EXECUTIVE SUMMARY

Introduction

Tellus Holdings Ltd (Tellus) propose to construct and operate an open-cut kaolin mine and storage facility (herein referred to as the 'Sandy Ridge Facility', 'Facility', the 'Proposal' and the 'Sandy Ridge Project'). If approved, the Sandy Ridge Facility would be located approximately 75 kilometres (km) north-east of Koolyanobbing, in the Shire of Coolgardie, within the Goldfields Region of Western Australia (WA).

There are two key aspects of the Proposal. The first involves mining kaolin primarily for export to Asia or the domestic ceramic clay market. The second involves storing hazardous, intractable and low level radioactive wastes (LLW) within the void spaces left from the mining operations.

A Public Environmental Review (PER) has been prepared to support the approval of the Proposal under Part IV of the *Environmental Protection Act 1986* (WA) (EP Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The PER has been prepared to address the requirements set out in the final Environmental Scoping Document (ESD) for the Proposal issued by the WA Office of the Environmental Protection Authority (OEPA) on 26 May 2016. The PER has also been prepared to address the requirements set out in Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) (EPBC Regulations).

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 kaolin clay and rock salt 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 plans 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 Sandy Ridge Facility in WA and the proposed Chandler Facility in the Northern Territory (NT) which has been awarded Major Project Status by the NT Government.

Company details

Tellus Holdings Ltd
Suite 2, Level 10
151 Castlereagh Street
Sydney NSW 2000.
ABN 97 138 119 829

Key contact for the PER is:

Mr Richard Phillips
Environment and Approvals Manager
Tellus Holdings Ltd
Email: info@tellusholdings.com
Office: +61 2 8257 3395

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

Alternatives, justification and benefits

Alternatives to the Proposal

A range of options and alternatives were investigated for the Proposal including an assessment of the 'do nothing' scenario. In-depth, detailed investigations were also undertaken into site selection. Further investigations were undertaken with respect to the site selection for the mining components, the approach to mining the kaolin, access to the proposed development envelope, transportation of the kaolin, water and power supply alternatives, alternatives to handling mining spoil, the design of the waste cells, the types of waste to be accepted, the criteria for accepting them and the handling and storage of wastes.

Justification for the Proposal

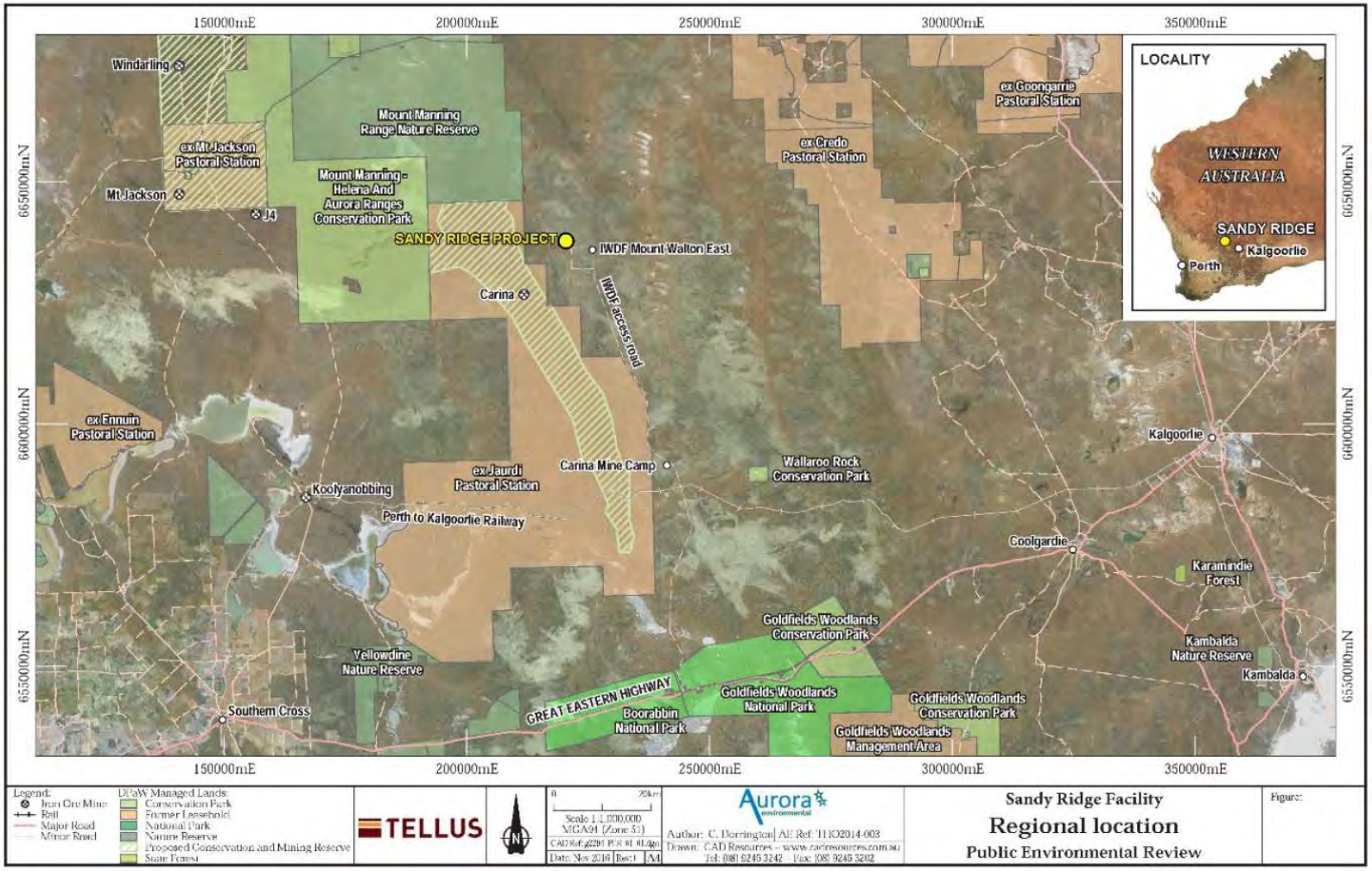
The viability of the proposed Sandy Ridge Facility would rely on implementing both aspects of the dual revenue Proposal:

- The kaolin business.
- The waste storage, recovery and isolation business (in an arid, near surface geological repository).

Kaolin business

Kaolin is found across Australia, with large deposits in WA, but significant production is now restricted to Victoria. Kaolin customers like Australian kaolin quality but are wary of Australian supply reliability. The Asia/Pacific region continues to have the largest kaolin market influence globally, underpinned by strong manufacturing demand and continued urban development amongst its emerging economies. These trends are expected to continue and consolidate Asia as the fastest growing region for kaolin demand over the next five years, hosting the top four growth users, China, India, Malaysia, and Thailand.

WA has a number of world class kaolin deposits. However, none of these to date, have been able to be developed on a commercial scale due to development and operating cost hurdles. In the case of Sandy Ridge, these economic disincentives are overcome because of the synergies of operating a dual revenue kaolin and waste repository, on the same site, and collecting two revenue streams.



Location of the proposed Sandy Ridge Facility

As a result, for the first time, WA would potentially have a viable kaolin mine, and storage facility which would generate additional regional investment, training and jobs, business opportunities, infrastructure, royalties and taxes for the State and improved overall product stewardship. The kaolin deposit at Sandy Ridge has been determined to be high grade and Australia is well positioned geographically for the distribution of the processed kaolin products into the Asian marketplace.

Kaolin is used widely in the ceramic industry. It is also used in a number of other industries including the paper, paint, rubber, plastics, ink and insecticide industry.

The dual revenue business model is attractive to investors as it generates a higher margin and is countercyclical. The benefit of this is that it produces a more predictable revenue stream. The customers who want to buy the kaolin and customers who want to use the storage space also like the dual revenue business as it gives them confidence that the operations would be reliable, cost effective, and sustainable and that Tellus would be around over the next 25 years.

Waste storage, recovery and isolation business

The problem

Australians are the second highest emitters of hazardous waste per capita due to our 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 and intractable waste generated historically) estimated to be temporarily stored in WA and across other Australian states and territories.

The solution

There is a need and regulatory obligation to provide for the safe and secure storage and permanent isolation of both hazardous and intractable waste. The solution put forward involves the isolation of such wastes in an arid near surface clay 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 and intractable waste that relies on both a natural geological barrier (e.g. a clay 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 site 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 both hazardous, intractable and LLW.

At present, WA has one operational Class IV facility (Red Hill Waste Management Facility) and one campaign based operational Class V facility (IWDF). The IWDF facility is the only Class V facility in Australia and is also classed as an arid, near surface geological repository. However, the use of existing facilities, such as the IWDF facility, is limited due to the site being cost prohibitive and not well known. It is difficult for customers as the onus is on waste producers to demonstrate that they have exhausted all other potential options for handling the hazardous waste materials before they can be directed to the IWDF. The IWDF facility is also only open for a campaign style operation once every few years with the last operation being eight years ago in 2008.

The lack of cost effective and regular disposal operations at the IWDF facility means that potentially hazardous and intractable wastes are being stockpiled in undesirable circumstances around Australia or are shipped overseas at great expense to international facilities. Current management of hazardous and intractable waste, at unknown locations across Australia, may pose a significant human health and environmental risk due to their locations near sensitive environmental and social receptors. It is also possible that some wastes may be disposed of in an inappropriate or illegal manner.

The proposed Sandy Ridge Facility would operate within an environment not constrained by sensitivities such as communities as it is in a very remote area, groundwater, surface water or protected flora and fauna species or populations. In addition, the Facility would offer significantly lower gate charges than currently available at the IWDF facility. This would encourage the correct storage, recovery or disposal / permanent isolation of high risk hazardous and intractable wastes, eliminating a significant environmental residual risk to the community.

What hazardous and chemical wastes would Sandy Ridge take?

Hazardous and intractable chemical wastes that would and would not be accepted at the proposed Sandy Ridge Facility are listed in the table below.

Hazardous and intractable wastes (NEPM 75)	Accepted on site (surface storage)[2]	Accepted below ground in waste cells[2]
Hazardous and intractable wastes (NEPM 75) subject to meeting the characteristics criteria below (examples of acceptable wastes on next slides)	✓	✓
• Liquid and sludges	✓	×[1]
• Explosive wastes	✓	×[1]
• Flammable liquids or solids	✓	×[1]
• Self-combusting wastes or wastes that can generate a gas-air mixture which is toxic or explosive	✓	×[1]
• Highly corrosive or oxidizing	✓	×
• Gases	×	×
• **Clinical waste** *such as infectious hospital waste and body parts*	×	×
• **Municipal Solid waste** *such as putrescible household and commercial waste*	×	×
• Putrescible wastes *which rot such as household rubbish*	×	×
• Uncertified waste *which can not be identified or has not undergone characterisation testing*	×	×
• Reacts with the repository geology *such as dissolving it or producing a gas*	×	×

[1]*Normally excluded unless modified before disposal or during disposal so the operational or post closure safety of the waste cell and facility is not compromised.*

[2] ✓ = accepted, × = not accepted. ×[1]= normally excluded but possibly suitable[3]

[3] Classification of Radioactive Waste – ARPANSA RPS20

What types of low level radioactive wastes would be accepted at the proposed Sandy Ridge site?

Examples of low level radioactive wastes, such as medical isotopes, smoke detectors, sealed gauges as suitable for storage and disposal in accordance with the safety case, that would be accepted at the proposed Sandy Ridge site are shown in the table below.

Nuclear waste storage or disposal services would not be provided at the proposed Sandy Ridge Facility. The Sandy Ridge Project has not been nominated as a potential National Radioactive Waste Management Facility. No such nomination is planned and no such nomination would be accepted should it be made by any other party.

Table 1-1 NORM and LLR wastes accepted on site (surface) and below ground in waste cells

Radioactive wastes[2] (✓ = accepted, ✗ = not accepted)	Accepted on site (surface storage)	Accepted below ground in waste cells
Naturally Occurring Radioactive Material (NORM) ***up to LLW activity levels*** *such as oil and gas industry scale*	✓	✓
Low level Waste (LLW) *such as smoke detectors, exit signs, industrial gauges and medical isotopes*	✓	✓
Intermediate level (ILW) and high level waste (ILW) *such as reprocessed spent nuclear fuel and components with high levels of radioactivity*	✗	✗
Nuclear waste *from power generation and defense use*	✗	✗

[1] *Classification of Radioactive Waste – ARPANSA RPS20*

Environmental suitability for a waste storage, recovery and isolation business

The following key site characteristics are of specific importance for establishing a dual use kaolin business and waste storage, recovery and isolation business (in an arid, near surface geological repository) at the site of the proposed Sandy Ridge Facility:

- Geologically stable – it has very low seismicity and no volcanic or tectonic activity.
- Natural geological barrier – the clay bed is approximately 70 million old and is laterally extensive, thick, flat, and has been stable for millions of years, and is capped by a natural impermeable rock layer. The in situ clay has very low permeability. When combined with the thickness and extent of the clay it would not transmit waste off-site, even if a solute (water) was present.
- Climate – Semi arid, therefore low erosion and water ingress risk.
- Groundwater and surface water – no regional aquifers present (confirmed through hydrogeological investigations), the site is not subject to flooding, it has low rainfall (averages just over 250 mm of rainfall per annum) and evaporation is greater than 2,000 mm per annum. This means that water would generally evaporate before infiltrating into the ground), and there are no defined surface watercourses or waterbodies in the proposed development envelope.
- Other features –
    - Very low rates of erosion.
    - Lack of commercial mineral deposits (other than kaolin).
    - It is located in an area with zero population (the closest non-permanent camp is approximately 52 km away).
    - There is no potential for medium to high value agriculture.

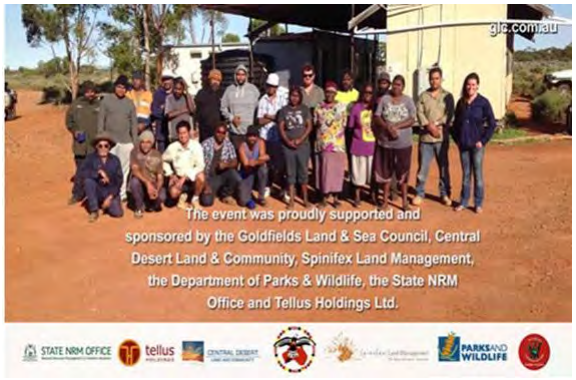
- The site has no special environmental or cultural features (confirmed through field surveys in consultation with stakeholder's familiar with the area).

In addition to the above, the IWDF facility, Australia's only Class V waste disposal facility is located immediately to the east of the proposed development envelope as the locality has previously been recognised for its suitability for intractable wastes and has a 22-year safe operating history.

Benefits of the Proposal

The Proposal would result in significant, positive social and economic benefits to WA and to Australia, including:

- Providing a unique dual revenue business that commercialises an industrial bulk commodity (kaolin) and provides safe environmentally sound management solutions for difficult to manage hazardous waste resources.
- Future potential recovery of valuable materials (that are currently deemed waste).
- Long-term jobs and major investment and business opportunities in remote regional Australia.
- Diversification of the economy by an environmental infrastructure business with strong social, environmental and economic values.
- Royalties, taxes and levies over the 25 year term could support other parts of the economy.
- Employment and business opportunities that can support local and regional communities.



Indigenous training, employment and business opportunities would result from the Proposal

- Long project life of 26 years. The site can be expanded for generations (1 year build, 25 year operation plus possible rolling terms).
- Creation of approximately 90 jobs during the construction phase, and approximately 23 direct and 46 indirect (2x multiplier) during the operation phase.
- Benefits would apply to local indigenous communities where opportunities for training, employment and business opportunities during construction and operations exist.
- When operating, the Facility would also provide a reliable long-term utility service to other industries that produce waste materials within Australia.
- The Facility could attract new kaolin and waste recycling and recovery industries to WA, and support industrial development in WA, bringing attendant economic benefits.

Tellus has supported indigenous jobs (left) and local firms (right) during the development of the PER.

Legislative framework

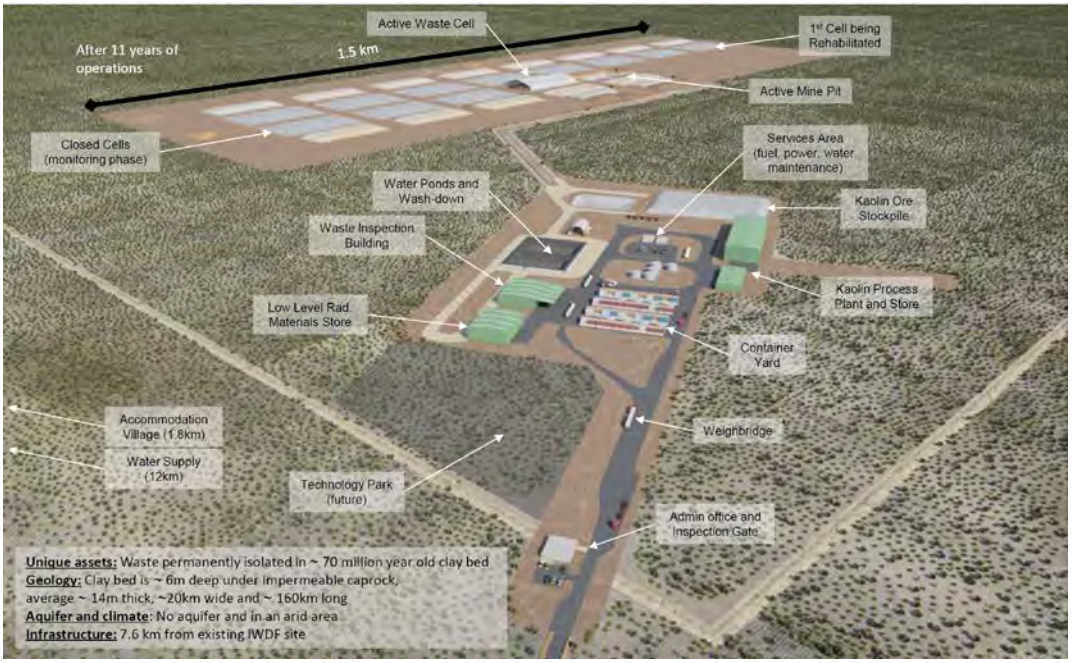
The Proposal will require planning approval, licenses and permits from both the Commonwealth Government and the WA Government. The key approvals and licenses will be sort from:

- 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 WA Minister for Environment, Heritage under Part IV of the EP Act and the Environmental Impact Assessment (Part IV Divisions 1 and 2), Administrative Procedures 2012. The EP Act and the Environmental Impact Assessment (Part IV Divisions 1 and 2), Administrative Procedures 2012 are administered by the WA Office of the Environmental Protection Authority (OEPA).
- The WA Minister for Mines and Petroleum for a mining lease under Section 71 of the *Mining Act 1978* supported by a Mining Proposal and a Mine Closure Plan.

Overall approval is sought under the EPBC Act and EPBC Regulations (administered by the DoEE) and the EP Act and Environmental Impact Assessment (Part IV Divisions 1 and 2), Administrative Procedures 2012 (administered by the OEPA) via a bilateral agreement between the Australian Government and the WA Government.

Proposal definition

Tellus propose to develop an open-cut kaolin mine and complementary storage facility with supporting above ground infrastructure that would export up to 40,000 tonnes per annum (tpa) of refined kaolin for ceramic paint and other industrial uses. The storage facility would provide for the safe and secure storage and permanent isolation of an average of 66,000 tpa but up to 100,000 tpa of waste. The open cut kaolin mine and complementary storage facility is referred to as the Sandy Ridge Facility. An artist impression of the proposed Sandy Ridge Facility is provided below.



Aerial view of the proposed Sandy Ridge Facility. Mining pit/cells are located in the background. Supporting aboveground infrastructure is located in the foreground.

Kaolin mining

Kaolin would be extracted using the open cut method of mining. The surface of each pit would be cleared of vegetation and stockpiled (for later reuse in rehabilitation). The pit would then be opened by excavation of the topsoil, subsurface soils and laterite. Following this, there would be carefully controlled blasting using explosives or continuous mining of the hard, dense silcrete layer that overlays the kaolin, and then removal by excavator and truck. The kaolin would then be recovered by conventional earthmoving equipment (front end loader, excavator and articulated dump trucks). Overburden would be stockpiled adjacent to the cells in readiness for backfilling. Separate stockpiles of different grades of kaolin ore would be located adjacent to each pit or at the proposed kaolin processing plant.

Up to 40,000 tpa of kaolin would be extracted. The ore would be processed via an onsite wet processing plant. The kaolin would then be packaged and transferred from the Sandy Ridge Facility via road to the domestic market or to Fremantle Port for export overseas.

Conceptual view of pit being mined. Roof canopy is erected at the later stages of kaolin mining, prior to waste emplacement to prevent rainfall from entering the waste cell.

Waste storage and isolation

Waste would be transported mostly via rail to Kalgoorlie and then by road by reputable licensed transport contractors to the proposed Sandy Ridge Facility. Waste arriving would be inspected, sampled, unloaded and stored in line with a strict Waste Acceptance Criteria (WAC) and in accordance with operational management plans.

Open cut kaolin mine creates the voids (left). The voids are used for the safe and secure storage of waste in sealed containers (right).

The mining pits (now referred to as waste cells) would be filled with packaged waste in layers. Waste types would be placed 'like-with-like' for safety reasons, with multiple sections in each layer (to separate the different waste types). The space between the waste packages would then be backfilled with kaolin clay and compacted to minimise air or void space. Each layer would also be compacted, until approximately 7 m below the ground surface. At this depth, a thick layer of low permeability clay would be placed on top of the waste to seal the waste layers and to prevent water ingress into the cell. Compacted gravel and laterite backfill would then be placed on the clay layer. A

clay domed cap would then be situated on the top of the cell, to horizontally shed any landing rainfall for the duration of a subsidence monitoring period. At the completion of the subsidence monitoring period, soil would be placed over the domed clay cap to enable re-vegetation.

During the waste storage and isolation process, a roof canopy would be positioned over the cell to exclude rainfall prior to the capping layer being installed.

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

In the first year of operation, about 42,500 tpa of waste material would be disposed of at the Facility. This may increase up to 100,000tpa, but likely to average 66,000 tpa over the life of the facility.

Tellus supports the circular economy with the development of the proposed Sandy Ridge Facility

Hazardous and intractable waste primarily from the mining, oil and gas, chemical, manufacturing, agricultural, and remediation industries would be accepted at the proposed Sandy Ridge Facility. Wastes would also be accepted from the State Emergency Services such as hazardous material resulting from man-made or natural disasters. Accepted waste materials would come from WA, the Australian mainland and Australian waters.

Key infrastructure

Infrastructure that would be constructed and used for the mining operation includes:

- Open cut mining pits (later used as waste cells) approximately 120 m long, 60 m wide and 23 m deep (depending on local stratigraphy, with a maximum depth of 30 m). Twenty-five pits are currently proposed.
- A kaolin processing plant.
- A kaolin ore stockpile area (run of mine [ROM] pad).
- A finished product (kaolin) storage building.
- A laboratory.
- Mining contractor offices and laydown yard including repair and maintenance facilities for earthmoving and plant equipment, saline water ponds, reverse osmosis plant, and an explosive magazine.

Infrastructure that would be constructed and used for the waste storage operation includes:

- Waste cells created by the pits (voids) left from the mining operation.
- Relocatable waste cell roof canopy on a rail system.
- Container hardstand.
- Waste inspection area.
- Radioactive waste warehouse and packaging building.
- A waste laboratory.
- A waste solidification and stabilisation facility comprising waste storage, consumables storage and blending and mixing equipment. This is anticipated to be similar in size and layout to a small concrete batching plant.
- Truck and machinery wash-down pad, wash-down water system (including treatment and storage), front gate office, secure site fencing and gatehouse incorporating a computerised weighbridge.

In addition to the above infrastructure, the following activities would be undertaken:

- Upgrade of the IWDF access road and intersection at Great Eastern Highway.
- Construction of the site access roads and internal haul roads.
- Construction of a mobile and permanent accommodation camp.
- Construction of a water pipeline and associated pump station at the Carina Mine pit.
- Construction of administration building and carpark (including offices, first aid, training centre, communications, lunch room, and ablutions).

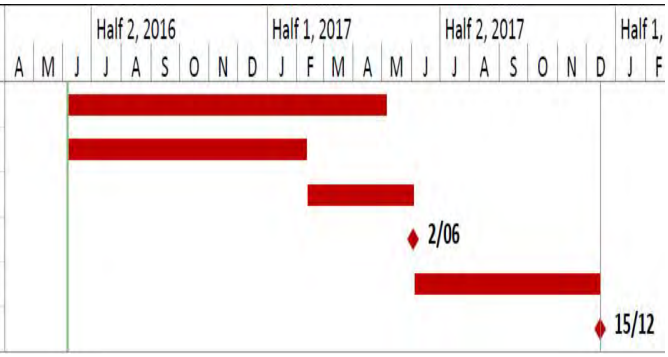
- Excavation of a trench at the Class II putrescible landfill location and erection of a fence around the landfill.
- Installation of sewage treatment systems.
- Installation of water tanks for raw and potable water.
- Installation of diesel storage tanks, piping reticulation and bowser.
- Installation of drying process fuel storage tanks.
- Installation of switchboards and generators.
- Erection of a fence around infrastructure area and pits/cells.

Timeline

Subject to obtaining approval, it is anticipated that construction of the Proposal would commence in mid-2017, with operation commencing at the end of 2017. A likely timeline for the Proposal is presented in Table E-2.

Table E-2 Likely Proposal timeline

Task Name	Start	Finish
Approvals	Mon 6/06/16	Fri 5/05/17
Bankable Feasibility Study	Mon 6/06/16	Fri 10/02/17
Front End Engineering & Design	Mon 13/02/17	Fri 2/06/17
Final Investment Decision	Fri 2/06/17	Fri 2/06/17
Construction (Stage 1)	Mon 5/06/17	Fri 15/12/17
Operation (Stage 1)	Fri 15/12/17	Fri 15/12/17



Stakeholder consultation and engagement

The proponent commenced initial consultation in August 2012. The steps involved in the consultation process included the identification of key stakeholders, the development and implementation of a consultation and engagement strategy and recording stakeholder feedback.

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 both the ESD and PER.

Community engagement (Kalgoorlie)

Stakeholders were engaged using a range of consultation and communication techniques, including face-to-face meetings, workshops, 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.

Key stakeholders were offered the opportunity to provide feedback and raise issues during the development of the draft ESD and PER. The key stakeholders included government agencies, non-government organisations, industry and business, landholders, traditional owners and residents of the surrounding communities and potential customers.

Communication tools used during community information sessions

Early stakeholder consultation helped shape the technical studies for the PER. Government 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.

Key environmental factors

The key environmental factors identified in the ESD include:

- Flora and vegetation.
- Terrestrial environmental quality.
- Terrestrial fauna.
- Inland waters environmental quality.
- Human health.

- Heritage.
- Offsets (integrating factor).
- Rehabilitation and decommissioning (integrating factor).

In addition, amenity (in relation to noise, dust and visual impacts) as well as cumulative impacts are considered relevant to the Proposal.

Environmental 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 and 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 consultation with local communities, regional stakeholders, and with key agencies within the WA Government.

As the Proposal develops into detailed design, construction and operation, risk assessments would be undertaken at each milestone.

Assessment of key environmental factors

Extensive investigations have been undertaken to describe the existing (baseline) environment and to assess the potential environmental impacts during construction, operation, decommissioning and closure of the Proposal. These included specialist studies of flora and vegetation, geological evolution, soils and landform, fauna, hydrology and hydrogeology, infiltration and seepage, heritage, and radiation. Environmental mitigation and management measures have been identified to avoid

and minimise potential impacts and to protect the environment. A summary of the environmental assessment is provided below.

Flora and vegetation

A flora and vegetation assessment was undertaken to assess the potential impacts to flora and vegetation during construction and operation of the Proposal. The flora and vegetation assessment included a review of previous flora and vegetation surveys in the region, review of aerial photography and contour maps, a review of publicly available databases for conservation significant flora and vegetation communities that may be affected by the Proposal and a field survey.

Flora and vegetation surveys

A range of different vegetation associations and vegetation types were recorded within the proposed development envelope and vicinity. The proposed development envelope consists of open woodland and shrublands dominated by *Acacia* and *Eucalyptus* spp. Open heaths are dominated by *Leptospermum* sp. All of the vegetation types are considered common and widespread within the region. Most of the vegetation within the proposed development envelope is considered to be in excellent condition.

There are no Priority Ecological Communities listed by the Department of Parks and Wildlife (DPAW), Threatened or Endangered Ecological Communities listed under the *Wildlife Conservation Act 1950* (WC Act) or Threatened or Endangered Ecological Communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) within the proposed development envelope.

Direct impacts on terrestrial flora and vegetation during construction and operation of the Proposal include the removal of vegetation and impacts to land managed by the DPAW. Up to 276.05 hectares (ha) of native vegetation would be removed for the construction and operation of the Proposal. Of this, approximately 13.32 ha of vegetation would be removed within the former Jaurdi Pastoral Lease, which includes 6.44 ha of vegetation within a proposed Conservation and Mining Reserve (both managed by DPAW). The removal of this vegetation would be negligible given the expanse of similar vegetation in the general vicinity of the Proposal.

There would be no impact to conservation significant flora or vegetation listed under the WC Act or the EPBC Act. Conservation significant flora populations would not be cleared during either construction or operation of the Proposal.

Two flora species of conservation significance were recorded within the proposed development envelope. These were *Calytrix creswellii* and *Lepidosperma lyonsii* (both listed as Priority 3 by the DPAW) and are not protected by environmental legislation. In addition, an undescribed sedge

species was also recorded within the proposed development envelope – *Lepidosperma* sp. This species is currently undescribed and may have some conservation value.

The taxonomy of the *Lepidosperma* sp. is currently being reviewed by the WA Herbarium. Its conservation status is currently unknown. Until the taxonomy and conservation status of this species is known, it is difficult to predict impacts to this species during construction and operation of the Proposal. If the species is deemed to have conservation significance, surveys would be undertaken prior to construction to confirm the presence/absence of the species within the proposed development envelope. If the species is found to be present, significant impacts would be avoided through changes to the location of the proposed infrastructure, if possible. Alternatively, a translocation program developed in consultation with DPAW would be implemented to avoid significant impacts to this species. If significant impacts could not be avoided, the need to calculate and deliver biodiversity offsets would be assessed in accordance with the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* and in consultation with the DoEE and/or DPAW, as appropriate.

Indirect impacts on flora and vegetation may include an increased incidence of fire, altered hydrology, increased dust, the uptake of saline water, and the introduction and spread of weeds. The potential for radiation exposure and the transpiration of leachate from the waste cells would not likely occur.

***Acacia resinmarginea* Open Heath is one of the most dominant vegetation types within the proposed development envelope.**

Mitigation and management measures would be implemented to avoid (eliminate) or reduce these impacts including ensuring that vegetation clearing is kept to a minimum, ensuring populations of conservation significant flora are clearly marked and avoided, implementing dust suppression and management measures, monitoring vegetation health to determine if water ponding/water starvation is occurring and incorporating a weed management plan into the construction and operational environmental management plan for the Proposal.

Terrestrial environmental quality

Topography and landforms within and in the vicinity of the proposed development envelope was determined based on a desktop review of publicly available information, a review of aerial photography and via a field reconnaissance survey. A regional geology and geological evolution assessment was also undertaken in order to understand and describe the geology within and in the vicinity of the proposed development envelope. This included a desktop review of publicly available information, a review of geological mapping and a field reconnaissance survey.

A baseline soils assessment was undertaken to characterise and quantify the soil resource within the proposed development envelope. The baseline soils assessment included a review of publicly available information, a field assessment (which included the excavation of soil pits to collect soil samples and to log soil profiles), physical and chemical analysis of collected soil samples and interpretation of results and soil mapping of the proposed development envelope.

Geological assessment

The proposed development envelope has very low relief. It consists of flat to gently undulating plains and low rises and is typical of landscape which occurs over deeply weathered granite rocks. The topography ranges from about 460 m above sea level to 490 m above sea level and generally rises slightly from west to east.

The geology of the proposed development area is well understood due to mineral exploration drilling across the exploration tenement. In geological terms, the proposed development envelope is a deeply weathered granitoid terrane that generally comprises four main lithologies. From the surface these are: colluvial and gravel with mottled zone laterite; silcrete, kaolinitic clay; and granitoid basement. Current weathering and erosion in the area is extremely slow. The semi-arid climate, with a median annual rainfall of about 250 mm and an annual evaporation rate over 2,000 mm is not conducive to chemical weathering.

Two soil types occur within the proposed development envelope. These are deep yellow sand and red sandy duplexes. The deep yellow sand is associated with the higher relief areas within the proposed development envelope. The red sandy duplexes are associated with the lower lying areas within the proposed development envelope and are areas potentially subject to erosion.

Impacts to the quality of land and soils during the construction and operation of the Proposal may include the degradation of stockpiled soils; soil contamination from leaks/spills; and a change in landform upon closure of a cell. Mitigation and management measures would be implemented to avoid (eliminate) or reduce these impacts including implementing stockpile management measures (maximum height restrictions, seeding to reduce erosion, monitoring for erosion and weed infestation), implementing spill response procedures and implementing traffic management procedures to avoid potential spills.

Other potential impacts include radiation impacts on surrounding land and soils, and the subsidence and instability of waste cells/pits allowing infiltration of water and the potential generation of leachate. These would be highly unlikely given that the Proposal has been specifically designed to avoid these impacts.

Terrestrial fauna

A terrestrial fauna assessment was undertaken to assess the potential impacts to fauna during construction and operation of the Proposal. The fauna assessment included a review of previous fauna surveys in the region, a review of publicly available databases for conservation significant fauna that may be affected by the Proposal and a field reconnaissance survey that included a habitat assessment. Targeted threatened fauna searches were also undertaken for *Leipoa ocellata* (Malleefowl).

Two fauna habitats were recorded within the proposed development envelope. These included open woodland and shrublands.

Fauna surveys

Evidence of two fauna species of conservation significance was recorded within the proposed development envelope. These were *Leipoa ocellata* (Malleefowl) (listed as Vulnerable under the WC Act and the EPBC Act) and *Merops ornatus* (Rainbow Bee-eater) (listed as Migratory under the WC Act and the EPBC Act). An additional four conservation significant species may possibly occur within the proposed development area. These species include *Nyctophilus(timoriensis)* sp. 1 (Central Long-eared Bat), *Platycercus icterotis xanthogenys* (Western Rosella (Mallee)), *Apus pacificus* (Fork-tailed Swift) and *Falco peregrinus* (Peregrine Falcon).

Direct impacts on terrestrial fauna during construction and operation of the Proposal include the loss of habitat through the removal of native vegetation. The removal of up to 276.05 ha of native vegetation would result in the loss of fauna foraging, breeding, roosting, sheltering and/or dispersal habitat. The removal of this habitat would have a negligible impact on fauna present in the vicinity of the Proposal given the presence of large areas of suitable adjoining habitat.

Clearing of vegetation would unlikely have a significant impact on conservation significant fauna listed under the WC Act or the EPBC Act. All would readily move to adjacent undisturbed habitat once vegetation clearing commences.

Indirect impacts may include those associated with increased light, noise and vibration; fauna displacement, increased predation and competition for resources; fire; increased feral fauna attracted to water and food resources; and injury or death from fauna ingress into a cell or from collisions. Impacts associated with radiation exposure and the generation of void space and subsequent collapse/instability of the waste cell are highly unlikely to occur.

Mitigation and management measures would be implemented to avoid (eliminate) or reduce these impacts including pre-clearing surveys (and capture/relocation, if necessary), ensuring clearing is kept to a minimum and conducted in stages, ensuring that an experienced spotter/handler is present onsite during clearing activities, ensuring there is no driving off designated access roads,

limiting night driving and restricting speed limits, implementing vehicle strike procedures and designing infrastructure to deter fauna from accessing operational areas.

Inland waters environmental quality

A hydrological (surface water) study of the proposed development envelope was undertaken. The hydrological study included:

- Demarcation of the catchment areas and waterways likely to impact on the cell/pit area, infrastructure area and access road.
- A hydrological analysis of relevant catchment areas in order to estimate peak run-off for rainfall events between 1 and 2 year and 1 in every 100 years average recurrence intervals, and the extreme probable maximum precipitation (which is a 1 in 2,000 year event).
- Examination of historical rainfall records for nearby weather stations in order to assess the maximum total rainfall and average recurrence intervals.
- Preparation of intensity frequency duration rainfall curves using the polynomials as recommended by the Australian Rainfall and Run-off Publication (ARR, 1987).
- Examination of recorded total losses due to evaporation and infiltration in the Mount Walton area in order to estimate realistic peak flows.
- Completion of a surface water hydraulic analysis in order to assess the extent, depths and velocities of natural flow paths likely to impact the cell/pit area, infrastructure area and access road.
- Design and recommendations for preliminary concept flood protection levees for the cell area, infrastructure area and waterway crossings along the access road.

A hydrogeological (groundwater) study of the proposed development envelope was also undertaken. The groundwater study included a desktop review of regional hydrogeology (which included a review of publicly available mapping, databases, and previous hydrogeological and geotechnical drilling results from other investigations in the vicinity of the proposed development envelope) and a field investigation (which included drilling bores to depths ranging from 21 metres (m) to 49 m below ground level).

No channels or creeks occur within the proposed development envelope. There are no major flow paths in the area of the proposed cells/pits, and surface water runoff would only be generated from very infrequent high rainfall events. These flows would be from small local catchments which drain residual runoff after infiltration losses, to low–lying depressions. Generally, surface water would only be retained for short periods in the depressions due to continual evaporation and infiltration.

Extensive groundwater investigations (undertaken within the proposed development envelope and vicinity by others previously and for the Proposal) have revealed that there is no groundwater aquifer present in the proposed development envelope.

Seven monitoring bores were drilled to confirm the absence of groundwater (left). Equipment was installed to confirm soil evaporation rates (right).

Impacts to groundwater and surface water during construction and operation of the Proposal may include contamination from leaks/spills and from water entering an open cell/pit. These impacts would be minor, however, as the Proposal has been specifically cited in an area where there is no groundwater aquifer or surface water receptors present. Surface water flows are generated only under extreme rainfall events and there is a both high evaporation rates and high infiltration rates into the sandy soils present in the proposed development envelope. Mitigation and management measures would be implemented to avoid (eliminate) or reduce impacts including implementing spill response procedures and by implementing controls to prevent water ingress into the cell during operation (roof canopy, diversion levees, bunding, drains and sumps). Following closure of the cells they are expected to be stable, with no water ingress.

Other impacts include the generation of leachate from a stored waste package which may contaminate surface water runoff and groundwater. These would be highly unlikely given that the Proposal has been specifically designed (engineered) to avoid these impacts. The location of the Proposal has also been specifically selected for its natural abilities to avoid leachate generation. The natural climatic and geological conditions within the proposed development envelope reduce the chance of water infiltration and the generation of a groundwater table at the site.

Human health

An assessment of the potential impacts on human health during construction and operation of the Proposal was undertaken. This included a baseline radiation and metals assessment and a worker dose assessment.

Activities or situations considered to pose the greatest potential risk for adverse human health effects include the mining of kaolin; the acceptance and handling of hazardous and intractable waste; the storage and containment of hazardous and intractable waste; and bushfire. 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 and operation of the Proposal. This would include the development of a detailed Safety Case and Operating Strategy. The implementation of these plans and procedures would minimise the risk of adverse impacts to human health to as low as reasonably achievable.

Heritage

A cultural heritage assessment was undertaken to assess the potential impacts to heritage (Aboriginal and European) during construction and operation of the Proposal. The heritage assessment included a desktop review of previous heritage surveys and relevant heritage databases to determine whether there were any listed heritage sites within or in close proximity of the proposed development envelope. A field survey consisting of pedestrian transects was also undertaken in consultation with representatives of the Kapam Native Title Group, Kelamaia Kabu(d)n and Widji Group.

There are no known records of heritage items within the proposed development envelope. This was confirmed via the field survey. Therefore, there would be no impact to cultural heritage during construction or operation of the Proposal. In the event that items of potential European historical significance are encountered, work in their immediate vicinity (defined as a 10 metre radius) would stop and the Heritage Council and State Heritage Office would be contacted. Similarly, if items of Aboriginal heritage significance are identified during construction, work in their immediate vicinity would stop and the Department of Aboriginal Affairs in addition to the Kaparn Native Group, Kelamaia Kabu(d)n and Widji Group would be contacted for further advice.

If suspected skeletal remains are discovered during construction, work in their immediate vicinity would stop and the local police and the Department of Aboriginal Affairs would be notified as soon as possible to determine a course of action. Construction works in the area of the remains would not resume until the proponent receives written approval from either the police or from the Department of Aboriginal Affairs, as appropriate.

Offsets

An assessment of the residual impacts on flora and vegetation and terrestrial fauna was undertaken in accordance with the *Environmental Offsets Guidelines* (Government of Western Australia, 2014). The only issue which potentially triggers a requirement for an offset relates to the clearing required

within the former Jaurdi Pastoral Lease (of which 6.44 ha is located within a proposed Conservation and Mining Reserve). As this area is only a proposed reserve at this stage and vegetation is sparse with no conservation significant flora or fauna present within the 6.44 ha area, the potential impact is not considered to be significant enough to warrant an offset.

Rehabilitation and decommissioning

Potential impacts during rehabilitation and decommissioning include the subsidence of a waste cell allowing infiltration of water and the generation of leachate; topsoil degradation; erosion/gullies/deep rooted vegetation creating cracks in the clay capping allowing infiltration of water and the generation of leachate; vegetation not growing and unable to support a functioning ecosystem; fauna not returning and a functioning ecosystem is not achieved; and long term impacts on terrestrial environmental quality, inland waters and human health.

Two closure and decommissioning plans would be implemented in order to avoid (eliminate) or reduce the potential impacts associated with rehabilitation and decommissioning of the Proposal. Two plans would be implemented, primarily as the regulation of mining and waste disposal and are managed under different legislation in WA:

- Mining aspect – details relating to mine closure for tenement relinquishment would be outlined in a Mine Closure Plan (MCP).
- Waste storage and isolation aspect – details relating to the waste cells and associated infrastructure would be outlined in a Waste Facilities Decommissioning and Closure Plan (WFDCP).

Both documents would contain closure objectives, indicative completion criteria and key measurement tools. The measurement tools would include (but would not be limited to):

- Geotechnical assessments.
- Visual inspections.
- Safety bunding.
- Revegetation monitoring.
- Subsidence monitoring.
- Erosion, radiation and monitoring for any potential groundwater.

Environmental management

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

A Construction Environmental Management Plan (CEMP), Operational Environmental Management Plan (OEMP) and a Waste Facility Decommissioning and Closure Plan (WFDCP) and Mine Closure Plan (MCP) would be prepared and implemented for the Proposal. The plans would include:

- Environmental objectives and performance targets for construction, operation, and rehabilitation and decommissioning.
- 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 PER.
    - Relevant 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 PER 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, operational, and rehabilitation, decommissioning and closure phases of the Proposal.

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 Environmental Management Systems. It is regularly audited internally, and annually audited by an external party.

Justification and conclusion

The Proposal is considered justified because it:

- Provides diversity in the WA mining sector.
- Responds to a recognised need and is consistent with WA and national waste management strategies in addition to regional economic strategies and plans.
- Provides a number of community and economic benefits including opportunities for the long-term, storage, treatment and recovery of valuable materials or the permanent isolation of hazardous, intractable and LLW in addition to long-term full-time employment.
- Would not result in significant effects on the environment.
- Is consistent with the principles of sustainability and environmental protection.

Proceeding with the Proposal would result in significant social and economic benefits, including:

- Providing a unique dual revenue business that commercialises an industrial bulk commodity (kaolin) and provides safe management solutions for difficult to manage hazardous waste resources.
- Future potential recovery of valuable materials.
- Long-term jobs and major investment and business opportunities in remote regional Australia.
- Diversification of the economy by an environmental infrastructure business with strong social, environmental and economic values.
- Royalties, taxes and levies over the 25 year term could support other parts of the economy.
- Employment and business opportunities that can support local and regional communities.
- Long project life of 26 years (1 year build, 25 year operation). The site can be expanded for generations.
- Creation of approximately 90 jobs during the construction phase, and approximately 23 direct and 46 indirect (2x multiplier) during the operation phase.
- Benefits would apply to local indigenous communities where opportunities for training, employment and business opportunities during construction and operations exist.
- When operating, the Facility would also provide a reliable long-term utility service to other industries that produce waste materials within Australia.
- The Facility could attract new kaolin and waste recycling and recovery industries to WA, and support industrial development in WA, bringing attendant economic benefits.

Detailed scientific desktop and field investigations were undertaken to assess key environmental factors and to discuss their potential environmental impacts, positive or negative, during each phase of the Proposal. These included specialist studies of biodiversity, soils, cultural heritage, surface

water, groundwater and radiology. These studies were undertaken in accordance with relevant Commonwealth and State environmental legislation, guidelines and procedures established by regulatory agencies.

Based on the findings of the environmental investigations, it is likely there would be some minor but manageable adverse impacts on the environment. Mitigation measures that would be implemented during all phases of the Proposal have been recommended to avoid (eliminate) or ensure potential impacts are short-term and easily managed. The environmental performance of the Proposal would be managed through the implementation of a CEMP, OEMP and WFDCP and MCP. This would also help to ensure compliance with relevant legislation and any conditions of approval.

A summary of the Proposal is presented below.

Summary of the Proposal		
Proposal title	Sandy Ridge Facility.	
Proponent name	Tellus Holdings Ltd.	
Short description	The Proposal is to develop a kaolin open cut mine and use the voids resulting from mining for the secure storage and isolation of hazardous, intractable waste and LLW using an international best practice storage and isolation safety case. The Proposal is located approximately 75 km north-east of Koolyanobbing, WA (Figure 1-1).	
PHYSICAL ELEMENTS		
Element	**Location**	**Proposed Extent Authorised**
Pits/Cells	Figure 1-3	Clearing no more than 202.3 hectares (ha) within 1004.2 ha proposed development envelope.
Mine infrastructure	Figure 1-3	Clearing no more than 17.2 ha within 1004.2 ha proposed development envelope.
Accommodation camp	Figure 1-3	Clearing no more than 2.5 ha within 1004.2 ha proposed development envelope.
Class II Landfill	Figure 1-3	Clearing no more than 0.25 ha within 1004.2 ha proposed development envelope.
Future technology park	Figure 1-3	Clearing no more than 4 ha within 1004.2 ha proposed development envelope.
Access roads	Figure 1-4	Clearing no more than 22.2 ha within 1004.2 ha proposed development envelope.
Water pipeline	Figure 5-1	Clearing no more than 27.6 ha within 1004.2 ha proposed development envelope.
Total disturbed area		Clearing no more than 276.05 ha within 1004.2 ha proposed development envelope.
OPERATIONAL ELEMENTS		
Element	**Location**	**Proposed Extent Authorised**
Ore Processing	Kaolin Plant, Figure 1-3, coordinates: 220800mE, 6637520mN	Kaolin plant design capacity per annum 40,000 t. Maximum amount disposed 1,000,000 t over a 25-year period
Class IV and Class V waste disposal	Pits/Cells, Figure 1-3 coordinates: 219920mE, 6638195mN	Disposal of no more than 100,000 tpa[1] Average amount per annum 66,000 tonnes (t) Maximum amount disposed 2,500,000 t over a 25 year period.
Class II Landfill for waste generated on the site	Class II Landfill, Figure 1-3 coordinates: 218507mE, 6637370mN	Disposal of no more than 500 tpa.
Water Use	Water Tanks, coordinates: 220770mE, 6637430mN	0.18 gigalitres per annum sourced from water tanks onsite that are supplied via a water pipeline from the Polaris/Mineral Resources Carina Iron Ore Mine.

[1] *The exact volumes of hazardous and LLW wastes can not be defined at this stage of project development. Subject to planning approval, there would be more certainty with respect to potential waste volumes.*