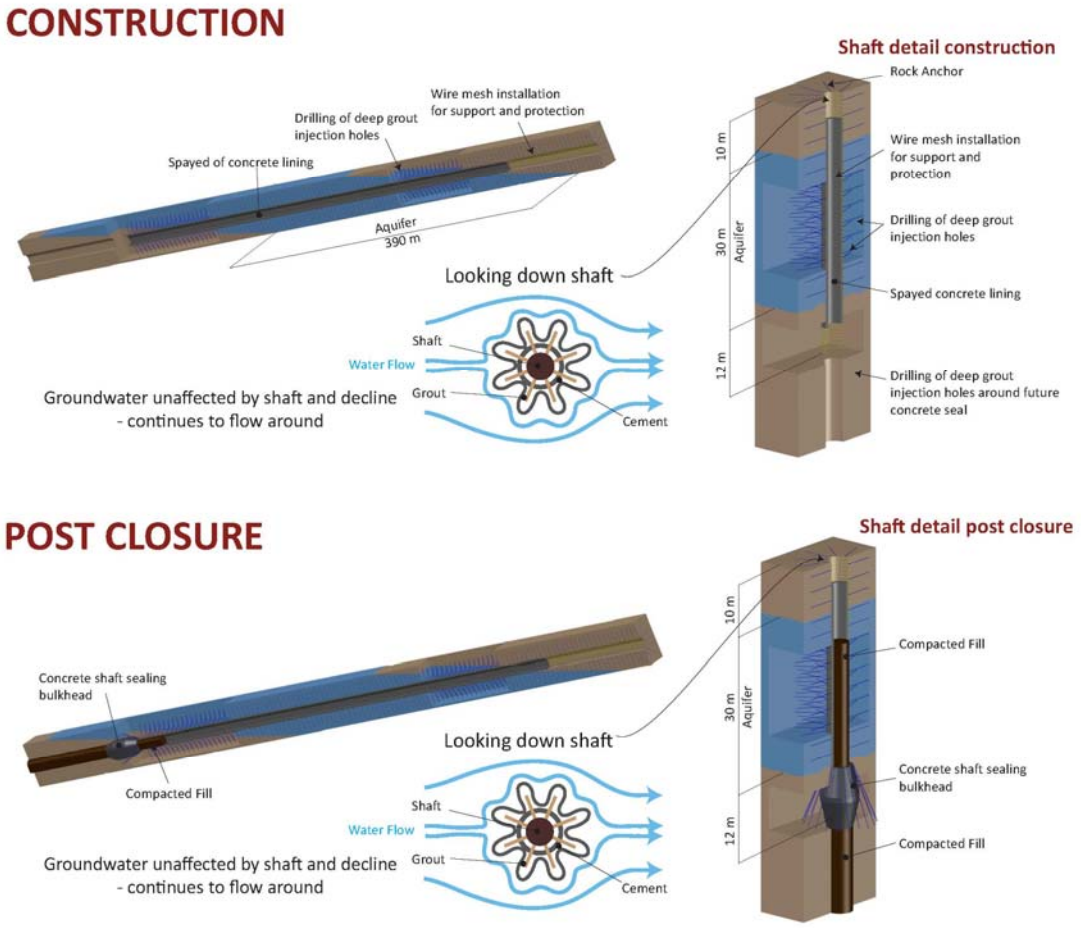


Figure 5-39 Decline and shaft sealing methods during construction and post closure

5.2.48 NT EPA 48

Issue raised

The draft EIS implies that the emplacement of fine salt eliminates the possibility of future recovery, which appears contradictory to other parts of the draft EIS. One of the points made in the draft EIS is that isolated material may be recovered at some future point where recovery of a component material of a waste is commercially viable. The process of progressively backfilling and sealing rooms and then finally the decline and shafts seems to remove the possibility of economically retrieving such waste in the future.

In the Supplement, please provide scenarios of how material could be reclaimed or state explicitly that once the rooms are closed there is no subsequent economical or practical opportunity to reclaim the material.

Proponent's response

It is the aim of the proponent to deal with the recycle and recovery opportunities either pre-Gate or post-Gate on the surface. However in the long term storage opportunity Tellus plans to allow

maximum flexibility in design and operation of the facility, in order to allow for retrievability without compromising the long-term performance of the facility. In the zoning of materials Tellus plans to separate the wastes that are best suited for permanent isolation due to their medium to high risk to the environment and human health. This will be most of the waste and steps will be taken to immediately backfill and seal the rooms once they are fill,

However, those wastes (minority) that have lower risk and future recycle or recovery opportunity (for example wastes with a higher concentration of metals in them), the rooms will be left open for easy inspection and retrievability or temporary seals will be placed at the end of the rooms that can be easily unsealed and resealed for interim audits or retrievability during the operation period of the Facility. If at the end of the project life an economic recovery event has not happened, the rooms will be permanently sealed and the facility will be decommissioned. A complete inventory of waste in each room will be handed to the authorities.

For reference commentary by the Organisation for Economic Co-Operation and Development (OECD) regarding the matter of waste retrievability is provided below that also tries to address the competing objectives of underground facilities:

Reversibility can be an aim throughout waste management:

- Wastes should not, as far as possible, be conditioned into a form which precludes taking advantage of future technological developments.
- Designs should not be frozen too soon.
- Commissioning, operation and closure of a repository should all be in small steps each of which allows commitments to be fully considered.

Reversal of the entire disposal process by retrieving previously emplaced wastes is perhaps the most challenging and contentious issue. At a practical, technical level easy retrievability can conflict with maximal isolation; in the area of disposal economics, planning for possible retrieval leads to the need for financial provisioning for subsequent alternative disposal technologies.

Nevertheless, in view of the increasingly widespread desire to keep future options open, there is a corresponding increased interest in evaluating retrievability.

The degree of difficulty and the cost involved in retrieving waste safely from a repository depend on the details of the disposal concept, including the materials that are used. In the United Kingdom and Switzerland, for example, the low strength of the cement-based backfill material referred to above may facilitate retrievability, should this be required.

For long-lived waste, governments in the Netherlands, France and the USA have either recommended, or require consideration of, retrievability or reversibility (for a limited time after emplacement). Implementers in countries like Sweden, Switzerland, Canada and the United Kingdom have read the signs given by the public and politicians, and have themselves built in features assuring longer term retrievability than originally envisioned. The periods explicitly

considered run through the whole operational period and over a period of the order of a hundred of years beyond.

The predominant technical view, however, remains that disposal implies emplacement without intention to retrieve, and that allowing for retrievability must not be allowed to compromise the long-term performance of a repository.

Retrieval is currently judged to be an extremely unlikely scenario, and the implications of doing so would have to be weighed against the benefits when a decision on whether or not to retrieve is being taken.

5.2.49 NT EPA 49

Issue raised

The draft EIS notes that potential recovery of waste must occur prior to decommissioning. Decommissioning results in permanent isolation containment that would need to be breached to allow for future access. Deferment of decommissioning is not desirable from a risk management perspective since the risks of exposure to the environment are highest during operational phase while the shaft is open.

In the Supplement, please clarify the triggers and timeline for decommissioning of access to the storage rooms and the circumstances under which an extension may be sought to enable recovery.

Proponent's response

The anticipated Chandler Proposal lifecycle is presented in Table 3-4 and illustrated graphically in Figure 3-6 in Section 3.2.2 of the draft EIS. As described in Table 3-4 of the draft EIS:

> *'At the completion of year 29, up to 19,800,000 tonnes of salt would have been mined, and up to 8,500,000 tonnes of hazardous waste would have been permanently isolated over 800 metres underground. Unless the proponent wishes to continue operations and an extension of the approval and licence is granted, mining and waste storage would cease. In accordance with the Mine Closure Plan, the shaft and decline would have been backfilled and sealed. Environmental groundwater monitoring continues.'*

5.2.50 NT EPA 50

Issue raised

Segregation of wastes for potential recovery or isolation from other material is likely to result in partially filled storage areas requiring continued access for the life of the facility as surrounding rooms are sealed and the facility expands. This may lead to voids being maintained for longer than planned without backfill to provide support.

In the Supplement, please provide information on how the decision to close a room will be made:

a) how the materials are deemed not to have future potential use;

b) should reduction in accepted waste quantities being segregation and monofilled occur to prevent unstable conditions.

The response should include information on how this issue will be managed when the acceptance of multiple waste types requires operation of multiple segregated rooms.

Proponent's response

It is the intention of the proponent to allow maximum flexibility in the design and operations to allow for retrievability of waste materials after placement (as discussed in NT EPA 48 response).

At this stage of the project design, the proponent has completed an indicative schedule and placement methodology in line with the Waste Zoning Procedure of the WAC. During the next stage of feasibility and detailed design this area will be subject to further engineering study and recoverability forecasting.

5.2.51 NT EPA 51

Issue raised

Land has also been previously cleared for tracks and a small amount of land has been cleared previously for mining exploration by Central Petroleum.

In the Supplement, identify the location of land disturbed by other Operators.

Proponent's response

Please refer to proponent's response to DEE 1 (Section 5.1.1).

5.2.52 NT EPA 52

Issue raised

Frequent Groundwater monitoring is required during the pre-mining and construction phase of the project to ensure that data can be used to ascertain background water quality and ensure that no groundwater impacts are occurring during the operation of the project. Initial monitoring should have already commenced and needs to be undertaken on a regular basis.

In the Supplement, provide sufficient evidence that groundwater quality results obtained through quarterly monitoring are representative of pre-mining water. A discussion outlining the potential risks of less frequent monitoring, for example a delay in identifying groundwater contamination should be included.

To satisfy the requirement that background water quality has been adequately assessed, QA and QC procedures should be detailed, potential temporal changes in water quality should be discussed, and the statistical confidence in the results presented

Proponent response

Since June 2015, the proponent has undertaken monthly standing groundwater level monitoring. The draft EIS did not include the annual standing groundwater level report (unintentionally) but has been included as Attachment E.

The proponent acknowledges that additional groundwater chemistry (local and regional) baseline information is both important and necessary to the ongoing environmental impact assessment to define pre-mine water quality boundaries and trigger values for future reporting. With that said, the groundwater assessment and Water Management Plan (WMP) documents included in the draft EIS provide considerable detail relating to DPIR 18.

A risk assessment has been completed to identify the level of risk to the groundwater resource associated with construction, operational and post-closure activities. The management commitments (including advanced dewatering, shotcreting, plugging, sealing, waste packaging and transportation, and hard-stand bunding) mitigate the risk associated with potential groundwater contamination.

The deep unsaturated zone provides a disconnect between the shallow alluvium and the deeper groundwater system. Combined with surface water management systems (i.e. hardstand impervious surfaces, concrete bunding) the likelihood for the movement of contaminants into shallow alluvium is low and the consequence also low.

In the Stage II groundwater program, the proponent is committed to fitting all monitoring bores with pressure transducers (water level dataloggers), programmed to record water levels every 6 hours and downloaded quarterly.

The proposed quarterly groundwater quality monitoring frequency is considered justified based on the assessed risk to the groundwater system and the proponent's proposed management commitments. The proposed management response to groundwater quality exceedances is detailed in Figure 8.2 of the WMP in the draft EIS.

A QA/QC procedure is outlined in detail in Appendix B of the WMP. This procedure commits Tellus to QA/QC procedures that are consistent with the Australian industry standard, including the collection of duplicate samples and the calculation of the relative percentage difference (RPD) – both of which assess laboratory repeatability.

Reporting of monitoring results (standing water levels and water quality) will occur annually (see WMP: Section 10.1). Reporting will include comparisons of baseline water quality and level monitoring data with established site specific trigger values. In addition, the water quality data will be analysed using statistical methods consistent with the requirements of the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ 2000) and reported using ESdat water quality software.

Mann-Kendall rank correlation tests (Kendall 1938) will be applied to each time series to identify if a statistically significant trend (or dependence) exists in the concentration of each analyte with respect to time (see Section 4 for more detail).

5.2.53 NT EPA 53

Issue raised

GW. 4 Develop of detailed groundwater quality database

Report groundwater quality results to the DPIR and the NT EPA every four months (April, August and December) to compare seasonal data against project activities.

Please describe the components of the 'groundwater quality' sampling being undertaken.

Proponent's response

The draft Water Management Plan (WMP) in the draft EIS provides detailed descriptions of the proposed Pre-construction, Construction, Operational, and Post Closure water monitoring protocol. A summary of the groundwater monitoring program has been provided below. Please see the WMP in the draft EIS for more detail.

Groundwater study design

Groundwater monitoring bores have been selected for their appropriateness in terms of gathering relevant spatial and temporal scale data. Bores targeting the alluvium/aeolian sediment, Horseshoe Bend Shale, Langra, Stairway Sandstone, and the Jay Creek Formations have been selected across the Proposal area as a means to capture known and potential groundwater level behaviour within these aquifer systems. Most locations are sited at the Chandler Facility surrounding the mine site. The Stage II groundwater drilling program will contain regional bores located between the proposed mine site and Titjikala and the Finke River (to the south east in the direction of likely groundwater flows).

Nested sites targeting discrete zones within the different groundwater systems provide information on potential vertical gradients between shallower and deeper formations. This is important for the ongoing conceptualisation of the groundwater environment, including recharge and discharge characteristics in the deeper groundwater systems.

Additional monitoring bores (refer to Figure 5-41 and Figure 5-42) have been located to capture potential impacts at a local and regional scale. Multiple nested sites have been located directly adjacent to the Chandler Facility and the proposed accommodation village just northeast of the Chandler mine infrastructure area.

These sites will monitor local depressurisation and potential contamination of the groundwater systems intercepted by the Proposal. A nested site has been proposed adjacent to the Apirnta Facility to monitor for potential impacts arising from loading/unloading and temporary storage of salt and waste materials.

At the completion of the BFS study, a total of 20 bores will be monitored at a local and regional level. During Stage III (construction) and Stage IV (operation) the number of monitoring and construction bores may increase depending on the results of groundwater data taken from the Stage I and Stage II research. The proponent will continue to liaise with DPIR and the NT EPA through reporting its annual groundwater report.

Water quality

In accordance with the requirements of the EIS ToR, the water quality parameters included in the proposed monitoring program have been selected based on:

- The Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ 2000).
- Site-specific baseline data.
- Proposed project hazardous chemical waste material to be received by the project.

Quarterly 'standard' sampling events will be completed during all phases of the project. Water quality analytes included in the standard suite broadly comprise physico-chemical properties, selected total and dissolved metals, major ions, nutrients, and hydrocarbons).

Quarterly monitoring will be supplemented by an annual 'comprehensive' monitoring event. The comprehensive analytical suite will include at a minimum, polycyclic aromatic hydrocarbons (PAH), and additional metals including: antimony, beryllium, boron, molybdenum, selenium, strontium, radium and uranium.

Sampling method

Dedicated low-flow double valve Solinst pumps will be installed in all monitoring bores. Dedicated low-flow pumping systems ensure samples are representative of local groundwater conditions, whilst removing risks associated with cross-contamination, and eliminating the requirement for surface water discharge management.

Trigger Action Response Plan

A detailed response plan has been prepared for groundwater quality threshold exceedances (refer to Figure 5-40).

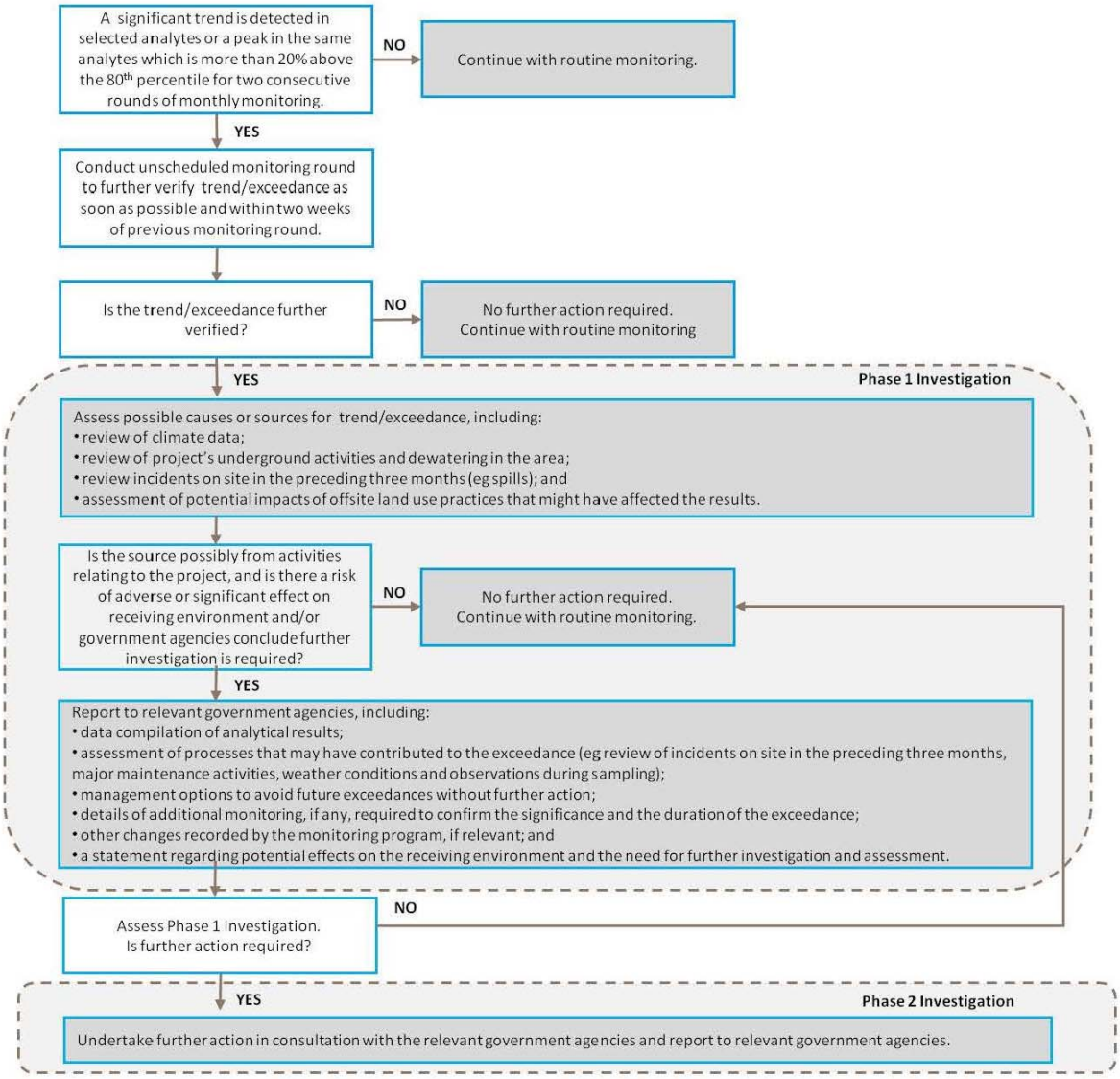


Figure 5-40 Groundwater TARP

5.2.54 NT EPA 54

Issue raised

GW. 5 Undertake a hydro-census (condition) survey of local groundwater users prior to construction to ascertain bore condition and current status of the bores located within a 25 kilometre spatial buffer around the proposed Chandler Facility.

Please explain how/why 25km was chosen? Will the same be done for the Apirnta facility?

Proponent's response

A hydro census (condition) survey of local groundwater users will be undertaken prior to construction to ascertain bore condition and current status of the bores located within a 25 km

spatial buffer around the proposed Chandler Facility. This process will involve consultation with local groundwater users (which were identified in section 8.3 of the draft EIS), with an end purpose of establishing additional baseline conditions to those already reported.

The proposed construction and operation of the underground workings (i.e. ventilation shafts) were identified as the biggest risk to the groundwater resource from both a water resource and quality point of view. The key sensitive receivers identified within a 25 km radius of the underground workings include the Finke River, Hugh River, and the Titjikala community. The 25 km search radius includes each of these sensitive receptors, and the majority of landholder bores within the immediate vicinity of the project area.

The construction of the proposed Apirnta Facility will not intercept groundwater. The Apirnta facility will be constructed on a hard stand, bunded concrete base, eliminating the potential for surface contaminants mobilisation within the surface water environment. A site specific search radius has therefore not been applied around the proposed Apirnta facility.

5.2.55 NT EPA 55

Issue raised

GW. 7 Develop a detailed groundwater database. Complete a groundwater isotope study for monitoring bores prior to construction.

Provide further details in the Supplement including when this is planned, and whether this will be done for both the Chandler and Apirnta facility area?

Proponent's response

The proponent is committed to developing a detailed groundwater database which builds on the results of the Stage I groundwater study completed for the draft EIS. To date, the proponent has described local and regional groundwater level, gradient and quality conditions that exist within a 25 km radius of the proposed Chandler Facility.

The draft WMP and responses to DPIR questions 18,19, 20, and 21 have described the commitments the proponent will make in Stage II. A local and regional Stage II groundwater drilling and monitoring schedule is provided in Table 5-30.

Table 5-30 Stage II groundwater outline schedule

No.	Milestone	Scheduled timeline	Depth (mbgl)	Geological horizon	Comment
1	Tellus capital raise program	July to December 2017	N/A		Funds raised to support Sandy Ridge construction and Chandler BFS.
2	Installation of Chandler groundwater dataloggers across Stage I bores	October 2017	N/A		Install and record levels and water quality samples are taken.
3	Groundwater transmissivity (non-intrusive) groundwater research	October 2017	Target depth 800 m	MIA, Aprinta and Accommodation Village	The proponent proposes to source labour from Titjikala. Results to inform depths of future bores.
4	Transmissivity report to inform Stage II drilling locations	December 2017	N/A		Results to inform the exact locations for Stage II drilling program.
5	EPA and DoEE project approval	November - December 2017	N/A		Dependant on the quality of the proponent's draft EIS Supplement Report.
6	Tellus Board approve Chandler BFS budget	December 2017	N/A		Chandler BFS can now proceed
7	Chandler BFS commences	December 2017	N/A		December 2018 - Draft BFS completed
8	Mobilisation of Stage II groundwater drilling rig	December 2017	N/A		N/A
9	Commence Stage II groundwater drilling program	January 2018	N/A		Additional bores at a local and regional level (refer to Figure 5-41 and Figure 5-42)
10	Regional bore – Between proposed mine camp and Titjikala	January 2018	90 m	Horseshoe Bend Shale	To confirm outcome of conceptual groundwater model that there is no hydrogeological connectivity to the Titjikala bore
11	Regional bore – Between Chandler MIA and Finke River to the southeast	January 2018	See No.3	Lower Langra	Refer to Figure 5-41 and Figure 5-42
12	Local bore – within the northeast corner of Tellus MLA (near proposed accommodation village)	February 2018	See No.3	Lower Langra	Refer to Figure 5-41 and Figure 5-42
13	Mine bore (near run of mine salt stockpile)	February 2018	35	Horseshoe Bend Shale	Refer to Figure 5-41 and Figure 5-42.
14	Mine bore	February 2018	700	Jay Creek Limestone	Refer to Figure 5-41 and Figure 5-42
15	Mine bore	February 2018	160	Lower Langra	Along route of mine decline
16	Mine bore	March 2018	240	Lower Langra	Along route of mine decline
17	Mine bore	March 2018	500	Stairway Sandstone	Along route of mine decline
18	Aprinta bore	April 2018			Dependant on work item No.3

Proposed Henbury access road

Proposed Apirnta Facility (see inset)

Proposed Chandler Haul Road

Access to Chambers Pillar road

Chambers Pillar road

Proposed accomodation village (see inset)

Proposed nested bore field

Proposed mine infrastructure area (see separate figure)

HENBURY

PALMER VALLEY

MARYVALE

TITJIKALA

IDRACOWRA

STUART HIGHWAY

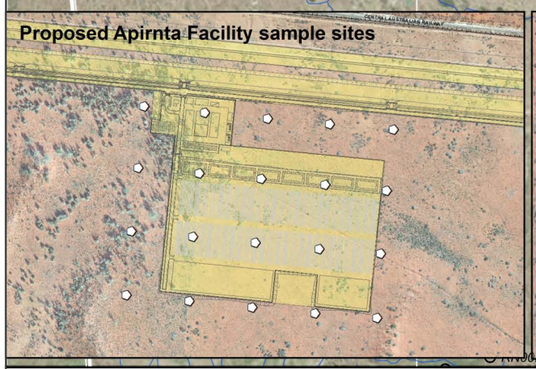
MARYVALE ROAD

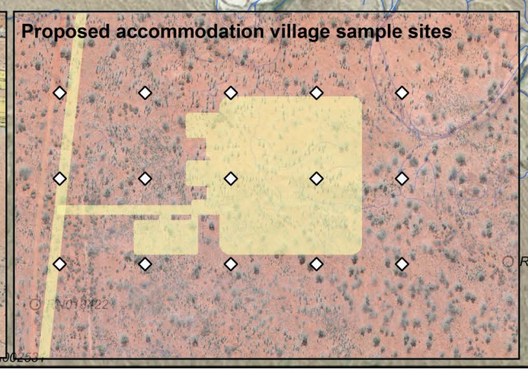
Hugh river

Finke river

Finke river

RN018068 RN014940 RN014941 RN010289 RN018471 RN001316 RN001321 RN007012 RN007013 RN001963 RN003353 RN003282 RN001320 RN001685 RN010917 RN011505 RN012940 RN003308 RN012939 RN003310 RN014367 RN019278 RN012773 RN015903 RN010531 RN002957 RN003304 RN016793 RN003315 RN010916 RN001860 RN001983 RN011504 RN003208 RN003933 RN013889 RN003305 RN007005 RN017427 RN019229 RN001318 RN017407 RN015238 RN003209 RN004469 RN015833 RN010082 RN014584 RN019116 RN019194 RN019119 RN019118 RN014572 RN014288 RN014492 RN004475 RN014117 RN014150 RN015670 RN014585 RN010970 RN015993 RN004623 RN016632 RN010915 RN011443 RN004478 RN013421 RN001338 RN019243 RN003309 RN003307 RN003311





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N

0 10

kilometres

Coordinate system:
GDA 94 MGA Zone 53

TCH0011a_Proposed_fieldwork_regional

Legend

- Stuart Highway
- Maryvale road
- Proposed Henbury access road
- Proposed Chandler Haul road
- Access to Chambers Pillar road
- Chambers Pillar road
- Watercourse
- Railway
- Homesteads
- NT registered bores
- Tellus exploration drillhole
- Historical petroleum well
- Historic seismic line
- Cadastre boundaries
- Tellus mining lease application (ML30612)
- Tellus exploration leases
- Proposed development envelope

Stage 1 Program (EIS) - Completed

- Tellus water bore

Stage 2 Program (BFS) - Proposed

Phase 1

- Proposed water bores (monitoring)
- Proposed electroseismic sites

Phase 2

- Proposed water bores (monitoring and production)

Figure 5-41
Proposed Chandler Facility Regional Project Area
Proposed groundwater research program

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PB1
RN019193
CH003
WT1
RN019117
WT2
RN019116
WT6
RN019194
CH001A
MULGA CREEK
MARYS CREEK
OAK GULLY
WT5
RN019120
RODEY GULLY
SNAKE GULLY
DINGO GULLY
ROO GULLY
WT4
RN019119
HALFWAY CREEK
PB2
WT3
RN019192
RN019118
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kilometres

Coordinate system:
GDA 94 MGA Zone 53

TCH0005_Proposed_fieldwork_MIA

Legend

- Proposed access road
- Proposed internal roads
- Proposed underground infrastructure
- Proposed decline
- Proposed portal
- Proposed shafts
- Tellus exploration drillhole
- Watercourse
- Historic seismic line

Stage 1 Program (EIS) - Completed

- Tellus water bore
- Electroseismic sites

Stage 2 Program (BFS) - Proposed

Phase 1

- Proposed electroseismic sites
- Proposed water bores (monitoring)
- Proposed telemetry & dataloggers

Phase 2

- Proposed geotechnical drillhole
- Proposed water bores (monitoring and production)

Figure 5-42
Proposed Chandler Facility Mine Infrastructure Area
Proposed groundwater research and geotechnical drilling program

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5.2.56 NT EPA 56

Issue raised

Overall, there is minimal response to rainfall recharge in the piezometric surfaces monitored, indicating the aquifer is dominated by lateral flow rather than vertical flow. In the uppermost formation, the Horseshoe Bend Shale Formation, there is a minor and delayed response (a 0.06 metre rise over 15 days) to rainfall recharge at WT2 and WT6a only.

The response from WT6a has not been plotted, is this WT6? indicating the aquifer is dominated by lateral flow rather than vertical flow. In the uppermost formation, the Horseshoe Bend Shale Formation, there is a minor and delayed response (a 0.06 metre rise over 15 days) to rainfall recharge at WT2 and WT6a only.

In the Supplement please clarify whether WT6 and WT6a are the same. (WT6a has not been plotted).

Proponent's response

Yes, WT6 and WT6a are the same.

5.2.57 NT EPA 57

Issue raised

Calculations of the expected time for groundwater levels to rebound back to pre- mining levels on completion of mining need to be included. All stakeholders that use or rely on groundwater from potentially impacted bores need to be consulted and briefed on the potential impacts (or lack thereof).

In the Supplement, please map the extent of groundwater drawdown, ideally with contours, and identify potentially impacted bores.

Proponent's response

Please refer to Figure 5-43.

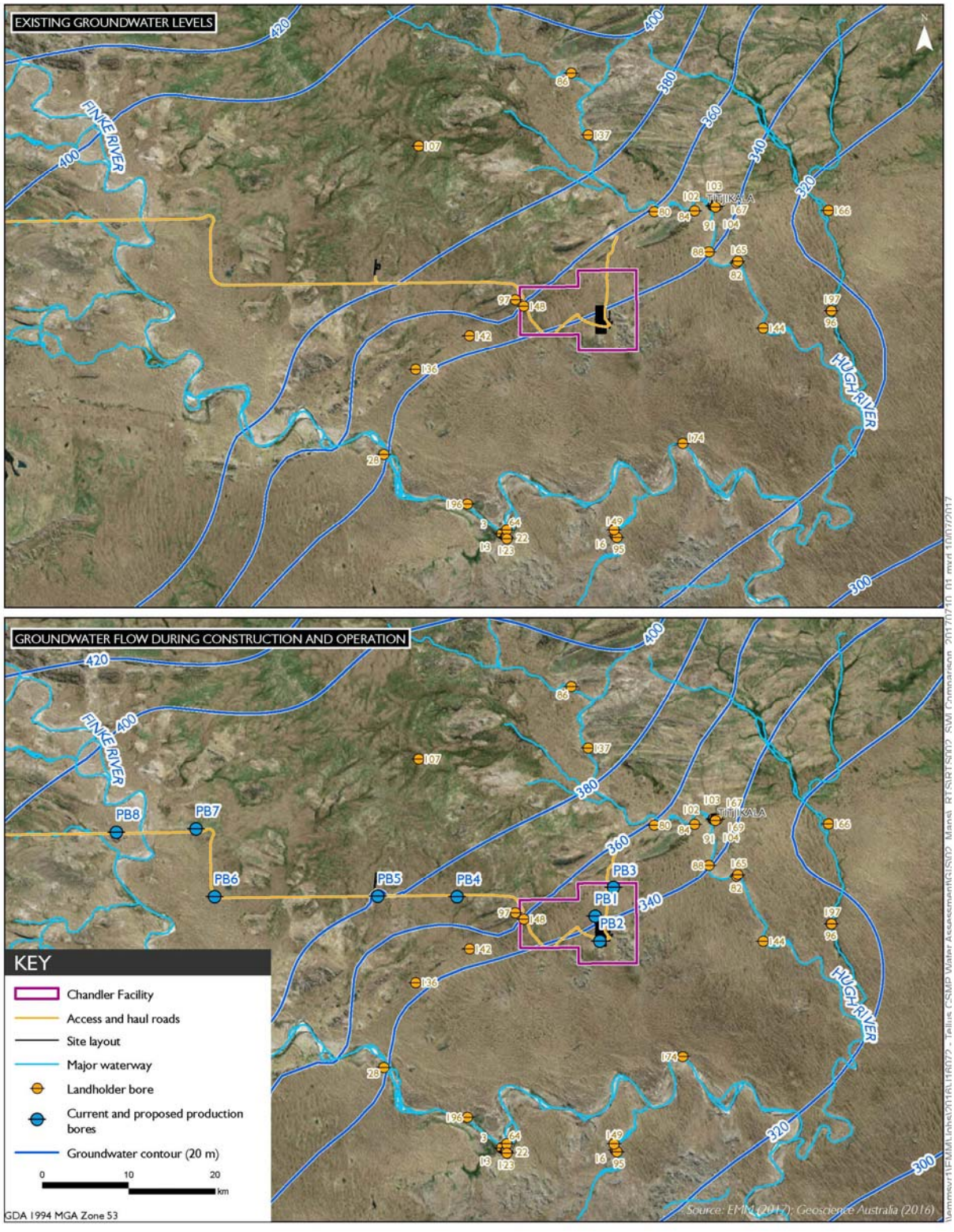

Figure 5-43 Groundwater contour map – baseline/operational comparison

5.2.58 NT EPA 58

Issue raised

Table 8-3 Water balance (average rainfall per year) shows there will be 0 inflows into the shaft and therefore 0 inputs into the water balance.

In the Supplement, provide detailed calculations showing potential maximum inflows for completeness and to provide a clear picture of the potential worst- case scenario risks.

Proponent's response

The proposed shaft and decline entrance would be raised (i.e. above existing ground levels and/or into the side of the existing Maryvale Hill). Therefore, any surface water inflow into these structures is considered unlikely. The proponent commits to completing detailed calculations to support this theory during detailed design.

5.2.59 NT EPA 59

Issue raised

There is the potential for low to moderate impacts to River Red Gum and Coolabah vegetation proximal to the Proposal area, as these ecosystems are considered to be partially dependent on groundwater.

As discussed in Section 8.3, two ecological communities (Eucalyptus camaldulensis var. Obtuse and Eucalyptus coolabah subsp. Arida) have been identified by DENR to persist within the riparian corridors of the Finke and Hugh Rivers. The root structure is considered to be shallow (less than 15 metres) and dependent on the perched shallow groundwater systems (i.e. near-surface alluvial sources) associated with ephemeral creeks, rather than the water table at about 80 metres depth.

In the Supplement, please verify these assumptions. Please outline the low to moderate impacts. Describe how the mine may affect the "perched shallow groundwater systems" and associated vegetation.

Please clarify "partial dependence" vs "dependence".

Outline the risks including, but not limited to, excessive groundwater drawdown, drainage of the perched groundwater systems, contamination, etc.

Proponent's response

Dependence

Eucalypt species located in semi-arid – arid Australian environments are broadly characterised as having a facultative (optional or 'partial') dependence on groundwater (GDE Risk Assessment Guidelines 2012). An ecosystem's dependence on groundwater can be variable, ranging from partial

and infrequent dependence, i.e. seasonal or episodic (facultative), to total continual dependence (entire/obligate).

The root structure of the identified species is primarily positioned within the unsaturated vadose (soil) zone, accessing interflow (surface infiltration) during episodic rainfall and flooding events. A smaller proportion of the root structure (primary roots as opposed to secondary or tertiary roots) typically accesses deeper groundwater within the capillary zone. This deeper root system is likely to opportunistically access the locally perched groundwaters and smaller washout drainages / gullies during drier periods.

The identified eucalypt species are outside of the predicted zone of project-related groundwater drawdown and is therefore highly unlikely to be impacted (as identified in Section 11.1 of the Groundwater Assessment in Appendix P of the draft EIS).

Risk

A detailed risk assessment has been completed and provided in Section 11 of the Groundwater Assessment (refer to Appendix P of the draft EIS). Further, a project conceptual hydrogeological model has been developed and presented in Section 8 of the draft EIS.

The conceptual model establishes the local and regional groundwater environment, specifically focusing on the established disconnect between the perched alluvial groundwater system and the deeper regional system. Subsurface excavations (i.e. construction/operation of the decline, ventilation shafts, underground mine) will occur within the deeper system, thereby limiting the extent of impact to deeper regional groundwater systems.

5.2.60 NT EPA 60

Issue raised

Table 8-6 Operation raw water demands Process Water - Saline 45 ML/y. Re- use from hydraulic backfill process and Langra formation.

In the Supplement, please clarify how much water is reuse vs abstraction.

Proponent's response

Abstraction volumes for operation will be 100 % sourced from the Langra formation. The same geological formation will be used to source the majority of water that is required for the hydraulic backfill process. The expected small volume of water that will be re-used from the hydraulic backfill process cannot yet be determined. This is because the proponent must undertake a trade-off study in the BFS to determine the final method of hydraulic backfill (i.e. flushing or viscous).

If a flushing backfill process is selected as the preferred option, then there would be a requirement for a brine drainage and pump system as shown in Figure 5-44. Under a flushing hydraulic backfill process, 58,500 t/a or 58.5 ML/y could be reused / recycled.

If a viscous backfill method is selected, there is no requirement to re-use water because any excess fluid can be managed by simply letting it "dry out", i.e. the fluid evaporates due to the constant mine ventilation air being led through the backfill storage rooms and the expected high temperatures of the Chandler Facility.

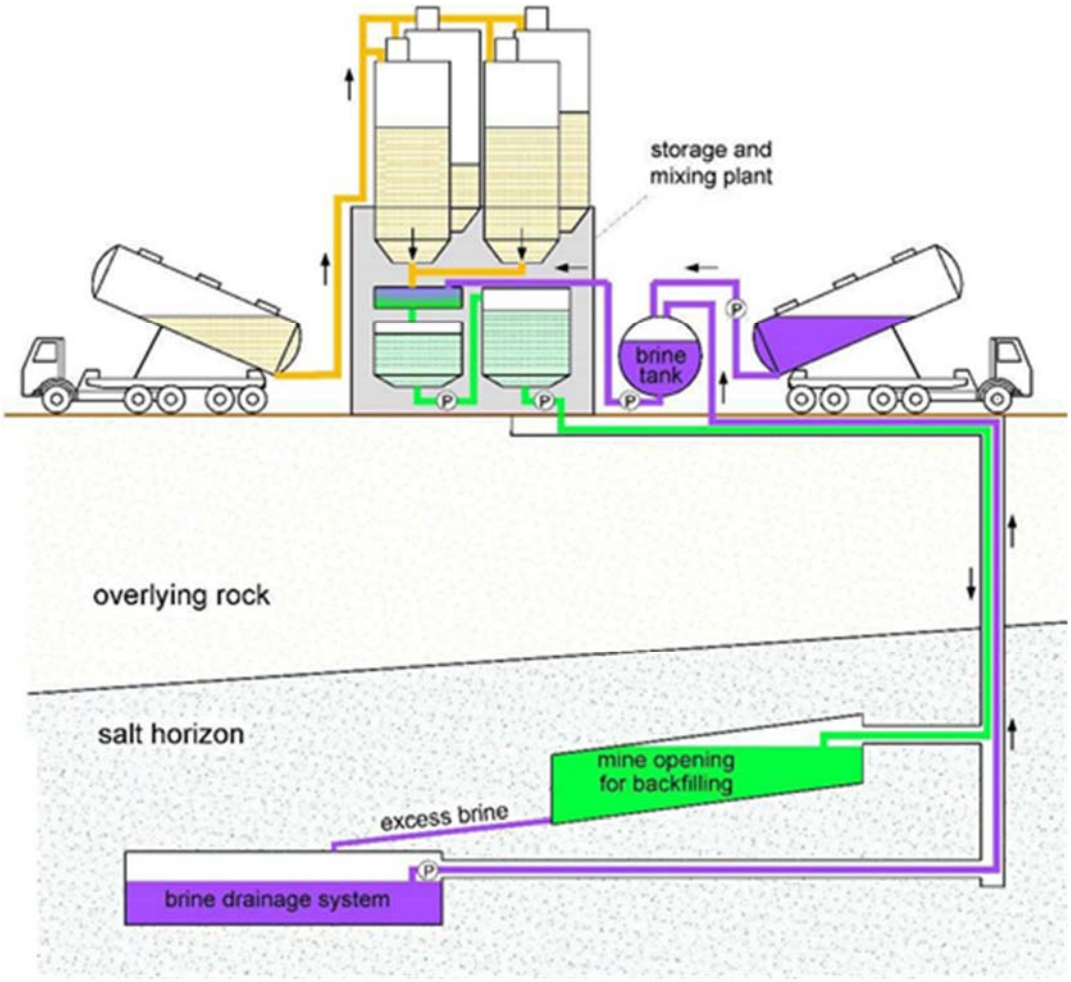

Figure 5-44 Flushing backfill process involving a brine drainage sump and pump system

5.2.61 NT EPA 61

Issue raised

The water quality results, analysis, and discussion within both the main document and the appendix (appendix R) are lacking a substantial amount of detail. The report does not explain:

- the observed elevated concentrations of metals,
- no mention of filtered and total metal concentration variations,
- explain any management strategies relating to the livestock exclusion, or

- the potential for site-specific guidelines.

In the Supplement, please provide additional available data to address the gaps identified above.

Proponent's response

Water quality data has been compiled and presented as a series of graphs (refer to NT EPA 66 and Figure 5-46 through Figure 5-72). Water quality samples were either collected as grab samples or via rising stage samplers installed in local drainage lines ("CS" monitoring locations – refer Figure 9-2 in the draft EIS). For the latter, the time between sampling and laboratory dispatch varied (depending on site accessibility following rainfall). The delay could have affected analysis results. Samples were not field filtered and that laboratory analyses were undertaken for total concentrations of metals.

It is considered likely that the higher concentrations of metals recorded are associated with suspended matter. This is illustrated by Figure 5-46 to Figure 5-60 which summarises total metals concentrations and total suspended solids (TSS) concentrations (Figure 5-70) for recent samples (TSS was determined for recent samples).

As stated in ANZECC/ARMCANZ (2000): "Comparison of total concentrations will, at best, overestimate the fraction that is bioavailable. The major toxic effect of metals comes from the dissolved fraction, so it is valid to filter samples (e.g. to 0.45 micron [µm]) and compare the filtered concentration against the trigger value".

Future monitoring will include improved sample collection and preservation, including field filtering for metals samples and laboratory analysis of both total and dissolved metals concentrations. The proposed monitoring will be implemented during the pre-construction phase / BFS, and will continue throughout proposal construction and operations. Monitored water quality data will form the basis for site-specific trigger values (SSTVs).

SSTVs will be based on water quality analyses of samples from the Project site (i.e. a pre-project baseline), provided that an adequate number of samples are able to be collected prior to Project commencement, and/or, on the basis of 'control' sites on drainage lines that will be unaffected by the Project (e.g. Finke and Hugh Rivers upstream of the Project area).

Given the foregoing, that no Project development has yet occurred and that livestock grazing presently occurs in the area, livestock exclusion is not considered warranted.

5.2.62 NT EPA 62

Issue raised

The water quality results obtained for the Chandler project area contain substantial concentrations of metals contaminants. The highest value for copper observed is 70 times the recommended ANZECC 95% species protection trigger value. The values presented are not clearly labelled as filtered or total components; this should be included in the results for better interpretation.

Presumably, no filtered metal data has been presented. All conclusions and interpretations are therefore unreliable for aquatic ecosystem protection. Further sample collection and data interpretation is required.

Proponent's response

Noted. Please refer to Chapter 4 of this document for more information on the proposed surface water monitoring and management measures proposed for the Chandler Facility. In addition, please refer to Figure 4-1 and Figure 4-3 for the locations of existing and future surface water baseline data collation.

5.2.63 NT EPA 63

Issue raised

In this study, bulk sediment samples have been collected and analysed for metal concentrations and percentage < 63 µm grain size. In this instance, a very simple form of normalisation was suitable whereby bulk sediment concentration data (expressed as mg/kg dry weight) was divided by the percentage '< 63 µm

% passing' (expressed as a decimal) (Simpson et. al. 2013). Bulk metal concentrations for the current dataset can then be compared on a spatial basis in order to evaluate sediment enrichment, independent of differences in particle size in different creeks.

This is not an appropriate approach given that smaller particles (such as clays) contain negatively charged surface sites, which positive metal ions are able to bind to, while larger sized particles (such as sands) do not contain a charged surface and therefore generally do not bind metal ions.

Proponent's response

The normalisation process involves dividing the laboratory-determined metals concentrations by a number less than one (i.e. the proportion of sample <63 µm). This process results in an increase in the (calculated) metals concentrations. Reversing this process would lower the metals concentrations. All metals concentrations provided in Table 9-5 of the draft EIS were below ANZECC/ARMCANZ (2000) guideline values (refer to Table 9-4 of the draft EIS - BECA [2017]). The lower concentrations would likewise be below guideline values.

Notwithstanding the above, examination of the laboratory certificate from the NATA registered laboratory that undertook the analyses indicates that these were undertaken on "as received" samples and that the values provided in the draft EIS Table 9-5 (BECA, 2017) are the same as the values reported by the laboratory. The laboratory also undertook particle size distribution analyses of the five samples. Analysis indicates that the samples do not appear to have the <63 µm size fraction explicitly determined. Figure 5-45 shows the particle size distribution analysis results for the five sediment samples.

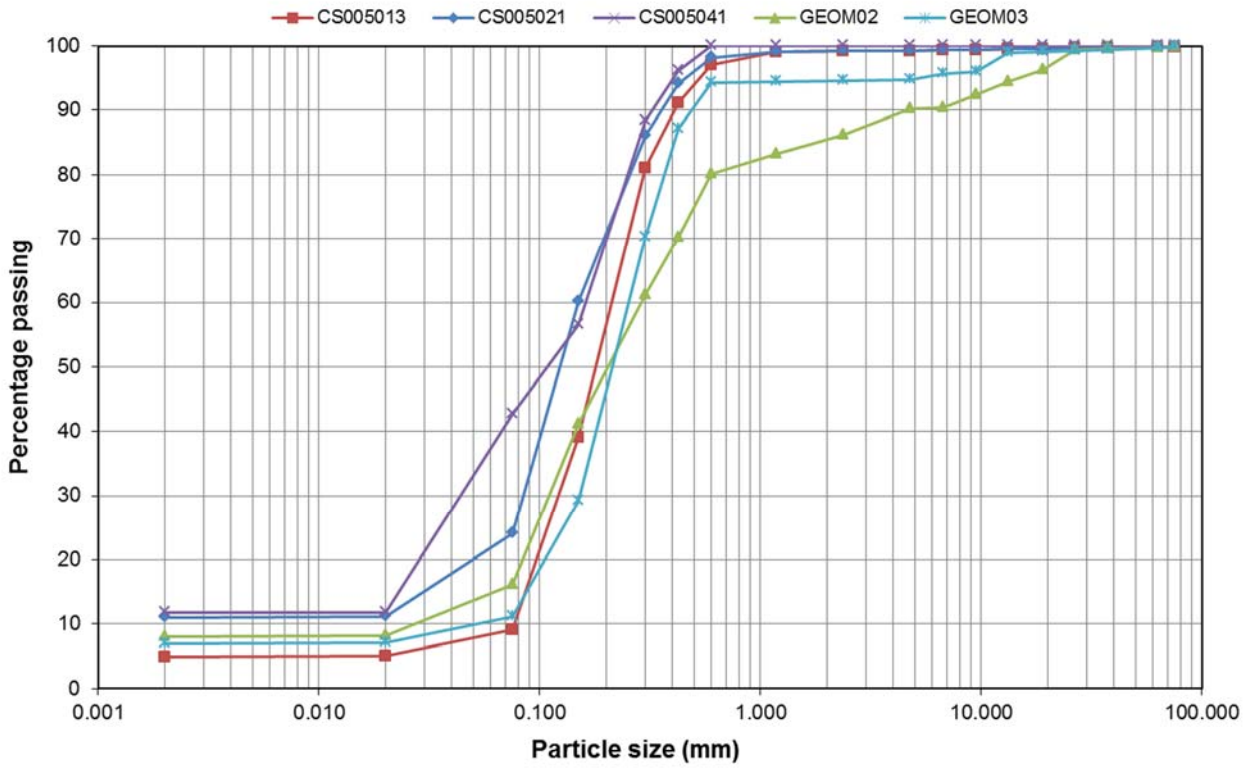

Figure 5-45 Particle size distribution test results – sediment samples

5.2.64 NT EPA 64

Issue raised

No breakthrough to the dune area to the north of the sub-catchment is observed, with water in this area locally-derived from runoff from the adjacent dune system. Furthermore, no connectivity between the dune area and the Hugh River to the north is anticipated. No assessment downstream from the confluence between the Hugh and the Finke is deemed necessary because the flow contribution from the Proposal area to flows below this point is considered to be insignificant.

The comment that contributions from the proposed area will not be significant below the confluence of the Hugh and Finke Rivers has not been substantiated. In the Supplement, please discuss how the impacts of the proposal area on the reach downstream of the Hugh and Finke confluence were assessed. Please provide additional available information to justify this rationale.

Proponent's response

The proponent has spent four years studying local and regional hydrology with respect to proposed construction and operational activities. Following the results of detailed GIS desktop modelling and multiple field visits to support the desktop research which included walking draining courses and undertaking river cross sections, the draft EIS concludes that surface water flows within and surrounding the proposed mine infrastructure area flow inland and towards an internal drainage basin (alluvial flood out zone as illustrated and described in Figure 9-14 of the draft EIS).

This means that flows off the Maryvale Hills and from Halfway Creek to the south of Halfway Dam are not hydraulically connected to either the Hugh River or Finke River. To the northwest of the flood out zone, a very large dune and swale system exists. This natural topographic feature prevents surface water drainage from leaving the alluvial flood out zone. This is a common feature of arid land drainage systems (Knighton, 1998).

5.2.65 NT EPA 65

Issue raised

The Figure shows that the ROM area will be located adjacent the Halfway Creek flow path. During high rainfall events, is there the potential for stockpiled material to be carried downstream, potentially resulting in altered water chemistry of the downstream environment? Please describe how this risk has been assessed.

Proponent's response

The proponent assumes the NT EPA refers to the site layout figure when responding to this question. The environmental risk assessment completed in the draft EIS (please refer to Chapter 6, Table 6-10) has considered the downstream impacts of altered water chemistry as a result of contamination from both salt and spoil stockpiles.

The risk assessed was *salt and spoil dissolution and transport off-site* and the proponent herein adds to that risk *resulting in potential changes to downstream water chemistry*. Without environmental mitigation and management measures in place the likelihood of this risk occurring was considered as "likely" with a "major" consequence. The environmental mitigation and management measures proposed to avoid and/or minimise this potential adverse impact includes:

- Locating spoils heaps at a minimal distance of 25 m from a water course.
- Bunding of spoil and salt stockpiles.
- Lining of spoil areas using clay materials from the decline and shaft excavations.

The residual risk with management measures in place was concluded as having a remote likelihood of occurring with a minor consequence.

In addition, the proponent commits to undertaking further assessment of risk in this space and against all other surface water elements as detailed design progresses. Detailed flood modelling in and around the min infrastructure area will also be undertaken to inform and /or improve existing surface water management measures as outlined above and in the WMP.

5.2.66 NT EPA 66

Issue raised

In the Supplement, please provide the following additional information:

- the Surface water discussion includes results that have been presented in text format. Please provide graphical representation of the data, where appropriate
- discuss various potential influences to surface water quality in relation to the results observed
- the location coordinates associated with the data should be presented in Latitude and Longitude or UTM and not only mine grid values
- the discussion should contain at least two distinct sections, one for aquatic ecosystem protection and one for livestock drinking water comparison.
- if there are more uses of water within the project-impacted region these should also be included for discussion.

Proponent's response

Recorded water quality data is presented as time series plots in Figure 5-46 through Figure 5-72 on a 'by parameter' basis. Guideline values for both the 95% level of protection of freshwater aquatic ecosystems and primary industries livestock protection (ANZECC/ARMCANZ 2000) have also been included on time series plots for reference. There are no other known or potential beneficial uses of surface water in the proposal area.

It should be noted that for certain metals, guideline values for the 95% protection of freshwater aquatic ecosystems depend on water hardness. For these analytes, the trigger values have been plotted as a range based on the highest and lowest recorded hardness values. For other water quality analytes, the vertical axis has been plotted on a log scale, as the guideline values would otherwise be indiscernibly close to zero.

The location coordinates of the sampling sites ("Grid Reference" in Appendix B of draft EIS Appendix R) are in UTM (MGA) coordinates (Zone 53).

The following presents a revised discussion on exceedances of the ANZECC/ARMCANZ (2000) guideline values and potential factors which could influence the recorded surface water quality.

Aquatic ecosystem protection trigger values (95% level of protection)

Some total metals concentrations consistently exceeded the guideline values: notably aluminium, chromium, copper, silver and zinc. As discussed in DPIR 33, the elevated concentrations of total metals appear to be related to suspended solids in the samples analysed (dissolved concentrations are expected to be lower). The proponent is committed to analysing both dissolved and total metal concentrations in water in future sampling programs.

Dissolved organic matter found in most fresh waters are generally sufficient to remove chromium, copper and zinc toxicity and these are also adsorbed strongly by suspended material (ANZECC/ARMCANZ, 2000). All analysis results for silver were below the laboratory limit of detection (LOD). The guideline value for chromium is considered a "low reliability" value (ANZECC/ARMCANZ,

2000). Aluminium toxicity is reduced with increased water hardness but the guideline value does not allow for this (ANZECC/ARMCANZ, 2000). Given the elevated aluminium concentrations, it is recommended that a soil sampling and test program be undertaken to assess the concentrations of aluminium in the proposal area. The proponent will commit to undertaking this assessment during pre-construction / BFS.

Recorded nitrate, ammonia and phosphate concentrations are typically higher than their respective guideline values. Concentrations are nevertheless considered low and consistent - nitrate (<10 mg/L), ammonia (45 to 235 µg/L) and phosphate (<55 ug/L). Given the lack of human activity in the area, these concentrations are considered likely due to the decay of organic matter. On-going monitoring throughout the pre-construction phase should lead to the accumulation of sufficient data to allow an establishment of SSTVs. Ongoing monitoring throughout the construction and operational phases will be consistently compared with SSTVs.

Most of the recorded electrical conductivity values exceed the upper bound guideline value, indicating significant natural variability likely associated with the arid climate. Similarly, fluctuations in turbidity (above the guideline value) are likely associated with the sparse vegetation and natural erosion processes. All recent pH readings and the majority of relevant historic NT Government samples were above the upper guideline value of 7.5 pH units. This is likely due to the slightly to moderately alkaline nature of the soils in the proposal area (draft EIS Appendix E).

Livestock drinking water quality guideline values

In undertaking this assessment, where the ANZECC/ARMCANZ (2000) guidelines provide different values depending on the type of livestock, cattle have been chosen.

The majority of water quality samples exceeded the total aluminium guideline value. It is noted that the guideline value is the concentration below which there is a minimal risk of toxicity and higher concentrations may be tolerated. Given the elevated aluminium concentrations, it is recommended that a soil sampling and test program be undertaken to assess the concentrations of aluminium in the proposal area.

There were no other analysed chemical parameters with consistent exceedances of the guideline values.

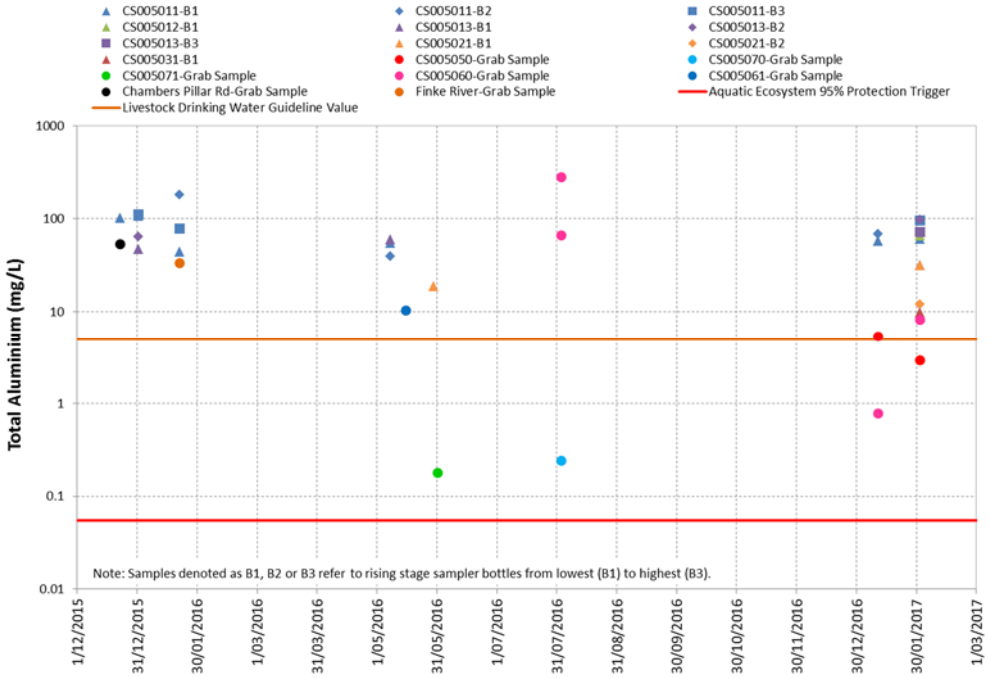

Figure 5-46 Aluminium (total) results

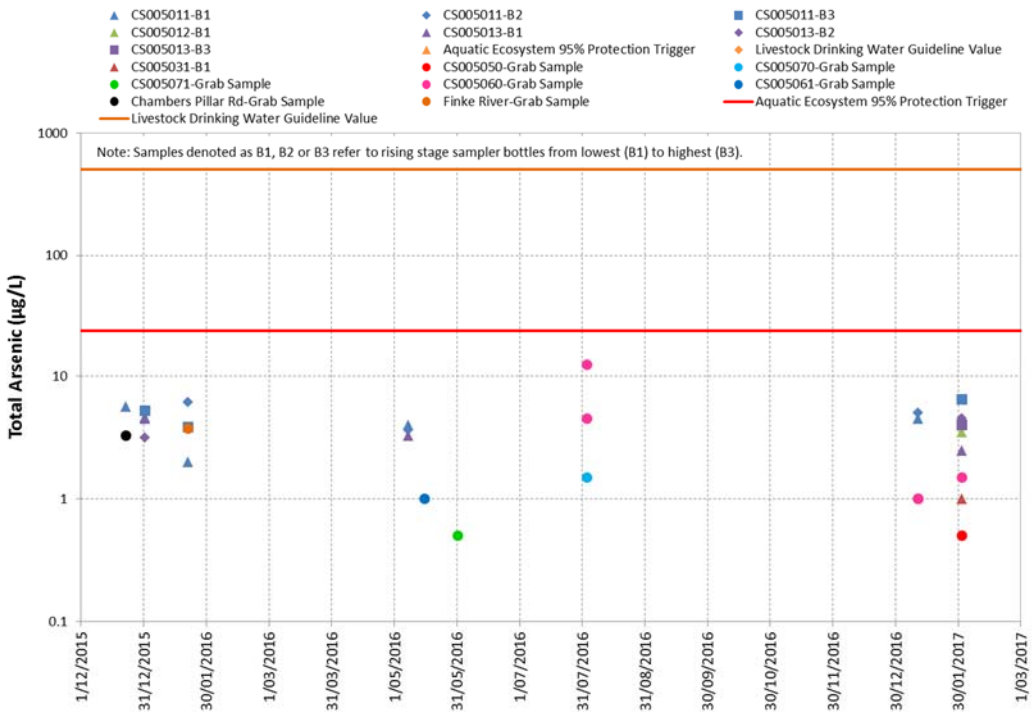

Figure 5-47 Arsenic (total) results

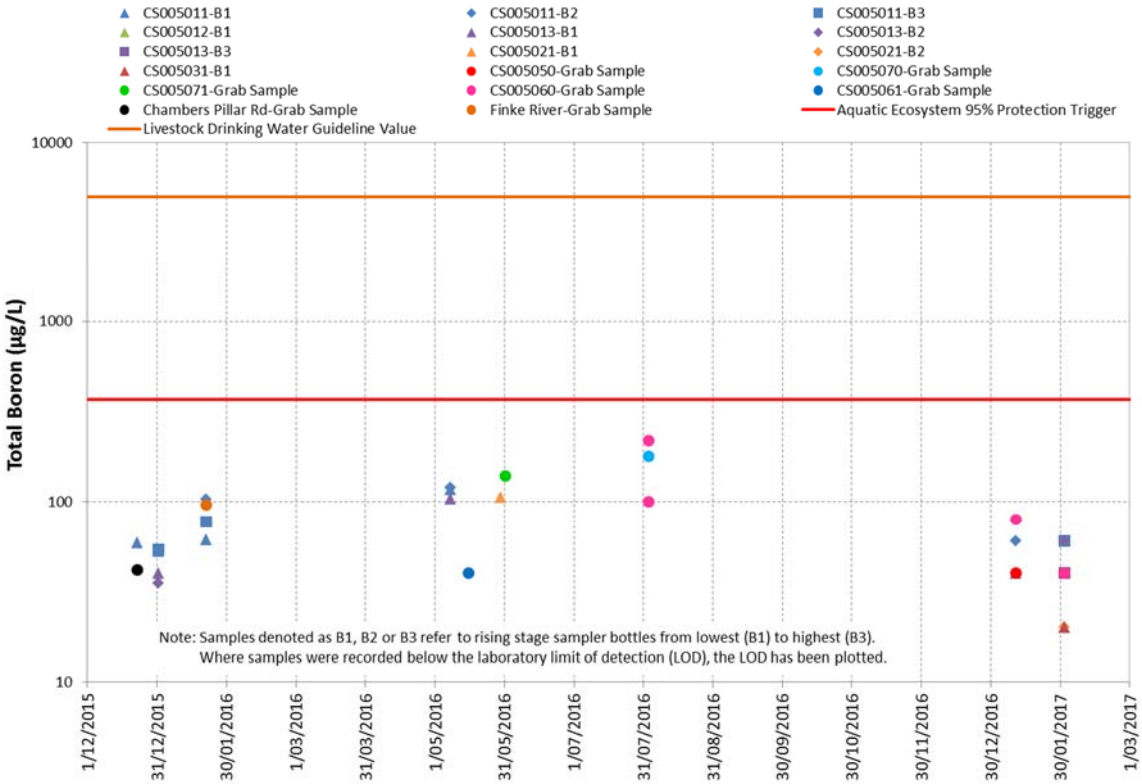

Figure 5-48 Boron (total) results

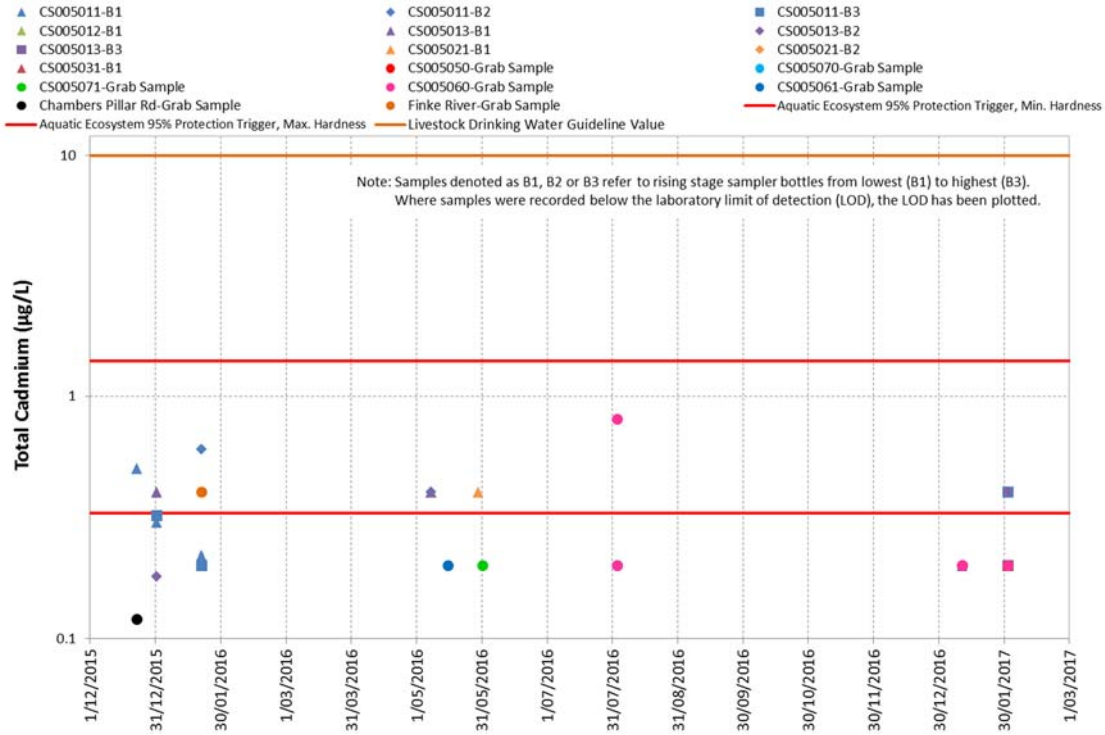

Figure 5-49 Cadmium (total) results

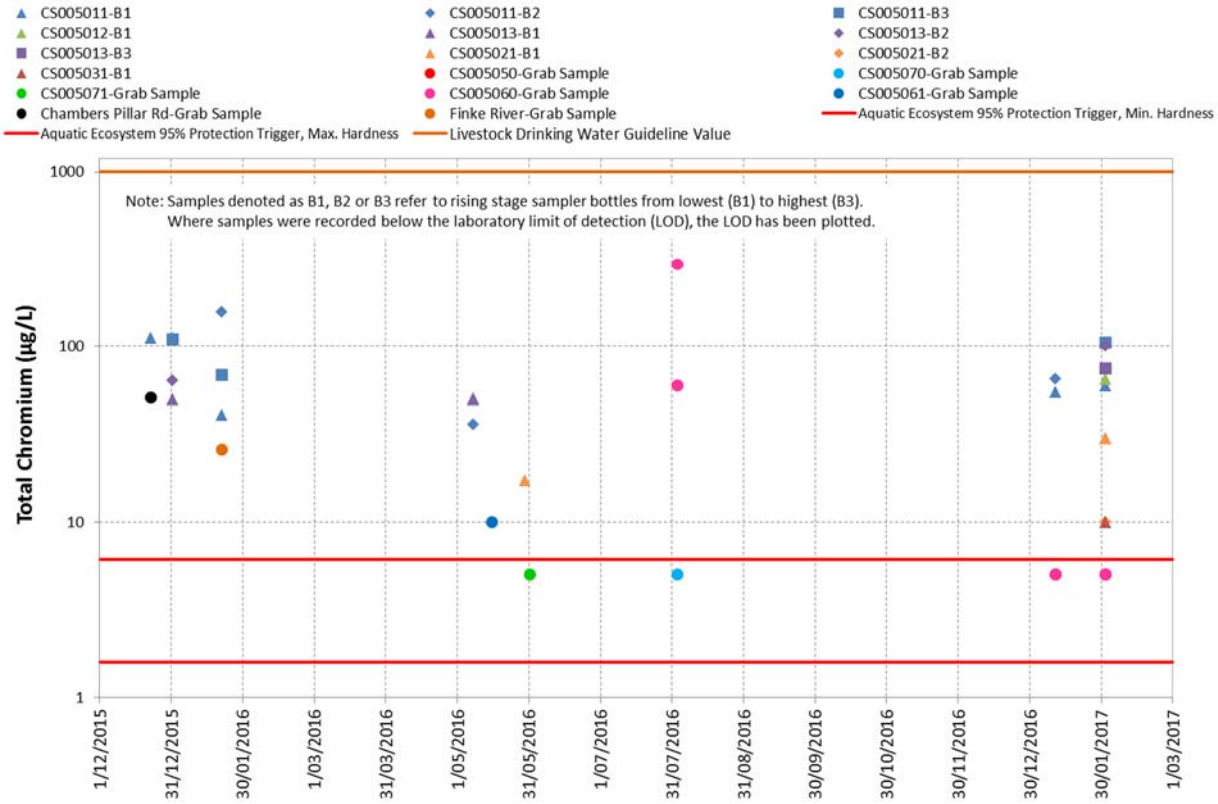

Figure 5-50 Chromium (total) results

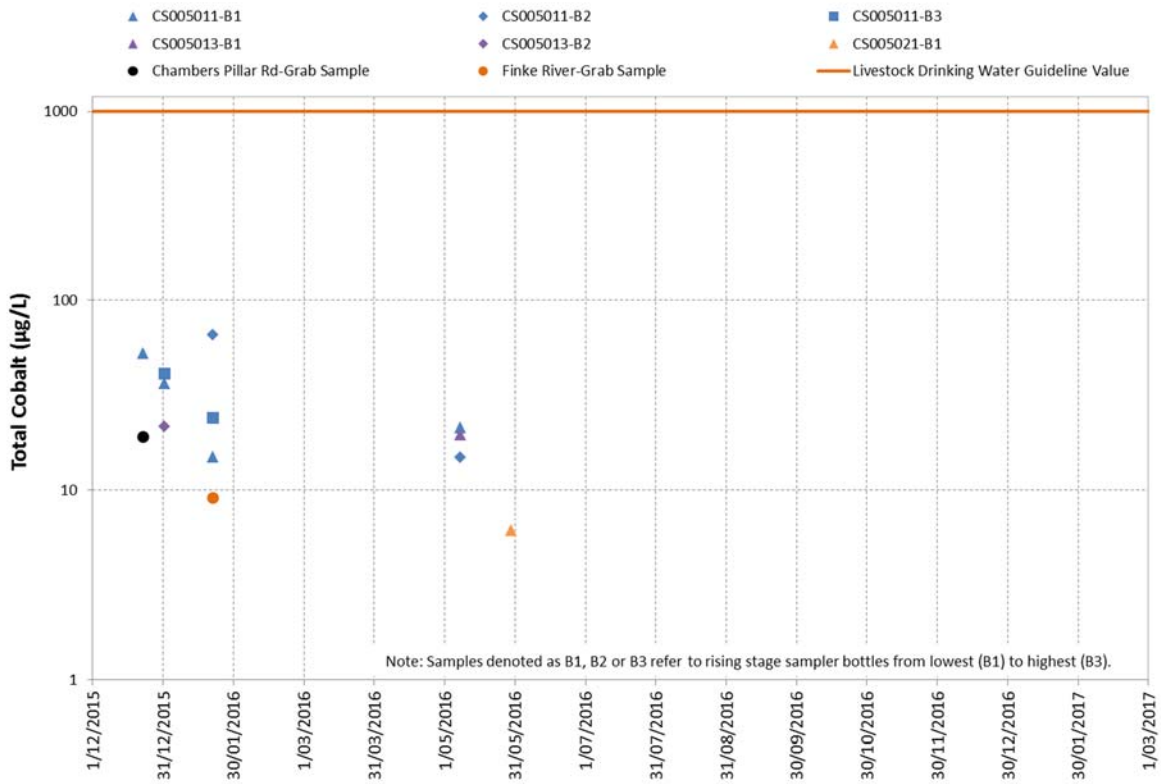

Figure 5-51 Cobalt (total) results

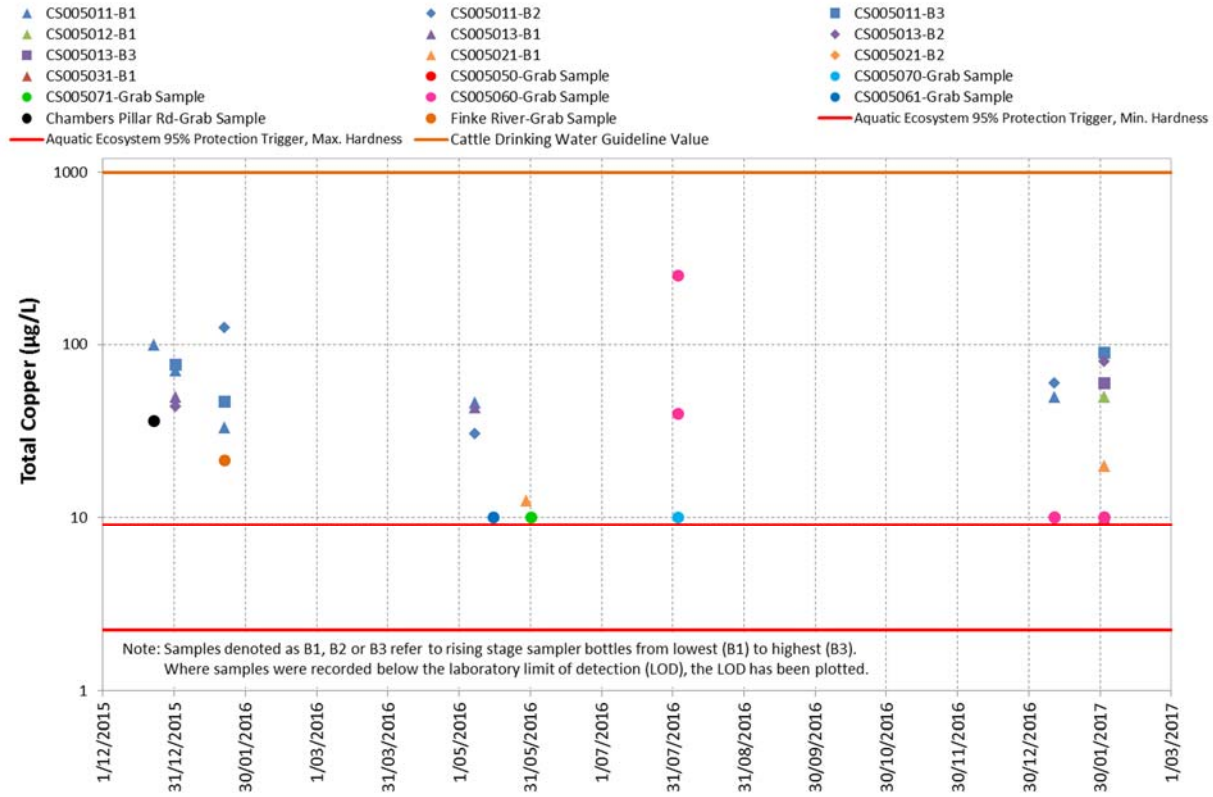

Figure 5-52 Copper (total) results

Figure 5-53 Lead (total) results

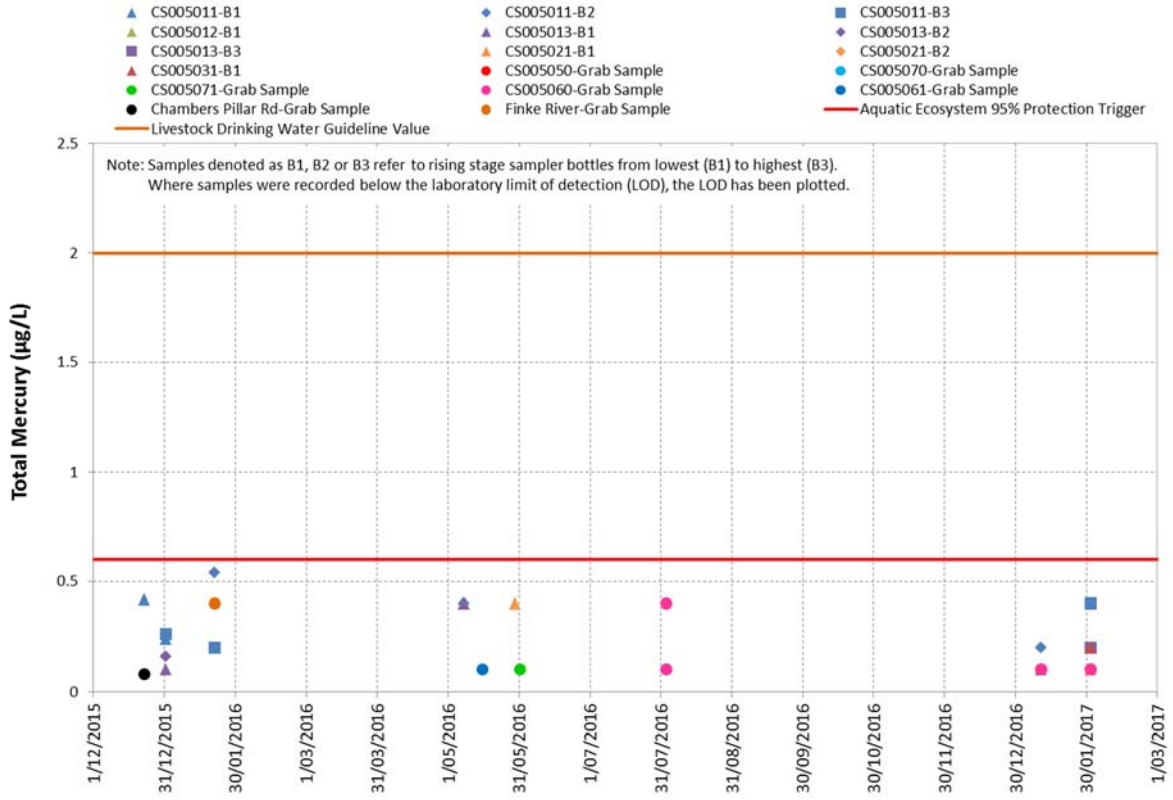

Figure 5-54 Mercury (total) results

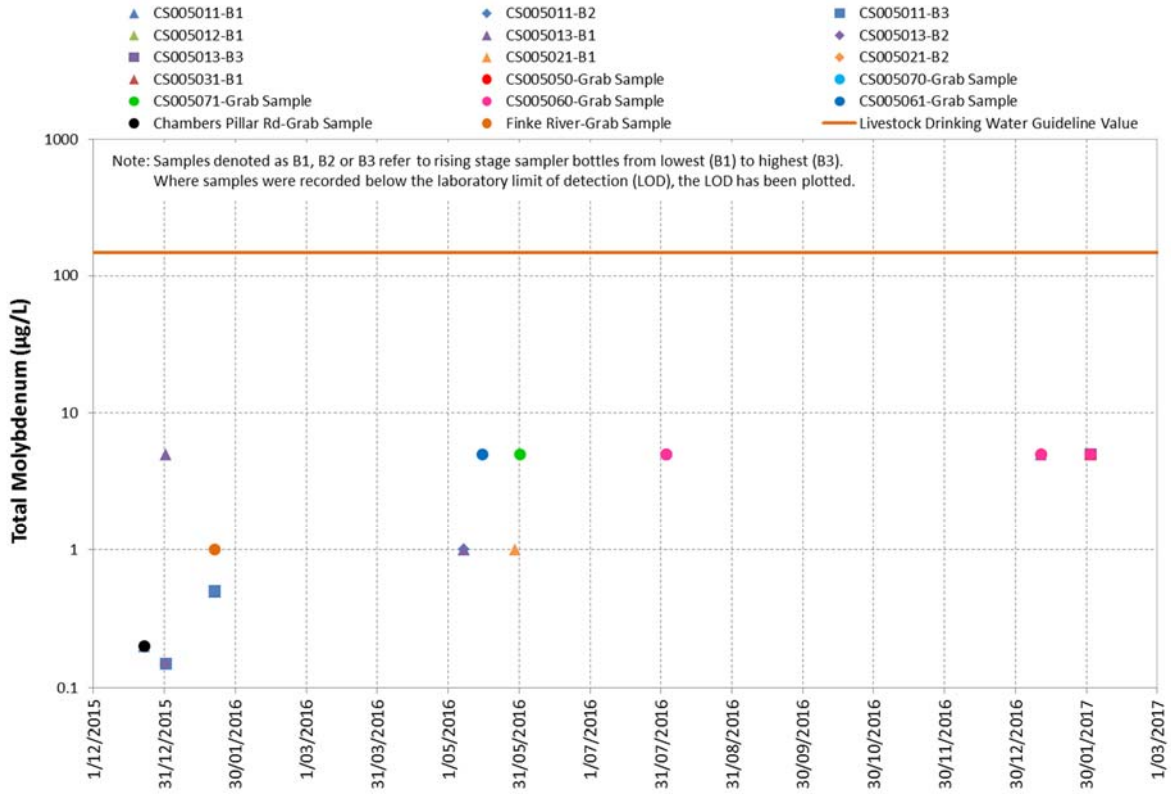

Figure 5-55 Molybdenum (total) results

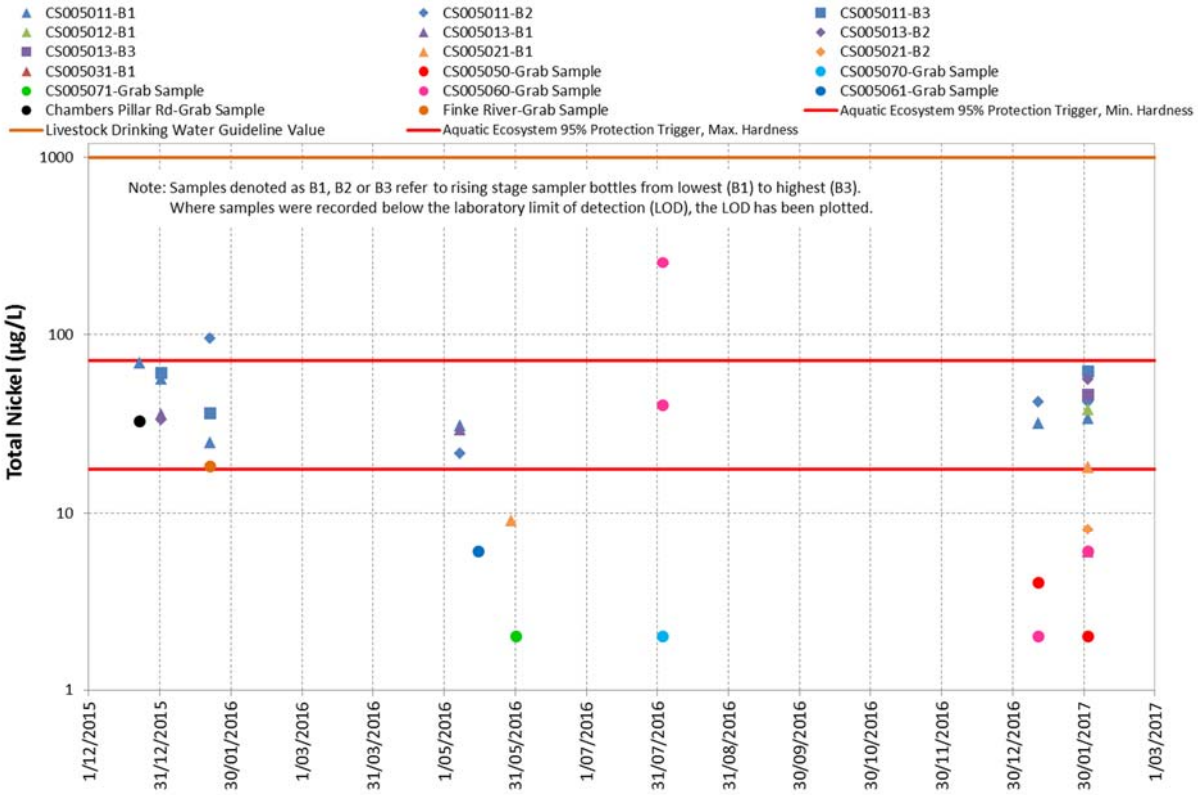

Figure 5-56 Nickel (total) results

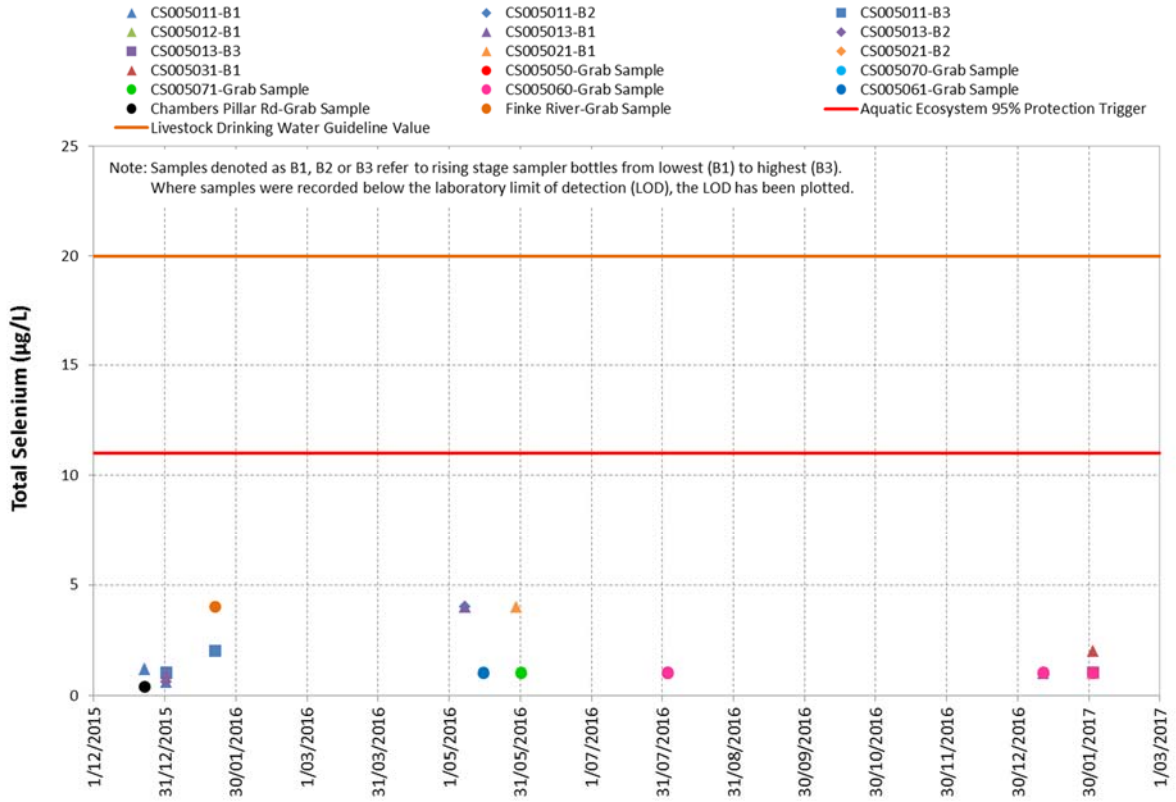

Figure 5-57 Selenium (total) results

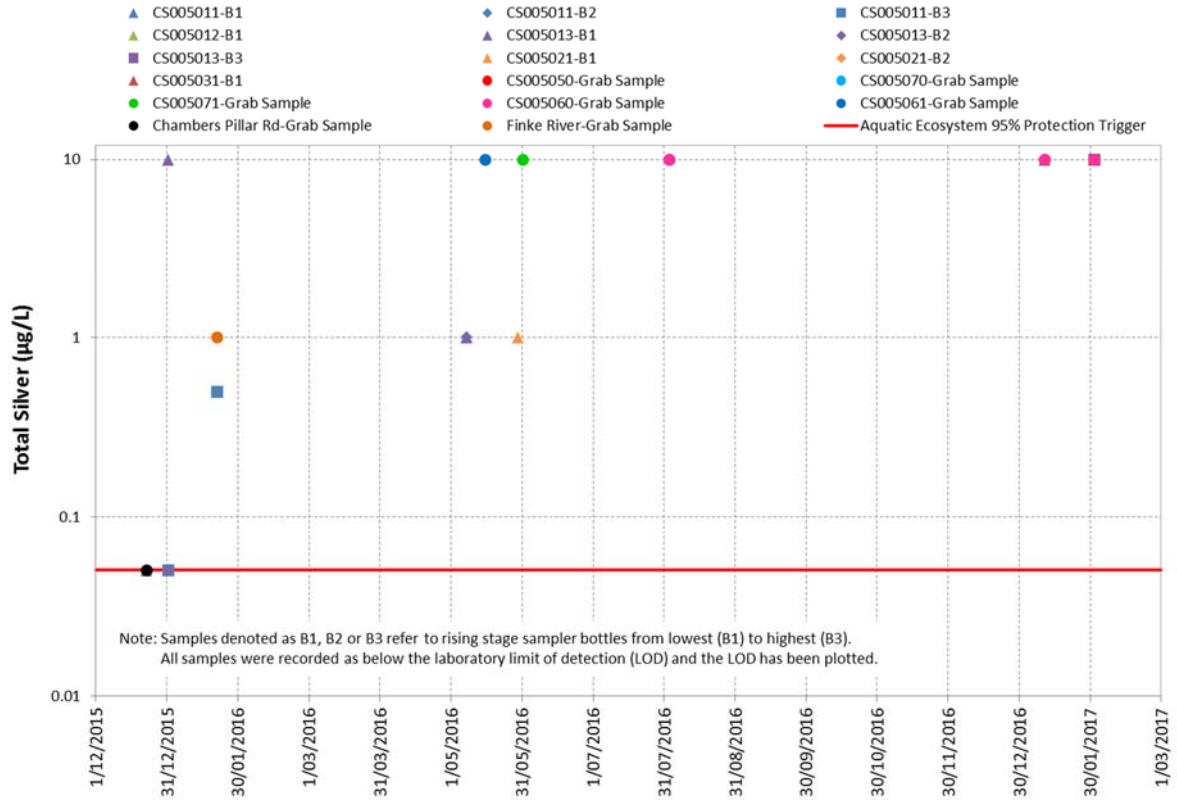

Figure 5-58 Silver (total) results

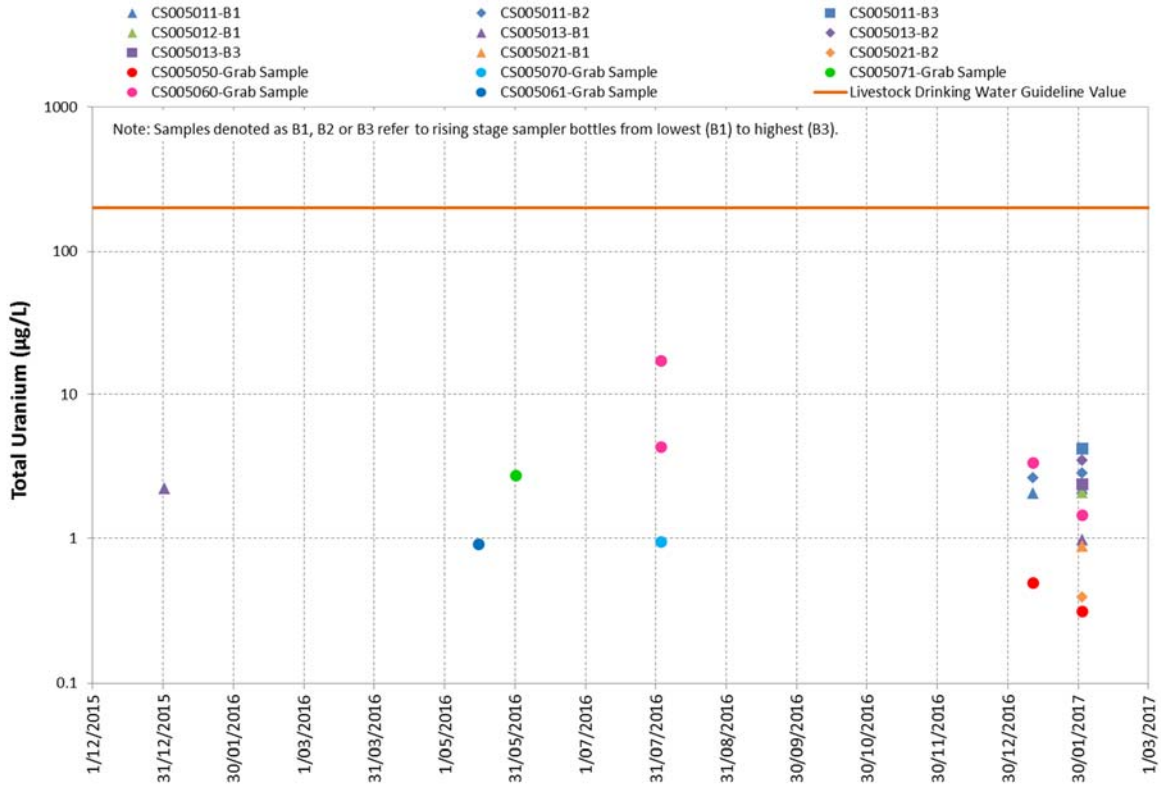

Figure 5-59 Uranium (total) results

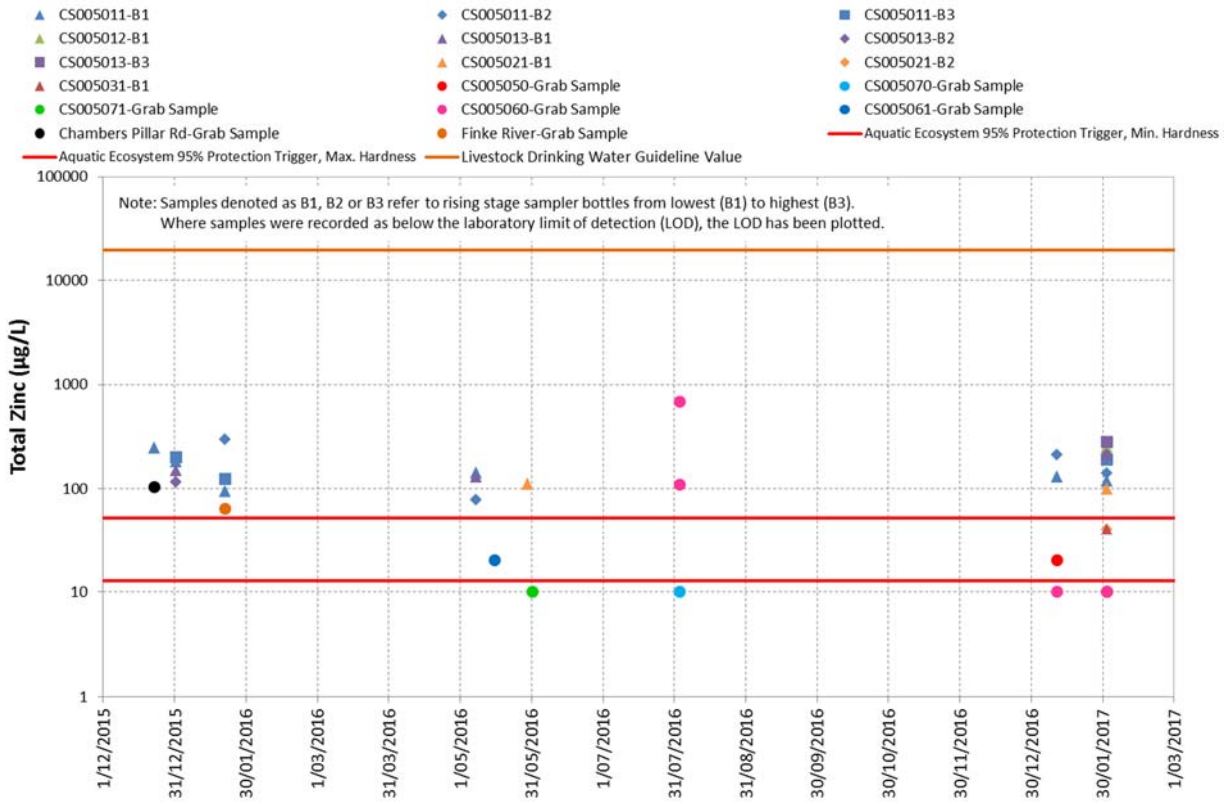

Figure 5-60 Zinc (total) results

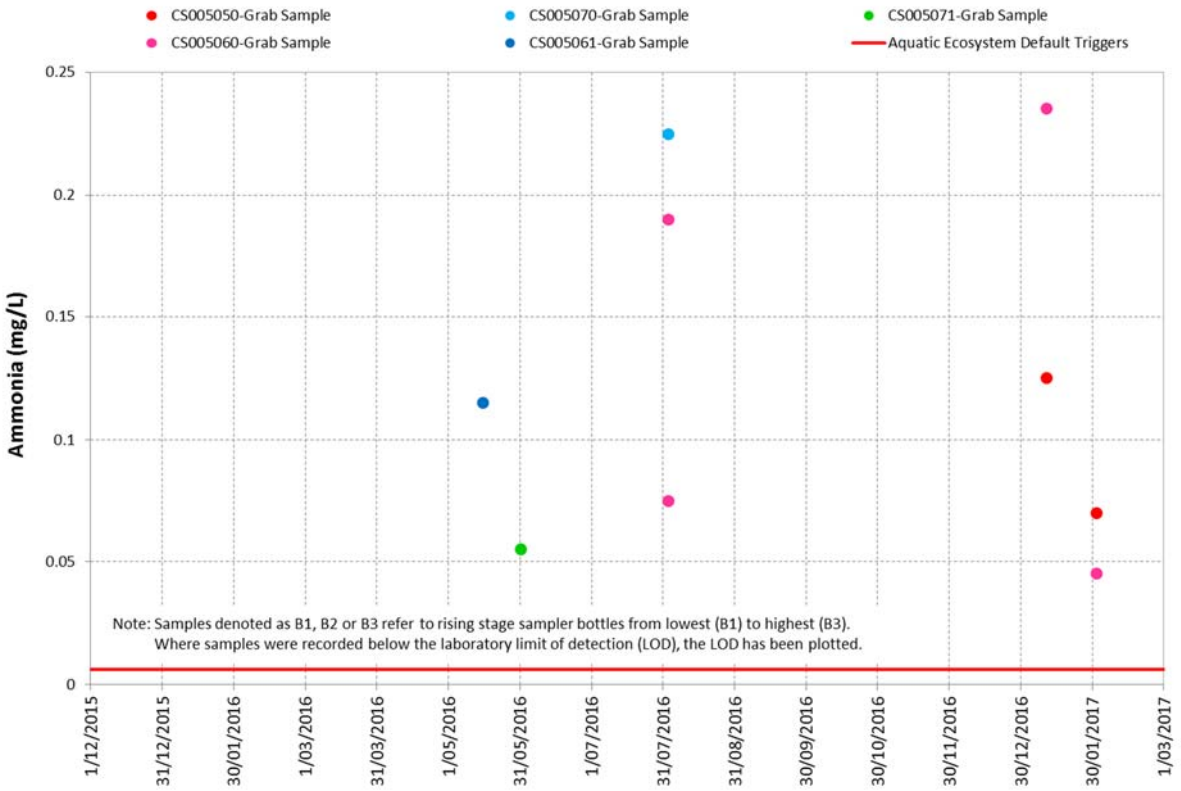

Figure 5-61 Ammonia results

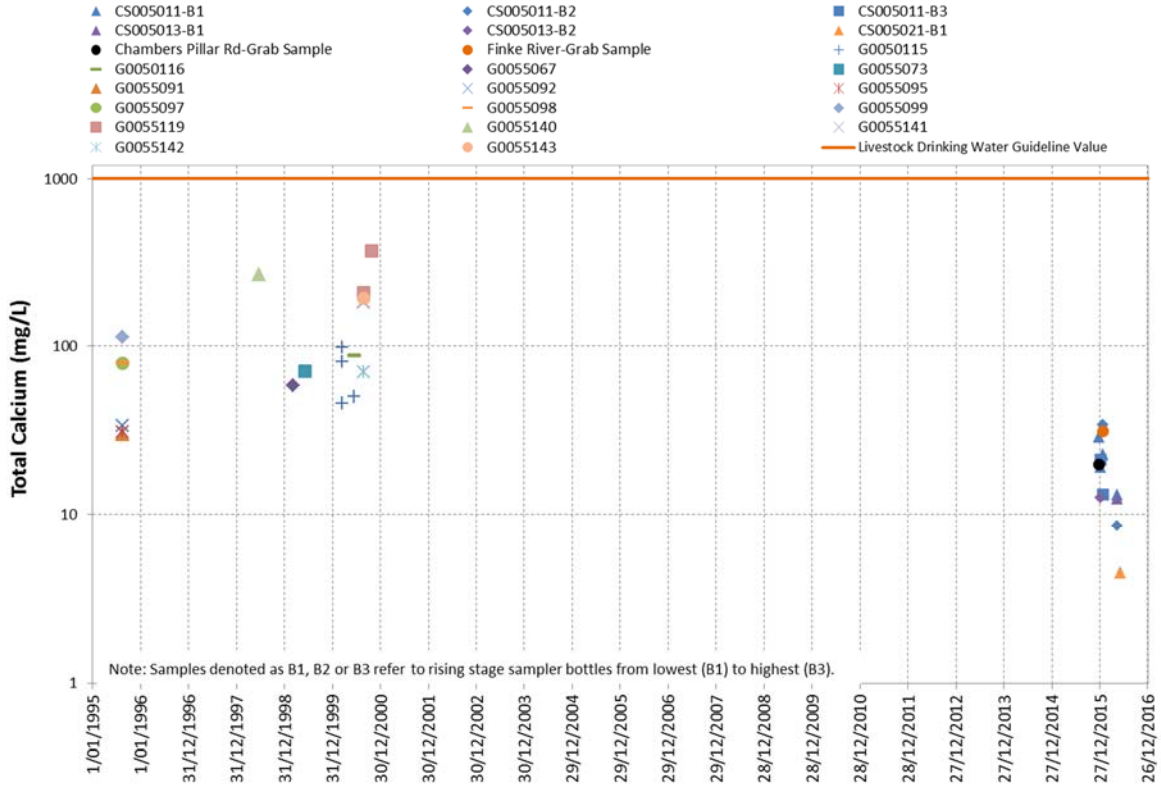

Figure 5-62 Calcium results

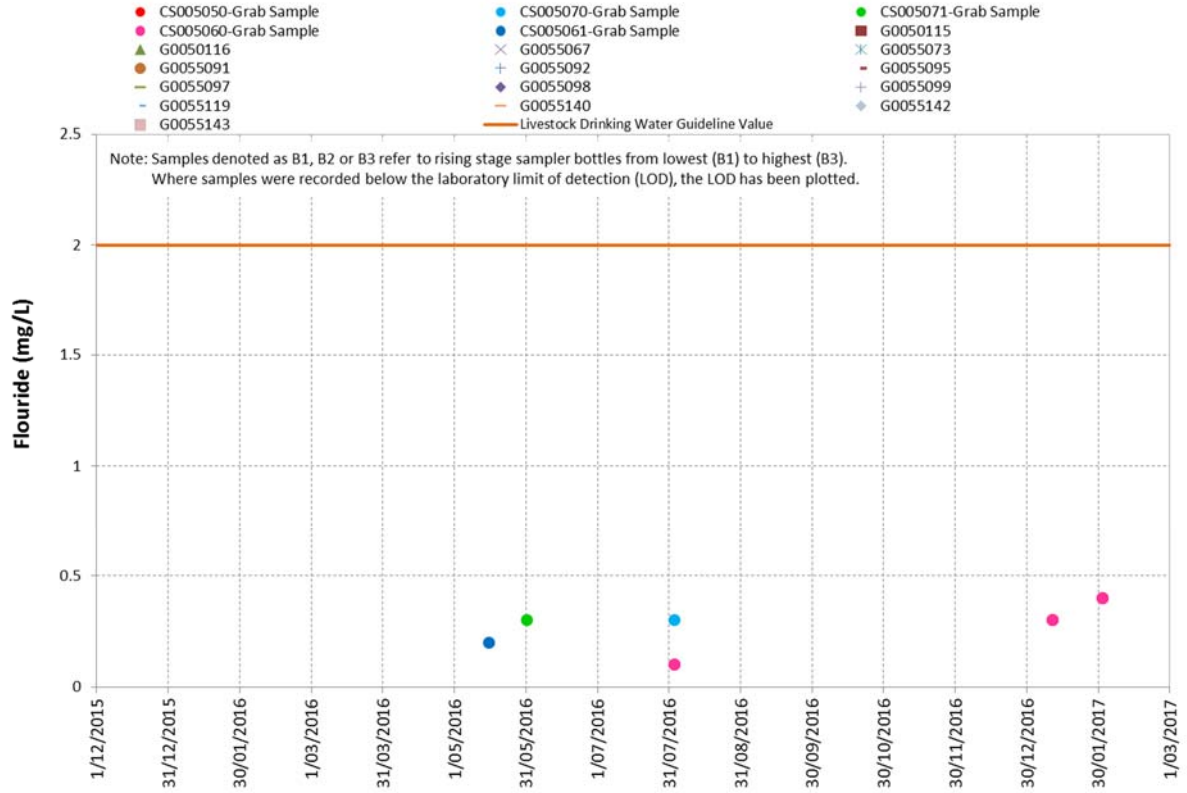

Figure 5-63 Fluoride results

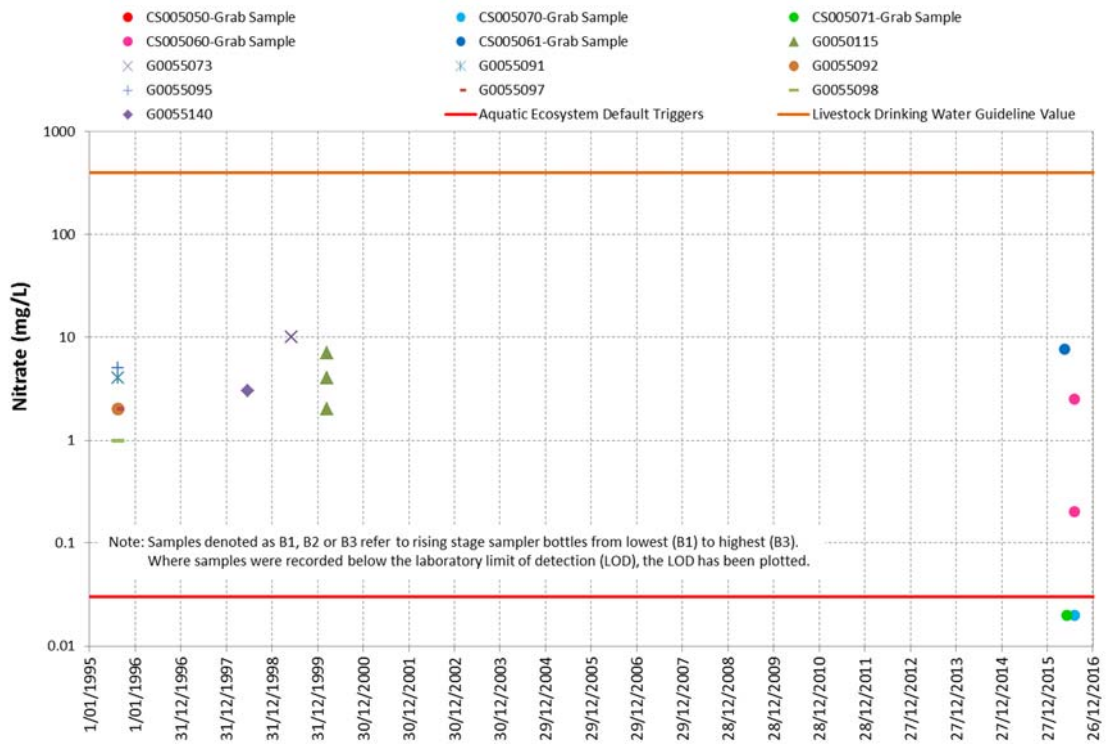

Figure 5-64 Nitrate results

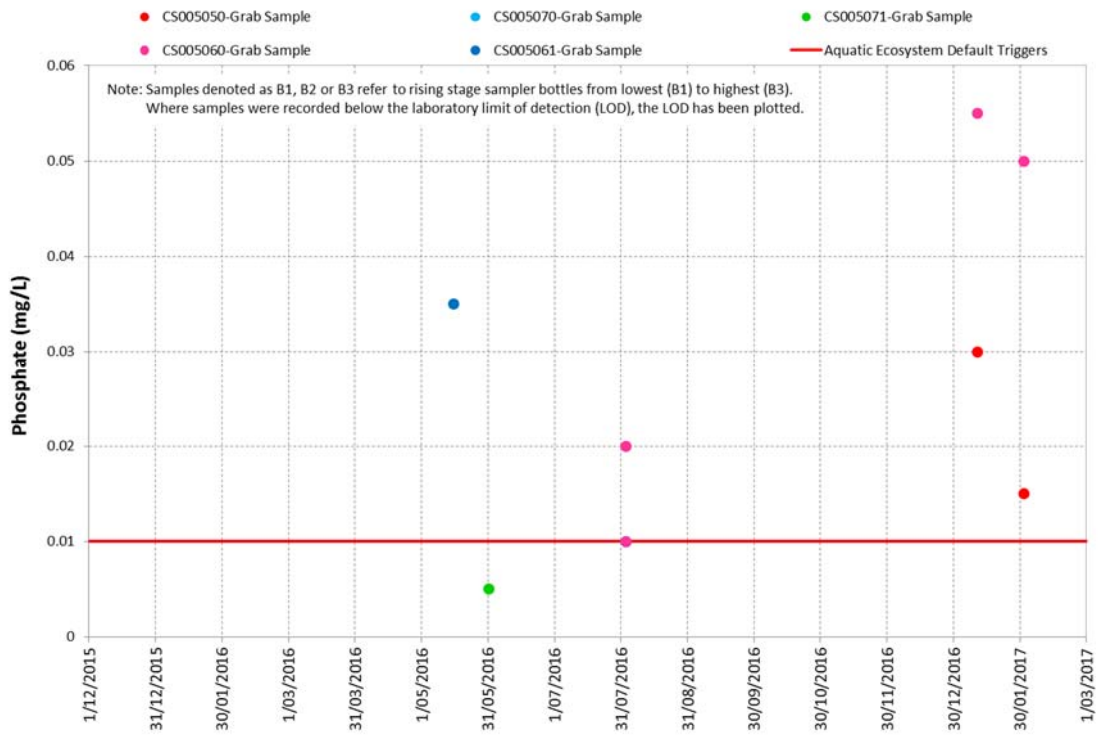

Figure 5-65 Phosphate results

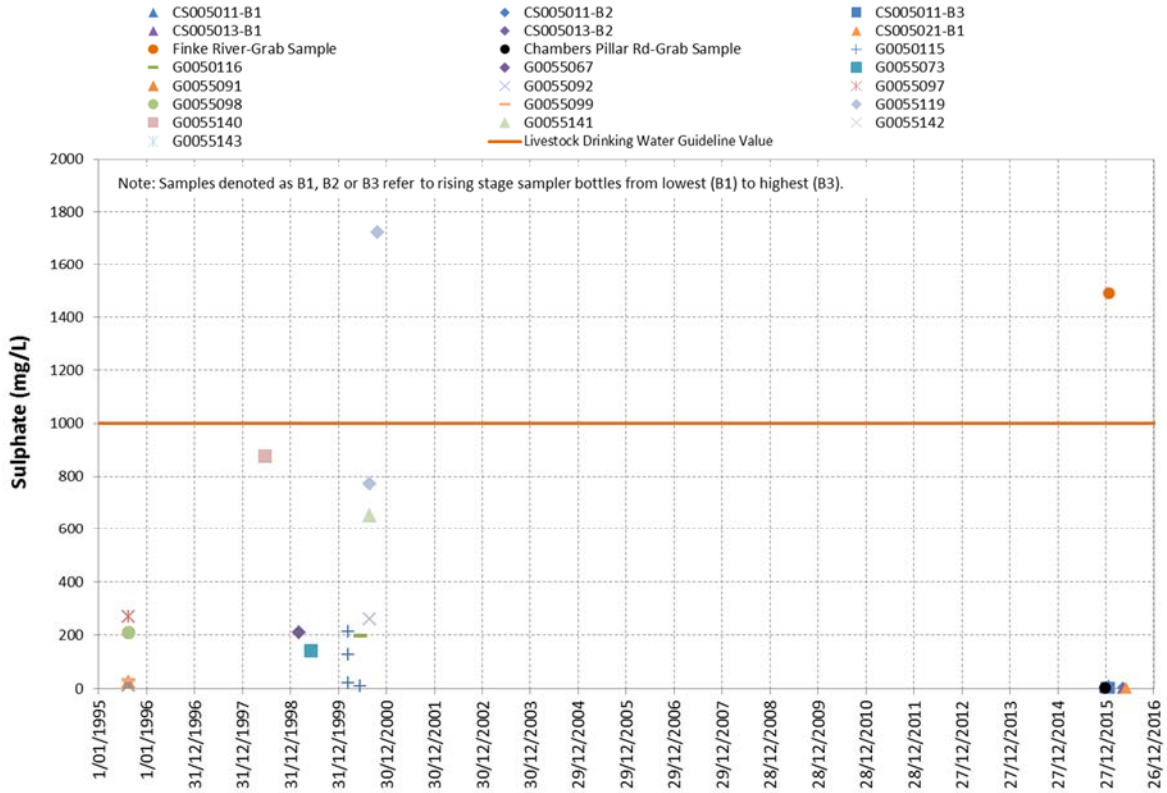

Figure 5-66 Sulphate results

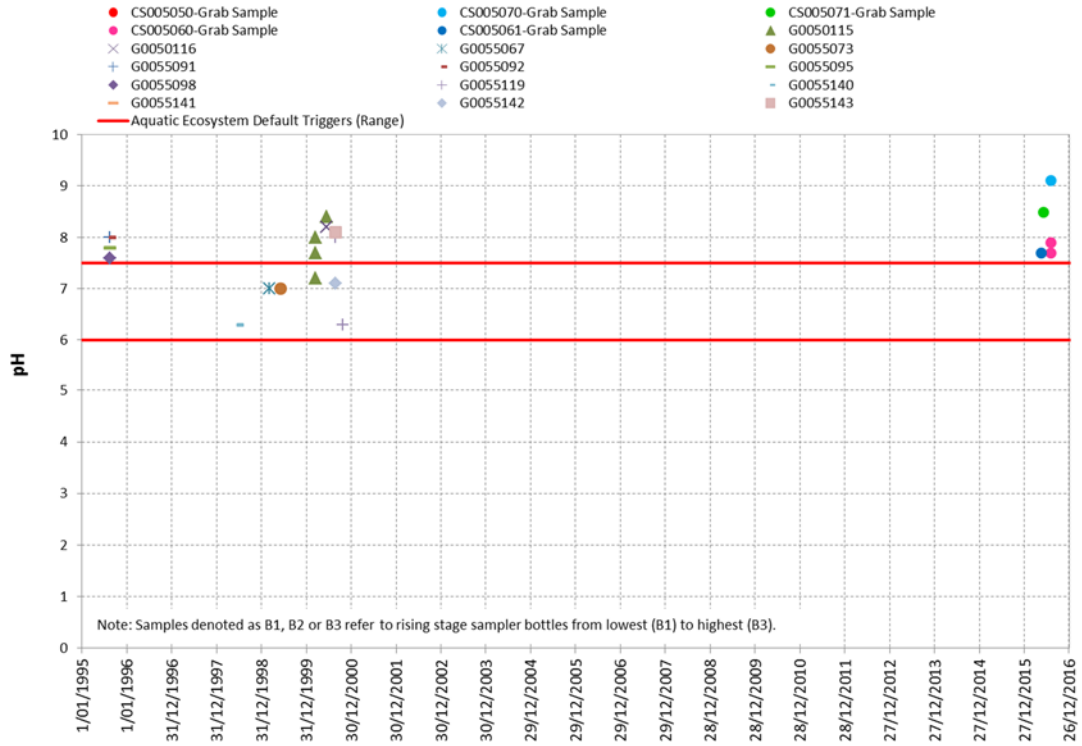

Figure 5-67 pH results

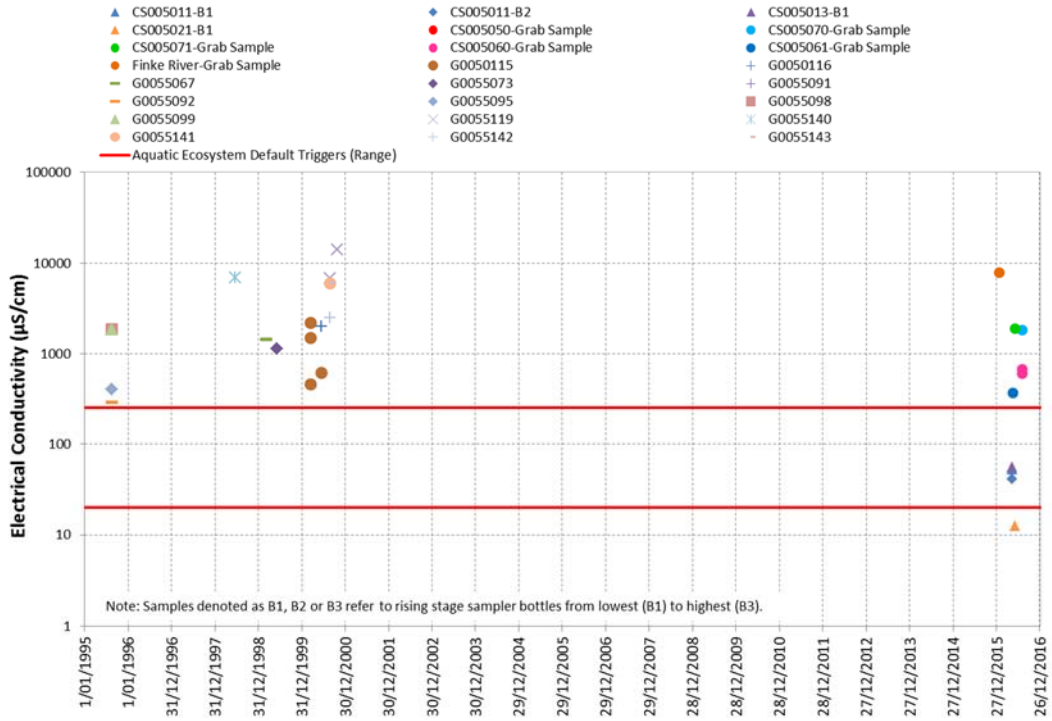

Figure 5-68 Electrical conductivity results

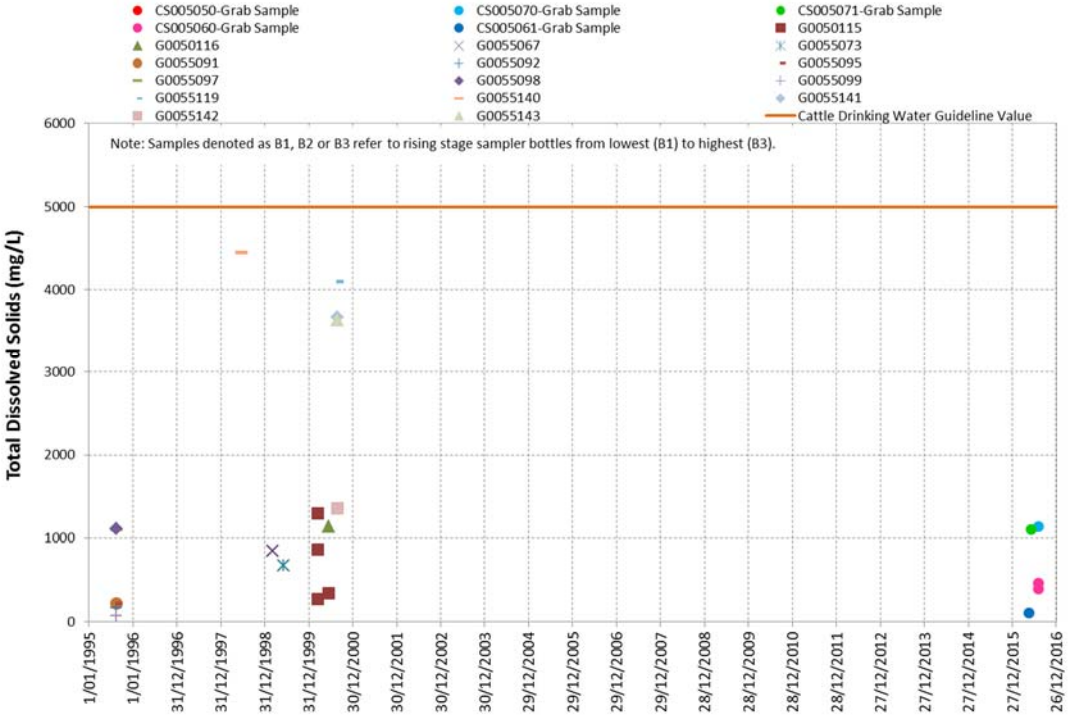

Figure 5-69 Total dissolved solids results

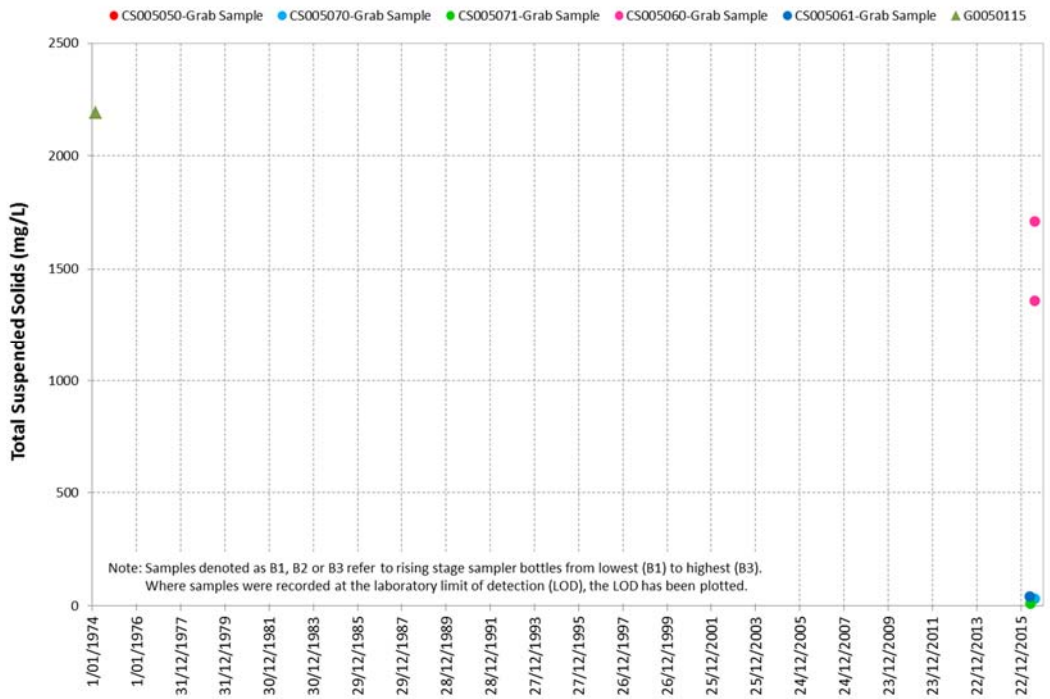

Figure 5-70 Total suspended solids results

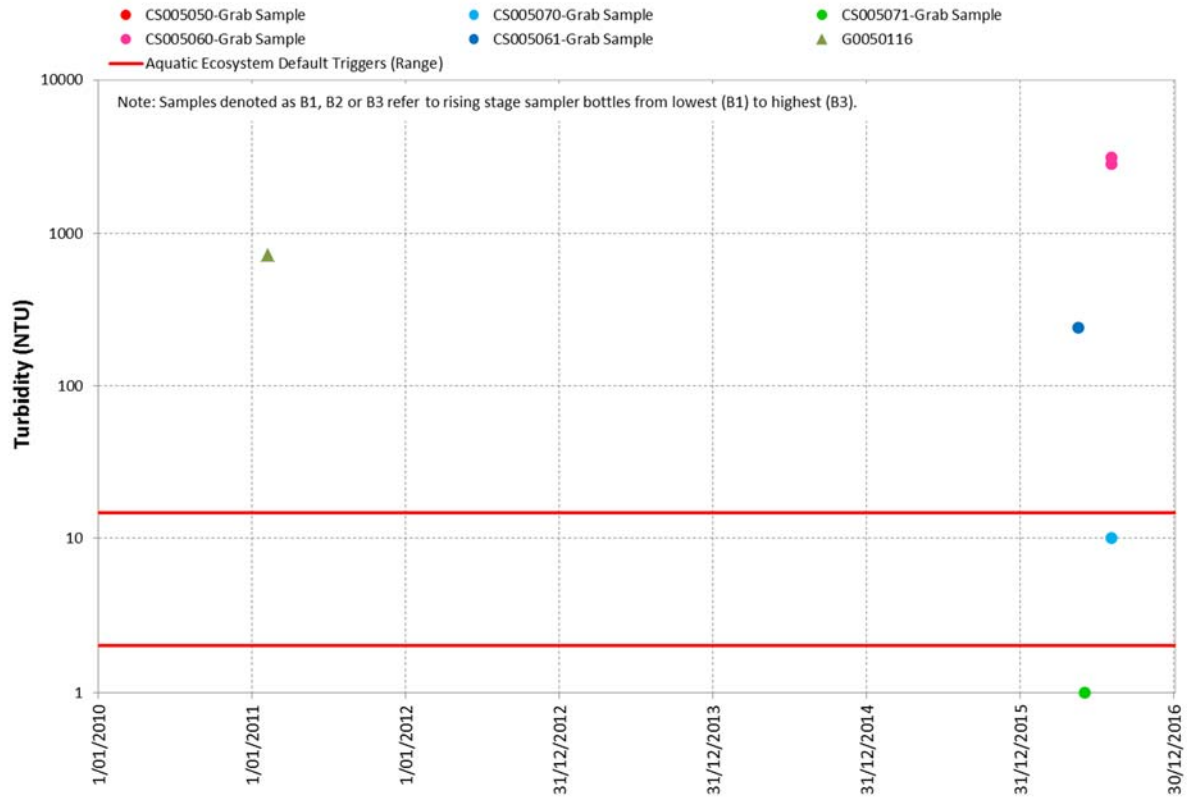

Figure 5-71 Turbidity results

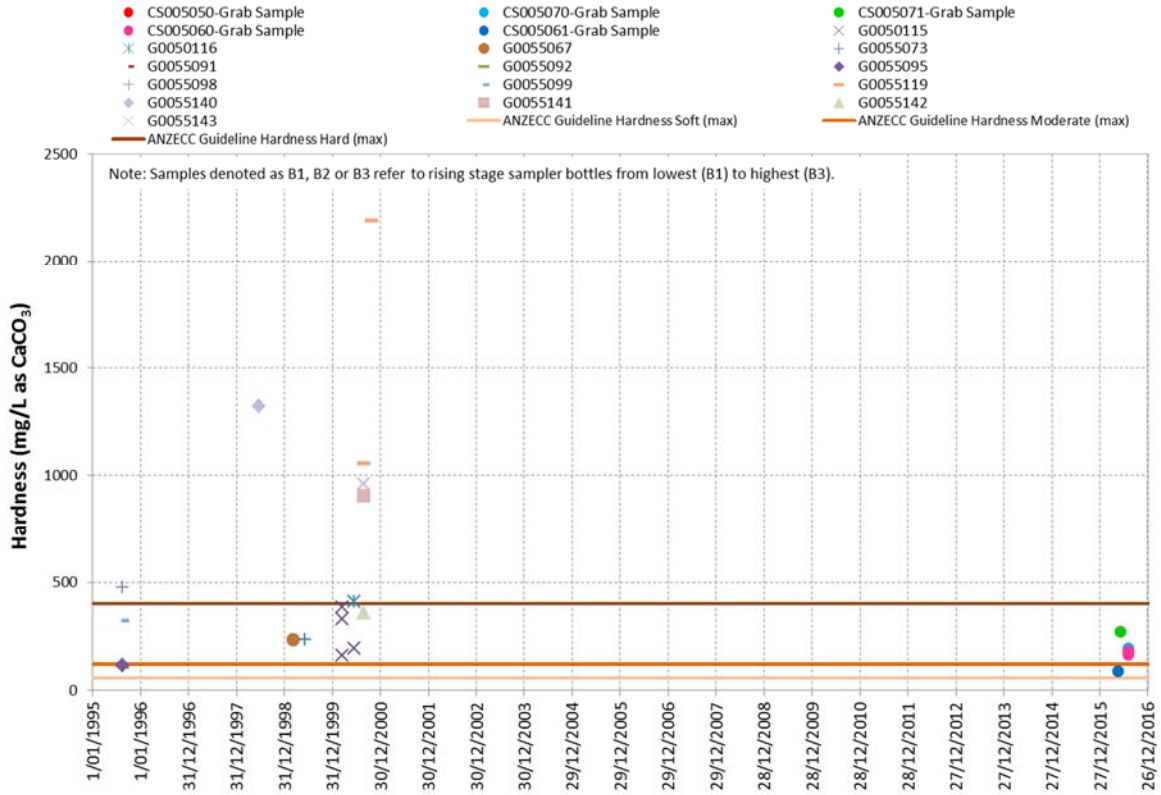

Figure 5-72 Hardness as $CaCO_3$ results

5.2.67 NT EPA 67

Issue raised

The current plan is to relocate Halfway Dam…further down the creek line and utilise its current site as the salt stockpile. Therefore, further detailed investigation is required to:

- *Find a suitable location for a new dam;*
- *Assess the effect of any mine activity in the catchment upstream on flow yield / reliability; and*
- *Inform the dam location, intake structure and dam capacity.*

This statement implies that a dam in (or near) a creek will be used as a salt stockpile area. In the Supplement please clarify this statement and outline any risks from stockpiling salt in a dam or in this area.

Proponent's response

The proponent confirms that the existing Halfway Dam, constructed by the current pastoralist, would removed and relocated to allow for the mine infrastructure. Consultations with the pastoralist have been undertaken to confirm the removal and relocation of Halfway Dam. As indicated in the response to NT EPA 64, a risk assessment and recommended environmental management measures associated with potential offsite contamination of watercourses from stockpiles has been addressed.

The proposed run of mine salt stockpile will be located upstream of Halfway Creek and at a minimum distance of 50 m from Halfway Creek. Further optimisation of the current conceptual site layout will be undertaken during the BFS and detailed design.

5.2.68 NT EPA 68

Issue raised

Using an Initial Loss of 40 mm, rainfall depths would result in no runoff for the majority of design events of 5 years ARI or less. While selecting a higher ongoing loss is expected to result in no effective rainfall from much of the longer- duration storm profiles.

In the Supplement, please provide calculations using the worst possible conditions (a higher ARI and lower initial loss) to enable an assessment of the extent of potential environmental impact.

Proponent's response

Peak flow rate estimation has been revised as described in DPIR 36. In addition to the 1% Annual Exceedance Probability (AEP) estimates, calculation has been undertaken for 10% AEP flows. Tables 3-3 and 3-4 present flood predictions for locations along the proposed Chandler Haul Road. A sensitivity analysis was undertaken by simulating both median and lower bound storm loss rates. The adopted values, as recommended by ARR (Geoscience Australia 2016), are shown in Table 5-31.

Table 5-31 Adopted values recommended by ARR

Parameter	Initial loss (mm)	Continuing loss (mm/h)
Minimum	20.0	1.4
Median	37.5	2.7

Results for both sets of loss rates are presented in Table 5-31. Peak flow rates were also calculated for the catchments draining to the Halfway Dam (refer to Figure 9-22 of the draft EIS) and were 88 and 107 m^3/s for the 1% AEP (for median and lower bound loss rates respectively) and 23 and 47 m^3/s for the 10% AEP (for the two sets of loss rates)

5.2.69 NT EPA 69

Issue raised

SW 16 Additional monitoring. Catchment drainage

SW17 & 18 Additional investigations during detailed design. Develop two- dimensional modelling of flow paths and inundation in the mine lease area,

SW19 Model flood risk and scour protection at the crossing of the Finke River.

SW20 Model flood risk1 of haul crossings (bridges, culverts, causeways) of drainage lines.

SW21 Develop site specific water quality guidelines. SW23 Preventing erosion and sedimentation

In the Supplement, confirm these measures are in progress or provide timelines for these studies to commence.

Proponent's response

Please refer to the proponent's commitments and management measures listed in Table 4-1.

5.2.70 NT EPA 70

Issue raised

Chapters 4.4.1/4.4.2 of the Emergency Response Plan refers to the reporting requirements under the *Environment Protection and Biodiversity Conservation Act*. These sections should be updated to note that the only reporting requirements that apply to the Project are those that are specified on an approval under Part 9 of the Act. The reporting provisions with respect to permits are only applicable to works that happen within areas owned or leased by the Commonwealth.

Proponent's response

Noted. The Emergency Response Plan would be updated to reflect the above information after regulatory approval of the Proposal and prior to construction of the Proposal.

5.2.71 NT EPA 71

Issue raised

The draft EIS notes that air quality data by the NT EPA in Darwin has been used to represent the baseline conditions at the Proposal site. Air quality data from Darwin is likely to be very different to Central Australia and the Chandler site. In the Supplement, provide justification for the use of Darwin air quality data as a baseline for the Chandler Facility. Further discussion should be provided with respect to how Tellus Holdings Ltd has accounted for the effect of existing industry in Darwin and whether this affects the ability to obtain a meaningful baseline for the Chandler Site.

Proponent's response

Section 4.2, Part A in Appendix X of the draft EIS, provides detail on the identification of available and suitable baseline air quality monitoring data for use in the Air Quality Risk Assessment. As stated in that section:

> *'The nearest air quality monitoring performed by the NT EPA to the Proposal site is in Darwin, which is located approximately 1,300 km to the north of the Proposal site. Given the large distances between the Proposal site and the closest air quality monitoring station, caution must be used when using these data. It is of note that air quality criteria for all monitored pollutants, other than particulates (PM_{10} and $PM_{2.5}$), are achieved within Darwin, and for SO2, NO2 and CO concentrations represent between 4% and 42% of the relevant criteria.*

Although the populations of Alice Springs and Darwin vary significantly (approximately 28,080 and 140,400 respectively) it may be reasonably assumed that combustion/traffic related pollutants such as SO_2, NO_2 and CO would be lower than those measured in Darwin, and the air quality pollutant concentrations at the Proposal site would be lower than those that would be measured in Alice Springs. Correspondingly, whilst the air quality monitoring data measured in Darwin may be generally unrepresentative of the Proposal site, it should be regarded as being highly conservative when compared to the conditions expected at the Proposal site.'

It is acknowledged that the monitoring data measured in Darwin is likely to be generally unrepresentative of both Alice Springs and the Proposal site, however despite the differences between the locations, Darwin is still the closest EPA monitoring site.

The air quality monitoring data collected in Darwin will be influenced by a significantly larger residential population than Alice Springs (28,080 and 140,400 persons respectively for Alice Springs and Darwin), a significantly more developed industrial base, significantly larger traffic flows, port operations etcetera. Whilst these differences are acknowledged it is reasonable to assume that the baseline air quality conditions assumed in the Air Quality Risk Assessment are likely to represent a highly conservative representation of the baseline conditions at the Proposal site.

5.2.72 NT EPA 72

Issue raised

The relocation of threatened species is not considered an acceptable measure for avoiding significant impacts. With respect to *Liopholis slateri*, the species lives in a communal warren. The relocation of a single individual away from the alignment of the road would have minimal conservation benefit for the species and would likely result in the death of the individual skink. If a communal warren is identified within the road alignment, it is preferable that Tellus Holdings Ltd realigns the section of the access road to avoid impacts.

Furthermore, it is noted that the thick billed grasswren (*Amytornis modestis indulkana*) is listed as extinct in the Northern Territory. If a population or individual birds are found during pre-clearance surveys, it is requested that the Flora and Fauna Division of the Department of Environment and Natural Resources be contacted to obtain further information about how to proceed. It should be noted that the capture and relocation of any birds from the area will require the use of mist nests which can result in serious injury and death of the bird if used by unqualified or trained persons.

To ensure there is sufficient detail to assess the likely risks and potential impacts to both species, provide maps and an estimate of how much habitat for the two species is likely to be impacted. This information will ensure the Australian Government has sufficient information to calculate possible offsets under the EPBC Act if it considers that offsets are necessary.

Proponent's response

Additional presence/absence field surveys for Slater's skink and thick-billed grasswren were undertaken by Low Ecological Surveys post submission of the draft EIS in late April 2017. The

additional surveys confirmed that these species are not present within the proposed development footprint or vicinity and would, therefore, not be impacted by the Proposal (refer to Attachment C).

5.2.73 NT EPA 73

Issue raised

Figure 9-1 in Appendix J is referred to in the draft EIS but was not provided. Please provide this figure in the Supplement.

Proponent's response

Please refer to Figure 5-73.

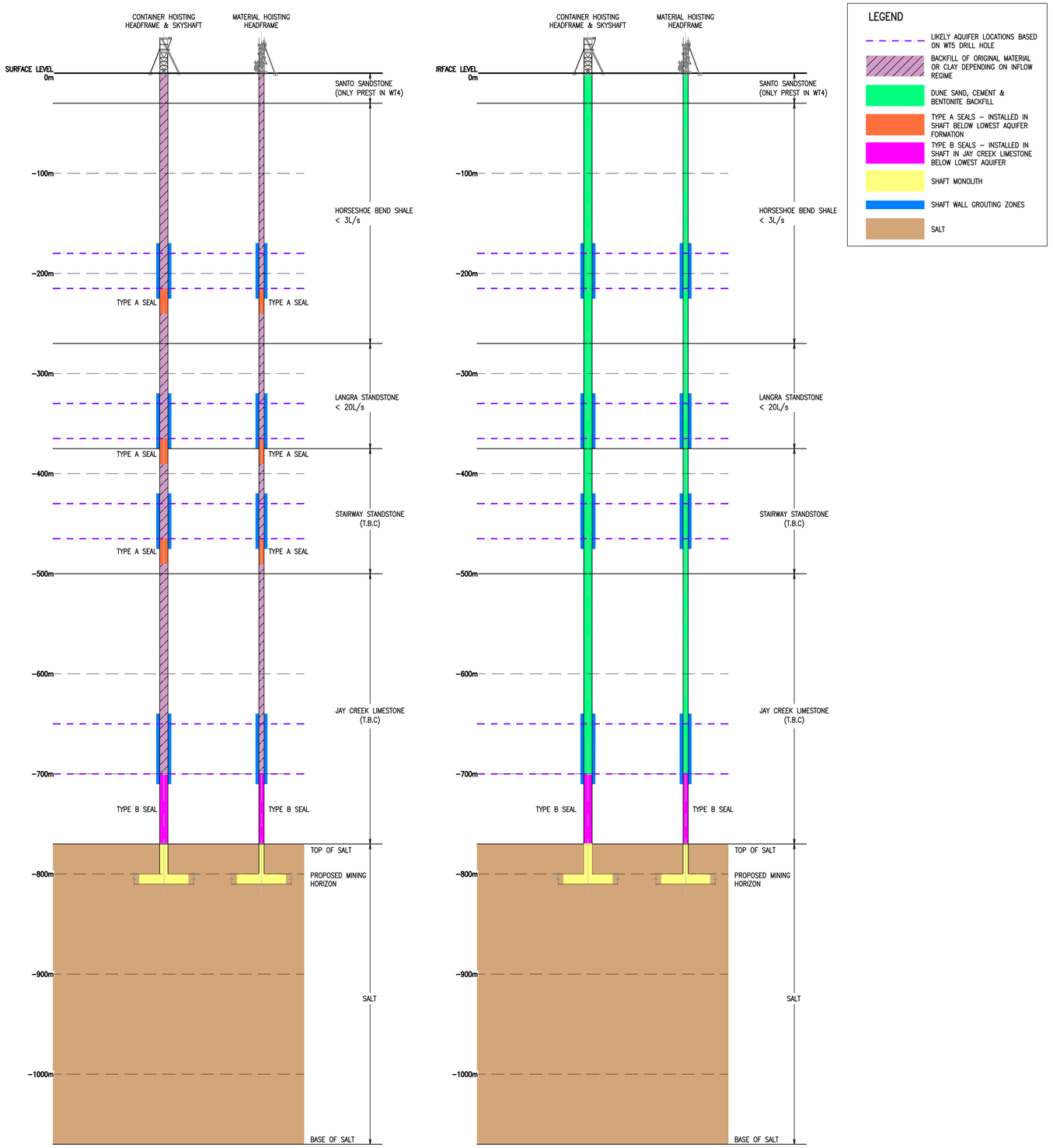

Figure 5-73

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DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REFER COVER SHEET FOR NOTES UNLESS NOTED OTHERWISE

Rev.	Revision Description	By.	App.	Date
1	PRELIMINARY ISSUE FOR REVIEW	OH	CW	30.10.15

Structural, Civil & Construction Engineering Consultant
RobertBirdGroup
SYDNEY OFFICE:
Robert Bird Group Pty Ltd
PO Box AJ309
Sydney South, NSW 1235
Level 11
151 Castlereagh St
Sydney NSW 2000
Ph. (02) 8246 3200
ACN 010 580 248
Web Site: www.robertbird.com

Client: TELLUS

Title: SHAFT SEALING STRATEGY – OPTION A & B

Project: CHANDLER SALT MINE PROJECT

NOT FOR CONSTRUCTION

Date	Designer	Design Checker
30.10.15	Value	–
Scale at B1	Drawn	Principal/Project Leader
VALUE	Value	–
Job Number	Drawing Number	Revision
15451C	C-0-1-13	1

B1 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

5.2.74 NT EPA 74

Issue raised

The Emergency Response Plan should include details around the transportation of waste to the site. It is understood that Tellus Holdings has contracted Toll to transport waste material to the site, outline the proposed emergency procedures and the preferred sub-contractors that will be engaged if there is a truck accident/derailment and waste is no-longer contained during transportation to Apirnta and/or the Chandler Facility.

Proponent's response

The proponent commits to updating its Draft Emergency Response Plan included in Appendix T in the draft EIS to include details around the transportation of waste to the site. To ensure further information on this issue is provided as part of the EIS Supplement process, the proponent attaches Toll's Emergency Response Plan, which includes their provisions for emergency response with respect to transportation of waste to the site.

In addition to the policies and guidelines detailed the Toll Group Health and Safety Management Standards, Toll has well defined and established Emergency Response Procedures in each Toll operating divisions involved in this proposal covering Tellus' National Transport and Distribution requirements. Each clearly outlines the processes and responsibilities for each party involved.

Toll roadside depot assistance

Toll's Fleet Management Business Unit operates a 24 hour, 7 day a week national emergency assistance/response service to assist all Toll businesses in dealing with incidents both major and minor involving vehicles and property which include:

- Vehicle breakdowns.
- Vehicle accidents.
- Incidents involving dangerous goods, hazardous substances or other products which may pose a risk to the environment.
- General emergency response.
- Reporting and investigating incidents.

Services are coordinated through a central base and link into our national network of maintenance centres for breakdowns and our trained emergency response teams for emergency assistance, which are strategically situated throughout Australia.

1800 Emergency response number

Drivers call Toll's 1800 emergency number (1800 639 621 for general emergency, 1800 039 008 for Dangerous Goods/Hazardous Substances emergency).

The Depot Assistance Central Base utilises the Drivers Name, Business Unit, Location of Vehicle and Registration Number to help activate the response. A Response Coordinator will ensure the appropriate services are despatched and relevant information provided and will liaise with the relevant Toll Business Unit in regards to delays/situation.

Toll will ensure that the customers affected are informed as soon as possible and contingency plans initiated to minimise the effect on customer operations.

Emergency response guide

Toll's 'Emergency Response Guide' details the relevant procedures and policies necessary to provide assistance and direction to any person required to respond to an emergency situation, particularly incidents involving linehaul operations and dangerous goods incidents. It includes:

- DG Customers 24 Hour Contact Details (list of phone numbers by customer).
- Incident Management guidelines.
- Contact Details by State and Location for Towing, Clean Up Assistance, Trucks or Other Transport Operators (to assist with recovery), Environment Protection Agency, Toll 1800 Emergency Response Number.
- Forms including: Emergency Response Form, Motor Vehicle Accident Response Form.

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Issue raised

While identified in the risk assessment, incidents at another geological storage facility (the Waste Isolation Pilot Plant (WIPP)) in New Mexico highlight the risks with incorrect waste handling/characterization and unforeseen incidents (fires). While it is acknowledged that the Chandler Facility differs from the WIPP in that it will not store high level radioactive wastes, will the Chandler Facility have any protocols and/or engineering solutions specifically designed into the declines/shafts or rooms for ensuring that if an unforeseen incident occurs, hazardous waste can be isolated and contained underground?

Proponent's response

The current level of engineering study has allowed for inclusion of mine safety considerations such as:

- Safety training of all personnel.
- Special training of an on-site emergency response crew.
- Emergency response equipment (surface and underground).

- Mobile and fixed gas, smoke and dust monitoring equipment throughout the surface and underground facility (connected to a central SCADA system seen by management at the facility and head office).
- Adequate ventilation.
- Emergency egress.
- Emergency isolation areas.
- Fire safety safeguards.

Additional monitoring and early warning systems will be developed during the next phase of engineering.