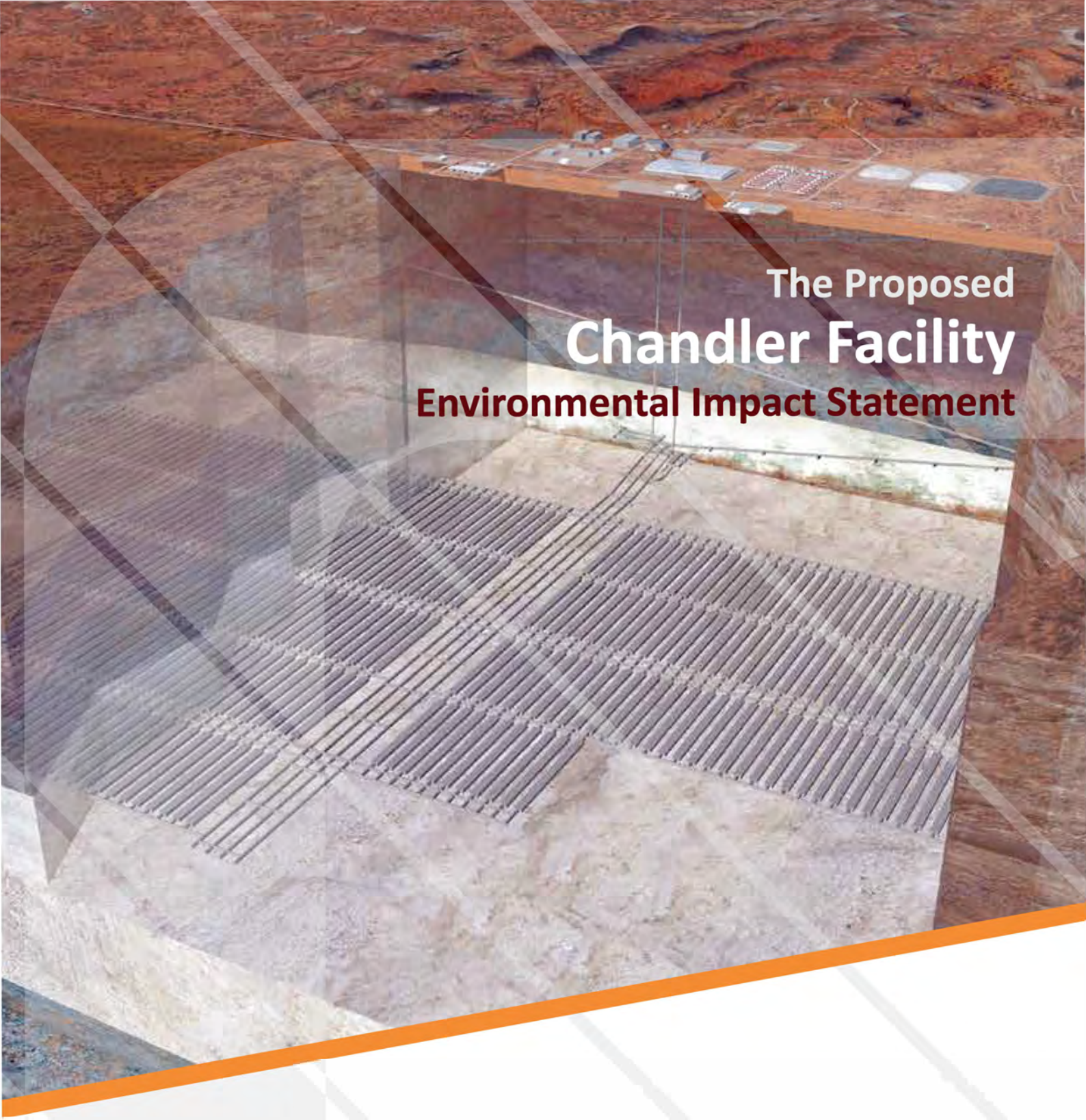

The Proposed

Chandler Facility

Environmental Impact Statement

Executive Summary

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EXECUTIVE SUMMARY

Introduction

Tellus Holdings Ltd (Tellus) propose to construct and operate an underground rock salt mine and complementary storage, recovery and permanent isolation facility (herein referred to as the 'Chandler Facility'). A rail siding and temporary storage and transfer facility (herein referred to as the 'Apirnta Facility') is also proposed. 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 Apirnta Facility with the Stuart Highway. Collectively, the two proposed facilities, 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). The proposed site approximately 120 kilometres south of Alice Springs and about 25 kilometres by road from the community of Titjikala in the Northern Territory (NT) (refer to Figure ES-1). The Apirnta Facility, Henbury Access Road and a portion of the Chandler Haul Road would be located to the west of the proposed Chandler Facility, also on a pastoral lease (the Henbury Station).

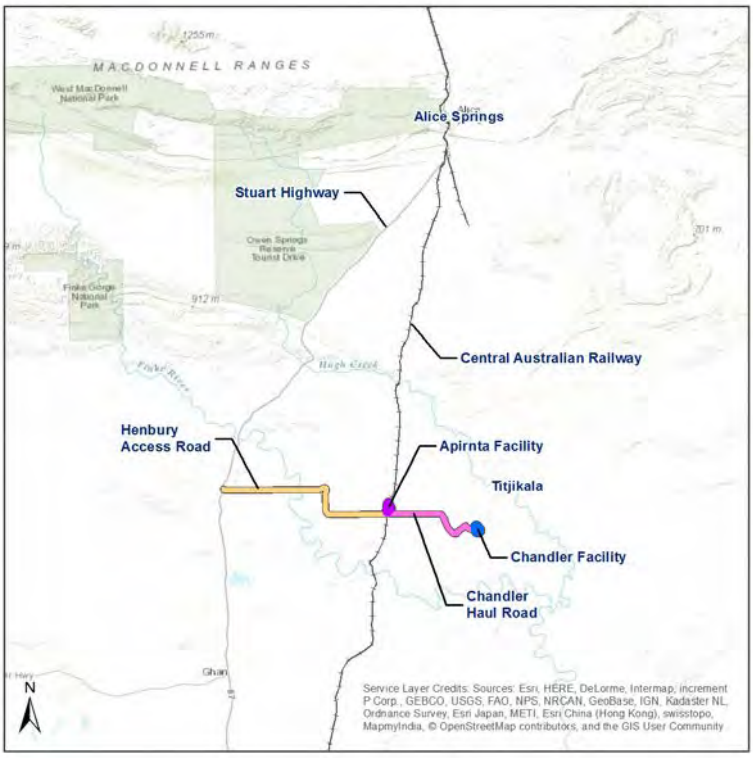

Figure ES-1 Location of the Proposal

This Environmental Impact Statement (EIS) has been prepared by Tellus to support key approvals under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the NT *Mining Management Act* (MM Act), the NT *Environmental Assessment Act* (EA Act) and the NT *Waste Management Pollution Control Act* (WMPC Act) for the construction, operation, and closure and rehabilitation of the Proposal. The EIS has been 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 proponent

Tellus is the proponent for the Proposal. Tellus is an infrastructure development company in the business of creating economic, social and environmental value from waste, clay and salt resources. This dual revenue model involves mining the commodities rock salt and kaolin clay in thick dry remote beds which creates world's best practice geological repositories. The voids created by mining are then used to store equipment, archives or waste using a multi barrier system as part of an overall safety case.

Tellus plan to permanently isolate hazardous waste using environmentally sound management principles that protect the environment and human health. Tellus also supports the circular economy using long term storage by placing like-with-like materials for operational safety reasons and to create opportunities for the future recovery of valuable materials.

Tellus' business model mirrors international solutions operating in the United Kingdom, Europe and North America. Tellus is developing the proposed Chandler Facility in the NT (which has been awarded Major Project Status by the NT Government) and also the proposed Sandy Ridge Facility in Western Australia.

The company details are as follows:

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Further information regarding the proponent is provided on their website at the following address: www.tellusholdings.com.au

Proposal need

The viability of the proposed Chandler Facility would rely on implementing both aspects of the dual revenue Proposal:

- The salt business.
- The equipment and archives storage business and waste storage, recovery and permanent isolation business in a deep (850 metre) geological repository.

Salt

Salt, or sodium chloride, is a mineral that naturally occurs in our seas and in underground deposits. There are three ways in which salt can be harvested (1) via solar evaporation (2) solution mining and (3) deep underground mining. Salt is one of the most widely used substances on Earth. It has over 14,000 direct and indirect uses. The most familiar use of salt is for food and food processing (both for humans and animals). It is also widely used in the chemical industry for chlor-alkali production and synthetic soda ash production.

World demand for salt is forecast to grow, particularly in Asia. It is estimated that there will be an approximately six million tonne shortfall of salt in the Asian market by 2018. The worldwide demand for salt is expected to be the greatest in the chemical industry (specifically chlor-alkali production) and for other industrial end-uses (for example, salt fluxes used in the smelting and mining industry).

Australia is the sixth largest producer of salt and the largest exporter of salt worldwide. About 60 percent of salt imported to Asia comes from Australia.

In Australia, salt is produced predominantly via solar evaporative salt facilities in Western Australia. Solar evaporation is quite inefficient (about 65 tonnes of sea water is needed to produce one tonne of salt) and time intensive (the process can take between 12 to 18 months).

Heavy rain or cyclones can also disrupt salt production in solar evaporative facilities for months at a time. Solar evaporative salt facilities are also becoming increasingly difficult to obtain planning approval for in Australia due to their negative environmental impacts.

An opportunity exists to meet the growing demand for salt in Asia. This opportunity is the mining of rock salt in the Chandler Formation in the NT. Extensive investigations have proven that billions of tons of salt are contained within the Chandler Formation. Mining this salt could easily be scaled up

to meet the growing supply requirements in Asia. Australia is also considered the gateway to Asia. We are closer than India and Chile who also supply salt to Asia.

Given the specification and quality of the salt within the Chandler Formation, the chlor-alkali industry in China, Japan and Indonesia are considered to present the greatest opportunity for the export of salt from the Proposal (refer to Plate ES-1).

Plate ES-1 Independent salt experts confirm viability of salt within the Chandler Formation suitable for the dual use business model (salt experts from Ercosplan, Germany).

Waste storage, recovery and permanent isolation

The problem

Over the last 20 years, waste production in Australia has grown at six times population growth (ABS 2016). Australians are the second highest emitters of hazardous waste per capita due to the economy being driven largely by mining, oil and gas, and manufacturing. Approximately 10 % of the waste Australian's produce is hazardous. That means approximately six million tonnes per year of known hazardous waste is produced and is growing at approximately 3% per annum. There is also approximately 900 million tonnes of reported legacy waste (hazardous waste generated historically) estimated to be temporarily stored in the NT and across other Australian states and territories.

Traditional re-processing, incineration, treatment before landfilling, storage/disposal into man-made engineered landfill are temporary solutions, often do not extinguish liability, can be very expensive from a full lifecycle perspective, especially if sent overseas, and are not viewed today as world's best practice. Many of these options support the old linear economy of 'use and dispose'. This has created a growing legacy and forecast pool of waste materials which require long term storage, recovery of valuable materials that supports the circular economy or the permanent isolation of hazardous materials using sound environmental management principals. These solutions are not readily available.

Governments have realised or are increasingly realising that the previous widespread use of engineered surface landfills with either no liner, or liners with lifespans of 10 to 30 years as a catch-all solution with no or limited discrimination in waste acceptance has created many contaminated sites that pose environmental hazards and have ongoing remediation requirements.

The degradation of ageing landfill facilities has created significant contamination problems with numerous examples of waste breaching the liners and landfill perimeters and spreading into groundwater aquifers. As a result of this emerging and widespread environmental problem,

governments globally are now banning surface landfill of hazardous waste and are endorsing geological repositories capable of permanently isolating waste from the biosphere as a final solution for end of life hazardous waste disposal as best practice.

The difference between landfills and geological repositories is illustrated in Figure ES-2. The key difference being that even with a well-engineered landfill, the artificial liner usually only isolate 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.

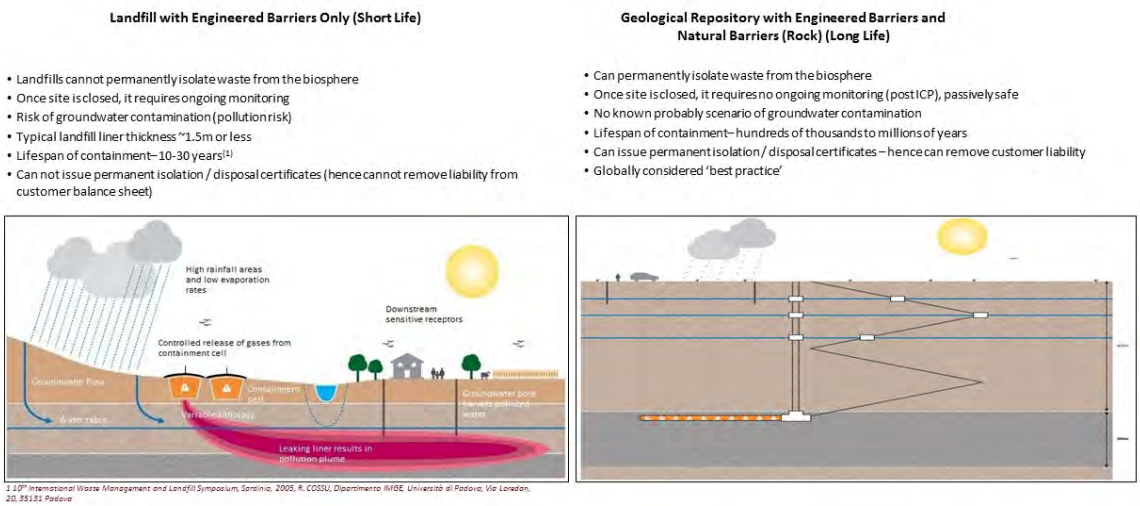

Figure ES-2 Difference between landfill and a geological repository

The solution

There is a need and regulatory obligation to provide for the safe and secure storage, recovery of valuable materials and the permanent isolation of hazardous waste. The solution put forward involves the storage (retrievable) and recovery of valuable materials and the permanent isolation of such wastes in 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 as the geological 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 proposed Chandler Facility would be categorised as a deep geological repository. This infrastructure could contribute towards solving the legacy and forecast pool of waste materials in the NT which require long term storage, the recovery of valuable materials that supports the circular economy, or the permanent isolation of hazardous materials using sound environmental management principals. These solutions would become available if the proposed Chandler Facility is approved (approval for a recovery plant that would be accommodated within the proposed technology park would be covered in a separate approval).

The Proposal would operate in an environment that is not constrained by significant social or environmental sensitivities. It would be located in a very remote area - the nearest community is Titjikala, located approximately 25 kilometres by road from the proposed Chandler Facility and the closest regional centre would be Alice Springs located approximately 120 kilometres to the north of the proposed Chandler Facility. It is located in an area that is geologically stable (very low seismicity and no volcanic or tectonic activity). The climate is arid (low rainfall and high evaporation rates).

Groundwater in the area is not connected to groundwater used for domestic purposes (including drinking) by communities in the vicinity of the proposed Chandler Facility. There is also an absence of permanent surface water (indicating that groundwater and surface water systems are not connected). There is a lack of commercial mineral deposits (other than salt) and there is no potential for medium to high agriculture in the vicinity of the Proposal.

Waste hierarchy

There is a clear difference between what is considered best practice for hazardous and non-hazardous wastes. The 'waste hierarchy' methodology suggests the primary focus of waste management should be on reusing, recycling and recovering materials. This methodology is a broadly accepted policy for general (non-hazardous) wastes (refer to Figure ES-3).

A different framework is appropriate for hazardous wastes, which present a danger to health or the environment and, as such, should generally not be re-integrated into manufacturing processes for re-use. With these kinds of wastes, international best practice as reflected in conventions such *as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* ('The Basel Convention') adopt environmentally sound management principles, which focus on the permanent removal of such wastes from the biosphere, and in so doing protect the environment and human health.

One of the advantages of geological repositories is that one can also support the circular economy using long term storage by placing 'like-with-like' materials for operational safety reasons and to create opportunities for the future recovery of valuable materials. The proponent's business model mirrors international solutions operating in the United Kingdom, Europe and North America (refer to Figure ES-3).

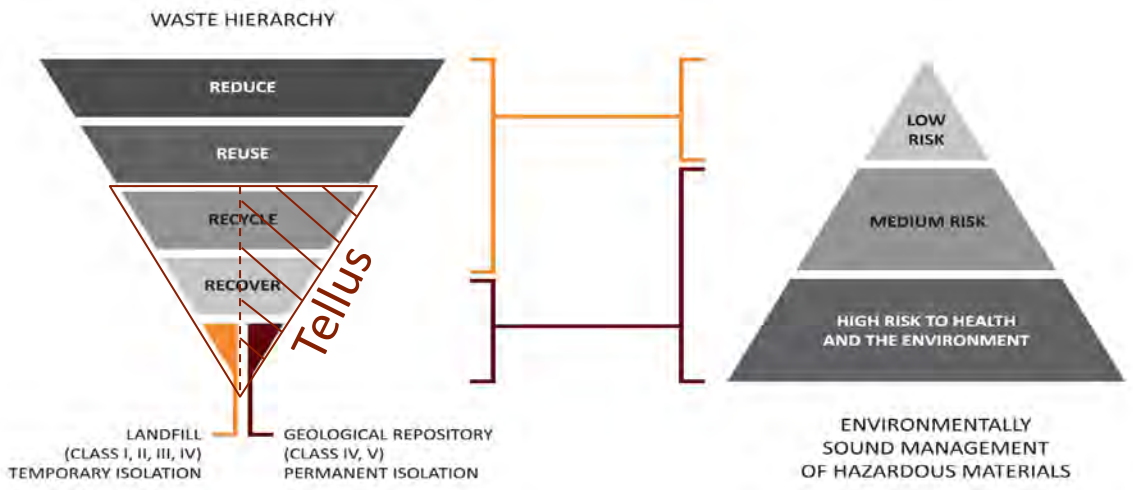

Figure ES-3 The waste hierarchy and the proponent's service offering

Circular economy

One of the advantages of geological repositories is that one can also support the circular economy using long term storage by placing 'like-with-like' materials for operational safety reasons and to create opportunities for the future recovery of valuable materials. The proponent's business model mirrors international solutions operating in the United Kingdom, Europe and North America (refer to Figure ES-4).

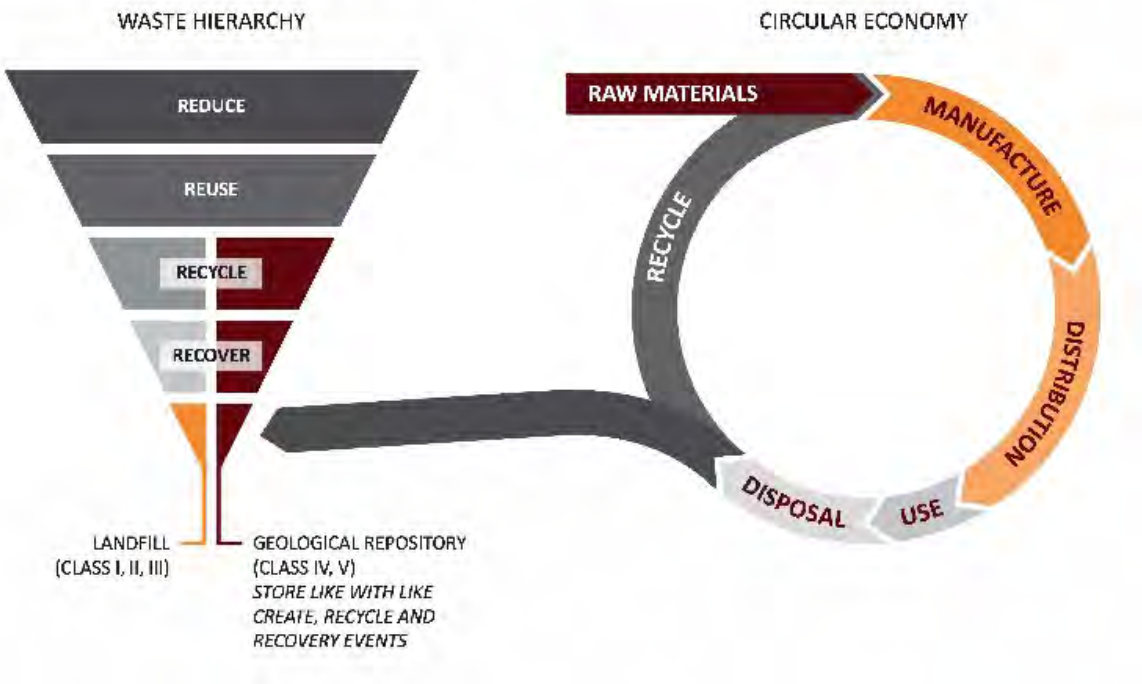

Figure ES-4 Tellus supports the circular economy with the development of the proposed Chandler Facility

Materials and waste accepted (and not accepted) at the proposed Chandler Facility

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.

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[1] 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.

Nuclear and uranium mining waste would not meet the WAC and, therefore, *would not be stored* at either the Chandler Facility or the Apirnta Facility. However almost everything in nature has some small amount of natural radioactivity and processing concentrates it. The proponent is planning to accept Naturally Occurring Radioactive Material (NORM) up to Exemption Level[2] (EW) activity content, which is the lowest activity level on the waste classification scheme. The industries that generate NORM's are usually those that refine raw materials and have a waste by-product that is concentrated. This includes utilities such as water treatment plants, ceramic industry and resource sector refineries. Exempt waste contains such small concentrations of radionuclides that it does not require provisions for radiation protection, irrespective of whether the waste is disposed of in

[1] National Environment Protection (Movement of Controlled Waste between States and Territories) Measure
[2] 2 Classification of Radioactive Waste – RPS20, Schedule 4 of the NDRP (ARPANSA 2010)

conventional landfills or recycled. Such material is exempt from regulatory control and does not require any further consideration from a regulatory control perspective.

A summary of the wastes that would be accepted (and not accepted) at the proposed Chandler Facility is presented in Table ES-1.

Table ES-1 Hazardous waste accepted and not accepted for underground disposal and permanent isolation

Type of hazardous chemical wastes	Accepted on-site for surface storage	Accepted in underground voids
Chemical wastes listed under the National Environment Protection Measures (NEPM) (refer to Schedule A List 1: Waste Categories) and under Schedule 2 of the NT Waste Management and Pollution Control (Administration) Regulations	✓	✓
Liquid and sludges	✓	✓[1]
Explosive wastes	×	×
Flammable liquids or solids	×	×
Self-combusting wastes or wastes that can generate a gas-air mixture which is toxic or explosive	×	×
Highly corrosive or oxidizing	×	×
Gases	×	×
Clinical waste (infectious hospital waste and body parts)	×	×
Municipal solid waste (putrescible household and commercial waste)	×	×
Putrescible waste (household rubbish that can rot)	×	×
Uncertified waste (which cannot be identified or has not undergone characterisation testing)	×	×
Reacts with the repository geology (such as dissolving it or producing a gas)	×	×
NORM[1]	✓	✓
Low level radioactive waste (e.g. smoke detectors, exit signs, industrial gauges and medical isotopes)	×	×
Intermediate level radioactive waste (e.g. reprocessed spent nuclear fuel and components with high levels of radioactivity)	×	×
High level radioactive waste (e.g. from power generation and defense use)	×	×

Note: ✓ = accepted, × = not accepted, ✓[1]= normally excluded but could be used in hydraulic backfill processing. 1. Exemption activity levels defined as per *The National Directory for Radiation Protection, February 2014 (RPS 6).*

Benefits of the Proposal

Proceeding with the Proposal would result in significant social and economic benefits in the NT and within Australia. The Proposal would:

- **Provide an innovative unique dual revenue business in remote Central Australia** -the business would commercialise an industrial bulk commodity (salt) and provides an equipment and archives storage business and a storage, recovery and permanent isolation business for hazardous waste generated in the NT and within Australia.
- **Diversify the economy.** - development of enabling environmental infrastructure which would assist in providing utility support services to other existing and new projects that generate waste as a result of the 'Developing the North' strategy.
- **Major investment in regional Australia** - the capital expenditure is estimated to be around A$676 million (nominal, including finance and contingency) for the Proposal. Around 67 % of all construction costs would be spent in Australia (36% spent in the NT).
- **Boost the economy over the 29-year project life** - on average, there would be spending of just under $81 million per annum to operate the Proposal. Of this, 64 % would be spent in Australia (a total of 52% would be spent in the NT). The site could be expanded for generations.
- **Royalties, taxes and levies** - over the 29-year term could support other parts of the NT and the Australian economy.
- **Create training and long term job opportunities** -
    - About 270 jobs during construction (720 jobs during peak build including in-directs).
    - About 150 to 180 full time equivalent workers would be employed during operation. Just over 5,400 full-time equivalent job years would be created over the life of the Proposal, an average of 217 full time equivalent job years per annum.
    - Jobs would be green, sustainable, and generally well paid covering technical (engineering, chemistry, science), commercial (sales, business) and operational skills.
    - Proposed jobs and training programs, such as:
        - Tellus' School to Jobs Program (Annual Schools Tour).
        - Tellus' Pre-employment Training Program ('Getting Job Ready') comprising Tellus' Traineeships Program, Tellus' Apprenticeships Program and Training Accreditation.

Plate ES-2 Tellus has supported indigenous jobs during the development of the EIS and would continue to support indigenous employment through the construction, operation, and closure and rehabilitation of the Proposal.

        - Indigenous Employment Program; comprising a 10 % indigenous employment target as well as other commitments that would benefit local indigenous people such as the sponsorship of sporting and academic programs in the nearby community of Titjikala (refer to Plate ES-2 and Plate ES-3).
        - Tellus' Employment Programs and Systems comprising a 'Sisters in Mining' Program; Tellus' Disabled Worker Program, Tellus' Ranger Program and support for Social Enterprises that could generate more jobs.

- **Provide local business support and new business opportunities** - goods and services such as construction and operational materials, food, accommodation, etc. would be sourced from local business, where possible.
- **Fulfil the government's own environmental and waste policy obligations under the following four main regulatory regimes** -
    - Environmental protection regulations (to minimise adverse impacts on the environment and human health and to meet national and international obligations);
        - Meeting NT and national obligations by providing critical infrastructure that can safely store, recover or permanently isolate difficult to manage wastes.
        - The NT EPA's *Waste Management Strategy for the Northern Territory 2015-2022*, the NT Department of the Chief Minister *Framing the Future* and the Australian Government *National Waste Policy*.
        - Meeting international obligations under the Basel Convention (Regulation of Transboundary Movements) and Waigani Convention (Regulation of Exports and Imports) by providing critical infrastructure for our near-neighbors such as the Pacific Islands who do not have suitable infrastructure to manage such wastes. Australia currently exports waste mostly to Europe and Asia and imports small volumes of waste materials mostly from our near neighbors (Pacific Islands). The proponent is not planning on actively marketing this service, but in the event of a man-made or natural disaster, the proposed Chandler Facility would be suitable.
    - Transport of dangerous goods regulations (to prevent accidents and promote safe transport, regulated by national legislation and codes).
    - Work health and safety regulations (hazardous chemical regulations that reduce occupational health and safety risk in the workplace).
    - Product stewardship regulations (the responsible management of products such as waste oil, asbestos, e-waste, tyres, batteries, mercury, medicines).
- **Support the circular economy** - by providing an opportunity for the future potential recovery of valuable materials (that are currently deemed waste). The Proposal could attract new salt and waste recycling and recovery industries to the NT.

Plate ES-3 Tellus would continue to support the local community through construction and operation of the Proposal.

Proposal alternatives

A range of options and alternatives were investigated for the Proposal. All options were based upon the Proposal objective of developing the Chandler salt resource identified in the Joint Ore Resource Committee Resource Statement (2014). The options and alternatives investigated included:

- Not proceeding with the Proposal (the 'do nothing' option).
- Site selection and access alternatives, including:
    - Underground location.
    - Mine entry (portal versus decline).
    - Mine decline route.
    - Underground layout of mine.
    - Aboveground layout of supporting infrastructure.
- Logistics alternatives, including:
    - Location of haul and access roads.
    - Location of storage and transfer facility.
    - Port linkages (Darwin and Adelaide).

Options to optimise ecological sustainability were also investigated. These included:

- Mining methods (solution mining versus room and pillar mining).
- Energy and water supply sources.
- Salt processing (wet versus dry processing, refer to Plate ES-4).

Alternative environmental management measures for key risks were also considered during the development of the Proposal.

The preferred alternatives were chosen based on a number of factors including operational efficiency, safety, capital costs, and the environmental setting of the area.

Plate ES-4 Salt processing pilot - dry optical sorter (left) and optical sorter results (right). A dry optical sorting process was selected as this option requires significantly less land area than wet processing and there is no need for evaporative ponds. Dry optical sorting requires less capital, is efficient, and can be scaled up on demand.

Proposal description

The Proposal includes an underground rock salt mine and a storage, recovery and permanent isolation facility (the Chandler Facility), as well as a supporting surface storage and transfer facility (the Apirnta Facility) and haul and access roads (the Chandler Haul Road and the Henbury Access Road). A description of the facilities and roads is provided below. The Proposal's schedule and workforce accommodation are also explained.

The Chandler Facility

Tellus propose to develop a new underground rock salt mine and complementary storage business with supporting aboveground infrastructure that would export up to 750,000 tonnes of salt product per annum. The facility would also provide for the safe and secure storage, recovery and permanent isolation of up to 400,000 tonnes of waste per annum, although average volumes are expected to be significantly less than this amount (year one 30,000 tonnes, average 340,000 tonnes per annum). The rock salt mine and complementary storage facility is

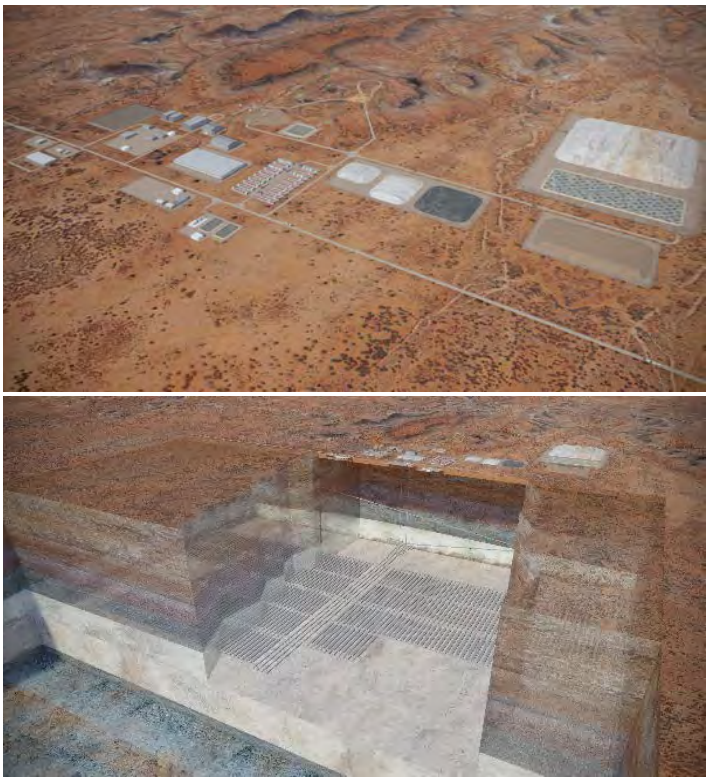

Figure ES-5 The proposed Chandler Facility. Underground infrastructure shown above and aboveground infrastructure shown below.

referred to as the Chandler Facility. A graphical representation of the proposed Chandler Facility is presented Figure ES-5.

Salt mining and storage/permanent isolation of materials

Salt mining activities would involve:

- Deep mining of rock salt using a 'room and pillar' system of mining.
- 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 Adelaide. From there, rock salt would be shipped to overseas markets predominantly in Asia.

Storage and permanent isolation of materials would involve:

- Transport of materials (equipment, archives, etc.) and waste, predominantly by rail, for receipt and temporary storage at the Apirnta Facility.
- Transfer of materials by truck from the Apirnta Facility to the Chandler Facility via the proposed private Chandler Haul Road.
- Transport of packaged materials via mine access decline or via hydraulic backfill into the voids left from the salt mining operation:
    - Waste would be permanently isolated in line with operational management plans and a strict WAC.
    - Materials such as equipment and archives would be stored separately for future retrieval.
- Once full, sealing the underground voids permanently with engineered barriers.

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 the 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.

The salt would be mined from the Chandler Salt Bed which is located approximately 850 metres below the surface. Materials stored within the voids left from the mining operation would be

situated within a salt bed approximately 250-300 metres thick allowing the waste to be permanently removed from the biosphere in a stable and dry environment.

Key infrastructure

The key underground infrastructure at the proposed Chandler Facility would include:

- Underground mine.
- Mine access decline.
- Two ventilation shafts (one allowing for salt hoisting and personnel riding as well as downcast ventilation, and one for upcast ventilation).

The key aboveground infrastructure at the proposed Chandler Facility would include:

- Dry salt processing facilities (salt processing and sales would be deferred for the first five years of salt mining).
- Waste unloading area.
- Waste storage warehouse.
- Surface hydraulic backfill plant and underground reticulation.
- Salt and overburden stockpiles.
- Maintenance buildings.
- Administration buildings.
- Accommodation village.
- Shaft hoist.
- 2 megawatt solar/diesel hybrid power plant.
- Clean and raw water dams.
- Water and sewage treatment.
- Fuel storage facility.
- Utility reticulation.
- A future technology recovery park.

The Apirnta Facility

The Chandler Facility would be supported by a proposed new, off-site rail siding and surface storage and transfer facility referred to as the Apirnta Facility. The purpose of the surface storage and transfer facility would be to provide a licensed facility that safely allows for the temporary storage of waste products prior to being transported by road for storage and/or permanent isolation at the proposed Chandler Facility.

The surface storage and transfer facility would provide for the temporary storage of up to 400,000 tonnes of waste, although average volumes are expected to be significantly less than this amount (year one approximately 30,000 tonnes, average 340,000 tonnes per annum). The waste would be stored either in a warehouse, within an open storage yard or within a liquid storage tank. A graphical representation of the Apirnta Facility is provided in Figure ES-6.

Waste would be brought to the surface storage and transfer facility via rail and offloaded at the new rail siding. The waste would be transported into the surface storage and transfer facility for temporary storage prior to being transported for storage, recovery and/or permanent isolation at the proposed Chandler Facility.

The Apirnta Facility would receive waste materials transported via road and rail from reputable companies licenced to transport dangerous goods. Waste arriving would be inspected, sampled, unloaded and appropriately stored in accordance with appropriate standards, codes and regulations and in line with a strict WAC.

Figure ES-6 The proposed Apirnta Facility. Aerial view (top) and proposed warehouse (bottom).

Waste materials stored in the warehouse would be sealed in storage containers and wrapped in plastic on wooden pallets then stacked in high-bays. The storage yard would be used for the temporary storage of waste materials that would be sealed in shipping containers. The liquid storage tank would be used to store a variety of liquid wastes (refer to Figure ES-7).

Figure ES-7 Materials would be transported 'like with like' in safe containers that meet regulatory standards

The Chandler Haul Road and Henbury Access Road

Haul and access roads would be constructed as part of the Proposal. The proposed private Chandler Haul Road would be approximately 30 kilometres long and would connect the Chandler Facility to the Apirnta Facility. It would provide for the movement of salt from the Chandler Facility to the rail siding at the Apirnta Facility. It would also provide for the movement of waste temporarily stored at the Apirnta Facility to the Chandler Facility.

The proposed private Henbury Access Road would be approximately 60 kilometres long and would connect the Apirnta Facility to the Stuart Highway. It would provide for the movement of workers and delivery vehicles to and from the Stuart Highway to the Apirnta Facility and through to the Chandler Facility. The Henbury Access Road would be constructed once mining operations have begun. During construction, all workers, equipment and delivery vehicles would access the Chandler Facility via the existing Maryvale Road (a public road).

Both roads would be unsealed and designed and constructed to appropriate industry standards and their proposed use.

Schedule

The construction of the Proposal is expected to take three years with a further year for commissioning. Pending planning approval and finance of the Proposal, construction is anticipated to commence in late 2018. An overall Proposal schedule is shown in Figure ES-8.

Figure ES-8 Outline schedule for the Chandler Proposal

Workforce, hours of construction and operation, and worker accommodation

At the peak of construction, it is estimated that there would be 270 direct people working on-site (540 including in-directs). It is estimated that up to 90 people would be required on-site at any one time during operation of the Proposal. Where possible, the proponent has a policy to source and retain local labour and to achieve over time a minimum of 10 % indigenous employment.

The hours of construction would be 12 hours per day, seven days per week (day shift only) with night working proposed as a contingency. Shaft sinking activities are, however, expected to be undertaken 24 hours per day, seven days per week, with three rotating eight hour shifts of approximately 270 employees. The hours of operation would be the same as those for construction, namely 12 hours per day, seven days per week (day shift only).

During the construction stage, around 90 % of employees would operate under fly-in fly-out contract conditions and during the operational stage this would be reduced to nearer 75 % fly-in fly-out with an objective of reducing that ratio over time to attract as many local residents as possible who would drive-in drive-out from Alice Springs and the surrounding area.

An accommodation village has been provisionally positioned approximately two kilometres north of the main aboveground infrastructure at the proposed Chandler Facility. The accommodation village would provide accommodation for up to 165 people during construction and up to 100 people at any one time during operation.

Regulatory framework

The Proposal will require planning approval, licenses and permits from both the Australian Government and from the NT Government. The key approvals and licenses will be sort from:

- The Australian Minister for the Environment under the provisions of the EPBC Act and Environment Protection and Biodiversity Conservation Regulations 2000 (EPBC Regulations). The EPBC Act and EPBC Regulations are administered by the Commonwealth Department of the Environment and Energy (DoEE).
- The NT Minister for Mines and Energy under the provisions of MM Act and the Mining Management Regulations (MM Regulations). The MM Act and MM Regulations are administered by the NT Department of Primary Industry and Resources (DPIR).
- The NT Minister for the Environment under the following legislation:
    - EA Act and the Environmental Assessment Regulations (EA Regulations) and Environmental Assessment Administrative Procedures (EA Procedures) administered by the NT EPA.
    - WMPC Act and Waste Management Pollution Control Regulations (WMPC Regulations) also administered by the NT EPA.

Overall approval is sought under the EPBC Act and EPBC Regulations (administered by the DoEE) and the EA Act, EA Regulations and EA Procedures (administered by the NT EPA) via a bilateral agreement between the Australian Government and the NT Government. If approved, the salt mining operations would be regulated under the MM Act and MM Regulations administered by the DPIR. The storage, recovery and permanent isolation of waste within the salt mining voids would be regulated under the WMPC Act and WMPC Regulations administered by the NT EPA.

Consultation

The consultation process began in March 2012. The steps involved in the consultation process included the identification of key stakeholders and the development and implementation of a consultation and engagement strategy.

Stakeholders were identified as individuals or organisations that may be interested in or affected by the Proposal. A consultation and engagement strategy was developed to ensure effective and timely consultation activities during the development of the EIS.

Stakeholders were engaged using a range of consultation and communication techniques, including face-to-face meetings, workshops, national and local radio, newspaper and TV interviews, community information sessions, telephone and email communications, as well as media releases and website updates. These were supported by stakeholder feedback mechanisms, including a company-specific email address (refer to Plate ES-5).

Key stakeholders were offered the opportunity to provide feedback and raise issues during the development of the draft EIS. The key stakeholders included government agencies, non-government organisations, industry and business, landholders, Traditional Owners and residents of the surrounding communities.

Early stakeholder consultation helped shape the technical studies for the EIS. Community feedback also influenced the design of the Proposal.

Stakeholder consultation will be ongoing throughout the environmental impact assessment process. If approved, consultation would continue through site preparation and construction and during operation of the Proposal, where information would be provided to stakeholders on a regular basis.

Plate ES-5 Communication tools used during community information sessions

Approach to impact and risk assessment

An environmental risk assessment was undertaken to identify, evaluate and mitigate the potential environmental impacts of the Proposal. As the environmental impact assessment included input from a wide range of technical disciplines, a standardised environmental risk assessment was undertaken to ensure consistency in determining the level of risks.

This standardised approach did not replace the methodologies used by technical disciplines to identify or assess impacts, nor did it replace methods of impact assessment prescribed by existing guidance. Rather, it supplemented the impact assessment by providing clear, more readily comparable conclusions regarding the significance of impacts.

The standardised risk assessment for the Proposal involved:

- Defining the sensitivity of environmental and social values, resources and receptors.
- Describing the potential impacts that may arise as a result of the Proposal.
- Assessing the likelihood of an impact occurring.
- Assessing the probability of an impact occurring.
- Evaluating the consequence of an impact.

- Identifying outline management and/or mitigation measures.
- Evaluating the residual impact.
- Assigning an overall risk rating.

The environmental and social systems, resources and receptors potentially affected by the Proposal were defined through desktop-based research, field surveys and preliminary consultation with local communities, regional stakeholders, and with key agencies within the NT Government.

Environmental assessment

The environmental risk assessment combined with the Terms of Reference identified the following key issues for consideration in the EIS:

- Biodiversity.
- Water (groundwater and surface water).
- Historic and cultural heritage.
- Human health and safety.
- Socio-economic.
- Closure and rehabilitation.

Other risks identified as requiring consideration included:

- Air.
- Fire.
- Noise and vibration.
- Visual amenity.
- Public health and food.
- Biting insects.
- Greenhouse gases.

A summary of the environmental assessment is presented below. Various sections of the document have been prepared by external sub consultants and have also been peer reviewed by international experts.

Biodiversity

Extensive biological field surveys have been undertaken within the proposed development footprint and vicinity over the past four years. Sixty-nine sites were surveyed in total. The survey sites were selected to provide a representative sample of the different habitats within the proposed development footprint and vicinity. They were also selected based on the habitat requirements of conservation-significant species predicted to occur within the proposed development footprint or vicinity. The surveys were undertaken over several seasons and in varying weather conditions.

Vegetation communities within the proposed development footprint and vicinity consist of open and sparse shrublands and hummock grassland (refer to Plate ES-6). A range of habitat types support a diverse abundance of arid flora and fauna. A total of 194 plant species and 143 fauna species (25 reptile species, 89 bird species and 29 mammal species) were recorded over the four-years of field surveys. There are no sensitive or significant vegetation communities within the proposed development footprint or vicinity.

Plate ES-6 Sparse shrubland (left) and hummock grassland (right) within the proposed development footprint

Three flora species of conservation significance were recorded during the field surveys within the vicinity of the proposed development footprint. Four conservation-significant species are considered to have a moderate to high likelihood of occurrence within the proposed development footprint or surrounding vicinity. None of the species are listed as either data deficient or near threatened under the NT *Territory Parks and Wildlife Conservation Act* (TPWC Act).

No threatened flora species listed under the TPWC Act and/or EPBC Act have been recorded or are predicted to occur within the proposed development footprint or vicinity.

Six fauna species of conservation significance were recorded during the field surveys (either within the proposed development footprint or vicinity). All of these species are listed as either near threatened or data deficient under the TPWC Act. Secondary signs, such as scratching or burrows, of three threatened fauna species were recorded within the vicinity of the proposed development footprint. These were brush-tailed mulgara (*Dasycercus blythi*), crest-tailed mulgara (*Dasycercus cristicauda*) and southern marsupial mole (*Notoryctes typhlops*) (all listed as vulnerable under the TPWC Act and/or EPBC Act; refer to Plate ES-7). An additional 13 conservation significant species (eight listed as either near threatened or data deficient under the TPWC Act and five threatened species listed under the TPWC Act and/or EPBC Act) are considered to have a low to moderate, moderate, or high likelihood of occurrence within the proposed development footprint or vicinity.

Three migratory bird species were recorded during the field surveys within the proposed development footprint or vicinity. These were sharp-tailed sandpiper (*Calidris acuminata*), rainbow bee-eater (*Merops ornatus*) and marsh sandpiper (*Tringa stagnatilis*). An additional five migratory

species are considered to have a moderate to high likelihood of occurrence within the proposed development footprint or vicinity. All of these species are listed under the EPBC Act.

Construction of the Proposal would result in the removal of approximately 397.5 hectares of vegetation. The removal of this vegetation would result in the loss of fauna habitat. Construction and operation of the Proposal may also result in indirect impacts on biodiversity including impacts associated with fauna displacement, injury or mortality; fauna strike; altered hydrology; potential for contamination, erosion and sedimentation; and increased dust, light, noise and vibration. Indirect impacts may also include the introduction and spread of weeds and invasive species; increased predator species; increased introduced fauna use; and an increased incidence of fire.

Plate ES-7 Southern marsupial mole backfilled tunnels in a mole trench on the bank of the Finke River

In addition, operation of the Proposal may result in potential impacts associated with salt runoff and windblown salt from stockpiles. Potential impacts on biodiversity during closure and rehabilitation of the Proposal would generally be the same as those during construction of the Proposal.

There would be no significant impact on species listed as near threatened or data deficient under the TPWC Act. None of the species are considered to have conservation significance within the proposed development footprint or vicinity, or within the wider locality. All species are locally common with a widespread distribution and there is no critical habitat for any of the species listed as near threatened or data deficient recorded or predicted to occur within the proposed development footprint or vicinity.

The potential for significant impacts on matters of national environmental significance and on state-listed threatened species were assessed in accordance with significant impact guidelines prescribed by the EPBC Act. The results of the assessments concluded that there would be no significant impact on species listed as threatened under the TPWC Act and/or EPBC Act. At present, 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.

Additional, targeted surveys would be undertaken prior to construction to confirm the presense/absense of two matters of national environmental significance (threatened species) considered to have a low to moderate likelihood of occurrence within the proposed development fooprint or vicinity. These are Slater's skink (*Liopholis slateri slateri*) and the thick-billed grasswren

(*Amytornis modestus indulkana*). Potential habitat for these species is located within the vicinity of the proposed Henbury Access Road. If these species are found to be present, significant impacts would be avoided through changes to the proposed alignment of the Henbury Access Road. Alternatively, a program of trapping and relocating would be implemented to avoid significant impacts to these species.

Mitigation and management measures would be implemented to reduce the potential impacts on biodiversity during construction, operation, and closure and rehabilitation of the Proposal. These mitigation and management measures include the development of a Biodiversity Management Plan and Bushfire Management Plan. These plans would be incorporated into the Construction Environmental Management Plan (CEMP), Operational Environmental Management Plan (OEMP) and/or Rehabilitation Closure Plan (RCP) for the Proposal.

Groundwater

Baseline research

The groundwater reserves within the development envelope for the Proposal are not within an existing NT Water Control District and is not connected to the Titjikala water bore. The information detailed below explains this.

Extensive hydrogeological (groundwater) investigations have been undertaken within the proposed development footprint between 2015 and 2016. Groundwater monitoring is an essential component in characterising the Proposal area baseline (pre-mining) hydrogeological and hydrological environments. Baseline water level and quality data collected from the various aquifers and watercourses is used to understand flow paths, recharge and discharge characteristics, and groundwater–surface water connectivity. The collection and analysis of field data was used to establish the conceptual (hydrogeological) model (refer to Figure ES-9).

A dedicated groundwater monitoring network for the Proposal was designed and installed in May 2015 to investigate the local groundwater conditions across the proposed development footprint and vicinity. Following installation of the

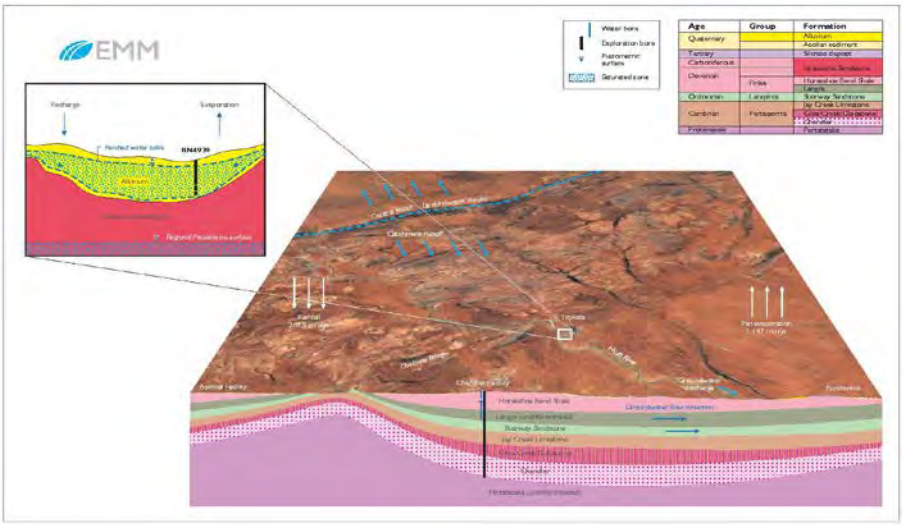

Figure ES-9 Conceptual (hydrogeological) model

network, 18 months of groundwater level monitoring data was collected at monthly intervals including baseline groundwater level and groundwater quality data. Groundwater quality data will continue to be monitored every quarter in 2017.

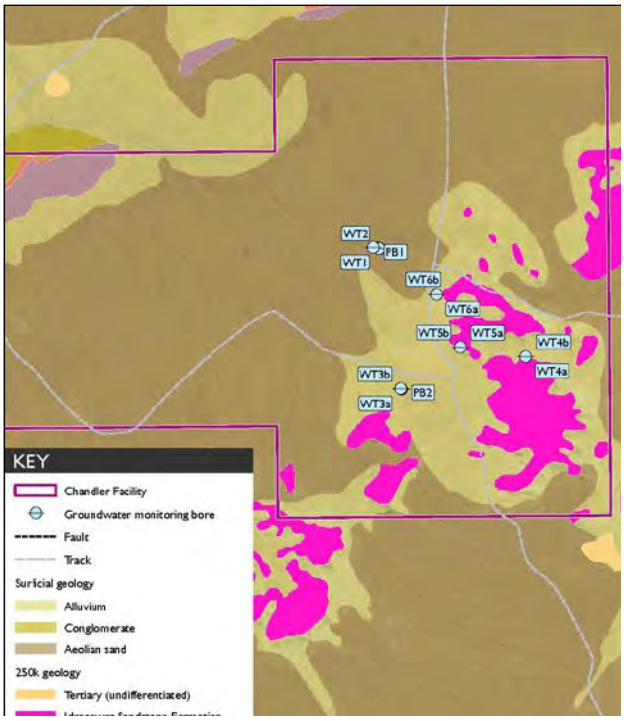

Figure ES-10 Existing groundwater monitoring network

The existing groundwater monitoring network shown in Figure ES-10:

- Identifies and characterises water bearing units (aquifers) and aquitards in the Chandler Facility area, with focus on characterising groundwater flow and quality within the main groundwater bearing units, the Horseshoe Bend Shale Formation and the Langra Formation, which both overlie the Chandler Formation (salt deposit) by hundreds of metres.
- Provides spatial representation of pressure heads across the Chandler Facility area to investigate potential vertical hydraulic gradients and potential connectivity between water bearing units.

A detailed Water Management Plan has been prepared for the Proposal which outlines future groundwater resource management measures.

Surface geophysical logging and pumping tests were also undertaken within the proposed development footprint (refer to Plate ES-8). Surface geophysical logging (electroseismic and electrotelluric surveying) is used to determine the potential hydraulic conductivity and the groundwater presence and flow potential of geological formations. Pumping tests obtain estimates of aquifer properties including storativity, transmissivity and horizontal hydraulic conductivity. Pumping tests can also provide information on the extent and sustainability of the aquifer and the degree of connection with nearby surface waterbodies, if present.

The Groundwater Assessment includes an impact assessment which uses the conceptual model to assist in the assessment of potential impacts of the Proposal, specifically:

- Impacts from predicted changes in groundwater level and quality of groundwater, surface water, groundwater dependant ecosystems and landholder bores.

- Sources of potential contaminants, mechanisms of their release, pathways for transport, fate of any potentially contaminated waters, and the potential for human and ecological exposure to potential contaminants.

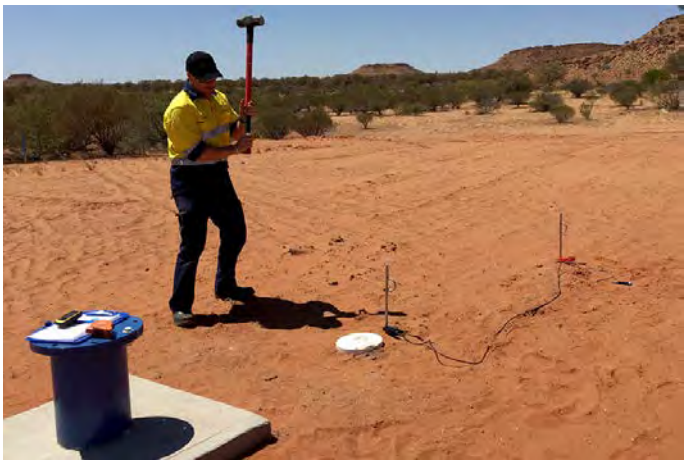

Plate ES-8 Surface geophysical logging within site of the proposed Chandler Facility.

Regional geological setting

The Proposal area lies within the Chandler Syncline sub-basin of the south-eastern extent of the Amadeus Basin. The predominant marine and terrestrial sedimentary sequences that form the Amadeus Basin were deposited about 500 million years ago. The south-eastern extent of the Amadeus Basin abuts the Pedirka Basin about 80 kilometres south-east of the Proposal area. The land surface is structurally controlled to the north, east and west by a series of extensive Palaeozoic orogenies including Precambrian intrusive and metamorphic rocks, while alluvial sediments dominate low lying areas.

The Amadeus Basin comprises a series of synclinal sub-basins defined by numerous folds and thrust belts. The three predominant sub-basins are: the Northern Amadeus Sub-basin; the Orange Creek Syncline; and the Chandler Syncline. The Proposal lies within the southern-most Chandler Syncline sub-basin.

Local geological setting

The Proposal targets the Chandler Formation, a unit of the Pertaoorrta Group of Cambrian age (485-541 million years old) within the Chandler Syncline of the southern Amadeus Basin. Despite the complex history of the Amadeus Basin, the strata in the area of the Proposal are relatively flat lying and continuous.

The geological structure in the area of the Proposal has been investigated by some 2D seismic coverage in the area (reprocessed as part of the Tellus investigations), and sampled by four deep drillholes and nine shallower boreholes. The four deep drillholes reach the Chandler Formation; two were drilled by Tellus (CH001A and CH003), and two are pre-existing oil exploration wells (Mt Charlotte No. 1 and Magee). CH001A lies at the northern margin of the underground footprint of the facility, while the other boreholes are outside the Chandler Facility footprint. Both CH001A and CH003 were drilled to the base of the salt for site investigation purposes.

The Chandler Formation, shown in Figure ES-11, is encountered between 755 and 811 metres below ground level, and is up to 275 metres in thickness (Tellus exploration borehole CH001A). It occurs as an extensive evaporite unit comprising anhydritic siltstone to 825 metres and halite below that.

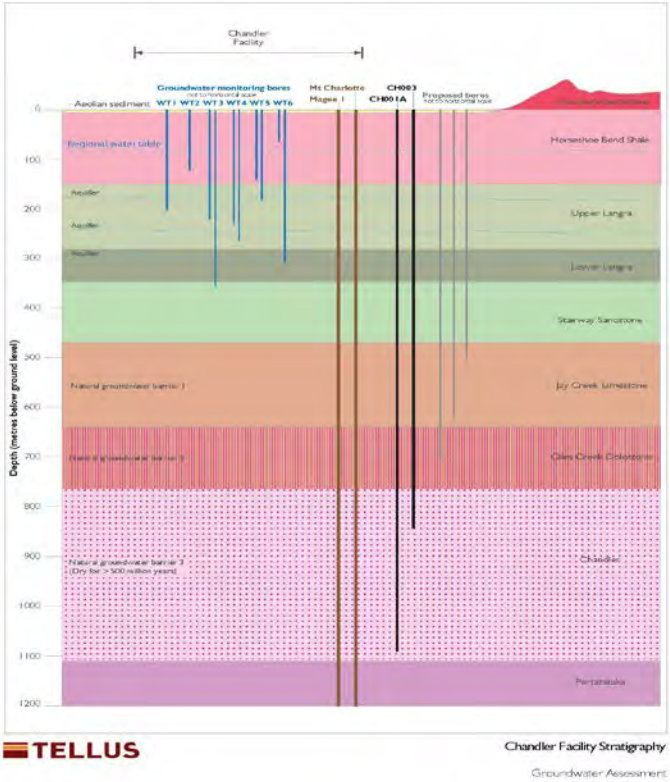

Figure ES-11 Geology at Chandler; existing and proposed groundwater bores; known aquifers and natural geological barriers.

The Chandler Formation is encountered between 755 and 811 metres below ground level, and is up to 275 metres in thickness (Tellus exploration borehole CH001A). It occurs as an extensive evaporite unit comprising anhydritic siltstone to 825 metres and halite below that. Core from boreholes CH001A and CH003 show the salt to be almost pure halite (yellow to red brown, transparent and glassy) with very few marly beds (siltstone and claystone) or other impurities.

The Chandler Facility would be located in the upper part of the Chandler salt formation. The upper halite bed in borehole CH001A is present in the depth interval 825 metres to 861 metres.

Overlying the Chandler Formation are deposits of siltstones and sandstones associated with the Pertaoorrta Group (Giles Creek Formation and Jay Creek Sandstone Formation), Larapinta Group (Stairway Sandstone Formation), Finke Group (Horseshoe Bend Shale Formation and Langra Formation) and the Idracowra Sandstone Formation. Exploration drilling has characterised the overlying geological formations as follows (from shallow to deep):

- **Idracowra Sandstone Formation**: a kaolinitic sandstone that caps the Maryvale Hills across the Chandler Facility area and has a maximum thickness of 40 metres.
- **Horseshoe Bend Shale Formation**: a massive, red brown siltstone/very fine grained, soft to firm quartz sandstone with moderate mica. Contains occasional beds (up to 1 m thick) of light brown, fine grained sandstone.
- **Langra Formation:** subdivided into three members: the upper, a very fine to coarse light brown sandstone; middle, a mottled red brown siltstone; and lower, a pale brown to orange very fine to fine sandstone with interbedded siltstone. The base of Langra formation is approximately 340 m below ground level.

- **Stairway Sandstone:** a white coarse to medium grained sandstone with interbedded siltstone and minor shale. The base of the Stairway Sandstone is approximately 500 metres below ground level.
- **Jay Creek Sandstone Formation:** comprises upper layers of siltstone with thin interbeds of dolomite and minor fine grained sandstone, and lower layers of shale, and laminated claystone and siltstone. The base of the Jay Creek Formation is approximately 770 metres below ground level.
- **Giles Creek Dolomite Formation**: a fine-grained, massive, yellow-brown dolomitic limestone unit, with minor shale bands.

Underlying the Chandler Formation is the Pertatataka Formation, a siltstone and shale formation with lenses of sandstone, dolomite, limestone and conglomerate.

Regional groundwater setting

There are three main groundwater system types associated with the central and south-eastern NT within the Amadeus Basin, the:

- Mereenie Aquifer System.
- Fractured rock groundwater systems.
- Near surface sediment groundwater systems.

Mereenie Aquifer System

In the northern-central part of the Amadeus Basin, near Alice Springs, broad folds define three key aquifer systems, the Hermannsberg Sandstone, Mereenie Sandstone and the Pacoota Sandstone systems. These aquifers are collectively termed the Mereenie Aquifer System

Fractured rock groundwater systems

South of the Orange Creek Syncline and the Central Ridge, a series of intense folding and faulting generated by the James Ranges and Ollife Range has given rise to the deposition of a series of fractured rock systems, including those within the Chandler Syncline.

Groundwater within the fractured rock systems is unlikely to be extensive. Localised faulting and the deposition of claystones and siltstones form leaky aquitards throughout the area are likely to have resulted in the development of less extensive and more localised groundwater systems. Groundwater storage and flow within these localised systems is likely to be restricted by their thickness and the permeability of the geology. Recharge is thought to occur through infiltration of overlying alluvial stream beds during flood events however, the reduced permeability influenced by the claystone aquitards is likely to restrict recharge to these deeper systems.

Water quality within the localised groundwater systems is highly variable and generally considered to be brackish to saline (>1,500 mg/L). The limited recharge and low permeability of the system is

thought to contribute to long groundwater residence times, greater mineralisation of the local groundwater systems, and therefore reduced water quality.

Near surface sediment groundwater systems

The local near-surface sediment groundwater systems support the various ephemeral surface drainage features bisecting the Proposal. These surface drainage channels incise the bedrock, allowing sediment to partly fill the channel void and provide a medium for groundwater storage and flow.

The main developed alluvial systems located across the south-eastern extent of the Amadeus Basin are associated with the Hugh River and Finke River. Recharge to these shallow systems primarily occurs during major flooding events.

Based on calibration with bore log data, modelling results indicate there are three main aquifer zones within the saturated thickness of the upper and lower Langra Formations. These occur predominately between 140 and 350 metres below ground level, with minor small perched groundwater systems existing above the regional water table (inferred to be approximately 90 metres below ground level).

Local groundwater setting

Proposal groundwater monitoring bores targeted the fractured sandstone aquifer present across the south-east of the Amadeus Basin. During the Proposal groundwater drilling campaign, inflows were first intersected in the Horseshoe Bend Shale Formation between 80 and 100 metres below ground level. Subsequent groundwater level monitoring has seen a rise in groundwater levels by up to 25 metres from the water intersections observed during drilling.

Groundwater flow is interpreted to be via fracture flow (secondary porosity), although some limited groundwater flow through primary porosity may also occur. Borehole water intersections in the relatively shallow Horseshoe Band Shale Formation were comparable and ranged from 0.2 to 2 litres per second (L/s). The highest yields were observed in the north-western extent of the Proposal.

The next unit encountered was the Langra Formation, which exhibited a larger range of borehole water intersections, more typical of fractured rock groundwater flow. The average water yield for the upper Langra Formation was 4.2 L/s, the middle Langra Formation was 7.5 L/s and the lower Langra Formation was 11 L/s.

A constant rate pumping test was conducted at bore Production Bore 1, in the upper Langra Formation. The low pumping rate achieved (4 L/s) and the limited extent of drawdown (as observed at monitoring bore WT1) indicates that the local groundwater system is likely to have a low transmissivity and a limited extent.

Water yields for the next unit, the Stairway Sandstone, were recorded at two bores (between 15 and 20 L/s). Water yields observed during drilling typically over-estimate the sustainable yield from the

Formation. A potential sustainable groundwater yield associated with the Stairway Sandstone is therefore likely to be significantly less and likely no greater than 5 L/s.

The Jay Creek Formation exhibits the potential for groundwater presence within the upper sequences of the Formation, as defined through the estimated porosity measurements of 30 % observed at the Mt Charlotte 1 exploratory bore. The Jay Creek Formation transitions into a calcareous dolomitic unit toward its basal extent, where it overlies the Giles Creek Formation. Groundwater potential is negligible within the extent of this unit, given its massive nature and the limited fracture potential.

The Chandler Formation halite deposit is hydro-geologically isolated from the overlying groundwater systems described above.

Groundwater recharge and discharge

The main groundwater flow mechanism for the fractured sandstone aquifer is considered to be rainfall recharge to the west and north-west of the Chandler Facility. This creates opportunities for lateral flows in the Horseshoe Bend Shale overlying the Chandler deposit.

As monthly average evaporation exceeds monthly average rainfall by up to 11 times, recharge is event-based and episodic, occurring only during high rainfall events that cause flooding of the overlying local alluvial groundwater systems adjacent to watercourses.

However, across the mine infrastructure area, groundwater level changes were observed to be muted or negligible in response to rainfall as indicated by observations and records at each groundwater monitoring bore.

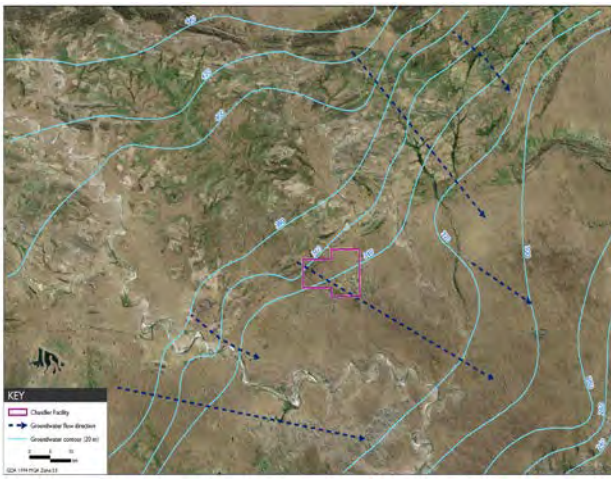

Figure ES-12 Groundwater flows in a southeast direction at Chandler

The groundwater flow direction at the Horseshoe Bend Spring location (some 8 kilometres to the south-east) is oriented west/east. However, the flow from the Proposal area is oriented north-west/-south-east (refer to Figure ES-12). This indicates that groundwater discharges at the Horseshoe Bend spring area are likely to be sourced from a separate groundwater system to the south of the Finke River.

Groundwater quality

The groundwater quality results are reasonably comparable between the different target Formations. The groundwater is slightly alkaline (averaging pH 8) and saline (electrical conductivity ranged between 12,600 and 21,000 microSeimens per centimetre (µS/cm)).

The water type at all locations was dominated by sodium and chloride, with minor calcium and sulfate ions. Total iron and zinc measurements were typically two to three orders of magnitude higher than the other total metal analytes.

Regional water quality monitoring conducted by the NT Government indicates that salinity is comparable (i.e. moderately saline) for other monitoring locations targeting the Langra Formation. Regional mean electrical conductivity (11,307 µS/cm) is slightly lower than observed within the proposed Chandler Facility area but remains within a saline category.

Regional monitoring in the Stairway Sandstone, underlying the Langra Formation, has comparable pH and electrical conductivity results (mean electrical conductivity: 16,578 µS/cm) to the Langra Formation at the Chandler Facility. Regional water type for the Langra Formation and Stairway Sandstone is also dominated by sodium and chloride. The water is generally suitable only for industrial uses.

It is important to note that:

- All the aquifers (Horseshoe Bend Shale, Upper Langra, Lower Langra and Stairway Sandstone) contain water with salinity significantly in excess of the salinity of potable water. Were water from these aquifers to be used for human consumption it would need to be diluted to < 1000 mg/L and more likely < 600 mg/L.
- The highest known salinity groundwater occurs in the Stairway Sandstone (~15,000 mg/L). The Jay Creek Formation (~40,000 mg/L) and the underlying Gillen Member (~ 318,000 mg/L).
- The highest salinities are all less than any water that is saturated with respect to (in equilibrium with) halite. Such a water at 25 °C would have a TDS of about 360,000 mg/L.

If any of these groundwater's were to be used in future for human consumption or for agriculture, they would need to be diluted significantly on account of their high salinity. This dilution would also reduce the concentrations of any contaminants that could potentially mobilise in the groundwater systems through construction, operational, or post closure activities.

Water use – Alice Springs and landholder bores

The Proposal is not located within the Alice Springs groundwater supply (Roe Creek) which is approximately 100 kilometres north of the Proposals.

Local land holder bore fields are located within the Orange Creek Syncline and target the Mereenie Aquifer System which is distinctly separate to the Chandler Syncline system.

Elsewhere, closer to the Proposal and within the south-east extent of the Amadeus Basin, numerous landholder bores target the shallow near-surface sediment groundwater systems along the Finke and Hugh Rivers. Other bores target deeper groundwater within the Idracowra and Stairway Sandstone.

In total, 36 landholder production bores were identified within the 25 kilometre buffer (including the Titjikala bore) and 193 were identified within the 75 kilometre buffer.

What will groundwater be used for?

Groundwater would service the following primary activities:

- Raw water supply for dust suppression along the haul road and access road.
- Potable water supply for mine workers.
- Building and operating the Apirnta Facility.
- Building and operating the Chandler Facility

What are the potential risks to groundwater?

During construction and operation of the proposal, the potential risks on groundwater include the potential for over abstraction of local groundwater reserves leading to drawdown of other groundwater bores, contamination of aquifers, and changes to groundwater dependent ecosystems.

Impacts are minor, with only minor localised drawdown predicted as a result of extraction from these bores (i.e. 0.2 metres drawdown within one kilometre of a bore pumping at 2 L/s).

The saline groundwater quality within the Chandler Syncline differs markedly from the potable water quality reported for the Mereenie Aquifer System (MAS) about 100 kilometres north within the Northern Amadeus Basin (the MAS is utilised for the Alice Springs Water Supply).

The Chandler Syncline is a separate groundwater system entirely, given that the MAS units occur within the Northern Amadeus sub-basin and Orange Creek Syncline, but do not occur within the Chandler Syncline. The evidence presented in the EIS confirms that the Chandler Syncline is distinct and separate from the MAS in terms of geological structure, lithological units, groundwater flow properties, hydraulic gradients and water chemistry. Therefore, water resource impacts to the Alice Springs water supply bore fields (Roe Creek borefield and Rocky Hill borefield) arising from Proposal-related dewatering and/or groundwater abstraction is not expected.

Water quality within shallow alluvial groundwater accessed by landholder bores to the north and west of the Chandler Facility, particularly at Titjikala can be characterised as potable. Whereas groundwater quality observed within the Horseshoe Bend Shale and Langra local groundwater systems are poor and equivalent to seawater.

As shown in Figure ES-13, the Proposal would not target storage within the alluvium. Mining and groundwater abstraction would target the deeper groundwater systems, and therefore, impacts on riparian vegetation or groundwater dependent ecosystems is highly unlikely.

Contamination of groundwater arising from the storage of waste in the underground repository has been quantitatively assessed during operation and post-closure. The assessments conclude there is no credible risk of contamination to the upper groundwater lenses and aquifer in the Langra Formation.

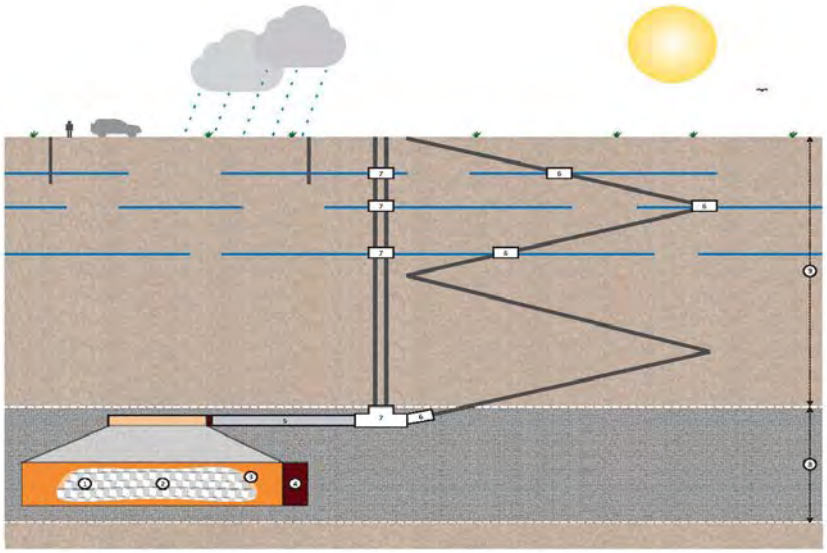

Figure ES-13 Location of storage, recovery and permanent isolation rooms in the

Contamination of groundwater arising from the storage of waste in the underground repository is unlikely to pose a groundwater contamination risk given the natural impermeability of the Chandler Formation halite resource. As shown in Figure ES-13, the depth of the proposed Chandler salt mine and deep geological repository in comparison to known groundwater systems provides approximately 450 metres of vertical separation comprising low permeability overburden material between the waste repository and the nearest overlying groundwater system

During construction and operation, it is anticipated that geophysical surveying will be used to identify faults/features of interest up to several hundred metres ahead of and prior to excavation with the mine layout subsequently adjusted to avoid such structures. The Proposal is not expected to be intersected by any geological faults or features that could be a pre-existing pathway to the overlying formations or groundwater resources.

Risks during post closure

The potential for indirect impacts on groundwater during closure and rehabilitation have been quantitatively assessed by Quintessa and Atkins. Calculations were undertaken for periods of up to one million years. The assessment provides confidence that, for the proposed categories of wastes and with appropriate facility design, there will be no significant risks arising from the Proposal in terms of environmental safety or risks to groundwater resources on a local or regional basis during post closure.

Groundwater mitigation and management

To ensure the sustainable use of existing and future local and regional groundwater reserves, the proponent would apply for water abstraction licences and permits under the *Water Act.*

During construction, the risk assessment identified potential impacts from accidental spills and/or leaks from drilling machinery. These types of impacts could unintentionally contaminate groundwater resources during the construction of mine shafts and the decline. To avoid and minimise these risks, the drilling program would implement shaft sealing techniques as shown in Figure ES-14.

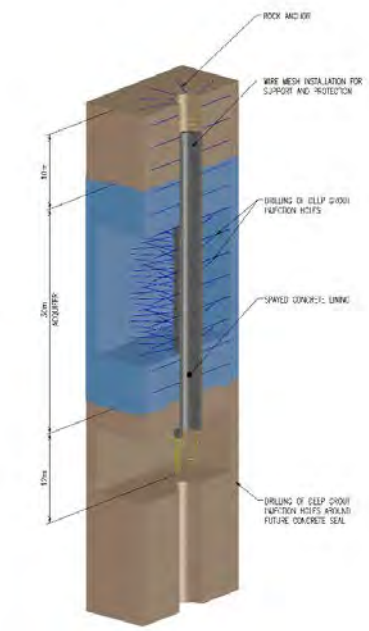

Figure ES-14 Groundwater seals and plugs

A draft Water Management Plan is included in this EIS which includes a detailed a groundwater monitoring plan for the life of the Proposal. In addition, during construction and operation, it is planned that geophysical surveying will be used to identify faults/features of interest up to several hundred metres ahead of and prior to excavation with the mine layout subsequently adjusted to avoid such structures.

Surface water

Baseline research

The Proposal occurs within an arid environment. Rainfall occurs periodically and, as a result, drainage lines such as gullies, creeks and rivers within the study area are generally dry for most of the year. In fact, the long term average annual rainfall within the proposed development footprint and vicinity is approximately 204 millimetres. The annual average evaporation is approximately 3,147 millimetres. This means evaporation is about 15 times greater than the annual average rainfall.

The major surface water features within the vicinity of the proposed development footprint are the Hugh River (located approximately 20 kilometres to the north-east of the proposed Chandler Facility) and the Finke River (located approximately 17 kilometres {at the nearest point} to the south of the proposed Chandler Facility). Both rivers are ephemeral. This means they remain dry for long periods of time with infrequent high flows during major storm events. Small flow events occur once or twice a year, often only resulting in a section of each river flowing (refer to Plate ES-9).

Several ephemeral drainage lines are present within the proposed development footprint. The only permanent waterbody within the proposed development footprint is a farm dam used for livestock watering (Halfway Dam). Halfway Dam is located within the footprint of the proposed mine infrastructure area at the Chandler Facility.

Extensive surface water investigations have been undertaken within the proposed development footprint since 2013. The purpose of the investigations was to describe and monitor baseline surface water characteristics (flow direction and speeds as well as the duration of flood events) associated within the development footprints of the proposed Chandler and Apirnta Facilities. Generally, flows are not connected to either the Hugh or Finke Rivers. Flow rates are low and water does not pond in low lying areas for too long because of high evaporation rates.

Plate ES-9 The Finke River shortly after a minor flow event

Geomorphological surveys and sediment sampling was undertaken at waterbodies both within and down gradient of the proposed development footprint and where land permissions could be obtained. Seven sites were selected where existing hydrographic stations were established or where hydrographic stations are proposed in the near-future. The surveys were undertaken to provide a snapshot various channel types and to characterise the main watercourses within the proposed development footprint and vicinity. Sediment sampling included testing of electrical conductivity, pH, dissolved oxygen, total dissolved solids, total suspended solids, nitrates, metals, moisture content, particle size distribution and total organic carbon.

The surface water quality samples were assessed against the trigger levels for freshwater aquatic ecosystem protection and primary industries livestock protection set out in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000). The results of water quality sampling within the proposed development footprint and wider region indicate that surface water is generally suitable for aquatic ecosystem protection, but may have adverse effects for livestock production due to the level of nitrates and/or metals in the water.

In addition to the above, soil erosion modelling, flood modelling, and storm profiling was undertaken in order to assess potential impacts during construction, operation, and closure and rehabilitation of the Proposal.

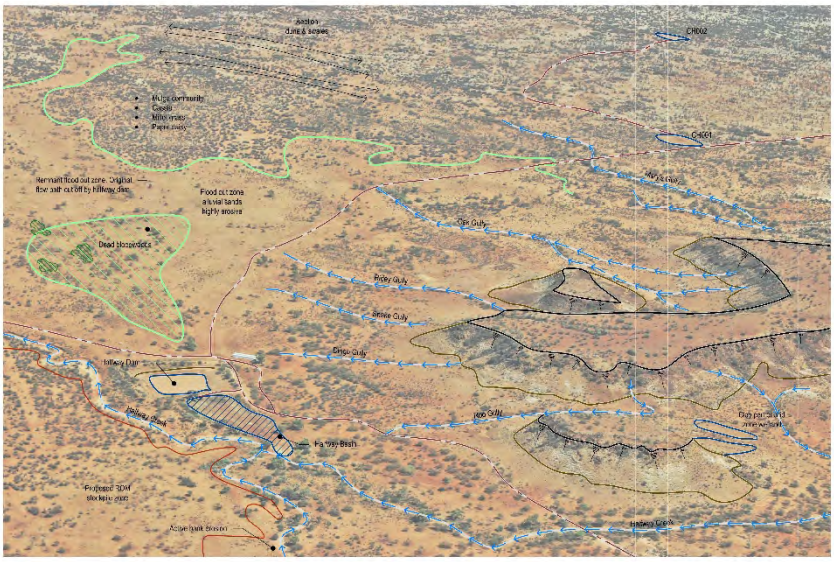

Figure ES-15 Conceptual surface water model at Chandler

A site conceptual surface water model was generated using aerial photography to show the characteristics of surface water patterns within the proposed mine infrastructure area (refer to Figure ES-15).

Potential impacts on surface water

Potential direct impacts on surface water during construction, operation, and closure and rehabilitation include those primarily associated with erosion (through exposed soils and stockpiled materials). There would be no perceptible change to hydrology for the following reasons:

- **Chandler Facility**. Surface water flowing through the proposed facility would drain towards a flat washout area to the north, towards the Charlotte Range. The water would pond in this washout area where the majority of the water would be lost through evaporation and infiltration. Surface water runoff is not expected to reach the Hugh River. In addition, the proposed facility (including the accommodation village) and catchments upstream of the proposed facility only represent 10% of the catchment draining through the Charlotte Range towards the Hugh River and the community of Titjikala.
- **Chandler Haul Road and Apirnta Facility**. Surface water flowing across the proposed haul road and through the proposed storage and transfer facility would drain to the south-west, towards Charlotte Range. Though the haul road would be less impervious than the existing track, the area would be insignificant when compared to the areas of contributing catchments. In addition, runoff from the proposed Apirnta facility would be collected, treated, and reused on-site for various purposes (e.g. dust suppression, vehicle washdown, ablutions). It is, therefore, not anticipated that there would be any perceivable increase in flow or volume of water draining through the Charlotte Range towards the Finke River.

Potential indirect impacts on surface water during construction, operation, and closure and rehabilitation include flooding and contamination of surface water from accidental spills. These

potential indirect impacts are easily managed through standard construction and operation sediment and erosion management measures.

Proposed mitigation and management

Mitigation and management measures would be implemented to reduce the potential impacts on surface water during construction, operation, and closure and rehabilitation of the Proposal. These measures would include installing erosion and sediment control measures around exposed surfaces and stockpiles; retaining large mature trees and shrubs, where possible; and ensuring that hazardous materials (including waste brought to site) is stored within bunded areas sufficient to hold 110 % of the material.

Drainage channels would be formalised to divert/convey flood flows from upstream catchments past both the proposed Chandler Facility and Apirnta Facility. Culverts or causeways (as appropriate) would also be incorporated into the design of the proposed Henbury Access Road and Chandler Haul Road. Infrastructure would not be placed within watercourses or drainage depressions and clearing or disturbance to watercourses or drainage depressions would be avoided (where possible). These measures (among others) would be included in a draft Water Management Plan that would be prepared and incorporated into the CEMP, the OEMP and/or the RCP for the Proposal.

The monitoring of baseline surface water conditions will continue during the public exhibition of the EIS. The proponent is committed to continuing field investigations through the detailed design, construction, operation, and closure and rehabilitation phases of the Proposal.

The surface water management system at Chandler and Apirnta would be designed to:

- Segregate different water sources and different water qualities, (i.e. raw water from the groundwater inflows/abstracted groundwater, sediment-laden water).
- Capture and contain mine affected water[3] and prevent discharge to receiving surface water environments.
- Ensure unused abstracted saline groundwater is contained and evaporated rather than discharged to surface water environments.
- Capture and segregate runoff from the following locations:
    - processing area.
    - salt overburden stockpiles.
    - topsoil and subsoil stockpiles.

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[3] *Note – mine affected water relates to water encountered during construction of the mine decline and/or shafts. The mine operation will be undertaken in a dry environment.*

- other disturbed areas.

- Divert clean runoff away from areas disturbed by mining activities to minimise the volume of mine affected water.
- Manage sediment laden water in accordance with an erosion and sediment control plan that would be part of the water management plan, which will include the capture and treatment of sediment laden water in sediment dams.
- Reuse and recycle water in mining operations.
- Include contingency measures to accommodate either a surplus or deficit of site water.
- Communicate with key stakeholders (i.e. DENR, NT EPA, landholders, other users).

Historic and cultural heritage

The methodology for the historic and cultural heritage impact assessment included consultation, a database and literature review, the development of predictive models, field surveys and assessments of significance. The field surveys consisted of both pedestrian transects and slow moving vehicle transects. Eighty-five transects were conducted totalling approximately 83.9 kilometres.

No historic places were recorded within or in the vicinity of the proposed development footprint during the field surveys. One historic item was, however, recorded. This was a Bells brand tin matchbox, located outside of the proposed development footprint.

A range of archaeological site types including artefact scatters, knapping floors, ochre and stone quarries were recorded within and in the vicinity of the proposed development footprint during the field surveys (refer to Plate ES-10). Fifty-one sites were recorded (of which 30 were a part of eight larger site complexes). In addition, nine background scatters and 26 isolated finds were also recorded.

Plate ES-10 Retouched/grinding implement, ground and pitted surface (left), other side (middle), retouch/use-wear along edges (right)

No historic items would be impacted during construction or operation of the Proposal. With regards to archaeological material, a minimum of three site complexes, 11 individual sites, three background scatters and 11 isolated finds would be directly impacted during the construction of the Proposal. In addition, two site complexes, four individual sites, three background scatters and six isolated finds may be vulnerable to disturbance during construction given their close proximity to the proposed

development footprint. The risk of adverse impacts to cultural heritage would be low during operation and closure and rehabilitation of the Proposal.

Additional surveys of areas that would be impacted but have not yet been surveyed and which have a moderate to high probability of containing archaeological material (e.g. sections of the proposed Chandler Haul Road and the eastern end of the proposed Henbury Access Road) would be undertaken prior to construction.

Appropriate consent would be obtained for all sites that would be directly impacted or vulnerable to disturbance (and that require protective measures). Consent would be obtained from the NT Heritage Branch under section 72 of the NT *Heritage Act*. Additional mitigation and management measures to conserve cultural heritage values would be included in a Cultural Heritage Management Plan. This plan would be incorporated into the CEMP, OEMP and/or RCP for the Proposal.

Sacred sites have been identified within the proposed development footprint by the Central Land Council and the Aboriginal Areas Protection Authority. These sites would be managed in accordance with the conditions of an Aboriginal Areas Protection Authority Certificate and in accordance with an Indigenous Land Use Agreement.

Human health and safety

They key risks on human health and safety without mitigation or management measures in place were identified as being the transport and handling of hazardous waste; fire; and working underground. These activities/situations may result in injury, illness or possibly death.

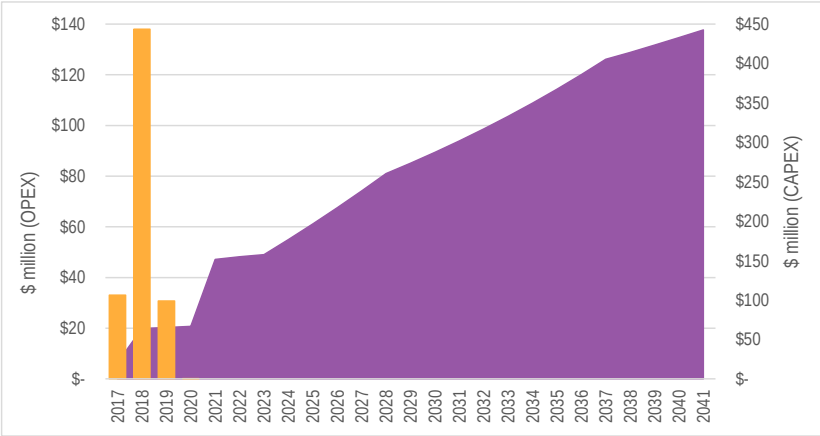
Mitigation and management measures would be implemented to reduce human health impacts during both construction, operation, and closure and rehabilitation of the Proposal. This would include the development of a detailed Safety Case and Operating Strategy (which would include a Waste Acceptance Procedure [WAP], Waste Acceptance Criteria [WAC], Waste Zoning Guide [WZG], a Traffic Management Plan, Air Quality Management Plan, Drug and Alcohol Management Plan, among others). These plans and procedures would be developed with reference to applicable legislation and regulations (NT and Australian). The implementation of these plans and procedures would minimise the risk of adverse impacts to human health to as low as reasonably achievable.

Economic and social

There would be a significant economic and social benefits to the economy of the local region, the NT and to the economy of Australia as a result of the Proposal.

The capital expenditure is estimated to be around A$676 million (nominal, including finance and contingency) for the Proposal. The construction period would have a high local content - around 67% of all construction costs would be spent in Australia (36 % spent in the NT). It is expected that up to 1,299 full time equivalent workers would be employed across all facets of the Proposal (all sourced from within Australia). Around 477 workers (or 37 % of the construction workforce) would be sourced from the local region. In total, 72 % of the construction workforce would be sourced from the NT with the remaining 28 % sourced from the rest of Australia.

On average, there would be spending of just under $81 million per annum to operate the Proposal (refer to Figure ES-16). Of this, 64 % would be spent in Australia (a total of 52 % would be spent in the NT, 32 % of which would be spent in the local region).



Note: Orange represents capital expenditure (CAPEX), purple represents operational expenditure (OPEX).

Figure ES-16 Capital and operational expenditure on the Proposal

The local region would benefit significantly from the Proposal. Around $118 million of capital expenditure would be spent in the region during construction and an average of $26 million per annum in operation. Local employment would receive a boost with 477 construction workers would be required and an average of 90 full time equivalent workers per annum in operation peaking at about 180.

The gross domestic product of Australia would rise by about $4.1 billion or an average of $166 million each year over the life of the Proposal. Most of this impact would be realised in the NT (the majority of which in the local region). About $3.6 billion (or an average of $144 million per year) would be added to the gross state product of the NT over the life of the Proposal. This would result in a significant annual contribution to the gross state product of the NT and is equivalent to around 0.6 % of the current gross state product of $23.1 billion.

Almost $3.4 billion would be contributed to the real incomes of Australians over the life of the Proposal. This includes an increase of $440 million to real incomes in the NT. The contribution to the local region would be higher at $475 million for the life of the Proposal.

During steady state operations, it is expected that up to 180 full time equivalent workers would be employed by the Proposal (refer to Figure ES-17). Just over 5,400 full time equivalent job years would be created over the life of the Proposal. This is an average of 217 full time equivalent job years per annum. The Proposal would deliver long term job creation in Australia, particularly in the NT where most of the job creation would be realised. An estimated 3,665 full time equivalent job

years would be created in the NT over the life of the Proposal. This is equivalent to an average of 71 full time equivalent job years per annum.

Almost $1.9 billion in direct and indirect taxation would be paid over the life of the Proposal (or an average of around $75 million each year). The majority of this taxation would be in the form of company taxes paid by the proponent as well as other personal and company income taxes paid to the Federal Government. In total, the NT is likely to receive $34 million in payroll taxes as a result of direct and indirect state revenues from the Proposal, or an average of $1.4 million per annum.

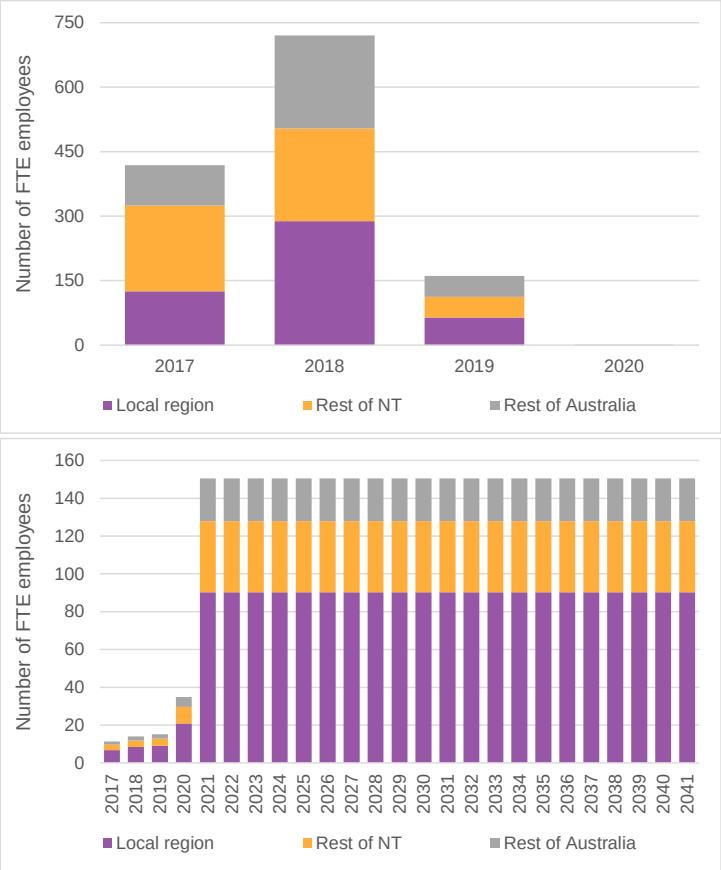


Figure ES-17 Direct employment during construction (top) and operation (bottom) of the Proposal

In addition to the modelled economic benefits, there would be other benefits (particularly to the local region) during construction and operation of the Proposal These benefits include the creation of new employment opportunities for local job seekers and new business opportunities for businesses wishing to support the Proposal. These opportunities would assist in retaining and attracting people to the local region and particularly to the town of Alice Springs. This would aid in addressing the current population decline in the local region and in Alice Springs.

Indigenous people would have a number of opportunities as a result of the Proposal. The proponent has set a target of 6 to 10 % indigenous employment as well as other commitments that would benefit local indigenous people such as the sponsorship of sporting and academic programs in the nearby community of Titjikala. Land use agreements are currently under negotiation with the government and with the Central Land Council. It is anticipated that the land use agreements would generate a range of potential opportunities for businesses in the local region and in the NT in the areas of agribusiness, tourism and conservation including ranger services and cultural and traditional tourism ventures. There would also be financial commitments to local Aboriginal groups under the *Native Title Act 1993.*

Closure and rehabilitation

Potential impacts during closure and rehabilitation include failure of the mine rooms; failure of the mine entry seals; infiltration of water into the mine rooms and the generation of leachate; surface remediation fails resulting in vegetation not growing and unable to support a functioning ecosystem; fauna not returning and a functioning ecosystem is not achieved.

A RCP would be implemented in order to avoid or reduce the potential impacts associated with closure and rehabilitation of the Proposal. The RCP would contain closure objectives, indicative completion criteria and key measurement tools. The measurement tools would include (but would not be limited to):

- Visual inspections.
- Revegetation monitoring.
- Erosion monitoring.
- Surface water and groundwater monitoring.
- Unauthorised access monitoring.

Based on the results of the monitoring, remedial actions would be evaluated and implemented (if required).

Surface monuments would be installed after closure and rehabilitation of the proposed Chandler Facility (refer to Plate ES-11). The purpose of the monuments would be to identify the isolation/disposal area located approximately 800 metres below the surface.

Plate ES- 11 Example of surface monument indicating a change in land use

Other risks

Other risks assessed included air, fire, noise and vibration, visual amenity, public health and food, biting insects, and greenhouse gases. A summary of these risks is presented below.

Air

Dust and odour/gases may be generated during construction, operation, and closure and rehabilitation of the Proposal. Activities that may result in dust include vegetation clearing and topsoil removal and the movement of plant and equipment on unpaved surfaces. Salt mining (particulate emissions) and combustion gases from local power generation (diesel engines) also have the potential to affect local air quality. The accidental loss of containment of salt or hazardous waste

may also result in air quality and human health impacts. These impacts would, however, be limited due to the lack of sensitive receivers within the vicinity of the proposed development footprint.

Mitigation and management measures would be implemented to reduce the potential for air quality and human health impacts during construction, operation, and closure and rehabilitation of the Proposal. Measures to control dust would include wet suppression, suspending excavation activities during high wind events, revegetating disturbed areas as soon as practicable, implementing vehicle speed restrictions on un-paved roads, daily on-site and off-site inspections in addition to a program of dust monitoring at strategic locations (for example, at the proposed Chandler Facility, Apirnta Facility, and within the community of Titjikala).

To reduce particulate emissions from the mine surface operations, salt stockpiles would be treated with a range of controls including windbreaks, shaping and profiling, and the rehabilitation of sandstone, shale, limestone and topsoil stockpiles would be implemented. Emissions from diesel engines would be minimised through adherence with international emission standards (specifically those developed by the United States EPA).

To reduce the risk of loss of containment of waste materials, containers would be handled on a strict one-at-a-time basis and the removal of containers from trucks would be performed in appropriately bunded areas to minimise the surface area of spills and to enable efficient clean-up of any spilled material. Load restrictions would be implemented for all trucks delivering waste materials to the site and a collision avoidance system would be developed to prevent potential accidents.

Specific mitigation measures would be developed for the potential loss of containment at Orange Creek, the Desert Oaks Motel, Stuart Wells and at the proposed Apirnta Facility. These mitigation measures would include a pre-prepared management response plan, restrictive speed limits and the provision of spill kits at each location.

These mitigation and management measures would be incorporated into an Air Quality Management Plan and Operating Strategy that would be included in the CEMP, OEMP and/or RCP for the Proposal.

Fire

Hazards associated with bushfire could occur during the construction, operation and closure and rehabilitation phases of the Proposal. If a bushfire were to occur, people, assets and the environment would likely be impacted.

Mitigation and management measures would be implemented to reduce the potential for bushfires during construction, operation, and closure and rehabilitation of the Proposal. These mitigation measures would include the creation of fire breaks (designed around prevailing wind directions, highest wind speeds and vegetation types), the preparation of a fire risk maps and firefighting training for personnel. The measures would be incorporated into a Bushfire Management Plan that would be included in the CEMP, OEMP and/or RCP for the Proposal.

Noise and vibration

Activities that would generate noise and vibration include:

- Rock blasting associated with the construction of the decline portal and tunnel at the proposed Chandler Facility. Rock blasting would generate noise in addition to ground vibration.
- Mechanical equipment and plant associated mainly with construction of the Proposal. Some equipment would also be used during the operation and closure and rehabilitation phases of the Proposal. This equipment would generate noise.
- Truck movements during the construction, operation, and closure and rehabilitation phases of the Proposal. Truck movements would generate noise and minor, localised ground vibration.

The nearest residents (the community of Titjikala) are located approximately 25 kilometres to the north-east of the proposed Chandler Facility and approximately 56 kilometres from the Apirnta Facility. Noise or vibration from the activities described above would not be audible at these distances.

A Noise Management Plan would be prepared and incorporated into the CEMP, OEMP and/or RCP for the Proposal. The primary purpose of the plan would be to safeguard workers from occupational noise. The Noise Management Plan would be prepared in accordance with the NT *Work Health Safety Act*.

Visual amenity

It is possible that transient views of the proposed Apirnta Facility could be seen from within a train travelling north or south along the Central Australian Railway during construction, operation, and closure and rehabilitation of the Proposal. These views would be of a short duration and likely screened by existing vegetation. Therefore, the visual impacts are considered to be minor. Mitigation and management measures would be implemented to reduce these potential impacts.

None of the proposed infrastructure would be visible from Maryvale Homestead, the community of Titjikala, Chambers Pillar, Chambers Pillar Historical Reserve, Idracowra Homestead, Henbury Homestead or Palmer Valley Homestead during construction, operation or during closure and rehabilitation of the Proposal. This would be due to the distance of the sensitive visual receptors from the proposed infrastructure and due to intervening topography that blocks views from the sensitive visual receptors to the proposed infrastructure (predominantly, Charlotte Range and the Maryvale Hills).

The proposed above ground infrastructure would be long term features within the existing landscape. Without appropriate landscape and visual amenity mitigation in place, a high visual impact on the existing landscape character and visual amenity of the area is likely. Landscape mitigation and management measures would be implemented to minimise these impacts. These measures would also mitigate visual impacts that could apply to cultural heritage.

These measures would include utilising the existing landscape to screen infrastructure or planting native and endemic trees and shrubs to screen infrastructure; utilising external building finishes and colours that blend with the colours of the surrounding landscape; and erecting boundary fences that are simple, non-reflective and have a high degree of transparency. These mitigation and management measures would be incorporated into a Landscape Concept Plan that would be prepared as part of the detailed design of the Proposal.

Public health and food

The Proposal would be designed, constructed and operated in accordance with the requirements set out in the NT Department of Health – Environmental Health *Environmental Fact Sheet No. 700: Requirements for Mining and Construction Projects* (2014a). The requirements for food safety, staff accommodation and sanitary facilities, on-site wastewater disposal, trade waste pre-treatment devices, potable water supply, bores, fuel storage, public health nuisance abatement, occupational health and safety and environmental management plan would be adhered to.

Biting insects

The presence of biting insects within the proposed development footprint and vicinity is highly variable and dependent on breeding conditions determined by warm seasonal rainfall. The existing surface hydrology of the proposed development footprint and vicinity consists of ephemeral watercourses, claypans, swamps and a purpose-built pastoral dam called Halfway Dam.

A number of mosquito species, several of which have the potential to cause discomfort and others that have the potential to carry disease, are likely to occur within the proposed development footprint or vicinity.

Activities associated with the construction, operation, and closure and rehabilitation of the Proposal have the potential to effect and possibly increase the mosquito population within the proposed development footprint and vicinity through the development of favourable breeding environments.

Mitigation and management measures would be incorporated into a Biting Insect Management Plan to prevent an increase in biting insects within the proposed development footprint and vicinity and to protect personnel during construction, operation, and closure and rehabilitation of the Proposal. The Biting Insect Management Plan would be incorporated into the CEMP, OEMP and/or RCP for the Proposal.

Greenhouse gases

Construction, operation, and closure and rehabilitation activities would generate both direct greenhouse gas emissions (e.g. via land clearance, fuel combustion) and indirect greenhouse gas emissions (e.g. via the extraction and processing of fuels). Greenhouse gas emissions have been calculated for each activity and are provided as annual total emissions during the construction and operational phases of the Proposal (emissions generated during closure and rehabilitation are expected to be similar to those generated during construction).

Direct emissions during construction were calculated to be 13,205 t CO_2-e per year with over half of emissions due to land clearance activities. During operation, direct emissions are calculated to be 104,310 t CO_2-e per year. Indirect emissions are calculated to be minor during construction (155 t CO_2-e per year) with emissions during operation anticipated to be 5,351 t CO_2-e per year.

The estimates indicate that the Proposal would contribute less than 1% of the total greenhouse gas emissions in the NT, and 0.02 % of the total greenhouse gas emissions in Australia (when compared to a base year of 2014).

A number of sustainability measures would be incorporated into the design, construction and operation of the Proposal. For example, solar energy would be used to supplement the power requirements of the proposed Chandler Facility and Apirnta Facility (a two megawatt solar farm would be installed at the Chandler Facility). These measures would ensure that greenhouse gas emissions are minimised to the maximum extent possible.

Environmental management

The environmental assessment has indicated that the Proposal would result in environmental impacts during construction, operation, closure and rehabilitation. A range of management plans, protocols and procedures to manage the environmental impacts of the Proposal would be implemented.

A CEMP, OEMP and a RCP would be prepared and implemented for the Proposal. The plans would include:

- Environmental objectives and performance targets for construction, operation, and closure and rehabilitation.
- Required statutory and other obligations, including consents, licences, approvals and voluntary agreements.
- Management policies, procedures and review processes to assess the implementation of environmental management practices and the environmental performance of the Proposal against the objectives and targets.
- Requirements and guidelines for management in accordance with:
    - Conditions of consent for the Proposal.
    - Mitigation measures specified by this environmental assessment.
    - Relevant construction management guidelines.
- Requirements in relation to incorporating environmental protection measures and instructions in all relevant standard operating procedures and emergency response procedures.
- Specific procedures, including monitoring, as defined by the environmental assessment and the conditions of consent.

- Roles and responsibilities of all personnel and contractors to be employed on-site.
- Procedures for complaints handling and ongoing communication with the community.
- Environmental sub-plans.
- Incident response procedure.
- Monitoring and auditing program.

An environmental monitoring program would be implemented that enables auditing of mitigation measures to ensure they achieve their objectives and to facilitate modification, where necessary. An environmental monitoring program would be established for both the construction and operational phase of the Proposal.

An environmental monitoring program enables auditing of mitigation measures to ensure they achieve their objectives and to facilitate modification, where necessary. An environmental monitoring program would be established for the construction, operation, and closure and rehabilitation phases of the Proposal. Monitoring requirements would be listed within the CEMP, OEMP and RCP.

Environmental management information and data would be stored in Tellus' existing Environmental Management System (EMS). The Tellus EMS is accredited to Australian and New Zealand Standards (AS/NZS) ISO 14001:2004 EMS. It is regularly audited internally, and annually audited by an external party.

Justification and conclusion

The Proposal is considered to be justified because it:

- Responds to a recognised need and is consistent with state and national waste management strategies.
- Provides a number of social and economic benefits including opportunities for long-term, full time employment.
- Would not result in significant effects on the environment.
- Is consistent with the principles of ecologically sustainable development.

Proceeding with the Proposal would result in significant social and economic benefits in the NT and within Australia. The Proposal would:

- **Provide an innovative unique dual revenue business in remote Central Australia** -the business would commercialise an industrial bulk commodity (salt) and provides an equipment and archives storage business and a storage, recovery and permanent isolation business for hazardous waste generated in the NT and within Australia.
- **Diversify the economy.** - development of enabling environmental infrastructure which would assist in providing utility support services to other existing and new projects that generate waste as a result of the 'Developing the North' strategy.
- **Major investment in regional Australia** - the capital expenditure is estimated to be around A$676 million (nominal, including finance and contingency) for the Proposal. Around 67 % of all construction costs would be spent in Australia (36% spent in the NT).
- **Boost the economy over the 29-year project life** - on average, there would be spending of just under $81 million per annum to operate the Proposal. Of this, 64 % would be spent in Australia (a total of 52% would be spent in the NT). The site could be expanded for generations.
- **Royalties, taxes and levies** - over the 29-year term could support other parts of the NT and the Australian economy.
- **Create training and long term job opportunities** -
    - About 270 jobs during construction (720 jobs during peak build including in-directs).
    - About 150 to 180 full time equivalent workers would be employed during operation. Just over 5,400 full-time equivalent job years would be created over the life of the Proposal, an average of 217 full time equivalent job years per annum.
    - Jobs would be green, sustainable, and generally well paid covering technical (engineering, chemistry, science), commercial (sales, business) and operational skills.
    - Proposed jobs and training programs, such as:
        - Tellus' School to Jobs Program (Annual Schools Tour).

- Tellus' Pre-employment Training Program ('Getting Job Ready') comprising Tellus' Traineeships Program, Tellus' Apprenticeships Program and Training Accreditation.
- Indigenous Employment Program; comprising a 10 % indigenous employment target as well as other commitments that would benefit local indigenous people such as the sponsorship of sporting and academic programs in the nearby community of Titjikala.
- Tellus' Employment Programs and Systems comprising a 'Sisters in Mining' Program; Tellus' Disabled Worker Program, Tellus' Ranger Program and support for Social Enterprises that could generate more jobs.

- **Provide local business support and new business opportunities** - goods and services such as construction and operational materials, food, accommodation, etc. would be sourced from local business, where possible.
- **Fulfil the government's own environmental and waste policy obligations under the following four main regulatory regimes** -
  - Environmental protection regulations (to minimise adverse impacts on the environment and human health and to meet national and international obligations);
    - Meeting NT and national obligations by providing critical infrastructure that can safely store, recover or permanently isolate difficult to manage wastes.
    - The NT EPA's *Waste Management Strategy for the Northern Territory 2015-2022*, the NT Department of the Chief Minister *Framing the Future* and the Australian Government *National Waste Policy*.
    - Meeting international obligations under the Basel Convention (Regulation of Transboundary Movements) and Waigani Convention (Regulation of Exports and Imports) by providing critical infrastructure for our near-neighbors such as the Pacific Islands who do not have suitable infrastructure to manage such wastes. Australia currently exports waste mostly to Europe and Asia and imports small volumes of waste materials mostly from our near neighbors (Pacific Islands). The proponent is not planning on actively marketing this service, but in the event of a man-made or natural disaster, the proposed Chandler Facility would be suitable.
  - Transport of dangerous goods regulations (to prevent accidents and promote safe transport, regulated by national legislation and codes).
  - Work health and safety regulations (hazardous chemical regulations that reduce occupational health and safety risk in the workplace).
  - Product stewardship regulations (the responsible management of products such as waste oil, asbestos, e-waste, tyres, batteries, mercury, medicines).

- **Support the circular economy** - by providing an opportunity for the future potential recovery of valuable materials (that are currently deemed waste). The Proposal could attract new salt and waste recycling and recovery industries to the NT.

Investigations were undertaken to assess the potential environmental impacts during construction, operation and closure and rehabilitation of the Proposal. These included specialist studies of biodiversity, groundwater, surface water, historic and cultural heritage, social, economic, air quality (including a greenhouse gas assessment and risks to human health) and noise and vibration. These studies were undertaken in accordance with relevant environmental legislation, guidelines and procedures established by regulatory agencies.

Based on the findings of the environmental investigations, there would be some adverse impacts on the environment. Mitigation measures that would be implemented during construction, operation and closure and rehabilitation have been proposed to avoid (eliminate) or reduce these impacts. The environmental performance of the Proposal would be managed through the implementation of CEMP, OEMP and RCP. This would also help to ensure compliance with relevant legislation and any conditions of approval. Based on this environmental impact assessment, it is considered that the long term operational benefits of the Proposal would outweigh the minor adverse effects of the Proposal.

Accessing the EIS

The draft EIS is available for public comment from **Saturday 18 February to Friday 31 March 2017**.

The proposal has been referred to the Australian Government Department of the Environment and Energy and determined to be a controlled action under the *Environment and Biodiversity Conservation Act 1999* (EPBC Act) (reference number EPBC 2012/6684). The controlling provisions under the EPBC Act are listed threatened species and communities (Sections 18 and 18A) and listed migratory species (Sections 20 and 20A). The Australian Government has accredited the assessment process under the Northern Territory *Environmental Assessment Act* for the purposes of assessing the proposal under the EPBC Act.

Copies of the draft EIS may be viewed and downloaded from the NT EPA webpage www.nt.gov.au/environment or the Tellus Holdings Ltd webpage www.tellusholdings.com

Hard copies of the draft EIS are available for viewing at the following locations:

- NT EPA, Level 1, 16 Parap Road, Parap.
- Mines and Energy Information Centre, Department of Primary Industry and Resources, 3rd Floor, Paspalis Centrepoint, 48 Smith Street Mall, Darwin.
- Northern Territory Library, Parliament House, Darwin.
- Environment Centre Northern Territory, Unit 3, 98 Woods St, Darwin.
- Arid Lands Environment Centre, 90 Gap Rd, Alice Springs.
- Central Land Council, 27 Stuart Hwy Alice Springs.

A CD copy of the draft EIS may be obtained by contacting Tellus Holdings Ltd on (02) 8257 3395 or info@tellusholdings.com

Interested persons and organsiations wishing to comment on the draft EIS for the Chandler Facility are invited to make written submissions on or before 31 March, 2017. Submissions can be emailed to eia.ntepa@nt.gov.au or posted to:

Environmental Assessments
Northern Territory Environment Protection Authority
GPO Box 3675, Darwin NT 0801

How to lodge a submission

A properly made submission should:

- Be in writing and received on or before the last day of the submission period.
- Be signed by each person who makes the submission.
- State the name and address of each person who makes the submission.
- Sate the grounds of the submission and the facts and circumstances relied on to support those grounds.
- Clearly state the matter(s) of concern or interest and list points to help with clarity.
- Reference the relevant section(s) of the EIS.
- Ensure the submission is legible.

What happens to my submission?

Your comments or submissions on the Proposal and supporting EIS are received by the NT EPA during the formal EIS public exhibition period. They are collated and issued to the proponent (Tellus). All comments and submissions received by the NT EPA will be addressed in a separate Supplementary EIS document.