

# Leachate Monitoring and Management Plan

## Sandy Ridge



Effective Date: 7<sup>th</sup> May 2020

Version Date: 7<sup>th</sup> July 2026

Version 2

**Company Proprietary Information**

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## ABBREVIATIONS

| Term     | Definition                                                                      |
|----------|---------------------------------------------------------------------------------|
| CAR      | Compliance Assessment Report                                                    |
| DAWE     | Department of Agriculture, Water and Environment (now DCCEEW)                   |
| DBCA     | Department of Biodiversity, Conservation and Attractions                        |
| DCCEEW   | Department of Climate Change, Energy, the Environment and Water (formerly DAWE) |
| DGMMP    | Deep Groundwater Monitoring and Management Plan                                 |
| DEMIRS   | Department of Energy, Mines, Industry Regulation and Safety                     |
| DPLH     | Department of Planning, Lands and Heritage                                      |
| DWER     | Department of Water and Environmental Regulation                                |
| EPA      | WA Environmental Protection Authority                                           |
| EPBC Act | Environmental Protection and Biodiversity Conservation Act 1999                 |
| GAP      | Groundwater Analysis Plan                                                       |
| GL/a     | Gigalitres per annum                                                            |
| ICP      | Institutional Control Period                                                    |
| ISO      | International Standards Organisation                                            |
| LLW      | Low Level Radioactive Waste                                                     |
| LMMP     | Leachate Monitoring and Management Plan                                         |
| LOR      | Limit of Reporting                                                              |
| mbgl     | metres below ground level                                                       |
| MS 1078  | Ministerial Statement Number 1078                                               |
| MS 1234  | Ministerial Statement Number 1234                                               |
| NEMP     | National Environmental Management Plan                                          |
| NEPM     | National Environment Protection Measures                                        |
| PAH      | Polycyclic Aromatic Hydrocarbons                                                |
| QA       | Quality Assurance                                                               |
| SWL      | Standing Water Level                                                            |
| Tellus   | Tellus Holdings Ltd                                                             |
| TRH      | Total Recoverable Hydrocarbons                                                  |
| WA       | Western Australia                                                               |
| WFDCMP   | Waste Facility Decommissioning Closure Management Plan                          |

## RELEVANT MANAGEMENT PLANS

Additional aspects and impacts related to leachate monitoring and management are included in the following management plans.

| Document No.  | Management Plan                                             | Aspect / Impact Related to Leachate |
|---------------|-------------------------------------------------------------|-------------------------------------|
| SR-11-MPL-003 | Deep Groundwater Monitoring & Management Plan – Sandy Ridge | Groundwater monitoring              |
| SR-09-MPL-003 | Waste Facility Decommissioning Closure Plan – Sandy Ridge   | Soil monitoring programme           |

## DOCUMENT STRUCTURE

The structure of this Leachate Monitoring and Management Plan (LMMP) is based on the template requirements detailed in the 'Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans' (EPA, 2024).

Table 1.1 lists the requirements as set out in WA EPA (2024) and shows where these requirements are addressed within this LMMP.

| Reference<br>(as per WA EPA Oct 2021) | Template Requirement<br>(as per WA EPA Oct 2021) | Location in LMMP |
|---------------------------------------|--------------------------------------------------|------------------|
| <b>1.</b>                             | Executive Summary                                | Page 8           |
| <b>2.</b>                             | Context, scope and rationale                     | Section 1        |
| 2.1                                   | Proposal                                         | Section 1.1      |
| 2.2                                   | Key environmental factors                        | Section 1.2      |
| 2.3                                   | Condition requirements                           | Section 1.3      |
| 2.4                                   | Rationale and approach                           | Section 1.4      |
| <b>3.</b>                             | LMMP components                                  | Section 2        |
| <b>4.</b>                             | Adaptive management and review of the LMMP       | Section 3        |
| <b>5.</b>                             | Stakeholder consultation                         | Section 4        |
| <b>6.</b>                             | Changes to LMMP                                  | Section 5        |

## EXECUTIVE SUMMARY

| Aspect                       | Summary                                                                                                                                                                          |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Facility name                | Sandy Ridge Facility                                                                                                                                                             |
| Proponent name               | Tellus Holdings Ltd                                                                                                                                                              |
| Ministerial Statement number | MS 1234 (superseding MS 1078 and MS 1152)                                                                                                                                        |
| Purpose of the LMMP          | Monitoring, management and reporting actions for terrestrial environmental quality in accordance with the relevant conditions of MS 1234.                                        |
| Key environmental factors    | Terrestrial Environmental Quality<br>Inland Waters (Surface water and Groundwater)                                                                                               |
| Key environmental outcome    | The Site will be operating in such a manner that the outcome in Condition B5-1(1) of MS 1234 is achieved before the commencement of Phase I of the Institutional Control Period. |
| Key environmental objective  | Avoid where practicable, or otherwise minimise, contamination of soil quality and soil pore water.                                                                               |
| Condition clauses            | B1-2, B1-3, C4                                                                                                                                                                   |
| Project status               | Construction: Completed October 2020<br>Operations: Commenced October 2020                                                                                                       |

## 1 CONTEXT, SCOPE AND RATIONALE

### 1.1. Proposal

Tellus Holdings Ltd (Tellus) owns and operates the Sandy Ridge Facility (the Facility, the Project, the Site), Australia's only continuously operating commercial scale near-surface geological repository for Class IV and V wastes. At the Site, kaolin is mined for later use (e.g. for cell capping, or potential export to Asia or the domestic ceramics market), and then Class IV and V, intractable and low-level radioactive wastes (LLW) are disposed of within the void spaces created because of the mining operations. The Facility is located approximately 75 kilometres (km) northeast of Koolyanobbing, in the Shire of Coolgardie (Figure 1-1).

The Facility received initial approval from the WA Government under Ministerial Statement 1078 (MS 1078) on 26 June 2018, pursuant to the Environmental Protection Act 1986 (WA) and from the Commonwealth Government under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) on 7 January 2019 (EPBC 2015/7478).

Schedule 1 of MS 1078 authorised up to 100,000 tonnes per annum (tpa) of Class IV and V waste to be accepted at the gate of its Sandy Ridge Facility, and up to 280,000 tpa of waste (including treated waste) to be disposed of into the waste cells. On 9 July 2021, Tellus submitted a referral to the WA Environmental Protection Authority (EPA) under Section 38 of the EP Act, proposing to align the tonnage of waste received at the gate with the approved tonnage of waste permitted for permanent isolation in the Site's waste disposal cells (i.e., up to 280,000 tpa). A subsequent amendment under Section 46 was granted via MS 1152 relating to Financial Assurance requirements.

A revised proposal was submitted on 9 July 2021 to align the approved quantity of waste disposed (up to 280,000 tonnes per annum) with the volume received at the gate. This proposal was formally assessed at the Public Environmental Review (PER) level. The Environmental Review Document (ERD) was published in October 2023, and the EPA issued Report 1767 in June 2024. Following the EPA's assessment of the significant amendment to the proposal, MS 1234 was issued on 13 December 2024, and superseded MS 1078 and MS 1152.

The authorised extent of physical and operational elements of the Facility are listed in Table 1-1.

**Table 1-1 Authorised extent of physical and operational elements of the Facility**

| Element                                                 | Proposed extent                                                                                                      |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Physical elements</b>                                |                                                                                                                      |
| Mine pits/waste cells                                   | Clearing up to 202.3 ha of native vegetation within a 1,061 ha development envelope                                  |
| Associated infrastructure                               | Clearing up to 73.75 ha of native vegetation within a 1,061 ha development envelope                                  |
| Waste cap design                                        | 2.0 metres (m) capillary break (screened and gap-graded material)                                                    |
| <b>Operational elements</b>                             |                                                                                                                      |
| Wastes permitted                                        | Acceptance of only Class IV & V waste                                                                                |
| Class IV and V wastes accepted at gate                  | Up to 280,000 tonnes tpa                                                                                             |
| Waste (including treated waste) disposed to waste cells | Up to 280,000 tpa                                                                                                    |
| Waste origin                                            | Only wastes generated within WA, other Australian States and Territories, and the Australian Exclusive Economic Zone |
| Water use                                               | Up to 0.18 Gl/a                                                                                                      |

| Element                                | Proposed extent                          |
|----------------------------------------|------------------------------------------|
| Wastes permitted                       | Acceptance of only Class IV & V waste    |
| Class IV and V wastes accepted at gate | Up to 280,000 tonnes tpa                 |
| <b>Timing elements</b>                 |                                          |
| Maximum temporary surface storage time | Up to 12 months, or as agreed by the CEO |
| Project life                           | 25 years                                 |

### 1.1.1. Purpose of this document

Condition 9 of MS 1078 require that a Leachate Monitoring and Management Plan (LMMP), was prepared and implemented to meet the environmental objective to minimise impacts on soil quality. The LMMP provides direction and guidance on leachate monitoring and management during the operation of the project.

Condition B1-3 of MS 1234 requires the following:

*The proponent must review and revise the Leachate Monitoring and Management Plan (Version E, 7 May 2020) so that it satisfies the requirements of condition C4 and demonstrates how the achievement of the Terrestrial Environmental Quality environmental outcomes in condition B1-1 and objectives of B1-2 will be monitored and substantiated and submit to the CEO.*

This LMMP has been prepared to address the requirements of Condition B1-3 and supersedes the May 2020 LMMP.

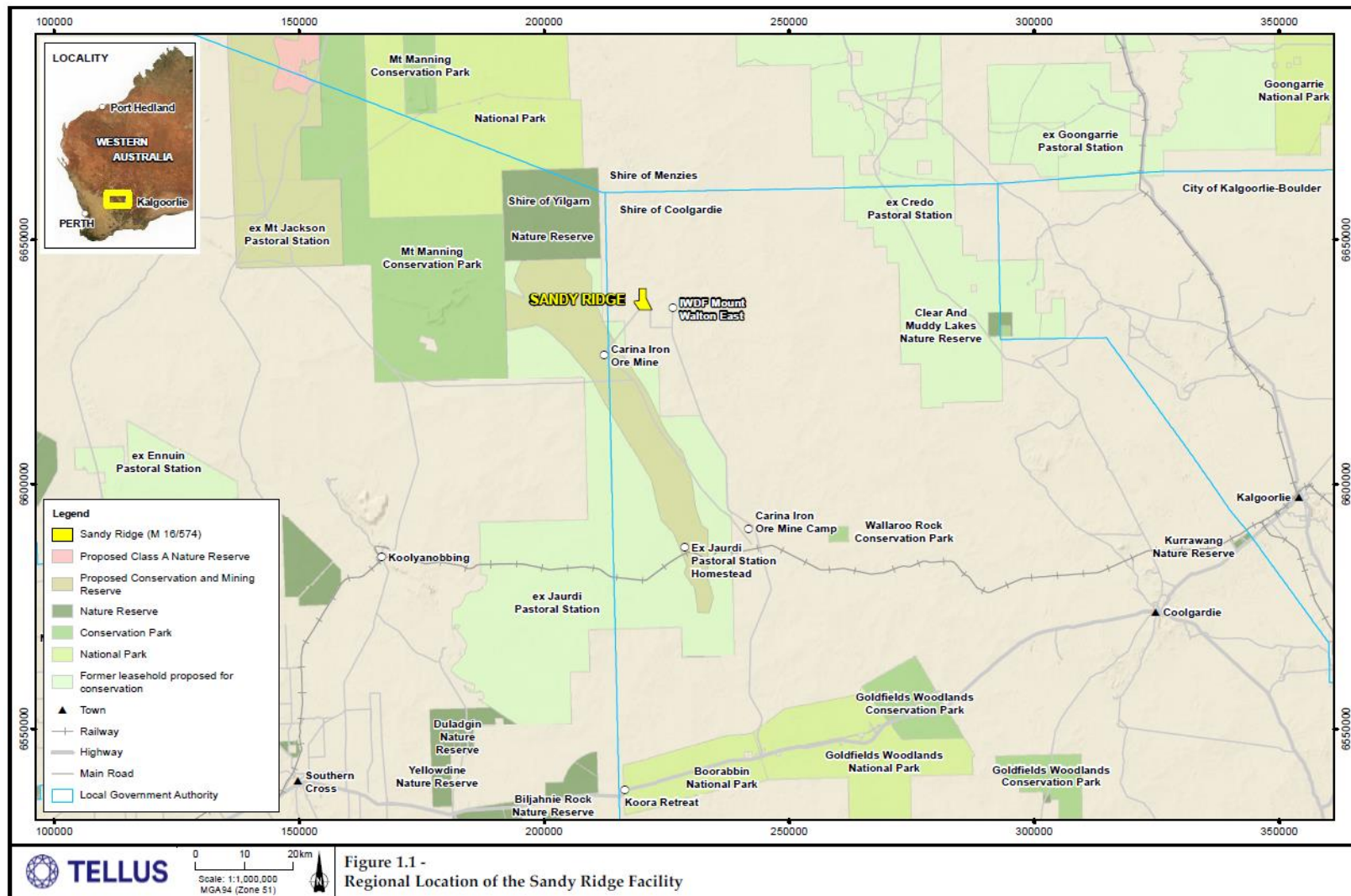


Figure 1-1: Regional location of the Sandy Ridge Facility

## 1.2. Key Environmental Factors

The LMMP demonstrates how the EPA's objectives for key Environmental Factors are met.

Whilst MS1234 identifies Terrestrial Environmental Quality as the Key Environmental Factor, the EPA's environmental factor of inland waters is indirectly related to terrestrial environmental quality, in that if soil quality was impacted by activities at the Facility, surface water and groundwater quality may also be impacted if there were an established pathway.

Accordingly, Table 1-2 lists both of these environmental factors, the Environmental Protection Authority's (EPA) objective and the potential impacts associated with leachate generation.

**Table 1-2 Environmental Factors, Objectives and Potential Impacts**

| Environmental Factor                                                              | EPA Objectives                                                                                                                | Potential Impacts                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Terrestrial Environmental Quality (Soil quality, land integrity, soil pore water) | Avoid where practicable, or otherwise minimise, contamination of soils and soil pore water.                                   | Potential contamination of the receiving environment as a result of leachate generation arising from: <ul style="list-style-type: none"> <li>• Direct precipitation into a cell during operations</li> <li>• Surface water inflow to a cell</li> <li>• Cell cap failure</li> <li>• Liquid waste being placed into the cell</li> <li>• External recharge</li> <li>• Surface water runoff from above-ground waste handling and storage.</li> </ul> |
| Inland Waters (surface or groundwater) <sup>1</sup>                               | To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected. |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## 1.3. Condition Requirements

Table 1-3 lists the MS1234 conditions that directly address Terrestrial Environmental Quality and identifies where each requirement is addressed in this LMMP. Elements of Condition B5-1 relating to rehabilitation and decommissioning and long-term stability (items 1 and 2) are addressed in the Waste Facility Decommissioning and Closure Plan (WFDCCP), while item 3 is addressed in Section 2.1 of this LMMP.

**Table 1-3 Applicable Ministerial Conditions**

| Condition                                | Requirement                                                                                                                                                                                                                                                                                                                                                                                        | Where addressed |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Terrestrial Environmental Quality</b> |                                                                                                                                                                                                                                                                                                                                                                                                    |                 |
| B1-1                                     | The proponent must implement the proposal to achieve the following environmental outcome:<br>(1) Site will be operating in such a manner such that the outcome in B5-1(1) is achieved before the commencement of Phase I of the Institutional Control Period.                                                                                                                                      | Section 2.1     |
| B1-2                                     | The proponent must ensure that the implementation of the proposal achieves the following environmental objective:<br>(1) Avoid where practicable, or otherwise minimise, contamination of soil quality and soil pore water.                                                                                                                                                                        | Section 2.2     |
| B1-3                                     | The proponent must review and revise the <i>Leachate Monitoring and Management Plan (Version E, 7 May 2020)</i> in order to demonstrate that it satisfies the requirements of condition C4 and demonstrates how the achievement of the Terrestrial Environmental Quality environmental outcomes in condition B1-1 and objectives of B1-2 will be monitored and substantiated and submit to the CEO | This document   |

| Condition | Requirement                                                                                                                                                                                                                                                                                                                                                                                                               | Where addressed                                 |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| B5-1      | The proponent must implement the proposal to ensure the following environmental outcomes are achieved: (1) Site will be rehabilitated, remediated, and decommissioned to ensure it is physically safe to members of the public and non-human biota in the long term, (2) Site is geotechnically and geomorphically stable in the long term, and (3) Site is chemically and radiologically non-polluting in the long term. | Items 1 & 2:<br>WFDCP<br>Item 3:<br>Section 2.1 |

#### 1.4. Rationale and approach

This LMMP provides the framework for monitoring and managing potential leachate risks at the Sandy Ridge Facility. The rationale is to demonstrate how Tellus will achieve outcome-based conditions under MS 1234 by linking monitoring indicators with clear triggers, thresholds, and management responses. The approach integrates engineering controls, waste acceptance provisions, and groundwater monitoring to ensure that the Facility continues to meet environmental outcomes during operations, closure, and the Institutional Control Period.

##### 1.4.1. Environmental outcome or management objective/s

The key environmental outcome, consistent with MS 1234 Condition B1-1(1), is that the Facility remains physically safe and does not cause significant changes to soil or groundwater quality. This relates directly to the potential impact identified in the Environmental Review Document — the generation and migration of leachate from waste cells.

Monitoring and management assist in demonstrating compliance with this outcome by:

- Establishing conservative, site-specific trigger and threshold criteria for groundwater quality and standing water levels.
- Conducting regular monitoring to provide early warning of deviations from baseline conditions.
- Investigating and addressing any exceedance of triggers before thresholds are reached.
- Maintaining multiple lines of defence, including waste acceptance controls, engineered capping, and adaptive management, to minimise leachate risk and safeguard terrestrial environmental quality.

##### 1.4.2. Survey and study findings

Between 2015 and 2021, numerous site surveys and studies were undertaken to assess, analyse and describe (qualitatively and quantitatively) baseline soil and groundwater conditions. Findings relevant to this LMMP are outlined in Sections 1.4.2.1 to 1.4.5.

A full list of the surveys and studies may be found in the documents referred to the EPA for assessment under the EP Act.

###### 1.4.2.1. Site characteristics

The Facility is located in remote region of Western Australia, at an approximate palaeo-valley divide near the top of a surface water catchment between the Raeside and Rebecca palaeo-drainages.

Important characteristics of this location with respect to the Facility include:

- Semi-arid desert climate with low rainfall and high evaporation rates
- Extensive natural kaolin clay barrier within the deep weathering profile
- Absence of surface water receptors
- Flat topography with low rates of erosion
- No regional aquifer, as near a groundwater divide between two palaeo-valleys.
- Remote location away from population centres.

Annual average rainfall at Sandy Ridge was 276.5 mm between 2016 and 2024, while annual evaporation exceeded 2,400 mm. Under these conditions, the sporadic rainfall events (which may be intense), result in local runoff, and infiltration into the thin aeolian surface sand. However, during subsequent dry periods, evaporation and evapotranspiration act to remove this rainfall infiltration from the top few metres of soil, which results in little if any net recharge to any isolated pockets of groundwater that may occur in the landscape (CyMod, 2021).

The Development Envelope has low relief that consists of flat to gently undulating plains and low rises, typical of landscapes in the WA Goldfields region.

#### 1.4.2.2. Lithology

The geology at Sandy Ridge comprises a thick weathering profile developed over Archaean granite basement (~2.7 billion years). The sequence typically includes a thin surface layer of aeolian sand, a laterally extensive silcrete cap, a thick kaolin clay unit, and a gradual transition through saprock into weathered granite before fresh basement is encountered (Figure 1-2). This lithological profile, particularly the silcrete and kaolin units, forms a natural, low-permeability barrier that restricts vertical water movement consistent with investigations by Rockwater (2015), CyMod (2016), and Geo9 (2019).

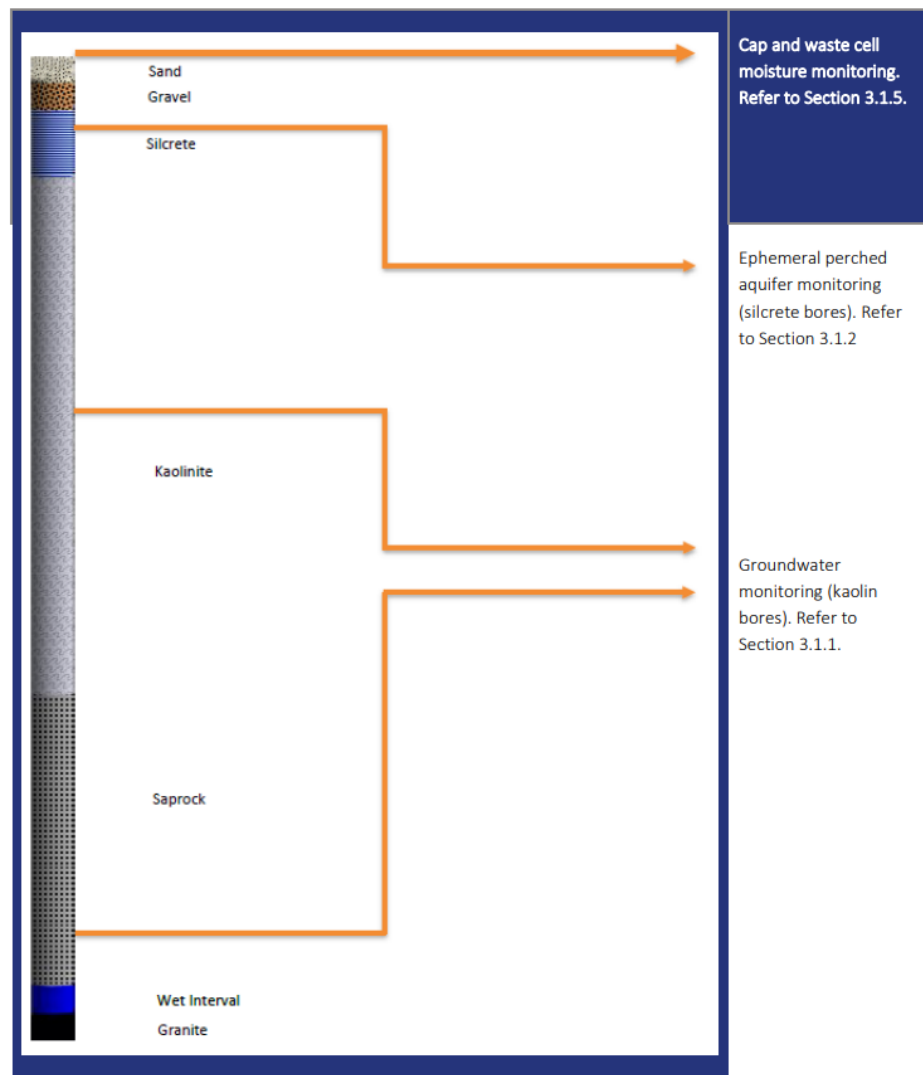


Figure 1-2 Typical lithology at the Sandy Ridge Facility

### 1.4.2.3. Hydrogeology

Hydrogeological investigations since 2015 (Rockwater 2015; CyMod 2016, 2021, 2022; Geo9 2019) confirm that groundwater at Sandy Ridge is relict, stagnant, and confined to isolated basement depressions within the weathered granite profile. No laterally connected aquifers have been identified.

Key hydrogeological findings include:

- Recharge is negligible under the prevailing semi-arid climate, where annual rainfall (<300 mm) is greatly exceeded by evaporation (>2,400 mm).
- Groundwater occurs only in natural basement lows, which act as hydraulically isolated sumps disconnected from regional systems.
- Groundwater movement is extremely slow, with residence times in the unsaturated zone estimated at ~400,000 years (CyMod 2016).
- Monitoring confirms standing water levels are typically 30–42 m below ground level, with water columns generally less than 10 m
- Six silcrete bores are generally dry, with only ephemeral water columns recorded after major rainfall events; these dissipate within days.

### Seismo-electric survey

Seismo-electric data (Figure 1-3) provides relative permeability profiles across a transect of drillholes (117–136) in the central portion of the Development Envelope.

The results demonstrate uniformly low permeability throughout the weathered granite profile, confirming that groundwater movement is highly restricted. A single localised anomaly was detected at Point 117, where slightly elevated permeability coincides with a basement low. Correlation with drilling data indicates that this feature represents a hydraulically isolated sump rather than a connected flow pathway (Geo 2019).

The seismo-electric survey findings support the conceptual model that groundwater at Sandy Ridge is confined to isolated depressions, with no laterally connected aquifers and negligible potential for contaminant migration.

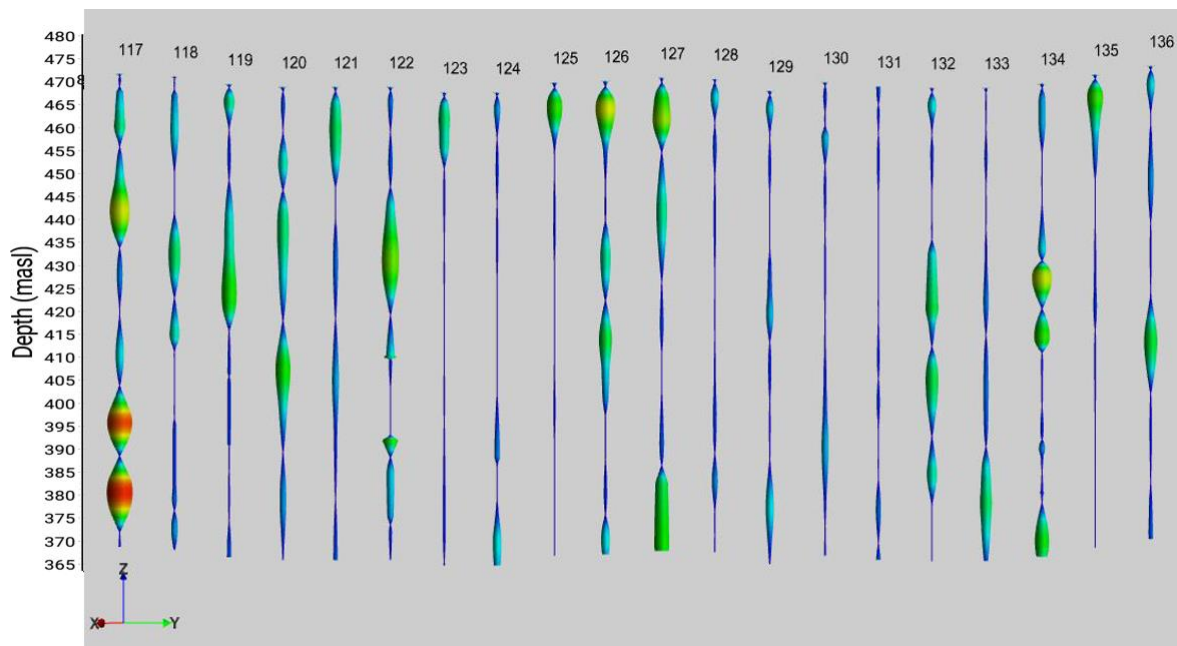


Figure 1-3 Data traces show relative permeability from the surface to end of drill holes metres above sea level (masl)

## Hydrological update – CyMod 2021 and 2022

CyMod (2021) reviewed its original 2016 hydrogeological model and incorporated findings from the 2019 Geo9 investigations and field measurements collected between 2015 and 2021. This review confirmed that the conceptual model remains valid and that groundwater at Sandy Ridge is confined, with no evidence of lateral connectivity.

A further update by CyMod (2022) reinforced these conclusions, finding that groundwater mounding or lateral seepage from waste cells is unlikely. The combination of waste cell design and local geology minimises the potential for leachate plume formation or migration beyond the Facility.

## Conceptual site model

A comprehensive review of environmental baseline data from 2015 to 2021 enabled Tellus to validate the conceptual site model (CSM). CyMod (2021) confirmed that it is unlikely groundwater mounding or lateral flow seepage will occur in the vicinity of the cell, and any seepage stored in a saturated zone on fresh/fractured granite would result in groundwater movement measured in thousands of years.

Specifically, the basic conceptual hydrogeological model reaffirms that unsaturated groundwater flow from rainfall recharge migrates vertically, through the soil profile, until it reaches the interface between the overlying weathered granite or fractured granite and fresh unweathered granite (refer to Figure 1-4). This process has occurred over hundreds of millions of years in this landscape.

The low rainfall recharge implied by the lack of groundwater in the area is supported by the prevailing climatic conditions with annual rainfall generally less than 300 mm and evaporation exceeding 2,400 mm per annum. Sporadic rainfall events (which may be intense) result in local runoff, and infiltration of rainfall into the thin aeolian surface sand. However, during subsequent dry periods, evaporation and evapotranspiration act to remove this rainfall from the top two metres of soil, which results in little if any net recharge (Cymod Systems, 2022).

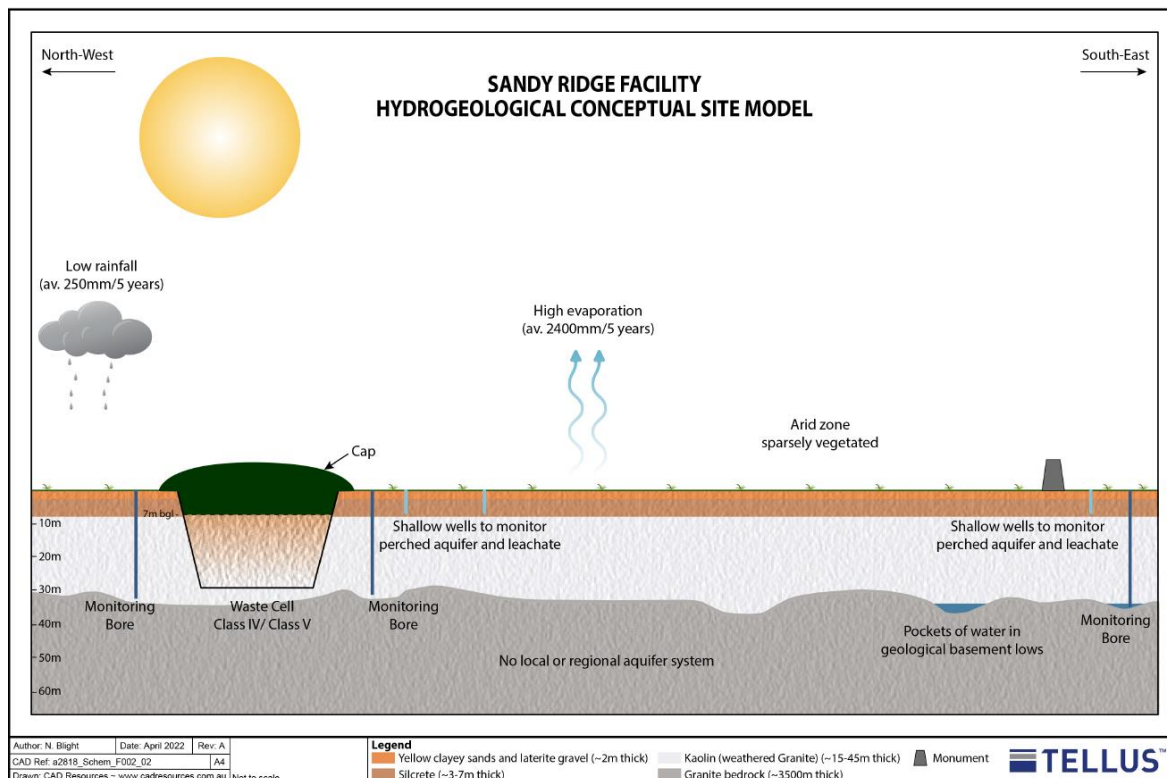


Figure 1-4 Conceptual Hydrogeological Model

#### 1.4.2.4. Groundwater

##### Groundwater quality

A baseline groundwater quality assessment was undertaken between April and September 2020 to establish site-specific trigger and threshold criteria. Twelve monitoring events were conducted fortnightly over six months. Five kaolin bores and the deep granite bore were selected for sampling on the basis that they contained sufficient water (>1 m water column) and were located within 1 km of Cell 1. Silcrete bores were excluded due to their typically dry nature.

Sampling included measurement of standing water level (SWL), field screening, and laboratory analysis. A total of 140 analytes were assessed, covering major ions, metals, hydrocarbons, PFAS, pesticides, PCBs, radionuclides, and other potential contaminants. Triggers and thresholds developed from baseline and subsequent review by GHD are discussed in Section 2.1.3.2.

Groundwater at Sandy Ridge is neutral to slightly acidic (average pH 6.5), marginally brackish to saline (average EC 9,600  $\mu\text{S}/\text{cm}$ ), and chemically similar across wells and events, with Piper diagrams showing no discernible differences.

Since completion of the baseline assessment, groundwater monitoring has been conducted biannually at the same six bores. The most recent event (April 2026) analysed 73 analytes. Of these, 59 were below detection limits at all bores, and only one analyte (Sum of PFAS WA DWER list), exceeded interim triggers at one or more bores. No threshold exceedances were recorded.

Table 1-4 Summary of Baseline Laboratory Analytical Results provides a summary of the laboratory analytical results associated with potential operational waste streams. Baseline and subsequent monitoring results have been used to inform the development of site-specific trigger and threshold criteria for groundwater, which are discussed further in Section 2.1.

**Table 1-4 Summary of Baseline Laboratory Analytical Results**

| Suite         | Status                     | Rationale                                                                                                                 |
|---------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------|
| PCBs          | <b>Absent</b>              | Not detected above laboratory limit of reporting (LOR)                                                                    |
| OC/Ops        |                            |                                                                                                                           |
| BTEX          |                            |                                                                                                                           |
| Metals        | <b>Present<sup>1</sup></b> | Commonly detected above LOR                                                                                               |
| Nutrients     |                            |                                                                                                                           |
| Radionuclides |                            | Radium-226, Radium-228, Thorium-228, Thorium-230, Thorium-232, Uranium-238, gross alpha and gross beta detected above LOR |
| PAH           | <b>Limited</b>             | Detected at low concentrations in three samples from kaolin bores                                                         |
| Cyanide       |                            | Detected in seven samples                                                                                                 |
| PFAS          |                            | Detected above LOR in some samples                                                                                        |
| TRH           |                            | Detected above LOR in samples from some kaolin bores                                                                      |

1. Results not caused by operational activities (as the site was not operational) and most likely reflective of naturally occurring background conditions and/or a result of bore installation/gauging/sampling and analysis (in some cases) at very low (ultra-trace concentrations).

##### Standing Water Level (SWL)

The groundwater monitoring network at Sandy Ridge comprises 22 bores (21 in kaolin and one in granite; Figure 1-5 Standing water level of monitoring bores located within 1km of Cell 1 that contain more than 1m of water column (June 2020 – April 2025)), of which nine are consistently dry. Standing water levels (SWL) range from 29.5

to 42.1 m below ground level. Water columns in the kaolin bores range from 0 to 9.3 m, while the deep granite bore contains a 62 m water column.

Monitoring since 2015 has shown only minor variability in SWL, consistent with barometric pressure changes, with no evidence of seasonal recharge or long-term trends. Notably, four kaolin bores located immediately around Cell 1 (SRMB168–171; Figure 2-1) have remained dry throughout the monitoring record. This indicates an absence of groundwater and leachate in the vicinity of the active cell during the monitoring period, providing confidence in the effectiveness of existing leachate-prevention controls.

Six additional silcrete bores, with bottom-of-casing depths between 1.49 and 2.77 m, are also typically dry. Following significant rainfall events (>40 mm in 24 h), ephemeral water columns of up to 0.4 m may be observed for short periods. When present, these shallow perched waters dissipate rapidly, with bores typically returning to dry conditions within 0–7 days after the rainfall event.

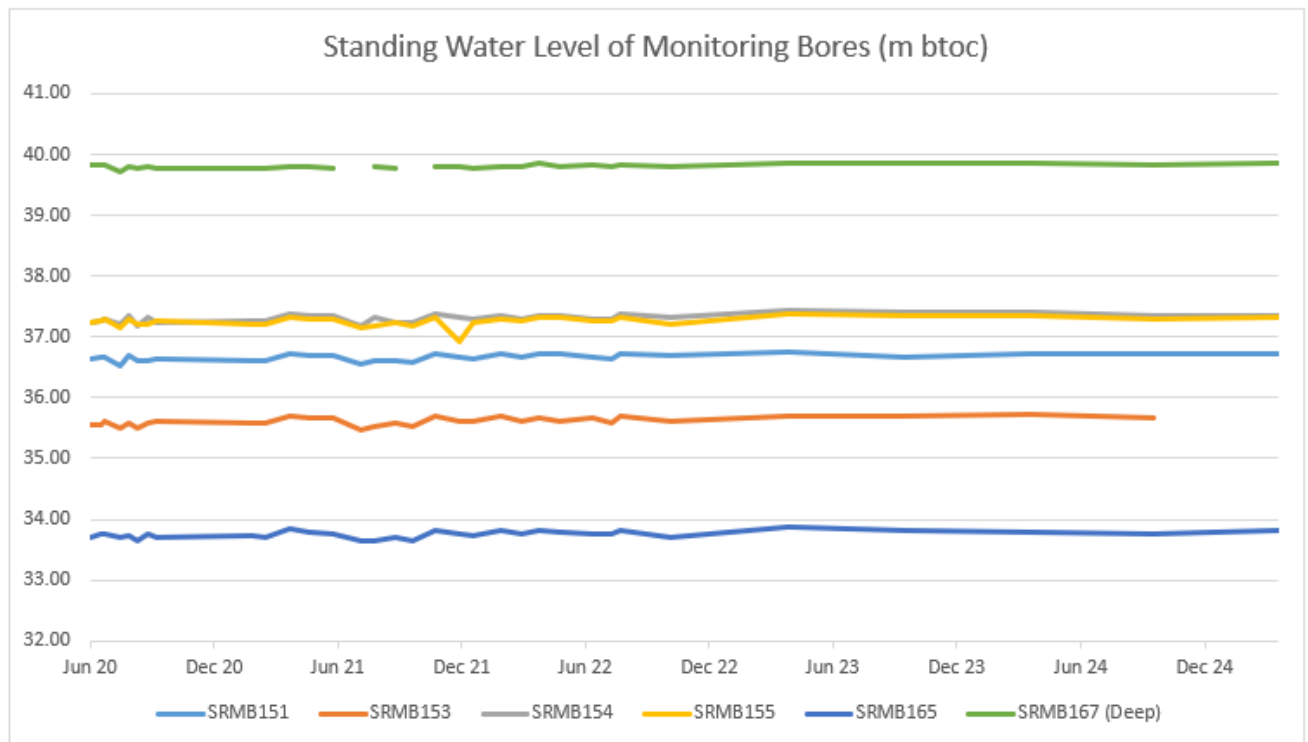


Figure 1-5 Standing water level of Sandy Ridge monitoring bores containing a water column (June 2020 – April 2026)

#### 1.4.2.5. Soil

Since the publication of the Sandy Ridge PER (2015), Tellus has undertaken additional soil baseline sampling to establish a dataset for comparison with future monitoring and to develop trigger and threshold criteria.

Two campaigns were completed:

- April 2019 – ~210 samples collected within the Crown Lease boundary, analysed for heavy metals, radionuclides, and asbestos (Landloch, 2020).
- January 2020 – ~50 samples collected along the Mt Walton Access Road and Facility Access Road, analysed for heavy metals, inorganics, radionuclides, PFAS, PCBs, and asbestos (Landloch, 2020).

The 2020 baseline results showed:

- No exceedances of NEPM HILs.
- Elevated background chromium and nickel relative to EIL-1, attributed to natural geological variability.

- No exceedances of commercial/industrial or urban residential guideline values.

Follow-up monitoring in January 2023 confirmed that soil concentrations of heavy metals, asbestos, PCBs, and PFAS remained consistent with baseline and below relevant NEMP HIL B levels. No elevated radionuclide activity was detected adjacent the Radiation Storage Yard, confirming that existing controls are effectively preventing soil contamination.

It is noted that soil quality is a poor indicator of leachate risk, as surface soils are isolated from subsoils by an impermeable silcrete layer. If leachate were to occur beneath the silcrete, it would not migrate upward into surface soils. Instead, groundwater quality monitoring provides a more sensitive and reliable early indicator of leachate generation. Notwithstanding this, soil monitoring remains valuable for detecting potential surface impacts such as spills, dust deposition, or other localised contamination from site activities.

### **1.4.3. Engineering and Operational Controls**

The rationale for this LMMP is that risks to soil quality and soil pore water are avoided where practicable, and otherwise minimised, through multiple, complementary lines of defence. These include preventing infiltration, eliminating free liquids, and ensuring long-term containment integrity. Together, these controls underpin the monitoring framework presented in Section 2.

#### **1.4.3.1. Inflatable Air Dome**

During operations, the first line of defence against leachate generation is the prevention of rainfall infiltration into active waste cells. This is achieved through the use of an inflatable dome that covers the open cell to divert rainfall prior to final capping. The dome ensures that water ingress is prevented while wastes are being emplaced, significantly reducing the potential for leachate generation during the operational phase.

#### **1.4.3.2. Waste Acceptance**

The second line of defence against leachate generation is the control of waste inputs. In accordance with Licence L9240/2020/1, liquid wastes must be solidified before disposal. Only solidified liquid wastes are permitted for permanent isolation within waste cells. This requirement is implemented through Tellus' waste acceptance procedures, which provide front-end controls to minimise the potential for leachate generation.

#### **1.4.3.3. Cap Design**

The waste cell caps at Sandy Ridge are engineered to minimise the potential for water ingress and subsequent leachate generation, while allowing for some settlement of the underlying waste. Subsidence is expected post-capping, but acceptable tolerances are defined in the Waste Facility Decommissioning and Closure Management Plan (WFDCMP).

The caps are constructed from natural granular materials that maintain integrity under differential movement and do not fracture or tear. Localised subsidence, if it occurs, is typically short-lived and can be remediated by placing additional compacted fill to remove low points that might otherwise pool water.

Each cell is ultimately sealed with a final capping layer designed to:

- Promote runoff and minimise infiltration.
- Provide a low-permeability barrier and store-and-release capacity.
- Resist erosion over the long term.

The final capped surface is covered with soil and revegetated in accordance with the WFDCMP, ensuring long-term stability, water-shedding capacity, and compatibility with the surrounding environment.

The combined controls: preventing rainfall ingress with the inflatable dome, avoiding the placement of free liquids in accordance with licence conditions, and sealing cells with robust engineered caps, provide multiple, complementary barriers to protect soils and groundwater. Supported by ongoing soil-moisture and groundwater

monitoring, these measures make the likelihood of leachate generation at Sandy Ridge extremely low, even beyond the 100-year Institutional Control Period (ICP).

#### 1.4.4. Key assumptions and uncertainties

The LMMP has been prepared using the best available knowledge; however, several key assumptions and uncertainties influence the assessment of leachate risk and the design of monitoring. These include:

- Climatic factors outside of Tellus' control, particularly the frequency and magnitude of extreme rainfall events under a changing climate, which could influence the potential for leachate.
- The accuracy and representativeness of baseline survey results, including limitations from analytical detection limits and natural geochemical variability.
- Continued performance of engineered controls (inflatable dome, waste acceptance procedures, capping systems) in line with their design specifications.
- The validity of the current conceptual hydrogeological model, which assumes groundwater is confined to isolated basement depressions with negligible lateral connectivity.
- The representativeness of the groundwater monitoring network, which assumes that the selected bores and probes adequately capture potential changes near waste cells.

Any additional assessments, monitoring results, or changes in legislation, regulations, or best practice guidelines may necessitate revision of this Plan and will be managed in accordance with Section 3.

#### 1.4.5. Risk-based approach

This LMMP has been developed using a risk-based approach that outlines management provisions to minimise risks. A risk assessment of the key environmental factors was undertaken for the Revised Proposal, based on the broad definitions, methodology and principles defined in AS/NZS ISO 31000:2018. The risk significance is presented on a continuum of 'eliminated', 'low', 'medium', 'high' and 'extreme'. Appendix B presents a risk assessment of the risks related to leachate.

Raw risk levels represent risks in the absence of controls or mitigation. The risk assessment indicated the following high and medium-level raw risks associated with leachate:

High risks:

- Leak/spill generation of leachate to contaminate groundwater
- Contamination of groundwater from waste in disposal cells after capping

Medium risk:

- Potential subsidence and instability of a waste cell allowing infiltration of water and generation of leachate
- Actions for mitigation and management of these risks are detailed in Section 2 of this LMMP. Mitigation and management reduced the level of these risks to low.

#### 1.4.6. Rationale for choice of indicators

For outcome-based environmental conditions, Tellus has utilised a trigger and threshold system for monitoring and reporting. If a trigger is met, it will prompt Tellus to employ early response investigations that look into the cause of change in environmental condition/quality that causes this trigger to be met. Triggers and thresholds are detailed in Section 2. Trigger levels relating to environmental outcomes of MS 1234 have been chosen conservatively to provide early warning for investigations before threshold levels are approached.

Tellus intends that the environmental criteria and performance indicators established for groundwater at the Facility be:

- Measurable
- Effective for tracking potential changes to recorded background/baseline conditions
- Scientifically credible through rigorous sampling procedures, laboratory analysis and QA/QC linked to ISO 9001 and ISO 14001
- Unambiguous and easily understood
- Consistent with techniques used in Australia
- Repeatable and easily monitored over the operational period and Institutional Control Period (ICP).

## 2 LEACHATE MONITORING & MANAGEMENT PLAN COMPONENTS

### 2.1. Outcome-based condition B1-1

Condition B1-1 of MS 1234 requires that the Facility is operated in a manner that achieves the long-term outcome set out in Condition B5-1(1) (Table 2-1).

**Table 2-1 Outcome-based condition**

| Outcome-based condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Condition B1-1</b></p> <p>The proponent must implement the proposal to achieve the following environmental outcome:</p> <p>(1) Site will be operating in such a manner that the outcome in B5-1(1) is achieved before the commencement of Phase 1 of the Institutional Control Period.</p> <p><b>Condition B5-1(1)</b> states: Site will be rehabilitated, remediated, and decommissioned to ensure it is physically safe to members of the public and non-human biota in the long term.</p> |

To demonstrate compliance, this LMMP applies a risk-based monitoring framework with defined trigger and threshold criteria, response actions, monitoring programs, and reporting requirements (Table 2-2). The framework focuses on preventing leachate generation and migration, maintaining soil and groundwater quality, and verifying that engineered containment features (e.g. cell caps and moisture controls) are functioning as intended.

#### 2.1.1. Outcome

The outcome for Condition B1-1 is that the Sandy Ridge Facility operates in a manner that avoids, or where this is not practicable, minimises contamination of soil and groundwater, ensuring the site remains physically safe to members of the public and non-human biota in the long term.

To track the achievement of this outcome, the following suite of outcome-based indicators has been adopted:

- Standing water levels in kaolin and granite bores
- Groundwater quality (chemical and radiological)
- Presence of water within silcrete bores (as an indicator of perched aquifers)
- Soil quality
- Soil moisture content in cell caps
- Subsidence of cell caps

These indicators are summarised in Table 2-2 and are described in detail in the following subsections

## Leachate Monitoring and Management Plan – Sandy Ridge

Table 2-2 Condition B1-1(1)

| <b>EPA factor and objective: Terrestrial Environmental Quality; to maintain the quality of land and soils so that environmental values are protected.</b><br><b>Outcome: The site will be physically safe in the long term.</b><br><b>Key environmental values: soil quality, groundwater.</b><br><b>Key impacts and risks: leachate generation and migration</b> |                                                                                               |                                      |                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                              |                                                                                                         |                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator                                                                                                                                                                                                                                                                                                                                                         | Monitoring                                                                                    | Timing/<br>Frequency                 | Trigger                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                              | Threshold                                                                                               |                                                                                                                                                                                                                                                                                                 | Reporting                                                                                                                                                                                                                                                           |
|                                                                                                                                                                                                                                                                                                                                                                   |                                                                                               |                                      | Criteria                                                                                                                                                                                                                                                                                                                                                            | Response Actions                                                                                                                                                                                                                             | Criteria                                                                                                | Response Actions                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                     |
| Indicator 1:<br><br>Standing Water<br>Level of Monitoring<br>bores                                                                                                                                                                                                                                                                                                | SWL from deep<br>granite bore and<br>kaolin monitoring<br>bores                               | Biannually -<br>April and<br>October | Rise in SWL >0.5m since<br>previous biannual<br>measurement                                                                                                                                                                                                                                                                                                         | An internal investigation<br>on possible<br>source/cause.                                                                                                                                                                                    | Rise in SWL >1.0m since<br>previous biannual<br>measurement                                             | Report to DWER CEO<br>within 7 days in<br>accordance with<br>MS1234 D1-2.<br><br>Further investigation<br>and/or mitigation (in<br>consultation<br>hydrogeological<br>consultant and/or<br>DWER)                                                                                                | Groundwater Monitoring<br>Report<br><br>Monthly Environment<br>Report<br><br>MS1234 Compliance<br>Assessment Report<br><br>Report potential non-<br>compliance to the CEO<br>within seven days (D12)                                                                |
| Indicator 2:<br><br>Groundwater quality<br>– chemical and<br>radiation                                                                                                                                                                                                                                                                                            | Groundwater<br>samples analysed in<br>accordance with<br>Ground Water<br>Monitoring Procedure |                                      | Groundwater quality triggers<br>presented in GAP (Appendix<br>A)<br><br>AND/OR<br><br>statistically significant<br>increasing concentration trend<br>identified for an individual<br>chemical parameter in an<br>individual bore using a non-<br>parametric Mann-Kendall<br>trend test at the 95%<br>confidence level over a<br>minimum of four sampling<br>events. | Relevant suite 2 Analysis<br>in accordance with GAP<br><br>Exceedances of trigger<br>and/ or increasing<br>concentration identified<br>through Mann-Kendall<br>analysis to trigger an<br>internal investigation on<br>possible source/cause. | Groundwater quality threshold<br>figures presented in GAP,<br>confirmed through 2 rounds of<br>sampling | Report to DWER CEO<br>within 7 days in<br>accordance with<br>MS1234 D1-2.<br><br>Radionuclide<br>exceedances also<br>reported to the WA<br>Radiation Council.<br><br>Further investigation<br>and/or mitigation (in<br>consultation with<br>DWER and/or WA<br>Radiation Council) as<br>required | Groundwater Monitoring<br>Report<br><br>Monthly Environment<br>Report<br><br>MS1234 Compliance<br>Assessment Report<br><br>Report non-compliance to<br>the CEO within seven<br>days (D12)<br><br>Report radionuclide non-<br>compliances to WA<br>Radiation Council |

## Leachate Monitoring and Management Plan – Sandy Ridge

| <b>EPA factor and objective: Terrestrial Environmental Quality; to maintain the quality of land and soils so that environmental values are protected.</b><br><b>Outcome: The site will be physically safe in the long term.</b><br><b>Key environmental values: soil quality, groundwater.</b><br><b>Key impacts and risks: leachate generation and migration</b> |                                                                                                                                                                                                                                 |                                                                                                                           |                                                                                                           |                                                                                                                                             |                                                                                                                                                          |                                                                                                                                                                                                                                    |                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator 3:<br><br>Presence of water in Silcrete Bores                                                                                                                                                                                                                                                                                                           | Dipping of silcrete bore network to determine extent of water column                                                                                                                                                            | Automated water-level alarm indicates presence of water column<br><br>AND/OR<br>significant rainfall event (>40mm in 24h) | >0.1 m water column                                                                                       | An internal investigation on possible source/cause.<br><br>Grab-sample taken for water quality analysis in accordance with GAP (Appendix A) | Investigation indicates water column of >0.1m is due to site activities<br><br>AND/OR<br><br>Groundwater quality threshold figures from GAP are exceeded | As above                                                                                                                                                                                                                           | Groundwater Monitoring Report<br>Monthly Environment Report<br>MS1234 Compliance Assessment Report<br>Report non-compliance to the CEO within seven days (D12) |
| Indicator 4:<br><br>Soil quality                                                                                                                                                                                                                                                                                                                                  | Risk-based targeted soil sampling in accordance with Sandy Ridge Soil Monitoring Procedure (SMP)                                                                                                                                | Three-yearly                                                                                                              | Exceedance of 50% of NEPM HIL-D level                                                                     | An internal investigation on possible source/cause.                                                                                         | Exceedance of NEPM HIL-D level                                                                                                                           | Further sampling to determine extent of contamination<br><br>Remediation and disposal of contaminated soils                                                                                                                        | Soil Monitoring Report<br>Results summarised in MS1234 Compliance Assessment Report<br>Report non-compliance to the DWER within seven days                     |
| Indicator 5:<br><br>Cell cap soil moisture                                                                                                                                                                                                                                                                                                                        | Soil moisture and temperature probes installed in the caps of Cells 1-3.<br>Cell 1: one probe within each of the three engineered cap layers.<br>Cells 2-3: one location per cap; with exact depths informed by Cell 1 results. | Data capture: 24/7 electronic logging.<br><br>Quarterly data assessment                                                   | A sustained increasing trend over ≥6 consecutive months outside expected seasonal/background variability. | Internal investigation into possible causes (e.g. rainfall anomaly, probe fault, localised cap compaction).                                 | A sustained increasing trend over ≥6 consecutive months outside expected seasonal/background variability.                                                | Immediate risk (if known) to be mitigated as far as reasonably practicable<br>Notify DWER within 7 days of confirmation.<br><br>Engage relevant technical consultants to develop mitigation program with outcomes reported to DWER | Report potential non-compliance to DWER within seven days<br>Annual Compliance Assessment Report<br>Monthly Environment Report                                 |

| <b>EPA factor and objective: Terrestrial Environmental Quality; to maintain the quality of land and soils so that environmental values are protected.</b><br><b>Outcome: The site will be physically safe in the long term.</b><br><b>Key environmental values: soil quality, groundwater.</b><br><b>Key impacts and risks: leachate generation and migration</b> |                                                                                                                                                                                                                                                                                                                                                                    |        |                                                                                                                                                    |                                                                                                                                                                                                                 |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                              |                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Indicator 6:<br>Cell cap subsidence                                                                                                                                                                                                                                                                                                                               | Survey pickup and fixed photo monitoring for slumping, cracking, deformation, or ponding, consistent with Section 2.1.7<br><br>Measurements of erosion of clay domes (surface geometry, location, depth) and any subsidence features (number and depth) will be recorded.<br><br>Potential use of ground-penetrating radar, LIDAR, or seismic surveys if required. | Annual | >5% settlement of cell cap height survey (or as otherwise defined via detailed design of capping systems and associated Works Approval conditions) | Undertake internal investigation of cause (e.g. settlement, construction defect, erosion).<br><br>Implement corrective actions if required.<br><br>Record in site environmental system and report in Annual CAR | > 10% settlement of original cell cap height, confirmed through repeat survey (or as otherwise defined via detailed design of capping systems and associated Works Approval conditions) | Immediate risk mitigated (e.g. cap repairs, local regrading, erosion control) as far as reasonably practicable.<br><br>Notify DWER in accordance with MS 1234 Condition D1-2 (within 7 days).<br><br>Implement corrective works to restore cap to approved profile.<br><br>Monitor effectiveness of repairs. | Report potential non-compliance to DWER within seven days<br><br>Annual Compliance Assessment Report<br><br>Monthly Environment Report |

### 2.1.2. Indicator 1: Standing Water Level

Standing Water Level (SWL) monitoring provides early detection of potential leachate migration pathways. SWLs are gauged biannually in the granite bore and all kaolin monitoring bores, consistent with the frequency required under Commonwealth approval EPBC/2015/7478.

As groundwater at Sandy Ridge is not subject to seasonal recharge, monitoring is scheduled in April and October, aligning with cooler periods to reduce occupational health and safety risks. Locations of silcrete, granite, and kaolin monitoring bores are shown in Figure 2-1.

#### 2.1.2.1. SWL Response Actions

**Trigger criterion:** A rise in SWL greater than 0.5 m above the previous biannual measurement.

**Actions:**

- Conduct an internal investigation to determine possible source or cause of increase.
- Findings will be reported in the Biannual Groundwater Monitoring Report and summarised in the MS1234 CAR

**Threshold criterion:** A rise in SWL greater than 1.0 m above the previous biannual measurement.

**Actions:**

- Report to DWER within 7 days in accordance with MS1234 Condition D1-2.
- Undertake further investigation and/or mitigation in consultation with DWER and/or a hydrogeological consultant.
- Findings and remedial actions will be reported in the Biannual Groundwater Monitoring Report and summarised in the MS1234 CAR.

#### 2.1.2.2. SWL Monitoring

SWL will be measured in April and October each year using a water level meter, in accordance with the Groundwater Monitoring Procedure. Current monitoring bores are shown in Figure 2-1. The monitoring network may change over time due to clearing for new waste cells and installation of additional bores around each new cell.

#### 2.1.2.3. SWL Reporting

Results of SWL monitoring, including investigations and responses, will be reported in the Biannual Groundwater Monitoring Report, with summaries presented in the annual MS1234 CAR. Threshold exceedances will be reported to DWER within 7 days in accordance with MS1234 Condition D1-2.

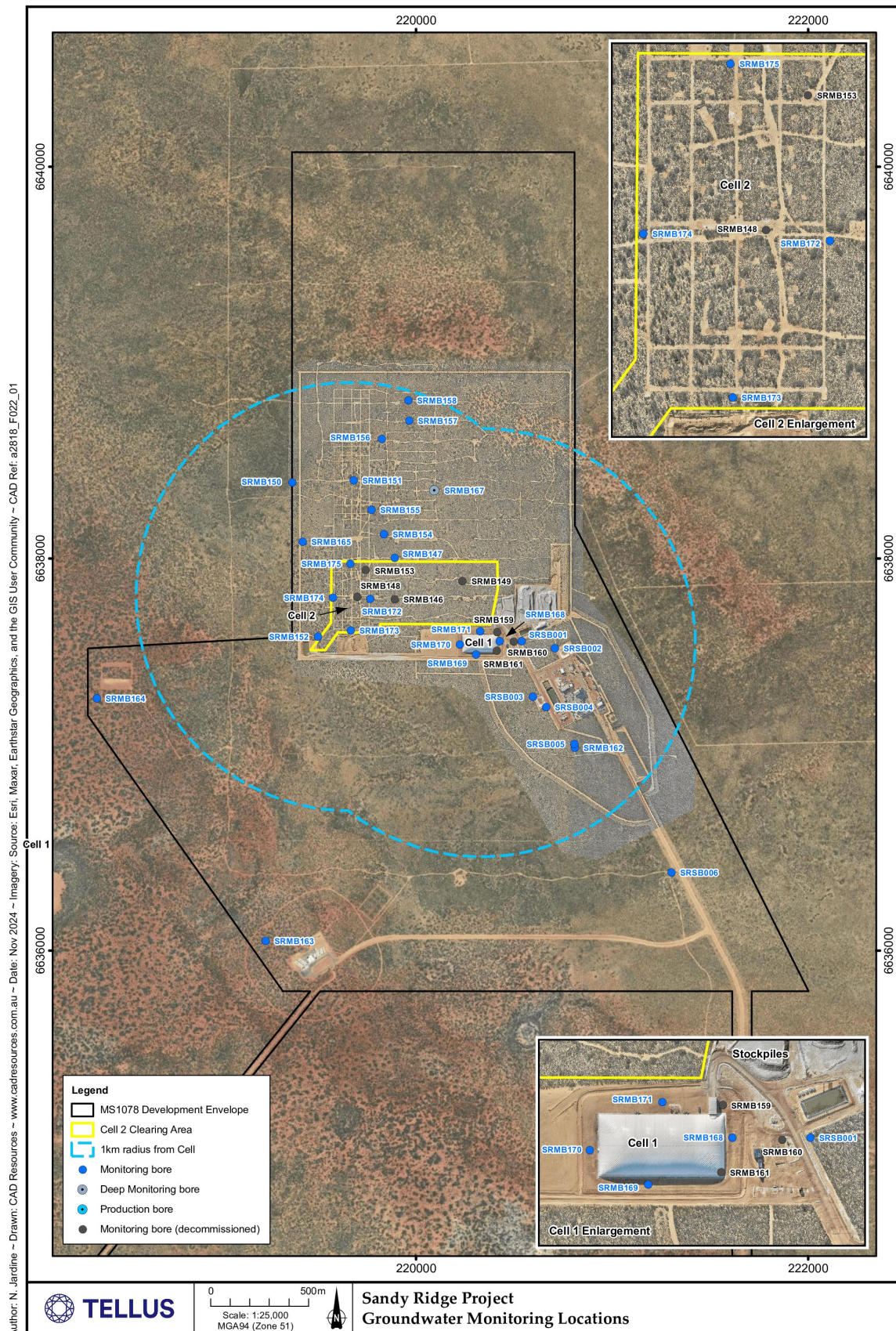


Figure 2-1 Groundwater monitoring locations at Sandy Ridge

### 2.1.3. Indicator 2: Groundwater Quality

Groundwater quality is a key indicator for assessing whether the Facility is operating in a manner that prevents leachate generation and migration, consistent with the outcome required by Condition B1-1. Monitoring provides early detection of potential leachate impacts by sampling kaolin and granite bores within 1 km of a waste cell, where sufficient water (>1 m column) is present. Monitoring is undertaken biannually in April and October, aligned with standing water level measurements, and analysed in accordance with the Groundwater Analysis Plan (GAP; Appendix A), which provides trigger and threshold concentrations for key analytes.

In addition to these criteria, analyte concentrations are assessed for statistically significant increasing trends using a Mann-Kendall trend test, providing a complementary line of evidence to detect gradual changes in groundwater quality over time.

#### 2.1.3.1. Groundwater Quality Monitoring

Groundwater quality will be monitored biannually in April and October, at the same time as standing water level (SWL) measurements to align with the sampling frequency required under Commonwealth approval EPBC/2015/7478. Samples are collected from kaolin and granite bores located within 1 km of a waste cell, provided they contain a sufficient water column (>1 m). This criterion reflects the very low propensity for subsurface water movement due to the site's geology.

Analytes were selected based on waste acceptance categories (chemical, radiological, and other potential contaminants of concern) to ensure early detection of any potential leachate impact. Sampling and analysis will follow the Groundwater Monitoring Procedure, using appropriate QA/QC protocols, including field blanks, duplicates, and laboratory controls.

The analytical suite is defined in the Groundwater Analysis Plan (Appendix A). A staged approach is applied:

- Suite 1 – focuses on key chemical and radiological indicators relevant to accepted waste streams and provides an initial screen.
- Suite 2 – applied where indicators are elevated, to confirm the presence and extent of potential impacts.

This approach ensures monitoring remains risk-based and targeted, while retaining the ability to escalate investigations if anomalies arise.

Trigger and threshold criteria are also defined in the GAP (Appendix A). Interim trigger values were first developed by EMM (2021) using baseline data, excluding statistical outliers and applying separate trigger sets for kaolin and granite wells. As a result, conservatively set interim triggers were routinely exceeded by naturally occurring metals and radionuclides during early monitoring despite reflecting background levels.

A review by GHD in 2024 concluded:

- Comparability of formations – Groundwater chemistry is broadly consistent across kaolinite and granite aquifers, as demonstrated by Piper diagrams. On this basis, there is no need for separate trigger sets, and Tellus has adopted a single consolidated set of trigger and threshold criteria across kaolinite, granite, and silcrete bores.
- Adjustment of trigger levels – early trigger exceedances of metals and radionuclides were not due to site impacts but reflected natural variability and/or analytical artefacts. GHD adjusted the trigger levels by:
  - adopting an estimated average maximum of background concentration spikes across multiple wells (based on graphical assessment), and
  - applying a multiplying factor of between 10% to 50% above the observed peaks.

This refinement accommodates noisy datasets while avoiding false trigger exceedances, but still retains the sensitivity required to detect genuine changes. Despite the minor adjustments to metals and radionuclide triggers, threshold levels remain unchanged from those originally developed by EMM, providing a firm boundary for unacceptable impacts.

In addition to the trigger and threshold criteria described above, analyte concentrations at each bore are also assessed for increasing trends using a one-tailed Mann-Kendall trend test (95% confidence level), applied on a rolling basis over four or more consecutive monitoring events. Non-detect results are substituted at  $0.5 \times$  the laboratory limit of reporting (LOR) prior to analysis. This provides an additional, complementary line of evidence to detect gradual changes in groundwater quality that may not be captured by trigger or threshold concentration level exceedances alone.

#### **2.1.3.2. Groundwater Quality Response Actions**

##### **Exceedance of groundwater quality trigger**

Trigger criterion: Exceedance of a groundwater quality trigger value presented GAP

Actions:

- Retest for Suite 2 analytes (if required in accordance with GAP)
- Undertake an internal investigation into possible source or cause.
- Report findings in Biannual Groundwater Monitoring Report and summarise in the MS1234 Compliance Assessment Report (CAR).

Threshold criterion: Exceedance of a groundwater quality threshold value presented in GAP

Actions:

- Confirm exceedance through resampling over subsequent monitoring round
- If confirmed, report to DWER within 7 days in accordance with MS1234 Condition D1-2.
- Undertake further investigation and/or mitigation in consultation with DWER and/or a hydrogeological consultant.
- Report radionuclide exceedances to the WA Radiological Council.

##### **Trend analysis**

Trigger criterion: A statistically significant increasing trend in analyte concentration within an individual monitoring bore, as identified by the Mann-Kendall trend test described in Section 2.1.3.1.

Actions:

- Undertake an internal investigation into possible source or cause.
- Report findings in Biannual Groundwater Monitoring Report and summarise in the MS1234 Compliance Assessment Report (CAR).

#### **2.1.3.3. Groundwater Quality Reporting**

Results of groundwater quality monitoring, including any investigations, will be reported in the Biannual Groundwater Monitoring Report and summarised in the annual MS1234 CAR. Confirmed threshold exceedances will be reported to DWER within 7 days, and radionuclide threshold exceedances will also be reported to the WA Radiological Council.

#### **2.1.4. Indicator 3: Presence of Water in Silcrete Bores**

The silcrete bores are normally dry under typical site conditions, reflecting the arid climate and limited recharge potential. Monitoring of the shallow silcrete horizon was developed in consultation with DWER to

address concerns that perched water may form following extreme rainfall events. The objective of silcrete bore monitoring is to assess whether ephemeral perched water develops above the silcrete layer (1–2 mbgl) and, if present, whether it has been impacted by waste storage activities.

Silcrete bores are monitored for the presence of perched water using a combination of automated alarm-based detection and rainfall-triggered gauging, as described in Section 2.1.4.2. Where a standing water column is present and exceeds 0.1 m, a sample will be collected and analysed in accordance with the Groundwater Analysis Plan (GAP; Appendix A). Results are assessed against trigger and threshold criteria to determine whether water quality has been affected by leaching and/or soil contamination.

#### **2.1.4.1. Silcrete Bore Response Actions**

Trigger criterion:

- Detection of >0.1 m water column in a silcrete bore.

Trigger exceedance actions:

- Undertake an internal investigation into potential sources or causes.
- Collect grab sample for Suite 1 analyses in accordance with GAP. A risk based modified suite may be required if insufficient volume.
- Report findings in the Biannual Groundwater Monitoring Report and summarise in the MS1234 CAR.

Threshold criteria

- Detection of >0.3 m water column in a silcrete bore and investigations indicate the presence of a water column is due to site activities; or
- The analysed grab-sample water exceeds threshold levels presented in the GAP

Threshold exceedance actions:

- Report to DWER within 7 days in accordance with MS1234 Condition D1-2.
- Undertake further investigation and/or mitigation in consultation with DWER and/or a hydrogeological consultant.

#### **2.1.4.2. Silcrete Bore Monitoring**

Bore network: Four monitoring bores (SRSB001–SRSB004) are located adjacent to the Infrastructure Area in proximity to waste storage areas and potential infiltration sources (Figure 2-1). These are designed to act as “sentinel bores” to detect perched water development that may be associated with site activities. Two additional bores (SRSB005–SRSB006) are located upgradient and to the south of the Infrastructure Area, aligned with local drainage patterns.

Monitoring trigger: An automated water-level alarm system is installed in SRSB003, which has historically shown the greatest tendency to develop a measurable perched water column, to detect the formation of a 0.1 m standing water column. Upon alarm activation, the remaining silcrete bores will be inspected to determine the extent of perched water development across the monitoring network. As a fail-safe against alarm system malfunction, all silcrete bores will continue to be gauged following rainfall events exceeding 40 mm in 24 hours (as recorded at the Sandy Ridge Weather Station), independent of alarm status.

Sampling protocol: Where water is present and the standing water column exceeds 0.1 m, a grab sample will be collected in accordance with the GMP and analysed using a peristaltic or vacuum pump and analysed in accordance with the GAP (Appendix A).

Note: To avoid triggering multiple sampling events in a short period during rainy seasons, groundwater sampling and analysis is only required if a sample has not been collected and analysed from the relevant bore

in the preceding 6 months. Where this exemption applies, the trigger event, internal review outcome, and basis for not resampling will still be documented and reported as above.

#### **2.1.4.3. Silcrete Bore Reporting**

Results of silcrete bore monitoring, including any trigger events, analyses, and investigations, will be reported in the Biannual Groundwater Monitoring Report and summarised in Monthly Environment Report and MS1234 CAR. Confirmed threshold exceedances will be reported to DWER within 7 days. Radionuclide exceedances within silcrete bore groundwater will also be reported to the WA Radiological Council.

#### **2.1.5. Indicator 4: Soil Quality**

Soil quality monitoring is undertaken every three years to confirm that Facility operations do not result in unacceptable contamination of soils. Monitoring covers both chemical contaminants (metals, PFAS, asbestos, hydrocarbons, etc.) and radioactivity (gross alpha/beta), using methodologies and QA/QC defined in the Sandy Ridge Soil Monitoring Procedure (SMP) and the Radiation Management Plan (RMP).

##### **2.1.5.1. Soil Quality – Chemical**

**Trigger criterion:** Exceedance of 50% of the NEPM HIL-D level

**Actions:**

- Undertake an internal investigation into possible sources or causes and conduct targeted re-sampling if required.
- Findings will be reported in the Soil Monitoring Report and summarised in the MS1234 CAR.

**Threshold criterion:** Confirmed exceedance of HIL-D level.

**Actions:** Undertake further sampling to delineate the extent of contamination.

- Implement corrective actions such as remediation of contaminated soils, followed by validation sampling to confirm effectiveness.
- Report exceedance to DWER within 7 days in accordance with MS1234 Condition D1-2.

##### **2.1.5.2. Soil Quality – Radiological**

As no NEPM guideline values exist for radionuclides in soils, background/control site values will be compared to high-risk locations such as Radiation Yard perimeter or cell cap/s.

**Trigger:** Gross alpha or beta activity >2× background/control site median.

**Actions:**

- Undertake an internal investigation into possible sources or causes and conduct targeted re-sampling if required.
- Findings will be reported in the Soil Monitoring Report and summarised in the MS1234 CAR.

**Threshold:** Confirmed exceedance of more than 3 x background/control median

**Actions:**

- Notify WA Radiation Council and DWER within 7 days (MS1234 Condition D1-2).
- Further investigation/remediation in consultation with regulators.

##### **2.1.5.3. Soil Quality Reporting**

Results of soil quality monitoring, including any trigger events, investigations, and responses, will be reported in the triennial Soil Monitoring Report and summarised in the MS1234 CAR.

Confirmed threshold exceedances will be reported to DWER within 7 days in accordance with MS1234 Condition D1-2.

#### **2.1.6. Indicator: 5 Soil Moisture in Cell Caps**

Soil moisture monitoring is undertaken to verify the long-term performance of cell caps as engineered containment barriers, ensuring they shed and release water rather than allowing infiltration that could lead to leachate generation.

##### ***Cell Cap Soil Moisture Monitoring***

Soil moisture and temperature probes are installed within the caps of the first three capped cells. In Cell 1, three probes are installed within the cap, corresponding to each of the engineered layers; in Cells 2 and 3, a single monitoring location is installed per cap, with depth and placement informed by Cell 1 results. Probes are installed within sealed access conduits, allowing individual probes to be replaced in the event of failure without disturbing the surrounding cap.

Moisture and temperature data are logged continuously (24 hours a day) and reviewed on a quarterly basis. Moisture levels in newly constructed caps are expected to be initially elevated due to water applied during construction and compaction, with levels anticipated to decline over time under high evaporation rates as the cap equilibrates with background conditions. This provides a benchmark for verifying that the cap is behaving as designed.

Further detail on cell cap moisture monitoring is provided in the WFDCP, including post-closure monitoring requirements.

##### ***Cell Cap Soil Moisture Response Actions***

**Trigger:** A sustained increasing trend over  $\geq 6$  consecutive months outside expected seasonal/background variability.

**Actions:**

- Undertake an internal investigation into possible causes (e.g. rainfall anomaly, probe fault, localised cap compaction).
- Review and validate monitoring data.
- Report findings in the Annual Compliance Assessment Report (CAR) in accordance with MS1234 Condition D2-1.

**Threshold:** A sustained increasing trend over  $\geq 12$  consecutive months outside expected seasonal/background variability.

**Actions:**

- Notify DWER within 7 days of confirmation.
- Engage relevant technical consultants to develop a mitigation program, with outcomes reported to DWER.
- Report immediate risk (if known), to be mitigated as far as reasonably practicable.

##### ***Cell Cap Soil Moisture Reporting***

Potential non-compliances will be reported to DWER within 7 days. Results will be summarised in the Annual Compliance Assessment Report and Monthly Environment Report.

#### **2.1.7. Indicator: 6 Subsidence of Cell Caps**

Subsidence monitoring is undertaken to confirm that engineered cell caps remain physically stable and retain their approved design profile. Cap settlement or deformation can create depressions that retain rainfall, increase infiltration, and lead to elevated leachate generation.

##### ***Cell Cap Subsidence Monitoring***

Monitoring is undertaken via high-precision survey (GNSS, total station or equivalent) compared against the approved design profile, together with fixed-point photographic monitoring and detailed logging of any subsidence features (surface geometry, location, depth, and number). Indicators of potential subsidence include slumping, cracking or unusual deformation, and ponding or preferential flow paths that could result in rilling or erosion. Event-based inspections are also carried out following significant rainfall or wind events. Advanced diagnostic methods such as ground-penetrating radar, LiDAR or seismic survey may be applied if more detailed investigation is required. Subsidence is reported as both a percentage and absolute deviation from the approved design profile.

Further detail on cell cap subsidence monitoring is provided in the WFDCP, including post-closure monitoring requirements.

### ***Cell Cap Subsidence Response Actions***

**Trigger:** >5% settlement of cell cap height relative to the design profile (or as otherwise defined via the detailed design of capping systems and associated Works Approval conditions).

**Actions:**

- Undertake an internal investigation to confirm cause (e.g. settlement, construction defect, erosion), and validate monitoring data.
- Implement corrective actions if required.
- Record in the site environmental system and report in the Annual CAR.

**Threshold:** >10% settlement of original cell cap height, confirmed through repeat survey (or as otherwise defined via the detailed design of capping systems and associated Works Approval conditions).

**Actions:**

- Notify DWER within 7 days of confirmation, in accordance with MS1234 Condition D1-2.
- Implement corrective works (e.g. repairs, regrading, erosion control) to restore the cap to its approved profile, as far as reasonably practicable.
- Monitor the effectiveness of repairs at the next inspection.

### ***Cell Cap Subsidence Reporting***

Potential non-compliances will be reported to DWER within 7 days. Results will be summarised in the Annual Compliance Assessment Report and Monthly Environment Report.

## **2.2. Objective-based condition B1-2**

Condition B1-2 requires that contamination of soil quality and soil pore water is avoided where practicable, or otherwise minimised (Table 2-3). This objective addresses the protection of terrestrial environmental quality by preventing leachate generation and migration, which could compromise soil and groundwater values.

**Table 2-3 Objective-based condition**

| Objective-based conditions                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Condition B1-2</b><br>The proponent must ensure the implementation of the proposal achieves the following environmental objective:<br>(1) Avoid where practicable, or otherwise minimise, contamination of soil quality and soil pore water. |

A risk-based management framework underpins this LMMP, with clearly defined management targets, actions, monitoring programs, and reporting requirements, as detailed in Table 2-4, to demonstrate compliance with MS 1234.

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**Table 2-4 Condition B1-2**

|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                   |                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Condition B1-2                                         | EPA factor and objective: Terrestrial Environmental Quality; to maintain the quality of land and soils so that environmental values are projected<br>Objective: Avoid contamination of soil quality and soil pore water<br>Key environmental values: soil quality, groundwater<br>Key impacts and risks: leachate generation and migration                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                   |                                                                                                                                                                                                                                                                  |
| Objective-based                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                   |                                                                                                                                                                                                                                                                  |
| Management targets                                     | Management actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Monitoring                                                                                                                                                                                                                                                                                                                                                 | Timing/frequency of actions                                                                                                                       | Reporting                                                                                                                                                                                                                                                        |
| No leachate generated in the waste cells.              | Implement waste acceptance and cell construction requirements in accordance with Licence L9240/2020/1 including restrictions on free liquids, immobilisation of wastes prior to placement, canopies over active cells, and drainage controls.                                                                                                                                                                                                                                                                                                                                                   | Waste verification inspections in accordance with the Waste Management System and Licence L9240/2020/1.<br>Free-liquid and compaction testing of solidified wastes as required under L9240/2020/1.<br>Daily inspections of cell by Facility Manager.<br>Waste cell cap monitoring in accordance with WFDCMP<br>SWL monitoring of kaolin and silcrete bores | As required.                                                                                                                                      | A compliance report is prepared for each new cell to assess compliance with the relevant management actions.<br>MS1234 Compliance Assessment Report<br>MS1234 Annual independent waste audit.<br>L9240/2020/1 AER<br>L9240/2020/1 Annual Audit Compliance Report |
| Spills minimised and remediated when they occur        | Solid and liquid waste containers on the premises remain closed, unless waste verification inspection or testing is being undertaken within inspection warehouses or is being managed in accordance with Sandy Ridge Facility – Waste Acceptance Procedure and Licence L9240/2020/1 (Condition 7, Table 3).<br>Spill response procedures facilitate the immediate recovery of spills of hydrocarbons, contaminated solid wastes, radioactive wastes, or other chemicals associated with the storage or handling of waste onsite, whether inside or outside of an engineered containment system. | Daily site inspections conducted of all waste storage areas.<br>Site inspections and audits                                                                                                                                                                                                                                                                | Daily site inspections, Audits as scheduled (at least annually).<br><br>Spills and leaks remediated immediately                                   | L9240/2020/1<br>Annual Compliance Assessment Report required by MS 1234.<br>Internal inspection log.                                                                                                                                                             |
| No detection of contaminants above defined Thresholds. | Site selection and cell design (including dome and cap) are integral to minimising leachate migration.<br>Groundwater monitoring programme established and implemented to detect any contaminants in groundwater.<br>Staff involved in monitoring programs will be assessed to verify their competency for the tasks they are responsible for.                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"><li>Granite and kaolin bores – groundwater sampling in accordance with GMP and GAP</li><li>Silcrete bores – gauging and sampling (if water column &gt;0.3 m)</li><li>Soil quality – sampling and analysis in accordance with Soil Monitoring Procedure</li></ul>                                                         | <ul style="list-style-type: none"><li>Biannually (April and October)</li><li>Water column exceeding &gt;0.1m)</li><li>Every three years</li></ul> | Groundwater Monitoring Report<br>Soil Monitoring Report<br>Summaries in MS1234 CAR<br>Threshold exceedances reported to DWER within 7 days                                                                                                                       |

### **3 ADAPTIVE MANAGEMENT AND LMMP REVIEW**

Continuous improvement aims to reduce impacts by embedding a cycle of monitoring, reporting, and implementing change (where required). The adaptive management approach involves adjusting management and mitigation measures as a result of:

- Evaluation of monitoring data
- Review of assumptions and uncertainties
- Re-evaluation of Project-related risks
- Increased understanding of the ecological regime
- External changes during the life of the Project

Continuous improvement of this LMMP will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets to identify opportunities for improvement. The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause of causes of non-compliance and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets

Further refinements to this LMMP may result from changes identified during future works and operations. Any changes will be managed per Tellus' Change Management procedure.

## 4 STAKEHOLDER CONSULTATION

Tellus recognises the importance of engaging with stakeholders to achieve acceptable environmental outcomes, manage stakeholder expectations and eliminate or minimise potential risks associated with closure. Tellus' Stakeholder and Communications Strategy aims to:

- Continuously identify stakeholders and interested parties
- Consult key stakeholders throughout the life of the Facility
- Target the communication strategy to reflect the needs of the stakeholder groups and interested parties
- Allocate adequate resources to the engagement process
- Work with local communities to manage the potential impacts of Facility closure.

### 4.1. Stakeholder consultation to date

Since 2019, Tellus has had several meetings with Decision-Making Authorities. The key communications relating to this LMMP are provided in Table 4-1.

**Table 4-1 Key stakeholder engagement during the development of the LMMP**

| Stakeholder             | Date         | Topic                                                                                                                                                                 | Outcome                                                                                                                                                                                                                          |
|-------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DWER                    | 2019-ongoing | As the LMMP has been continually improved, revisions have been issued for comment/approval.                                                                           | This version has been issued to DWER for approval.                                                                                                                                                                               |
| DPLH                    | 2015 & 2019  | Baseline surface soils quality at Sandy Ridge; DPLH required equivalent sampling along the Mt Walton East access road as a condition of Crown Lease approval.         | Tellus conducted baseline radiation measurements along Mt Walton Access Road and commissioned third-party soil sampling.                                                                                                         |
| WA Radiological Council | Mar 2020     | Aspects of the LMMP related to radionuclides were discussed with WA Radiological Council for their comment/approval.                                                  | Aspects of the LMMP related to radionuclides have been issued to WA Radiological Council for their approval.                                                                                                                     |
| KASA Consulting         | Nov 2022     | Comprehensive review and update of May 2020 version of LMMP prepared as part of the 2023 Public Environmental Review.                                                 | LMMP revised to incorporate updated baseline studies, groundwater trigger and threshold criteria, monitoring program improvements and other operational refinements. Submitted to DWER as part of the 2023 PER but not assessed. |
| Dr Tom Hatton           | Aug 2023     | Independent peer review of the potential for transient perching above the silcrete aquitard following high rainfall events, and associated contaminant transport risk | Concluded transient perching is expected to be rare, short-lived, and limited in extent, with low risk of lateral contaminant transport. Findings incorporated into the silcrete bore monitoring approach.                       |
| GHD                     | Dec 2024     | Independent review of interim groundwater trigger values and thresholds, using graphical assessment and trend analysis of monitoring data.                            | Revised trigger levels adopted, as reflected in Appendix A                                                                                                                                                                       |

### 4.2. Future stakeholder consultation

Table 4-2 lists future planned consultation and topics that are associated with this LMMP, particularly results, stages of work and remediating actions.

**Table 4-2 Future consultation associated with the LMMP**

| Stakeholder                                             | Topic                                                                                     | Timing                                                       |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Department of Water and Environmental Regulation (DWER) | Multiple departments covering all phases of the project, inclusive of Phase I of the ICP. | As required. At the completion of decommissioning each cell. |

|                                                                      |                                                                   |                                               |
|----------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------|
| Department of Planning, Lands and Heritage (DPLH)                    | Transition into ICP.                                              | As required.                                  |
| Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) | Decommissioning of waste infrastructure (work health and safety). | As required.                                  |
| Department of Biodiversity, Conservation and Attractions (DBCA)      | Progressive rehabilitation of waste cells.                        | As required.                                  |
| WA Radiological Council                                              | Post closure radiation and radon monitoring.                      | ICP.                                          |
| Shire of Coolgardie                                                  | Transition into closure.                                          | Ongoing and once closure dates are announced. |
| Indigenous groups                                                    | Cultural heritage.                                                | Ongoing.                                      |
| Department of Agriculture, Water and the Environment                 | Operation, decommissioning and closure.                           | As required.                                  |

Consultation with stakeholders will be recorded in an appropriate electronic platform.

## 5 CHANGES TO A MANAGEMENT PLAN

This LMMP will be reviewed and revised periodically to demonstrate that it satisfies the requirements of MS 1234.

**Table 5-1 Changes to LMMP**

|                                                                        |                                                     |                                       |                                             |                                          |
|------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------|---------------------------------------------|------------------------------------------|
| Complexity of changes                                                  | Minor revisions <input checked="" type="checkbox"/> |                                       | Moderate revisions <input type="checkbox"/> | Major revisions <input type="checkbox"/> |
| Number of key environmental factors:                                   | One <input type="checkbox"/>                        | 2-3 <input type="checkbox"/>          |                                             | >3 <input type="checkbox"/>              |
| Date revision submitted to EPA                                         |                                                     |                                       |                                             |                                          |
| Proponent's operational requirement timeframe for approval of revision | < One Month <input type="checkbox"/>                | < Six Months <input type="checkbox"/> | > Six Months <input type="checkbox"/>       | None <input type="checkbox"/>            |
| Reason for timeframe                                                   |                                                     |                                       |                                             |                                          |
| Item no.                                                               | LMMP section no.                                    | LMMP page no.                         | Summary of change                           | Reason for change                        |
| 1.                                                                     |                                                     | -                                     |                                             | Requirement of MS 1234                   |

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## APPENDIX A – GROUNDWATER ANALYSIS PLAN

| Chemical Group     | Analyte                        | Unit | Trigger | Threshold | Suite 1: Key Indicators                   |                                                 | Suite 2: Other Analytes                                                                                                                             |
|--------------------|--------------------------------|------|---------|-----------|-------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                                |      |         |           | Primary Samples                           | QA/QC Samples                                   |                                                                                                                                                     |
| Metals             | Aluminium (Filtered)           | mg/L | 1.5     | 20        | Test analytes if present in wastes onsite | 2 chemical groups analysed per monitoring event |                                                                                                                                                     |
|                    | Arsenic (Filtered)             |      | 0.005   | 2         |                                           |                                                 |                                                                                                                                                     |
|                    | Barium (Filtered)              |      | 0.2     | 20        |                                           |                                                 |                                                                                                                                                     |
|                    | Beryllium (Filtered)           |      | 0.02    | 0.6       |                                           |                                                 |                                                                                                                                                     |
|                    | Boron (Filtered)               |      | 5       | 40        |                                           |                                                 |                                                                                                                                                     |
|                    | Cadmium (Filtered)             |      | 0.0005  | 0.05      |                                           |                                                 |                                                                                                                                                     |
|                    | Chromium (III + VI) (Filtered) |      | 0.02    | 1         |                                           |                                                 |                                                                                                                                                     |
|                    | Cobalt (Filtered)              |      | 0.05    | 1         |                                           |                                                 |                                                                                                                                                     |
|                    | Copper (Filtered)              |      | 0.02    | 20        |                                           |                                                 |                                                                                                                                                     |
|                    | Iron (Filtered)                |      | 3       | 10        |                                           |                                                 |                                                                                                                                                     |
|                    | Lead (Filtered)                |      | 0.005   | 5         |                                           |                                                 |                                                                                                                                                     |
|                    | Manganese (Filtered)           |      | 0.5     | 10        |                                           |                                                 |                                                                                                                                                     |
|                    | Mercury (Filtered)             |      | 0.0005  | 0.01      |                                           |                                                 |                                                                                                                                                     |
|                    | Nickel (Filtered)              |      | 0.05    | 2         |                                           |                                                 |                                                                                                                                                     |
|                    | Selenium (Filtered)            |      | 0.01    | 0.1       |                                           |                                                 |                                                                                                                                                     |
|                    | Silver (Filtered)              |      | 0.005   | 1         |                                           |                                                 |                                                                                                                                                     |
|                    | Zinc (Filtered)                |      | 0.2     | 20        |                                           |                                                 |                                                                                                                                                     |
| Hydrocarbons (TRH) | C6-C10                         |      | 0.02    | 150       | Test analytes if present in wastes onsite |                                                 |                                                                                                                                                     |
|                    | C10-C16                        |      | 2.7     | 27        |                                           |                                                 |                                                                                                                                                     |
|                    | C16-C34                        |      | 3       | 30        |                                           |                                                 |                                                                                                                                                     |
|                    | C34-C40                        |      | 0.2     | 2         |                                           |                                                 |                                                                                                                                                     |
| BTEX               | Benzene                        |      | 0.002   | 0.01      |                                           |                                                 | If TRH C6-10 is detected above trigger, triggered samples and QA/QC samples to be analysed for BTEX suite as part of internal investigation         |
|                    | Ethylbenzene                   |      | 0.002   | 0.025     |                                           |                                                 |                                                                                                                                                     |
|                    | Toluene                        |      | 0.002   | 0.003     |                                           |                                                 |                                                                                                                                                     |
|                    | Xylene (m & p)                 |      | 0.004   | 0.02      |                                           |                                                 |                                                                                                                                                     |
|                    | Xylene (o)                     |      | 0.002   | 0.02      |                                           |                                                 |                                                                                                                                                     |
|                    | Xylene Total                   |      | 0.006   | 0.02      |                                           |                                                 |                                                                                                                                                     |
| PAH                | 2-methylnaphthalene            | mg/L | 0.0002  | 0.001     |                                           |                                                 | Test analytes if TRH is detected above trigger. Triggered samples and QA/QC samples to be analysed for PAH suite as part of internal investigation. |
|                    | Acenaphthene                   |      | 0.0002  | 0.001     |                                           |                                                 |                                                                                                                                                     |
|                    | Acenaphthylene                 |      | 0.0002  | 0.001     |                                           |                                                 |                                                                                                                                                     |
|                    | Anthracene                     |      | 0.0002  | 0.001     |                                           |                                                 |                                                                                                                                                     |

# Leachate Monitoring and Management Plan – Sandy Ridge

| Chemical Group            | Analyte                       | Unit | Trigger  | Threshold | Suite 1: Key Indicators                   |               | Suite 2: Other Analytes |
|---------------------------|-------------------------------|------|----------|-----------|-------------------------------------------|---------------|-------------------------|
|                           |                               |      |          |           | Primary Samples                           | QA/QC Samples |                         |
|                           | Benz(a)anthracene             |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Benzo(a) pyrene               |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Benzo(b)fluoranthene          |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Benzo(b)fluoranthene          |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Benzo(g,h,i)perylene          |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Benzo(k)fluoranthene          |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Chrysene                      |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Dibenz(a,h)anthracene         |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Fluorene                      |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Fluoroanthene                 |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Indeno(1,2,3,-c,d)pyrene      |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Naphthalene                   |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Phenanthrene                  |      | 0.0002   | 0.001     |                                           |               |                         |
|                           | Pyrene                        |      | 0.0002   | 0.001     |                                           |               |                         |
| PFAS                      | Perfluorooctanoic acid (PFOA) | µg/L | 0.0020   | 10        | Test analytes if present in wastes onsite |               |                         |
|                           | Sum of PFAS (WA DER List)     |      | 0.0050   | 2         |                                           |               |                         |
|                           | Sum of PFHxS and PFOS         |      | 0.015    | 12        |                                           |               |                         |
| Nutrients                 | Ammonia                       | mg/L | 2.2      | 339       |                                           |               |                         |
|                           | Nitrate                       |      | 1.8      | 9         |                                           |               |                         |
|                           | Nitrite                       |      | 0.95     | 79        |                                           |               |                         |
| Other                     | Cyanide                       |      | 0.01     | 0.8       |                                           |               |                         |
| Organochlorine Pesticides | 2,4-DDT                       | mg/L | 0.000002 | 0.09      | Test analytes if present in wastes onsite |               |                         |
|                           | 4,4-DDE                       |      | 0.000002 | 0.09      |                                           |               |                         |
|                           | α-BHC (Lindane)               |      | 0.000002 | 0.1       |                                           |               |                         |
|                           | Aldrin                        |      | 0.000002 | 0.003     |                                           |               |                         |
|                           | β-BHC                         |      | 0.000002 | 0.00001   |                                           |               |                         |
|                           | Chlordane                     |      | 0.000004 | 0.02      |                                           |               |                         |
|                           | δ-BHC                         |      | 0.000002 | 0.00001   |                                           |               |                         |
|                           | DDD                           |      | 0.000002 | 0.00001   |                                           |               |                         |
|                           | DDT                           |      | 0.000002 | 0.09      |                                           |               |                         |
|                           | Dieldrin                      |      | 0.000002 | 0.003     |                                           |               |                         |
|                           | Endosulfan I                  |      | 0.000002 | 0.2       |                                           |               |                         |
|                           | Endosulfan II                 |      | 0.000002 | 0.2       |                                           |               |                         |

# Leachate Monitoring and Management Plan – Sandy Ridge

| Chemical Group        | Analyte                      | Unit | Trigger  | Threshold | Suite 1: Key Indicators                   |               | Suite 2: Other Analytes                                                                                                                                                                                  |
|-----------------------|------------------------------|------|----------|-----------|-------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                              |      |          |           | Primary Samples                           | QA/QC Samples |                                                                                                                                                                                                          |
|                       | Endosulfan sulphate          |      | 0.000002 | 0.00001   |                                           |               |                                                                                                                                                                                                          |
|                       | Endrin                       |      | 0.00002  | 0.0001    |                                           |               |                                                                                                                                                                                                          |
|                       | g-BHC (Lindane)              |      | 0.000002 | 0.1       |                                           |               |                                                                                                                                                                                                          |
|                       | Heptachlor                   |      | 0.000002 | 0.00001   |                                           |               |                                                                                                                                                                                                          |
|                       | Heptachlor epoxide           |      | 0.000002 | 0.003     |                                           |               |                                                                                                                                                                                                          |
|                       | Methoxychlor                 |      | 0.00004  | 3         |                                           |               |                                                                                                                                                                                                          |
|                       | Oxychlorthane                |      | 0.000002 | 0.00001   |                                           |               |                                                                                                                                                                                                          |
|                       | Insecticides                 |      | 0.0001   | 0.35      |                                           |               |                                                                                                                                                                                                          |
|                       | Fipronil                     |      | 0.00004  | 0.007     |                                           |               |                                                                                                                                                                                                          |
|                       | Organophosphorous Pesticides |      | 0.00001  | 0.00005   |                                           |               |                                                                                                                                                                                                          |
|                       | Bromophos Ethyl              |      | 0.00001  | 0.1       |                                           |               |                                                                                                                                                                                                          |
|                       | Chlorpyrifos                 |      | 0.00001  | 0.04      |                                           |               |                                                                                                                                                                                                          |
|                       | Diazinon                     |      | 0.00002  | 0.04      |                                           |               |                                                                                                                                                                                                          |
|                       | Ethion                       |      | 0.00002  | 0.07      |                                           |               |                                                                                                                                                                                                          |
|                       | Ethyl parathion              |      | 0.00004  | 0.07      |                                           |               |                                                                                                                                                                                                          |
|                       | Fenitrothion                 |      | 0.00002  | 0.7       |                                           |               |                                                                                                                                                                                                          |
|                       | Malathion                    |      | 0.00002  | 0.007     |                                           |               |                                                                                                                                                                                                          |
|                       | Methyl parathion             |      | 0.00004  | 0.9       |                                           |               |                                                                                                                                                                                                          |
| Herbicides            | Trifluralin                  |      | 0.00002  | 0.5       |                                           |               |                                                                                                                                                                                                          |
| Fungicides            | Chlorothalonil               |      | 0.00002  | 0.35      |                                           |               |                                                                                                                                                                                                          |
|                       | Vinlozolin                   |      | 0.001    | 0.02      |                                           |               |                                                                                                                                                                                                          |
| Solvent               | MTBE                         |      | 0.002    | 0.00001   |                                           |               |                                                                                                                                                                                                          |
| Halogenated Benzene   | Hexachlorobenzene            |      | 0.000002 |           |                                           |               |                                                                                                                                                                                                          |
| PCBs                  | Arochlor 1242                | mg/L | 0.0002   | 0.001     |                                           |               | Test analytes if TRH C10-16 is detected above trigger.<br>Triggered samples & QA/QC samples to be analysed for PCB suite as part of internal investigation                                               |
|                       | Arochlor 1254                |      | 0.0002   | 0.001     |                                           |               |                                                                                                                                                                                                          |
|                       | PCBs (Sum of total)          |      | 0.0002   | 0.001     |                                           |               |                                                                                                                                                                                                          |
| Radionuclides Suite 1 | Gross alpha                  | Bq/L | 50       | 140       | Test analytes if present in wastes onsite |               |                                                                                                                                                                                                          |
|                       | Gross beta                   |      | 30       | 85        |                                           |               |                                                                                                                                                                                                          |
| Radionuclides Suite 2 | Americium-241                |      | 2        | 150       |                                           |               | Test Rad Suite 2 analytes if any result from Rad Suite 1 is above trigger.<br>Triggered samples and QA/QC samples to be analysed for relevant Rad Suite 2 analytes as part of the internal investigation |
|                       | Caesium-137                  |      | 2        | 740       |                                           |               |                                                                                                                                                                                                          |
|                       | Cobalt-60                    |      | 2        | 1800      |                                           |               |                                                                                                                                                                                                          |
|                       | Krypton-85                   |      | 240      | 1200      |                                           |               |                                                                                                                                                                                                          |
|                       | Lead-210                     |      | 1        | 3.7       |                                           |               |                                                                                                                                                                                                          |
|                       | Lead-212                     |      | 1        | 740       |                                           |               |                                                                                                                                                                                                          |

# Leachate Monitoring and Management Plan – Sandy Ridge

| Chemical Group | Analyte       | Unit | Trigger | Threshold | Suite 1: Key Indicators |               | Suite 2: Other Analytes |
|----------------|---------------|------|---------|-----------|-------------------------|---------------|-------------------------|
|                |               |      |         |           | Primary Samples         | QA/QC Samples |                         |
|                | Nickel-63     |      | 0.2     | 1100      |                         |               |                         |
|                | Plutonium-238 |      | 0.02    | 180       |                         |               |                         |
|                | Plutonium-239 |      | 0.01    | 180       |                         |               |                         |
|                | Radium-226    |      | 5       | 24.4      |                         |               |                         |
|                | Radium-228    |      | 5       | 40        |                         |               |                         |
|                | Strontium-90  |      | 2       | 11        |                         |               |                         |
|                | Thorium-228   |      | 3       | 260       |                         |               |                         |
|                | Thorium-230   |      | 2       | 74        |                         |               |                         |
|                | Thorium-232   |      | 0.5     | 74        |                         |               |                         |
|                | Tritium       |      | 10      | 100       |                         |               |                         |
|                | Uranium-238   |      | 3       | 1500      |                         |               |                         |

## APPENDIX B – RISK ASSESSMENT

| Hazard                                                                                                         | Pre-mitigated risk |             |              |         |           | Confidence in mitigation | Post-mitigated risks |             |              |         |            | Outcome      |
|----------------------------------------------------------------------------------------------------------------|--------------------|-------------|--------------|---------|-----------|--------------------------|----------------------|-------------|--------------|---------|------------|--------------|
|                                                                                                                | Likelihood         | Consequence | Risk ranking | Nature  | Duration  |                          | Likelihood           | Consequence | Risk ranking | Nature  | Duration   |              |
| Potential subsidence and instability of a waste cell allowing infiltration of water and generation of leachate | Possible           | Minor       | Medium       | Adverse | Permanent | Moderate                 | Unlikely             | Minor       | Low          | Adverse | Short term | Risk reduced |
| Leak/spill generation of leachate to contaminate groundwater                                                   | Possible           | Moderate    | High         | Adverse | Permanent | Moderate                 | Rare                 | Moderate    | Low          | Adverse | Permanent  | Risk reduced |
| Contamination of groundwater from waste in disposal cells after capping                                        | Possible           | Moderate    | High         | Adverse | Permanent | Moderate                 | Rare                 | Minor       | Low          | Adverse | Permanent  | Risk reduced |