Balranald Mineral Sands Project - West Balranald Mine MOD 1 Consent (SSD-5285)

Water Management Plan

October 2023

DOCUMENT AUTHORISATION			
Document:	**Water Management Plan**		
Fusion reference:	MWB00006-H-PLN-0005	**Version:**	4
Document owner:	Dave Wright	**Next review:**	
Author:	Brendan Isaacs		
Authorised by:	Dave Wright	**Date:**	31/10/2023
Signature:			
Related documents:	Balranald Mineral Sands Project - Environmental Management Strategy (MWB00006-H-PLN-0001) Rehabilitation Management Plan (MWB00006-H-PLN-0012). Pollution Incident Response Management Plan (MWB00006-H-PLN-0013). Radiation Management Plan (MWB00006-H-PLN-0010).		

DOCUMENT REVISION HISTORY

Date	Version	Description	Author
March 2023	0	Draft for Agency Consultation	Brendan Isaacs
May 2023	1	Draft for DPE Approval	Brendan Isaacs
26 May 2023	2	Draft for DPE Approval	Brendan Isaacs
31 July 2023	3	Final addressing DPE comments	Brendan Isaacs
18 October 2023	4	Update for Murrumbidgee River extraction	Brendan Isaacs

Abbreviations

Abbreviation	Full Title
AWS	Automatic Weather Station
AMD	Acid and Metalliferous Drainage
ANC	Acid Neutralising Capacity
Consent	Development Consent SSD-5285
DCCEW	Department of Climate Change, Energy the Environment and Water
DPE	NSW Department of Planning and Environment
DPE-Water	NSW Department of Planning and Environment Water
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EPA	NSW Environment Protection Authority
EP&A Act	NSW Environmental Planning and Assessment Act
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
GDE	Groundwater Dependent Ecosystem
HMC	Heavy mineral concentrate
HSEC	Health, Safety, Environment and Community
Iluka	Iluka Resources Limited
ISO	International Standard Organisation
LCC	Lost Control Card
LGA	Local Government Area
LOM	Life of Mine
LPS	Loxton Parilla Sands Formation
MOD1	Development Consent Modification 1
NAF	Non Acid Forming
NRAR	NSW Natural Resources Access Regulator
NSW	New South Wales
OF	Olney Formation
PAF	Potentially Acid Forming
PAX	Potassium amyl xanthate
PIRMP	Pollution Incident Response Management Plan
RMP	Radiation Management Plan
POEO Act	NSW Protection of the Environment Operations Act 1997
SF	Shepparton Formation
SSD	State Significant Development
TARP	Trigger Action Response Plan
WA	Western Australia
WCP	Wet concentrator plant
WHIMS	Wet high intensity magnetic separator
WMA 2000	NSW Water Management Act (2000)
WMP	Water Management Plan
WSP	Water Sharing Plan

1. Contents

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1. Introduction

1.1. Purpose and scope

This Water Management Plan (WMP) has been prepared by Iluka Resources Limited (Iluka) to satisfy the requirements of Schedule 3, Condition 15 of NSW Development Consent (SSD-5285). This WMP has been prepared using the Departments *Guideline for the preparation of Environmental Management Plans* (DIPNR 2004) and the management plan requirements stated in Schedule 5, Condition 3 of NSW Development Consent (SSD-5285).

This version of the WMP is submitted prior to commencement of construction. It is anticipated that this Plan will be revised and submitted for approval at the following stages of project development:

1. Prior to the commencement of mining operations
2. Following calibration and validation of the groundwater model
3. Prior to cessation of mining
4. As required and appropriate for changes in legislation or if monitoring information informs levels of greater accuracy.

Additional information will be submitted in a subsequent version of this WMP submitted prior to the commencement of mining, including:

- Description of as built infrastructure including water supply bores.
- Groundwater monitoring infrastructure, as built, and updated baseline data.
- Groundwater quality trigger values developed using the baseline data.

Should Iluka undertake construction of the open cut mining at West Balranald or at the Nepean deposit, a revised WMP will be prepared prior to commencement of construction to include management measures and monitoring relevant to the site for approval by DPE, in accordance with Schedule 2, Condition 17 of Development Consent (SSD-5285).

The conditions of consent to which the WMP relates to and where they are addressed in the WMP is presented in Table 2.

1.2. Environmental Policy

The Iluka HSEC policy is publicly available at https://www.iluka.com/ and provides a declaration of the importance Iluka places on conducting its business safely, without detrimental health effects and with regard to the community and the value of the natural environment.

1.3. Document Structure

The remainder of this WMP is structured as follows:

- Section 2 Outlines the project description, the environmental setting is described in Appendix A.
- Section 3 Describes the community and regulator engagement including consultation with DPE-Water and EPA.

- Section 4 Describes the environmental management structure for the project and the relevant statutory requirements and policies relevant to this Plan.
- Section 5 Provides a summary of the overarching water management strategy for the project.
- Section 6 Describes the water management system and water balance.
- Section 7 Describes the surface water management measures and monitoring program.
- Section 8 Describes the groundwater and tailings management measures and groundwater monitoring program.
- Section 9 Provides a summary of the environmental inspection programs relevant to this plan.
- Section 10 Describes the exceedance and contingency protocols relevant to this Plan.
- Section 11 Describes the reporting commitment and protocols relevant to this Plan.

2. Project description

2.1. Project overview

Iluka have approval to develop a mineral sands mine in south-western New South Wales (NSW), known as the Balranald Mineral Sands Project (the Balranald Project). It includes construction, open-cut mining, primary processing, and rehabilitation of two linear mineral sand deposits, known as the West Balranald and Nepean deposits, located approximately 12 kilometres (km) and 66 km north-west of the town of Balranald, respectively. The Balranald Project also included undertaking an approved bulk sampling activity at the West Balranald deposit with the removal of up to 100,000 tonnes (t) of mineral ore to trial the use of underground mining methods.

Development consent (SSD-5285) was granted for the Balranald Project by a delegate of the NSW Minister for Planning under the EP&A Act on 5 April 2016 (herein referred to as the consent). Approval was also granted under the EPBC Act (EPBC 2012/6509) by a delegate of the Commonwealth Minister for the Environment on 6 January 2017 (herein referred to as the Commonwealth approval).

On 21 December 2022, Iluka were granted approval to modify the consent (MOD1) to expand the underground mining trial which includes an additional area of disturbance to the approved Balranald Project area to enable primary processing of the ore into heavy mineral concentrate (HMC) and transport of HMC offsite for secondary processing at Iluka's facilities in Victoria and/or Western Australia (WA).

Iluka intend to construct and operate the underground mining trial for up to six years as approved, at the completion of the underground mining trial Iluka would either seek a life of mine approval for underground mining, cease operations and rehabilitate or develop the open cut mining method to extract the remainder of the ore deposit.

2.2. Site location plan

The regional setting and conceptual site layout for the Balranald Project is presented in Figure 1 and Figure 2 respectively.

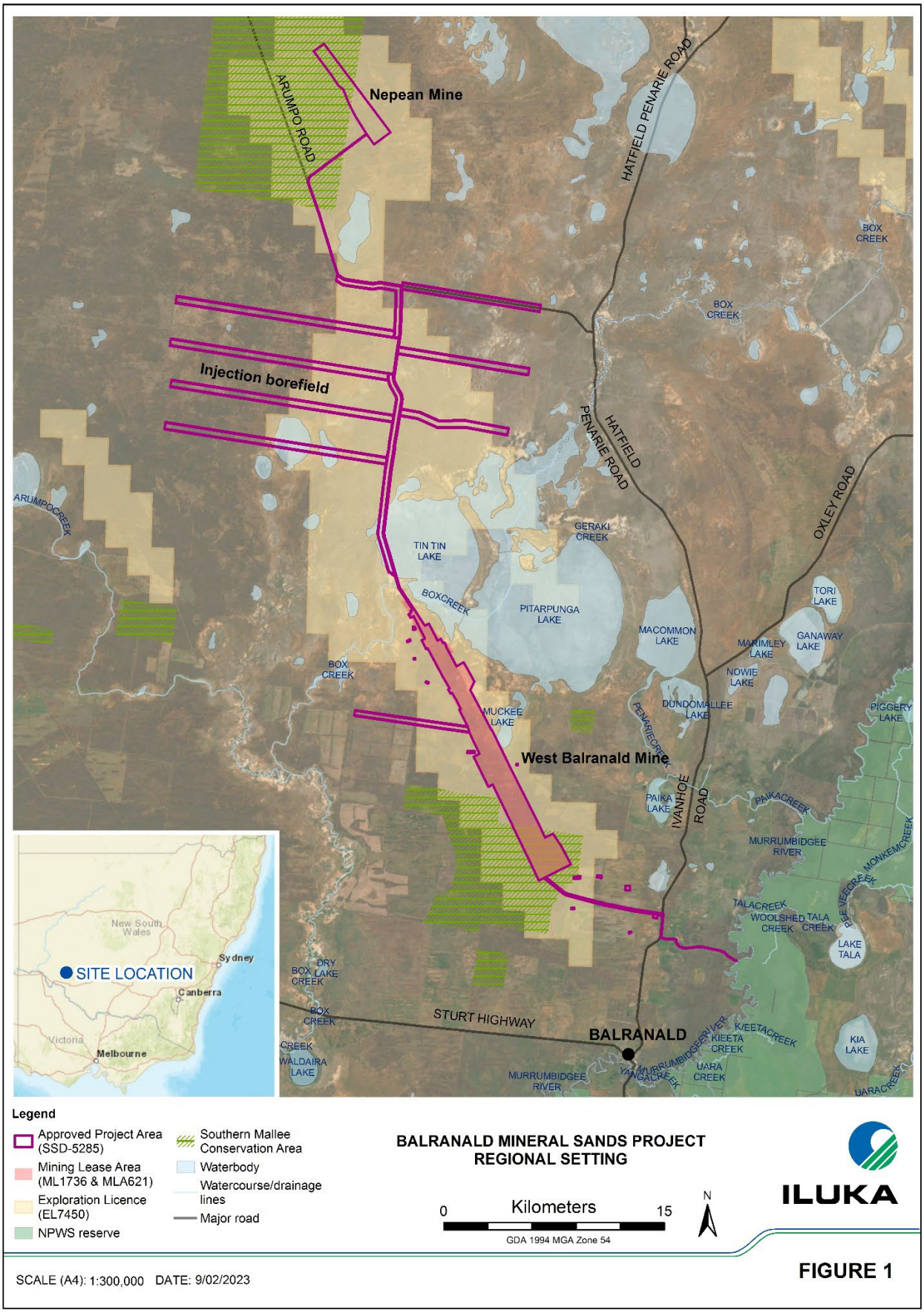

Figure 1- Regional setting

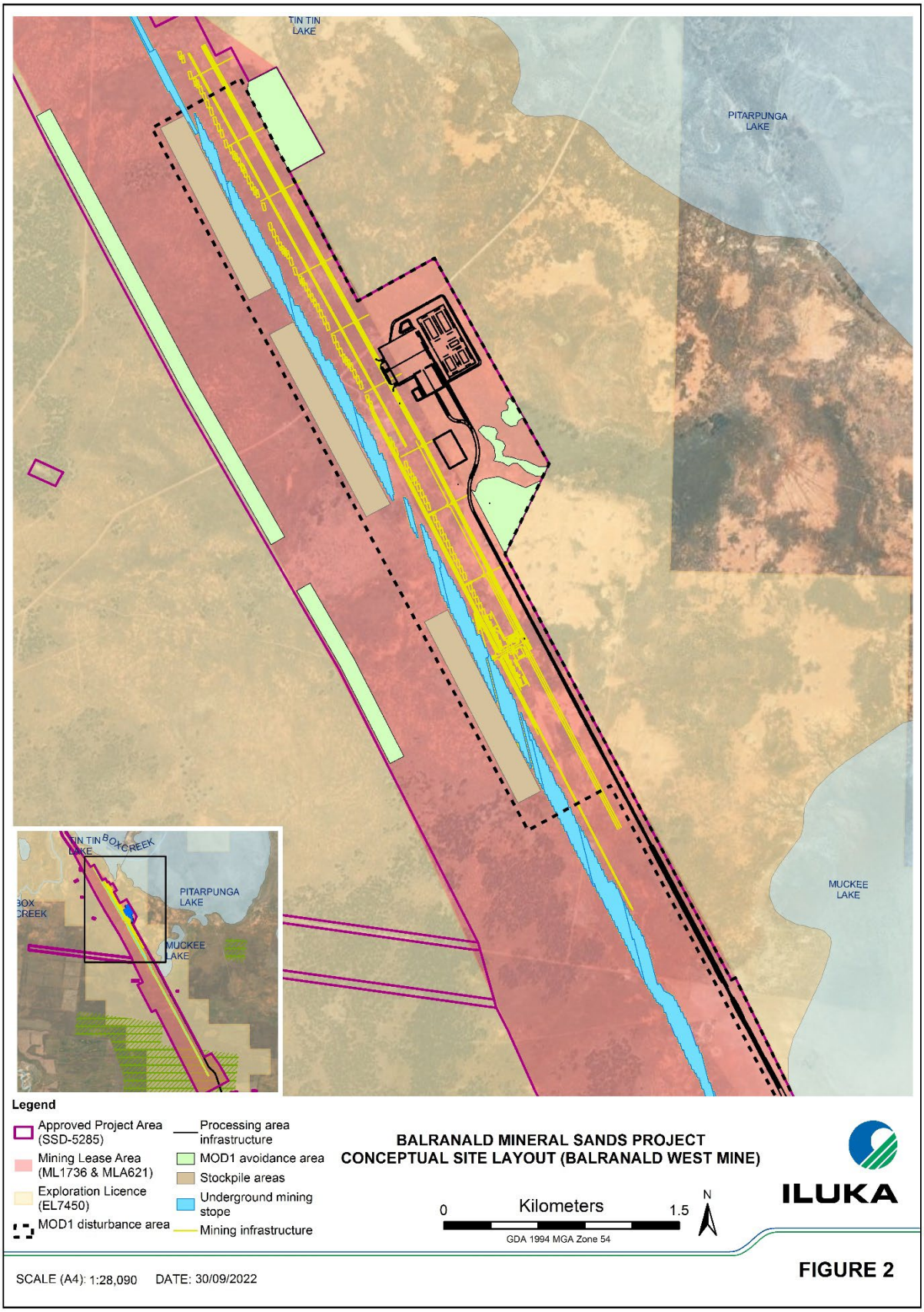

Figure 2- Underground mining general arrangement

3. Scope of works

All works will be carried out in accordance with Iluka's EMS and this WMP to manage water related risks associated with the construction and commissioning of the Balranald west mine underground mining trial. An indicative list of plant and equipment that will be used in the construction and commissioning of the mine is:

- surface mobile equipment (SME) e.g. dozers, graders, scrapers, tractor scoops, excavators, haul trucks, rollers, water trucks and loaders;
- lifting equipment (cranes, telehandlers and forklifts);
- mining plant (drill rigs, groundwater bores and lighting plants); and
- processing plant (wet concentrator plant, floatation plant, WHIMS plant, conveyors, pumps and stackers).

3.1.1. Construction

Construction of the underground mining trial involves initial vegetation clearing and soil stripping within the approved Balranald Project footprint, with the following infrastructure proposed to be located within this area:

- processing plant infrastructure, comprising WCP, flotation plant and WHIMS plant;
- product and tails pad(s);
- process water, potassium amyl xanthate (PAX) and fines dams;
- underground mining infrastructure;
- temporary stockpiles (topsoil, subsoil and overburden);
- timber stockpiles (felled vegetation);
- hardstand and laydown areas;
- site offices, warehousing, workshops, amenities and carparking;
- services and utilities infrastructure;
- fuel storage and dispensing area;
- telecommunications tower;
- mine access road and accommodation camp; and
- internal access tracks and roadways.

Additional construction works would be undertaken should the open cut mining method be developed.

3.1.2. Operations

The underground mining trial will extract mineral ore via a process of pumping slurried ore to the surface.

The predicted processing rate is anticipated to be between 50 and 200 tph, consistent with the previous bulk sampling activity.

The processing plant has a number of components including the screening plant, WCP, flotation plant and WHIMS plant.

The ore is concentrated through the processing plant to generate two primary product streams, magnetic HMC and non-magnetic HMC. HMC will be stockpiled on site and transported to an off-site location for processing.

Tailings generated at the processing plant will include fine clays (slimes), floatation plant tail and courser sand tails. The coarse sand tailings will be placed on surface directly above the panels ahead of mining. The topsoil and subsoil will be pre-stripped from these areas prior to the emplacement of the coarse sand tails and then returned for rehabilitation.

The majority of the fine sand slimes and a portion of the finer sand tails resulting from the flotation process will be reinjected underground. The mining process is depicted in Figure 4.

3.2. Timing of activities

The Balranald west mine includes a construction period of approximately 18 months followed by an operational phase of approximately six years to extend underground mining trials. Year 1 of the operational phase overlaps with the completion of the construction phase by approximately four months. The site will operate 24 hours per day, seven days per week during construction, mining, processing and transport activities. The indicative planned sequencing of activities is presented in Figure 3.

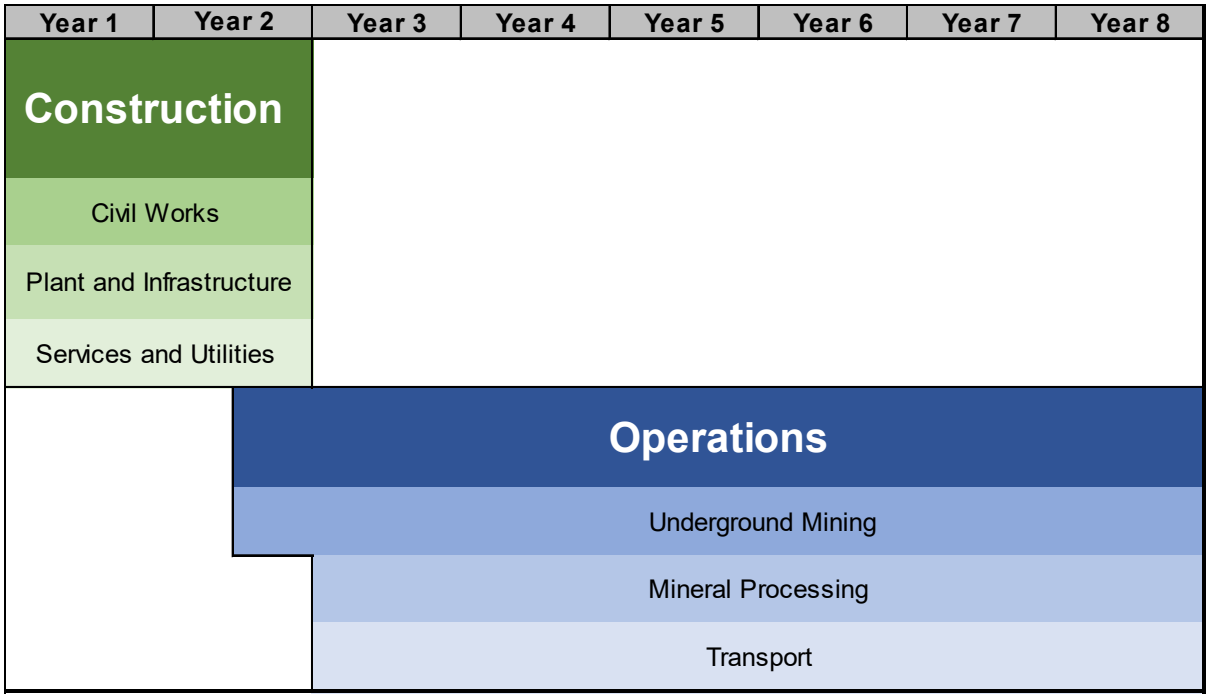

Figure 3- Sequence of site activities

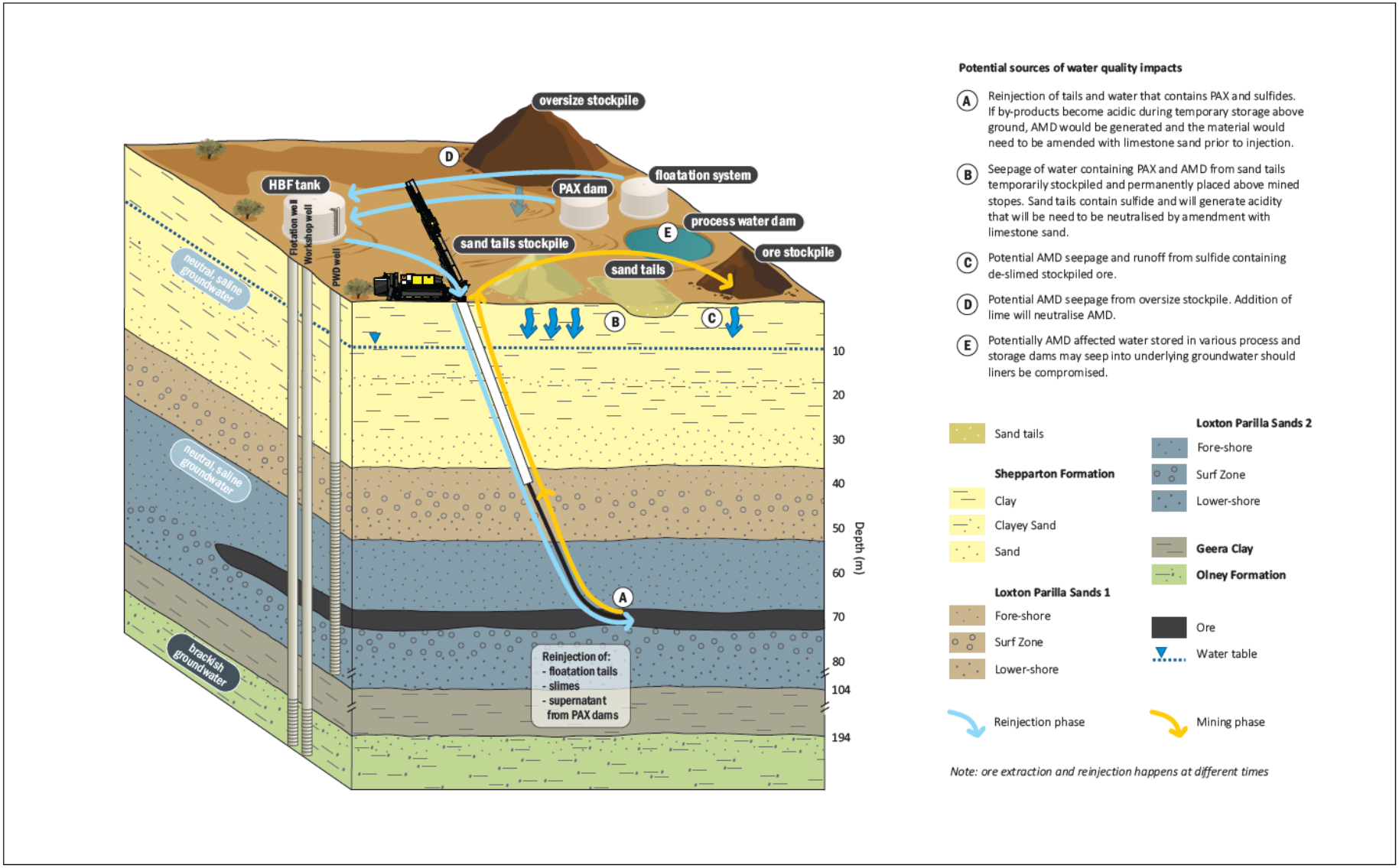

Figure 4- Mining process

4. Community and stakeholder engagement

4.1. Consultation acquired for the WMP

Iluka revised the WMP (Version 4, dated 18 October 2023) to include the temporary extraction of water from the Murrumbidgee River for construction activities. The WMP was revised in consultation with NSW EPA and DPE-Water as required by Schedule 3, Condition 12(a) of Development Consent (SSD-5285).

Iluka received the following responses:

- EPA email dated 24 October 2023, did not provide any comments on the revised WMP.
- DPE-Water correspondence (OUT23/17749, dated 30 October 2023) provided three recommendations:
    - The proponent should confirm what water sources the reference "…..if required other licensed off-site sources of fresh water will be used during the construction phase…." refers to.
    - The proponent should update the Water Management Plan to include:

      • a plan of the pipeline route from the site to the Murrumbidgee River

      • a plan of the location of the proposed pumping infrastructure, including Lot/DP details, pump, pipe and intake location, and point where pipeline trenching commences

      • details of the pipeline diameter, pump intake pipe diameter and pump capacity.
    - The proponent should update Table 7 to amend the date for the Guidelines for Controlled Activities on Waterfront Land from "DPI 2007" to "DPE 2022".

Iluka has amended the WMP (Version 4) to address recommendations made by DPE-Water.

A consultation register is provided in Appendix B.

4.2. Communication

In accordance with Schedule 5, Condition 10 of NSW Development Consent (SSD-5285), the Iluka website will be maintained as a tool for the provision of information to stakeholders and interested parties about the environmental and community performance of the Project .

Information available on the Iluka website will kept up to date to the satisfaction of the Secretary of the DPE.

Stakeholder engagement is also managed in accordance with Iluka's Social Management Plan.

Engagement with stakeholders should be conducted in a meaningful, transparent, collaborative and consistent manner. External stakeholder interactions are recorded in Iluka's database to ensure a record of stakeholder interactions is maintained for the life of the operation.

4.3. Complaints

Iluka will maintain an enquiries and community complaints hotline for the Balranald Project (Phone 1800 305 993 or email balranald.community@iluka.com). The community hotline will be publicly advertised on the Iluka website Balranald engagement hub.

Community complaints will be managed in accordance with Iluka's Social Management Plan and Social Performance standard *(Group Standard 02 – Social Performance)*.

Iluka's Social Management Plan for the Balranald operation provides additional requirements regarding stakeholder engagement and consultation.

In the event a complaint or inquiry is made by an external party the nominated Iluka employee (dependent on the nature of the complaint) will be directed on the course of action in consultation with the Senior Manager.

A record of the event will be entered into the HSEC electronic management system. Any actions arising from the event will be tracked to ensure the event is dealt with appropriately.

Community inquires and complaints will be recorded. The following information will be captured:

- the date and time ;
- the method by which the complaint or inquiry was made;
- any personal details of the complainant if provided;
- the nature of the complaint or inquiry;
- the action taken by Iluka in relation to the complaint or inquiry, including any follow-up contact with the proponent; and
- if no action was taken by Iluka, the reasons why no action was taken.

The record will be kept for at least 4 years.

The Social Management Plan includes a grievance resolution process to enable Iluka to respond appropriately and respectfully to any issues raised by stakeholders (including internal stakeholders). The grievance resolution process is summarised in Figure 5.

A complaints and inquiry register is available on the Iluka community engagement hub website https://www.iluka.com/engage/balranald and kept up to date on a monthly basis.

4.4. Dispute resolution

In the event of a disagreement between Iluka and a member of the community, the nominated Iluka employee (dependent on the nature of the complaint) will be directed on the course of action in consultation with the Senior Manager. Iluka will undertake the liaison to reach a resolution. Should resolution of the dispute not be reached through this primary process, either party may refer the matter to the Secretary of the DPE for resolution.

A flow diagram summarising the dispute resolution process is presented in Figure 5.

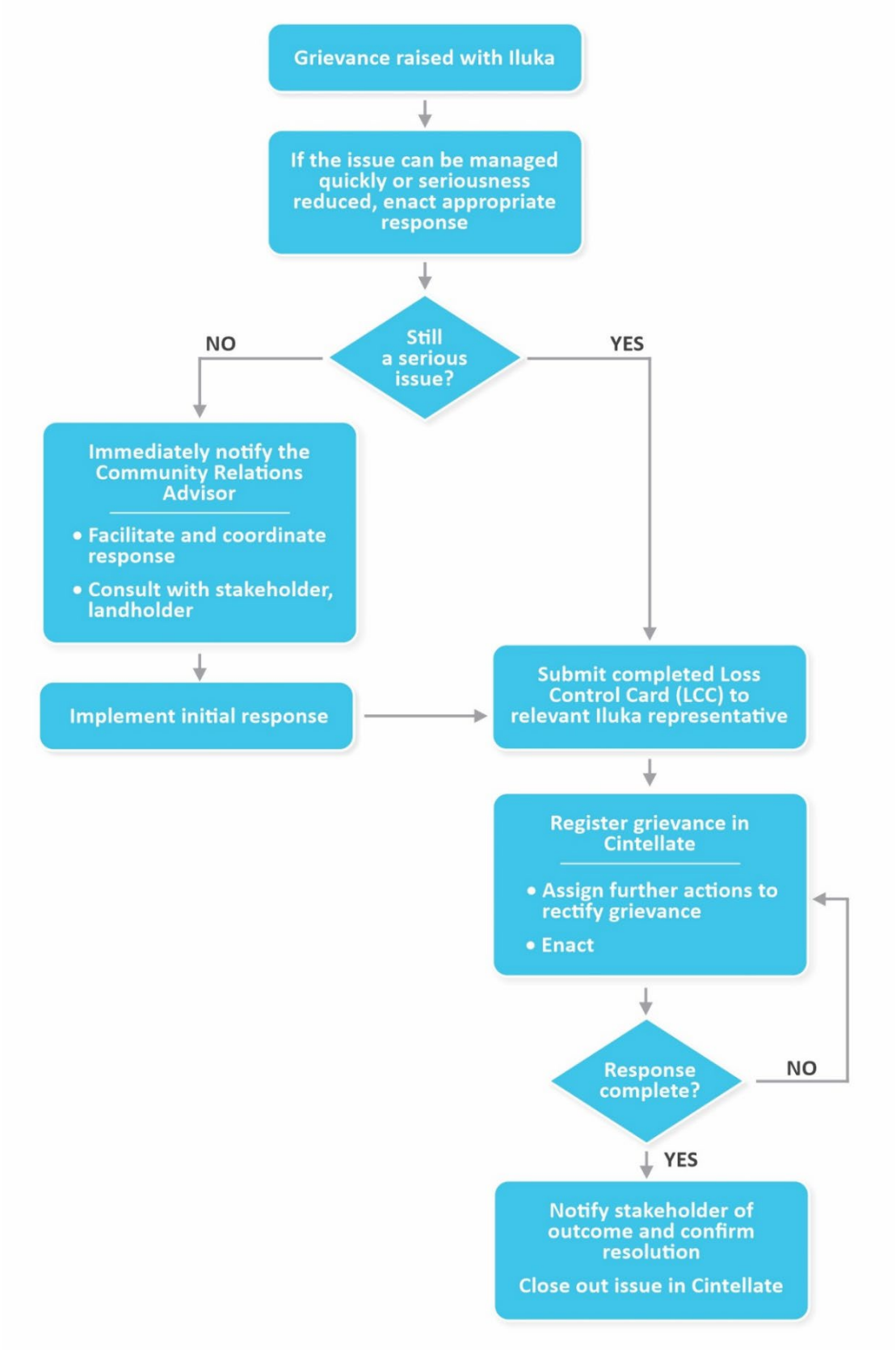

Figure 5- Summary of grievance resolution process

5. Environmental management framework

5.1. Relationship to existing EMS

Iluka's EMS has been developed to fulfil the relevant conditions in the NSW Development Consent (SSD-5285 and Commonwealth Approval (EPBC Act 2012/6509) by providing a strategic framework for environmental management of the Project including all environmental management plans (EMPs), strategies and programs prepared for the Project . The EMS establishes the overarching framework for the monitoring and environmental management of activities undertaken for the Project . The EMS incorporates the principals of continuous improvement and is consistent with the five pillars of International Standard Organisation (ISO) 14001: Environmental Management Systems. This WMP is a subordinate of Iluka's EMS.

5.2. Environmental management structure and responsibilities

All persons undertaking activities on the site are responsible for environmental management and are accountable for the following:

- complying with relevant legislation;
- complying with the EMS;
- communicating any information they become aware of in relation to environmental management; and
- taking actions to prevent and mitigate environmental impacts.

All employees and contractors within Iluka are held accountable for promoting and displaying behaviours consistent with the Iluka Plan. Table 1 defines HSEC and EMS related accountabilities.

Table 1- Roles and responsibilities for Environment and Community management

Role	Accountabilities
Operations Manager	• Develop business plans that align with wider sustainability objectives and targets. • Promote a culture of accountability and risk awareness, ensuring corrective and preventive actions are completed. • Promote active participation in Environment & Community matters in general. • Provide effective resources to implement the management system within the operation / function. • Ensure overall compliance to the EMS & HSECMS within the operation / function.
Environment, Rehabilitation and Community Relations (ERCR) Superintendent	• Provide advice/support to the environmental team for achievement of ongoing environmental compliance. • Inform and provide advice for environmental issues, non-compliances and incidents to the Operations Manager. • Support the preparation of environmental reports in compliance with corporate and regulatory requirements. • Support the review and oversee the implementation of the EMS, EMPs and procedures in accordance with corporate and regulatory requirements. • Investigate environmental incidents and endorse corrective actions in consultation with the Operations Manager.

Role	Accountabilities
	• Facilitate and review environmental risk assessments with team members and other stakeholders as required. • Oversee rehabilitation planning and implementation. • Respond to and report on community complaints in consultation with the Operations Manager. • Conduct internal compliance audits of applicable regulatory approvals, licences and other legislation for the project. • Liaise with government regulators and other stakeholders on environment and community matters.
Environmental Specialist	• Manage the environmental monitoring database. • Collate data and prepare written reports for environmental and community performance reporting. • Implement and review the EMS, EMPs and procedures in accordance with corporate and regulatory requirements • Assist and provide advice to the Environmental Technician in collection of environmental monitoring data. • Develop procedures required for effective environmental management of the site. • Review and update management plans and procedures. • Conduct site environmental inspections and audits to identify issues and report findings to the ERCR Superintendent. • Assist in achieving compliance with regulatory requirements related to environmental management as required by the ERCR Superintendent. • Participate in the review and development of environmental risk assessments. • Conduct internal compliance audits of applicable regulatory approvals, licences and other legislation for the project and advise the ERCR Superintendent of any non-compliances.
Environmental Technician	• Conduct the environmental monitoring required by the approved EMPs for the project. • Follow procedures for environmental monitoring accurately and consistently. • Collect and record raw data accurately and consistently for all compliance monitoring. • Maintain calibration records of all equipment and ensure within manufacturers specifications. • Conduct site environmental inspections and report issues identified to ERCR Superintendent. • Assist with on ground environmental improvement works.
Rehabilitation Specialist	• Coordinate the planning and implementation of the rehabilitation in accordance with the Rehabilitation Management Plan and applicable procedures. • Coordinate the rehabilitation monitoring programs including engagement of specialised consultants. • Ensure that rehabilitation resources are managed effectively to ensure the success of the rehabilitation. • Prepare rehabilitation related documents and maintain the spatial data required under the Mining Act 1992. • Liaise with government regulators and other stakeholders on all rehabilitation matters.

Role	Accountabilities
Site Employees and Contractors	• Understand and comply with the Iluka EMS, HSEC policy and supporting standards • Accept accountability to ensure personal safety and the health and safety of others, and protect the environment • Identify, assess and control risks prior to undertaking any activity • Actively challenge or refuse to work in unsafe conditions or where unacceptable impact to the environment or community may occur • Intervene to prevent incidents • Actively participate in HSEC meetings, initiatives, risk assessments and monitoring programs • Report all incidents and near hits immediately • Correct or isolate hazardous situations in the workplace • Understand and follow the local emergency procedures • Comply with and suggest improvements to site documentation, processes and procedures

5.3. Legal and compliance requirements

5.3.1. NSW Environmental Planning and Assessment Act 1979

Development Consent SSD-5285 (Modification 1) was issued by NSW Department of Planning and Environment on 21 December 2022. Relevant conditions and where they are addressed in this document are provided in Table 2.

Table 2- Conditions from NSW Development Consent (SSD-5285) that are relevant to this WMP

Condition	Description	WMP Section
	Water Supply	
Schedule 3, Condition 11	*The Applicant shall ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of mining operations to match its available water supply.* *Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Applicant is required to obtain the necessary water licences for the development.*	*Section 8.2*
	Water Pollution	
Schedule 3, Condition 12	*Unless an EPL authorises otherwise, the Applicant shall comply with Section 120 of the POEO Act.*	*Entire document*
	Compensatory Water Supply	

<table>
<tr><th>Condition</th><th>Description</th><th>WMP Section</th></tr>
<tr><td>Schedule 3, Condition 13</td><td>The Applicant must provide a compensatory water supply to the owner or leaseholder of any privately-owned land whose basic landholder water rights (as defined in the Water Management Act 2000) are adversely and directly impacted as a result of the development. This supply must be provided in consultation with DPE Water, and to the satisfaction of the Secretary.

The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributable to the development. Equivalent water supply should be provided (at least on an interim basis) as soon as practicable from the loss being identified, unless otherwise agreed with the landowner.

If the Applicant and the landowner cannot agree on whether the loss of water is attributed to the development or the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

If the Applicant is unable to provide an alternative long-term supply of water, then the Applicant must provide alternative compensation to the satisfaction of the Secretary.

Notes:
• The Water Management Plan (see condition 15) is required to include trigger levels for investigating potentially adverse impacts on water supplies.
• The burden of proof that any loss of surface water or groundwater access is not due to mining impacts rests with the Applicant.</td><td>Section 12.3</td></tr>
<tr><td></td><td>Water Management Performance Measures</td><td></td></tr>
<tr><td>Schedule 3, Condition 14</td><td>Water Management Performance Measures
The Applicant must comply with the performance measures in Table 6, to the satisfaction of the Secretary.

Table 6: Water Management Performance Measures
<table>
<tr><th>Feature</th><th>Performance Measure</th></tr>
<tr><td>Water management – General</td><td>Minimise the use of clean water (i.e. water not in contact with disturbed areas) on site

Minimise the need for make-up water from external supplies</td></tr>
<tr><td>Loxton Parilla Sands and Shepparton alluvial aquifers</td><td>Negligible environmental consequences to the alluvial aquifer beyond those predicted in the EIS, including:
• negligible change in groundwater levels beyond those predicted;
• negligible change in groundwater quality beyond those predicted; and
• negligible impact to other groundwater users levels beyond those predicted</td></tr>
<tr><td>Construction and operation of infrastructure</td><td>Design, install and maintain erosion and sediment controls generally in accordance with the series Managing Urban Stormwater: Soils and Construction including Volume 1, Volume 2A – Installation of Services and Volume 2C – Unsealed Roads

Design, install and maintain infrastructure within 40 m of watercourses generally in accordance with the Guidelines for Controlled Activities on Waterfront Land (DPI 2007), or its latest version

Design, install and maintain any creek crossings generally in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013) and Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003), or their latest versions</td></tr>
</table></td><td>Section 6

Section 8.3

Section 10

Section 7.1</td></tr>
</table>

Condition	Description		WMP Section
	Clean water diversion & storage infrastructure	Design, install and maintain the clean water system to capture and convey the 100 year ARI flood. Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on site	Section 9.2
	Sediment dams	Design, install and/or maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries*	Section 9.3
	Mine water storages	Design, install and/or maintain mine water storage infrastructure to ensure no discharge of mine water or saline water off-site (except in accordance with an EPL) On-site storages (including mine infrastructure dams, groundwater storage and treatment dams) are suitably designed, installed and/or maintained to minimise permeability, where practicable	Section 9.4
	Flood mitigation measures	Design, install and maintain flood mitigation measures including bunds to exclude flows from inundating the mining areas for all flood events up to and including the Probable Maximum Flood level Manage any residual downstream impacts in an appropriate manner	Section 9.2
	Overburden emplacements	Design, install and maintain emplacements to encapsulate and prevent any off-site migration of tailings, acid forming and potentially acid forming materials, and saline and sodic material Design, install and maintain emplacements to prevent off-site migration of saline groundwater seepage	Section 7
	Chemical and hydrocarbon storage	Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards	Section 9.5
	Water Management Plan		
Schedule 3, Condition 15	*The Applicant must prepare a Water Management Plan for the development to the satisfaction of the Secretary. This plan must:* *(a) be prepared in consultation with DPE Water and the EPA;* *(b) include a:* *(i) Site Water Balance, that:* • *includes details of:* o *sources and security of water supply, including contingency planning for future reporting periods;* o *water use and management on site;* o *reporting procedures, including the preparation of a site water balance for each calendar year; and* • *investigates and implements all reasonable and feasible measures to minimise clean water use and to recycle water;*		Section 4.1 Section 8 Section 8.2 Section 7 Section 8.5 Section 8.3

Condition	Description	WMP Section
	(ii) Surface Water Management Plan, that includes:	Section 9
	• baseline data on water flows and quality in the watercourses that could be affected by the development (if available);	n/a
	• a detailed description of the water management system on-site, including the:	Section 7
	o clean water diversion systems;	Section 9.2
	o erosion and sediment controls; and	Section 9.3
	o mine water management system, including a description on the measures that would be implemented to manage drilling fluids and muds;	Section 9.4
	• detailed plans, including design objectives and performance criteria for the:	Section
	o emplacement areas for tailings, acid forming and potentially acid forming materials, and saline and sodic materials;	10.5
	o reinstatement of drainage lines on the rehabilitated areas of the site; and	n/a(1)
	o final void;	n/a(1)
	• surface water assessment criteria, including trigger levels for investigating any potentially adverse impacts associated with:	Section 9.7
	o the water management system;	
	o surface water users supplies;	
	o downstream surface water quality;	
	o downstream flooding impacts; and	
	• a program to monitor and report on:	Section 9.8
	o the effectiveness of the water management system; and	
	o surface water flows and water quality (if any); and	
	o downstream flooding impacts;	
	• reporting procedures for the results of the monitoring program; and	Section
	• a plan to respond to any exceedances of the surface water assessment criteria, and mitigate any adverse impacts of the development;	9.8.4 Section 12
	(iii) Groundwater Management Plan, that includes:	Section 10
	• detailed baseline data on groundwater levels, yield and quality in the region and privately-owned groundwater bores that could be affected by the development;	Appendix D
	• a detailed description of the groundwater management system on site;	Section 10
	• detailed plans, including design objectives and performance criteria for the:	Section
	o emplacement areas for tailings, acid forming and potentially acid forming materials, and saline and sodic materials;	10.5
	o groundwater dewatering and reinjection system; and	
	o final void;	Sections 7
	• groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts associated with:	& 10.4
	o alluvial aquifers including the Loxton Parilla and Shepparton aquifers;	Section
	o groundwater users bores;	10.6
	o groundwater dewatering and reinjection system;	
	o seepage/leachate from water storages, emplacements, backfilled voids and the final void;	
	o groundwater dependent ecosystems; and	
	o reinjection of process water (including PAX) during the underground mining trial;	
	• a program to monitor and report on:	Section
	o groundwater inflows to the mining operations;	10.7
	o background changes in groundwater yield/quality against mine-induced changes;	
	o the impacts of the development on the regional and local (including alluvial) aquifers;	
	o impacts on the groundwater supply of potentially affected landowners/leaseholders;	
	o groundwater levels and quality at the dewatering and reinjection sites;	
	o impacts on groundwater quality as a result of reinjection of process water (including PAX) during the underground mining trial;	
	o seepage/leachate from water storages, emplacements, backfilled voids and the final void;	
	o groundwater dependent ecosystems; and	
	o post-mining groundwater recovery;	
	• a program to validate the groundwater model for the development, and compare the monitoring results with modelled predictions; and	Section 10.3.5
	• a plan to respond to any exceedances of the groundwater assessment criteria, and mitigate any adverse impacts of the development.	Section 12

Condition	Description	WMP Section
Schedule 3, Condition 15A	*The Applicant must not commence construction until the Water Management Plan is approved by the Secretary.*	This document
Schedule 3, Condition 15B	*The Applicant must implement the Water Management Plan as approved by the Secretary.*	This document
Schedule 3, Condition 31	*The Applicant shall:* *(d) manage on-site sewage treatment and disposal in accordance with the requirements of Council and EPA; and*	Section 9.6
Schedule 5, Condition 3	***Management Plan Requirements*** *The Applicant shall ensure that the management plans required under this consent are prepared in* *accordance with any relevant guidelines, and include:* *(a) detailed baseline data;* *(b) a description of:* *- the relevant statutory requirements (including any relevant approval, licence or lease conditions);* *- any relevant limits or performance measures/criteria;* *- the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;* *(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;* *(d) a program to monitor and report on the:* *- impacts and environmental performance of the development;* *- effectiveness of any management measures (see c above);* *(e) a contingency plan to manage any unpredicted impacts and their consequences;* *(f) a program to investigate and implement ways to improve the environmental performance of the development over time;* *(g) a protocol for managing and reporting any:* *- incidents;* *- complaints;* *- non-compliances with statutory requirements; and* *- exceedances of the impact assessment criteria and/or performance criteria; and* *(h) a protocol for periodic review of the plan.*	 Appendix D Section 5.3 Sections 9.7 and 10.6 Section 6 Sections 9.8 and 10.7 Section 12 Section 13.5 Section 14

Notes: 1. Not applicable at this stage of the development.
2. Will be addressed or provided in a revised version of this Management plan that will be submitted for approval prior to the commencement of mining operations.

5.3.2. NSW Protection of Environment Operations Act 1997

EPL 20795 was issued by NSW Environment Protection Authority under the NSW *Protection of Environment Operations Act 1997* (POEO Act). The EPL was varied 5 July 2023 to include groundwater monitoring requirements. EPL 20795 conditions relevant to this WMP and where they are addressed in this document are provided in Table 3.

Table 3- Relevant EPL Conditions

<table>
<tr><th>Condition</th><th>Description</th><th>WMP Section</th></tr>
<tr><td>P1.2</td><td>The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.
Water and land
<table>
<tr><th>EPA Identification no.</th><th>Type of Monitoring Point</th><th>Type of Discharge Point</th><th>Location Description</th></tr>
<tr><td>17</td><td>Groundwater Monitoring</td><td></td><td>Groundwater bore labelled 'Karra Bore' identified in Figure 29 and Table 23 of the document titled 'Balranald Mineral Sands Project- West Balranald Stage 1 Consent (SSD-5285)-Water Management Plan' dated May 2023 and kept on EPA file DOC23/513414.</td></tr>
<tr><td>18</td><td>Groundwater monitoring</td><td></td><td>Groundwater bore labelled 'T01' identified in Figure 29 and Table 23 of the document titled 'Balranald Mineral Sands Project- West Balranald Stage 1 Consent (SSD-5285)-Water Management Plan' dated May 2023 and kept on EPA file DOC23/513414.</td></tr>
<tr><td>19</td><td>Groundwater monitoring</td><td></td><td>Groundwater bore labelled 'GW036673' identified in Figure 29 and Table 23 of the document titled 'Balranald Mineral Sands Project- West Balranald Stage 1 Consent (SSD-5285)-Water Management Plan' dated May 2023 and kept on EPA file DOC23/513414.</td></tr>
<tr><td>20</td><td>Groundwater monitoring</td><td></td><td>Groundwater bore labelled 'GW036866' identified in Figure 29 and Table 23 of the document titled 'Balranald Mineral Sands Project- West Balranald Stage 1 Consent (SSD-5285)-Water Management Plan' dated May 2023 and kept on EPA file DOC23/513414.</td></tr>
<tr><td>21</td><td>Groundwater monitoring</td><td></td><td>Groundwater bore labelled 'WB01' identified in Figure 29 and Table 23 of the document titled 'Balranald Mineral Sands Project- West Balranald Stage 1 Consent (SSD-5285)-Water Management Plan' dated May 2023 and kept on EPA file DOC23/513414.</td></tr>
<tr><td>22</td><td>Groundwater monitoring</td><td></td><td>Groundwater bore labelled 'WB02' identified in Figure 29 and Table 23 of the document titled 'Balranald Mineral Sands Project- West Balranald Stage 1 Consent (SSD-5285)-Water Management Plan' dated May 2023 and kept on EPA file DOC23/513414.</td></tr>
<tr><td>23</td><td>Groundwater monitoring</td><td></td><td>Groundwater bore labelled 'LPSPB03' identified in Figure 29 and Table 23 of the document titled 'Balranald Mineral Sands Project- West Balranald Stage 1 Consent (SSD-5285)-Water Management Plan' dated May 2023 and kept on EPA file DOC23/513414.</td></tr>
<tr><td>24</td><td>Groundwater monitoring</td><td></td><td>Groundwater bore labelled 'T03' identified in Figure 29 and Table 23 of the document titled 'Balranald Mineral Sands Project- West Balranald Stage 1 Consent (SSD-5285)-Water Management Plan' dated May 2023 and kept on EPA file DOC23/513414.</td></tr>
</table></td><td>Section 10.7.4</td></tr>
</table>

<table>
<tr><th>Condition</th><th>Description</th><th>WMP Section</th></tr>
<tr><td>L1.1</td><td>Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.</td><td>Entire document</td></tr>
<tr><td>M2.1</td><td>For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:</td><td>Section 10.7.4</td></tr>
<tr><td>M2.3</td><td>Water and/ or Land Monitoring Requirements
POINT 17,18,19,20,21,22,23,24
<table>
<tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr>
<tr><td>Aluminium (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Arsenic (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Cadmium (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Chromium (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Cobalt (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Copper (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Electrical conductivity</td><td>microsiemens per centimetre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Iron (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Lead (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Manganese (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Nickel (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>pH</td><td>pH</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Uranium</td><td>micrograms per cubic metre</td><td>Yearly</td><td>Representative sample</td></tr>
<tr><td>Zinc (dissolved)</td><td>micrograms per litre</td><td>Yearly</td><td>Representative sample</td></tr>
</table>
POINT 19,20,21,22,23
<table>
<tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr>
<tr><td>Standing Water Level</td><td>metres</td><td>Quarterly</td><td>In situ</td></tr>
</table></td><td>Section 10.7.4</td></tr>
</table>

5.3.3. NSW Water Management Act 2000

Water Sharing Plans (WSPs) are statutory documents established under the *Water Management Act 2000* (WMA 2000) that apply to individual water source areas and contain the rules for sharing and managing the water resources of NSW. The WMA 2000 outlines the requirements for the taking and trading of water through water access licenses (WALs), water supply works and water use approvals.

There are a number of surface and groundwater WSPs that relate to water sources in and surrounding the project area; two are applicable to the current project activities being the Water Sharing Plan for the MDB Porous Rock Groundwater Source 2020 and Murrumbidgee Regulated River Water Source. The Balranald Project lies within the Western Murray Porous Rock Groundwater Source. Further information about this WSP and the Balranald Project can be found in the Balranald Project Water Impact Assessment (EMM, 2015).

Iluka intend to construct the approved Murrumbidgee fresh water supply pipeline and pump, or use existing privately owned water supply infrastructure under a land access agreement. River water will be used during the construction phase for selected construction activities that specifically require fresh water (e.g. engineered road construction, concrete batching etc).

Water extraction from the Murrumbidgee river would be regulated by the Water Sharing Plan for the Murrumbidgee Regulated River Water Source 2016. Iluka hold 101 shares of Murrumbidgee Regulated

River Water Source and an additional 100ML of temporary allocation under Water Access Licence WAL41857. Water Supply Works Approval 40MW416854 would be nominated to this Water Access Licence for the extraction of surface water.

Remaining construction phase water demand will be from groundwater sourced from the Western Murray Porous Rock Groundwater Source. There will be no net increase in water usage during construction as water demand will be met through the either groundwater or fresh water depending on the construction activity.

5.3.4. NSW Aquifer Interference Policy

The NSW Aquifer Interference Policy (AIP) was finalised in September 2012 and clarifies the water licensing and approval requirements for aquifer interference activities in NSW, including the taking of water from an aquifer in the course of carrying out mining.

The NSW AIP requires that potential impacts on groundwater sources, including their users and GDEs, be assessed against minimal impact considerations, outlined in Table 1 of the Policy. If the predicted impacts meet the Level 1 minimal impact considerations, then these impacts will be considered as acceptable. The adopted Level 1 minimal impact considerations for the Project are discussed further below and are outlined in Table 4.

The minimal impact thresholds outlined in the AIP will be used to assess the potential impacts to groundwater resulting from the Balranald Project. This is in accordance with the Minister's requirements for approval and administration of the WMA 2000.

The AIP's 'minimal impact considerations' are employed to assess impacts to water table levels, water pressure levels and water quality across a range of different groundwater system types. The AIP divides groundwater sources into 'highly productive' or 'less productive' based on the yield (>5 L/s for high yielding) and water quality (<1,500 mg/L total dissolved solids for high yielding). Thresholds are set in the AIP for the different groundwater sources for the different minimal impact considerations.

The groundwater within the Western Murray Groundwater Source in the MDB Porous Rock WSP in the vicinity of the Balranald Project is classified as 'less productive', based on the very high salinity levels. The categories of less productive groundwater sources include alluvial, porous rock and fractured rock. The greater water source is classified as a 'porous rock' water source, therefore the minimal considerations for porous rock units of less productive groundwater systems have been adopted for the Balranald Project.

Table 4- Minimal Impact Criteria for adopted for the Balranald Project (after EMM, 2022).

Impact level	Watertable	Water pressure	Water quality
Level 1 impact (ie less than minimal)	Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 m from any: a) high priority groundwater dependent ecosystem; or b) high priority culturally significant site. Listed in the schedule of the relevant water sharing plan. A maximum of a 2 m decline cumulatively at any water supply work.	A cumulative pressure head decline of not more than a 2 m decline, at any water supply work.	Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.
Level 2 impact (ie greater than minimal)	If more than 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 m from any: a) high priority groundwater dependent ecosystem; or b) high priority culturally significant site. Listed in the schedule of the relevant water sharing plan if appropriate studies demonstrate to the Minister's satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or significant site. If more than a 2 m decline cumulatively at any water supply work, then make good provisions should apply.	If the predicted pressure head decline is greater than requirement 1 above, then appropriate studies are required to demonstrate to the Minister's satisfaction that the decline will not prevent the long-term viability of the affected water supply works unless make good provisions apply.	If condition 1 is not met then appropriate studies will need to demonstrate to the Minister's satisfaction that the change in groundwater quality will not prevent the long-term viability of the dependent ecosystem, significant site or affected water supply works.

Source: AIP DPI Water 2012.

Notes: 'Post-WSP'– refers to the period after the first WSP in the water source begins, including the highest pressure head (allowing for typical climatic variations) within the first year after the first WSP begins.
'Appropriate studies' on the potential impacts of watertable changes greater than 10% are to include an identification of the extent and location of the asset, the predicted range of watertable changes at the asset due to the activity, the groundwater interaction processes that affect the asset, the reliance of the asset on groundwater, the condition and resilience of the asset in relation to watertable changes and the long-term state of the asset due to these changes.
All cumulative impacts are to be based on the combined impacts of all 'post-WSP' activities within the water source.

5.3.5. Water Licencing and Approvals

Iluka's Water Access Licences (WALs) are listed in Table 5 and water works approvals are provided in Table 6. State significant developments are exempt from the requirement to obtain a water supply works approval under the WMA 2000, if proposed works have been previously assessed in a Groundwater Impact Assessment for the Consent. Two miscellaneous works approvals have been created to permit nomination of water supply works for licenced water extraction. Other water supply works approvals held by Iluka prior to approval of SSD-5285 that were used for previous mining trials are also listed in Table 6.

All production bores used to extract groundwater for construction water supply, operations water supply and the mining plant will be linked to works approval 60MW583326 to permit water extraction under one or more of the WALs held by Iluka. Any production bores not approved under the Consent will be subject to a new Water Supply Works Approval under the WMA 2000.

Iluka hold four WALs to permit extraction of groundwater from the production bores during construction and operations phases of the project and one WAL for the extraction of water from the Murrumbidgee River. All water extracted as part of the mining process will be accounted for under a WAL, even though the majority of this water will be reinjected. Water will be extracted in accordance with the available allocation and the carryover and record keeping conditions stated in the WALs.

Iluka have received approval for two controlled allocations of Western Murray Porous Rock groundwater entitlement, which is considered sufficient for groundwater extraction throughout all stages of the project.

- Application number D1022351 for 2,000 megalitres (ML). A notice of decision from DPE Water was received on 9/9/2022 for approval of 60AL583681 (WAL 44602).

- Application number D1023935 for 3,400 megalitres (ML). A notice of decision from DPE Water was received on 8/8/2023 for approval of 50AL514844.

WAL31101 and WAL31102 have 0 ML entitlement however Iluka may assign allocation to these WALs from other WALs or by trading on the open market, if required.

All monitoring bores will be licenced prior to their construction and the licence details published in a future revision of this Plan.

Table 5- Water access licences

WAL number	Water Source	Entitlement Volume (ML)
WAL31101 (60AL583095)	Western Murray Porous Rock Groundwater Source	0
WAL31102 (60AL583094)		0
WAL44602 (60AL583681)		2,000
*WAL (50AL514844)		3,400
WAL41857 (40AL417267)	Murrumbidgee Regulated River Water Source	101 (General Security) 100 (Temporary trade)

*WAL number to be issued by NSW Land Registry Services when registered.

Table 6- Works approvals and monitoring bore licences

Approval / licence number	Issue date	Expiry date	Linked WAL	Water Source	Listed Works
60MW583326	18/5/2016	17/5/2026	WAL44602, WAL31101	Covers all groundwater works extracting water from the Western Murray Porous Rock Groundwater Source	- Construction and production water supply bores in the Olney and Loxton Parilla Sands Formations - Mining plant ore extraction and reinjection holes
40MW416854	18/5/2016	17/5/2026	WAL41857	Covers all surface water works extracting water from the Murrumbidgee Regulated River Water Source	Construction of water supply pipeline and placement of temporary surface water pump.
60WA583164	25/10/2013	24/10/2033	31102		WMPB05

Approval / licence number	Issue date	Expiry date	Linked WAL	Water Source	Listed Works
60WA583165	28/10/2013	27/10/2033	31102	Western Murray Porous Rock Groundwater Source	WMPB03, WMPB04
60WA583166	28/10/2013	27/10/2033	NA		Groundwater storage and pipeline
60WA583168	27/11/2013	26/6/2026	31101		Bore WB6, Karra Bore
60WA583169	2/12/2013	1/12/2023	31102		PB-P2, WB31

5.4. Training and awareness

Iluka have a standard for training and awareness *(Group Standard 3:Training and Awareness)* to ensure employees and contractors are appropriately trained and are competent to perform their work.

Inductions (excluding visitor induction) shall be undertaken every two years or more frequently as required. The Iluka induction and a Project specific induction shall be undertaken prior to commencement of works.

Processes and procedures are developed and implemented by the operation to identify, prioritise and plan the fulfilment of training needs commensurate with HSEC risks. Processes shall include (at a minimum):

- development of a training needs analysis, including the identification of training needs for all employees and contractors within the area, operations, Project or function;
- delivery of training and maintaining currency;
- methods and criteria for the determination of competency; considering training, education, skills and experience; and
- evaluation of the effectiveness of training processes and programs.

Training attendance, inductions and competency shall be recorded. Employee and contractor records shall be maintained and attendance recorded in the Iluka Training Management System.

Iluka maintain a training platform, which requires employees to undertake specific training programs periodically.

5.5. Environmental risk assessment

A risk-based framework was adopted for the groundwater assessment to categorise and characterise risk in-line with the National Water Commission's (NWC) mining risk framework (NWC 2010). The groundwater risk assessment framework uses a source-pathway-receptor model to characterise the significance of a water-affecting activity, grouping these as either 'direct' or 'indirect' impacts (EMM, MOD1 report).

All water related risks have been collated into an Aspects and Impacts register for the Balranald Project. Mitigation measures have been developed to minimise impacts to water as low as reasonably practicable during the construction phase of the Project. The risk assessment will be reviewed throughout different stages of the Project or when a potential hazard is identified to ensure that adaptive management is being applied effectively and appropriate controls are adopted. Appendix C provides a summary of the aspects and impacts register relevant to this Plan.

6. Water Strategy and Performance Measures

The water management strategy is based on the separation of water from different sources based on anticipated water quality, as follows:

- Saline groundwater extracted from the Loxton Parilla Sands (LPS) and brackish water sourced from the Olney Formation will be used to satisfy mine water demands, and partially reinjected into the LPS during the mining process. This use of saline groundwater minimises the need for river water from the Murrumbidgee River. Water efficiency will be maximised at all stages of operations, where practical to minimise groundwater take.

- Mine affected water, comprising processing water and runoff collected in the processing area (including run of mine (ROM) pad and tailings and mining by-product stockpiles) is contained within the ore processing area and returned to the process for reuse.

- Process water quality will be monitored and managed to minimise its influence on groundwater quality when recirculated into the ground for mining.

- The potential for AMD generation from ore and waste streams will be mitigated and minimised via dedicated handling and storage measures and infrastructure, and where it cannot be minimised it will be mitigated via limestone neutralisation.

- A comprehensive monitoring strategy will be used to assess the performance of the water system and the influence of mining activities on the nearby groundwater system. Monitoring in the initial stages of mining will be used to calibrate and validate the groundwater model.

- Flood risk is mitigated via comprehensive flood modelling and construction of flood bunds and diversion structures.

- Potable water would be produced by a potable water treatment plant.

- Sewage would be managed via an approved package waste treatment system serviced by Iluka personnel or a licenced contractor as required.

- An adaptive management framework will be applied to all aspects of water management in accordance with Iluka's EMS and via future revisions of this WMP.

- Water data and information will be transparently reported via the Annual Review.

- Water performance measures (from Schedule 3 Condition 14) and the management and mitigation measures implemented to address these, are provided in Table 7. Implementation of these measures is described in further detail in Sections 9 and 10 of this document.

6.1. Environmental management measures

The water management performance and management measures that will be implemented are outlined in Table 7.

Table 7: Water performance and management measures

Feature	Performance Measure (SSD-5285 Schedule 3 Condition 14)	Management and Mitigation Measures
Water management – General	- Minimise the use of clean water (i.e., water not in contact with disturbed areas) on site - Minimise the need for make-up water from external supplies	- Process area bunded to divert clean water around it - water captured from processing area is reused to offset demand for groundwater - mine water is reused as much as possible to minimise demand for external water - Hypersaline and brackish groundwater (low beneficial use) used preferentially over river water extraction (high beneficial use) - Training and awareness of environmental hazards and controls for site personnel, including water efficiency
Loxton Parilla Sands and Shepparton alluvial aquifers	Negligible environmental consequences to the alluvial aquifer beyond those predicted in the EIS, including: · negligible change in groundwater levels beyond those predicted; · negligible change in groundwater quality beyond those predicted; and · negligible impact to other groundwater users levels beyond those predicted	- groundwater monitoring program and data review against investigation triggers - groundwater model review process to confirm / validate EA predictions - treatment of tailings to mitigate and minimise infiltration of seepage water - Minimise PAX reinjected underground - Stockpiles located on an engineered hardstand that diverts surface runoff to the diversion drains.
Construction and operation of infrastructure	- Design, install and maintain erosion and sediment controls generally in accordance with the series Managing Urban Stormwater: Soils and Construction including Volume 1, Volume 2A – Installation of Services and Volume 2C – Unsealed Roads - Design, install and maintain infrastructure within 40 m of watercourses generally in accordance with the Guidelines for Controlled Activities on Waterfront Land (DPI 2007), or its latest version - Design, install and maintain any creek crossings generally in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013) and Why Do Fish Need To Cross The Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003), or their latest versions	- Installation of stormwater infrastructure in accordance with the hydrology assessment recommended design. - routine inspection and maintenance of drainage and erosion control - hydrology assessment completed and identified no permanent watercourses in the mining operations area. - Murrumbidgee pipeline and pumping infrastructure constructed in accordance with Guidelines for Controlled Activities on Waterfront Land (DPE 2022) - Use of any existing surface water infrastructure for extraction of water from the Murrumbidgee River.
Clean water diversion & storage infrastructure	Design, install and maintain the clean water system to capture and convey the 100 year ARI flood. Maximise as far as reasonable and feasible	- Flood levee designed to 1% AEP 72-hour event - water diverted around operations.

Feature	Performance Measure (SSD-5285 Schedule 3 Condition 14)	Management and Mitigation Measures
	the diversion of clean water around disturbed areas on site	
Sediment dams	Design, install and/or maintain the dams generally in accordance with the series Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries	- Sediment control designed according to NSW blue book. - routine inspection of drainage, sediment control and dams.
Mine water storages	- Design, install and/or maintain mine water storage infrastructure to ensure no discharge of mine water or saline water off-site (except in accordance with an EPL) - On-site storages (including mine infrastructure dams, groundwater storage and treatment dams) are suitably designed, installed and/or maintained to minimise permeability, where practicable	- process plant area bunded to 1% AEP 72-hour event. - process plant drainage and rainfall runoff capture dams designed to 1%% AEP 72-hour event. - all process water dams are lined - surface and groundwater monitoring program to detect any leakage - routine inspection and maintenance of water infrastructure - automated shut-off system to prevent overflow/spill for process water dams - Training and awareness of environmental hazards and controls for site personnel including water pollution
Flood mitigation measures	- Design, install and maintain flood mitigation measures including bunds to exclude flows from inundating the mining areas for all flood events up to and including the Probable Maximum Flood level - Manage any residual downstream impacts in an appropriate manner	- Flood mitigation bunds constructed around the processing plant areas in accordance with the hydrology assessment recommended design. - Culverts will be constructed along access road to permit passage of flood flows.
Overburden emplacements	Design, install and maintain emplacements to encapsulate and prevent any off-site migration of tailings, acid forming and potentially acid forming materials, and saline and sodic material. Design, install and maintain emplacements to prevent off-site migration of saline groundwater seepage	- Sand tailings will be disposed of in pre-stripped area above the mining panels, encapsulated with 2 m of inert material, and covered with subsoil and topsoil. - Sand tailings containing PAF material will be amended with limestone to neutralise acid and metalliferous drainage.
Chemical and hydrocarbon storage	Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards	- Chemical and hydrocarbon products will be stored in bunded areas in accordance with: *AS1940-2004 The storage and handling of flammable and combustible liquids* *AS 3780:1994 Australian standard for the storage and handling of corrosive substances* *AS 1692:1989 Australian standard for tanks for flammable and combustible liquids*

Feature	Performance Measure (SSD-5285 Schedule 3 Condition 14)	Management and Mitigation Measures
		- routine inspection and maintenance of bunding and storage areas - Training and awareness of environmental hazards and controls for site personnel

7. Site Water System

Construction water will be sourced from new and existing groundwater production bores and the Murrumbidgee River initially, then production bores that will be used for the operations phase of the project (location shown in Figure 16). Construction water will be stored in the T3 process water pond and or tanks. Its primary uses will be for dust suppression, material conditioning and miscellaneous uses such as wash down. Potable water will be imported to site or produced on site using a package Reverse Osmosis (RO) water treatment plant.

The project water management system comprises the mining system (groundwater injection and recovery), a series of lined dams within the processing plant area and sediment dams located downstream from soil stockpiles and disturbed areas. The preliminary layout of the process plant areas is shown in Figure 6 and Figure 7, and a simplified conceptual layout of the site water system is provided in Figure 8. Water storages are summarised in Table 8.

Mining will involve two mining plants located along the strike of the ore body. The first mining rig will commence on panel 1 and the second will commence at panel 5. Both will then mine in a northerly direction. Each will inject high pressure water underground to the ore body which will fluidise the ore, which is then recovered via the mining equipment at an anticipated rate of 50 to 200 tonnes per hour. The combined ore from both mining plant is pumped to the processing plant which concentrates the ore to generate two primary product streams; magnetic Heavy Mineral Concentrate (HMC) and non-magnetic HMC.

Each plant has its own water circuit. Flotation water contains PAX, a chemical used to separate iron sulfide from the ore. Flotation circuit overflow is sent to a series of PAX destruction dams to reduce the PAX concentration. This water is reused back in the flotation process and excess water is combined with other mine water and recycled as part of the mining process. The desliming and thickening process also produces a fine tailings material which is also reinjected underground.

Hypersaline groundwater supply and other process waters are stored in the process water dam from where it is distributed for various uses. Brackish water is used for purposes where a lower salinity is required such as gland seal water and dust suppression.

Sand tailings is a by-product generated in the ore processing plant. This is dewatered as much as practicable prior to being trucked and deposited on prepared areas overlying mining panels, that exist ahead of mining. Lime is added to sand tailings to neutralise any potential acidity in the water.

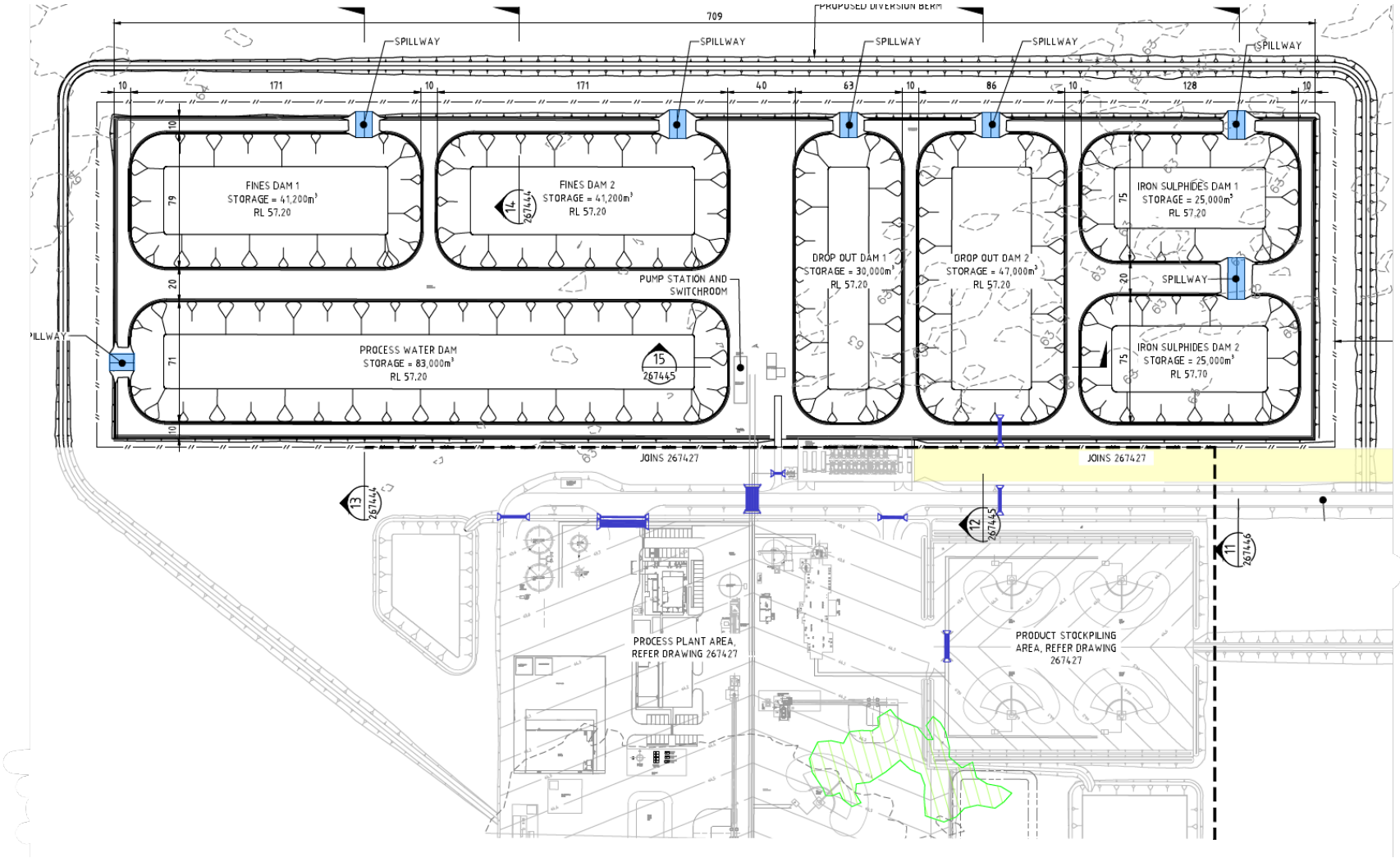

Figure 6- Conceptual plan view drawing of the ore processing plant and water infrastructure. The layout will be optimised prior to construction.

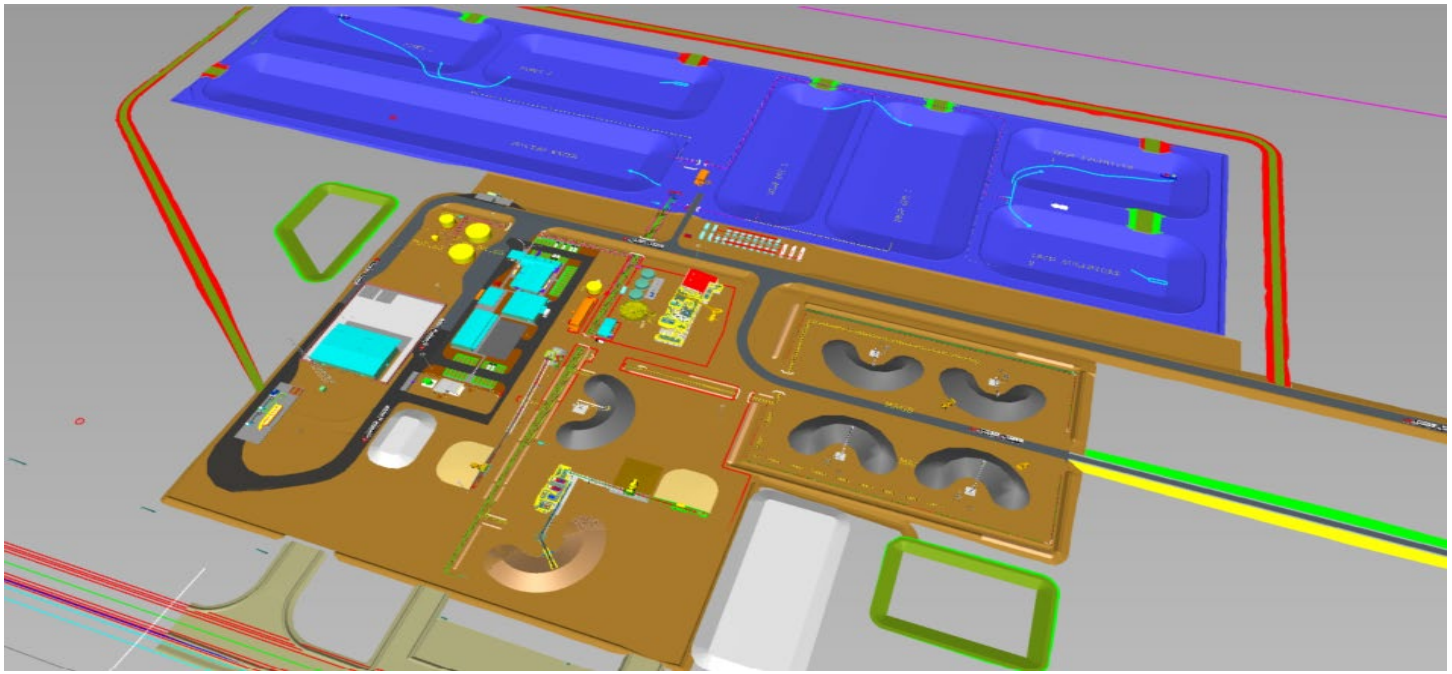

Figure 7- Conceptual three-dimensional view (looking from the west) of the ore processing plant and water infrastructure. The layout will be optimised prior to construction.

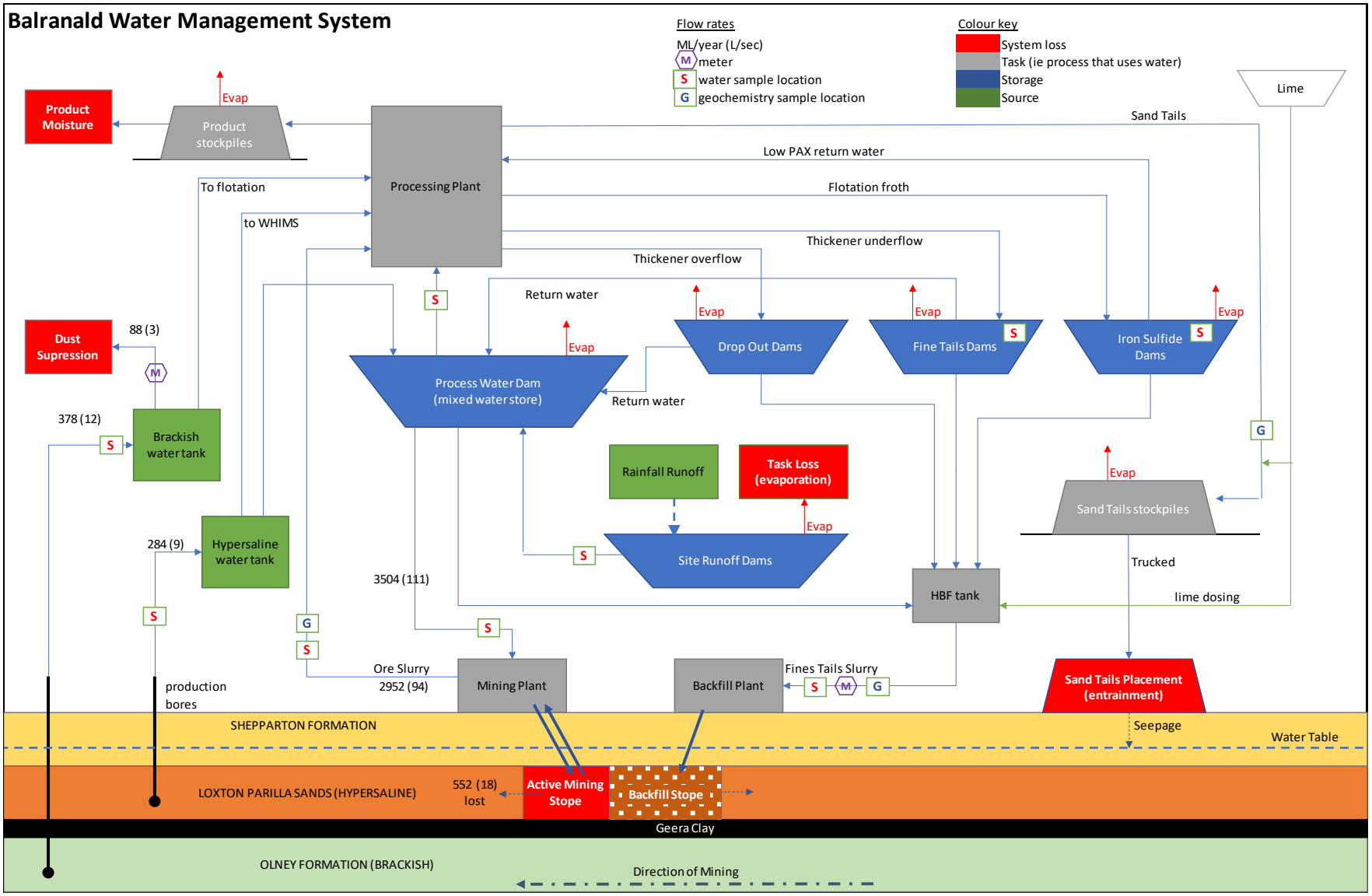

Figure 8- Simplified site water system schematic

Table 8- Mine water storage dams

Dam	Description
Construction Phase	
T3 water dam	Used during the construction phase to store dust suppression and material conditioning water.
Operations Phase	
Site Runoff Dam 1	Lined dam to collect runoff from the ore processing areas. Designed to store a 1:100 year 72-hour rainfall event plus additional freeboard. This dam is maintained in a nominally empty state at all times to ensure that adequate freeboard is available to capture rainfall runoff to within its design capacity.
Site Runoff Dam 2	Lined dam to collect runoff from the ore processing areas. Designed to store a 1:100 year 72-hour rainfall event plus additional freeboard. This dam is maintained in a nominally empty state at all times to ensure that adequate freeboard is available to capture rainfall runoff to within its design capacity.
Process Water Dam (PWD)	Lined dam to collect runoff from the ore processing areas. Designed to store a 1:100 year 72-hour rainfall event plus additional freeboard. The PWD is the main receiver and source of process water for a range of streams within the processing facility, mining and backfilling.
Drop Out Dams (DODs)	Lined dam to collect runoff from the ore processing areas. Designed to store a 1:100 year 72-hour rainfall event plus additional freeboard. The drop out dams function as additional solids capture facilities before discharging back into the PWD These are periodically dredged and the fine material is sent to the HBF tank for underground backfill. There are two DODs, one Duty and one Standby
Sulfide Dams	Lined dams to collect runoff from the ore processing areas. Designed to store a 1:100 year 72-hour rainfall event plus additional freeboard. The sulfide dams store flotation overflow (froth) that contains predominantly fine, iron sulfide minerals. These are stored under a water cover to prevent them from oxidising and generating acidic conditions. The fine material is sent to the HBF tank for underground backfill.
Fine Tailings Dams	Lined dam to collect runoff from the ore processing areas. Designed to store a 1:100 year 72-hour rainfall event plus additional freeboard. These dams receive the fine tailings from the desliming and thickening process. The fine material is then sent to the HBF tank for underground backfill.

7.1. Construction of infrastructure

Infrastructure will be constructed generally in accordance with the EA. In accordance with SSD-5285 Schedule 3 Condition 14, the following guidelines will be adopted where relevant:

- any infrastructure within 40 metres (m) of watercourses will be designed, installed and maintained generally in accordance with the Guidelines for controlled activities on waterfront land (DPE, 2022), or its latest version; and
- any creek crossings will be designed, installed and maintained generally in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management (Department of Primary Industries, 2013) and Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Fairfull, S. and Witheridge, G., 2003), or their latest versions.

The proposed construction of the Murrumbidgee water conveyance infrastructure for the temporary freshwater extraction during the mine construction phase will involve the following activities:

- placement of a mobile skid or trailer based, diesel operated pump on the river bank;
- placement of a suction hose in the water course suspended on a float;
- trenching of the delivery pipeline within a private existing road footprint; and

- installation of storage tanks and standpipe on a private land holding.

The proposed works will not require any clearing or earthworks of the river bank for the placement of the mobile pump, the pump will be placed adjacent an existing privately owned pumping station. Erosion and sediment controls outlined in Section 9.3 will be adopted for any ground disturbance works required for the pipeline installation.

A mobile diesel pump with a pumping capacity of 9L/S will be temporarily placed on the river bank within Lot 99 of Development Plan 751245. The pump will be equipped with 150mm diameter suction and delivery pipes which will convey water to the permanent trenched 100mm HDPE pipeline.

A plan of the pumping infrastructure and pipeline route is show in Figure 9 and Figure 10 respectively.

Figure 9- Location of pumping infrastructure

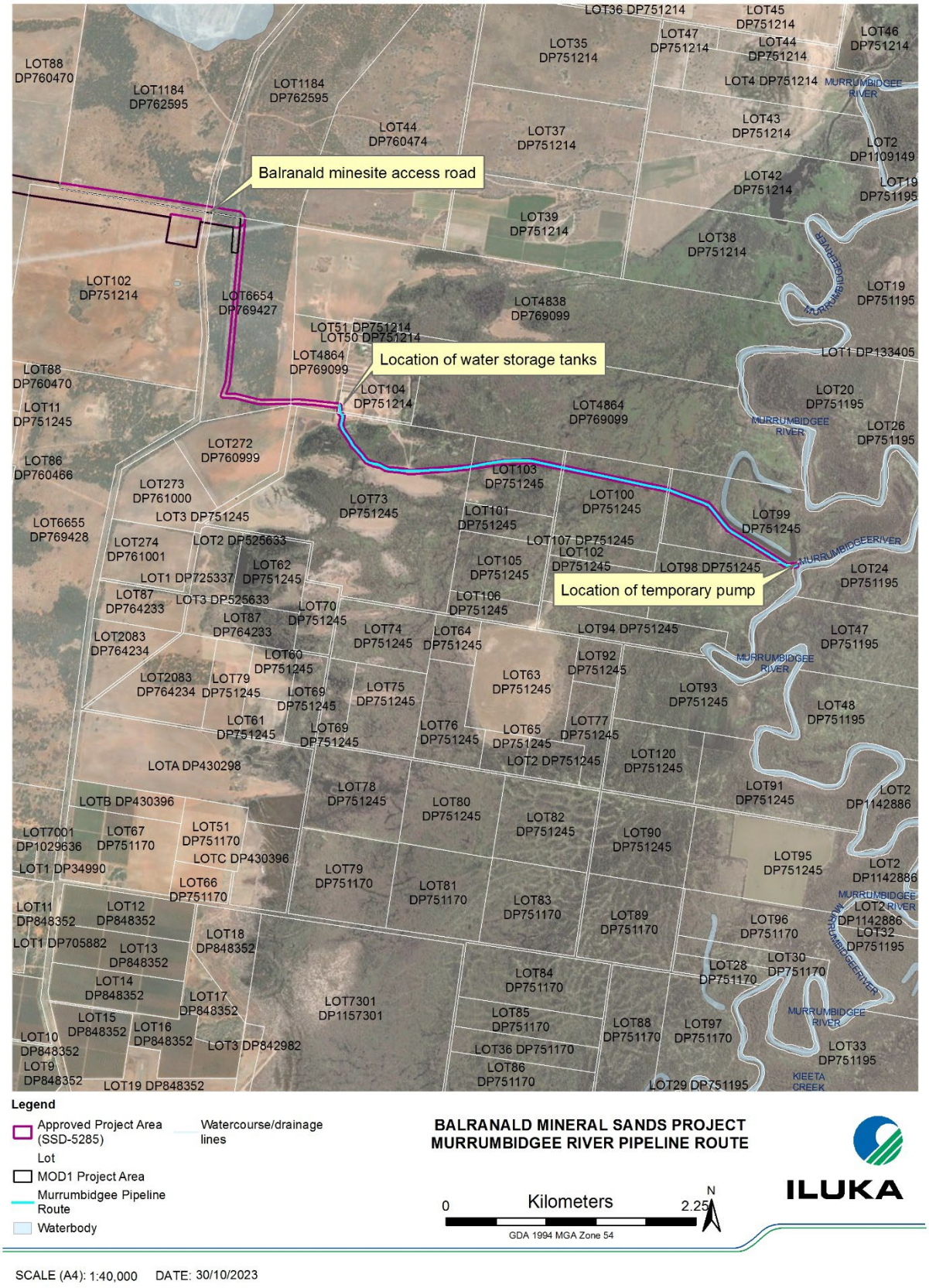

Figure 10- Murrumbidgee River Pipeline Route

8. Water Balance

8.1. Water Demand

Construction water will be required for dust suppression and material conditioning for infrastructure construction. Brackish groundwater and Murrumbidgee River water will be used for construction activities that specifically require fresh or potable water, with brackish water otherwise prioritised for general construction activities.

Saline water will not be used in undisturbed areas where there is a risk of topsoil contamination.

The predicted water demands and corresponding sources are shown in Table 9. The primary water demand is for mining, where it is estimated that 3,400 ML/year is required to mobilise the ore. The majority of this water (2,864 ML/year, or 84%) is directly recovered as part of the mining process. The remaining demand for mining is sourced from production bores from the hypersaline LPS aquifer which also hosts the ore. Hence the water lost during mining is essentially being returned to the aquifer.

The other demands are for ore processing (714 ML/year entrained in tailings and products), dust suppression (85 ML/year), evaporation from dams (64 ML/year) and reagent make-up (26 ML/year).

Table 9- Estimated water demands and sources (EMM, 2022).

Demands		Sources				
Water use	**Volume**	**Hyper saline groundwater**	**Brackish groundwater**	**Ore body groundwater**	**Floc and reagents**	**Potable water truck**
		Imported	**Imported**	**Recovered with ore**	**Imported**	**Imported**
Mining						
Mining water supply	3,400	536	-	2,864		-
Processing	714	616	68	-	26	-
Water in Tails	*689*					
Water in Product	*26*					
Site operation						
Dust suppression	85	-	85	-	-	-
Evaporation from dams	60	64	-	-	-	-
Potable use	15	-	-	-	-	15
Total demand	**4,274**	**1,216**	**153**	**2,864**	**26**	**15**

8.2. Sources and Security of Supply

The Balranald project will source its water from groundwater and the Murrumbidgee River. This is anticipated to provide all water requirements for the duration of the Project. Iluka's water works approval and access licences are described in Section 5.3.5.

For construction, existing production and/or farm bores will be licenced appropriately for use. If required, additional production bores will be drilled and added to 60MW583326 or new Water Supply Works Approval to supplement the construction water supply. Murrumbidgee river water will be extracted

under Iluka's Water Access Licence during construction and will substitute a portion of the brackish groundwater source.

For the operations phase, production bores will be constructed to source water from the LPS Formation (nominally 12 L/sec each) and Olney Formation (nominally 6 L/sec each). The site is located in a low rainfall region. Any rainfall captured in the ore processing areas will drain into one of two runoff dams. This water is not considered suitable for discharge and will be pumped back into the process water dam to offset the need for groundwater extraction.

Water supply reliability presents a low risk for the project, due to the high productivity of the groundwater formations. In accordance with SSD-5285 Schedule 3 Condition 11, activities will be modified in the event that water supply is not available.

In the event that groundwater allocations are restricted within the water source, Iluka may, as a contingency in accordance with SSD-5285 Schedule 3 Condition 15(b)(i), temporarily trade groundwater allocation on the open water market to maintain availability of its water supply.

8.3. Water Efficiency Measures

In accordance with SSD-5285 Schedule 3, Condition 15(b)(i), water is reused at every stage of the process to minimise the need for clean water. The primary purpose of maximising water reuse is to minimise extraction of groundwater from the Western Murray Porous Rock water source, thus minimising the potential impact from groundwater drawdown.

The primary form of reuse is direct recovery of water during mining operations where the majority of water injected for mining is recovered. Other reuse includes clay fines thickener overflow water and sumps that capture and recover water from ore and tailings stockpiles.

8.4. Metering and monitoring

Australian Standard, pattern approved meters will be installed at water extraction points, where required under any relevant Water Supply Works Approval conditions, in accordance with the NSW DPE Non-Urban Metering Framework. Flow meters will also be installed at other locations within the site water system to track key water transfers and water efficiency.

8.5. Water Accounting and Reporting

In accordance with SSD-5285 Schedule 3 Condition 15(b)(i), an annual water account will be developed and reported in the AEMR for each calendar year. This will be presented in accordance with the Minerals Council of Australia Water Accounting Framework (MCA, 2021). This water account will include:

- Licenced water extraction
- Summary of reconciled water balance
- Water consumption
- Water efficiency

Water consumption will be compared against EA predictions (Section 8.1).

9. Surface Water Management

Due to the flat landscape and hydrological setting of the mine site, and the long distance to any receiving surface water systems, the surface water risks for the project are considered low. Surface water management measures are associated with managing localised flooding, segregation and containment of process water within the processing plant, localised erosion and sediment control.

The following sections outline the surface water management aspects in accordance with SSD-5285 Schedule 3 Condition 15(b)(ii).

9.1. Baseline Data

Due to the hydrological setting of the project (Appendix A), there is no baseline data available for local flow or surface water quality to satisfy the requirements of SSD-5285 Schedule 3, Condition 15(b)(ii).

9.2. Clean Water and Flood Diversion

A flood impact assessment was completed by WRM (2015) which considered flooding events from overflow from the Lachlan River into Box Creek. More recently, Worley (2022) focused on local flooding events. The Worley assessment (2022) included a two-dimensional TUFLOW flood model to assess on-site flood characteristics for both existing and post-development conditions. The Worley modelling was based on the following design storm events (Worley, 2022):

- Simulation of the 30 minute, 1 hour, 3 hour, 6 hour, 12 hour and 72 hour duration storms for both the 1% annual exceedance probability (AEP) and 5% AEP design events. The shorter duration storms are expected to result in higher peak flood levels along overland flow paths due to the higher rainfall intensity and flow rates, while the longer duration storms are expected to result in higher peak flood levels in the local depressions due to the higher total runoff volumes.

- Adoption of a temporal pattern with a relatively even distribution of rainfall throughout the storm duration.

The 72-hour duration storm was chosen as the upper limiting duration for design flood modelling following a review of historical rainfall records at the nearby gauges at Balranald (RSL) (gauge no. 049002) and Oxley (Walmer Downs) (gauge no. 049055). The two gauges are located 14 km and 40 km from the project boundary, respectively. The Balranald (RSL) gauge has been recording daily rainfall totals since 1879. The Oxley (Walmer Downs) gauge has been recording daily rainfall totals since 1922.

The available rainfall records show that the longest storm durations recorded were no more than 72 hours. The Balranald (RSL) gauge recorded a three-day rainfall event in June 1963, while the Oxley (Walmer Downs) gauge recorded a three-day rainfall event in February 2011.

The construction of the proposed works is predicted to have negligible impacts on the existing flood behaviour within the project boundary. In accordance with SSD-5285 Schedule 3, Condition 15(b)(ii) and based on the flood modelling, a series of flood diversion berms will be constructed to divert the 1% AEP 72-hour storm event. The flood mitigation measures will be designed to exclude flows up to the probable maximum flood level. The berms are located to the western side of the mining area (Figure 12) and around the north and eastern side of the processing plant area (Figure 6). The diversion berm is a keyed earthworks embankment with a crest width of 6m and 1 vertical to 4 horizontal batters. The height of the berm varies (typically 1 to 1.5m) to provide protection from the 1% AEP event with an additional 500 mm freeboard. A typical cross-section is shown in Figure 11.

The local flood modelling (Worley, 2022) showed that the site access road is predicted to remain largely flood-free during the 1% AEP event. Some minor overtopping is predicted at three locations but is not

predicted to be greater than 0.1 m depth and with relatively low flood velocities of 0.8 m/sec. The magnitudes of these depths and velocities constitute a H1 flood hazard category according to ARR 2019, which means that the inundation is “generally safe for people and vehicles” (Smith et al., 2014). Water is not expected to remain ponded on the road surface following the end of the storm event.

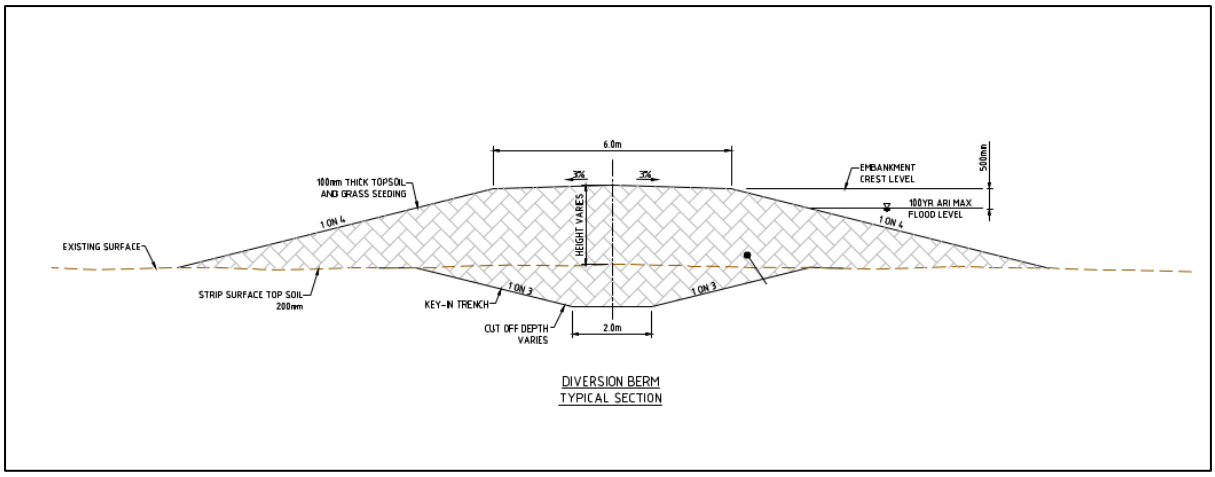

Figure 11- Typical cross-section of flood diversion berm

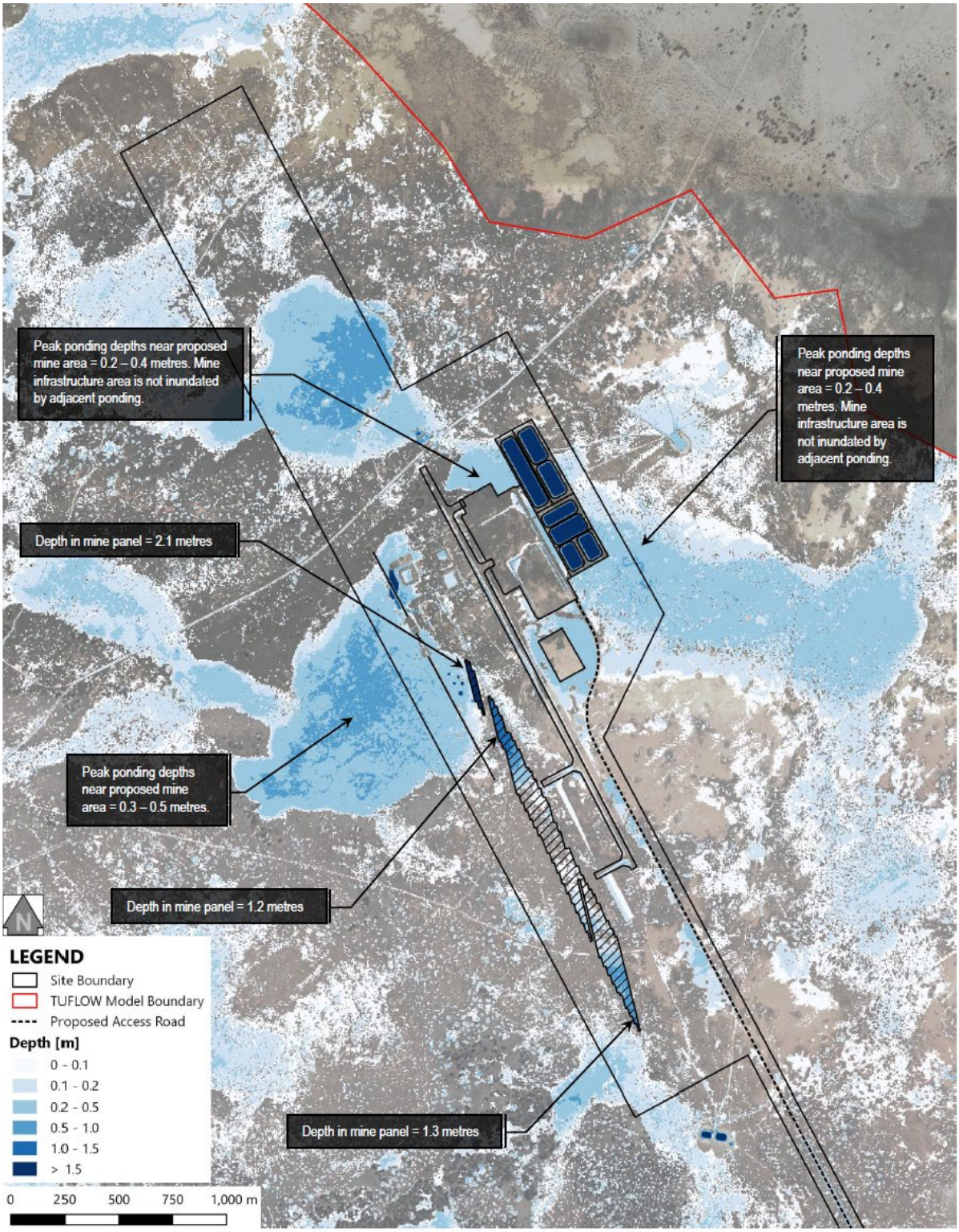

Figure 12- Peak flood depths for 1% AEP 72-hour scenario (Worley, 2022). Location of flood protection berms are shown west of the mining area.

9.3. Erosion and Sediment Control

Due to the hydrological setting of the Balranald project there is low risk of erosion and sediment impacts on receiving waterbodies. The following sections describe the erosion and sediment controls to be implemented in accordance with SSD-5285 Schedule 3 Condition 15(ii).

Erosion and sediment controls will be implemented for the mine development area, designed generally in accordance with the principles described in the series Managing Urban Stormwater: Soils and Construction including Volume 1 (Landcom, 2004) and Volume 2E Mines and Quarries (DECC, 2008) and Volume 2A – Installation of Services and Volume 2C – Unsealed Roads, including the following measures:

- minimising surface disturbance and restricting access to undisturbed areas;
- use of Iluka's Site Disturbance Permit process that includes specification of area specific erosion and sediment controls;
- installing appropriate erosion and sediment controls prior to disturbance of any land and around soil stockpile areas;
- progressive rehabilitation/stabilisation of disturbance areas;
- storing soil stockpiles at appropriate distances from watercourses;
- soil stockpile batters constructed at a minimum slope of 1:1.7.
- stabilise soil stockpile surfaces with vegetation or hydromulch as soon as practicably possible if required;
- separation of runoff from disturbed and undisturbed areas, where practicable;
- construction of surface drains to control and manage surface runoff;
- reducing the flow rate of water across exposed surfaces and in areas where water concentrates (e.g., through use of coir logs or cross ripping);
- construction of sediment dams to contain runoff up to a specified design criteria; and
- treating rehabilitation areas to promote infiltration (e.g. cross ripping ripping);

During construction, temporary sediment traps and sediment filters (e.g., sediment fences) will be installed where required downslope of disturbance areas in accordance with Landcom (2004). The temporary erosion and sediment control systems during the construction phase will remain in place until all earthwork activities are completed and the disturbed area is rehabilitated. All water conveyance structures (i.e., channels and diversions) will be designed and constructed to safely convey flow resulting from a 5% annual exceedance probability (AEP) rainfall event.

Sediment control dams will be constructed in areas of high risk such as downstream of soil stockpiles. These dams will be designed in accordance with Type-D sediment dams described in Landcom (2004). The dams will be sized to capture the equivalent of a 95th percentile 5-day rainfall event.

Drainage lines and sediment dams will be inspected monthly or following 10 mm rainfall (over 24-hours) to check for capacity and integrity. If required to maintain design criteria, sediment will be removed from the sediment dams to maintain their design storage capacity within 1 month.

9.4. Mine Water Management

Mine water includes process water, which is used for ore processing, mining operations and drilling muds and fluids. Process water quality has the potential to be influenced by extracted groundwater from production bores, process chemical additives (including PAX) and acid and metalliferous drainage and neutralisation reactions within ore, product and tailings stockpiles. As described in Section 7, process water will be reused for underground mining, where a portion of the water will be lost to the hypersaline LPS Formation. Some residual process water will also be contained within sand tailings that will be disposed of in trenches which has the potential to seep into the Shepparton Formation, which host the water table.

Management of process water quality is required to ensure that it is suitable for ore processing and groundwater reinjection, and the mine water management system must prevent discharge of mine water to receiving surface water systems.

9.4.1. Process plant runoff

All runoff from process plant infrastructure areas and including ore, product and tailings stockpiles will be captured and contained within the site runoff dams (see Figure 6 and Section 7) or the process dams. Their design runoff containment volumes be reinstated as soon as practicable following a rainfall event. Captured water will be returned to the process water dam for reuse.

9.4.2. Temporary storage of sulfidic materials

Ore and product stockpiles will be stored on compacted, low-permeability hardstand areas. Drainage from these areas will report to sumps and be returned to the process water dam for reuse.

Slimes and sulfide tailings, which have the highest potential to generate AMD, will both be disposed of sub-aqueously via the underground mining backfilling process. Below the water table, these materials cannot oxidise due to the absence of air. Prior to underground deposition, these materials will be temporarily stored at the surface within dedicated ponds (refer to Figure 6) which will prevent and minimise contact with air and subsequent oxidation of sulfidic materials. Any residual acidity released into the process water will be treated via limestone addition and/or addition of caustic soda to the process water to maintain a neutral to alkaline pH suitable for ore processing and underground reinjection.

The sulfide fines and slimes ponds will be periodically dredged and the treated materials deposited into the underground stopes within the LPSs aquifer.

A Trigger Action Response Plan (TARP) for maintaining the process water pH to within 6 to 8.5 will be developed and referred to in a revised version of this Plan to be submitted prior to the commencement of mining.

9.4.3. Drilling Fluids and Muds

The drilling of mining and reinjection drillholes will involve the use of drilling muds. In accordance with SSD-5285 Schedule 3, Condition 15(b)(ii), the following measures will be implemented to manage drilling fluids and muds:

- Drilling fluids and muds will be contained within a closed system consisting of sumps located adjacent to each mining plant drill pad.
- The drilling muds will be a water-based fluid containing primarily bentonite and polymers. The drilling fluids have been assessed as environmentally benign (LWC, 2017).

9.5. Chemical and Hydrocarbon Management

Chemicals and hydrocarbons will be handled and stored in a manner to prevent spills and leaks to the environment, in accordance with Australian Standards, including:

- AS1940-2004 The storage and handling of flammable and combustible liquids
- AS 3780:1994 Australian standard for the storage and handling of corrosive substances
- AS 1692:1989 Australian standard for tanks for flammable and combustible liquids

Control measures for chemical and hydrocarbon management will include:

- Bunding and permanent and temporary storage tanks and containers;
- Routine inspection and maintenance of bunded areas;
- Spill response kits and equipment available;
- Spill and incident response procedures (see Section 13.5); and
- Training and awareness for relevant roles relating to storage, handling and spill response.

Material incidents relating to chemical and hydrocarbon spills will be reported in accordance with the protocols in Section 13.5.

9.6. Waste Water Management

Wastewater will be managed during the construction phase via portable ablution blocks that are serviced and maintained by a licenced contractor.

A package wastewater treatment plant will be constructed and operated for the duration of the operations phase of the Project. A separate approval will be sought from Balranald Shire Council to operate this plant. Any relevant conditions of this approval will be included in a revised version of this Plan that will be submitted prior to the commencement of mining operations. Surface Water Assessment Criteria

There are no surface water criteria or limit conditions in SSD-5285 or EPL20795. Due to the hydrological setting of the development, there is no background data available with which to develop site specific surface water quality assessment criteria. ANZECC/ARMCANZ (2000) water quality criteria for livestock, and irrigation water for radionuclides have been selected as interim performance criteria for comparative purposes only (Table 10) with any surface water quality data collected outside of the processing plant area. These criteria will be updated, if possible, if surface water quality data becomes available in the future.

The southern end of the West Balranald deposit is approximately 10 km to the north of the Murrumbidgee River. The confluence of the Murrumbidgee and the Murray rivers is approximately 30 km to the south-west of the deposit. The proximity of the West Balranald deposit to the Murrumbidgee and Murray Rivers necessitates that the Surface Water Assessment considers these significant water bodies.

The Murrumbidgee and Murray Rivers in the vicinity of the MOD1 project area contain fresh water supplies that are frequently used for purposes such as town water supply and irrigation, however this is not considered further as no water will be discharged to these rivers.

Table 10- Provisional surface water assessment criteria

Parameter	ANZECC/ARMCANZ (2000) Guideline value/investigation trigger values
pH	6-9[(1)]
Total Dissolved Solids (mg/L)	4,000 (beef cattle) [(1)]
Calcium (mg/L)	1000[(1)]
Sulphate (mg/L)	1000[(1)]
Aluminum (mg/L)	5[(1)]
Arsenic (mg/L)	0.5[(1)]
Cadmium (mg/L)	0.01[(1)]
Cobalt (mg/L)	1[(1)]
Chromium (mg/L)	1[(1)]
Copper (mg/L)	1 (cattle) [(1)]
Mercury (mg/L)	0.002[(1)]
Nickel (mg/L)	1[(1)]
Lead (mg/L)	0.1[(1)]
Uranium (mg/L)	0.2[(2)]
Zinc (mg/L)	20[(1)]
Gross alpha (Bq/L)	0.5[(2)]
Gross beta (excluding K-40) (Bq/L)	0.5[(2)]
Ra-226 (Bq/L)	5[(2)]
Ra-228 (Bq/L)	2[(2)]

Notes: 1. Preliminary guideline value derived from ANZECC/ARMCANZ (2000) livestock drinking water guideline.

2. Preliminary guideline value derived from ANZECC/ARMCANZ (2000) irrigation water guideline.

9.7. Surface Water Monitoring Program

Objectives of the surface water monitoring program are to:

- Track process water quality to:
    - Identify the need for pH correction of the process water; and
    - Characterise the water quality being reinjected underground, to enable calibration of the hydrogeochemical model (Section 10.3.2).
- Monitor background concentrations

The following sections outline the surface water monitoring program for the construction phase of the Project, and the preliminary monitoring program for the operations phase of the Project. The monitoring program will be optimised and revised in a future revision of this plan that will be submitted prior to commencement of mining operations.

9.7.1. Surface water monitoring

Due to the lack of permanent watercourses within the project area and the project does not discharge to any watercourses, no hydrological monitoring is planned. Should flooding events occur, field observations will be recorded (if safe to do so) to support any future flood modelling and assessment.

The regional hydrology is characterised by infrequent flows in Box Creek and flooding of dry lakes. In the event of such flooding, opportunistic sampling will be conducted at Box Creek upstream and downstream of the project if the sampling sites can be safely accessed. Indicative surface water sampling locations are shown on Figure 13. These samples will be analysed for Suites 1 and 2 (as listed in Table 11) to provide background and downstream water quality.

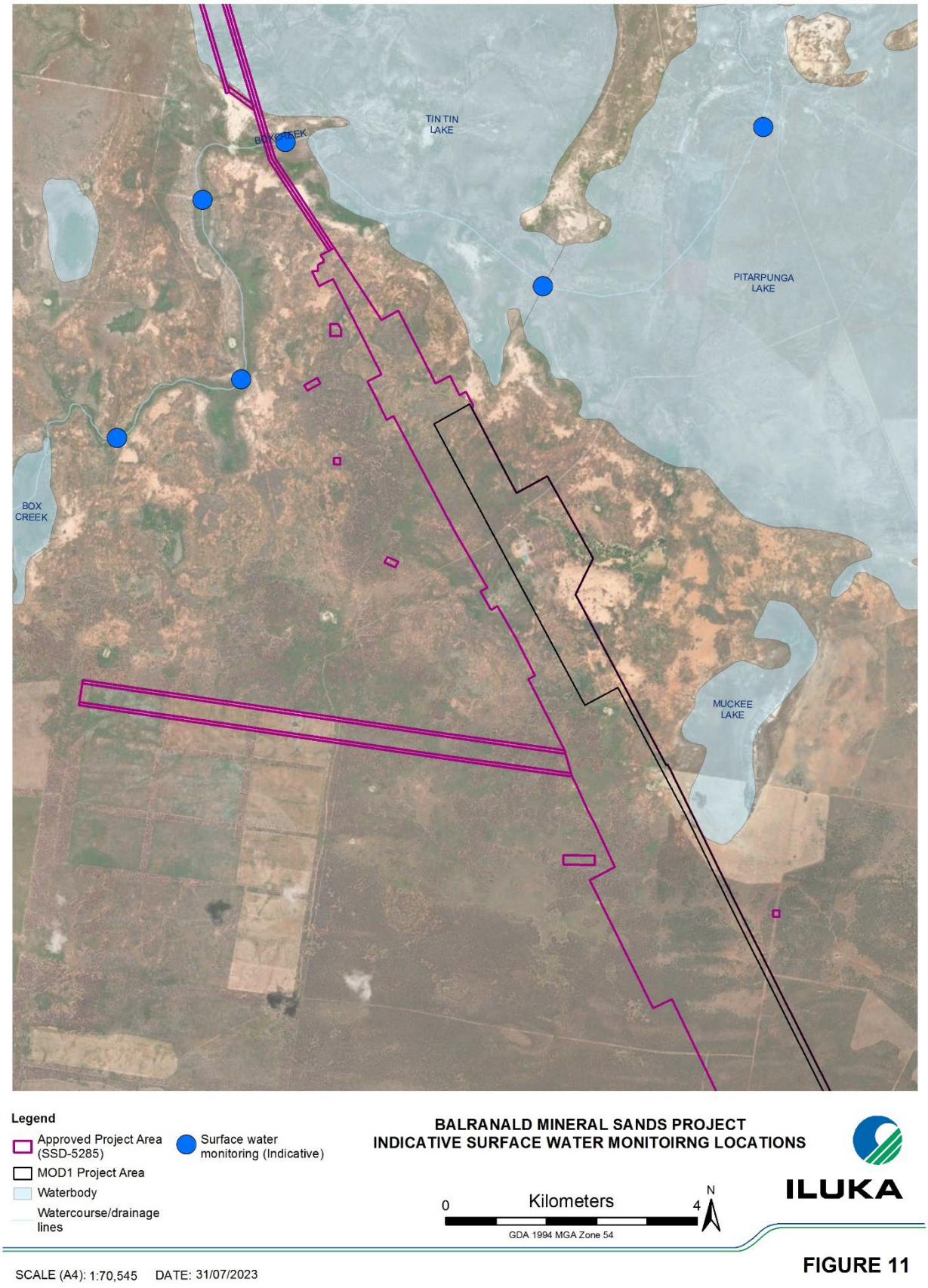

Figure 13- Indicative surface water monitoring locations

9.7.2. Process water monitoring

Process water monitoring will be undertaken at key locations in the processing plant to inform AMD treatment activities and monitor the process water quality. Table 11 provides the preliminary monitoring locations and frequencies, and Table 12 provides the analytical suites. This monitoring program will be optimised and submitted in a revised version of this Plan prior to commencement of mining operations.

Table 11- Preliminary process water quality monitoring schedule

Location	Purpose	Frequency	Parameters (refer to Table 12)
Construction phase			
T3 process water dam	Monitor quality of dust suppression water	Monthly	Suite 1
Commissioning phase (preliminary monitoring program)			
Process Water Dam	Monitor general trends in process water quality.	Monthly, (quarterly for Ra226/228)(1)	Suite 1, 2, 3 and Suite 4
Sand Tails Stockpile sump	Monitor water quality of leachate from sand tailings stockpiles to ensure that lime dosing is effective.	Monthly(1)	Suite 1
HBF tank	Characterise the WQ of reinjection water	Weekly field parameters, water sample weekly for first 6 months, then monthly.	Suite 1, 2 and 3
PAX destruction ponds (inflow and outflow)	Measure the effectiveness of PAX destruction	Monthly(1)	Suite 1, 3
Slimes Pond	Monitor pH	Weekly field parameters, monthly sample(1)	Suite 1
Site Runoff Dam(s)	Monitor trends in rainfall runoff water quality from the ore processing areas	Monthly(1)	Suite 1

Notes: 1. Monitoring to commence at the start of process plant commissioning.

2. Monitoring to commence at the start of mining.

The field and laboratory parameters that will be collected for the monitoring programs within this WMP are grouped into the following suites (as shown in Table 12):

- Water level, measured in the field manually or via a data logged level logger or VWP.
- Suite 1 – Physical water quality parameters measured in the field (pH, EC, ORP, temperature)
- Suite 2 – Major and trace element chemistry, dissolved metals. This suite will provide detailed characterisation of the salinity and metals in the water to enable assessment of groundwater interactions in the mining and transition zones and comparison with SSTLs at compliance monitoring locations.
- Suite 3 – PAX and PAX breakdown products. This suite will permit measurement of the migration of PAX from the mining area.
- Suite 4 – Radionuclides. Iluka is obliged to analyse and monitor for Naturally Occurring Radioactive Materials (NORM). These elements can be concentrated within heavy mineral deposits associated with monazite sands and include isotopes of uranium, thorium, radium and potassium. Two of the short-lived daughter isotopes including Ra-226 and Ra-228 are commonly monitored by Iluka, due to their high mobility under certain environmental

conditions and detrimental impact to ecosystems and humans following uptake (IAEA, 2014). Th, U, Ra-226 and Ra-228 will be monitored periodically.

Table 12- Field and laboratory analytical suites

Suite	Purpose	Parameters[1]
Level	Measure static water head in the groundwater system	Standing water level (SWL). Vibrating Wire Piezometers (VWPs) and water level data loggers (in selected bores) will be deployed.
Suite 1	General water quality characteristics	pH, EC, oxidation reduction potential (ORP), temperature
Suite 2	Water characterisation, detect changes in salinity and potential AMD impacts	Major ions, Alkalinity (if pH >4.5), acidity (if pH<4.5) Dissolved metals (As, Fe, Al, Mn, Zn, Cu, Pb, Ni, Co, Cd, Cr, Th, U)
Suite 3	PAX migration	PAX & PAX breakdown products
Suite 4	Radionuclides	Ra-226 and Ra-228 Gross alpha and gross Beta

Notes: 1. Monitoring parameters will be optimised and included in a revised version of this WMP prior to the commencement of mining operations.

9.7.3. Monitoring procedures and QAQC

Water quality monitoring would be undertaken in accordance with the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC and ARMCANZ, 2000a) and Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC, 2004). Analytical methods will be consistent with EPA Approved methods for the sampling and analysis of water pollutants in NSW (EPA, 2022).

All laboratory analyses will be performed by a National Association of Testing and Analysis (NATA) accredited laboratory.

9.7.4. Data evaluation and reporting

Data will be entered and stored in Iluka's environmental database system . Data will be reviewed promptly once received and relevant data compared with the process water performance criteria. A summary of process water quality results will be reported annually in the Annual Review.

10. Groundwater Management

Groundwater management at the Balranald project will focus on preventing and minimising groundwater contamination associated with process chemicals and AMD, and monitoring groundwater drawdown from production bores and the migration and dissipation, caused by the potential mounding of the process chemical plume during operations and post-mining.

During the construction and commissioning phase, groundwater management will focus on preventing and minimising the potential for groundwater contamination from construction activities, monitoring the drawdown from construction water supply bores, and installation of monitoring bores to collect baseline data for the operations phase of the project.

The following sections outline the groundwater management aspects in accordance with SSD-5285 Schedule 3 Condition 15(b)(iii).

10.1. Baseline data

Baseline groundwater data including water levels, water chemistry and aquifer hydraulic properties are provided in Appendix D.

10.2. Sensitive Receptors

10.2.1. Private bores

Several landholders in the area rely on groundwater, sourced from the brackish Lower Renmark Group Aquifer (part of the Olney Formation), for stock, irrigation, and domestic use. These landholder bores are located throughout the Balranald Project area and shown In Figure 14.

The only aquifer with beneficial use is the Olney Formation due to its brackish salinity. This water is used for livestock drinking purposes. Within the Balranald Project vicinity, bores that could be impacted by mine related activities are summarised in Table 13.

The Balranald Project will source a portion of its production water from the Olney Formation. The groundwater impact assessment (EMM, 2022) conducted modelling that predicted the drawdown in the Olney Formation from the production bores, with none of the private landholder bores were shown to be impacted in the modelling.

Table 13- Third party bore locations.

Local Name	Easting(1)	Northing(2)
HD1	726,012	6,185,773
T01	722,791	6,201,029
T02	729,721	6,195,973
T03	732,061	5,189,404

Notes: 1. MGA94 Zone 55S

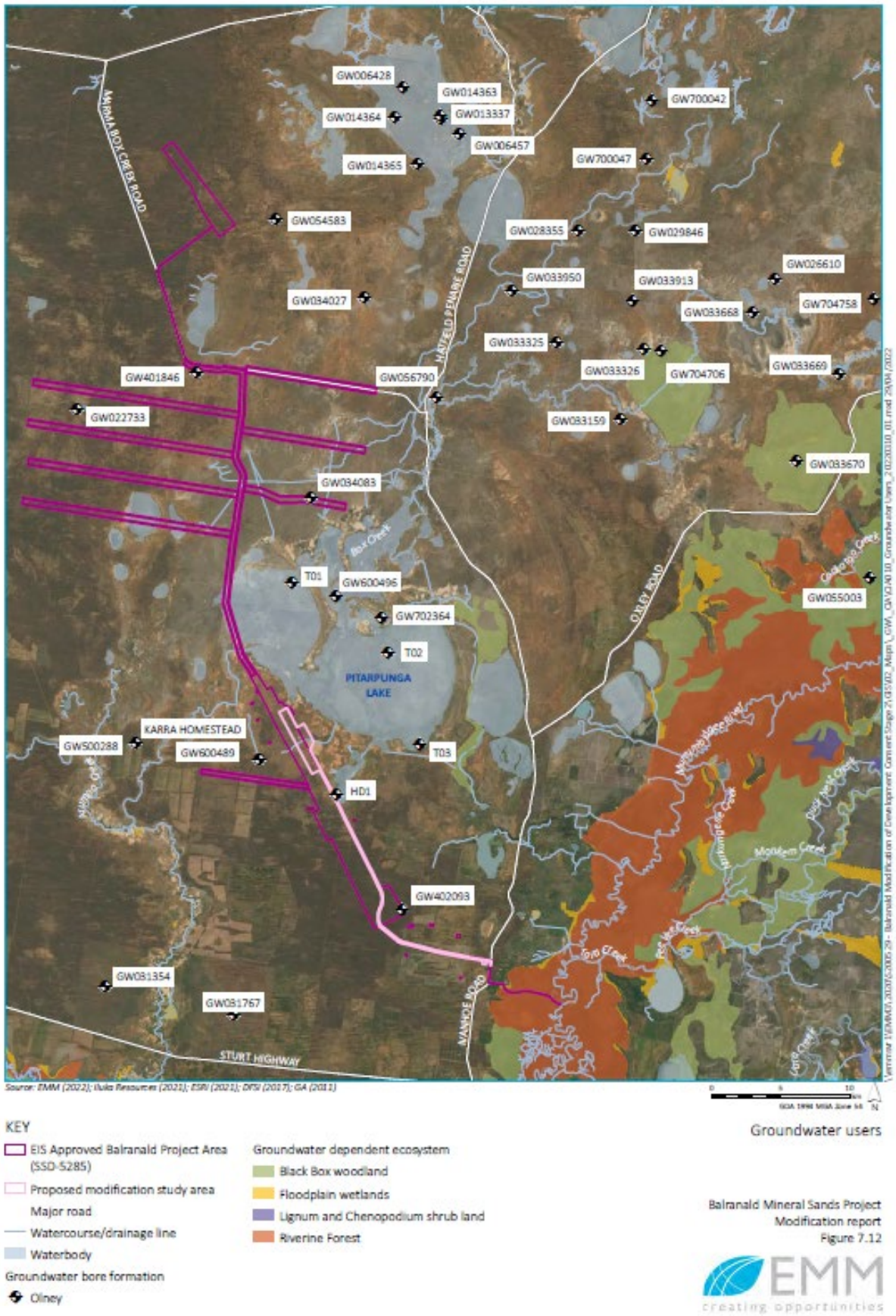

Figure 14- Private bore location map (EMM, 2022).

10.2.2. Groundwater Dependent Ecosystems

The baseline investigations (SKM 2011), undertaken as part of the pre-feasibility study (PFS), identified the occurrence of ecosystems that potentially rely on groundwater in the vicinity of the Balranald Project area (i.e. GDEs). This investigation mapped and characterised ecosystems that potentially rely on groundwater into two broad categories:

- wetlands and vegetation associated with the Murrumbidgee, Lachlan and Murray River Floodplain environments, as per the Lower Murrumbidgee Groundwater WSP for the vegetation to the south and west of the Murrumbidgee River; and

- vegetation (primarily Black Box woodland) outside the floodplain and permanent streams, in topographic depressions where the water table may be shallow enough and not too saline for vegetation use.

The study found that potential groundwater reliance associated with both of these environments is likely to be only opportunistic. Groundwater use of vegetation in the region is influenced by two main factors: the depth of the water table and groundwater salinity. The ecosystems that potentially rely on groundwater associated with the floodplain environments include the high value River Red Gum forests and the Great Cumbung Swamp. The Black Box woodlands away from the floodplain are less significant assets in terms of their ecological value, but they provide locally valuable shade and shelter for fauna (and stock) in a landscape sparsely populated by trees (WRM, 2015).

Rainfall and the periodic flooding of the Murrumbidgee River are more likely sources of water for vegetation (URS 2012). Thus, floodplain environments are considered to have a low susceptibility to altered groundwater conditions due to the close presence of the Murrumbidgee River, a flow regulated water source. Further from floodplains, vegetation may have a greater reliance on groundwater as there are no permanent water bodies in these environments.

In 2014, an investigation was undertaken to establish whether the Black Box vegetation was accessing water from the Shepparton Formation (CDM Smith 2015). This study found that rainfall and episodic surface water (irregular flooding and/or pooling from heavy rainfall) provided the dominant water source for Black Box, although there was some potential for these trees to use groundwater opportunistically to supplement their water needs. Previous studies have shown Black Box to be a hardy, resilient species capable of sustaining droughts and quite saline conditions (up to 60,000 µS/cm). The River Red Gum is more tolerate to water logging than the Black Box community.

The spatial distribution of ecosystems that rely on groundwater, updated from the baseline investigation to include the areas of Black Box that were mapped in 2014 by CDM Smith (EMM 2015), is shown on Figure 15 (after EMM, 2022).

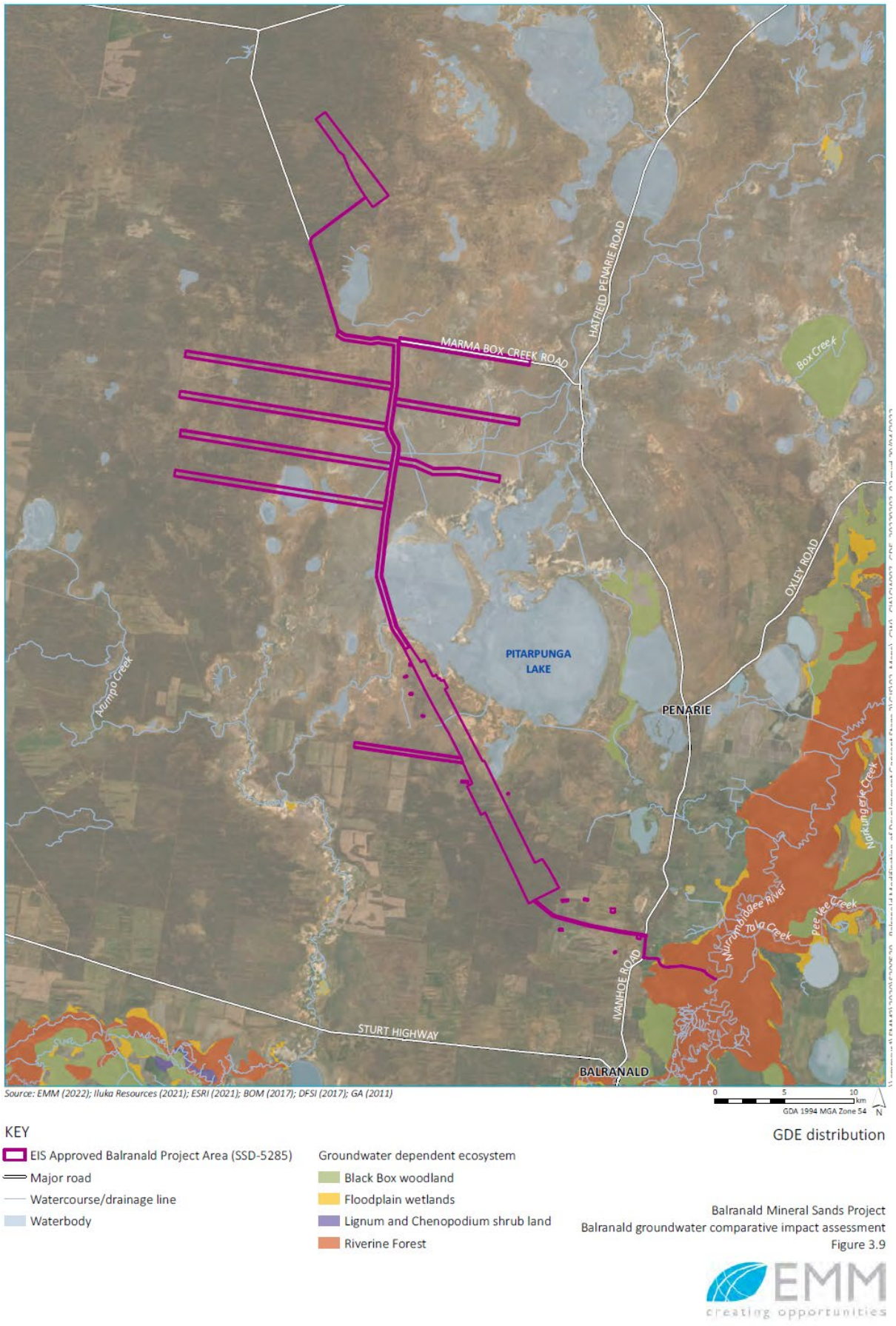

Figure 15- Mapped GDEs (EMM, 2022).

10.2.3. Aquatic ecosystems

There are no aquatic ecosystems within the area affected by PAX injection to the LPS, and PAX impacted groundwater will not migrate and discharge to the ecosystems associated with the Murray and Murrumbidgee Rivers (approximately 23 km to the east). The risk to aquatic ecosystems is therefore considered negligible (EMM, 2022).

10.3. Groundwater Assessments

The following sections outline the current conceptual hydrogeological and hydrogeochemical models, and the structure and predictions of the corresponding numerical groundwater flow model. The models include description of some of the possible impacts from the project, that are managed with measures described in other sections of this Plan. The conceptual and numerical models represent successive iterations of conceptualisation, which are based on progressive collection of data, numerous studies and data reviews assessments. Iluka will continue to refine and improve the understanding of the groundwater system as additional information becomes available.

More detailed information about the site conceptualisation and modelling methods and results can be found in the Groundwater Impact Assessment to support Modification 1 (EMM, 2022).

10.3.1. Conceptual Models

A series of conceptual models have been developed to describe the following (after EMM, 2021):

- The underground mining process and how it interacts with the surrounding aquifer water pressures, quality and integrity.
- The overall conceptual model including groundwater stresses, sources and sinks likely to develop during progressive mine development and rehabilitation including both surface and underground activities.
- A focused geochemical conceptual model, which identifies potential sources of AMD and processing chemicals that may impact groundwater quality.

10.3.2. Conceptual Hydrogeological Model

The overall conceptual model related to how the groundwater affecting activities interact with the surrounding environment is summarised in Figure 16 (EMM, 2022). The main features include:

- Groundwater supply bores are shown to the left of Figure 16. One production bore will target the LPS, which will direct saline water to the process water dam (PWD) to support mining and processing activities. Another two production bores will target the deeper Olney Formation to supply brackish water to the flotation dam and workshop. These activities have the potential to cause drawdown within the targeted aquifers. Drawdown within the LPS may encourage water associated with reinjected slimes to migrate towards the production bores and indirectly take from the overlying Shepparton Formation, (SF) which could cause water table drawdown. Drawdown within the Olney Formation could induce saline water to migrate downwards from the overlying Geera Clay and drawdown to nearby third-party bores. However, numerical modelling (Section 10.3.4) predicts minimal interaction between mine reinjection water and production water supply. A monitoring program is designed to manage any such interaction.
- Seepage from sand tails is assumed to occur for approximately 10 days and to be located one mine panel or approximately 155 m ahead of active mining. Emplacement of sand tails in advance of the mining front is aimed to induce subsidence. Seepage from sand tails may

cause water table mounding and migration of seepage water. Sand tailings will be dewatered as much as practicably possible prior to placement ahead of mining.

- Mining the stopes is estimated to cause four meters of subsidence. Subsidence can cause increased hydraulic conductivity within the units and may manifest as depressions or 'sink holes' at land surface.

- The slimes fraction of the tailings will be deposited into the cased ends of the previously mined stopes. Slimes injection will occur across five stopes simultaneously and will occur approximately 52 m behind the active mining stope.

- Slime injection may cause increased groundwater pressure to occur initially in the LPS, which may cause the injected water and any solutes to emanate away from the stopes being backfilled. If hydraulic connectivity has been increased due to subsidence, groundwater pressure could also increase in the overlying SF, potentially causing short-term water table mounding.

- The mining and backfilling process will not significantly impact on the underlying Geera Clay and Olney Formation, the latter only being affected by extraction of brackish water for the mine water supply.

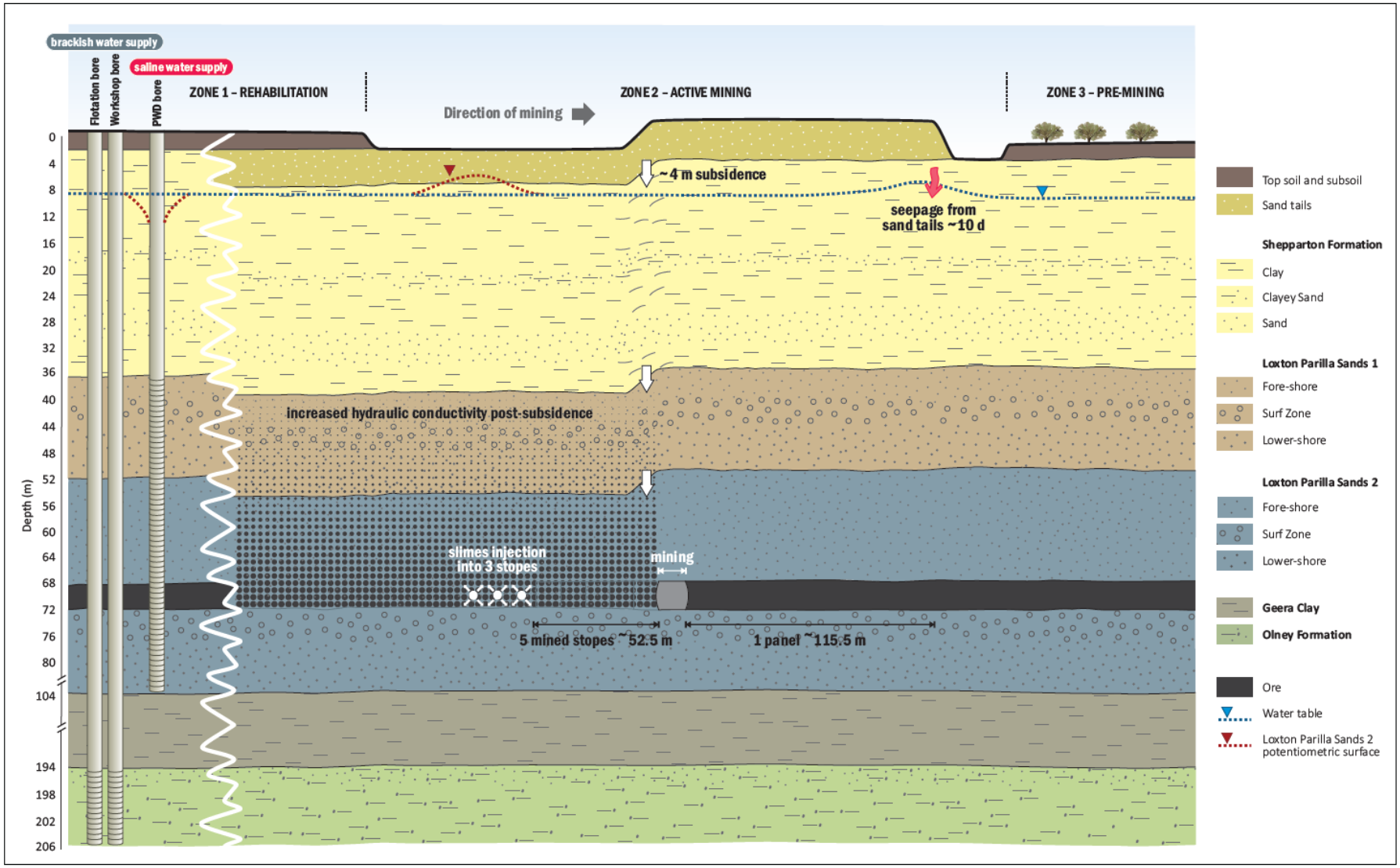

Figure 16- Groundwater-affecting activities conceptual model (EMM, 2022).

10.3.3. Geochemistry and processing conceptual model

A conceptual geochemical model of the groundwater system and potential sources of contamination that may affect groundwater quality is presented in Figure 4 (after EMM, 2022; Earth Systems (2020, 2021a, b, c, 2022). Key concepts that relate to water quality and geochemistry include:

- Groundwater in the SF and LPS aquifers is saline to hypersaline and has near neutral pH. Due to the high salinity, the water is not suitable for human consumption, irrigation or stock watering.

- Since groundwater in the Olney Formation is less saline than groundwater in the LPS and SF aquifers, injecting water originating from the deeper formation into the LPS aquifer is not considered to pose a risk to water quality in the LPS or SF aquifers.

- Oxidation of reducing minerals such as pyrite does not occur naturally in the SF and LPS aquifers because the dissolved oxygen concentration is limited, and the groundwater is not in contact with oxygen in the atmosphere. Oxidation of these minerals may occur when the ore is brought to the surface during mining. This process (referred to as AMD) can generate acidic water and liberate heavy metals. This will be minimised by adding limestone to the screened and de-slimed ore, products, by-products and wastes (namely sand tailings) that contain sulfide minerals as required.

- Process chemicals will be added during ore processing. Potassium amyl xanthate (PAX), used in the flotation circuit to remove sulfide minerals, is expected to last a few days in the natural environment (NICNAS, 1995) and is not expected to bioaccumulate (Earth Systems 2021b, c, 2022b).

- A portion of the PAX will biodegrade in storage dams and tanks and some PAX will sorb to surfaces of solids. It was assumed for the groundwater impact assessment, that 50% of the PAX will sorb to fine-grained tailings and has a current estimated half-life of eight weeks. Once injected into the LPS aquifer, PAX will also sorb to aquifer solids and will continue to degrade which will reduce the mobility of PAX and will consume PAX from the groundwater. Further testing on PAX sorption and degradation will be conducted.

- Flotation tails and sand fines will be mixed with supernatant water from the PAX dams in the HBF tank and will be re-injected into the ore body. Sulfides will be concentrated in the waste during the flotation process and will be returned to the LPS and are not expected to further oxidise because of the limited dissolved oxygen underground.

The monitoring programs (Section 10.7), groundwater flow model review and recalibration process (Section 10.3.5) are intended to continually improve the understanding of the geochemical conceptual model.

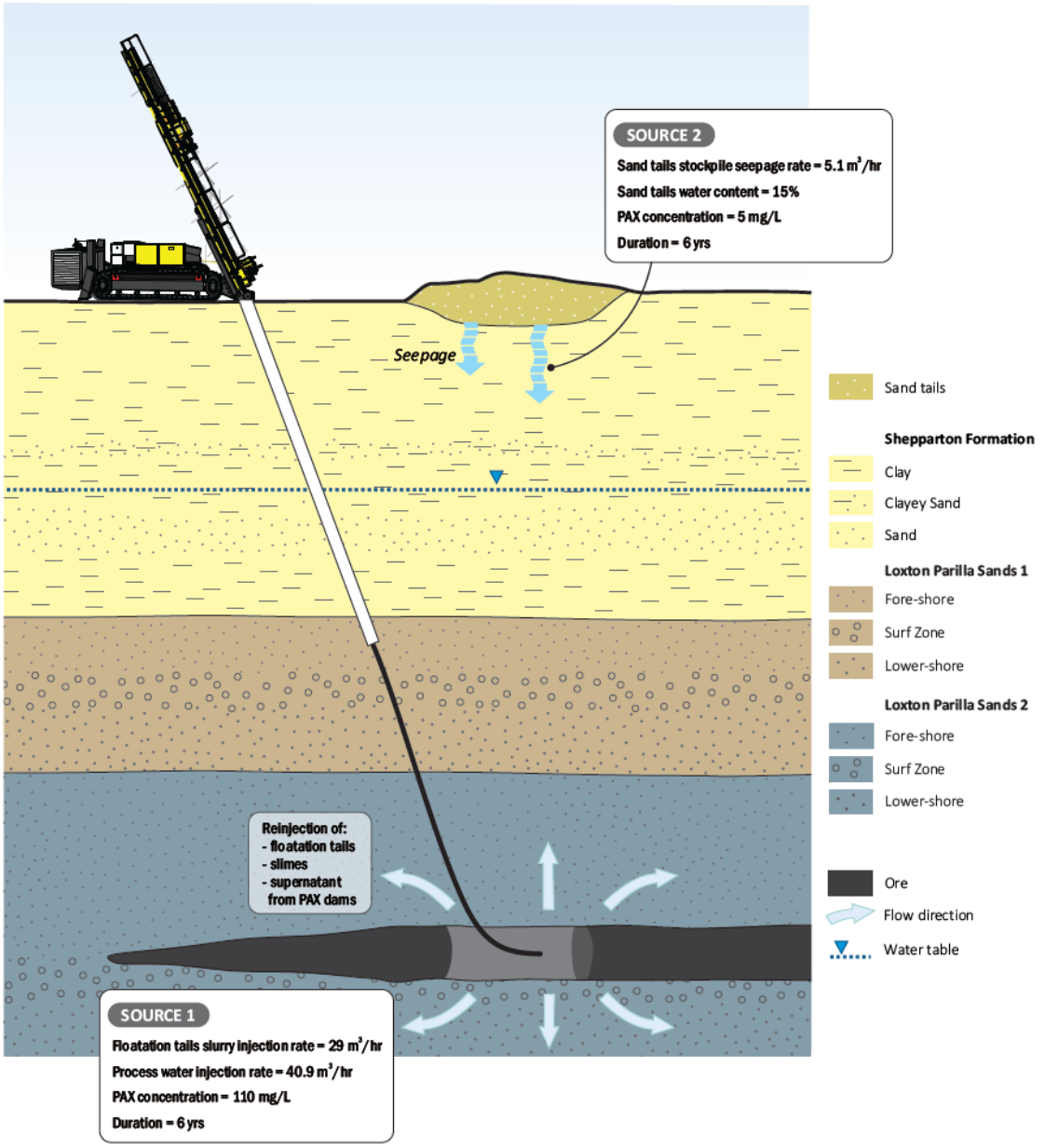

Figure 17- PAX source conceptual model (after EMM, 2022).

10.3.4. Numerical groundwater model

A 'BAL3.0' groundwater model was developed for MOD1 (EMM, 2022) and is an update to the 'BAL2.0' model that was used to support the 2015 EIS (EMM, 2015). The updated model was developed to take advantage of modern modelling software and the current best practice methodologies, and to include the additional data gathered during the T3 bulk sampling trial. For the full details regarding the groundwater model, refer to the MOD1 groundwater impact assessment (EMM, 2022). The model domain and grid are shown in Figure 18.

The MOD1 groundwater model was peer reviewed by HydroGeoLogic (2022) who concluded that the BAL3.0 groundwater modelling has been conducted consistent with best practice methods and a Class 2 model confidence level is well justified, confirming its fitness for mining project impact assessment and groundwater management purposes.

The key aspects of the model predictions were the potential for groundwater mounding near mining operations, groundwater drawdown in the Olney Formation and LPS from pumping of the mine water supply bores and the potential extent and migration of water quality impacts from PAX reinjection into the LPS aquifer. The numerical model predicted the following (after EMM, 2022):

- Mining activities would result in short-term and localised variations in groundwater levels in both the SF and LPS Formations. Mounding in the LPS is expected to be less than 1 m in the vicinity of the stopes and not extend beyond a few hundred meters (based on 0.2m drawdown).

- Mounding due to seepage of water from sand tailings is predicted to be insignificant.

- In the Olney Formation, 0.2 m drawdown from production water supply would extend to approximately 15km from the processing areas. Of the private bores identified (Section 10.2.1), the maximum drawdown of < 1.2m is observed at the Karra Homestead bore, which is located 4 km SSW of the mine site. A drawdown of greater than 2 m (threshold defined by the AIP for minimal impact) is localised to near the site and does not reach any third-party bores (Figure 19).

- In the LPS Formation, drawdown from production water supply would extend to approximately 2 km from the processing areas (modelled drawdown in the LPS Formation during mining (EMM, 2022)).

- The largest predicted drawdown responses at a GDE location was at GDE8 (Figure 15). At this location, potential GDEs are associated primarily with Black Box trees along Box Creek, located directly north-east of the West Balranald footprint. The GDE class and impact assessment framework developed for the project indicated that Blackbox in this region is likely a Class 4 GDE, which has a ‘low’ level of dependence on the occurrence of groundwater. In addition, drawdowns of up to 5 m may have a ‘low’ impact on GDE health. Given the modelled drawdown for MOD1 shows drawdown less than 0.1 m at this location, the risk to terrestrial impacts is considered low to insignificant.

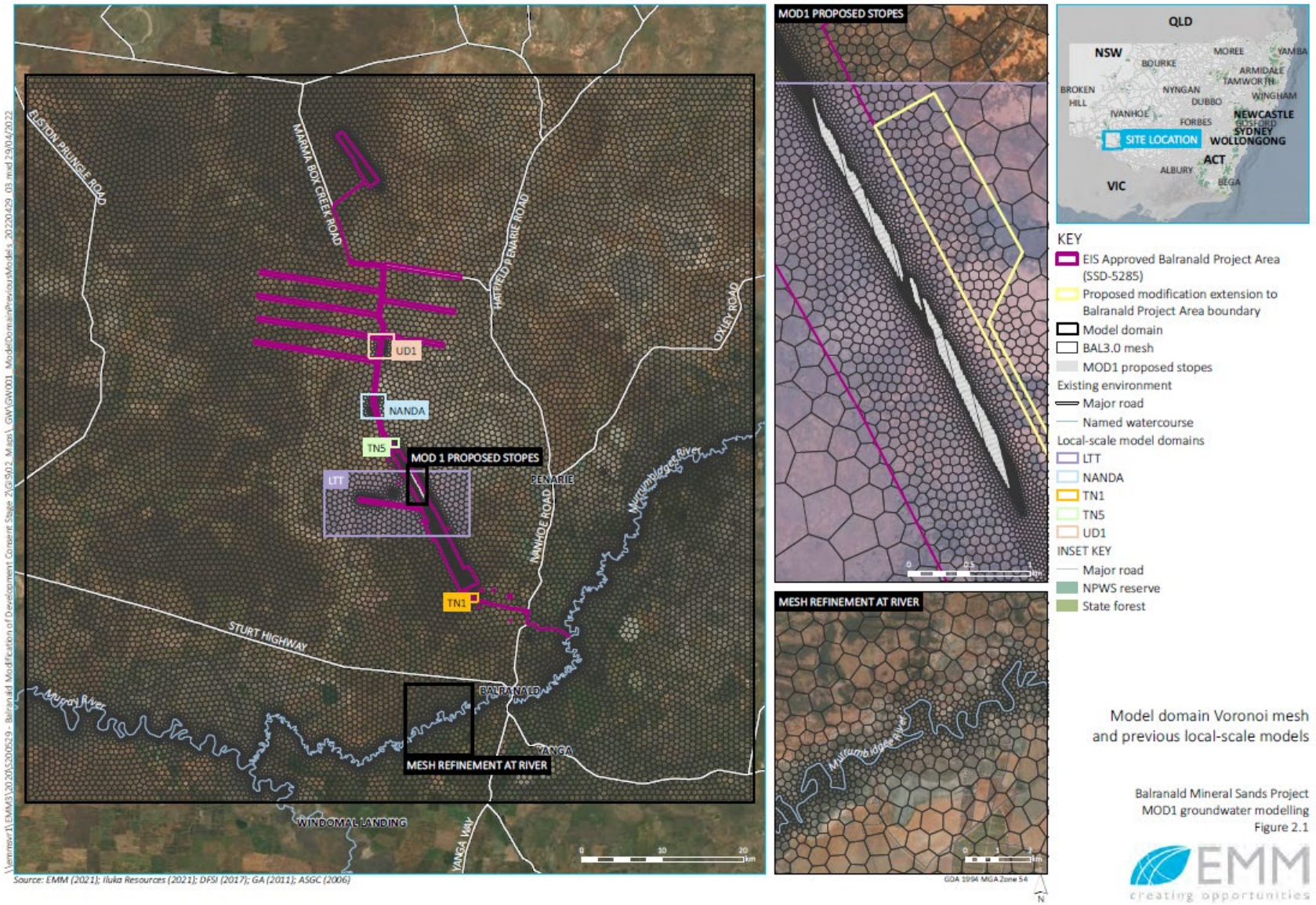

Figure 18- Balranald numerical model domain and grid (after EMM, 2022).

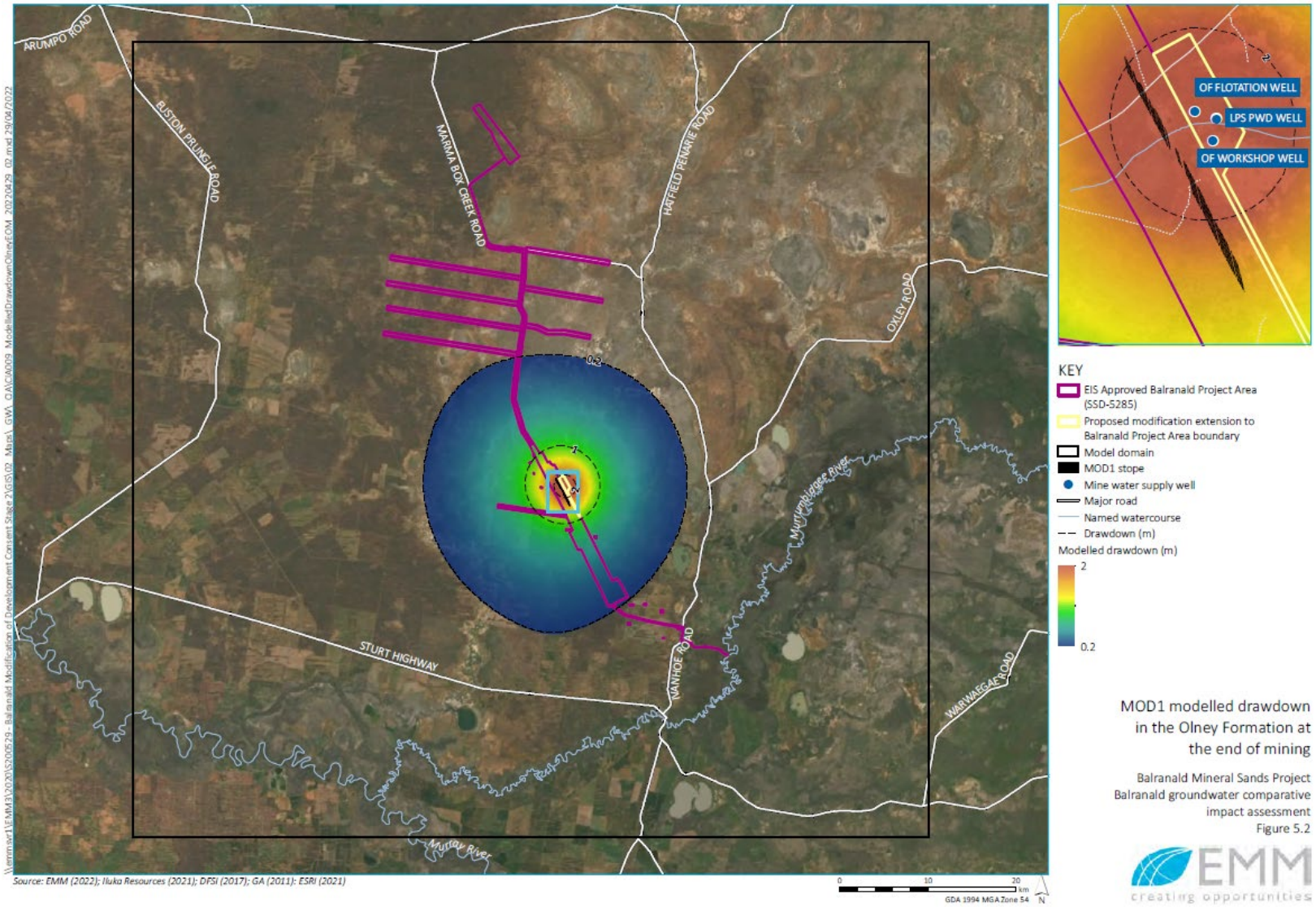

Figure 19- Modelled drawdown in the Olney Formation at the end of mining (after EMM, 2022).

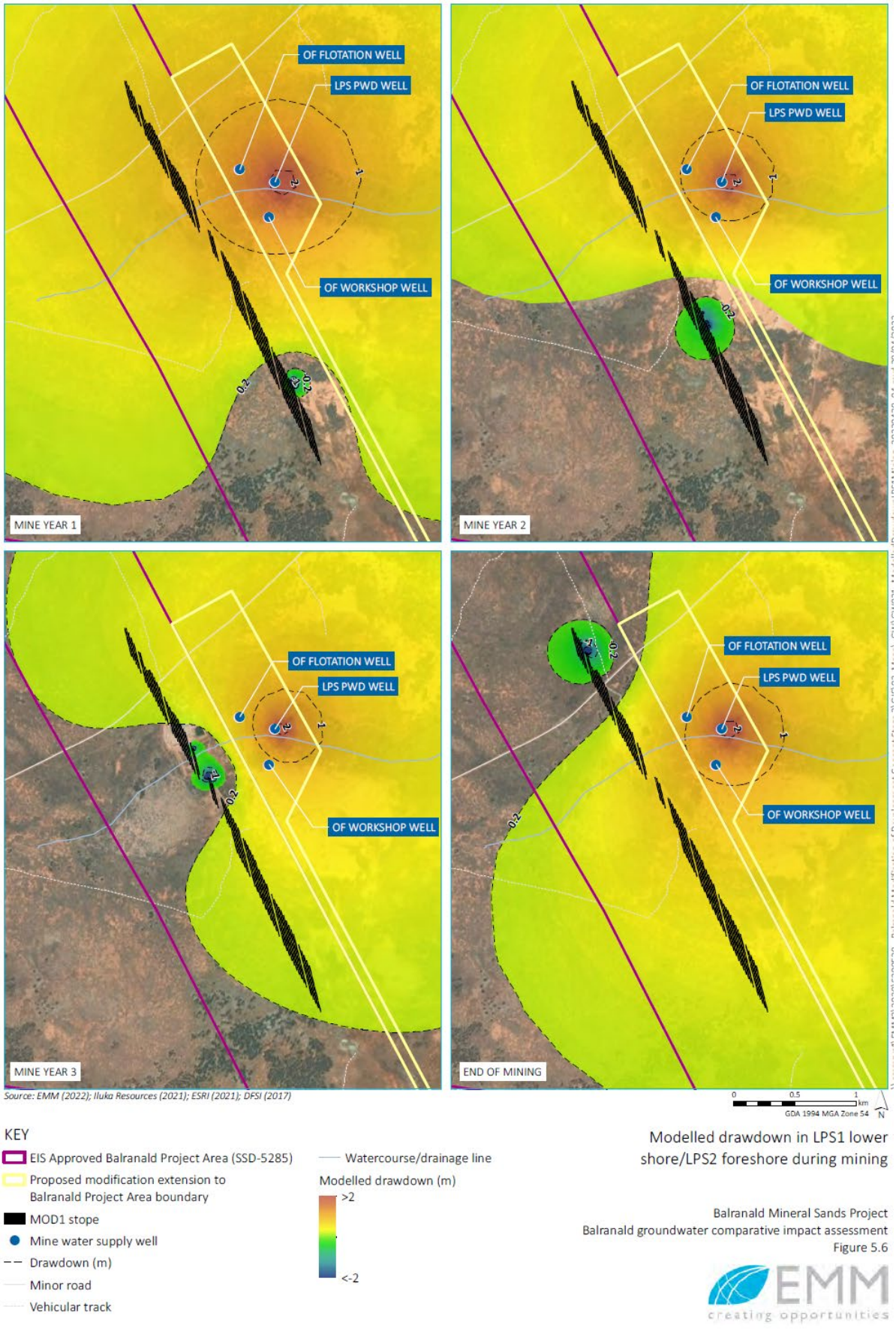

Figure 20: modelled drawdown in the LPS Formation during mining (EMM, 2022)

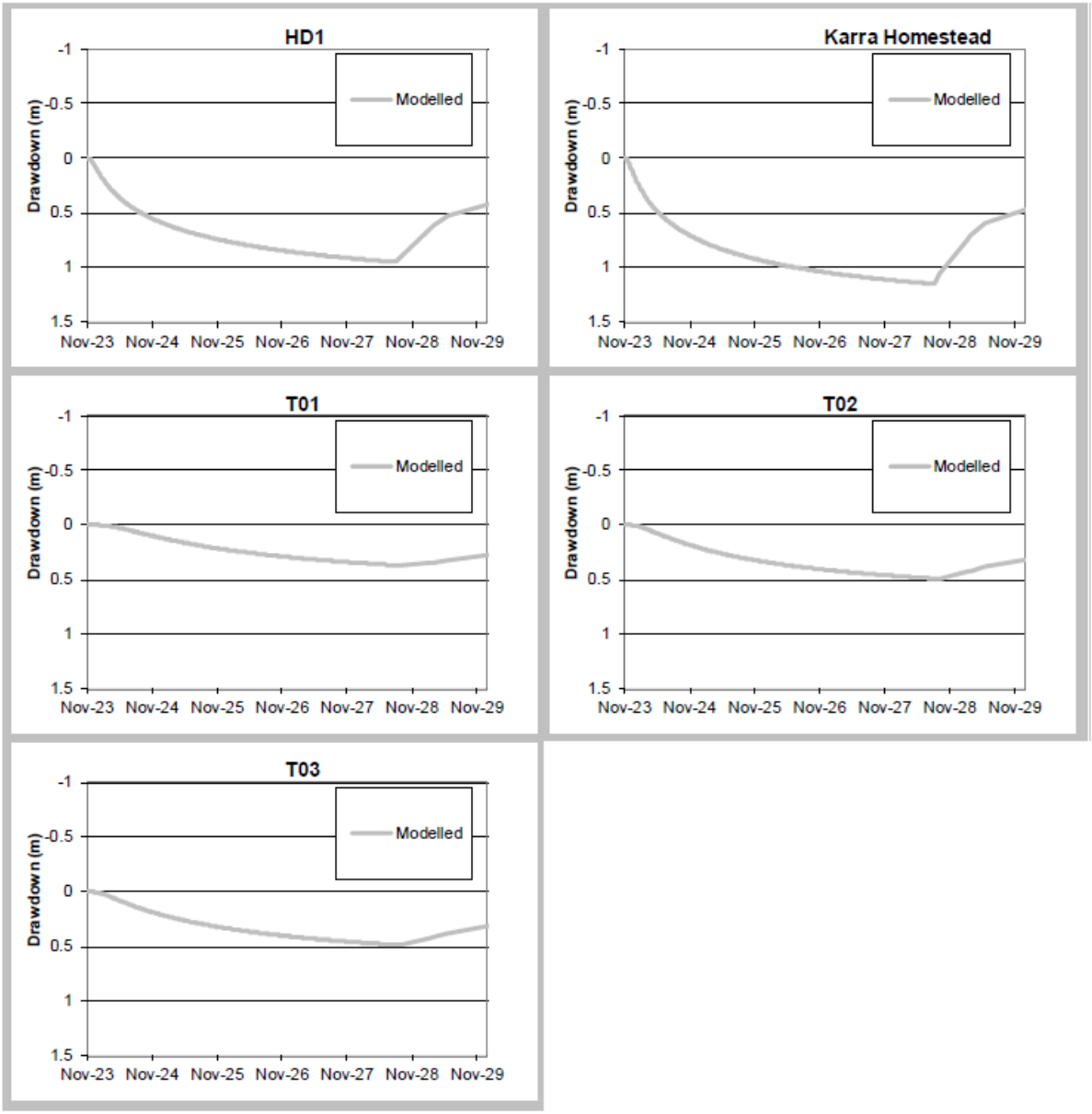

Figure 21: Modelled hydrographs at Olney Formation third party bores. Refer to Section 10.2.1 and Figure 14 for bore locations.

The dispersion of PAX in the surrounding groundwater system was also modelled (EMM, 2022). PAX will be reinjected into the LPS Formation via the recirculation of process water for mining, and also potentially from residual process water contained in sand tailings that may seep into the SF. PAX is commonly used in mining and has been shown to break down in water storage dams and in mining process circuits (EMM, 2022). A conservative rate of PAX breakdown was applied during the MOD1 groundwater assessment, assuming a PAX half-life of 12 weeks (Earth Systems, 2020). Model simulations were performed during operations, at cessation of mining and up to 100 years following cessation of mining. The MOD1 groundwater assessment report (EMM, 2022) provides additional detail about the modelling methods, results and further scenarios for post-mining conditions, including a conservative scenario in which PAX does not degrade.

The numerical model predicted that with the 12-week half-life applied, the PAX concentration did not extend past the project boundary. Figure 22 and Figure 23 show the modelled PAX concentration in the Shepparton and LPS Formations, respectively at various mine stages.

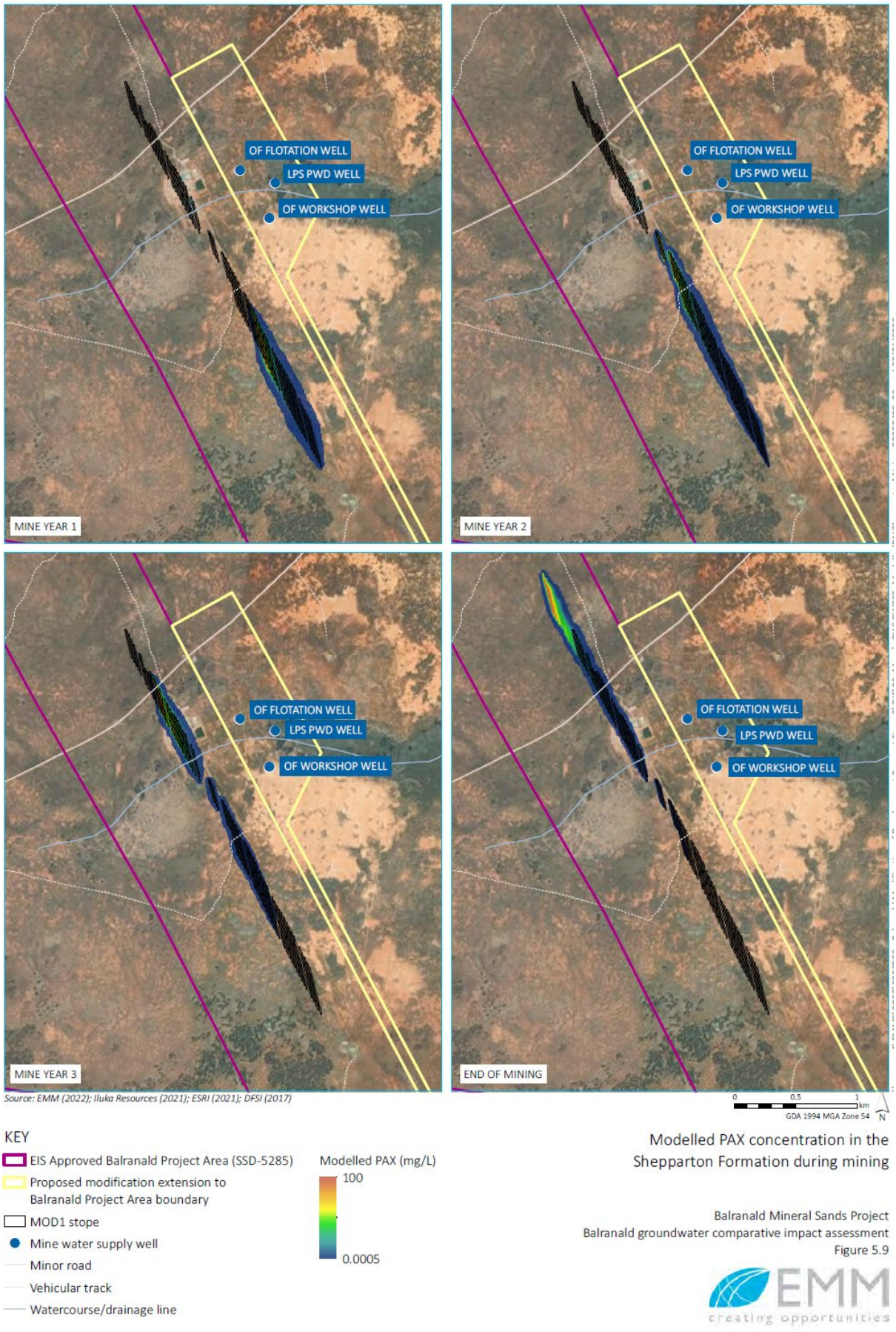

Figure 22: Modelled PAX concentration in the Shepparton Formation, PAX half-life of 12 weeks

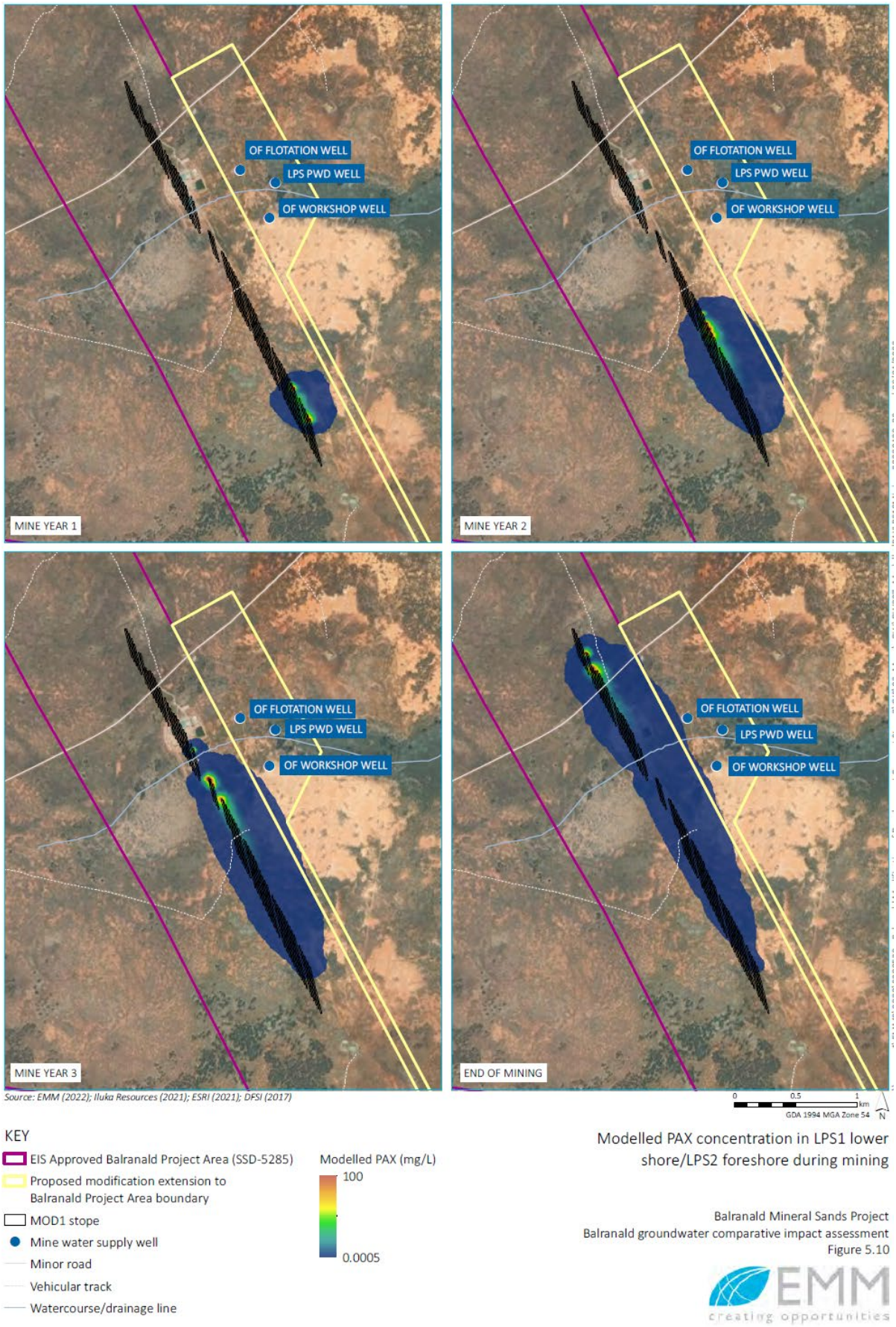

Figure 23: Modelled PAX concentration in the Loxton Parilla Sands Formation, PAX half-life of 12 weeks

10.3.5. Protocol for model review and update

The groundwater model will be progressively updated as new information becomes available, in accordance with SSD-5285 Schedule 3, Condition 15(b)(iii). Iluka will engage a specialist external consultant to review and if required revise the groundwater model, including the solute transport component, after nominally 6-12 months of data is collected, depending on the results of the monitoring program, and following the commencement of mining. The groundwater model will be reviewed and if necessary recalibrated every two years during life of mine. The groundwater model will be peer reviewed by an independent specialist consultant in accordance with SSD Groundwater Modelling Guidelines.

10.4. Groundwater Reinjection Management

Mine water reinjected underground during mining will contain residual process chemicals (namely PAX) and has the potential to contain salinity and AMD from stored product and stockpiles within the processing plant. The mining process also has the potential to cause localised groundwater pressure variations.

The groundwater reinjection pressure will be monitored in real-time via the mine control room. Vibrating wire piezometers will be installed in close proximity to mining and reinjection to monitor local groundwater pressures. Hydraulic Operating Conditions (HOCs, see Section 10.6.1) will be used to establish adaptive boundary conditions to minimise and prevent impacts.

Process water quality will be monitored and maintained (see Section 9.8.2) to neutralise any AMD derived from ore, product and tailings stockpiles.

10.5. Tailings and AMD Management

It is anticipated that approximately 50-60 tonnes per hour of sand tailings will be generated from ore processing activities. In accordance with SSD-5285 Schedule 3, Condition 15(b)(iii), the objectives of sand tailings management are to:

- Minimise the rate of AMD generation using encapsulation
- Mitigate AMD generated from sand tailings placed above the groundwater table using limestone amendment.

Sand tailings will be amended with limestone sand to neutralise any AMD that is anticipated to be generated when it is disposed of above the mining area. The limestone sand will be added via an auger system at the sand tailings stockpiles, before the tailings is trucked to its disposal location.

The sand tailings will be placed into the pre-stripped areas ahead of the progression of mining and above the ore body area, as shown in plan view in Figure 24. The pre-stripped areas will be nominally 2.5m deep, which will allow the sand tailings to be placed below the natural ground surface. Once placed, sand tailings will be promptly covered with the material excavated from the 2.5m deep pits (nominally 2 m of overburden, 0.35m of subsoil and 0.15 m of topsoil). This cover will minimise the rate of sulfide mineral oxidation within the sand tailings.

Iluka is currently conducting geochemical test work to optimise the limestone sand dosing rate. The dosing rate, protocols and performance criteria for limestone amendment will be included in a revised version of this management plan prior to commencement of mining.

The material will be monitored regularly during operations to verify its properties and assess the effectiveness of limestone amendment. A material geochemistry monitoring program, TARP and

reporting protocols will be established in a revised version of this management plan to be submitted prior to the commencement of mining.

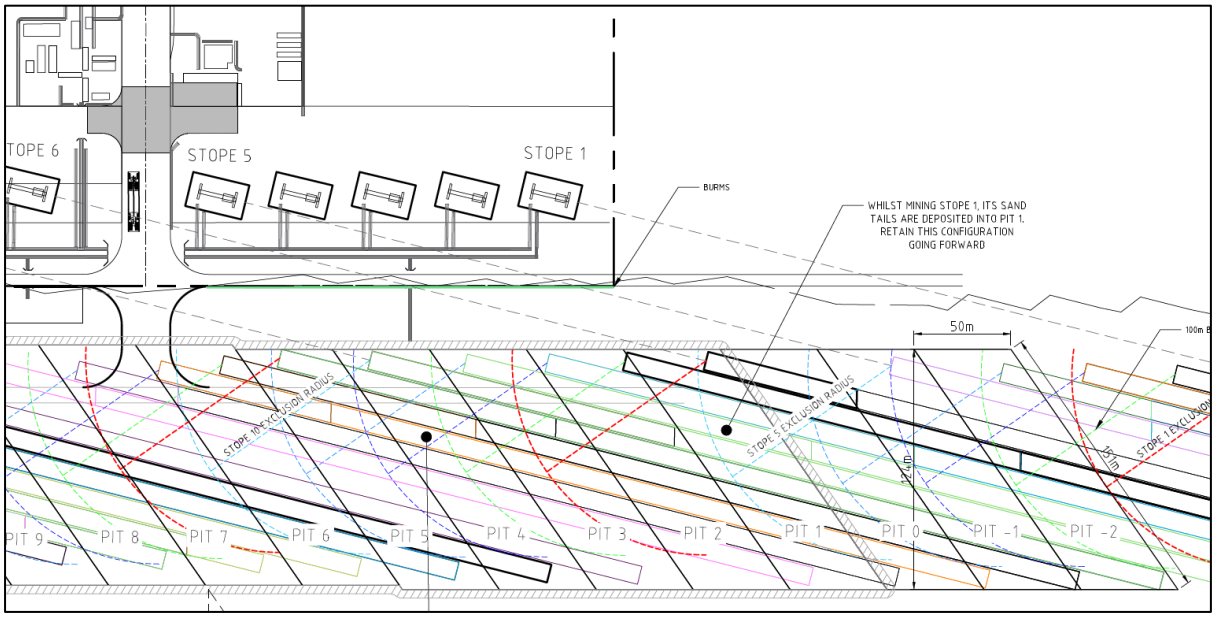

Figure 24: General arrangement of sand tailings pits relative to mine stopes.

10.6. Groundwater Assessment Criteria

In accordance with SSD-5285 Schedule 3 Condition 15(iii), this section describes the groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts associated with:

- alluvial aquifers including the LPS and Shepparton Formations;
- groundwater bore users;
- groundwater dewatering ;
- seepage/leachate from water storages, tailings, emplacements, backfilled voids and the final void. While voids are described in Condition 15, these do not apply to the underground mining trial approved under MOD1.
- groundwater dependent ecosystems; and
- reinjection of process water (including PAX) during the underground mining trial.

The underground mining trial approved under MOD1 and considered in this WMP excludes open pit voids and tailings storage facilities.

10.6.1. Groundwater Reinjection

Hydraulic pressures

The Hydraulic Operating Conditions (HOCs) framework was established as part of the T3 groundwater management plan (EMM, 2019). The HOCs represent the historical maximum pressures that have been experienced within the aquifers during previous hydrogeological field programs, without any adverse impacts being observed and were developed as follows:

- Shepparton Formation: HOCs were determined based on the rooting depths of nearby vegetation. Away from the Murrumbidgee River and associated floodplain region, vegetation relies predominantly on rainfall and soil water storages within the SF, with root system depths of around 5 mBGL. Therefore, due to the high salinity of groundwater in the SF, groundwater level rise into the root zone should be avoided (EMM, 2020).

- Loxton Parilla Sands Formation: Water level trigger levels for the LPS Formation have been defined for the upper-most facie of this unit, which lies directly below the SF. These HOCs have been set to avoid over-pressurising, and thus compromising the integrity of the overlying SF layer, but more specifically, the bentonite clay layer existing at the base of the SF.

These HOCs were initially developed based on past hydrogeological field programs which involved large scale reinjection activities (Iluka 2015; Iluka 2016). These were applied for the duration of the T3 trial, where at no point during the trial did the pressures exceed these values (EMM, 2021). These HOCs have been adopted as preliminary HOCs for the ongoing underground mining trial. The HOC framework is intended to be adaptive and will be reviewed and improved following the initial stages of mining.

An exceedance protocol in response to the HOCs is provided in Section 12.1.1.

Table 14- Initial Hydraulic Operating Conditions (HOCs, after EMM, 2020).

Parameter	Shepparton Formation			Loxton Parilla Sands Formation		
	Green	Yellow	Red	Green	Yellow	Red
Depth to Groundwater (mounding)	>8 mBGL	≤8 to >6 mBLG	≤6 mBGL	<15 mAGL	≥15 to <20 mAGL	≥20 mAGL

Notes: mBGL = metres below ground level; mAGL = metres above ground level

Water quality

To minimise the potential for changes to surrounding groundwater quality, the water quality of reinjected water will be maintained in accordance with the performance criteria in Table 15:

Table 15- Preliminary process water reinjection performance criteria

Monitoring Location	Parameter	Yellow investigation / action trigger (Leading indicator)	Red Investigation / Action Trigger (compliance)
HBF Tank	pH	Less than 7.0 or greater than 8.0	Less than 6.5 or greater than to 8.5.

10.6.2. Groundwater quality

Groundwater modelling (Section 10.3.4) has predicted that the groundwater system in the vicinity of mining activities will change due to aquifer mixing and injection of PAX. The MOD1 groundwater assessment (EMM, 2022) predicted no impacts to beneficial uses of the groundwater from these anticipated changes in groundwater quality. Hence, management of groundwater impacts is based on monitoring and assessment of groundwater quality to confirm that changes in groundwater quality remain within predicted values.

A groundwater quality management framework was established for the T3 mining trial (EMM, 2020) and will be adopted for the operations phase of the project. The management framework (described in Table 16 uses two operational zones (referred to as Mining Zone and Transition Zone in Figure 25) to monitor and evaluate anticipated changes in groundwater quality and one compliance zone (representing background groundwater conditions). The compliance zone establishes an area where any changes to the background groundwater quality would be considered greater than predicted in the Environmental Assessment and require a response.

Site Specific Trigger Levels (SSTLs) will be established for the compliance zone based on background water quality data collected after monitoring bore construction. As PAX is not present in the background water, any detected PAX (greater than 0.1 mg/L) will trigger the response measures outlined in Section 12.1.2. This PAX concentration was selected because it represents the laboratory limit of detection. SSTLs will also be used for comparison with data in the mining and transition zone where changes are expected, and as a leading indicator to potential changes at the compliance zone. However, in these two zones (the Mining and Transition Zones) the SSTLs will not be used to assess compliance. Where SSTLs are exceeded in the compliance zone, actions will be put in place to reduce the potential impact to groundwater quality.

The SSTL values and information about how they are derived will be provided in a revised version of this management plan prior to commencement of mining.

Iluka will investigate the possibility of using an inert tracer compound to reinject with the mine water to assist with groundwater model calibration and detect and quantify mixing of native and mine related water. Use of such a compound will be included in a future revision of this WMP prior to commencement of mining.

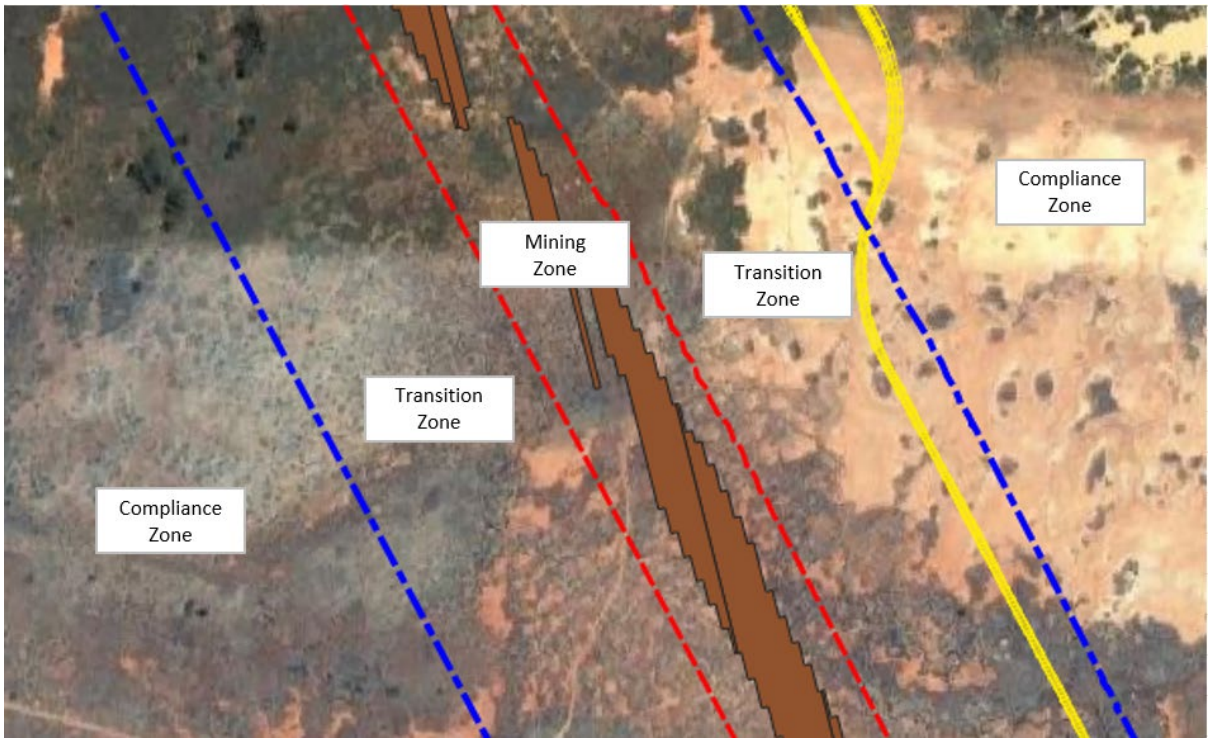

Figure 25: Groundwater quality management framework zones

Table 16- Groundwater management framework

Groundwater management zone	Purpose	Description
Zone 1 Mining Zone	Operational	Adjacent and surrounding the mining area including the stope footprint and extending 50 m in all directions. Required to understand immediate changes in groundwater head and quality in the vicinity of mining activities. Large changes in water quality relative to baseline are anticipated and this zone will be monitored for operational purposes and to refine and calibrate the groundwater model. This zone provides a leading indicator for potential changes in Zone 2.
Zone 2 Transition Zone	Operational	Largely non-mining areas (other than processing plant) and spans from 50 to 400m away from the stopes in all directions. Required to understand changes in water quality at various distances form the mine stopes and to track the migration of PAX away from the stopes. Some changes in water quality relative to baseline are anticipated and this zone will be monitored for operational purposes and to refine and calibrate the groundwater model. This zone provides a leading indicator for potential changes in Zone 3. Investigation triggers for PAX and dissolved metals will be developed and included in a future revision of this plan to be submitted prior to the commencement of mining.

Groundwater management zone	Purpose	Description
Zone 3 Background Zone	Compliance	Non-mining areas greater than 400 m from the stopes in all directions. No material changes in groundwater quality are predicted at these locations and any change would constitute an impact beyond that predicted in the Balranald MOD1 groundwater assessment and hence constitute a non-conformance with this WMP. Water Quality SSTL investigation trigger levels will be developed for this zone, based on baseline data collected following monitoring bore installation. These will be provided in a future revision of this plan.

10.6.3. Aquifer drawdown

The closest sensitive receptors identified (Section 10.2) include the Karra homestead bore and the Blackbox community to the east of the project area (GDE4). The maximum predicted drawdown (Section 10.3.4) was 1.2 m at the Karra homestead bore and 0.1m at the location of GDE4. In accordance with SSD-5285 Schedule 3 Condition 15(iii), these values have been assigned as investigation trigger levels (Table 17) at conservative locations within the monitoring network to provide a leading indicator of any potential impact.

Table 17- Groundwater drawdown investigation trigger levels for construction and operations phase.

Bore ID	Screened Aquifer		Nominal Coordinates(1)		Investigation Trigger Level(1)
	LPS	OF	Easting	Northing	
MB043	x	x	721484	6189038	>1.5m drawdown in the Olney Formation
MB044	x	x	727324	6189249	>1.2m drawdown in the Olney Formation
MB086	x	x	727324	6189249	

Notes: 1. Trigger levels defined as the approximate value where the drawdown is greater than that predicted in the Balranald MOD1 groundwater assessment (see Section 10.3.4).

10.7. Groundwater monitoring programs

This section provides the groundwater monitoring program to be implemented during the construction and commissioning phase of the Balranald Project. Preliminary monitoring programs for the operations phase are also included because selected bores will be constructed prior to operations to allow collection of additional baseline data. The operations phase monitoring programs will be optimised and submitted in a revised version of this Plan prior to the commencement of mining.

In accordance with SSD-5285 Schedule 3, Condition 15(b)(iii), several monitoring programs will be implemented throughout the life of the project. The groundwater monitoring strategy is as follows:

- Conduct relatively intensive monitoring during the initial stages of mining and groundwater reinjection, focused on the area surrounding the southern mining rig (Panels 1 and 2), to collect sufficient data to enable robust validation, and if required, re-calibration of the hydrogeological model. Model calibration is anticipated to occur after 6-12 months of mining

operations (depending on monitoring results). Therefore monitoring programs presented below are developed for the initial two years of mining operations.

- Based on the model calibration, the groundwater monitoring programs will be reviewed and updated with a focus on compliance with predicted impact levels. The revised groundwater monitoring program will be submitted in an updated version of this Plan.

- Monitoring bores will be progressively installed as the project develops, ensuring that there is adequate baseline data for each bore to establish SSTLs as required.

- Due to the nature of the mining activity, where mining will initially progress along a six-kilometre ore body, the monitoring program is required to be flexible and allows for the frequency of monitoring to be adjusted so that it is focused near the active mining areas where changes in groundwater are expected. At monitoring locations where mining is no longer active and groundwater quality has stabilised, the frequency of monitoring will be decreased and may cease in certain locations.

- Monitoring data will be quality controlled and reported transparently.

Groundwater monitoring has been split into several monitoring programs related to different operational phases and potential environmental risks, and as outlined in SSD-5285 Schedule 3, Condition 15(b)(iii). The monitoring programs and their respective objectives are outlined in Table 18 and discussed below:

1. Construction and commissioning phase monitoring program. This is intended to collect additional baseline data prior to mining and monitor aquifer drawdown from the construction water supply bores. This monitoring program will cease at the end of construction.

2. Mining Zone monitoring program. This will use a combination of Vibrating Wire Piezometers (VWPs) and monitoring wells to monitor groundwater head within close proximity to mining operations (Figure 26 & Figure 27). This monitoring will be compared with established hydraulic operating conditions (see Section 10.6.1).

3. Water supply drawdown monitoring program. This program will use monitoring wells screened within the LPS and Olney Formation (OF) to measure the drawdown caused by extraction of production water and assess the potential for impacts to private water supplies and/or GDEs. Monitoring results are compared with performance criteria in Section 10.6.3).

4. Groundwater quality monitoring program intended to monitor:

    a. the chemical composition of water being reinjected;

    b. track the migration and degradation of PAX;

    c. confirm that sand tailings seepage has negligible impact to groundwater quality;

    d. confirm that there is no leakage to the underlying OF; and

    e. radiation levels within close proximity to mining areas.

    This monitoring program will use nested monitoring wells in the LPS and SF to monitor anticipated changes in water quality surrounding the mining area. A SSTL framework and TARPs are established in this Plan to ensure that the changes in groundwater quality remain within those predicted. This monitoring program is intended to be both progressively

implemented and adaptive and will be updated (via resubmission of this Plan), following recalibration of the numerical hydrogeological model.

5. Regional & background monitoring program. This monitoring program continues on from exiting regional monitoring and will operate for the duration of construction, operations and post-mining to collect long-term background data. Monitoring bores will be located outside the extent of predicted groundwater impacts and up-hydraulic gradient within the groundwater systems.

6. Post-mining monitoring program. This will use selected monitoring wells to continue monitoring after cessation of mining to continue to track the migration and degradation of PAX within the groundwater system. This monitoring program will be developed prior to the end of mining and updated in a future revision of this Plan.

The following sections outline further detail about each groundwater monitoring program. Note that some bores are used in multiple monitoring programs.

Table 18- Summary of groundwater monitoring programs

MP#	Project Phase	Monitoring Program Name	Monitoring Purpose	Analytical Suites (see Table 12)	Operations phase TARP
1	**Construction**	**Construction Monitoring Program**	**Collection of additional baseline data in preparation for mining**	**SWL, Suite 1, Suite 2**	**No**
2	Mining	Mining – Zone Monitoring Program	Monitor changes in groundwater head surrounding mining activities.	SWL, loggers (selected)	HOC (Section 10.6.1) and TARP (Section 0)
3	Construction / Mining	Water Supply Drawdown Monitoring Program	To ensure that excessive drawdown does not occur at private bores and GDE locations	SWL	SSTL and TARP
4	Mining	Mining - Groundwater Quality	Monitor anticipated changes in water quality due to salinity, AMD and PAX reinjection. Confirm that these changes remain within the predicted and approved changes. Confirm no leakage to OF	SWL, Suite 1, Suite 2, Suite 3	SSTL (Section 10.6.3) and TARP(Section 0)
5	All	Regional Monitoring Program	Monitor background and regional hydraulic gradients and water quality.	SWL, Suite 1, Suite 2	n/a
6	Post-mining	Post-mining Monitoring Program	Monitor post-closure environmental conditions, PAX degradation	SWL, Suite 1, Suite 2, Suite 3, Suite 4	n/a

Notes: SWL = Standing water level.

10.7.1. Mining zone hydraulic pressure

As described in Section 10.3.1, mining operations are anticipated to produce localised changes in groundwater head. A combination of real-time and data-logged monitoring will be used to ensure that mining and reinjection activities remain within the defined HOCs. Three sets of VWPs will be installed

within the pillar between each 10 stope panel (shown in Figure 26 for Mining Rig 1 and Figure 27 for Mining Rig 2). Each set of VWPs will include one screened within the SF and two within the LPS. VWPs will be monitored in real-time and include automated alarms to alert operators to elevated groundwater head.

Only VWPs within the active mining areas will be used to assess compliance against HOCs and trigger any immediate response actions. Monitoring wells laterally adjacent to each stope will be used to record trends in groundwater head via data loggers.

This monitoring program will commence at the start of mining operations and is intended to be adaptive and will be updated and optimised following the initial stages of mining activities. This program will be optimised and finalised in a revised version of this WMP submitted prior to commencement of mining.

Indicative monitoring bore locations are provided in Table 19 for Mining Rig 1 (southern) and Table 20 for mining rig 2 (northern). Locations will be optimised based on site specific conditions. Iluka may use existing monitoring bores located close to any of the proposed monitoring locations.

Table 19- Preliminary VWP and monitoring bore locations (Mining Rig 1) used for mining and reinjection groundwater pressure monitoring.

ID	Timing of installation	Screened aquifer		Instrumentation	Frequency of data collection	Coordinates[1]	
		SFM	LPS			Easting	Northing
MB005	>6 months prior to mining panel 1	✓	✓	Level Logger[2]	6-hourly level logger, downloaded monthly[3]	724422	6187419
MB015		✓	✓			724112	6187869
MB018		✓	✓			724313	6187944
MB024	>6 months prior to mining panel 2	✓	✓			724166	6188233
MB033	>6 months prior to mining panel 3	✓	✓			723870	6188334
MB035		✓	✓			723984	6188589
MB007	>6 months prior to mining panel 1	✓	✓	Remote water sampling well + VWP	Real-time groundwater pressure, water quality collected monthly[3]	724293	6187677
MB017		✓	✓			724199	6188044
MB020	>6 months prior to mining panel 2	✓	✓			724070	6188089
MB031		✓	✓			723983	6188434
MB034	>6 months prior to mining panel 3	✓	✓			723831	6188574
MB040		✓	✓			723750	6188898
VWP001	>6 months prior to mining panel 1	✓	✓	VWP	Real-time groundwater pressure[3]	724293	6187677
VWP002		✓	✓			724249	6187847
VWP003		✓	✓			724199	6188044
VWP004	>6 months prior to mining panel 2	✓	✓			724070	6188089
VWP005		✓	✓			724029	6188259
VWP006		✓	✓			723983	6188434

ID	Timing of installation	Screened aquifer		Instrumentation	Frequency of data collection	Coordinates[1]	
		SFM	LPS			Easting	Northing
VWP007	>6 months prior to mining panel 3	✓	✓			723831	6188574
VWP008		✓	✓			723788	6188746
VWP009		✓	✓			723750	6188898

Notes: 1. Specific bore locations may be optimised based on field conditions.
2. Level loggers will only be deployed to bores adjacent to active mining panels at any given time.
3. Active mining areas only

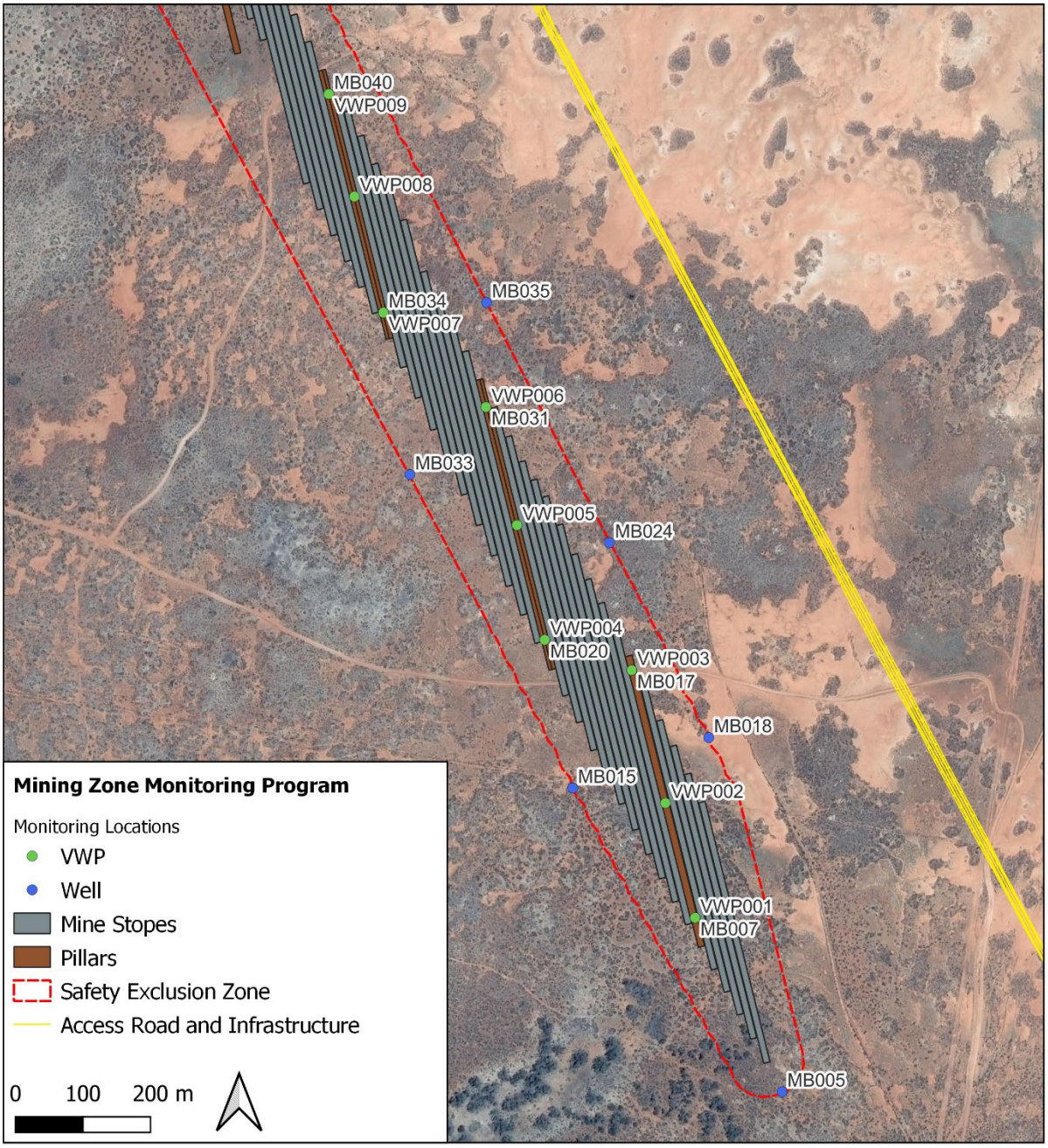

Figure 26- Initial mining zone monitoring program (years 1-2 of mining) – Mining Rig 1

Table 20- Preliminary VWP and monitoring bore locations (Mining Rig 2) used for mining and reinjection groundwater pressure monitoring.

ID	Timing of installation	Screened aquifer		Instrumentation	Frequency of data collection	Coordinates	
		SFM	LPS			Easting	Northing
VWP010	>6 months prior to mining panel 5	yes	yes	VWP	Real-time groundwater pressure(3)	723385	6189416
VWP011		yes	yes			723348	6189545
VWP012		yes	yes			723316	6189675
VWP013		yes	yes			723163	6189816
VWP014		yes	yes			723135	6189926
VWP015		yes	yes			723104	6190053
MB045		yes	yes	Remote water sampling well + VWP	Real-time groundwater pressure, water quality collected monthly(3)	723385	6189416
MB046		yes	yes			723316	6189675
MB049		yes	yes			723163	6189816
MB050		yes	yes			723104	6190053
MB047		yes	yes	Level logger(2)	6-hourly level logger, downloaded monthly(3)	723280	6189881
MB048		yes	yes			723199	6189597
MB051	>6 months prior to mining panel 6	yes	yes			722964	6190038
MB052		yes	yes			723050	6190292

Notes: 1. Specific bore locations may be optimised based on field conditions.
2. Level loggers will only be deployed to bores adjacent to active mining panels at any given time.
3. Active mining areas only

10.7.2. Water supply drawdown

Construction activities will cause drawdown on groundwater levels from pumping of construction water supply bores. The bores will extract significantly less water than during operations and hence the impacts from aquifer drawdown are anticipated to remain well within the predicted limits. Existing bores will be used to monitor groundwater drawdown from construction water supply bores.

Production water supply will be derived from bores constructed in the LPS and OF. Groundwater levels will be monitored in both formations at varying distances from the production bores. The results will be compared with the groundwater model predictions (see Section 10.3). Table 21 lists the preliminary bore locations for the bore water supply monitoring program. Figure 20 shows the nominal bore locations relative to the modelled groundwater drawdown contours (EMM, 2020).

The monitoring program will commence nominally six months prior to the commissioning of the water operations phase water supply production bores.

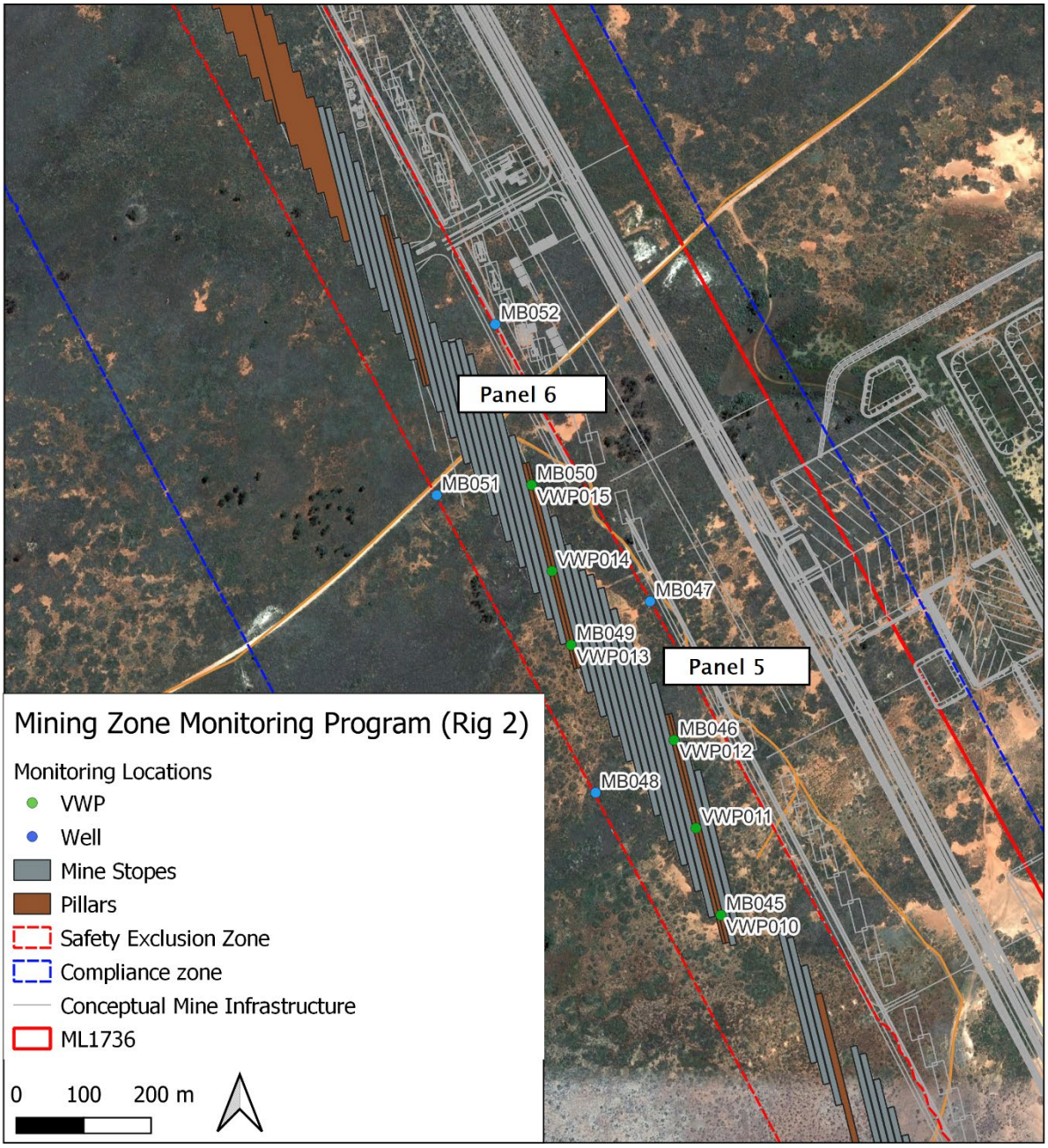

Figure 27- Initial mining zone monitoring program (years 1-2 of mining) – Mining Rig 2

Table 21- Production water supply groundwater monitoring program.

ID	Timing of installation	Screened aquifer		Frequency of data collection	Coordinates(1)	
		LPS	OF		Easting	Northing
WB102	Existing		✓	Monthly SWL	724967	6186394
MB018	>6 months prior to mining panel 1	✓	✓		724255	6188054
MB043	>6 months prior to commissioning of production bores		✓		721484	6189038
MB044			✓		727324	6189249
MB053		✓	✓		724714	6189699
MB068		✓	✓		722879	6190607
MB086			✓		723769	6193692
BH20-D	existing	✓			723676	6189207

Notes: 1. Specific bore locations may be optimised based on field conditions.

10.7.3. Groundwater quality

Mining activities and sand tails disposal has the potential to affect groundwater quality as described in Section 10.3. An adaptive monitoring program will be implemented to monitor changes in groundwater quality and compare these to predictions for modelled parameters. A SSTL framework has been established in Section 10.6 to trigger investigation and mitigation actions if water quality exceeds predicted impacts. The initial groundwater monitoring program will be more intensive and focus on the area where ore will be mined in the first 12-18 months of operations surrounding Mining Rig 1 (Table 22 and Figure 30), to permit robust calibration of the groundwater model Monitoring of groundwater quality surrounding Mining rig 2 (Table 20 and Figure 27) will be focused on the immediate surrounding area and future modelling will be used to establish suitable locations for compliance monitoring bores.

The monitoring program is intended to be adaptive and will be optimised prior to commencement of mining and following groundwater model calibration. A revised version of this management plan will be submitted prior to commencement of mining.

Groundwater monitoring bores have been located to form transects, perpendicular to and along the strike of the ore body. Transects will contain bores located adjacent to the mining panels, spaced within the transition zone on either side of the ore body where the PAX plume is anticipated to migrate. Compliance bores (linked with the SSTL framework) will be located at 400 m distance from the strike of the ore body, where PAX is not anticipated to reach based on the assessed groundwater impacts. The minimum distance of 50m from the ore body is defined by a safety exclusion zone established around the surface subsidence area above the ore body. Selected bores will be constructed within this exclusion zone using a remote sampling technique developed during the T3 mining trial. This technique will be used to locate monitoring bores within the pillars (between stopes) nominally up to 150 m within the safety exclusion zone. These selected bores will be screened within the SF with the primary purpose of monitoring potential water quality impacts related to infiltration of residual process water contained in sand tailings (Figure 30 & Figure 31). Selected bores will also be screened in the OF to confirm that the process chemicals do not leak to this lower aquifer.

Water quality data will be collected monthly in the mining and transition zones for the first 12 months of monitoring, then the frequency of data collection reviewed following analysis of these results.

The construction of monitoring bores will be staged according to the progression of mining and/or based on PAX and AMD related concentration triggers as outlined in Table 22. The timing of bore construction will allow for the collection of nominally 6 months of additional baseline data, which will assist with developing robust and suitable assessment criteria.

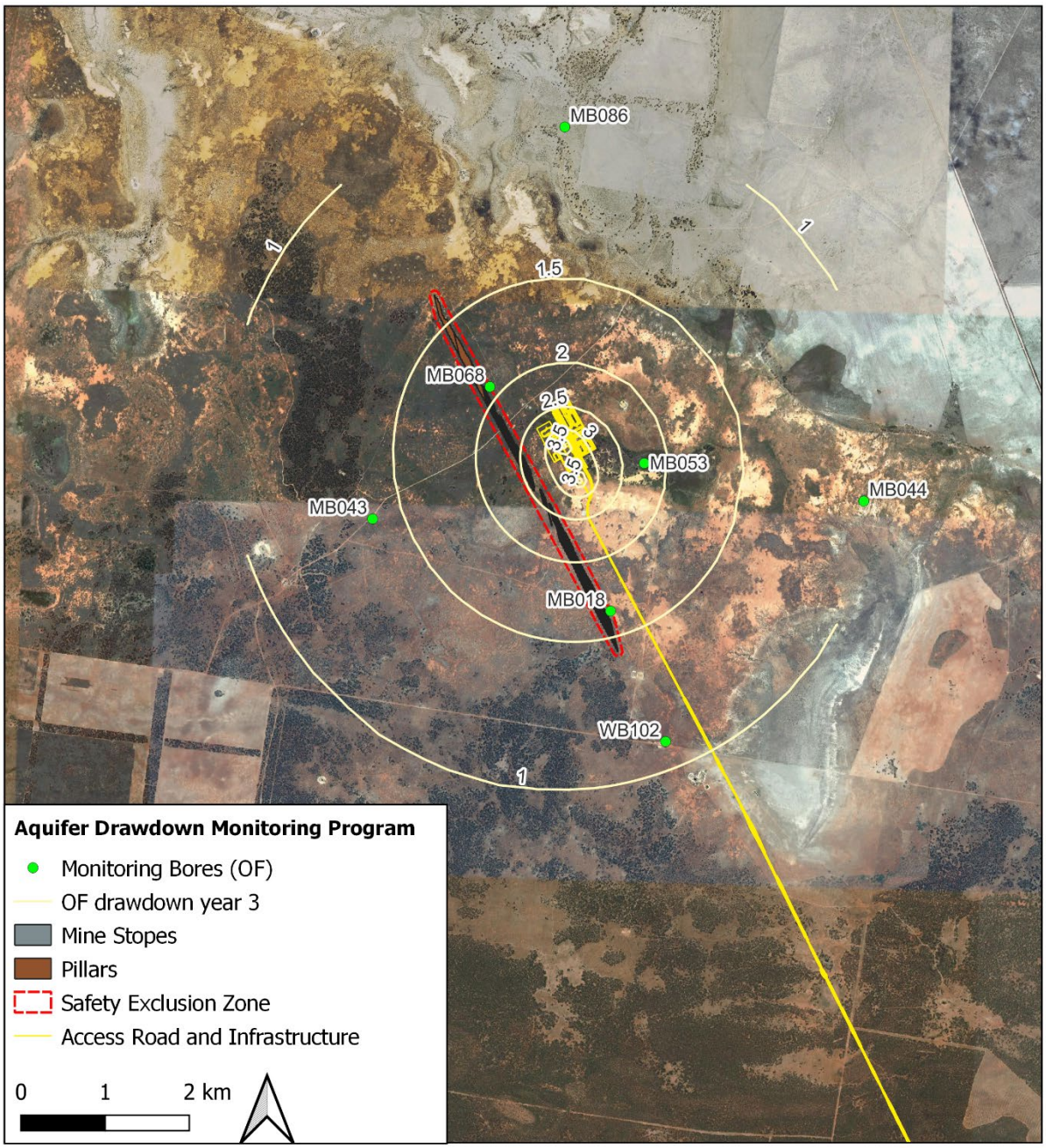

Figure 28- Production water supply monitoring program (OF)

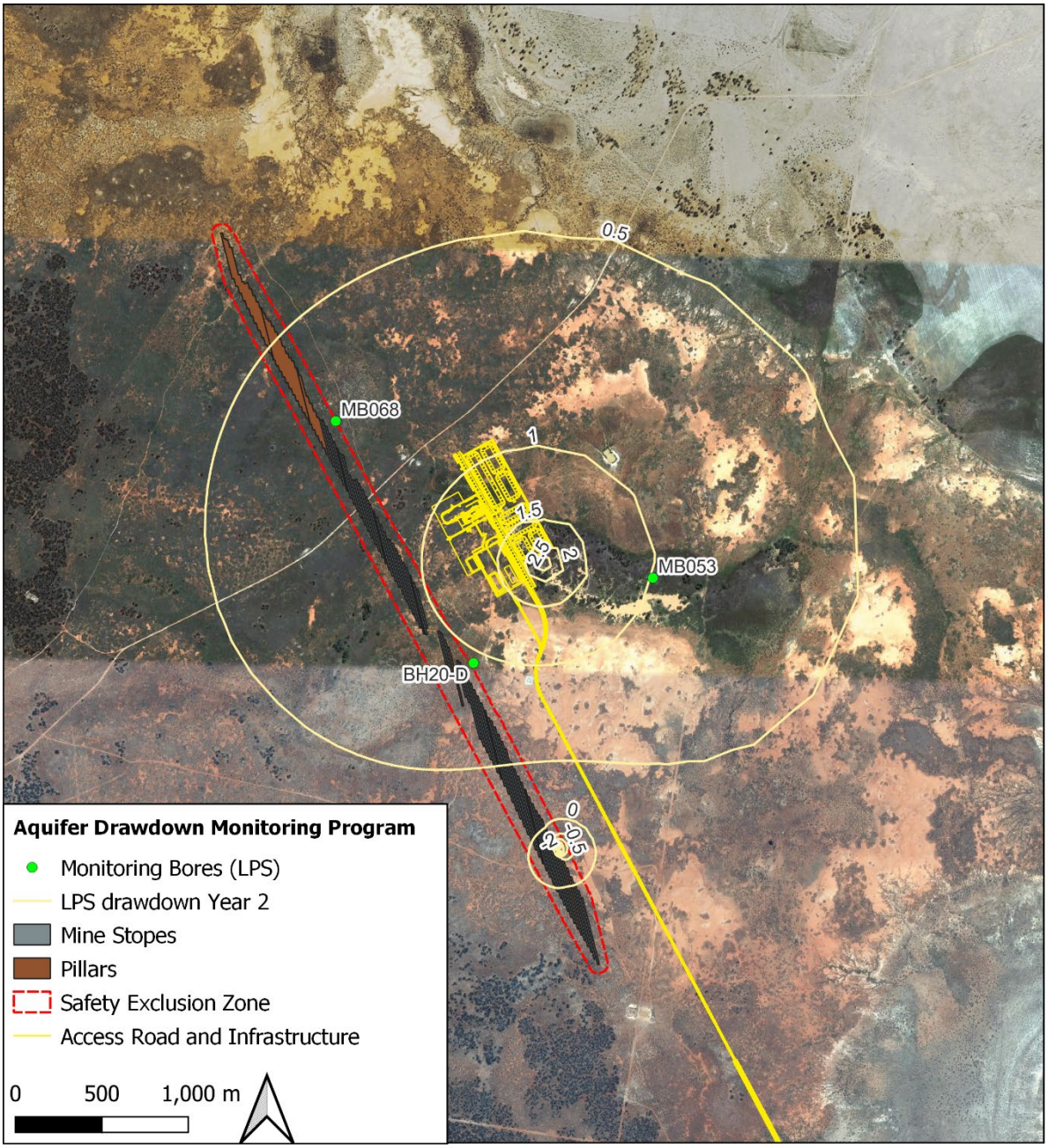

Figure 29- Production water supply monitoring program (LPS)

Table 22- Preliminary groundwater quality monitoring program (year 1-2 of operations phase)

ID	Groundwater management zone	Timing of installation	Screened aquifer			Parameters Frequency of data collection[2]	Coordinates[1]	
			SFM	LPS	OF		Easting	Northing
MB005	Mining Zone	>6 months prior to mining panel 1	✓	✓		SWL, Suite 1, Suite 2, Suite 3 - Monthly near active mining area, then quarterly[2] Suite 4 – Annual (mining zone only)	724422	6187419
MB007			✓	✓			724293	6187677
MB015			✓	✓			724112	6187869
MB017			✓	✓			724199	6188044
MB018			✓	✓	✓		724313	6187944
MB020		>6 months prior to mining panel 2	✓	✓			724070	6188089
MB024			✓	✓			724166	6188233
MB031			✓	✓			723983	6188434
MB033		>6 months prior to mining panel 3	✓	✓			723870	6188334
MB034			✓	✓			723831	6188574
MB035			✓	✓	✓		723984	6188589
MB040			✓	✓			723750	6188898
MB004	Transition Zone	if PAX >0.1 mg/L at MB005		✓			724500	6187292
MB013		if PAX >0.1 mg/L at MB015		✓			723983	6187790
MB019		>6 months prior to mining panel 1		✓			724358	6187969
MB023		if PAX >2 mg/L at MB019		✓			724447	6188019
MB025		>6 months prior to mining panel 2		✓			724211	6188258
MB028		if PAX >2 mg/L at MB025		✓			724299	6188306
MB032		if PAX >0.5 mg/L at MB033		✓			723740	6188255
MB036		>6 months prior to mining panel 3		✓			724028	6188614
MB037		PAX >3 mg/L at MB036		✓			724114	6188663
MB003	Compliance Zone	if PAX >0.1 mg/L at MB004		✓			724609	6187126

ID	Groundwater management zone	Timing of installation	Screened aquifer			Parameters Frequency of data collection[2]	Coordinates[1]	
			SFM	LPS	OF		Easting	Northing
MB006		if PAX >0.1 mg/L at MB013		✓			723803	6187698
MB016		if PAX >0.1 mg/L at MB023		✓			724620	6188113
MB029		if PAX >0.1 mg/L at MB032		✓			723564	6188164
MB038		if PAX >0.1 mg/L at MB088		✓			724292	6188761
MB063	Process Plant	>6 months prior to plant commissioning	✓				723805	6190294

Notes: 1. Specific bore locations may be optimised based on field conditions.

2. In line with the adaptive management framework, this plan allows for the monitoring frequency to be adapted on an ongoing basis as the mining plant progresses and/or water quality results indicate that the conditions have stabilised.

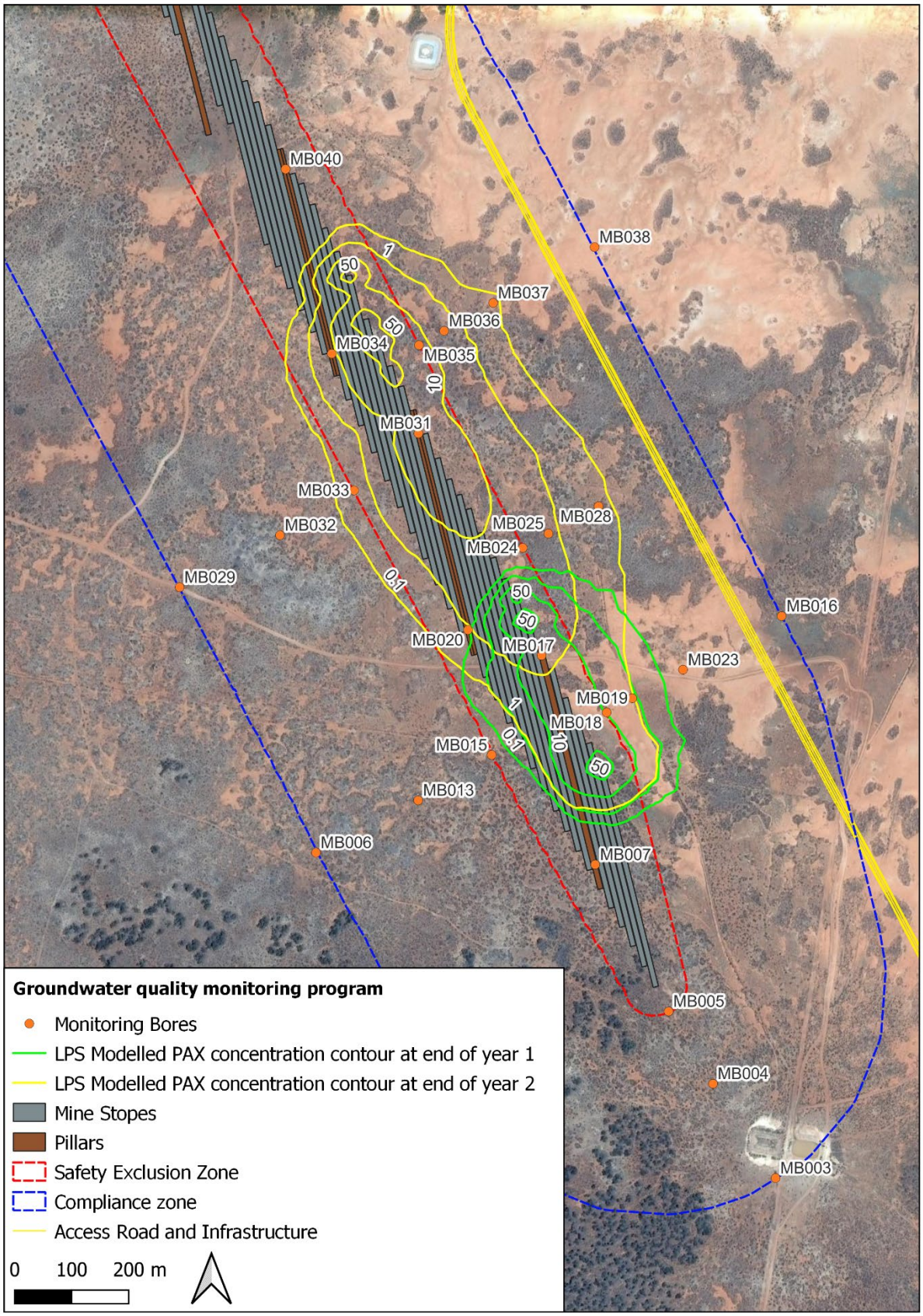

Figure 30- Initial groundwater quality monitoring program showing modelled PAX concentration at the end of year 1 of mining in LPS. The direction of mining is from southeast to north-west.

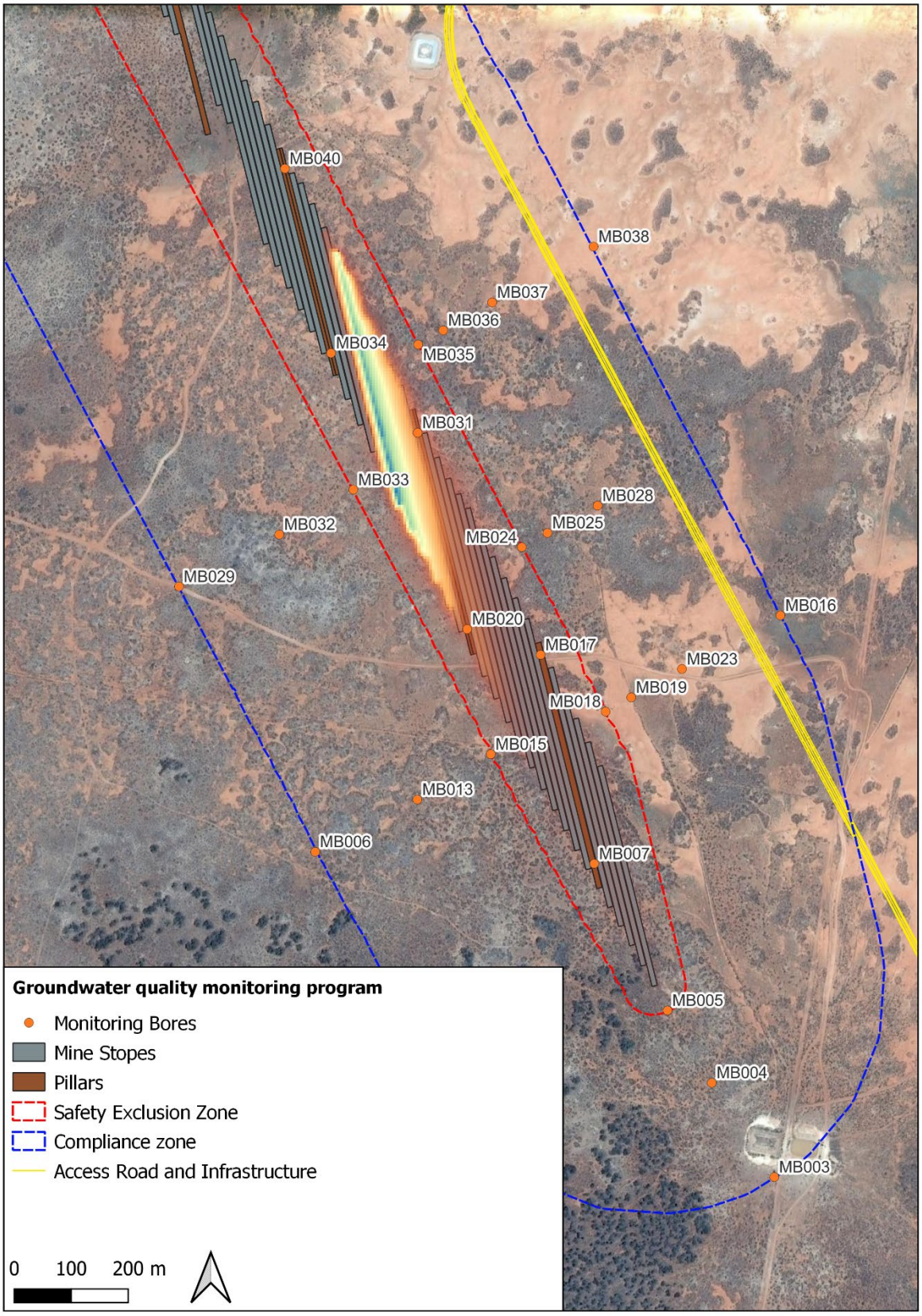

Figure 31- Initial groundwater quality monitoring program (top) showing modelled PAX concentration at the end of year 1 of mining in SF. The direction of mining is from southeast to north-west.

10.7.4. Regional and background

A regional monitoring program will be implemented throughout the duration of the Project to gather information on trends in background water quality and regional groundwater levels and trends in the regional groundwater flow regime. The HOC and SSTL framework will not be used to assess changes in groundwater level and quality at these locations. Bores have been located up-hydraulic gradient within the groundwater system and utilise existing bores to maintain continuity of long-term data records that currently exist. The bores selected represent a selection of the bores used in the T3 regional monitoring network and form part of the ongoing GMEs.

Table 23- Regional groundwater monitoring program

ID	Screened aquifer			Frequency of data collection	Analytical Suites	Coordinates	
	SFM	LPS	OF			Easting	Northing
Karra Bore			1	- SWL quarterly; - Water quality Annually	SWL (excl Karra Bore), Suite 1, Suite 2	720430	6188310
T01			1			722791	6201032
GW036673	1					711680	6189281
GW036866	1	1				734900	6203463
WB01	1					730399	6175412
WB02		1				730402	6175415
LPSPB03		1				724893	6186351
T03			1			732044	6189404

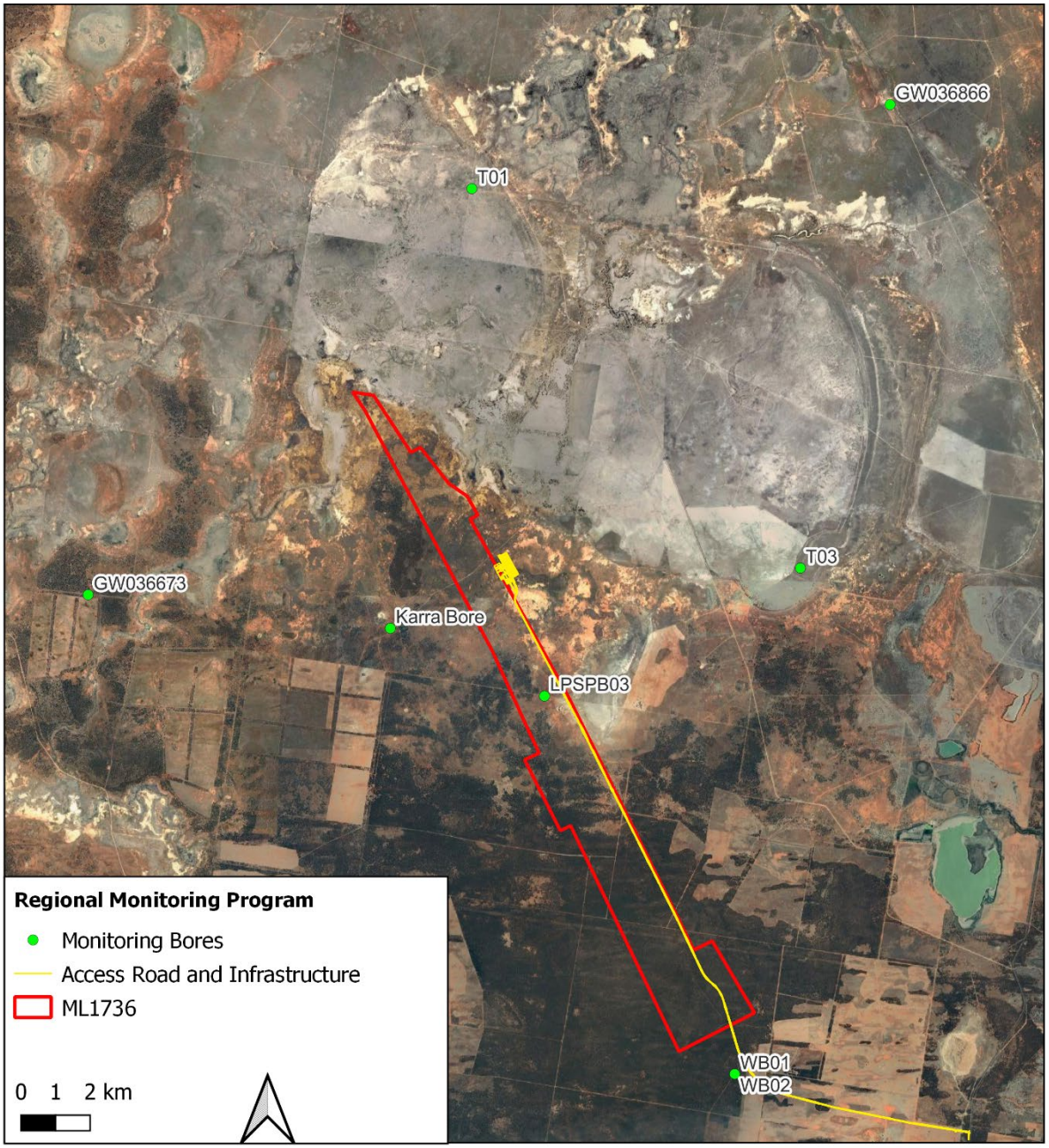

Figure 32: Regional monitoring bores.

10.7.5. Post-mining

A post-mining groundwater monitoring program will be developed at the later stages of the operations phase of the project based on monitoring results and groundwater model validation and calibration and included in a revised version of this plan.

10.7.6. Monitoring Procedures and QAQC

Iluka will maintain a groundwater bore register to store relevant construction details for all monitoring bores. Groundwater monitoring will be undertaken using a combination of low-flow sampling methods and/or collection via passive samplers (Hydrasleeves). Standard operating procedures (SOPs) for these

methods are provided in Appendix E, which are consistent with the following Australian/New Zealand Standards:

- AS NZS 5667.1, 1998 – Water Quality Sampling – Part 1 Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.
- AS NZS 5667.11, 1998 – Water quality - Sampling guidance on sampling of groundwaters.

Water quality monitoring equipment and groundwater level loggers will be calibrated, and calibration records maintained. Field blank and duplicate water quality samples will be collected, and results compared with parent samples.

All laboratory analyses will be performed by a NATA accredited laboratory.

10.8. Bore Development Procedures

Bores will be developed prior to groundwater monitoring or operations. Bore development is to be undertaken in accordance with the bore development Standard Operating Procedure (SOP) provided in Appendix E. This SOP has been developed using external expert advice (EMM, 2020) based on guidance in the Minimum Construction Requirements for Water Bores in Australia, 4th Edition (NUDLC 2020). The SOP includes a template for the collection of bore development details.

10.9. Data management and reporting

Data will be entered and stored in Iluka's environmental database system . Data will be reviewed promptly once received and relevant data compared with applicable performance criteria.

Monitoring data will be presented in the Annual Review. In accordance with SSD-5285 Schedule 3, Condition 15(b)(iii), the following will be reported:

- A summary of groundwater level data near mining operations and comparison with HOCs.
- A summary of groundwater quality data with focus on PAX migration / degradation and comparison with modelled predictions, within the mining, transition and compliance zones, including a comparison of bore water quality data with SSTLs.
- A summary of groundwater drawdown data from production bores and comparison with modelled predictions, and relative to the location of any private landholders/leaseholders and GDEs.
- A summary of any significant trends in regional / background changes in groundwater level and water quality relative to changes within mining areas.
- Post mining water level recovery (after the completion of mining activities).

11. Environmental Inspections

Environmental inspections will be carried out to identify environmental hazards and to assess the effectiveness of water management measures and controls. Table 24 outlines the inspection program that will be implemented during the construction phase of the Project.

Inspections will be documented in the form of a checklist and any hazards or non-conformances will be reported using Iluka's incident reporting system. Any actions arising from the inspections will be allocated as soon as reasonably practical and tracked electronically until closed out.

Table 24- Water management inspection program

Inspection area	Details of inspection	Timing/frequency	Responsibility
Mine water pipeline	Pipeline integrity Spills / leaks	Monthly	Environment Specialist
Process water dams (including T3 process dam during construction)	Dam integrity Minimum freeboard Liner / spillway condition Leaks/ spills	Monthly	
Flood mitigation berms	Integrity	Monthly	
Sediment control structures (including construction areas)	Condition and effectiveness of control Design freeboard is available	Monthly, or after 10 mm rainfall	
Mining Unit Plant / Drilling pads	Sump liner integrity, design freeboard available Spills or leakage	Monthly	
Chemical and Hydrocarbon storage areas	Bund integrity and capacity available Spills or leaks Spill kits available and stocked	Monthly	
Processing plant	Spills and leaks Drainage and sumps clear Any chemical drums containers stored in appropriate areas	Monthly	
Waste water treatment plant	Spills/leaks General operating condition	Daily	
RO plant	Spills/leaks	Monthly	

12. Adaptive Management

To facilitate continuous improvement of the environmental management system, the following sections outline protocols and procedures that will be followed in the event that an exceedance of the WMP assessment criteria or other unforeseen impact occurs.

The approach to management of groundwater during the underground mining trial will be adaptive. The adaptive management approach will allow for the use of the monitoring data to address the risks and impacts to the groundwater system and allow for ongoing environmental impact assessment to vary (if, appropriate) the trigger criteria should impacts be identified as negligible. This is especially the case for developing flexible operational hydraulic triggers, which will vary along the orebody/strike due to the

inherent heterogeneity within the subsurface system. Any variation in trigger criteria will be approved via resubmission of this WMP.

12.1. Exceedance of performance criteria

This WMP has been developed to manage and monitor water-related risks associated with the Balranald Project, to minimise the likelihood of exceedances of the performance criteria detailed in the project's operating approvals and licences. In accordance with SSD-5285 Schedule 5 Condition 2, If an exceedance of these criteria and/or performance measures occurs, Iluka will, at the earliest opportunity:

- Take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur.
- If the exceedance constitutes an environmental incident or emergency, then this will be managed via the Pollution Incident Response Management Plan (PIRMP) and the protocols stated in Section 13.5.
- Undertake an investigation into the cause of the exceedance and contributing factors.
- Consider all reasonable and feasible options for remediation (where relevant) and
- Transparently communicate and submit a report to regulator and community stakeholders as required, describing the nature of the exceedance, investigation outcomes and any remediation options or actions, if required.
- Implement remediation measures as directed by the EPA or Planning Secretary

The following investigation, assessment and notification protocols will be followed in the event of an exceedance of the stated performance criteria within this WMP.

12.1.1. HOC Exceedance

A preliminary adaptive exceedance protocol in response to an exceedance of the hydraulic operating conditions is provided in Table 25. The protocol will be finalised in a subsequent revision of this WMP that will be submitted prior to the commencement of mining.

Table 25- HOC exceedance protocol

Exceedance condition (detected by real-time monitoring at VWPs). Refer to Table 14 for HOC values.		**Action**	**Response**
Green	Normal Operations	Continue monitoring	Normal Operations, no action required.
Yellow	Leading indicator	- Control room operator, as soon as practically possible, to: - validate data, check for data / instrument errors - If data valid, notify the Mining and Environment Superintendents. - Closely monitor trends and if trend is increasing,	

		adjust mining operations to decrease the reinjection pressure and bring values back within the Green operating thresholds.	
Red	Non-compliance SF only, following 72-hours of sustained exceedance above red HOCs	- Environmental incident (loss Control Card) logged in Incident Management System. - Within 7 days (Schedule 5 Condition 6), Environment Superintendent to: - Notify Operations Manager - Notify DPE-Water and EPA. - As soon as practically possible, Mining manager to: - modify operations to reduce the groundwater pressures and bring the pressures back to within the green operating conditions.	- Incident investigation to identify cause and corrective actions. - If required, investigate environmental impacts and remediation options. - if required, and where no material environmental harm has occurred, review and update the HOC criteria and resubmit this WMP for approval.

12.1.2. Water Quality SSTL Exceedance

An preliminary exceedance protocol linked with the groundwater quality SSTL triggers (section 10.6.2) is presented in Table 26. This protocol will be finalised and included in a revised version of this WMP that will be submitted prior to the commencement of mining.

Table 26- Water Quality SSTL exceedance protocol

Exceedance condition (detected by routine water quality monitoring as outlined in Section 10.7.		**Action**	**Response**
Green	Normal Operations	Continue monitoring	Normal Operations, no action required.
Yellow	Leading indicator (compliance zone bores only, as described in Section 10.6))	- As soon as practically possible, Environment Specialist to: - notify Environment Superintendent. - Review data quality and validate. - If required, conduct additional sampling to further investigate. - Notify Operations Manager	- Increase the frequency of monitoring.
Red	Non-compliance (Compliance bores only, as described in Section 10.6), confirmed after two months of consecutive monitoring rounds with exceeded values and validated data.	- Environmental incident (loss Control Card) logged in Incident Management System. - Within 7 days (Schedule 5 Condition 6) Environment Superintendent to: - Notify DPE-Water and EPA.	- Incident investigation to identify cause and corrective actions. - Engage an expert to assess any potential environmental impacts and, if required, remediation options. Provide the report to DPE-Water and EPA. - if required, and where no material environmental harm has occurred, review and update the SSTL criteria and resubmit this WMP for approval.

12.1.3. Process Water Reinjection Exceedance

A preliminary exceedance protocol linked with the process water reinjection triggers is provided in Table 27. This protocol will be finalised and included in a revised version of this WMP that will be submitted prior to the commencement of mining.

Table 27- Process water reinjection exceedance protocol

Exceedance condition (detected by routine process water quality monitoring as outlined in Section 10.6.1).		**Action**	**Response**
Green	Normal Operations	Continue monitoring	Normal Operations, no action required.
Yellow	Leading indicator (detected via real-time process water monitoring and/or process water sampling).	- As soon as practically possible, Processing Plant Operator to: - notify Environment Superintendent. - Validate data by checking for instrument faults, subsequent readings, including additional sampling if required. - Notify Surface Mining and Concentrating Superintendent - As soon as practically possible, Ore Processing Superintendent to: - Dose the process water with neutralising agent to bring the process water pH into the green operating threshold.	- If required, increase the frequency of monitoring.
Red	Non-compliance Confirmed after 48 hours of consecutive monitoring rounds with exceeded values and validated data.	- Environmental incident (loss Control Card) logged in Incident Management System. - Within 7 days (Schedule 5 Condition 6) Environmental Superintendent to: - Notify DPE-Water and EPA. - Surface Mining and Concentrating Superintendent to take immediate action to prevent and/or minimise ongoing exceedance of the criteria.	- Incident investigation to identify cause and corrective actions. - Engage an independent expert to assess any potential environmental impacts and, if required, remediation options. Provide the report to DPE-Water and EPA. - if required, and where no material environmental harm has occurred, review and update the SSTL criteria and resubmit this WMP for approval.

12.1.4. Aquifer drawdown exceedance

If groundwater drawdown trigger levels exceed the levels stated in Table 17, the following investigation protocol will be used.

- The potential exceedance will be promptly reported to the Environment and Communities Manager and Operations Manager.
- Groundwater data will be verified with additional monitoring and supporting data from other bores.
- Once the data is verified and the exceedance is confirmed, DPE will be notified in writing within 7 days (Schedule 5 Condition 6) and provided with the available information and any management or mitigation actions undertaken.
- Within 30 days, a specialist hydrogeologist will be engaged in consultation with DPE-Water to undertake an assessment of groundwater impacts relative to EA predictions.
- Any further assessment, management and mitigation measures in response to the exceedance will be developed in consultation with DPE. Any potential impact to private water supply will be handled in accordance with SSD-5285 Schedule 3 Condition 13 (see Section 11.2).

12.2. Unforeseen Impacts

In the event that any unforeseen failure of the water management system occurs, or unforeseen surface water or groundwater impacts are detected, the following general response procedure will be initiated:

- As soon as practically possible, check and validate the data/information which indicates an unforeseen impact, this may involve resampling.
- If required, instigate environmental incident procedures, including DPE and EPA notifications.
- Review the unforeseen impact, including consideration of:
    - Any other relevant monitoring data; and
    - Current operational activities and land management practices;
- Provide a preliminary investigation report to DPE, EPA and relevant agencies within 7 days of identifying the unforeseen impact.
- If required, and nominally within 30-60 days, depending on the nature of the issue and regulator consultation required, commission an independent investigation by an appropriate specialist into the unforeseen impact.
- Implement appropriate contingency/remedial/monitoring measures, in consultation with DPE and any other relevant agencies.
- Communicate results of investigation and subsequent contingency and remedial measures to government agencies as required.
- Review and update this WMP and resubmit to DPE for approval.

12.3. Compensatory Water Supply

In accordance with SSD-5285 Schedule 3 Condition 13, Iluka will provide a compensatory water supply to the owner or leaseholder of any privately-owned land whose basic landholder water rights (as defined in the Water Management Act 2000) are adversely and directly impacted as a result of the Balranald Project. This supply will be provided in consultation with DPE Water, and to the satisfaction of the Secretary.

The compensatory water supply measures will provide an alternative long-term supply of water that is equivalent to the loss attributable to the development. Equivalent water supply will be provided (at least on an interim basis) as soon as practicable from the loss being identified, unless otherwise agreed with the landowner.

If Iluka and the landowner cannot agree on whether the loss of water is attributed to the development or the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

If the Applicant is unable to provide an alternative long-term supply of water, then the Applicant must provide alternative compensation to the satisfaction of the Secretary.

13. Compliance Monitoring and Reporting

13.1. Compliance Monitoring

Compliance for the Project is to be achieved by:

- adherence to conditions of the Development Consent, EPA Licence, Mining Lease conditions and corporate policies;
- annual compliance reporting in the Annual Review;
- review of the EMPs within 3 months of an Annual Review, a reportable incident, an Independent Environmental Audit or modifications to the conditions of the Consent;
- regular compliance auditing (both internal and external)
- revision of risk assessments periodically or after a reportable incident or a new hazard is identified;
- identification of performance against criteria and/or performance measures; and
- implementation of corrective measures to rectify a non-compliance or performance issue.

Compliance with all approvals, plans and procedures will be the responsibility of all personnel (staff and contractors) employed on or in association with the Project.

Iluka maintains an electronic database system for the management of obligations, stakeholder interactions and compliance monitoring. Each compliance source and its associated obligations are periodically audited for compliance by the responsible person. Actions can be assigned to any obligation to ensure compliance is met, automatic email alerts prompt the actioners to undertake the required tasks.

Iluka also maintains an electronic database system for the storage and management of environmental monitoring data. Compliance reports can be generated from the database and compared against known performance criteria or trigger levels. Monitoring schedules and alerts can be setup to notify environmental staff of required monitoring events.

Iluka environmental staff undertake scheduled environmental inspections of work areas to identify environmental hazards, which are reported and managed via Iluka's electronic inspection management system.

In accordance with Schedule 5, Condition 6A of the Consent, non-compliances will be reported to DPE within seven (7) days of becoming aware of the non-compliance. Notification will be in writing via the Departments Major Projects Website and detail the reasons for the non-compliance and what actions have been, or will be, undertaken to address the non-compliance.

13.2. Environmental reporting

13.2.1. Annual Review

In accordance with Schedule 5, Condition 4 of the Development Consent (SSD-5285), Iluka will submit an Annual Review to DPE before 31 March each year for the previous year.

The Annual Review will specifically address the following aspects of Condition 4, which directly relate to water:

- include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against:
    - the relevant statutory requirements, limits or performance measures/criteria;
    - the monitoring results of previous years; and
    - the relevant predictions in the EIS;
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the monitoring data over the life of the development;
- identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the development.

13.2.2. Annual EPA Return

Environment Protection Licence (20795) requires the inclusion of a monitoring and complaints summary in Iluka's Annual Return that is completed and supplied to the EPA not later than 60 days after the end of each reporting period. Water quality is required to be reported to the EPA as part of the Annual Return.

Water quality information included in the Annual Return includes:

- a statement of compliance;

- a monitoring and complaints summary including;
    - an analysis and interpretation of monitoring results; and
    - actions to correct identified adverse trends.

The Annual Review and Annual EPA Return and any water quality monitoring results will be published on the Iluka website in accordance with Schedule 5, Condition 10 of the Development Consent (SSD-5285).

13.3. Other environmental reporting

In accordance with Schedule 5, Condition 3 of NSW Development Consent (SSD-5285), Iluka has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

Environmental reporting requirements including timing, submission and distribution methods are summarised in Table 28.

In accordance with Schedule 5, Condition 7 of NSW Development Consent (SSD-5285), Iluka will provide regular reporting on the environment and community performance of the Project on the Iluka website community engagement hub (https://iluka.com/engage/balranald).

Table 28- Environmental reporting requirements

Report	Frequency	Distribution	Distribution Method
Incident Report	Notification immediately when becoming aware and reported via DPE Major Projects Portal.	DPE and any relevant agencies	DPE Portal/ Email
Annual Review	Annually by 31 March each year.	DPE and any relevant agencies	DPE Portal/Iluka website
Annual Return	Annually by 8 August (60 days from end of reporting period)	NSW EPA	eConnect EPA /Iluka website
Independent Environmental Audit Report	Every 3 years (Commencing within 1 year of the commencement of construction)	DPE	DPE Portal/Iluka website
Annual Rehabilitation Report & Forward Program	Annually by 1 March (60 days from end of reporting period)	NSW Resources Regulator	Regulator Portal/Rehabilitation Portal/Iluka website

13.4. Environmental auditing

Within 1 year of the commencement of construction and every three years thereafter, a full Independent Environmental Audit will be undertaken, as required by Schedule 5, Condition 8 of NSW Development Consent (SSD-5285). The Independent Environmental Audit will include consultation with all relevant agencies and will be conducted by a suitably qualified experienced and independent team of experts whose appointment has been endorsed by the Secretary of the DPE.

The Independent Environmental Audit will:

- assess the environmental performance of the Project and assess whether it complies with the requirements of all relevant approvals;
- review the adequacy of any approved strategy, plan or program required under all relevant approvals; and
- recommend measures or actions to improve the environmental performance of the Project and/or any strategies, plans or programs required under the relevant approvals.

A copy of the Independent Environmental Audit along with the response to any recommendations contained in the audit report, will be provided to the Secretary of the DPE and made available on the Iluka website.

13.5. Environmental incident and emergency management

13.5.1. Environmental incidents

An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in NSW Development Consent (SSD-5285).

Following the Group Guideline -Hazard Incident Emergency Classification (GUI1135), incidents of serious actual or potential consequence must be immediately notified to the Environment, Rehabilitation and Community Relations (ERCR) Superintendent (or equivalent environment representative) and site Operations Manager or their delegate.

The ERCR Superintendent (or equivalent environment representative) shall then:

- Determine if the incident is a ‘notifiable incident’ for notification to a Regulator.
- Consult with the Operations Manager or their delegate and the Environment Manager to agree on incident classification and notification requirements.
- Complete the notification within the legislated timeframes.
- Determine if the incident is a ‘reportable incident’ for inclusion in reports to the Regulator.

The reporting of incidents will be conducted in accordance with Schedule 5, Condition 6 of NSW Development Consent (SSD-5285) and in accordance with the protocol for industry notification of pollution incidents under Part 5.7 of the Protection of the *Environment Operations Act, 1997*.

Iluka will immediately notify the Department and any other relevant agencies immediately after the authorised person becomes aware of the incident and set out the location and nature of the incident. The DPE can be notified of incidents via the Major Projects Website

https://pp.planningportal.nsw.gov.au/major-Projects and the NSW EPA can be notified by telephoning the hotline on **131 555.**

The incident report will:

- describe the date, time and nature of the exceedance/incident;
- identify the cause (or likely cause) of the exceedance/incident;
- describe what action has been taken to date; and
- describe the proposed measures to address the exceedance/incident.

13.5.2. Environmental emergencies

Iluka will maintain a Pollution Incident Response Management Plan (PIRMP) for the Project in accordance with Condition R1.1 of Environment Protection Licence 20795. The PIRMP outlines the process for responding to environmental emergencies in a timely and effective manner and adopting appropriate measures for the control and recovery from emergencies. Where appropriate, environmental emergency response procedures will be integrated with the Balranald Project Emergency Control and Response Plan.

Preparedness for emergencies by staff, personnel, contractors and service providers will be undertaken in accordance with on-site training requirements whereby personnel will be appropriately trained in the use of emergency response equipment and procedures, and will be made aware of their responsibilities should such an event occur. A list of external agencies that may be required in the event of an emergency is presented in Table 29.

Table 29- External agency contact details

Name	Contact details	Location
Police	000 03 5898 4980	Balranald
Ambulance	000	Balranald
NSW Rural Fire Service	000	Balranald
Fire and Rescue NSW	000 03 5020 1577	Balranald
NSW Volunteer Rescue Squad	03 5020 1966	Balranald
Hospitals	03 5071 9800	Balranald Multi-Purpose Health Service
	03 5033 9300	Swan Hill District Hospital (emergency)
	03 5022 3333	Mildura Base Hospital (emergency)
NSW State Emergency Service	13 25 00	www.ses.nsw.gov.au
NSW Poisons Information Centre	13 11 26 (24-hour hotline)	www.poisonsinfo.nsw.gov.au
NSW Environment Protection Authority(EPA)	13 15 55	www.epa.nsw.gov.au
NSW Resources and Energy – ResourcesRegulator	1300 814 609	www.resourcesregulator.nsw.gov.au
SafeWork NSW	13 10 50	www.safework.nsw.gov.au
Balranald Shire Council	03 5020 1300	Balranald

14. WMP review and revision process

In accordance with Schedule 5, Condition 5 of Development Consent (SSD-5285), the WMP will be reviewed within 3 months of the submission of:

- the Annual Review;
- a reportable incident;;
- an Independent Environmental Audit; and
- any modification to the conditions of the Consent.

Where the review leads to revisions in any document, a revised document will be submitted to the Secretary of the DPE within 4 weeks of the revision occurring.

15. References

EMM Consulting Pty Ltd (EMM), 2015 Balranald Mineral Sands Project, Environmental Impact Statement

EMM Consulting Pty Ltd, 2021 Balranald Mineral Sands Project- Hydrogeological assessment of the T3 mining trial, prepared for Iluka Resources Limited, dated February 2021.

EMM Consulting Pty Ltd, 2022 Balranald Groundwater Comparative Impact Assessment in support of Modification No. 1

EMM Consulting Pty Ltd, 2022 Balranald Mineral Sands Project – Modification of Consent (SSD-5285) Surface Water Assessment

EMM 2019, Balranald bulk sampling activities historical groundwater assessment and summary report, prepared for Iluka Resources Limited, October 2019.

EPA, 2022. Approved methods for the sampling and analysis of water pollutants in NSW https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/water/22p3488-approved-methods-for-water-in-nsw.pdf?la=en&hash=19C9070D145112CD4B8317E5EFCAFBD1C0575A50

Worley, 2022. Balranald Mineral Sands Project Definitive Feasibility Study – Flood Impact Assessment