Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	W6700/2022/1
Applicant	Tellus Holdings Ltd
ACN	138 119 829
File Number	DER2021/000678
Premises	Sandy Ridge Facility Crown lease O289974 granted by the State of Western Australia to Tellus Holdings Ltd in respect of Lot 510 on Deposited Plan 413497, Whole Volume 3169 Folio 365 Mining lease M16/574 held by Tellus Holdings Ltd 102.5 km north of Great Eastern Highway, via Access Reserve 44102, Boorabbin WA 6429
Date of Report	13 December 2022
Decision	Works approval granted

Abbie Crawford

Digitally signed by Abbie Crawford
Date: 2022.12.13 09:37:29 +08'00'

Abbie Crawford
A/MANAGER, WASTE INDUSTRIES

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Table of Contents

1. Definitions of terms and acronyms

In this Decision Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
Air Dome	An inflated dome-shaped waterproof fire-retardant fabric structure, reinforced with cables anchored to buried concrete blocks. It has an airlock door for entry and egress and spans the width and length of one cell. Its purpose is to prevent rainfall entering waste cells.
Applicant	Tellus Holdings Ltd
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
Critical Containment Infrastructure Report / "CCIR"	means a report to satisfy the CEO that works of critical containment infrastructure have been constructed in accordance with the works approval.
CS Act	*Contaminated Sites Act 2003* (WA)
Dangerous goods	has the meaning defined in the *Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007.*
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
Discharge	has the same meaning given to that term under the EP Act.
DWER	Department of Water and Environmental Regulation As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation.
Emission	has the same meaning given to that term under the EP Act.

Term	Definition
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
Environmental Compliance Report	means a report to satisfy the CEO that the conditioned infrastructure and/or equipment has been constructed and/or installed in accordance with the works approval.
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act
Facility	The Sandy Ridge Facility, as shown in Figure 2
Hazardous waste	has the meaning defined in the Landfill Definitions.
Implementation agreement or decision	has the same meaning given to that term under the EP Act.
Intractable waste	has the same meaning given to that term in the Landfill Definitions.
LAA	*Land Administration Act 1997* (WA)
Landfill Definitions	means the document titled 'Landfill Waste Classification and Waste Definitions 1996' published by the CEO of DWER and as amended from time to time.
Licence Holder	Tellus Holdings Ltd
LLW	Low Level Waste
m^3	cubic metres
Minister	the Minister responsible for the EP Act and associated regulations
MS	Ministerial Statement
NEMP	refers to the PFAS National Environmental Management Plan Version 2.0, January 2020 (or as amended), developed by the Heads of EPAs Australia and New Zealand (HEPA).
NEPM	National Environmental Protection Measure
NORM	Naturally Occurring Radioactive Material
Occupier	has the same meaning given to that term under the EP Act.
PER	Public Environmental Review

Term	Definition
PFAS	Per- and polyfluoroalkyl substances
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Radiological Council	means the independent statutory authority appointed under the *Radiation Safety Act 1975* in Western Australia.
Risk Event	As described in *Guideline: Risk Assessments*
Tellus	means Tellus Holdings Limited
TLO	Time-limited operations
Unreasonable emission	has the same meaning given to that term under the EP Act.
Waste	has the same meaning given to that term under the EP Act.
Works Approval Holder	means Tellus Holdings Ltd

2. Purpose and scope of assessment

The Applicant has applied for a Works Approval to construct three additional waste cells at the Sandy Ridge Facility (the Facility).

The Facility is an open-cut kaolin mine and near surface geological repository located approximately 75 kilometres (km) north-east of Koolyanobbing in the Shire of Coolgardie, within the Goldfields Region of Western Australia. The Facility accepts Class IV and V wastes for temporary surface storage and treatment, prior to permanent isolation within the geological repository. Figure 1 shows the regional location of the facility.

The Facility currently includes one existing waste cell known as Waste Cell 1. Tellus has applied for a Works Approval to construct three additional waste cells, to be known as Cell 2, Cell 3 and Cell 4, all to be constructed in a similar manner to Waste Cell 1. Each cell will be progressively mined for kaolin and then constructed as a waste cell when the preceding operational cell nears the end of its life. Figure 2 shows the layout of the proposed waste cells associated with this application.

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

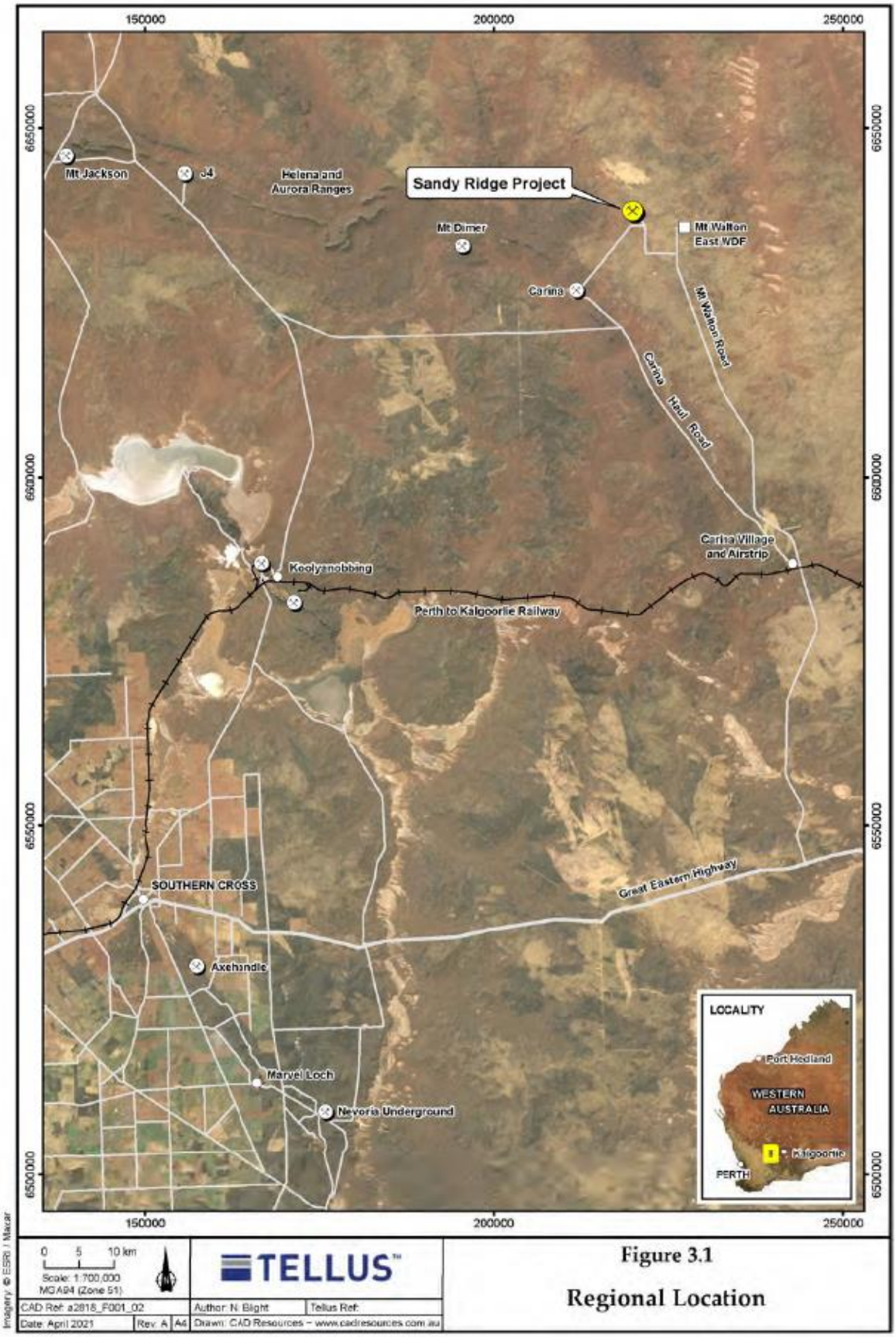

Figure 1: Regional location

Source: Figure provided by Applicant

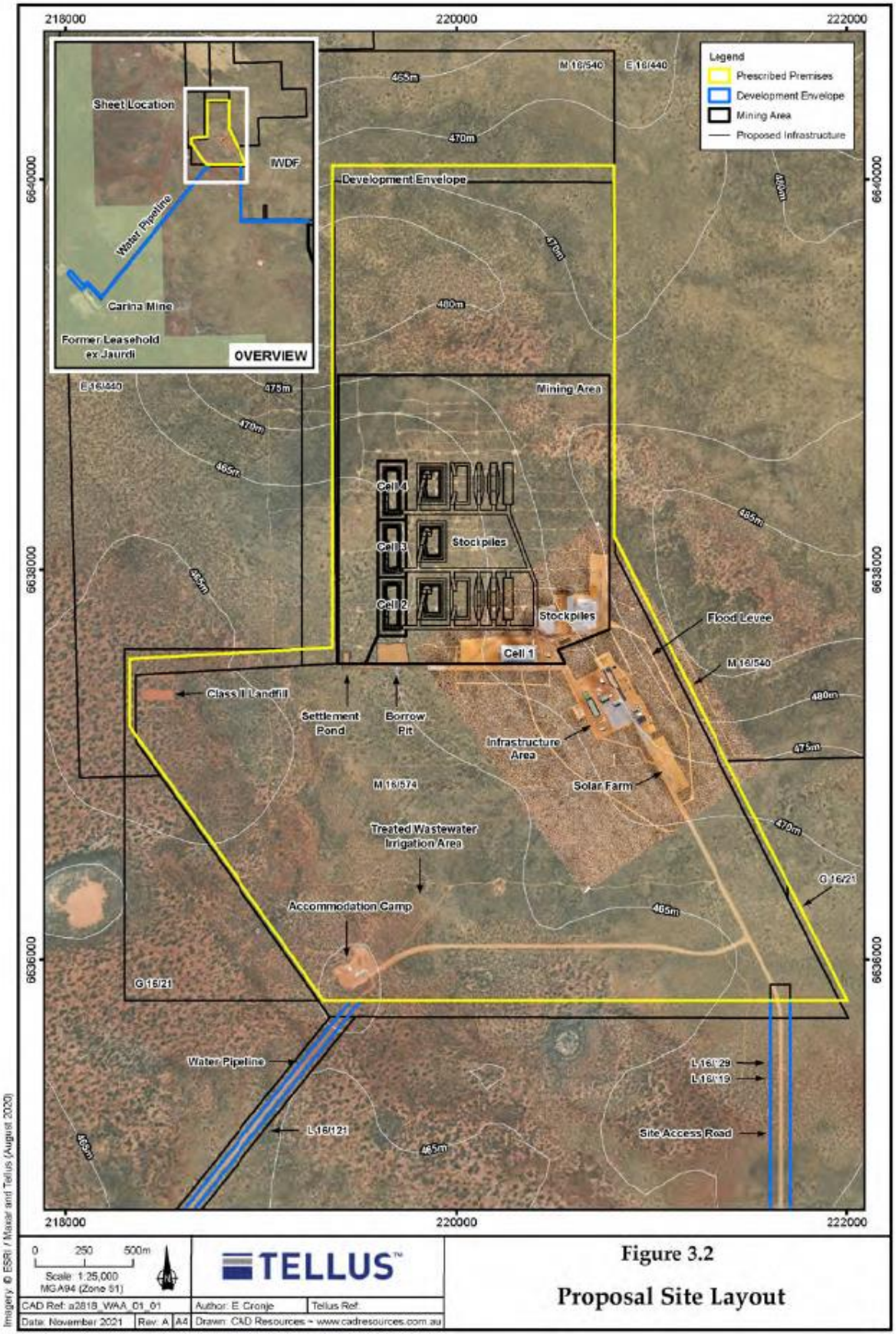

Figure 2: Locations of infrastructure including proposed new cells

Source: Figure provided by Applicant

2.1 Application details

On 24 November 2021 the Applicant submitted an application for a Works Approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The Applicant has applied for a Works Approval for the proposed progressive construction of three additional waste cells (Cell 2, followed by Cell 4 and then Cell 3).

Table 2 lists the documents submitted during the assessment process.

Table 2: Documents and information submitted during the assessment process

Document/information description	Date received
Works Approval Application and supporting documentation	24 November 2021
First response to Request for Information – description of the compliance documentation to be provided to DWER.	18 March 2022
Second response to Request for Information – list of documents that will be prepared as part of procurement associated with Cells 2 to 4.	6 May 2022
Final Response to Request for Information – Quality Management Plan report; and Design and Construct Contract Works Specification report for Cell 2.	7 June 2022
Further information about groundwater monitoring since operations began	30 August 2022
Update on soil monitoring	5 September 2022
Written advice that the Applicant wishes to withdraw the request for time-limited operations from the application.	9 November 2022
Information on the settlement sump.	14 November 2022
Updated engineering design drawings	25 November 2022
Information on the size of the cells and the properties of the Air Dome Fabric	30 November 2022

2.1.1 Construction detail

The Applicant has proposed the following engineering design for each cell:

- Each cell is proposed to be constructed in a similar manner to Waste Cell 1, being mined for kaolin (clay) until it is approximately 88 metres (m) wide, up to 250 m long, and a maximum of 30 m deep.
- The bottom of the mine void will be at least 5 metres above the unweathered granite bedrock, consistent with the Facility's approval under Part IV of the EP Act.
- Once the blasting phase of kaolin mining is complete (if required), a relocatable cover (Air Dome) will be installed to prevent rainfall entering the cell during waste disposal operations. The Air Dome currently in place for Cell 1 will be extended from 180 m to 250 m once it is relocated to Cell 4.

A survey of the cell will be conducted and "as built" drawings provided for the cell, Air Dome and earthwork, to confirm construction in accordance with the engineering design. The Applicant has provided a Quality Management Plan and a Design and Construct Contract Works Specification.

The Applicant has proposed the following method of operation, consistent with the approval under Part IV of the EP Act (also shown in Figure 3):

- A base layer of waste is placed on one side of the floor of the cell. Wastes of different types are separated by internal compacted kaolin walls which are 5 m wide. The height of each waste layer and barrier wall is the height of a waste package, typically 0.9 m. Waste packages are placed tightly next to each other in a row. Granular material is backfilled between and around the waste packages to fill any airspaces.
- A 300 mm minimum layer of compacted granular material is then placed over the waste layer. Compaction testing would be carried out in accordance with Australian Standard AS1289.5.8.1 *Australian Standard for testing soils for engineering*.
- A 3 m thick capping layer of kaolin is compacted onto the second waste layer if waste of an incompatible type is to be placed immediately above.
- The next layer of waste packages are placed on the internal compacted kaolin, including the 5 m kaolin separation walls.
- The other side of the cell is reserved for shafts proposed to contain low-level radioactive waste (LLW). The shafts for radioactive waste are constructed approximately 3 m apart from each other and with a 5 m barrier between the shafts and the chemical waste layer. Between each radioactive waste package, a 200 mm layer of kaolin is compacted into place. Concrete lids will be fitted into the top of each radioactive shaft.

Closure and capping of each waste cell will occur once each cell is full, consistent with the approval under Part IV of the EP Act (also shown in Figure 3):

- A 3 m kaolin cap will be placed on the fifth and final layer of waste packages and on the concrete lids, and keyed into the surrounding clay.
- A 4 m thick layer of compacted crushed silcrete and laterite material, with some kaolin or clayey sand is placed between the kaolin cap and the natural ground surface.
- Compacted kaolin clay, with permeability of approximately 6.0×10^{-8} m/s, is placed over the cell in the shape of a dome to shed stormwater from the structure into perimeter drains, which flow to a sump. The cap would have a 1:20 gradient and be approximately 2 m thick in the middle.

Once a waste cell has been sealed (filled to natural ground level), the Air Dome will be moved to the next mine pit and then the cell will capped and 10 years of subsidence monitoring would commence. Subsoil and topsoil are placed on the cap after the completion of subsidence monitoring.

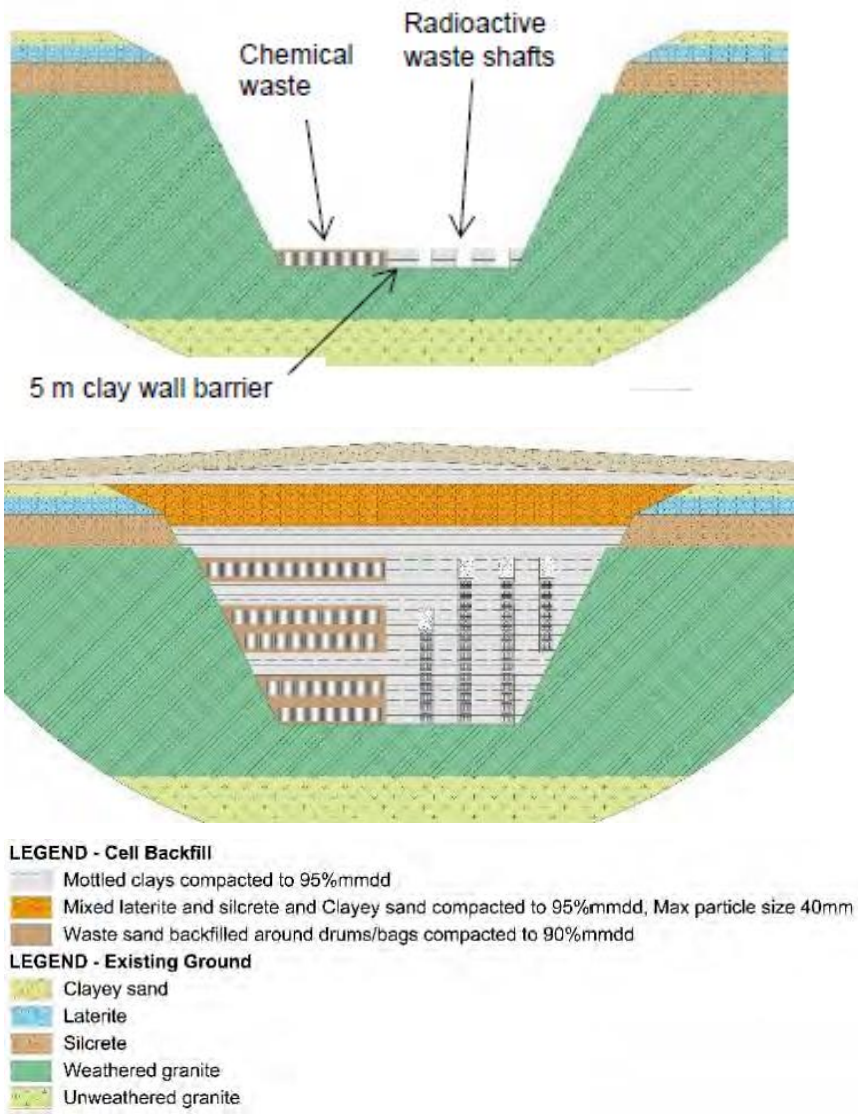

Figure 3: Proposed cell construction and capping (adapted from GHD, November 2021)

3. Background

The Sandy Ridge Facility, located approximately 75 kilometres north-east of Koolyanobbing in the Shire of Coolgardie, Western Australia, is regulated under the following legislation:

- The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) via approval number EPBC 2015/7478;
- Part IV of the *Environmental Protection Act 1986* (EP Act) through Ministerial Statement 1078 (MS 1078), which is currently proposed for amendment;
- Part V of the EP Act through licence L9240/2020/1 and works approvals; and
- The *Radiation Safety Act 1975* via a Site Registration RS 210/2018 30289.

The prescribed premises categories listed in the Facility's licence are shown in Table 3.

Table 3: Prescribed Premises Categories in the Existing Licence

Classification of Premises	Description	*Approved Premises production or design capacity or throughput*
Category 61	Liquid waste facility: premises on which liquid waste produced on other premises (other than storage waste) is stored, reprocessed, treated or irrigated.	No more than 100,000 tonnes per annual period and no more than 15,000 tonnes at any one time (combined), stored no longer than 12 months from date of acceptance.
Category 61A	Solid waste facility: premises (other than premises within category 67A) which solid waste produced in other premises is stored, reprocessed, treated, or discharged onto land.	
Category 65	Class IV secure landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled "Landfill Waste Classification and Waste Definitions 1996" published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	No more than 280,000 tonnes per annual period (combined). Limited by 100,000 tonnes per annum accepted onto premises by Category 61 and 61A.
Category 66	Class V intractable landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled "Landfill Waste Classification and Waste Definitions 1996" published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	

4. Overview of Premises

4.1 Operational aspects

4.1.1 Waste acceptance and management

The Facility operates as a category 61 (liquid waste) and category 61A (solid waste) facility, and is approved under the Existing Licence under Part V of the EP Act to accept up to 100,000 tonnes per annum (tpa) of combined contaminated liquid and solid wastes, stored for up to 12 months from the date of acceptance.

A full list of wastes that can be accepted at the Facility is provided in the Existing Licence.

Following acceptance, wastes are treated if needed (section 4.1.2) and then are permanently isolated (section 4.1.3) within the existing Waste Cell 1 or (for low level radioactive waste (LLW)) stored within the Radioactive Yard awaiting disposal (section 5.4.5).

The following procedures have been developed and established by the Licence Holder:

- Sandy Ridge Facility Waste Acceptance Procedure, Tellus Holdings Ltd, 2016
- Sandy Ridge Facility Waste Acceptance Criteria, Tellus Holdings Ltd, 2016
- Sandy Ridge Facility Waste Zoning Guide, Tellus Holdings Ltd, 2016
- Sandy Ridge Facility Radiation Management Plan for Temporary Storage of LLW, Tellus Holdings Ltd, 2019
- Sandy Ridge Emergency Response Plan, Tellus Holdings Ltd, 2019

4.1.2 Liquid waste immobilisation

The Licence Holder is approved to treat (stabilise and solidify) liquid wastes through the waste immobilisation plant prior to disposal in the waste cell.

The waste immobilisation plant (WIP) is used to prepare/stabilise liquid and sludge wastes prior

to disposal in the waste cells. A full description of this process was provided in the decision report for the Existing Licence.

Liquid wastes can include hydrocarbons, NORMS, PFAS or heavy metals. However, limited information has been provided by the Licence Holder regarding the treatment methodology for each waste type. The Licence Holder advises that similar treatment methods are used for all liquid wastes – chemical fixation with kaolinised granite and the addition of cementitious material in varying proportions for persistent organic pollutants.

Liquid wastes are solidified through chemical fixation such that no leachate will be generated upon disposal. The immobilised waste is tested in accordance with documented procedures to ensure it meets criteria for in-cell disposal.

Containers of immobilised waste are transported to the current waste cell or (for LLW) stored within the Radioactive Yard awaiting disposal. The immobilised waste is either transferred from the sea container into the waste cell or placed in the cell in disposal packages.

Quality Assurance/Quality Control (QA/QC) occurs for all fixated and solidified wastes with the frequency of sampling matching the requirements in the *Landfill Waste Classification and Waste Definitions (as amended 2019)*. Under the conditions of the licence, immobilised waste is not to have waste placed on top of it until QA/QC testing has been completed and passed the unconfined compressive strength and free liquid tests. If the waste fails, the waste is to be removed from the cell and reprocessed.

The PFAS National Environmental Management Plan 2.0 (the NEMP) notes that there is limited information on the long-term effectiveness of immobilisation techniques for PFAS contaminated materials and that conditions in a landfill may reverse or diminish the immobilisation chemistry in ways that are difficult to predict. The Licence Holder has previously committed to undertaking further development work of new waste streams and verifying the suitability of these formations ongoing.

The Existing Licence includes additional regulatory controls for documenting waste immobilization and treatment processes. Compliance with those licence conditions is discussed in section 5.4.6.

4.1.3 Waste disposal

The Facility has approval under categories 65 and 66 for the disposal of up to 280,000 tpa combined of Class IV and Class V intractable wastes into Waste Cell 1. The larger disposal volume, compared to the volume permitted to be accepted at the Facility, is to allow for the treatment and solidification of liquid wastes prior to disposal.

Under this Application, the Applicant is seeking to construct three additional waste cells (Cells 2, 3 and 4) into which the Applicant intends to permanently dispose up to 280,000 tpa Class IV and Class V intractable wastes, including LLW in future (subject to obtaining a licence amendment under Part V and separate approval under the *Radiation Safety Act 1975*).

The waste cells will be operated so only one cell is open for waste acceptance at a time. Cell excavation and waste backfilling operations will be undertaken under a pre-inflated air dome cover. The cell dome cover has an airlock door for entry and egress and spans the width and length of each cell. Prior to placing waste into the cell, the air dome would be in place covering the entire cell. The purpose of the air dome is to exclude water from the cell until it is capped, to avoid the generation of leachate within the cell and avoid any potential structural impacts that may affect the integrity of the cell walls.

The waste cells will be filled in layers with multiple sections in each layer containing wastes of similar characteristics to segregate the different waste types. Chemical waste types would be place ‘like-with-like’ for safety reasons and for potential future recovery (if identified as potentially valuable). Spaces between waste packages are to be backfilled with kaolinised granite and compacted to minimise air or void space. Each layer would be compacted, until

approximately 7m below the ground surface, where a thick capping layer of low permeability clay (referred to as a 'seal' would be installed to prevent water ingress into the cell.

Subsequent pits will be excavated while placement of Class IV and Class V waste materials continue in the adjacent cell. Waste cells will be closed progressively, with one Cell being capped and closed while the next Cell is being developed. This process, along with the closure and decommissioning of the waste infrastructure, is detailed in the Waste Facility Decommissioning and Closure Plan required by MS 1078.

5. Legislative context

5.1 Part IV of the EP Act

5.1.1 Background

In June 2015, the Sandy Ridge Facility proposal was first referred to the Environmental Protection Authority (EPA) under Part IV of the EP Act. The EPA determined to assess the proposal under a Public Environmental Review (PER) in August 2015. The EPA published a report on assessment in December 2017, and Ministerial Statement 1078 (MS 1078) was then issued for the proposal on 27 June 2018.

Post-assessment changes were made to Ministerial Statement 1078 under section 45C of the EP Act on 5 February 2019. Those changes included amending the development envelope; adding infrastructure for power generation, stormwater management and groundwater abstraction; and changes to internal and access roads and the accommodation camp.

5.1.2 Ministerial Statement 1078

The assessment conducted by the EPA (Report 1611) concluded that the relevant EP Act principles and environmental objectives for terrestrial environmental quality, flora and vegetation, human health, terrestrial fauna and inland waters environmental quality can be met (subject to conditions) and that the application was environmentally acceptable.

Ministerial Statement 1078 authorises a number of activities, including:

- Class IV and V waste acceptance (up to 100,000 tonnes per annum (tpa) at the gate);
- Temporary waste storage (up to 15,000 tonnes, for up to 12 months);
- Disposal of waste and treated waste to waste cells (up to 280,000 tpa); and
- Vegetation clearing, access roads and stormwater management infrastructure.

There are a number of conditions listed under MS 1078, including requirements to develop and implement a leachate monitoring and management plan; avoid and manage impacts from flora and fauna; and implement post-closure monitoring and management.

Key Findings:

The Delegated Officer has determined that the following environmental aspects are managed through MS 1078, under Part IV of the EP Act:

- The proponent is required to carry out six monthly groundwater monitoring in accordance with a Leachate Monitoring and Management Plan.
- The proponent is required to mitigate, monitor and manage indirect impacts including those for fire, dust suppression, water quality and weeds, in accordance with a Flora and Vegetation Management Plan.
- Part IV has assessed the clearing of up to 202.3 hectares of native vegetation for mine pits/waste cells and the clearing of up to 73.75 hectares of native vegetation

for associated infrastructure, within a 1,061 hectare development envelope.

5.1.3 Part IV assessment – Alignment of Gate Waste Acceptance Tonnage

Tellus are currently proposing to increase the tonnage of waste accepted at the Sandy Ridge Facility from 100,000 tpa up to 280,000 tpa for permanent isolation in waste disposal cells. The proposal has been referred to the EPA under section 38 of the EP Act.

The EPA determined in September 2021 to assess the proposal under Part IV of the EP Act, via a Public Environmental Review.

5.2 Contaminated sites

On 30 March 2022, the site was classified as *contaminated – restricted use* under the *Contaminated Sites Act 2003*. The restriction on use stated that "*The land use of the site is restricted to ongoing use as a managed waste disposal facility. The site should not be developed for any other use without further contamination assessment and/or remediation*." The reasons for classification also noted that the site is managed in accordance with the conditions of MS 1078 and the licence under Part V of the EP Act.

5.3 Other relevant approvals

5.3.1 Planning approvals

The Midwest/Wheatbelt Joint Development Assessment Panel accepted and approved DAP/17/01318 for the proposed Facility on 3 April 2019. The assessment panel accepted that the DAP Application reference DAP/17/01318 is appropriate for consideration as a "Waste Disposal Facility" land use and compatible with the objectives of the zoning table in accordance with Local Planning Scheme No 5 of the Shire of Coolgardie.

The assessment panel also approved the DAP Application reference DAP/17/01318 and accompanying plans in accordance with Clause 68 of the *Planning and Development (Local Planning Schemes) Regulations 2015* and the provisions of the Shire of Coolgardie Local Planning Scheme No.5 subject to conditions.

Due to the dual nature of the proposed Facility to undertake mining operations and the acceptance and disposal of waste simultaneously on the same land, tenure granted under both the *Mining Act 1978* (WA) and *Land Administration Act 1997* (WA) (LAA) was required for the construction and operation of the proposal.

The Applicant was granted land tenure under the LAA (Crown Lease) on 26 November 2019. It is noted that the Crown Lease stipulates that the Lessee must not accept any waste at the Leased Premises until a Financial Assurance Arrangement has been entered into.

5.3.2 Department of Mines, Industry Regulation and Safety

The Department of Mines, Industry Regulation and Safety (DMIRS) granted approval for a Mining Proposal and Mine Closure Plan associated with the Facility on 04 June 2019 (Mining Proposal Registration ID: 75521). This proposal relates to mining activities associated with the project, outside those specifically related to this application.

Further, the Applicant has received a Dangerous Goods Site Licence (DGS022452) for the Facility on 27 September 2018 under the *Dangerous Goods Safety Act 2004*, as regulated by the DMIRS.

During the assessment of associated works approval W6305/2019/1, the Delegated Officer noted that the DMIRS provided comment regarding the proposed storage of waste containers on the premises. It is the responsibility of the Applicant to ensure that storage, separation distances and packaging criteria for hazardous waste or dangerous goods on the premises

meets the requirements of *Dangerous Goods Safety Act 2004*, or other relevant legislation.

5.3.3 Radiation Safety Act 1975

The Applicant has been granted a registration under the *Radiation Safety Act 1975* (RS Act) for the temporary surface storage of low level radioactive wastes (LLW). This registration limits surface storage in accordance with the Applicant's Radiation Management Plan.

The Applicant is currently seeking further approval under the RS Act for the long-term disposal of LLW into waste cells at the premises.

5.3.4 Environment Protection and Biodiversity Conservation Act 1999 (Cth)

On 23 September 2015, the Department of Environment determined under section 75 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) the construction of the Sandy Ridge Facility to be a controlled action to be assessed under the Bilateral Agreement with Western Australia (Agreement between the Commonwealth of Australia and Western Australia under section 45 of the EPBC Act relating to Environmental Impact). The relevant matters of national environmental significance considered for the Sandy Ridge Facility included s21 and 22A – Nuclear action.

In January 2019, the Department of Environment and Energy granted approval for the Facility (EPBC Reference No. 2015/7478) under section 133 of the EPBC Act.

Key conditions within EPBC 2015/7478 include:

- Implementation of a deep groundwater monitoring and management plan;
- Implementation of the NEMP and subsequent amendments;
- Surface and floodwater management; and
- Waste placement within cells not to include disposal by the borehole method (also called BOSS method)

The PFAS NEMP 2.0 was agreed by Heads of EPAs in October 2019. It sets out requirements for waste acceptance and disposal for PFAS wastes. The requirements include a concentration limit for PFAS, which is reflected in condition 15 of licence L9240/2020/1.

Key Finding: The Delegated Officer will give consideration to the conditions of the Commonwealth approval when assessing the risk of this Application and the need for additional controls. In particular, the Commonwealth approval includes a deep groundwater monitoring and management plan, a requirement for surface and floodwater management, and implementation of the PFAS NEMP.

5.3.5 International conventions

The waste types that can be accepted at the Premises include substances (such as PFAS) that are subject to international conventions. These conventions include the Stockholm Convention on Persistent Organic Pollutants; and the Basal Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal. For example, the concentration limit for PFAS set in condition 15 of licence L9240/2020/1 is consistent with Article 6, paragraph 1(d)(ii) of the Stockholm Convention and the low content limit for PFOS set under the Basal Convention.

5.4 Part V of the EP Act

5.4.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

The guidance documents which inform this assessment are:

- *Guidance Statement: Setting conditions (October 2015)*
- *Guideline: Decision making (December 2020)*
- *Guideline: Environmental siting (December 2020)*
- *Guideline: Regulatory principles (December 2020)*
- *Guideline: Risk assessments (December 2020)*

5.4.2 Works approval and licence history

Table 4 summarises the works approval and licence history for the premises.

Table 4: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
W6243/2019/1	20/05/2019	Works Approval granted for activities relating to Category 12 – Screening etc., of material, Category 85 – Sewage facility and Category 89 – Putrescible landfill site, and ancillary premises infrastructure.
R2498/2019/1	28/11/2019	Registration for Category 85: Sewage Facility, associated with the sewage facility constructed under W6243/2019/1.
W6305/2019/1	20/12/2019	Works Approval granted for Category 61 and 61A activities, restricted temporary waste storage.
W6308/2019/1	7/02/2020	Works Approval application for the Category 61, 61A, 65 and 66 – waste handling, storage, processing and permanent isolation.
R2501/2020/1	27/02/2020	Registration for Category 89: Putrescible Landfill Facility, associated with the domestic landfill constructed under W6243/2019/1.
L9240/2020/1	29/07/2020	Licence granted.
L9240/2020/1	10/09/2020	Amendment to increase above-ground storage from 3,000 tonnes to 10,000 tonnes utilising the Non-radioactive Waste Inspection and Unloading Warehouse, Low Level Radiation Warehouse, Flammable Goods Store and East Yards Part 1 and 2 constructed under Works Approval W6308/2019/1
L9240/2020/1	01/12/2020	Amendment to increase above-ground storage from 10,000 tonnes to 15,000 tonnes.
L9240/2020/1	19/03/2021	Amendment to include prescribed premises categories 65 & 66 (waste cells), increase waste throughput tonnages and to authorise operation of the waste immobilisation plant.

5.4.3 Key works approvals

The Department issued works approval W6305/2019/1 under Part V of the EP Act on 20 December 2019, to construct infrastructure associated with early and temporary waste acceptance under categories 61 (liquid waste facility) and 61A (solid waste facility).

A second works approval, W6308/2019/1, was issued on 7 February 2020 to construct infrastructure associated with waste acceptance, processing and disposal – including the permanent disposal of category 65 (Class IV) and category 66 (class V intractable) wastes into the first waste cell, known as Waste Cell 1.

5.4.4 Key licence amendments

On 29 July 2020, DWER granted Licence L9240/2020/1 under Part V of the EP Act to allow limited operations associated with construction and above-ground storage. The Facility was licensed to operate under categories 61 (liquid waste facility) and 61A (solid waste facility).

Once construction works were complete for Waste Cell 1, Tellus provided environmental compliance reports to DWER as required by works approval W6308/2019/1.

The Licence was then amended on 19 March 2021 to increase the volume of solid and liquid waste acceptance and to allow permanent disposal of category 65 (Class IV) and category 66 (class V intractable) wastes into Waste Cell 1.

Tellus began placing wastes into Waste Cell 1 on 23 March 2020.

5.4.5 Exclusions to Part V approval

Tellus has approval under Part IV of the EP Act to accept low level radioactive waste (LLW) and permanently dispose of LLW into waste cells at the Facility. However, under the Licence and as per the Site Registration under the *Radiation Safety Act 1975* (RS Act) (see section 5.3.3), Tellus can accept LLW for temporary storage (up to 12 months) but cannot permanently dispose/isolate LLW into Waste Cell 1.

On 20 September 2022, DWER received an application from the Licence Holder for an amendment to the Licence. The application is in relation to the disposal of LLW into waste cells at the facility, and related updates to the waste acceptance criteria and procedures.

The WA Department of Health advised DWER in October 2022 that the Radiological Council has approved Tellus Holdings Ltd's Safety Case for the permanent disposal of LLW at the Sandy Ridge facility. Amendment of the facility's registration under the RS Act is in progress.

Key Finding: Tellus has applied for amendments under the RS Act and under Part V of the EP Act to permanently dispose of LLW into waste cells at the facility.

5.4.6 Compliance inspections and compliance history

The facility was subject to a full compliance inspection on 28 July 2020 while construction was still ongoing. At the time of the inspection, Tellus was found to be in compliance with its Part V licence.

Part V works approval compliance

Works Approval W6308/2019/1 required a Construction Compliance Report (CCR) to be submitted for Waste Cell 1, the Air Dome, the Settlement Pond and Waste Storage (East Yard) following the completion of construction. The CCR was provided to DWER in October 2020. The CCR reported a variation from the specifications of the Works Approval, namely that around 5% of the bottom of the constructed Waste Cell 1 was interpreted to be between 4.7 and 5 metres above the underlying unweathered granite bedrock, and not the minimum 5 metres as specified in condition 1 of the Works Approval. The variation was considered by DWER as not likely to be significant or material and it was considered that it could be assessed through the licence application, in determining operational controls. The variation for Waste Cell 1 is now considered to be resolved.

The Applicant has provided DWER with a description of the proposed approach to maintain

the proposed 5 metre separation from bedrock during construction of Cells 2 to 4, which is outlined in section 7.1 of this report.

Key Finding: The Delegated Officer notes that the CCR for Waste Cell 1 reported a variation from the specification of Works Approval W6308/2019/1. The Applicant proposes to apply additional controls during construction of Cells 2 to 4 to maintain the proposed 5 metre separation from underlying unweathered granite bedrock. The risk assessment for leachate from waste cells under this application will give consideration to the Applicant's proposed change to construction methodologies.

Part V licence compliance

To date, Tellus has submitted two Annual Audit Compliance Reports (AACRs) for the Sandy Ridge facility. During the 2020-21 period, Tellus reported in its AACR that it was non-compliant with four of its licence conditions, related to:

- The uncovered temporary storage of treated power poles (condition 7 of the licence) for 21 days in March and April 2021.
- Not meeting a criterion for stabilising and immobilising PFAS contaminated liquid (condition 15). The immobilised waste passed the free liquid test and subsequently (after being placed in Waste Cell 1) set to become a hard solid. The same issue also led to non-compliance with condition 18 (placing this waste into a cell prior to verifying compliance with acceptance criteria via sampling).
- The lack of a consolidated or documented process or procedures applicable to PFAS liquid waste (condition 16) – as is required for each individual liquid waste stream.

DWER is continuing to investigate these non-compliances in accordance with its Compliance and Enforcement Policy (2021).

During the 2020-21 period, Tellus was non-compliant with five of its licence conditions:

- Storing low-level radioactive wastes (LLW) in the temporary storage yard for longer than 12 months (condition 7 of the licence). Tellus advises that it is expecting an approval from the Radiological Council during 2022, after which it will apply for an amendment to the Existing Licence L9240/2020/1 to allow LLW to be transferred to permanent isolation in Waste Cell 1.
- The lack of a consolidated or documented process or procedures applicable to a pesticide liquid waste stream that was treated between 28 February 2022 and 5 March 2022 (condition 16).
- Not meeting a criterion for stabilising and immobilising PFAS contaminated liquid (conditions 15 and 18). Tellus reports that solidified PFAS-contaminated wastewater generally meets the required criteria within 7 days, but the concentrated PFAS liquid waste has been found to behave differently and consistently failed over extended timeframes. During 2021-22, this also lead to non-compliance with condition 19 because immobilised waste that had not cured or hardened was retained in the waste cell and other waste was placed on top. Tellus has reported that all treated material is dry (no free liquid under compression).

DWER will investigate these non-compliances in accordance with its Compliance and Enforcement Policy (2021).

Key Finding: The Delegated Officer notes that non-compliances have been reported in AACRs during the 2020-21 and 2021-22 annual periods relating to the lack of consolidated or documented processes or procedures for individual liquid waste streams, and meeting criteria for stabilising and immobilising PFAS contaminated liquid. Tellus has reported that

all treated material is dry (no free liquid under compression). The risk assessment for the treatment and immobilisation of liquid wastes and leachate from waste cells under this application will consider these non-compliances. These non-compliances will be considered in more detail by DWER in assessing future licence amendment applications.

Part IV licence compliance (MS 1078)

Tellus submitted a 2020-2021 Compliance Assessment Report (CAR), to DWER on 23 September 2021 as part of the requirements of MS 1078. The CAR identified that Tellus was non-compliant with three conditions of MS 1078 relating to the recording of specific coordinates for each waste package stored; the provision of a certificate of currency for its insurance policy; and non-compliance with its Part V licence as described above (MS 1078 requires that Tellus complies with all conditions of its Part V licence). DWER is investigating these non-compliances in accordance with its Compliance and Enforcement Policy (2021).

DWER is currently reviewing the 2021-2022 CAR submitted by Tellus on 23 September 2022.

6. Location and siting

6.1 Siting context

The Premises is located in the Shire of Coolgardie and is approximately 140 km north-west of Kalgoorlie and 75 km north-east of Koolyanobbing. The site is zoned Rural/Mining in the Shire of Coolgardie Town Planning Scheme No. 4 (District Scheme) Consolidated Scheme (TPS4). The surrounding area is shown in Figure 4 below.

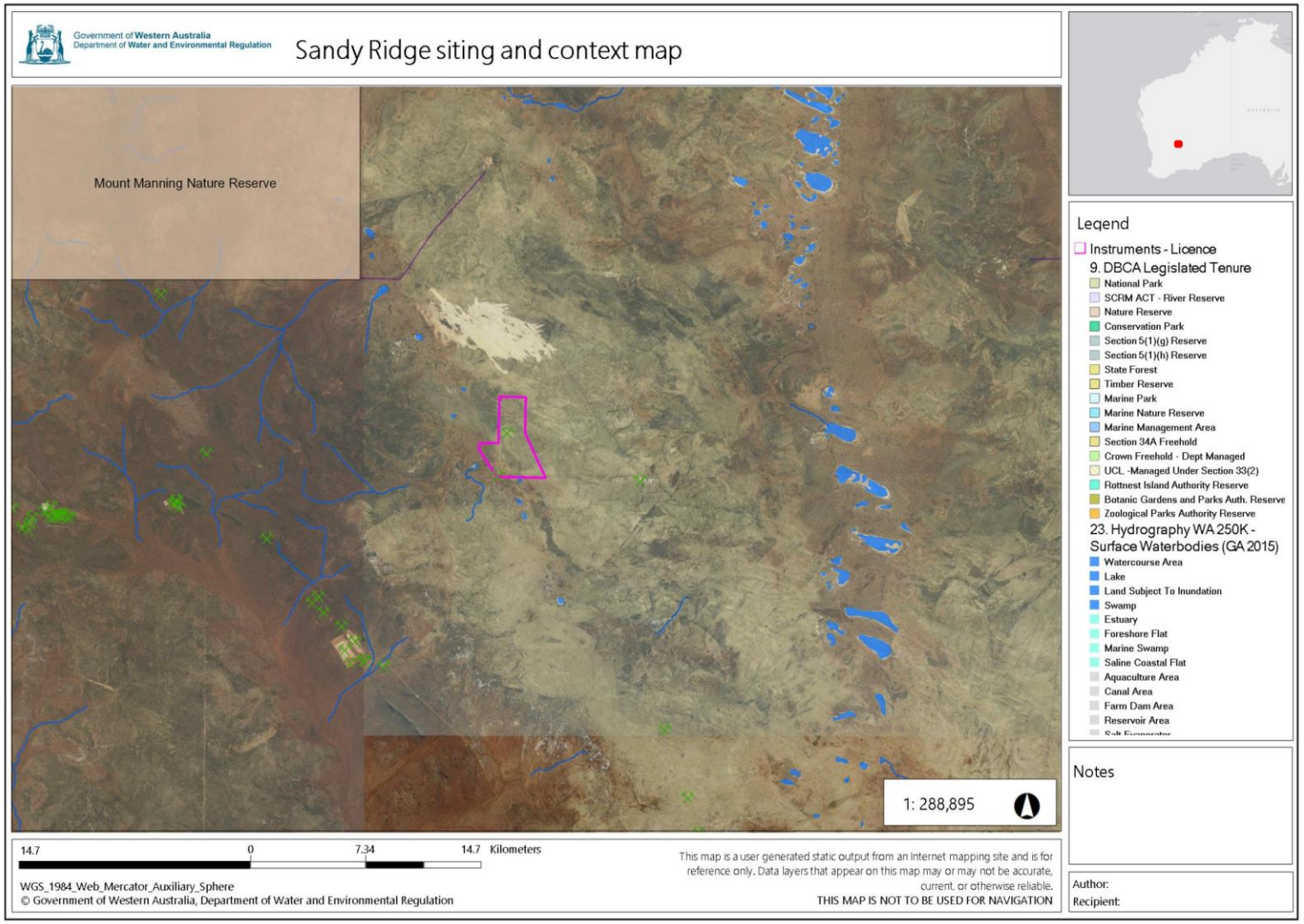

Figure 4: Siting context map. The premises boundary is shown in pink; surface waterbodies in blue; and operating mines in green.

6.2 Human and sensitive receptors

The distances to sensitive receptors are detailed in Table 5.

Table 5: Human receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Workers at the Mount Walton Intractable Waste Disposal Facility (IWDF)	Approximately 5 km east of the Premises.
Registered native title applicants, Marlinyu Ghoorlie	The native title claim registered under the National Native Title Register on 28 March 2019 includes the Premises boundary.
Carina Iron Ore Village / Mine Camp	Approximately 52 km south of the Premises
Town of Koolyanobbing	Approximately 75 km south-west of the Premises

A cultural heritage assessment that was undertaken in June 2015 indicated no known record of heritage items within the site. There are no registered Aboriginal sites or heritage places within the Project footprint or within 10 km. For that reason, visits by the registered native title applicants are only likely on an occasional and short duration basis, and the Marlinyu Ghoorlie have not been considered further as a sensitive receptor for the purposes of the risk assessment in section 7.

Key Finding: The Delegated Officer notes that on the basis of distance from the proposed activities the majority of these sensitive receptors will not be impacted from emissions and discharges from the construction and operation of Cells 2, 3 and 4 and will therefore not be considered as receptors in the risk assessment. Receptors considered as relevant for the assessment of risks associated with the scope of this assessment are:

- Human receptors at the Mount Walton Intractable Waste Disposal Facility

Risks associated with these receptors in relation to the proposed activities are considered in Section 7.

6.3 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 6. Table 6 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

The table has also been modified to align with the *Guideline: Environmental Siting.*

Table 6: Environmental values

Specified ecosystems	Distance from the Premises
Important wetlands – Western Australia	Not within 40 km.
Parks and Wildlife Managed Lands and Waters	The former Jaurdi Pastoral Lease, which is a proposed conservation reserve, is located approximately 4 km south-west of the Premises.

	The Mount Manning Range Nature Reserve is located approximately 9.8 km north-west of the Premises. The Mount Manning – Helena and Aurora Ranges Conservation Park is located approximately 19.8 km west of the Premises. The Boorabbin National Park is located approximately 100 km south of the Premises.
Threatened Ecological Communities and Priority Ecological Communities	The Finnerty Range/Mt Dimer/Yendilberin Hills Vegetation Complexes (Banded Ironstone Formation) (Priority 1 PEC) are located approximately 12.5 km to the south west of the Premises. The Licence Holder has carried out updated vegetation surveys since the original assessment under Part IV. These found that a vegetation association in the water infrastructure area has affinity to the Priority 1 PEC. The additional surveys are expected to inform the Part IV assessment described in section 5.1.3.
Biological component	**Distance from the Premises**
Threatened/Priority Flora	The assessment carried out under Part IV in 2016 found that 6 threatened/priority flora are located within a 10 km radius of the Premises, one of which was recorded within the premises. In response, MS 1078 included conditions on the management of flora and vegetation. The Licence Holder has carried out updated flora surveys since the original assessment under Part IV. These found that 10 priority flora species occur within the Premises or immediate surrounds, including within the indicative disturbance footprint. Three species of interest were also identified, and an undescribed species resolved. The additional surveys are expected to inform the Part IV assessment described in section 5.1.3.
Threatened/Priority Fauna	The assessment carried out under Part IV in 2016 found that Malleefowl, Central Long-eared bat, Western Rosella, Fork-tailed Swift, Peregrine Falcon could occur within the prescribed premises boundary. Vulnerable fauna (Leipoa ocellata) was also mapped within the premises boundary. In response, MS 1078 included conditions on the management of fauna. The Licence Holder has carried out updated fauna surveys since the original assessment under Part IV. These found that four fauna habitats were recorded within the development envelope. Five significant fauna are considered to potentially occur within the development envelope. The additional surveys are expected to inform the Part IV assessment described in section 5.1.3.
Other relevant ecosystem values	**Distance from the Premises**
Non-perennial surface water bodies	Two minor non-perennial waterbodies associated with Lake Raeside, one approximately 50 m south of the proposed premises boundary and one approximately 450 m west of the proposed premises boundary.
Public drinking water source areas	None within 50 km.

Key Finding: The Delegated Officer notes that on the basis of distance from the proposed activities the majority of these specified ecosystems will not be impacted from emissions and discharges from the construction and operation of Cells 2, 3 and 4 and will therefore not be considered as receptors in the risk assessment.

Receptors considered as relevant for the assessment of risks associated with the scope of this assessment are:

- Threatened/Priority Flora and Fauna and the ecosystem with which they are associated.

Risks associated with these receptors in relation to the proposed activities are considered in Section 7.

It is also noted that potential impacts to Threatened/Priority fauna and flora were also considered and assessed under Ministerial Statement 1078. MS1078 includes conditions relevant for potential impacts to flora and fauna associated with the Facility.

6.4 Geology

The proposed facility is located within the Archean Yilgarn Craton that comprises an area of approximately 657,000 km^2. The bulk of the craton is thought to have formed between 3,000 and 2,600 million years ago, with some gneissic terranes exceeding 3,000 million years in age (Anand and Butt, 2010, as referenced within the Sandy Ridge PER 2016). The surface of the Yilgarn Craton, the Yilgarn Plateau, has low relief and, on a regional scale, likely represents a Proterozoic erosion surface modified by weathering, partial erosion, and sedimentation, resulting in a complex regolith (Anand and Butt, 2010, as referenced within the Sandy Ridge PER 2016). Broad landforms are understood to have been in place for about 250 million years and the Yilgarn Craton has been tectonically stable for approximately 2,500 million years.

The local geology 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 sand and gravel with mottled zone laterite – comprising mostly yellow brown quartz sand overlying pisolitic-ironstone gravel and/or nodular red-brown clayey sand (lateritic mottled zone).
- Silcrete – comprising kaolinitic clay and silica to form a hard cap over underlying lithologies. The base of the silcrete generally merges gradationally into the underlying kaolinitic clay profile and as a result the silcrete can be quite variable in terms of overall thickness. The silcrete has most likely been hardened as the result of a secondary chemical process that effectively has re-cemented the kaolinitic clay profile from its upper surface.
- Kaolinitic clay – comprises soft white kaolin weathered from pre-existing granitoids. Drilling indicates the clay profile may be absent in certain areas where silcrete stretches to the granitoid basement, but generally is more than 15 m thick and up to a maximum of nearly 40 m thick. The clay is quite uniformly white with little fracturing and only exhibits minor iron staining in the few fracture zones present.
- Granitoid basement – comprises a fine to medium grained light coloured granite containing pegmatite and quartz veins. The basement topography varies widely to less than 5 m from the surface to greater than 45 m below the surface.

A typical cross section profile of the geology at the proposed Sandy Ridge Facility is shown in Figure 5.

The Premises is located within an area that has been previously identified as being suitable for siting Class V waste disposal facilities by the Geological Survey of WA (Hirschberg, 1988

as referenced within the Sandy Ridge PER 2016). The geological characteristics that were indicated to make this area suitable for the disposal of intractable wastes include:

- Location on the Yilgarn Craton – the region is underlain by granitic rocks with a thick weathered profile comprised of clays that have a low permeability to infiltrating water;
- Location near a continental drainage divide – the area is located in the vicinity of a drainage divide that separates westward flowing rivers from the internal drainage systems that are located to the east of the divide. Land in the vicinity of the drainage divide has a high elevation, and groundwater is likely to have only a limited occurrence at depth in this area;
- Low rainfall – the average rainfall of the area is less than 300 mm and the potential annual rate of evaporation is greater than about 2,000 mm, factors that limit the amount of water that can infiltrate through soil profiles in the area to provide groundwater recharge; and
- Tectonic stability – the area is located in a highly stable part of the Yilgarn Craton that has a very low incidence of earthquakes.

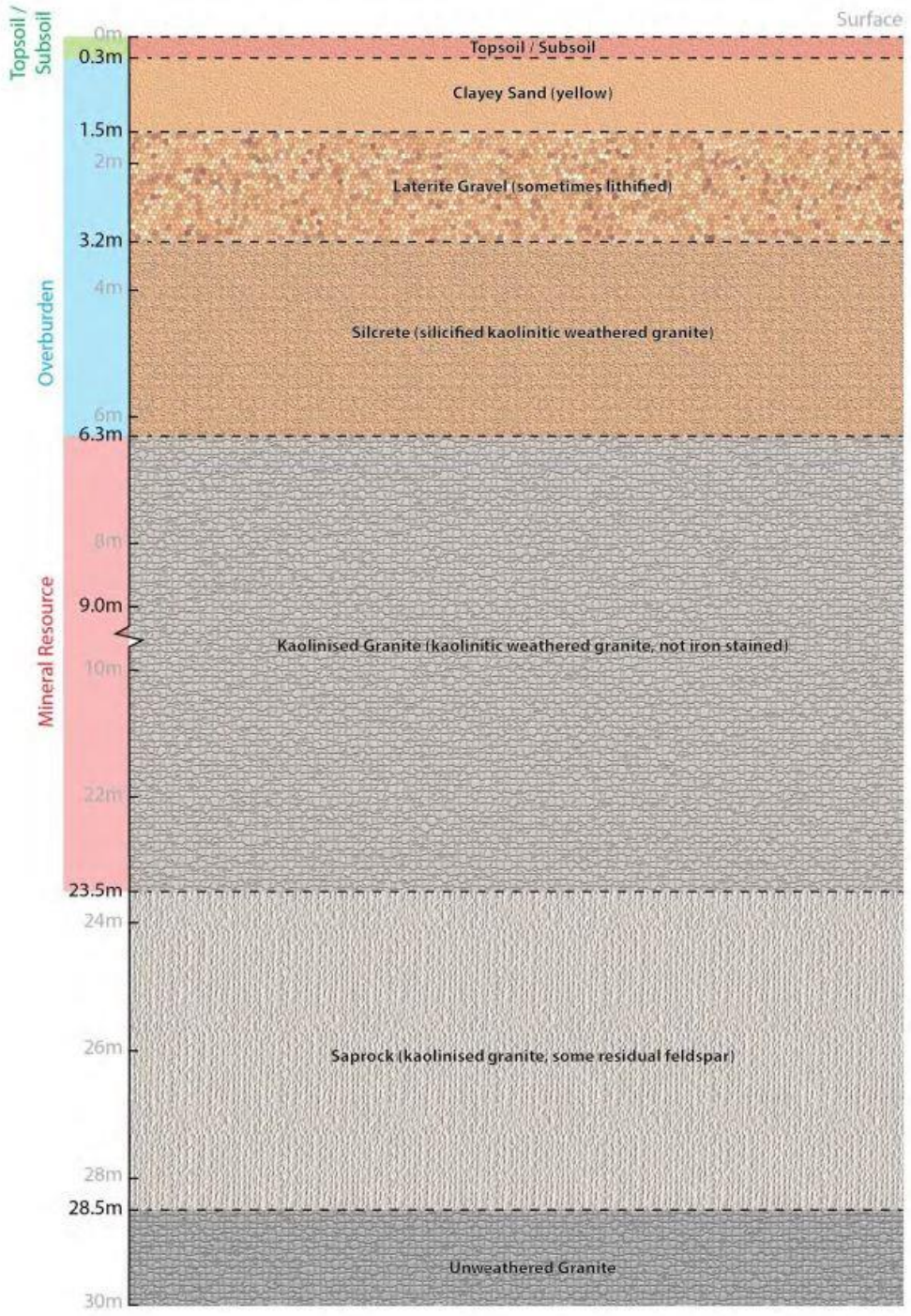

Figure 5: Typical geological profile at the Sandy Ridge Facility.

Source: Figure provided by the Applicant

6.4.1 Soil

The facility is located within the Norseman (266) soil landscape mapping zone, within the Kalgoorlie Province as defined by Tille (Sandy Ridge Public Environment Review 2016). The soils of the Norseman zone are described as calcareous loamy earths, yellow sandy and loamy earths, red loamy earths, deep red sands and salt lake soils. The Applicant has advised that the Premises geologic profile includes 2 m to 5 m of impermeable silcrete and up to 40 m of low permeability clay.

In situ geotechnical investigations undertaken by the Applicant applied Hazen's formula to laboratory testing of the soil types above the silcrete layer to estimate permeability. Permeability values of between 1 x 10^{-6} m/s (0.08 m/day) and 1 x 10^{-5} m/s (0.8 m/day) are suggested for the slightly silty sand, sandy gravel and weakly cemented sand.

Below the upper slightly silty sand, sandy gravel and weakly cemented sand soil layers, test pitting conducted within the proposed infrastructure areas determined compacted gravel and silcrete layers at depths up to 1.5 m below ground level.

Permeability results for silcrete taken from bore holes onsite indicated a silcrete permeability of 4.944 x 10^{-8} m/s and 5.012 x 10^{-8} m/s.

Key finding: The Delegated Officer notes that compaction and permeability test results for the upper soil profile indicate that while the permeability of the overlying silty sand, sandy gravel and weakly cemented sand is between 1 x 10^{-6} m/s (0.08 m/day) and 1 x 10^{-5} m/s (0.8 m/day), the permeability of the underlying silcrete is low. The subsurface silcrete layer is likely to act as natural barrier to infiltration and seepage from surface waste storage.

6.4.2 Soil monitoring

The Applicant has advised DWER that the baseline soils assessment (Landloch 2015) and baseline radiation and metals report (Terra Search 2016) have recently been supplemented by additional baseline studies (Landloch 2020; Landloch 2022). This included collecting surface samples from a 2,000 hectare area at a spacing of 250-500 metres, and analysis for metals, radionuclides, asbestos, PFAS and polychlorinated biphenyls (PCBs). The Applicant advises that no change has been observed in the last two years.

The Applicant advises that environmental gamma radiation surveys were also carried out (Radiation Professionals, 2019; Radiation Professionals, 2020) over 217 hectares and approximately 140 kilometres of access roads. These surveys were a condition of the Facility's Crown Lease and provide a baseline to which subsequent radiation measurements can be compared over time. A gamma survey was carried out of the first waste cell prior to excavation, and will also be completed for each new waste cell prior to excavation.

6.5 Hydrogeology and groundwater

The Premises is located on the Yilgarn Craton and is underlain by granitic rocks of Archaean age. These rocks have been extensively weathered. Hydrogeological investigations on site by the Applicant indicate that fresh bedrock is overlain by a clayey weathered profile which varies from 26 to 31 metres in thickness.

Only minor amounts of groundwater occur in partially weathered rock (saprock) near the base of the weathered profile. No continuous groundwater table was identified during the drilling of boreholes at depths between 21 to 49 metres below ground level. At the nearby Mount Walton IWDF, no groundwater was encountered during six-monthly monitoring from 1995 to 2016. Groundwater at the site is saline and has a total dissolved solids (TDS) content of about 6,000-6,500 mg/L.

A Proclaimed Groundwater Area (Goldfields Groundwater Area) intersects the premises boundary. However, there are no registered groundwater users (or bores) in the local area, with the exception of bores, constructed for environmental monitoring purposes, at the IWDF at Mount Walton East 5.5 km east of the development envelope. The closest water supply bores are located at the Mount Dimer gold mine, 23 km from the Facility.

Where groundwater has been encountered, it occurs in natural traps in the deepest parts of the basement surface.

Desktop and field research was undertaken by the Applicant between 2014 and 2019. An

updated hydrogeological model was also developed in 2022 and the Applicant provided a summary of that report to DWER. Hydrogeological studies carried out by the Applicant indicate:

- There is no surface recharge of groundwater in the survey area combined with a significant horizon of low permeability in the kaolinite and saprock horizons (Geo9, 2019);
- No groundwater aquifer was intersected during targeted groundwater investigations (Rockwater, 2015);
- No groundwater aquifer has been intersected during exploration drilling. This included 216 holes with depths ranging from 12.0–47.5 mBGL across the proposed development envelope;
- Very small quantities of groundwater were airlifted from two bores (SRMB150 (0.03 L/s) and SRMB152 (<0.01 L/s)). The low airlift yield and low permeability indicate that the water-bearing zones containing the groundwater do not constitute an aquifer (Rockwater, 2015);
- Analysis of resource samples collected during mining exploration activities indicate that for weathered granite deeper than 6 mBGL, moisture content is typically between 10% and 12% by weight. This suggests the soil is very dry, the area has limited recharge, the depth to the water table is inferred to be well below the weathered granite, and the material is free draining (i.e. water flows vertically under a unit gradient due to gravity) (CyMod, 2016);
- Since monitoring began in 1995, no groundwater has been detected in monitoring bores at the Mount Walton IWDF. Those bores vary in depths of between 24 m and 41 mBGL (Department of Finance, 2014);
- The absence of a groundwater aquifer in the weathered granite profile. The absence of a water table in the weathered kaolinised granite on top of the fresh granite suggests any deep water infiltration would subsequently migrate into very low permeability fresh granite and water stored in the fresh granite is to likely to form localised fractured rock aquifers;
- No evidence of a shallow groundwater table (i.e. in soils above the silcrete and kaolin), due to annual evaporation rates (greater than 2400 mm (BoM, 2015b)) exceeding the average annual rainfall amount of 250 mm.

The Applicant has conducted contaminant fate and transport modelling to consider the possibility of cell containment failure and degradation of the waste packages, allowing water ingress into the cells and the production of leachate. Modelling results predicted that in the worst-case scenario, seepage could enter the environment at a rate of 6 cubic centimetres per year and that the unsaturated geology directly beneath the cell has sufficient capacity to contain this volume of water for approximately 400,000 years. Without any environmental or engineering control measures in place, should geological storage capacity be exceeded, then contaminated water would take between 6,000 and 200,000 years (depending on fracture connectivity) to reach the most likely exposure point 75 km to the north.

EPA Report 1611 referred to the absence of a groundwater aquifer and groundwater users within the local vicinity. The EPA considered potential impacts from waste leachate to groundwater from the storage of intractable waste and found that there is unlikely to be any residual impact.

6.5.1 Monitoring of groundwater

Six monthly groundwater monitoring has been carried out by the Applicant across 21 monitoring bores in April 2021, September 2021 and April 2022 in accordance with conditions

under Part IV of the EP Act and under the EPBC Act. Trigger levels and threshold criteria are specified in the Leachate Monitoring and Management Plan (LMMP) required under MS 1078 and the Deep Groundwater Monitoring and Management Plan (DGMMP) required under EPBC 2015/7478.

The Applicant reports that the results of that monitoring have been consistent with the conceptual hydrogeological model:

- Where water exists in local depressions of the granite bedrock, water levels are stable, with changes in the order of decimetres and below the trigger levels, consistent with the low rainfall recharge and low aquifer transmissivity at the Premises.
- On top of the shallow silcrete formation, five of the six monitoring bores were dry in all monitoring events. In one monitoring bore, a saturated zone was reported for approximately two weeks following a 54 mm rainfall event. This is consistent with the expected infiltration of rainfall into thin aeolian surface sand following intense sporadic rainfall events. During subsequent dry periods, the high evaporation and evapotranspiration act to remove this rainfall, which results in little if any recharge.
- Water quality is likely reflective of background conditions (i.e. does not suggest impact from site operations, such as from leachate).

Key finding: The Delegated Officer notes that no developed groundwater aquifer was found within the proposed premises during hydrogeological investigations or subsequent groundwater monitoring, and notes that a pathway to groundwater is unlikely. The potential for risks to groundwater users as receptors are therefore not foreseeable. The risk assessment will still consider impacts associated with subsurface seepage from operational areas where subsurface flow of leachate has been identified as a potential pathway to other identified receptors.

6.6 Surface water and topography

The area is characterised as semi-arid, with little rainfall occurring over the site. The Applicant conducted a hydrological study which included a desktop review of regional hydrogeology and field investigations. There are no permanent channels or creeks in the development envelope, however within the larger proposed premises boundary, DWER mapping indicates two minor non-perennial channels associated with Lake Raeside. DWER mapping also indicates two non-perennial water bodies associated with Lake Raeside, one approximately 50 m south of the Premises boundary and one approximately 450 m west of the Premises boundary.

These surface water bodies represent localised drainage depressions, with the western water body being indicatively upstream of the Facility (approximately 2.5 km from surface infrastructure associated with this application), while the southern water body is indicatively downstream of the Facility (approximately 1.4 km from surface infrastructure associated with this application). The distances to the identified surface water bodies are shown in Table 7.

Table 7: Surface water bodies

Groundwater and water sources	Distance from the Premises
Major watercourses/waterbodies	There are no major watercourses/water bodies within 20 km of the premises (based on available GIS dataset – Hydrography WA 250K – Surface Waterbodies).
Non-Perennial Surface Water Bodies	DWER GIS data indicate two minor non-perennial waterbodies associated with Lake Raeside, one approximately 50 m south of the proposed premises boundary and one approximately 450 m west of the proposed premises boundary (based on available GIS

	dataset – Hydrography WA 250K – Surface Waterbodies).

Surface water management requirements are considered to be restricted to short term flows during infrequent high rainfall events (Rockwater 2016, as referenced within the Sandy Ridge PER 2016). Surface water and hydrological modelling for these rainfall events included an assessment for peak discharge rainfall events (modelling of Intensity Rainfall Duration (IFD) rainfall curves) as well as catchment runoff hydraulic calculations. Calculated Average Recurrence Interval rainfall events are presented in Table 10 below.

Table 8: Total rainfall including probable maximum precipitation

Duration	ARI/total rainfall (mm)									
	2	5	10	20	50	100	200	500	1000	2000
24	40	57	70	87	113	136	155	180	201	222
48	47	68	83	104	135	163	186	216	241	266
72	50	72	89	111	146	176	200	232	258	285

Source: Extracted from Sandy Ridge PER

Catchment runoff modelling determined 14 catchments within the development envelope.Flow durations were assessed to be short, with expected peak flows within the vicinity of the infrastructure area ranging from 1.6 m^3/s to 5.5 m^3/s (for the 100 year ARI event) and 7 m^3/s to 20 m^3/s for the probable maximum rainfall event (2,000 year event). With the absence of any surface water bodies, and no predominant surface water flow direction due to the flat surface, overland flow from the premises is considered to be restricted to on-site movement and limited off-site movement.

EPA Report 1611 considered potential impacts from waste leachate to inland surface water receptors from the storage of intractable waste, and found that there is unlikely to be any residual impact.

Key finding: The Delegated Officer notes that due to local topography, the proposed facility is subject to catchment drainage and overland flows of stormwater from both within and external to the proposed facility boundary. Receptors considered as relevant for the assessment of risks associated with the scope this assessment are:

- Non-Perennial Surface Water Bodies

Risks associated with surface water flows and drainage in relation to the proposed activities associated with this risk assessment are considered in Section 8.

6.7 Meteorology

The Applicant has advised that the proposed development envelope is located within a 'semi arid' climate and averages approximately 250 mm of rainfall per annum (Beard, 1990, as referenced within the Sandy Ridge Public Environment Review). Evaporation exceeds 2,400 mm per annum.

The climatic pattern during the warmer months of November to April is influenced by high pressure systems to the south-east, with the proposed site generally subjected to mostly easterly winds, clear skies and hot days. Sporadic high intensity rainfall can also occur in the summer months as a result of remnant tropical cyclones that cross the coast between Carnarvon and Port Hedland. These track south-easterly, weakening to rain-bearing troughs or depressions between the usual high pressure systems. Strong wind gusts can be associated with these depressions.

The Facility is located between two Bureau of Meteorology weather stations for climate data, Southern Cross Airfield (No. 012320) and Menzies (012052). The Menzies weather station is

located approximately 115 km north east of the proposed premises and the Southern Cross Airport weather station is located approximately 117 km south west from the proposed premises boundary. Data available for the Menzies station provides an historic dataset (1957 to 1996), while the Southern Cross Airport weather station provides data from 1996 to 2022.

The Applicant has established an automatic weather station within the proposed development area. Data collected includes wind speed and direction at 10 m, relative humidity and air temperature at 2 m, as well as precipitation.

6.7.1 Wind direction and strength

Based on the climate data for the Menzies station (Jan 1957 to Dec 1996), winter morning winds are generally north-easterly and north-westerly, while the prevailing afternoon winter wind direction is north-westerly. In the summer months, historic wind data at Menzies indicates prevailing south-easterly and north-easterly winds in the morning, and south-easterly in the afternoon.

Based on the climate data for the Southern Cross Airfield station (Oct 1996 to Aug 2019), the prevailing wind direction in winter months is northerly in the morning to west/north–westerlies in the afternoon, and in summer months the prevailing wind direction is generally easterly in the morning and variable in the afternoon.

Data provided with the Public Environmental Review indicated that between 7 May 2015 and 4 April 2016, winds were predominantly observed from the east/north-east to south-easterly directions. The majority of wind speeds experienced at the development envelope generally ranged from 3.6 km/h to 28 km/h (frequency of 78% combined) with the highest wind speeds (>37.5 km/h) occurring from a west and west-north-westerly direction.

6.7.2 Rainfall and temperature

Mean annual rainfall data for the Southern Cross Airfield weather station is 301.3 mm (1996 to 2022). Mean annual rainfall data for the Menzies weather station is 254 mm (1897 to 2019). Within the Sandy Ridge PER, rainfall data for the onsite automatic weather station indicates 304.2 mm of rainfall from May 2015 to April 2016, with the highest fall recorded in January, and the next highest falls in February, March and August. This is consistent with long-term trends from the Menzies and Southern Cross Airport weather station. Less than 1 mm of rain was recorded in May and September.

During the 2015-16 recording period, more rainfall occurred in the summer months (132.2 mm) than the winter months (76.2 mm). Maximum daily rainfall of 53.8 mm was observed during the summer, with the average rainfall during the summer months being the highest of all seasons. Lowest maximum and daily average rainfall was observed during the spring months at the proposal site.

Air temperatures measured at the proposed site between 7 May 2015 and 4 April 2016 varied between a minimum of 0.4 °C and a maximum of 42.1 °C. The average temperature measured over the monitoring period was 19.0 °C. This compares to annual average maximum air temperatures between 18 °C and 35 °C and annual average minimum air temperatures between 4°C and 18°C for the Southern Cross Airfield weather station (1996 to 2022 dataset).

Rainfall and air temperature data for the Southern Cross Airfield weather station is shown in Figure 6 below.

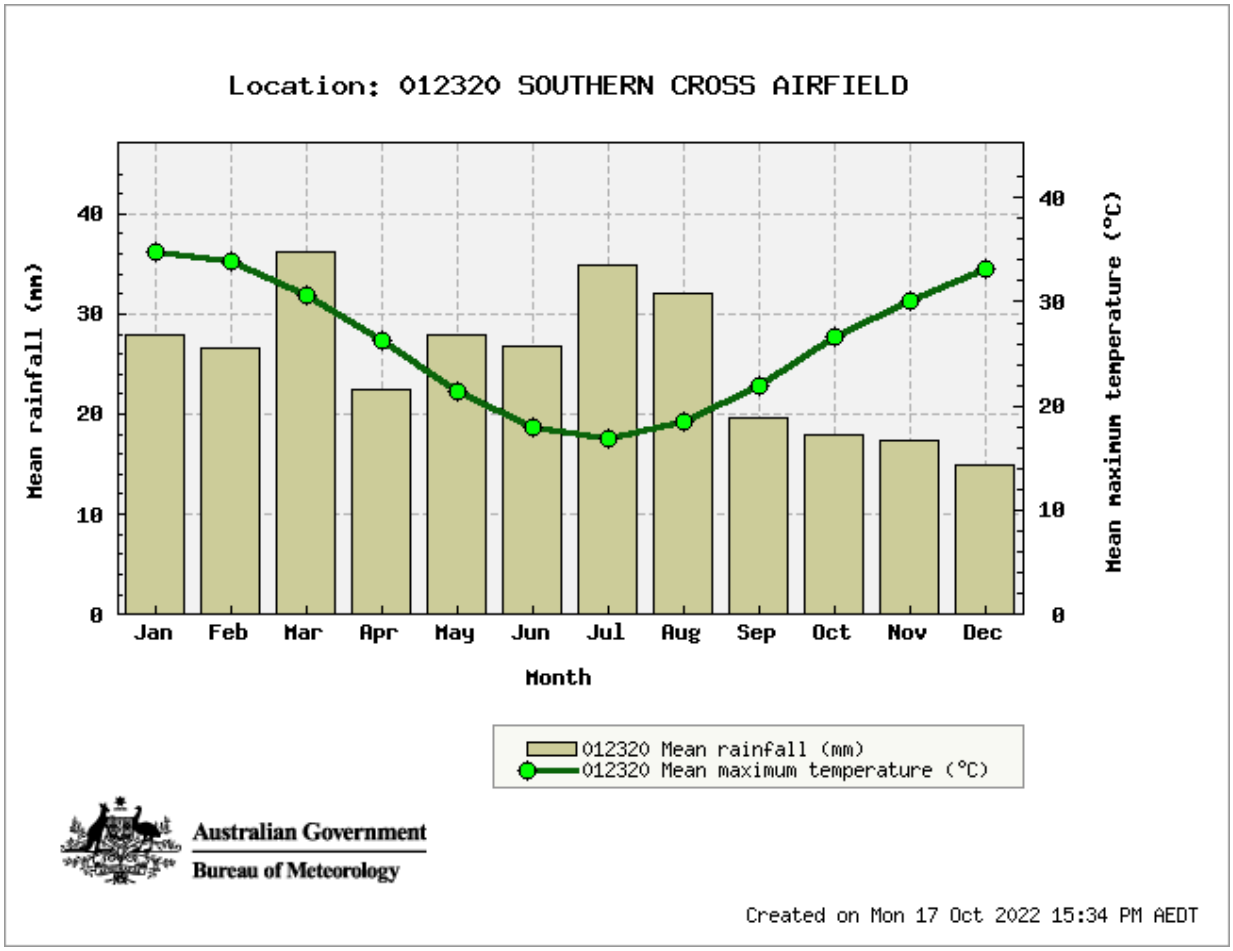

Figure 6: Southern Cross Airfield rainfall and mean maximum air temperature data

Source: Bureau of Meteorology

7. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk Assessments* (DWER 2020).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 13.

7.1 Emissions and applicant controls

The key emissions and associated actual or likely pathway during construction and operation which have been considered in this decision report are detailed in Table 9 below. Table 9 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 9: Proposed applicant controls

Emissions	Source	Potential pathways	Proposed controls
Construction			
Noise	Earthworks, including blasting for waste cell construction and stormwater infrastructure on unsealed access roads and unsealed ground Machinery operations and/or vehicle movements including reversing beepers Placement of machinery, equipment and infrastructure	Air/wind dispersion Ground vibration	Location of the premises remote from sensitive receptors. Waste cells will be constructed consecutively out of sequence to ensure safe distances between operating cells and areas where drill and blasting activities are undertaken. Blasting is infrequent (estimated one event per year) and short in duration (seconds).
Dust	Blasting and mining for waste cell construction Excavation and earth moving for access tracks and surface water management Vegetation clearing	Air/wind dispersion	Location of the premises remote from sensitive receptors. Following blasting, all mining activities will be undertaken beneath the Air Dome. Saline groundwater will be used for dust suppression. Dust deposition monitoring is carried out at the Facility.
Light	Machinery operations and/or vehicle movements	Light spill	Location of the premises remote from sensitive receptors. The majority of construction work will be carried out during daylight hours.
Hydrocarbon and contaminated liquid spills and seepage	Fuel and the chemicals and liquids stored and used on site for use during construction activities	Soil contamination and uptake via plant roots	Environmentally hazardous materials are stored in accordance with the Dangerous Goods Licence DGS022452. Spill kits will be distributed around the key work areas, storage locations, and in refuelling vehicles. Any spill or leak would be a priority and promptly addressed. Contaminated material would be recovered and disposed of in a waste cell.
Wastewater (contaminated stormwater)	Stormwater pond in the mining area	Contaminated water runoff entering surface water bodies via overland flow	Stormwater run-off from within the mining area is expected to be minimal as the cell will be covered with an Air Dome during construction. Stormwater, including from the two Air Domes on site, will be directed to an unlined stormwater pond.
Air pollutants, including greenhouse gases	Vehicles and generators	Air/wind dispersion	Emissions from light vehicles, mobile equipment and generators are expected to be minor and temporary. Equipment will be maintained in accordance with the manufacturer's specifications.
Operations			
Contaminated stormwater overtopping stormwater ponds	Temporary surface storage of wastes within dedicated storage yards (mixed store/east yard/low level radiation waste storage yard) Unloading hazardous wastes from transport packaging, inspection, consolidation and	Direct discharge to land and waters	Environmentally hazardous materials are stored in accordance with the Dangerous Goods Licence DGS022452. Waste will be contained in appropriate primary packaging that meets Tellus' WAC and Chain of Custody requirements. Storage containers/tanks, piping, handling areas, delivery areas and process tanks are located

	transfer to WIP or permanent isolation (low level rad. Warehouse, non-rad. Waste inspection warehouse)		within secondary containment areas. Inspection of waste packages upon arrival at the Facility. Storage containers and secondary containment materials are impermeable to the substance being stored and will not react with the substance being stored. Primary packages loaded into a sea container and sea containers onsite are kept locked and closed unless they need to be opened to mitigate or prevent a discharge of waste to the environment. Sea containers inspected for structural integrity prior to acceptance onsite. Separation distances facilitate incompatible chemicals not coming into contact during spills, leaks or fires. In the case of a spill or leak, contaminated material will be recovered and disposed in a waste cell.
Odour		Air / wind dispersion	Waste will be contained in appropriate primary packaging that meets Tellus' WAC and Chain of Custody requirements.
Windblown Waste		Air / wind dispersion	Primary packages loaded into a sea container and sea containers onsite are kept locked and closed. The Fauna Management Plan required under MS 1078 includes controls for feral pests. This includes baiting and monitoring.
Explosion/fire or smoke, including particulates and air emissions containing toxic elements, caused by incompatible solid waste storage or flammable wastes		Air / wind dispersion	Waste accepted will not be flammable or combustible. Inspection of waste packages upon arrival at the Facility. Separation distances facilitate incompatible chemicals not coming into contact during spills, leaks or fires. Storage containers and secondary containment materials are impermeable to the substance being stored and will not react with the substance being stored.
Air pollutants, including greenhouse gases	Vehicle movements, mobile equipment and generators	Air / wind dispersion	Minimal air emissions are expected. Many operations will be carried out under an Air Dome, and the premises is remote from sensitive receptors.
Light	Machinery operations and/or vehicle movements	Light spill	Location of the premises remote from sensitive receptors. Most operations will be carried out under an Air Dome.
Dust	Treatment, solidification and encapsulation of wastes within the Waste Immobilisation Plant Machinery operations and/or vehicle movements	Air / wind dispersion	Location of the premises remote from sensitive receptors. Dust suppression for kaolin stockpiles, cement silo dust filtration, covered conveyors and enclosed planetary mixer. The Flora and Vegetation Management Plan required under MS 1078 will be implemented, including implementing dust suppression and monitoring vegetation health.
Noise		Air / wind dispersion	Location of the premises remote from sensitive receptors. Plant and equipment to meet Australian Standards

			for noise.
Odour		Air / wind dispersion	Location of the premises remote from sensitive receptors.
Leachate from encapsulated/solidified liquid and sludge wastes	Placement of solid and encapsulated Class IV and Class V wastes within geological repository waste cells (excluding low level radioactive wastes)	Infiltration to underlying groundwater	The geology, hydrogeology and meteorology at this location make it suitable for the disposal of Part IV and V wastes, as assessed under Part IV of the EP Act. The Leachate Monitoring and Management Plan required under condition 9 of MS 1078 will be implemented during operation. A 5 m buffer will be maintained between the base of the cell and either groundwater or the underlying unweathered granite, whichever is shallower. The method is described in more detail below in **section 7.1.1**. A compliance report will be submitted by Tellus prior to commencing operations. All waste placed to be spadeable (no free liquids to be placed in the cell). Spaces between incompatible waste materials backfilled with kaolin (clay) and compacted to minimise void space. Cell closure includes compacted clay domed cap to shed water. Post-closure monitoring and management requirements apply under MS 1078.
Wastewater (contaminated stormwater)		Direct discharge to land and waters	Site selected for low rainfall and high evaporation rates. Use of relocatable air dome cover over the active landfill cell to prevent rainfall ingress. Surface water diversion channels directing surface water to stormwater settlement pond via a v-drain.

7.1.1 Cell floor construction methodology

The Applicant advises that consistent with the Public Environmental Review, a five metre buffer will be maintained between the base of the cell and either groundwater or the underlying unweathered granite, whichever is shallower.

As described in section 5.4.6, a minor potential variation with this criterion was observed during construction of Cell 1. The Applicant has advised that the following specific controls will be used to ensure that the minimum distance is met during the construction of Cell 2 (the next waste cell to be constructed).

The Applicant advises that a targeted geotechnical investigation of the Cell 2 area was completed in 2022, in addition to site-wide investigations conducted over the past 10 years. The geotechnical assessment will be used to inform the detailed design of Cell 2.

During construction, a Quality Management Plan will be implemented as well as inspection and test plans that include information reviews, witness points and hold points throughout construction. In particular, this includes:

- Regular surveys during excavation to map the dimensions and depth below ground level of the cell in detail;
- A hold point to ensure that the constructor and Tellus agree to the methodology and equipment to be used for the last few metres of excavation above the cell floor; and
- A competent geotechnical engineer will regularly attend Sandy Ridge during the excavation and will verify the surveys, review information from the constructor and

participate in witness and hold points. The engineer will also confirm construction as part of the final Compliance Report.

Tellus advises that it will maintain daily oversight of the construction of the cells as part of the implementation of its ISO-9001 certified Quality Management System.

7.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 10 below.

Table 10: Risk rating matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 11 below.

Table 11: Risk criteria table

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		The following criteria has been used to determine the consequences of a Risk Event occurring:		
			Environment	Public health* and amenity (such as air and water quality, noise, and odour)
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale**: mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite impacts wider scale**: low level • Short-term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **onsite impacts**: mid-level • **offsite impacts local scale**: low level • **offsite impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in	Slight	• **onsite impact**: minimal • Specific Consequence Criteria (for	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		**The following criteria has been used to determine the consequences of a Risk Event occurring:**		
			Environment	**Public health* and amenity (such as air and water quality, noise, and odour)**
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale**: mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
	exceptional circumstances		environment) met	public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guideline: Environmental Siting.*

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.*

"onsite**"** means within the Prescribed Premises boundary.

7.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment table 12 below:

Table 12: Risk treatment table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable. Subject to multiple regulatory controls.	Risk Event may be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk Event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled.	Risk Event is acceptable and will generally not be subject to regulatory controls.

7.4 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 6. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 7.1), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 13 and Table 14 below.

Table 13. Identification of emissions, pathway and receptors during construction

Risk Events						Risk rating C = consequence L = likelihood	Applicant controls sufficient?	Conditions of works approval	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Construction of waste cells and infrastructure and positioning of equipment	Earthworks, including for waste cell construction and stormwater infrastructure on unsealed access roads and unsealed ground Machinery operations and/or vehicle movements including reversing beepers Placement of machinery, equipment and infrastructure	Noise and vibration	Temporary workers of Mount Walton IWDF 5 km away	Air/wind dispersion	Amenity impacts	C = Minor L = Rare **Low Risk**	Y	7 – Complaints	Earthworks, including blasting, is likely to create short-lived noise and vibration emissions but the nearest sensitive receptor is a significant distance (5km) away. The Delegated Officer considers it unlikely a Risk Event from noise emissions will occur given that distance. As such, the Delegated Officer considers that noise and vibration can be managed under the general provisions of the *Environmental Protection (Noise) Regulations 1997*.
		Dust	Temporary workers of Mount Walton IWDF 5 km away	Air/wind dispersion	Health and amenity impacts	C = Minor L = Rare **Low Risk**	Y	1-6 – Infrastructure and equipment 7 – Complaints	The movement of plant and equipment during construction works is not expected to generate significant dust emissions. The nearest sensitive receptor is a significant distance (5km) away. The Delegated Officer considers it unlikely a Risk Event from dust emissions will occur given that distance. As such, the Delegated Officer considers that the Applicant's proposed controls are acceptable for the mitigation of dust emissions.
			Surrounding ecosystems, native vegetation and communities		Potential suppression of photosynthetic and respiratory functions	C = Minor L = Unlikely **Medium Risk**	Y	N/A	The Delegated Officer notes that the management of construction impacts from land clearing and adjacent vegetation communities is managed under requirements of the Part IV Ministerial Statement (MS 1078) and does not require further assessment under Part V of the EP Act.
		Light	Temporary workers of Mount Walton IWDF 5 km away	Direct illumination	Amenity impacts	C = Slight L = Rare **Low Risk**	Y	1-6 – Infrastructure and equipment 7 – Complaints	The movement of plant and equipment during construction works is not expected to generate significant light emissions. The nearest sensitive receptor is a significant distance (5km) away. The Delegated Officer considers it unlikely a Risk Event from light emissions will occur given that distance. As such, the Delegated Officer considers that the Applicant's proposed controls are acceptable for the mitigation of light emissions.
	Clearing of native vegetation	Unauthorised vegetation clearing	Native vegetation	Unauthorised clearing	Reduced biodiversity	C = Minor L = Unlikely **Medium Risk**	Y	N/A	The Delegated Officer notes that the management of construction impacts from land clearing and adjacent vegetation communities is managed under requirements of the Part IV Ministerial Statement (MS 1078) and does not require further assessment under Part V of the EP Act.
	Fuel and the chemicals and liquids stored and used on site for use during construction activities	Hydrocarbon and contaminated liquid spills and seepage	Surrounding ecosystems, native vegetation communities and fauna well	Soil contamination and uptake via plant roots	Impacts on vegetation growth and fauna health	C = Minor L = Unlikely **Medium Risk**	Y	1-6 – Infrastructure and equipment	The Applicant proposes that fuel used during construction will be stored and managed in accordance with the Dangerous Goods Safety (Storage and Handling of Non explosives) Regulations 2007 and Australian Standard 1940-:2017 – The storage and handling of flammable and combustible liquids. The Delegated Officer considers that with the short-term storage of relatively small quantities of fuels during construction, the Applicant's proposed controls are acceptable for the Management of hydrocarbons and other liquid spill impacts during construction activities. Discharges of hydrocarbons and other chemicals may also be subject to the provisions of the *Environmental Protection (Unauthorised Discharges) Regulations 2004*.
		Breach of containment causing discharge to land or waters	Surface water bodies within and adjacent to the premises	Contaminated water runoff entering surface water bodies via overland flow	Contamination of waters or deterioration of local/regional surface water ecosystems	C = Minor L = Unlikely **Medium Risk**	Y	1, 3 & 4 – Infrastructure and equipment (stormwater)	

Table 14: Identification of emissions, pathway and receptors during operation, including time-limited operation – permanent isolation

Risk Events						Risk rating C = consequence L = likelihood	Applicant controls sufficient?	Conditions of works approval	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**				
Permanent Isolation of wastes within waste cells	Placement of solid and encapsulated Class IV and Class V wastes within geological repository waste cells Placement of solid and encapsulated Class IV and Class V wastes within geological repository waste cells	Leachate from encapsulated/solidified liquid and sludge wastes	Surrounding ecosystems, native vegetation communities and fauna.	Direct discharge to land and waters	Soil contamination causing impacts to vegetation growth and fauna health	C = Moderate L = Unlikely **Medium Risk**	N	N/A	Aspects of premises operations that relate to the permanent isolation or disposal of wastes are managed under requirements of the Part IV Ministerial Statement (MS1078), in addition to Part V of the EP Act. In particular, the Applicant is required to implement the Leachate Monitoring and Management Plan under MS 1078. Immobilised wastes are not expected to generate leachate, but leachate emissions may occur if the treatment process is inadequate. The Existing Licence L9240/2020/1 was issued with conditions that included the development and verification of immobilisation procedures for liquid wastes to be immobilised. As immobilisation procedures for each waste accepted at the Facility have not yet been provided to DWER, those conditions remain on the Existing Licence. The Delegated Officer also notes that the Applicant has reported non-compliances with these conditions (section 5.4.6). Any leachate generated is expected to be effectively contained within the waste cell, but this may not be the case if the waste cell(s) are not constructed in accordance with the proposed design and construction plans and the Construction Quality Assurance plan. As part of validating the construction works, DWER will require the Applicant to submit a Critical Containment Infrastructure Report (CCIR). **The Delegated Officer considers that permanent isolation in the new waste cells should not be permitted until the CCIR and a licence amendment application have been assessed and a decision to grant been made.**
		Contaminated stormwater	Surrounding ecosystems, native vegetation communities and fauna.	Direct discharge to land and waters	Soil contamination causing impacts to vegetation growth and fauna health	C = Moderate L = Unlikely **Medium Risk**	N	N/A	The Applicant's proposed management and infrastructure controls include the use of an air dome over the active cell to prevent rainfall infiltration, and the diversion of uncontaminated stormwater away from the landfill cells. This is expected to reduce the likelihood of contaminated stormwater impacting the surrounding environment.

8. Determination of Works Approval conditions

The conditions in the issued Works Approval have been determined in accordance with the *Guidance Statement: Setting Conditions*.

Table 18 provides a summary of the conditions to be applied to this works approval.

Table 15: Summary of conditions to be applied

Condition Ref	Grounds
Infrastructure and equipment 1	These conditions are valid and risk-based.
Critical containment infrastructure 2	These conditions are valid, risk-based and contain appropriate controls.
Compliance reporting 3-6	These conditions are valid, risk-based and consistent with the EP Act and the *Industry Regulation Guide to Licensing* (DWER 2019).
Records and reporting 7-9	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.

DWER notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, DWER may initiate amendments to the works approval under the EP Act.

9. Consultation

9.1 Carried out by the Applicant

The Applicant advises that it has undertaken extensive public consultation for the Sandy Ridge Facility as part of Part IV approvals, including the proposed changes to Ministerial Statement 1078 as described in section 5.1.2.

The key stakeholders consulted by the Applicant have included the Marlinyu Ghoorlie Native Title claimant group; local government authorities; community and environmental groups; private-sector service providers, including Indigenous businesses; and the general public.

The Applicant has advised DWER that it signed a Project Native Title Agreement with the Marlinyu Ghoorlie Native Title claimant group in 2019.

9.2 DWER's statutory consultation

Table 16 provides a summary of the consultation undertaken by DWER as part of this works approval assessment.

Table 16: Summary of consultation

Consultation	Comments received	DWER response
Application advertised on DWER website (25/07/2022)	No comments received	N/A
Application advertised in the West Australian (25/07/2022)	No comments received	N/A

Consultation	Comments received	DWER response
Local Government Authority (Shire of Coolgardie) advised of proposal on 27/07/2022	No comments received	N/A
Local Government Authority (Shire of Yilgarn) advised of proposal on 27/07/2022	No comments received	N/A
Department of Planning, Lands and Heritage (DPLH) advised of proposal on 27/07/2022	DPLH responded on 5 August 2022 to advise that: • The location of the Premises does not intersect with any Aboriginal sites or reported Aboriginal Heritage places as currently administered by DPLH. • Previous heritage surveys did not record any objects of archaeological or ethnographic significance within the mine's boundary, and the surveys were undertaken in consultation with representatives of the Kapam Native Title Group, Kelamaia Kabu(d)n, Widji Group and more recently the registered Native Title Applicant; Marlinyu Ghoorlie (MG) Group. • The Applicant has signed a Project Native Title Agreement with the MG Group. • DPLH encourages ongoing consultation and involvement with the MG Group to continue, consistent with section 10.5 of the supporting document. • DPLH has no further comments on the Application.	Noted.
Department of Mines, Industry Regulation and Safety advised of proposal on 27/07/2022	No comments received	N/A
Department of Biodiversity, Conservation and Attractions (DBCA) advised of proposal on 27/07/2022	DBCA replied on 22 August 2022 to advise: • DBCA provided substantial input to the 2015-18 environmental assessment and approval of the facility under Part IV of the EP Act. • DBCA is also aware of the current assessment under Part IV of the EP Act as the proponent is proposing to increase the tonnage of waste accepted at the facility from that approved under MS 1078. • On this basis and noting the capacity for DWER to assess and apply appropriate regulatory measures to prescribed premises under Part V of the EP Act, DBCA has no comments on the application.	Noted.

Consultation	Comments received	DWER response
Radiological Council advised of proposal on 27/07/2022	The Radiological Council replied on 11 August 2022 to advise: • The application has been reviewed by officers of the Radiological Council. No objections have been raised. • Approval has not yet been issued by the Radiological Council to the proponent for disposal of low-level radioactive waste facility, while the operational radiological Safety Case is still under consideration. It is expected that a decision will be made by the council in this regard in the coming months. • However, the requirements and expectations for the construction of disposal cells are appropriately reflected in the supporting documentation to the works approval application. The Radiological Council further advised DWER on 28 October 2022 that the Safety Case had been approved. Amendment of the facility's registration under the *Radiation Safety Act 1975* is in progress.	Noted.
Marlinyu Ghoorlie advised of proposal on 27/07/2022	No comments received	N/A
Koora Retreat Centre Inc advised of proposal 27/07/2022	No comments received	N/A
Dimer Heritage Pty Ltd advised of proposal 27/07/2022	No comments received	N/A
Applicant referred draft documents on 17 November 2022.	The Applicant responded on 24 November 2022. In response to a request from DWER for more information on 28 November 2022, the Applicant responded on 30 November 2022. Refer to Appendix 1 for a summary of the comments received.	Refer to Appendix 1.

10. Conclusion

This assessment of the risks of activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report (available at https://dwer.wa.gov.au/regulatory-documents).

The Delegated Officer has determined that the Application for a works approval for the construction of three new waste cells will be granted.

As stated in Table , the Delegated Officer considers that permanent isolation in the new waste cells should not be permitted until the CCIR and a licence amendment application have been assessed and a decision to grant or refuse has been made.

Based on this assessment, it has been determined that the Works Approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of Applicant comment	DWER response
2	The Application document stated that the waste cells would be nominally 80 m wide, 250 m long and 30 m deep. A condition on the draft works approval stated that the waste cells should be a maximum of 80 m wide, 250 m long and 30 m deep. In addition, the base of the pit must be 5 m above unweathered granite. Tellus requests amending the condition to no greater than 92 metres wide, 247 metres long and 30 metres deep. Updated engineering drawings for Cell 2 have a width of 88 m, greater than the 80 m proposed in the original application. Geotechnical variations can also occur when mining, up to a couple of metres. Maximum pit size is constrained by the Air Dome (95 m wide, 250 m long) and the geotechnical requirement for space between the Air Dome and the pit crest (currently 3.5m each side).	The PER assessed by the EPA prior to MS 1078 stated that, "*Current mine planning is for approximately 25 pits to be constructed. Each mine pit and waste cell would be nominally 120 m long, 60 m wide and 23 m deep (depending on local stratigraphy with a maximum depth of 30 m).*" The PER also stated that the depth of the pit would be 5 m above unweathered granite. DWER will amend condition 2 to state that the maximum size of the waste cells will be 92 metres wide x 247 metres long x 30 metres deep. In addition, the base of the pit must be 5 m above unweathered granite.
2	No drainage sump is required inside the cells at the Sandy Ridge, as they are fully enclosed by the Air Dome.	The PER submitted by Tellus to the EPA stated that, "*There are some waste types which may be placed in a cell without a roof as the materials being placed are not immediately leachable. Any such cell construction would be designed with a drainage sump to enable pumping out of any direct precipitation whilst the cell is open.*" Given that the waste cells will be fully enclosed by the Air Dome during construction and until cell

Condition	Summary of Applicant comment	DWER response
		closure, DWER will remove reference to a drainage sump within the cells.
2	The Applicant may elect to undertake controlled blasting, or (as for Waste Cell 1) may elect to use other mining methods, such as surface mining, under the air dome.	Noted. The wording of condition 2 has been amended to, "After the completion of controlled blasting*, if required, and prior to excavation* of the cell an Air Dome is to be installed over the cell and is to remain in place during the remainder of construction."
2	Information provided in the application included that, "The Air Dome… has been made with a *water-proof* fire-retardant fabric". A condition on the draft works approval stated that the fabric used to construct the Air Dome should have permeability of 10^{-9} m/s. The Applicant responded that as stormwater runs off the air dome to the surrounding drain, and there is no pooling of water on the dome, the key property of the fabric is anti-wicking. The air dome fabric is a Polyvinylidene Fluoride (PVDF) coated, high-tensile strength polyester yarn architectural membrane. The membrane has been designed to achieve non-wicking properties by the selection of polyester yarns, the adhesive coat, and the coating procedure. The application of the adhesive coating compound that fully saturates the base polyester is an effective way to eliminate wicking. Anti-wick polyester yarns are also used. The yarns are treated with a finish by the yarn producer to reduce wicking. A wicking test is performed in accordance with *ASTM D 751 Standard Test Methods for Coated Fabrics* 'wicking of coated cloth' section by immersing a one-inch strip of synthetic resin	The Air Dome is a key control to manage stormwater egress (and therefore leachate) in the waste cells. DWER has amended the condition to state that the fabric of the Air Dome must be constructed in a such a way to prevent pooling and must use anti-wicking fabric, as measured by a "wicking of coated cloth" test performed in accordance with *ASTM D 751 Standard Test Methods for Coated Fabrics*.

Condition	Summary of Applicant comment	DWER response
	coated polyester fabric into a dye water solution.	
2	The fabric used to construct the Air Dome is fire retardant.	Noted.
Schedule 2	The Applicant provided updated engineering design drawings for Cell 2.	Schedule 2 has been updated to reflect the updated design drawings. References to the individual design drawings have also been updated throughout the instrument.
Table 9 of the decision document	In accordance with our Fauna MP required under MS1078, we record feral sightings. If numbers increase, we investigate the need for control measures in consultation with DBCA. Baiting was last conducted about a year ago, and there has not been any significant sightings since. Fox proof fencing was also installed at the putrescible landfill.	Noted. This part of the table (windblown waste) has been edited to say, “The Fauna Management Plan required under MS 1078 includes controls for feral pests. This includes baiting and monitoring.” The putrescible landfill is excluded from the licence and is covered in a separate registration under the EP Regs (R2501/2020/1).
Decision document	Correction of a management plan document title and other minor typographical errors.	These have been corrected in the final report.