CHAPTER 5 – PROGRESSIVE REHABILITATION AND CLOSURE

STANMORE ID EXTENSION PTY LTD

ISAAC DOWNS EXTENSION PROJECT

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5. PROGRESSIVE REHABILITATION AND CLOSURE

5.1 Introduction

This chapter describes the proposed progressive rehabilitation and closure for the Isaac Downs Extension Project (the Project) based on the progressive rehabilitation and closure plan (PRCP) and draft PRCP schedule provided as **Appendix AB** and **Appendix AC**, respectively. The draft PRCP schedule provides binding, time-based milestones for actions that achieve progressive rehabilitation and closure and will ultimately support the transition of the Project's mining disturbance to future post mining land uses (PMLUs) that are safe, stable, non-polluting and sustainable.

This chapter describes the strategies and decisions that have informed the design of the final landform, including the preferred PMLUs. Details on the proposed management of rehabilitation and closure are provided in the PRCP and are summarised in this chapter.

5.2 Regulatory Framework

The approvals process, and the legislative and policy context for the Project and its activities, are described in **Chapter 2**. This chapter provides additional information on the legislative and policy context and environmental objectives and performance outcomes relevant to the progressive rehabilitation and closure of the Project.

5.2.1 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) specifies the requirement for an application for an environmental authority (EA) for a mining activity relating to a mining lease (ML) to hold a PRCP and PRCP schedule. The EP Act states the main purposes and compliance requirements for a PRCP and its PRCP schedule. The EP Act also outlines the mechanism and decision process for statutory approval and amendment of a PRCP schedule and the regulatory role of the administering authority under the framework for the PRCP and PRCP schedule.

The proponent for the Project (Stanmore ID Extension Pty Ltd (ID Extension)) will apply for a new EA and PRCP (including a PRCP schedule) for activities on the Project's MLs. ID Extension is a wholly owned subsidiary of Stanmore Resources Ltd (Stanmore).

5.2.2 Environmental Protection Regulation 2019

The *Environmental Protection Regulation 2019* (EP Regulation) states the objectives and performance outcomes for a PRCP and its PRCP schedule and details the administrative and regulatory requirements for a PRCP and its PRCP schedule. The EP Regulation also outlines the administering authority's requirements for carrying out an objective assessment of a PRCP schedule.

5.2.3 Environmental Objectives and Performance Outcomes

The environmental objectives and performance outcomes, based on the EP Regulation and terms of reference (ToR) for the Project's environmental impact statement (EIS), that are relevant to progressive rehabilitation and closure, are provided in Table 5-1. A corresponding EIS section reference is provided in this table demonstrating how the Project meets these environmental objectives and performance outcomes.

Table 5-1 Environmental Objectives and Performance Outcomes – Progressive Rehabilitation and Closure

Requirement	Environmental Objectives and Performance Outcomes	EIS Reference
Terms of Reference	Land disturbed by mining activities will be rehabilitated progressively as it becomes available, to minimise the risks of environmental impacts and reduce cumulative areas of disturbed land.	5.3, 5.4, 5.5, 5.6, 5.10, 5.10.4 **Appendix AB** **Appendix AC**
	The activity is operated in a way that protects the environmental values of land including soils, subsoils, landforms and associated flora and fauna.	5.10 4.9, 4.18, 4.23 7.4, 7.5 11.6, 11.7 12.5
	The activity is operated in a way that disturbed land will be rehabilitated or restored to a stable condition; the land is safe and structurally stable, there is no environmental harm being caused by anything on or in the land, and the land can sustain a post-mining land use.	5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.10.3, 5.10.5, 5.10.6 **Appendix AB** **Appendix AC**
	The progress and outcomes of progressive rehabilitation activities will be monitored and reported on to demonstrate how successful they have been in achieving progress towards the agreed final land use, and to inform corrective action where required.	5.10.6.5, 5.10.6.6, 5.10.6.7, 5.10.8 **Appendix AB**
PRCP Performance Outcome (Schedule 8A of EP Regulation)	The PRCP schedule properly states a post-mining land use or non-use management area for each area of land to which the PRCP schedule relates.	5.10, 5.10.4 **Appendix AC**
Performance Outcomes		
Each post-mining land use— (a) is viable, having regard to the use of land in the surrounding region; and		5.3, 5.4, 5.6, 5.9, 5.10.5 **Appendix AB**
(b) satisfies at least 1 of the following— (i) the use is consistent with how the land was used before a mining activity was carried out on the land; (ii) the use is consistent with a development approval relating to the land; (iii) the use is consistent with a use of the land, other than a use that is mining, permitted under a State or Commonwealth Act, including, for example, a planning instrument under the Planning Act; (iv) the use will deliver, or is aimed at delivering, a beneficial environmental outcome.		5.3, 5.4, 5.6, 5.10.5 7.3.3, 7.3.19, 7.3.20, 7.5.1 **Appendix AB**
Table 1, performance outcomes 2 and 3 related to non-use management areas (NUMAs)		5.3.4 (No NUMAs are proposed)

Requirement	Environmental Objectives and Performance Outcomes	EIS Reference
Requirement	**Environmental Objective**	**EIS Reference**
PRCP Objective (Schedule 8A of EP Regulation)	Rehabilitation milestones are supported by milestone criteria and are suitable for rehabilitating land to a stable condition.	5.10, 5.10.4, 5.10.4.2, 5.10.4.3 **Appendix AB** **Appendix AC**
Performance Outcomes		
Each rehabilitation milestone is appropriate for achieving the post-mining land use for the rehabilitation area.		5.10, 5.10.4, 5.10.4.2, 5.10.4.3, 5.10.6 **Appendix AB** **Appendix AC**
Each rehabilitation milestone is supported by milestone criteria that— (a) are appropriate for achieving the milestone; and (b) facilitate achieving subsequent rehabilitation milestones.		5.10, 5.10.4, 5.10.4.2, 5.10.4.3, 5.10.6 **Appendix AB** **Appendix AC**
The last rehabilitation milestone and milestone criteria for the milestone demonstrate the post-mining land use will be sustainable in the long term.		5.10, 5.10.4, 5.10.4.2, 5.10.4.3, 5.10.6 **Appendix AB** **Appendix AC**
Requirement	**Environmental Objective**	**EIS Reference**
PRCP Objective (Schedule 8A of EP Regulation)	Rehabilitation of land to a stable condition will be achieved progressively during the life of the mine.	5.10, 5.10.6, 5.10.7, 5.10.8 **Appendix AB** **Appendix AC**
Performance Outcomes		
Rehabilitation areas are planned in a way that maximises achieving progressive rehabilitation for the post-mining land use.		5.10, 5.10.4, 5.10.6 **Appendix AB** **Appendix AC**
The first rehabilitation milestone for a rehabilitation area will start as soon as practicable after the land in the area becomes available for rehabilitation for section 126D(4) of the Act by, for example, starting within 6 months after the area becomes available for rehabilitation.		5.10, 5.10.4, 5.10.6 **Appendix AB** **Appendix AC**
The time frame mentioned in section 126D(4) of the Act for achieving each rehabilitation milestone has regard to the risks identified in the PRC plan for the land under section 126C(1)(f) of the Act.		5.10.7 **Appendix AB**
The time frame mentioned in section 126D(4) of the Act within which the land will be rehabilitated to a stable condition has regard to any time frames agreed to during consultation with the community about the PRC plan.		5.10.4.4 **Appendix AB**
Table 3 - NUMAs		5.3.4 (No NUMAs are proposed)

5.2.4 Policy

During 2017, the Queensland government released a 'Mined Land Rehabilitation Policy' that outlines the government's commitment to ensuring land disturbed by mining activities is rehabilitated to a safe and stable landform that does not cause environmental harm and is able to sustain an approved post-mining land use.

5.2.5 PRCP Guideline

The main purposes of the 'Statutory guideline – Progressive rehabilitation and closure plans' (PRCP Guideline) (DESI, 2023) are to:

- require the holder of an EA to plan for how, where and when activities will be carried out on land in a way that maximises the progressive rehabilitation of the land to a stable condition
- provide for the condition to which the holder must rehabilitate the land before the EA may be surrendered.

The purpose of this PRCP Guideline is to assist applicants in developing a PRCP and PRCP schedule as part of a site-specific application for a new mining activity. It identifies statutory information requirements applicable to most mining activities in Queensland. The administering authority must consider the Guideline when deciding whether to approve a proposed PRCP schedule under the EP Act. The PRCP Guideline was developed using contemporary best practice and industry standards, in line with the EP Act and the Mined Land Rehabilitation Policy.

The PRCP and draft PRCP schedule for the Project (**Appendix AB** and **Appendix AC,** respectively) have been prepared in accordance with the PRCP Guideline.

5.2.6 Planning Act 2016

As described in **Chapter 2**, the Project does not require approvals under the *Planning Act 2016* (Planning Act) as all activities occur on the Project's MLs. However, the regulatory framework governing the transition from mining activities under the *Mineral Resources Act 1989* (MR Act) to certain PMLUs requiring infrastructure development for commercial purposes, may require approval under the Planning Act. This transition could occur at the time of ML surrender or prior to construction of infrastructure to support PMLUs. However, the proponent notes that the regulatory framework governing this transition to certain PMLUs may evolve over the life of the Project's operations and hence may not be subject to the Planning Act at the time of transition. The proponent is committed to working with the relevant regulatory authorities to ensure there is an effective regulatory mechanism for approval of PMLUs that are environmental, technically and commercially feasible.

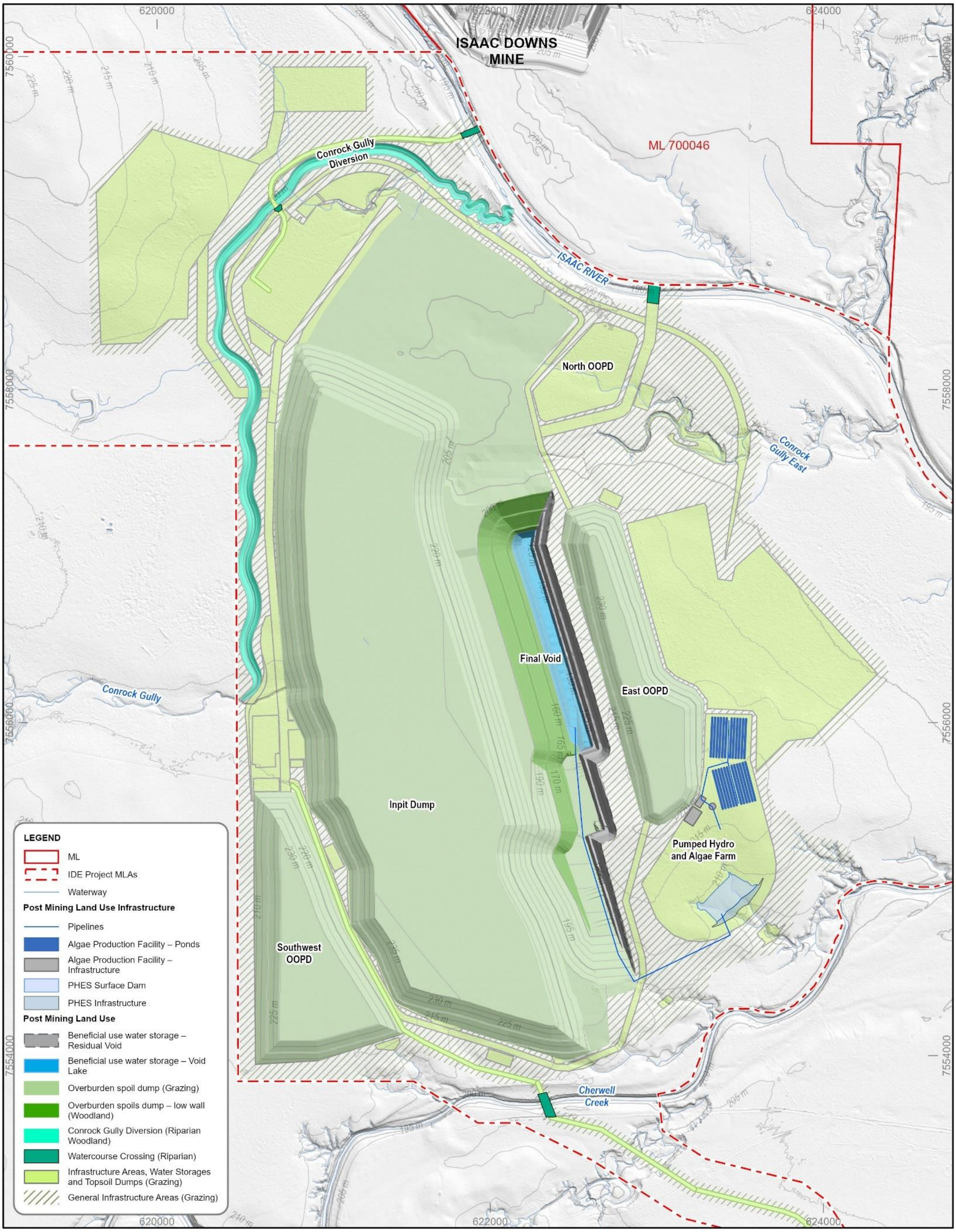
5.3 Final Landform Options Assessment

5.3.1 Overview

This section describes the rationale and factors that informed Stanmore's decisions on the proposed, final rehabilitated and closure landform design for the Project, including environmental, economic, community and regulatory factors. Final landform design and PMLUs were informed by multiple technical studies undertaken for the EIS, as referenced in sections below. The proposed final landform and post mining land uses (PMLUs) are shown in Figure 5-1. The following sections of this chapter describe the rational for the selection of this final landform and the planned PMLUs.

5.3.2 Unconstrained Final Landform Design

An unconstrained final landform design is one that would result in the greatest economic value to the proponent without consideration of environmental, community, landowner and regulatory constraints. This was not considered a feasible option, given the constraints of the Project location, regulatory requirements, and environmental and social considerations.



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Final Landform and Post Mining Land Uses

Figure | 5-1

5.3.3 Constraints for the Final Landform Design

The key constraints considered in the final landform design were:

- Project economics – delivering a Project with a positive net present value with socio-economic benefits to local and regional communities.
- Isaac River and Cherwell Creek.
- Design of Conrock Gully diversion, to allow access to economic resources, with a long term geomorphically stable diversion design.
- Flooding – locating any residual void[1] outside the 0.1% AEP flood event of the Isaac River and Cherwell Creek, in accordance with regulatory requirements of the EP Act, without long term changes to the hydrology or geomorphology of the Isaac River and Cherwell Creek.
- Dumps designed to minimise interaction with Isaac River and Cherwell Creek flood events, with consideration for other constraints in dump location such as tenement boundaries and ecological values.
- Landform designs that were erosionally and geotechnically stable, non-polluting and self-sustaining, with a nominated PMLU.
- Identifying PMLUs that were compatible with the landholders preferred use of the land, as well as being technically and commercially feasible with the ability to provide long term economic benefits to the landholder, and local and regional communities.

5.3.3.1 Project Economics

Open cut mining results in voids within the landscape being mined, unless they can be backfilled during or post mining. A complete backfill of the proposed open cut pit areas was found to be uneconomic for the Project, with a cost of approximately $433.5M. However, Project planning included maximising the volume of overburden (or 'spoil')[2] that was dumped in-pit, thereby reducing the size of a residual void to less than 10% of the pit area. The majority of overburden (around 90%) will be placed in-pit, in previously mined areas.

5.3.3.2 Isaac River and Cherwell Creek

The economic resource extends beneath the Isaac River (i.e. the same resource as mined at Isaac Downs Mine (IDM)) and Cherwell Creek. To access this resource would require diversion of the Isaac River and / or Cherwell Creek. The proponent did not consider diversion of the Isaac River and / or Cherwell Creek to be environmentally or socially desirable, and hence the resource in these areas is not proposed to be mined.

5.3.3.3 Conrock Gully Diversion

Diversion of Conrock Gully allows for access to economic resources, and was an important consideration for final landform design. Stanmore considered mining around Conrock Gully (i.e. leaving Conrock Gully in place) but this would have resulted in a material reduction in economic coal resources mined. Therefore, a diversion was required. Stanmore considered whether this diversion should be permanent around the mining area, or temporary around the mining area followed by a permanent diversion in a similar location to the pre-mining Conrock Gully; with a single, permanent diversion preferred as:

- A later permanent diversion in a similar location to the pre-mining Conrock Gully would have to be designed through the in-pit overburden dump, with associated risks for long term stability.
- The diversion, whether temporary or permanent, would need to be designed to a similar standard for operations, and hence construction of a temporary and later permanent diversion would significantly increase costs for the same outcome.

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[1] The terms 'residual void' and 'final void' are used synonymously in this EIS.
[2] The terms 'overburden', 'spoil' and 'mine waste rock' are used synonymously in this EIS, and include interburden.

- The diversion, whether temporary or permanent, would be subject to rehabilitation from the commencement of operations with achievement of rehabilitation milestones during the operational life of the mine. Therefore, any later permanent diversion would require another series of rehabilitation milestones with little environmental benefit compared to rehabilitation of the single permanent diversion around the mine workings.

The objective for a permanent diversion was to have stable landform that achieves hydraulic and geomorphic criteria. The diversion design, which achieves this objective, is described in detail in Section 9.6 of **Chapter 9** and Appendix D of **Appendix J**. The diversion has been designed to hold the 0.1% annual exceedance probability (AEP) flood event, flowing to the west and north of the in-pit dump landform. There is negligible risk of flood waters in the diversion interacting with the final void[3], as the diversion will be separated from the final void by a long term, stable dump structure that is more than 1 km wide (see Figure 5-1).

5.3.3.4 Flooding

In accordance with the requirements of Section 126D(3) of the EP Act, 'if land the subject of the proposed PRCP schedule will contain a void situated wholly or partly in a flood plain, the schedule must provide for rehabilitation of the land to a stable condition'. In this context, 'stable' condition refers to the land having a PMLU, which therefore does not preclude a void with a PMLU being situated in a floodplain.

In accordance with Section 41C(3) of the EP Regulation, 'the administering authority must treat the land as a flood plain to the extent the results of the flood plain modelling show that, when all relevant activities carried out on the land have ended, the land is the same height as, or lower than, the level modelled as the peak water level 0.1% AEP for a relevant watercourse under the ARR[4]'. Further definitions are provided for:

- 'flood plain modelling' where modelling excludes artificial features of the land
- 'relevant watercourse' which is a watercourse, or a permanently diverted watercourse, of stream order 4 or higher.
- 'artificial feature', including temporary structures or features requiring a level of maintenance greater than pre-mining.

In combination, these EP Act and EP Regulation requirements place constraints on voids within the 0.1% AEP flood event post mining.

The pre-mining 0.1% AEP flood extent is shown in Figure 5-2, demonstrating:

- The Isaac River (stream order 6) floodplain is approximately 1.5 km wide in Project area, including in the proposed pit area north of Conrock Gully.
- Cherwell Creek (stream order 5) has a narrow floodplain, typically confined to the banks of the creek and some backwater gully flows.
- Conrock Gully (stream order 2) experiences backwater flooding from the Isaac River.

The operational mine includes a levee along the Isaac River. Sections 9.4 and 9.5 of **Chapter 9** provide a detailed assessment of the pre-mining flood extents and the potential hydrological and geomorphic impacts of the levee during operations. Despite these operational hydrology and geomorphology impacts being assessed as negligible to minor in the context of the regional, rural location, Stanmore determined that any long term risks to the hydrology and geomorphology of the Isaac River would be further reduced by reinstating the floodplain of the Isaac River as far as reasonably practical. To achieve that objective, it was decided that the Isaac River levee (potentially an 'artificial feature') would be decommissioned and

[3] The terms 'final void' and 'residual void' are used synonymously in this EIS.
[4] ARR means the guideline called the Australian Rainfall and Runoff published by the Commonwealth, www.arr.ga.gov.au

rehabilitated post mining, and the northern portion of the pit area would be backfilled to a pre-mining topographical level.

The diversion of Conrock Gully will be permanent, and therefore, forms part of the final landform design for flood modelling.

Figure 5-3 shows the proposed final landform, including residual void area (see Section 5.6 for justification for the void design and configuration), relative to the 0.1% AEP floodplain:

- The Isaac River levee has been decommissioned and rehabilitated.
- The northern pit area is backfilled to pre-mining topographical levels.
- There is a permanent diversion of Conrock Gully.
- A portion of the northern part of the in-pit dump is situated at the edge of the floodplain.
- There is minimal interaction with Cherwell Creek, with any minor gully backwater flows managed by a final, stable dumped landform in the closure landform.

Figure 5-3 demonstrates that the residual void is not situated within the 0.1% AEP flood event after removal of any 'artificial features'.

Despite the EP Act allowing for a void in a floodplain where the void has a PMLU, Stanmore elected to situate any residual void outside the post mining 0.1% AEP flood extent. To achieve this required the backfilling of the northern pit area to a similar topographical level as pre-mining. Backfilling will occur prior to the decommissioning of levee and ensure that a stable, rehabilitated backfilled landform exists prior to reinstating any floodplain flows from the Isaac River.

The hydrological and geomorphological assessments, as presented Sections 9.4 and 9.5 of **Chapter 9**, determined that the final landform would have negligible impacts on the hydrology and geomorphology of watercourses.

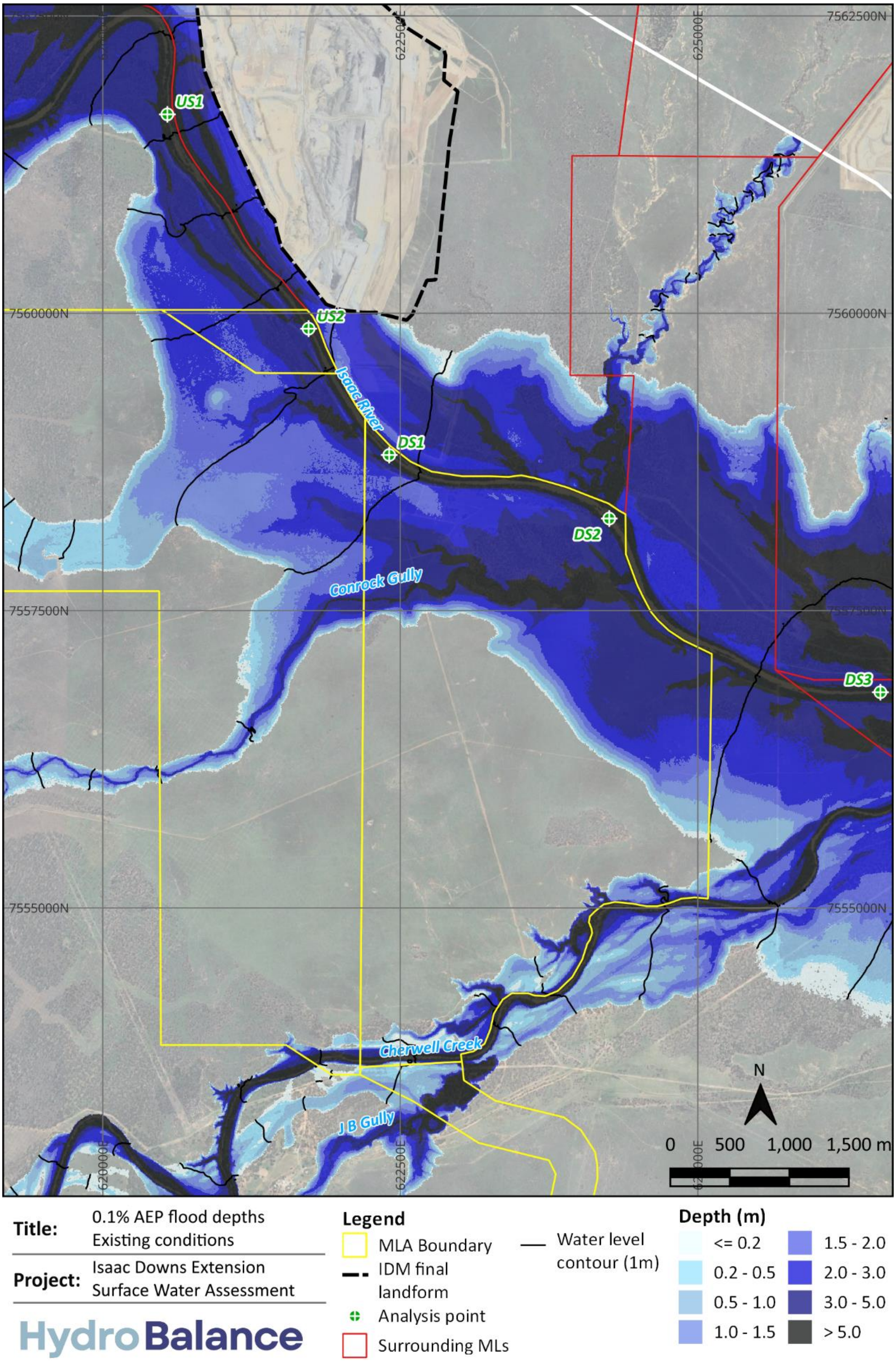


Figure 5-2 Existing Conditions - 0.1% AEP Flood Depths and Heights

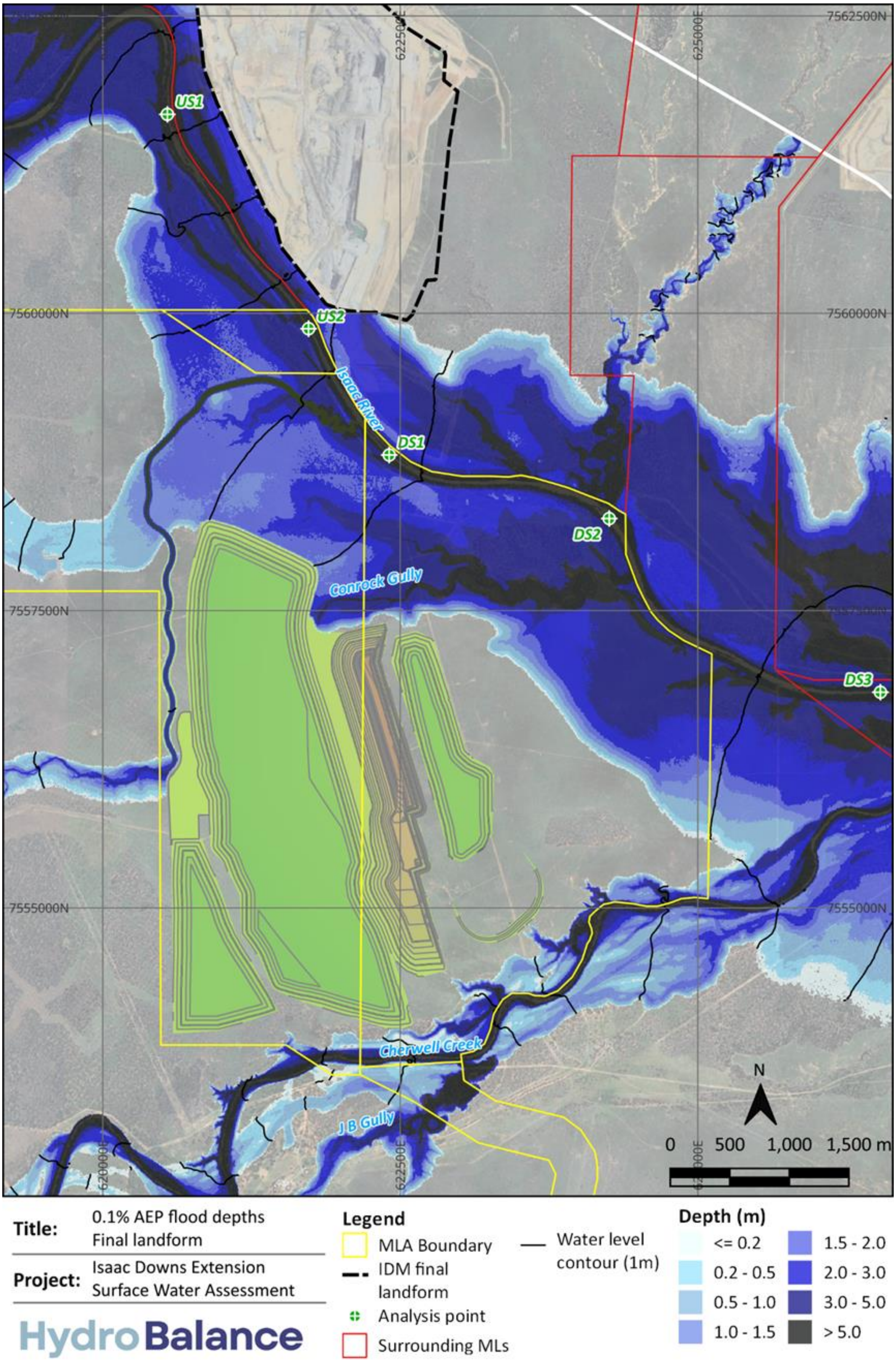


Figure 5-3 Final Landform – 0.1% AEP Flood Depths and Heights

5.3.3.5 Landholder and Other Stakeholders

Through consultation with the majority landholder (Winchester Downs) their preference is for ongoing use of the land for pastoral purposes. Therefore post mining land uses that supported grazing were preferred in the assessment of potential PMLU options. However a grazing final land use was not necessarily preferred in all proposed locations, in particular rehabilitation of areas that had pre-mining environmental values such as riparian or woodland areas associated with the Isaac River, Cherwell Creek or Conrock Gully. Further, in some limited locations the low wall dump slope was considered unsuitable for grazing and therefore was selected for a native vegetation PMLU.

Other stakeholders (e.g. Isaac Regional Council) indicated a preference for PMLUs that supported ongoing socio-economic development of the region through commercially feasible land uses, other than pastoral activities or native vegetation.

PRCP consultation is further described in Section 2.2 of the PRCP (**Appendix AB**).

5.3.4 Non-use Management Area

Having assessed the environmental, economic, community and regulatory constraints for the final landform design, it was determined that the optimal landform would include a residual void with a pit lake that could support a PMLU. There are no other areas within the final landform with the potential to be a NUMA.

This does not preclude a NUMA being required for the Project on the basis that proposed PMLUs are not accepted by the regulatory authorities or stakeholders. If a NUMA were required for the Project, Stanmore is of the view that a NUMA could be justified under Section 126(D)(2) of the EP Act based on:

- the risk of environmental harm being confined the area of the Project MLs, and
- the Project being in the public interest in accordance with the public interest considerations, which require the Project’s benefits to the community to be weighed against impacts to the community and environment, having regard to costs and consequences of options (NUMA and PMLUs), including financial viability of Project, or
- carrying out rehabilitation of the land would cause a greater risk of environmental harm than not carrying out the rehabilitation.

5.3.5 Residual Void Design

A lake will form in the residual void post mine life as a result of the balance between sources of inflow (e.g. rainfall, runoff, seepage through in-pit spoil and groundwater inflows) and outflows (primarily evaporation, but also potential uses of void lake water if they can support a PMLU). An iterative process was used in the design of the residual void and associated modelling of lake levels and quality. Residual void design is a function of mine engineering, including scheduling of overburden and coal extraction in an economic manner to the defined limit of the economic resource. Therefore, the amount of variation in size and shape of a residual void is somewhat limited. The general location of potential locations for a residual void is on the east of the mined pit area between the furthest northern extent to remain out the 0.1% floodplain, and the southern extent of the mined area. As the Project comprises a single open cut mine pit, a single residual void results from mining operations. The high wall is an integral component of the residual void design and formation of a lake with potential PMLUs. Residual void design options and potential PMLUs for the residual void are described in Sections 5.6, 5.7, 5.8 and 5.9.

Maintaining the residual void highwall at a geotechnically stable slope angle (see Section 5.7) was preferred over throw blasting the highwall to achieve a shallower slope angle, as this creates a wider pit area with increased disturbance of unmined land, reduces potential grazing areas by creating native vegetation and rock armoured PMLUs on reprofiled slopes, results in a shallower, wider residual void lake which would be likely to have higher salinity that a deeper, narrower lake, and increases closure costs without any material environmental or social benefit.

5.4 Overburden Dump Options Assessment

5.4.1 Location of Dumps

There are two out of pit dumps proposed for the Project – to the southwest of the mine pit and to the east of the highwall. The pit is progressively backfilled as mining occurs resulting in an in-it dump. Approximately 10% of total overburden material will report to out of pit dumps, hence the area required for these dumps has been minimised, whilst also maximising in-pit dumping and reducing the residual void size.

The location of the out of pits dumps was informed by the following constraints:

- 0.1% AEP floodplain extent
- mining lease application (MLA) boundaries
- ecological values, as represented by regional ecosystems, threatened ecological communities and listed threatened species habitat mapping
- the location of infrastructure required to support Project activities
- economics of overburden haulage.

Based on Figure 5-3, there are potential out of pit dump locations that are not within the 0.1% AEP flood extent, in the northwest of MLA 700081, in the southwest of MLA 700081 and the east of MLA 700082.

The northwest of MLA 700081 contains remnant vegetation with ecological values, and therefore, was largely avoided in defining the Project disturbance area (see **Chapter 4** and **Chapter 11**). Hence this area was avoided as a potential out of pit dump location.

Out of pit dumps are typically formed on the low wall side of mining activities as this is the most economic haulage option. The southwest dump location was therefore preferred as the primary location for an out of pit dump, despite there being some remnant vegetation in this area.

The dump on the eastern side of the highwall has limited interaction with remnant vegetation. However, this location results in additional costs due to the longer haulage distances.

Given the constraints on out of pit dump locations, the proponent has selected the optimal locations for out of pit dumps (see Figure 5-1) that avoid interactions with the floodplain, stay within the ML boundaries and avoid remnant vegetation as far as reasonably practical.

In-pit dumping results in the reduction in size of any residual void. In-pit dump design requires scheduling of waste movements in an economic manner, balancing waste volumes from different parts of the pit area, and maximising in-pit dumping to reduce residual void size. The in-pit dump (see Figure 5-1) comprises:

- areas in the northern part of the pit that are returned to a pre-mining topographical level to allow reinstatement of the Isaac River floodplain
- areas in the centre and south where the topography is above pre-mining topography
- the low wall area where in-pit dumping approaches final void area.

The northern portion of the in-pit dump that is above pre-mining topographical level is located at the edge of the 1% AEP floodplain extent. An assessment of the flood velocities at these locations was undertaken as part of the flood studies (see Section 9.4 of **Chapter 9**) which determined that velocities do not exceed 0.8 m/s for the 1% AEP flood event along this dump face and there is minimal interaction for the 2% AEP flood event and more frequent events. Therefore, potentially erosive flows will be very infrequent and only occur for short durations. For the vast majority of Isaac River flood events, interaction between floodwaters and this landform will be either minimal or non-existent. The dumps will be revegetated, with vegetation cover providing sufficient protection against interaction with infrequent flood events.

5.4.2 Dump Designs

The design of overburden dumps was based on achieving erosional and geotechnical stability, with a non-polluting and sustainable post-mining land use, which was informed by:

- slope angles
- soils proposed for use as a growth media
- geochemistry of overburden and interburden (spoil)
- vegetation cover
- landform erosion modelling
- ability to support the proposed PMLU, primarily grazing
- geotechnical modelling.

Dump design also considers economic factors including haulage and land forming / reshaping costs.

The studies that informed dump design are described in the following chapters and the PRCP (**Appendix AB**):

- soils resource for use in rehabilitation – Section 7.3.18 of **Chapter 7**
- geochemistry of spoil – Sections 7.3.12, 7.4.3 and 7.5.3 of **Chapter 7**
- land suitability assessment – Section 7.3.19 and 7.3.20 of **Chapter 7**
- landform evolution modelling, including vegetation cover requirements – Sections 7.4.7 and 7.5.5 of **Chapter 7**
- geotechnical modelling – Sections 7.4.4 and 7.5.4 of **Chapter 7**.

Based on these studies and economic factors, the total area of dumps (1,112 ha) was separated into two areas:

- All dump areas (approximately 1,075 ha out of 1,112 ha, or 97%), nominated as RA2 in the draft PRCP schedule (**Appendix AC**).
- A small section of the internally draining low wall dump slope (37 ha out of 1,112 ha, or 3%), nominated as RA3 in the PRCP schedule (**Appendix AC**).

Based on these studies, the majority of dump areas (i.e. corresponding to RA2) demonstrated that they could be successfully rehabilitated (i.e. achieve the proposed rehabilitation milestone criteria in the PRCP schedule (**Appendix AC**)), with the following design criteria:

- slope angles of overall ≤ 15%
- growth media cover of 0.3m
- > 65% vegetation cover
- establishment of vegetation suitable for cattle grazing
- geotechnical factor of safety of ≥ 1.5.

For the small section of the internally draining low wall dump slope (i.e. corresponding to RA3), studies demonstrated that this area could be successfully rehabilitated (i.e. achieve proposed rehabilitation milestone criteria in the PRCP schedule (**Appendix AC**)), with the following design criteria:

- slope angles of overall ≤ 25%
- rock armouring and growth media cover layer
- > 30% vegetation cover
- establishment of a native vegetation woodland
- geotechnical factor of safety of ≥ 1.5.

5.5 Infrastructure Decommissioning and Rehabilitation

In the absence of a third party agreement for retention of infrastructure, the PRCP (**Appendix AB**) is based on decommissioning and rehabilitating all mining infrastructure areas as these areas become available for rehabilitation. Infrastructure areas have been separated into the following rehabilitation areas (RAs) for the purposes of the PRCP:

- RA4 – Infrastructure
- RA5 – Water Storages
- RA6 – General Infrastructure Areas
- RA8 – Infrastructure – Bridges and Dragline Crossing

Rehabilitation milestone criteria for all infrastructure areas have been proposed in the PRCP schedule (**Appendix AC**).

The Conrock Gully diversion (RA1) will be a permanent, stable landform and is subject to rehabilitation milestone criteria to achieve that outcome.

Infrastructure required for the proposed PMLUs (RA7) is not subject to decommissioning and rehabilitation.

Infrastructure areas that are protected by the Isaac River levee (e.g. go-line area, mine water dams) will be decommissioned and rehabilitated prior to the levee being decommissioned and rehabilitated.

5.6 Residual Void Design Options Assessment

5.6.1 Overview

The options assessment for residual voids involved:

- Developing potential final void configurations which were plausible within the overall landform constraints identified in Section 5.3.
- Modelling long term lake levels, volumes and salinity as key factors in determining whether a particular void configuration was likely to result in a void lake that would support one or more PMLUs.
- Assessing the long term geotechnical stability of void high wall and low wall slopes (Section 5.7).

Subsequent detailed hydrogeochemical modelling of the void lake water quality was undertaken for the preferred void configuration (see Section 5.8).

5.6.2 Residual Void Lake Modelling Methodology

Void lake modelling was undertaken by Hydrobalance, as described in Section 8 of **Appendix I**. This section summarises the void modelling methodology.

A final void GoldSim model was used to assess the likely long-term water level behaviour of the final void. Water levels in the final void will vary over time, depending on the prevailing climatic conditions, and the balance between evaporation losses, inflows from rainfall, surface runoff and groundwater, and outflows from any use of void water. The GoldSim model was used to simulate the generation, movement, and loss of water on a daily time-step within the final void, over a 500-year period. The volume of water in the voids was calculated at each time step as the sum of direct rainfall to the void surface, catchment runoff, and groundwater flux, less evaporation losses and any PMLU outflows. The model also tracks the quantity of salt captured and stored within the system.

Climate data, including climate change predictions were used in modelling. The Shared Socioeconomic Pathway SSP2-8.5 was selected as the emission pathway for the Intergovernmental Panel on Climate Change (IPCC) assessment report AR5, to inform future climate data used in void modelling. SSP2-8.5

represents very high greenhouse gas emissions with 'middle-of-the-road' socio-economic development. It is considered a high-end climate risk scenario, rather than a central or most likely pathway. In the context of final void modelling, it is useful to understand sensitivity to extreme warming and is valuable for understanding upper-bound risks. Using historical and predictive climate data, a 500-year stochastic rainfall and evaporation dataset was generated.

An iterative approach was adopted for combining the numerical groundwater model and final void model results to ensure consistency and convergence between these models in estimating groundwater inflows to the final void (see Section 2.1 of Appendix H of **Appendix K**). Groundwater inflows into the residual void were obtained from the groundwater model as a time series over a 500-year simulation period. The inflows have been provided as two inflow sources:

- Flow to void from spoil – representing the groundwater inflow that enters the void from the backfilled spoil.
- Flow to void from rock - representing the groundwater inflow that enters the void from the highwall (coal seam).

The salinity concentrations in the final void model have been set to maintain consistency with the salinity source terms set within the void hydrogeochemical model (see Section 5.8). This includes salt loads and concentrations associated with the following model inputs:

- surface water inputs: runoff from natural, rehabilitated and spoil catchments
- groundwater inputs: inflows from surrounding non-coal rock, inflows from the backfilled spoil mass, and inflows from the coal seam to the void.

The adopted surface runoff salinity for the final void assessment is applied at a fixed concentration and does not include any allowance for decay in runoff salinity over time, and therefore, is likely to overstate salinity. Salinity provides a key metric to assess the performance of void as a PMLU for various uses.

5.6.3 Void Configurations

5.6.3.1 Overview of Void Configuration Options

The final void geometry, and catchment reporting to the final void from in-pit spoil dumps, are key inputs into the void model after accounting for the other variables in the modelling methodology.

Key factors influencing final void lake levels and quality are the surface area to volume ratio of the final void lake, and the size of the catchment draining to the lake. It was found that the smaller the surface area to volume ratio, and the larger the catchment, the more likely water quality within the void would remain suitable for PMLUs. The configuration of the in-pit dump, both in terms of the size and shape of the void that would contain a lake, and the proportion of the in-pit dump catchment reporting to the lake, were considered for void options. In addition, in accordance with the landholder's preference for additional water supply to support grazing, all final void modelling allowed for extraction of water from the void where salinity remained below acceptable limits for stock watering (7,800 us/cm) (see section 8.5 of Appendix I for a justification for the livestock drinking water guideline value for salinity). This has the effect of removing salts from the lake provided water quality remains suitable for stock watering.

Different void configurations were assessed. The following options, which represent the 'bookends' of potential void configurations, were modelled:

1. Minimise void size, maximise the catchment from in-pit dumps (also referred to as the 'base case' option) – a small deep void in the central pit area, with the southern portion of the pit area partially backfilled, which resulted in a small, deep lake
2. Maximum void size – a large void along the length of the final mined highwall (other than the northern portion of the pit in the 0.1% AEP floodplain which is backfilled), with a maximum catchment from in-pit dumps, which resulted in a broad, shallow lake forming in the base of the

pit. This option represents the most cost effective option for the Project as it requires minimal modification of the in-pit dump profile following the completion of mining operations.

3. Partial backfill - a partially backfilled void to around 175 metres above Australian Height Datum (mAHD), with a maximum size void catchment which resulted in a shallow, broad lake forming across the backfilled area. This option represents a high cost for the Project (circa $232 M) which could only be justified if it provides an improved long-term sustainable PMLU compared to other options.

A smaller in-pit dump catchment was considered, relative to option 1. However, this would have substantially reduced water security with a low lake level and would have required bunding and drainage within the dump area to redirect water away from the void, which was not considered stable in the long term.

5.6.3.2 Option 1 - Minimise Void Size, Maximise Catchment (Base Case)

The void and void catchment configuration for Option 1 is shown in Figure 5-6.

The modelled water levels for Option 1 are presented in Figure 5-4, showing the median (50th percentile) and 95th percentile results. The following is of note regarding this result:

- For the median (50th percentile) results, the void lake reaches equilibrium within the first 100 years, with a water level of between 144 and 148 mAHD. The maximum void water level (147.7 mAHD) is around 54 m below the pit crest (202 mAHD). The pit crest does not overtop at any point in the 500-year simulation.
- For the 95th percentile results, the void lake reaches equilibrium within the first 100 years, with a water level of between 149 and 152 mAHD. The maximum void water level (152.1 mAHD) is around 50 m below the pit crest (202 mAHD). The pit crest does not overtop at any point in the 500-year simulation.
- Based on the groundwater modelling (see Section 10.7 of **Chapter 10**) the residual void functions as a long-term groundwater sink.

The final void modelled salinity levels for are presented in Figure 5-5, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The following is of note regarding this result:

- For the median (50th percentile) results, the void lake salinity reaches equilibrium after approximately 250 years, with an EC concentration of between 2,800 and 3,100 µS/cm.
- For the 95th percentile results, the void lake salinity reaches equilibrium after approximately 250 years, with an EC concentration of between 3,400 and 4,000 µS/cm.
- The void water quality is suitable to support the proposed stock watering PMLU over the 500 years simulation.

The long-term predicted void water salinity from the hydrogeochemical modelling of the void lake, which was based on the Option 1 void configuration, is presented in Figure 5-13, showing consistent results with the median GoldSim model results (EC reaching equilibrium around 3,000 µS/cm). This demonstrates that both models are representing the long-term void water quality behaviour consistently.

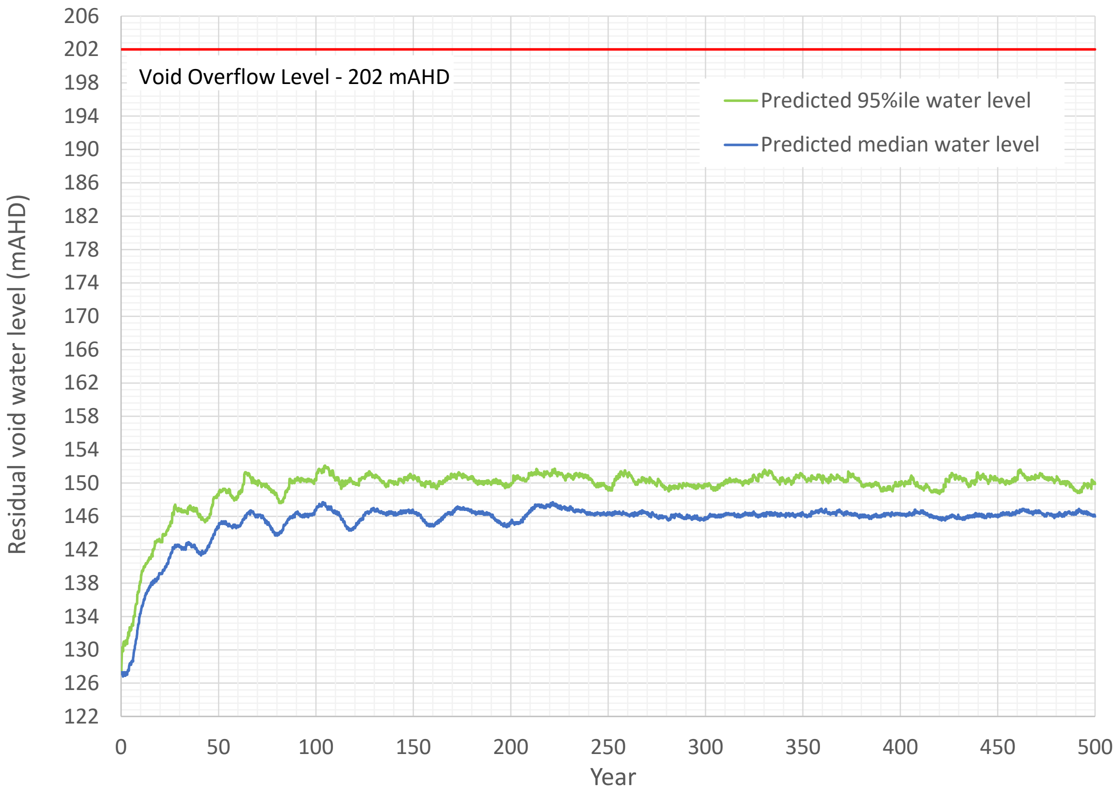


Figure 5-4 Long-term Predicted Void Water Levels (Option 1 – Base Case)

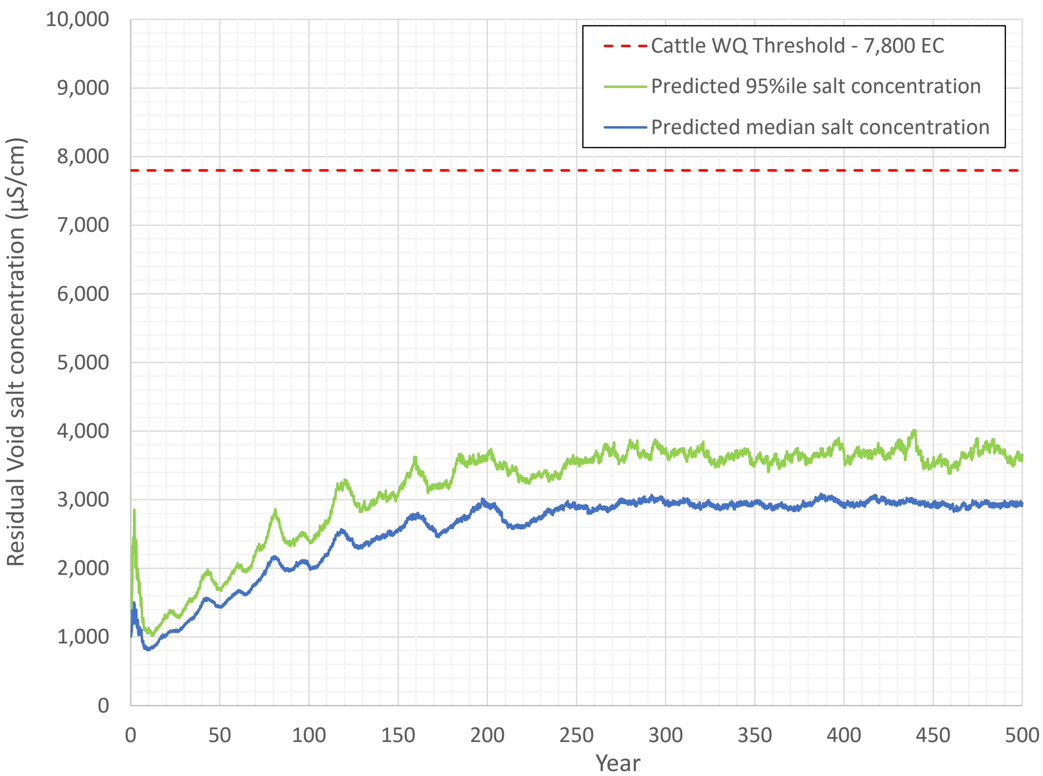
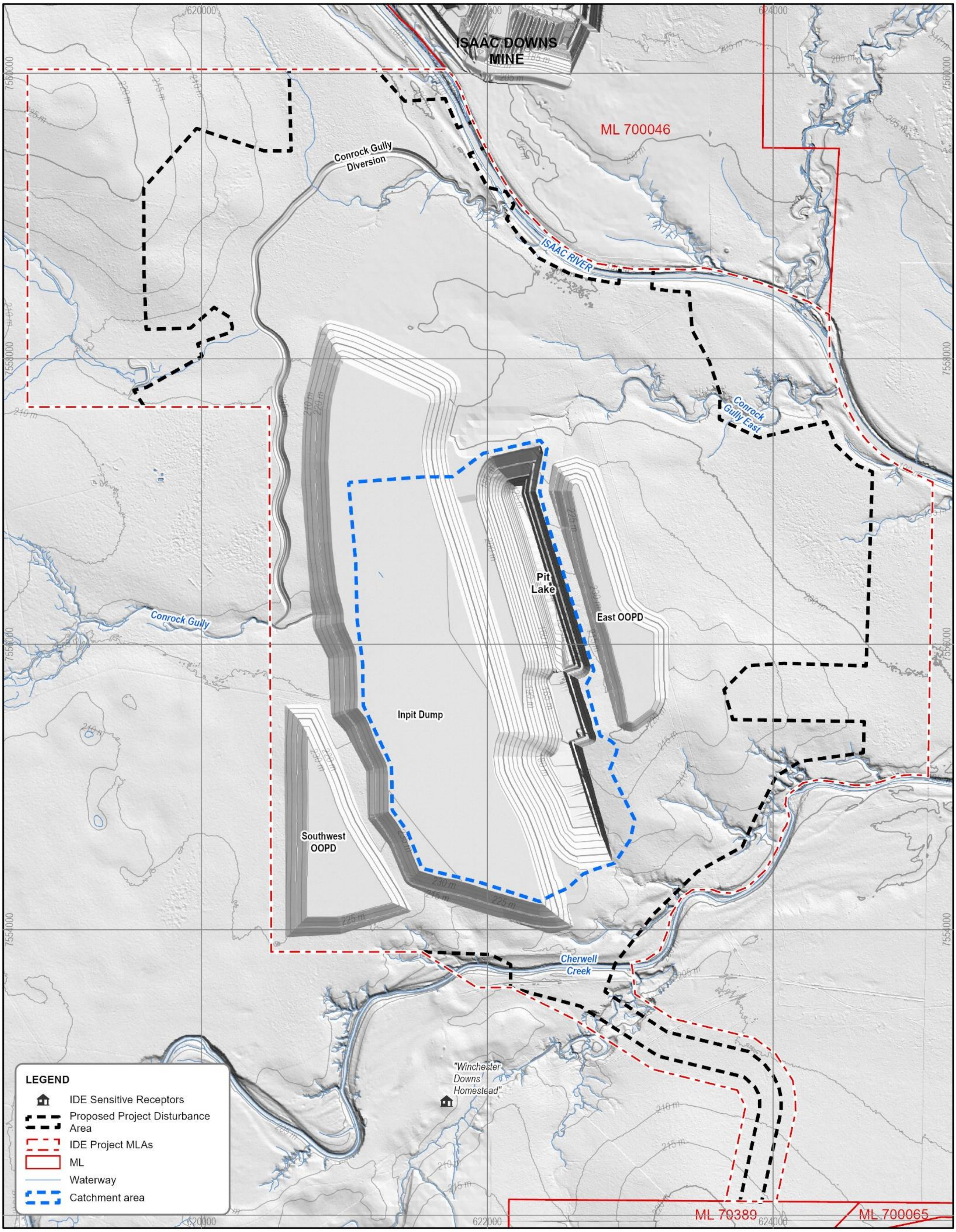


Figure 5-5 Long-term Predicted Void Water Salinity (Option 1 - Base Case)

An assessment of the impact of extreme storm events on the water level in the final void has been undertaken for the final void with the stock watering PMLU (see Section 8.6.3 of **Appendix I**). The potential for discharge of void water during a large storm was assessed for the 1 in 1,000 AEP (or 0.1% AEP) 72-hour (3 day) design storm. For conservatism, it has been assumed that the extreme storm would occur coincident with the peak modelled long-term water levels for the 95th percentile simulation result. The results demonstrate that the final void water level, under this extreme scenario, would reach 161.5 mAHD with freeboard to the pit crest level of 40.5 m, and therefore, would not overtop the pit crest.



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ISAAC DOWNS EXTENSION

Option 1 - Minimise Void Size, Maximise Catchment

Figure | 5-6

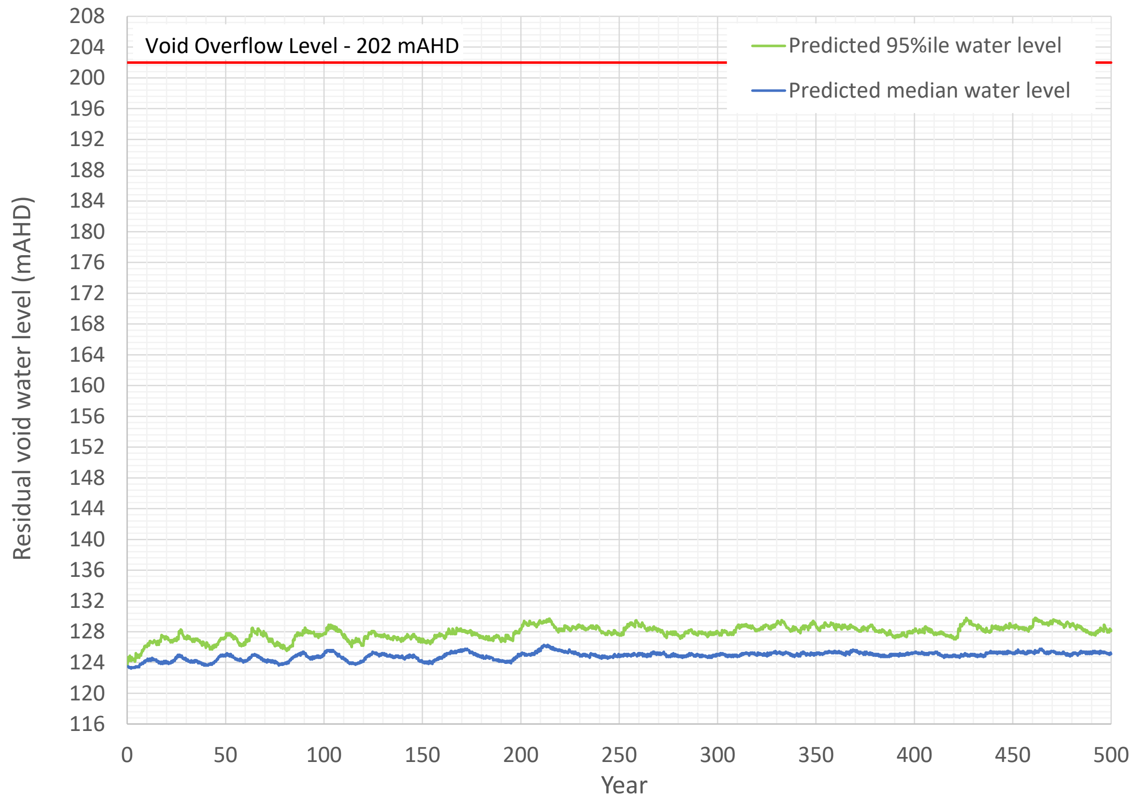


Figure 5-7 Long-term Predicted Void Water Levels – Option 2

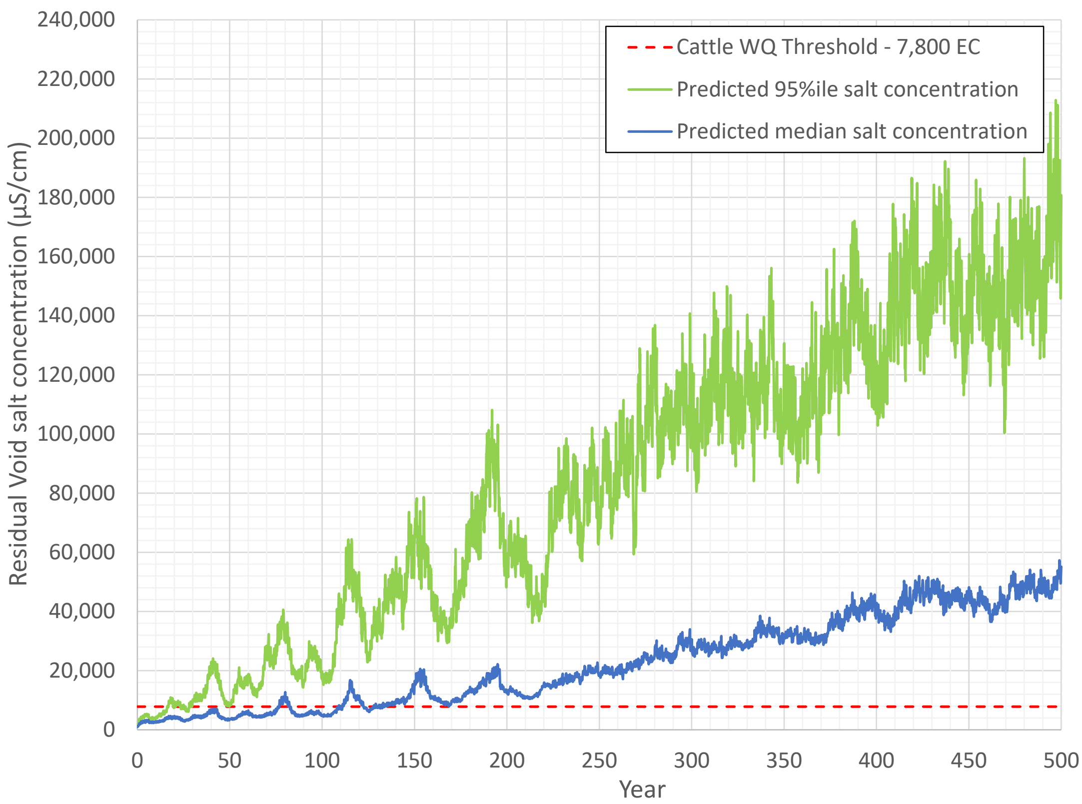
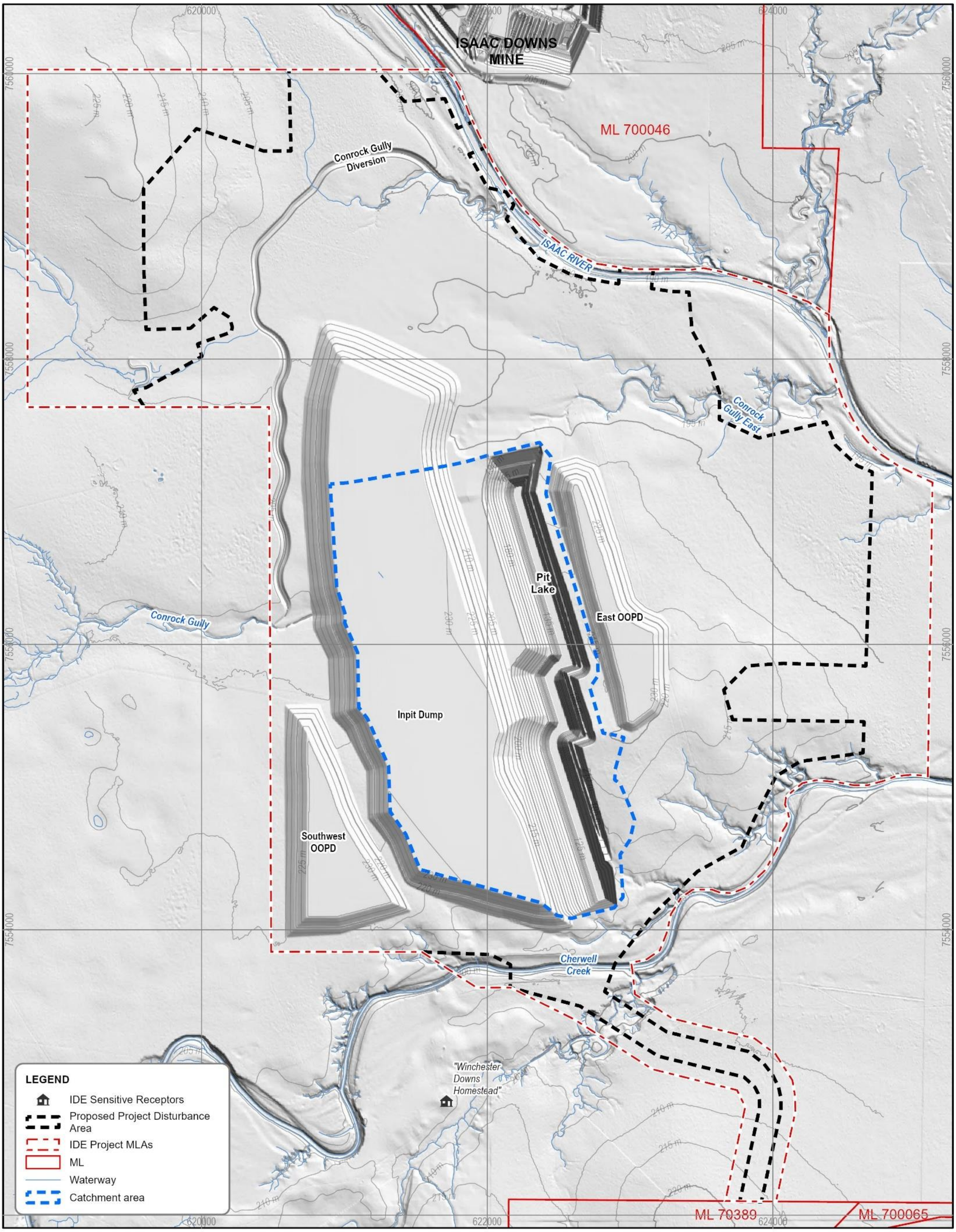


Figure 5-8 Long-term Predicted Void Water Salinity – Option 2



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Option 2 - Maximum Void Size

Figure | 5-9

5.6.3.4 Option 3 - Partial Backfill

The void and void catchment configuration for Option 3 is shown in Figure 5-12.

The final void modelled water levels and salinity for Option 3 are presented in Figure 5-10 and Figure 5-11 respectively, showing the median (50th percentile) and 95th percentile results. The following is of note regarding these results:

- The void lake is very shallow at most time (less 0.2 m in depth) and empties regularly. This presents a water supply security issue for any intended PMLU of void lake water.
- The salinity of the void lake varies significantly over time due to the small volume of water within the bottom of the void. The salinity of the void water becomes hyper saline at times (e.g. > 100,000 µS/cm and regularly exceeds the upper EC threshold for drinking water for cattle.
- This configuration is unable to reliably support a stock watering PMLU from a volumetric and water quality perspective. The void can only supply can only supply around 7-12% of the modelled demand, and the water is regularly undrinkable for the cattle.

Option 3 was discarded as it does not:

- support a stock watering PMLU due to water supply and water quality being unsuitable
- provide a sustainable long-term final landform that would justify the additional approximate $232 M cost in achieving this landform configuration.

Figure 5-10 Long-term Predicted Void Water Levels –Option 3

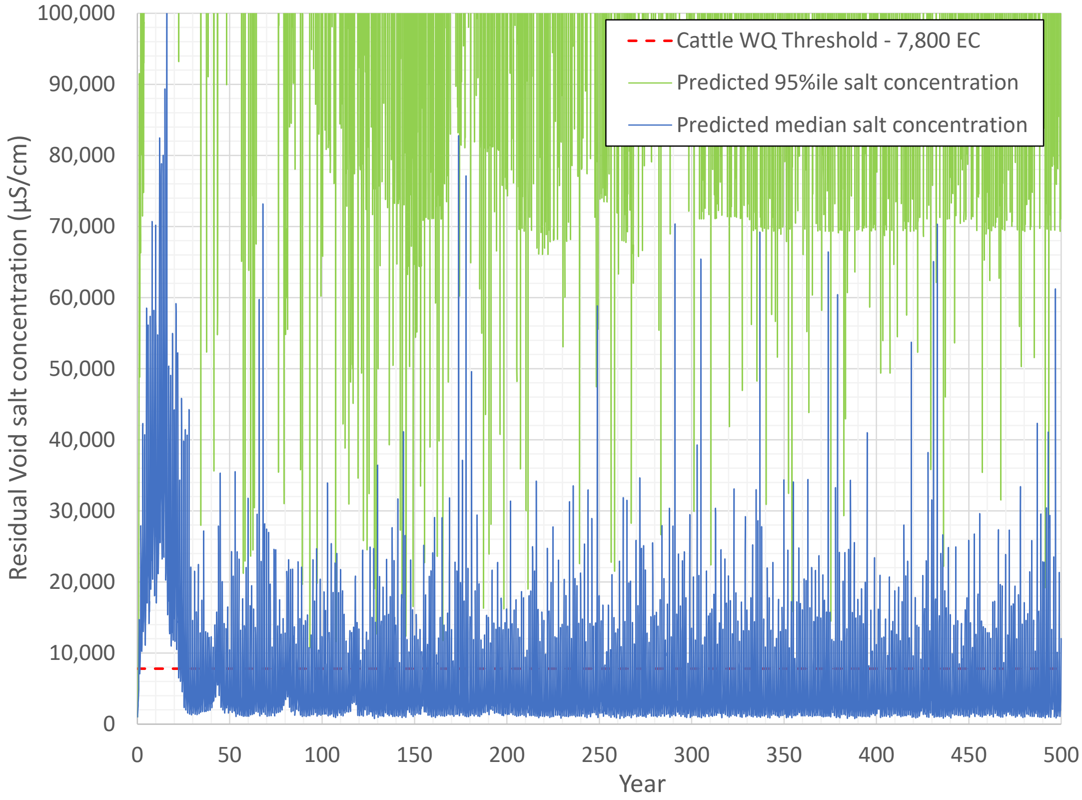
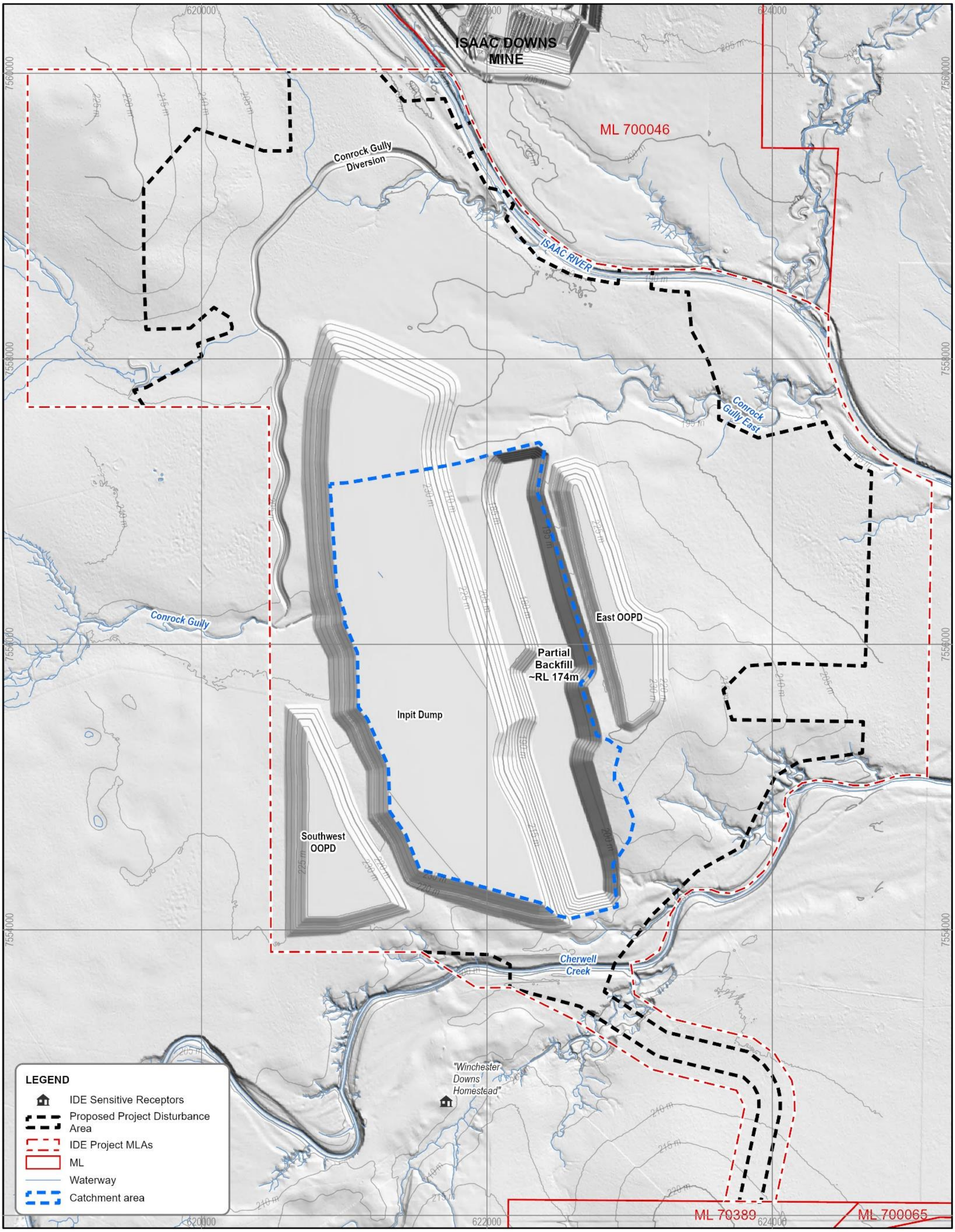


Figure 5-11 Long-term Predicted Void Water Salinity - Option 3



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ISAAC DOWNS EXTENSION

Option 3 - Partial Backfill

Figure 5-12

5.6.4 Findings - Preferred Void Design

Based on the iterative approach to mine design / engineering and final void modelling, the preferred residual void design, with the greatest potential to support one or more PMLUs was Option 1 – minimise the void size and maximise the catchment from in-pit dumps. This option maintains a usable volume of water in void at a salinity level that can reasonably supply various PMLUs.

5.7 Geotechnical Stability of Residual Void

Geotechnical stability modelling was undertaken by Blackrock Mining Solutions Pty Ltd, as detailed in **Appendix H**, for the preferred void configuration (option 1 - minimise void size, maximise the catchment). A description of the modelling and the results is provided in Sections 7.4.4 and 7.5.4 of **Chapter 7**. The assessment demonstrates that the Project's residual void, including highwall and low wall slopes is predicted to be geotechnically stable in the long term based on achieving a factor of safety of ≥ 1.5.

5.8 Residual Void Hydrogeochemical Modelling

5.8.1 Overview

Void lake hydrogeochemical modelling was undertaken by RGS Environmental Consultants Pty Ltd (RGS), as detailed in **Appendix M**, for the preferred void configuration (option 1 - minimise void size, maximise the catchment). This section provides a summary of the modelling methodology and model results.

5.8.2 Geochemistry

The geochemistry of the spoil and any 'waste coal' remaining in the spoil or the void is described in Section 7.3.12 of **Chapter 7**, based on the geochemical characterisation and assessment of mineral waste completed by Terrenus (see **Appendix F**).

In addition, kinetic leach column (KLC) geochemical testing has commenced on composite samples of spoil (see Section 2.3 of **Appendix M**). KLC testing will occur over at least 6 months. At the time of preparation of the EIS approximately 3 months' worth of testing data was compiled, which was considered sufficient to provide information on early stage 'first flush' conditions.

The primary objectives of the KLC test program were to quantify the concentration and rate at which weathering products (acid, soluble salts, and metals and metalloids) are leached from the solid phase materials (carbonaceous and non-carbonaceous spoil) over time, under free leaching unsaturated ('wet-dry') versus saturated conditions.

The key findings from the KLC testing are:

- Saturated sample materials transitioned from oxidising to reducing conditions over time.
- Across all materials, initial high salinity values and major ion concentrations and high loading rates seen in the leachates are likely due to the initial first flush of readily solubilised reaction products resulting in elevated dissolved concentrations.
- Consistent with the static geochemical testing undertaken by Terrenus (**Appendix F**), most materials are expected to generate alkaline drainage.
- The pH of drainage from mine materials is expected to increase as the pit lake fills, materials become saturated, and the oxidation of materials slows or stops. With an increase in pH, leached metals and metalloids typically decrease.
- Drainage from most materials is expected to have low dissolved acidity and relatively high alkalinity.

- Initial drainage from spoil materials may contain concentrations of soluble molybdenum, selenium and fluorine. However, concentrations of these elements in solution are expected to decrease over time.
- Increase in sulfate, calcium, magnesium, sodium, relatively constant pH, and decreasing chloride concentration suggest there is long-term dissolution of sulfate salts.

This information on the geochemistry of spoil and coal was used to inform inputs into the hydrogeochemical modelling.

5.8.3 Modelling

A numerical hydrogeochemical model of the void was developed to assess the potential water quality of the pit lake post closure (see Sections 3 and 4 of **Appendix M**). The post closure hydrogeochemical model consisted of an ensemble of the following separate models:

- The void water balance model developed by Hydrobalance, including climate change and groundwater inflows (see Section 5.6).
- An Excel spreadsheet to annualise the Hydrobalance model data (from daily time steps) so that it could be use in the RGS water quality model.
- A PHREEQC mixing model (Parkhurst & Appelo, 2013) was used to simulate geochemical processes and estimate the water quality in the void for PMLUs.

The hydrogeochemical water quality model was developed on an annual time-step to run for a period of 500 years. It should be noted that the longer the model simulation period, the greater the bounds of uncertainty in the modelled water balance and water quality results that are likely to be observed.

The model simulates water quality as the void fills and forms a lake. Each contributing input to the void is assigned a water quality source term based on available monitoring or laboratory data. Each input volume is calculated for each yearly timestep from the water-balance. These volumes are then converted to proportions of overall contributions and the resulting mixture modelled for 500-years using PHREEQC.

The void lake and water retained within the backfilled spoil material are considered two connected reservoirs for the purpose of modelling. This means that water quality is modelled for each reservoir for each annual timestep. The water quality evolves in these reservoirs as water moves between them and other interactions occur (e.g. rainfall infiltration). PHREEQC is used to calculate equilibrated solutions including total dissolved constituents, pH, and alkalinity via mixing. Evaporation and charge balance as well as mineralogical controls are incorporated. The model outputs water quality for the pit lake at each time step.

Source terms represent the concentrations of chemical substances in contact water from spoil and dissolved in groundwater and runoff. Source terms were derived from a combination of monitoring data, reference data and laboratory tests.

Groundwater quality source terms were developed from groundwater quality measured in bores in the Rangal Coal Measures coal and non-coal interburden bores, with this data used to inform salinity inputs into the void model (see Section 5.6.2).

Spoil runoff and seepage water quality was inferred using results of laboratory KLC testing. The most recent available leach data from the three KLC tests was used to calculate the median spoil leachate quality. This data likely represents the lower limit of the 'first flush' of readily soluble salts as opposed to a 'steady state' which would typically be used to infer long-term leachate quality.

Section 6 of **Appendix M** describes the model assumptions and uncertainties comprising:

- geochemical reactions and processes

- model uncertainties when predicting future conditions, noting that all models estimate future conditions (e.g. physicochemical parameters) by reducing complex systems to a limited number of significant, often simplified, processes.

However, geochemical evaluations over the last few decades have shown that modelling, particularly the equilibrium assumption, is a powerful tool that in many circumstances produces results that accurately describe the general chemistry of natural and mine waters.

5.8.4 Assessment Criteria

The primary PMLU for the residual void lake is stock (cattle) drinking water supply. The applicable guidelines for stock drinking water are the revised Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018), which provide essential, risk-based default guideline values for livestock drinking water (See Section 5 of **Appendix M**) to ensure animal health and productivity.

The levels of various parameters estimated using hydrogeochemical modelling were evaluated against the livestock drinking water guidelines (LDWG). Not every parameter modelled has an associated LDWG value.

5.8.5 Model Results

5.8.5.1 Water Balance

The void water balance model results for the preferred void configuration option are presented in Section 5.6.3.2. Section 7 of **Appendix M** provides additional analysis of the water balance results, noting the following:

- Water balance inflows are dominated by spoil to lake seepage with approximately 55-60% contribution to inflows
- Water balance outflows from the lake are dominated by evaporation (thus evapoconcentration) with approximately 85% contribution to outflows.
- There are generally no significant changes to the water balance over the modelling period.

5.8.5.2 Water Quality

Figure 5-13 presents the modelled pH, salinity (expressed as EC) in the void over 500 years, as well as showing the LDWG (orange line on figures) where applicable. Void water quality model results for all parameters are provided in Section 7 of **Appendix M**.

Key points from the modelling include:

- All modelled parameters generally show an increasing concentration trend for the first 110 years, after which the values reach a quasi-steady state.
- Modelled pH in the quasi-steady state (after 110 years) ranges between 8.92 and 9.07 (slightly alkaline), with a median value of 9.00 (Figure 5-13). The corresponding total alkalinity indicates there is an excess of acid buffering capacity from the lake water.
- Modelled EC (salinity) in the quasi-steady state varies from ~2,275 µS/cm to ~3,450 µS/cm, with a median of ~2,825 µS/cm (Figure 5-13).
- The major ion (represented by sulfate and chloride) and metal/metalloid concentrations (represented by arsenic (As), manganese (Mn), lead (Pb), and zinc (Zn)) generally follow the same trend as EC.
- The dominant major ions (other than bicarbonate alkalinity) are sodium and chloride with lesser sulfate, magnesium, potassium and calcium.
- The spikes in salinity, major ions and metals/ metalloids, once a quasi-steady state is reached, tend to be associated with lower rainfall years when runoff volumes (and direct rainfall) are lower

relative to spoil and groundwater inflow and thus dilution effects (from runoff and direct rainfall) are reduced while evapoconcentration of accumulated water in the void is relatively higher.

5.8.5.3 Water Quality Compared to LDWG Values

Comparison of the modelled post-closure pit lake water quality results to LDWG values indicates:

- Salinity (as indicated by EC) is well below the LDWG value of 7,800 µS/cm over the 500-year modelling period.
- Calcium (Ca) and sulfate (SO4) are below the LDWG value.
- The vast majority of modelled dissolved metal/metalloid concentrations in the void lake are within the LDWG values except for fluorine (F), molybdenum (Mo) and selenium (Se) which, at some point in the 500-year modelling period, exceed LDWG value (see Figure 5-14, with orange line showing LDWG value).

The modelled concentrations of F, Se and Mo, which are inferred to be mobilised from backfilled spoil, are considered conservative estimates (i.e. likely to be overestimated concentrations). This conservatism arises from methodological assumptions and testing conditions that likely overstate constituent mobilisation under long-term field conditions.

Firstly, the KLC test results used to estimate spoil porewater quality are representative of early stage ‘first flush’ conditions rather than long-term equilibrium behaviour. Additionally, KLC tests are conducted on crushed rock, which significantly increases the surface area available for water–rock interaction, thereby enhancing mineral dissolution rates. Sample dehydration during storage may also concentrate salts, influencing initial leachate chemistry. Consequently, extrapolating these first-flush results to predict long-term runoff or seepage quality likely overestimates contaminant concentrations.

Secondly, the long-term infiltration dynamics of the backfilled spoil are expected to reduce constituent mobilisation. Over time, spoil material will undergo consolidation, resulting in decreased permeability and reduced infiltration rates. This shift will favour increased surface runoff relative to percolation. Surface runoff generally exhibits more dilute concentrations compared to groundwater/ surface water that has interacted extensively with spoil material before discharging into the lake. Therefore, long-term water quality impacts are expected to be less pronounced than those predicted by current model assumptions.

Furthermore, the LDWG thresholds themselves are considered conservative in this context. For instance, modelled fluoride concentrations at or near LDWG values remain below the South African guideline limit of 4 mg/L (ANZG, 2018). Similarly, molybdenum concentrations are approximately aligned with the Canadian guideline (ANZG, 2018) value of 0.5 mg/L and may be further mitigated through copper supplementation. Selenium concentrations are also comparable to both Canadian and South African guideline limits of 0.05 mg/L (ANZG, 2018). Collectively, these comparisons suggest that modelled exceedances relative to LDWG may not necessarily indicate an unacceptable risk when evaluated against alternative international standards.

5.8.6 Conclusion

Based on the modelling undertaken, with its inherent conservatism (i.e. likely to overestimate void water quality results), the modelled void water quality is unlikely to pose an unacceptable risk as a livestock drinking water supply. Over the life of the Project and prior to a void lake forming post closure, additional information, studies and modelling will be undertaken to support the intended use of void water as a livestock drinking water supply.

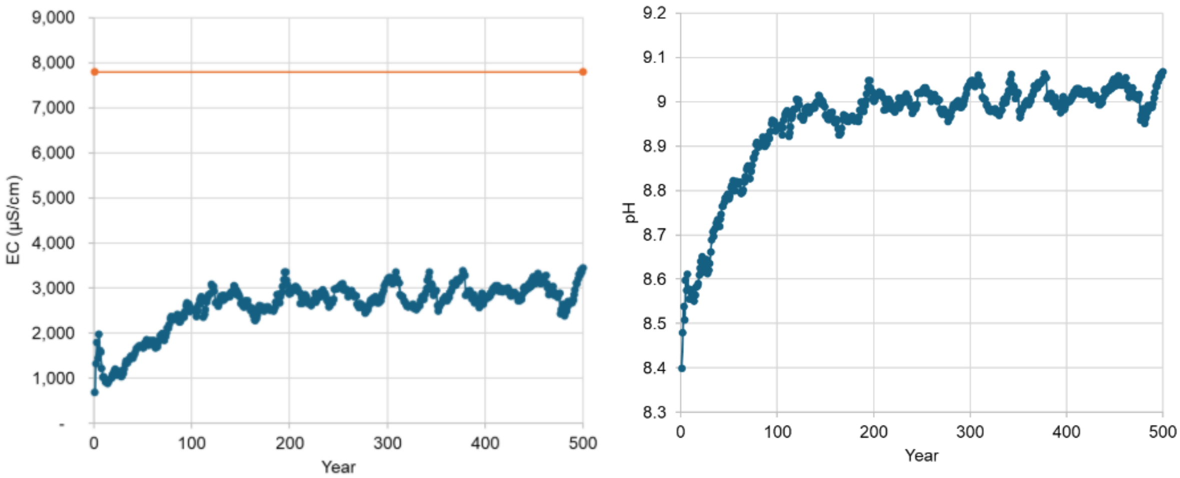


Figure 5-13 Void Salinity (EC) and pH Model Results

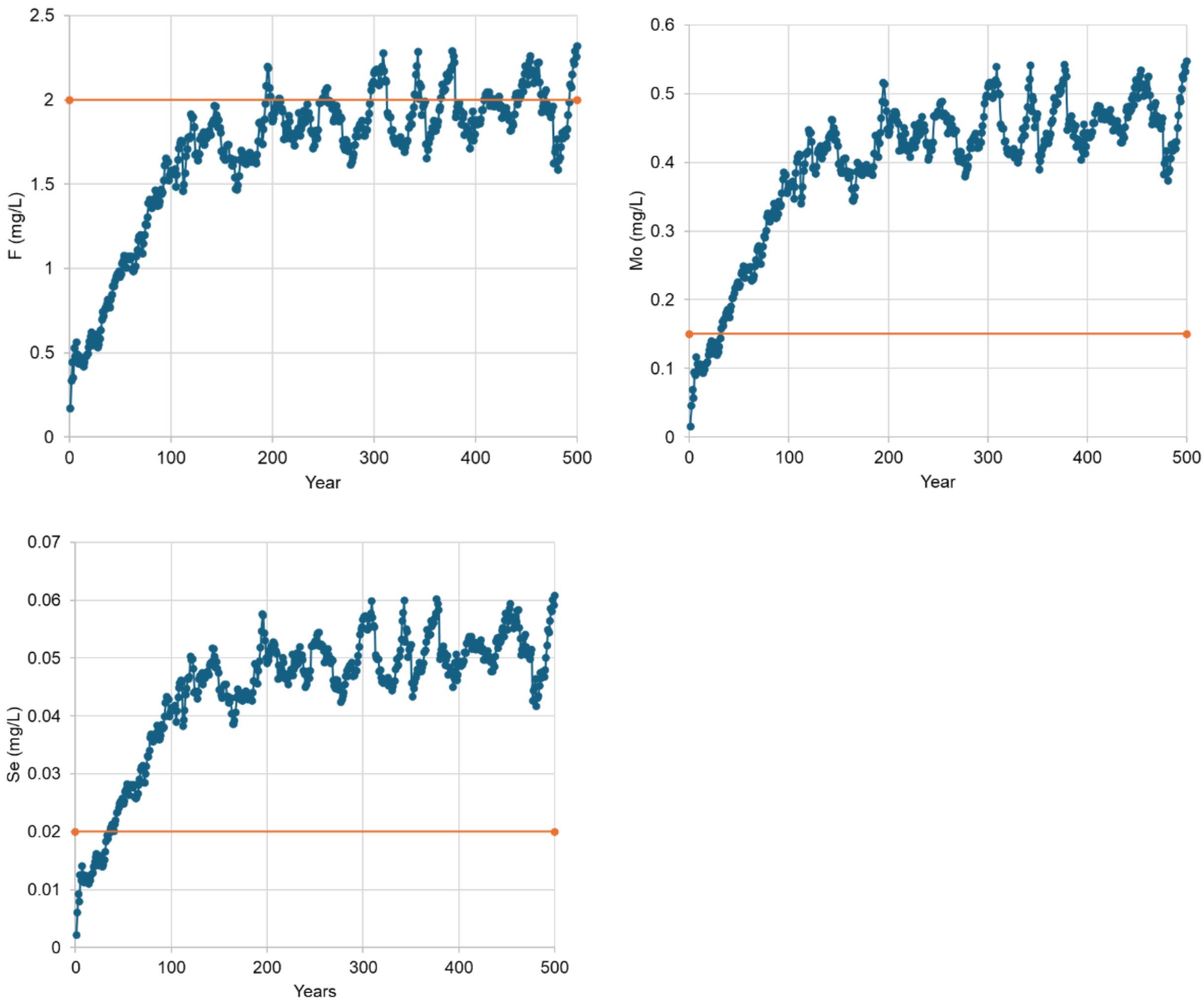


Figure 5-14 Void F, Mo and Se Model Results

5.9 PMLU Options for the Residual Void

5.9.1 Overview

Based on the results of the residual void design and void lake modelling, the following potential PMLUs were evaluated for the closure landform's residual void:

- stock watering
- algae production
- pumped hydroelectric energy storage (PHES or 'pumped hydro')
- irrigation of agricultural land
- aquatic ecosystem.

Where the potential PMLU was considered feasible, an assessment of the long term final void water balance and salinity was undertaken with the PMLU or combination of PMLUs. Modelling of the void lake with various PMLUs has been completed by Hydrobalance (see Section 8 of **Appendix I**) using the methodology described in Section 5.6.2.

5.9.2 Stock Watering

The void water quality modelling for the preferred final landform (see Section 5.6.3.2 and Section 5.8) demonstrates that the void lake can be used for stock watering in the long term. To further assist with stock watering the backfilled southern portion of the pit area has been designed with a gently sloping ramp (≤10%) to allow cattle access to the lake (see Figure 5-1).

Stock watering forms the 'base case' for all modelling of long term final void water balance and salinity. Where other PMLUs are considered feasible, void modelling has been undertaken inclusive of stock watering.

5.9.3 Algae Production

5.9.3.1 Background

Over six years of collaborative research has been undertaken by the Centre for Solar Biotechnology at the University of Queensland (UQ) and Valarion on the potential to cultivate and process Spirulina as a platform species within a microalgae-based PMLU for final voids. This research has been supported by the Australian Coal Association Research Program (ACARP), CRC TiME, and mining industry partners, including Stanmore. The research has progressed through three ACARP funded stages including laboratory and pilot scale studies and product development experiments. Extensive bioeconomic surveys and techno-economic analyses have also supported the research's transition into a pre-commercialisation phase. The research program has progressed through laboratory-scale strain isolation and pilot-scale cultivation trials using Bowen Basin void water, to experimental studies investigating partial desalination potential, biomass composition screening for bioproducts, downstream processing trials, and techno-economic modelling.

UQ, with supporting partners, was engaged by Stanmore to assess the feasibility of algae production (specifically Spirulina) utilising the final void water at the Project, building on prior years of research. This assessment is provided as **Appendix AL** of the EIS. This section of the EIS provides a summary of the information provided in **Appendix AL**. However, for detailed information on algae production refer to **Appendix AL**, including:

- applying the learnings from these microalgae PMLU studies to a pit lake application at the Project.
- using climate and future water quality and volume data to evaluate whether Spirulina is a suitable platform species for pits at the Project.

- evaluating the technical, economic and environmental feasibility of the proposed system at the Project.
- providing recommendations for further pilot studies or commercial development.

5.9.3.2 Microalgae

The adaptability of different microalgae strains to a wide range of aquatic conditions presents a potential opportunity to cultivate their biomass using void water as a commercially viable PMLU. Microalgae are microscopic photosynthetic single-cell organisms that have evolved to tap into the large energy resource of the sun and to use it to capture carbon dioxide to produce oxygen, and produce a wide range of biomolecules (e.g. proteins, lipids, carbohydrates) that collectively make up biomass. Microalgae can be cultivated in ponds on non-arable land using fresh to saline water. Depending upon the cultivated species and growing conditions, microalgae can produce biomass that has direct or indirect commercial application. Microalgae biomass can be used to produce a wide range of different products. As algae are produced, they are very efficient in taking up nutrients from the growth medium. As this growth medium can be made up from mine void water, microalgae production can contribute to ion extraction and management of void water quality.

Spirulina (*Limnospira* spp.) is a type of microalgae. **Appendix AL** presents a potential use case of installing a Spirulina production facility near the Project's final void in a closed pond system designed for mine site deployment. The primary reasons underpinning the selection of this species for cultivation from void water are that it is tolerant of a wide range of salinities, is a native species, has potential for scaling up, is cost effective to harvest, subject to well established global markets, and can generate a wide range of products. Spirulina has a preference for alkaline conditions and can tolerate a wide range of salinities. Spirulina grows well under temperate to warm conditions, generally preferring culture temperatures within the 20-35°C range.

While Spirulina is used as the reference platform species for the assessment, the proposed algae production facility is species agnostic. Alternative microalgae strains could be deployed if void water chemistry, regulatory constraints, or market access change over time.

5.9.3.3 System Design

Appendix AL evaluates the merits of open and closed pond systems in which the Spirulina can be grown. A closed system (i.e. similar to a greenhouse, as per the conceptual schematic in Figure 5-15) is preferred as it allows for climate regulation, rainwater harvesting, reduction in evaporative losses, increased biomass, reduced harvesting costs and reduction in potential for external factors (e.g. dust) to alter water quality. With a preference for temperatures within the 20-35°C range, and enclosed system assists with regulating climate, especially during winter periods in the Moranbah region, when temperatures may be below this range.

Concept drawings for the algae production facility (also referred to as the 'algae farm') are provided in Figure 5-16, comprising one of ten pond modules, with each module approximately 1ha. The 10 ha pond system would be located in the nominated PMLU area shown on Figure 5-1, which is located outside the 0.1% AEP flood extent for the final landform (see Figure 5-3). The facility includes downstream processing building, water treatment shed, chemical storage, packing and dispatch area, laboratory spaces, and administrative offices. The design assumes grid-based electricity supply, leveraging existing transmission infrastructure which will be available at the Project. A schematic overview of the algae production facility is provided in Figure 5-17.

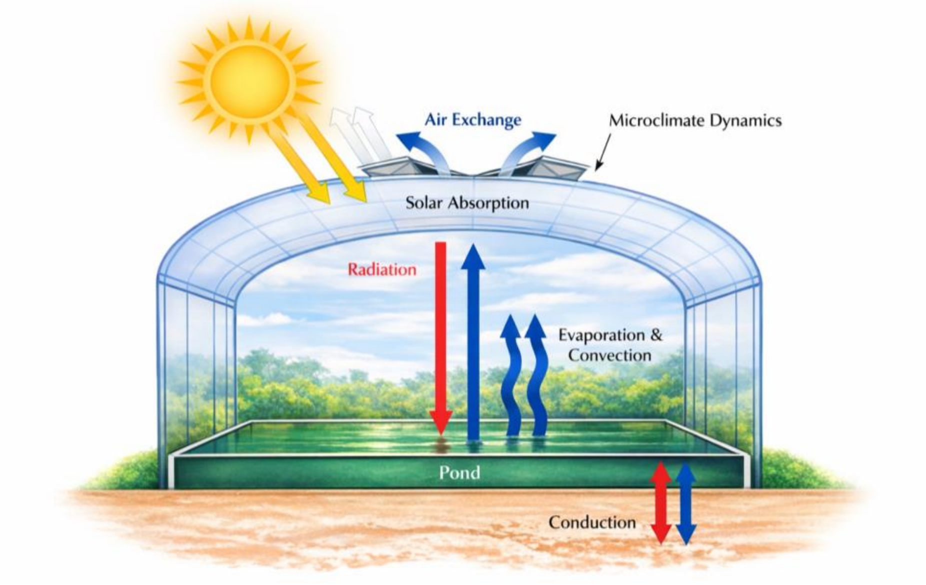


Figure 5-15 Conceptual System Design for an Enclosed Microalgae Pond System

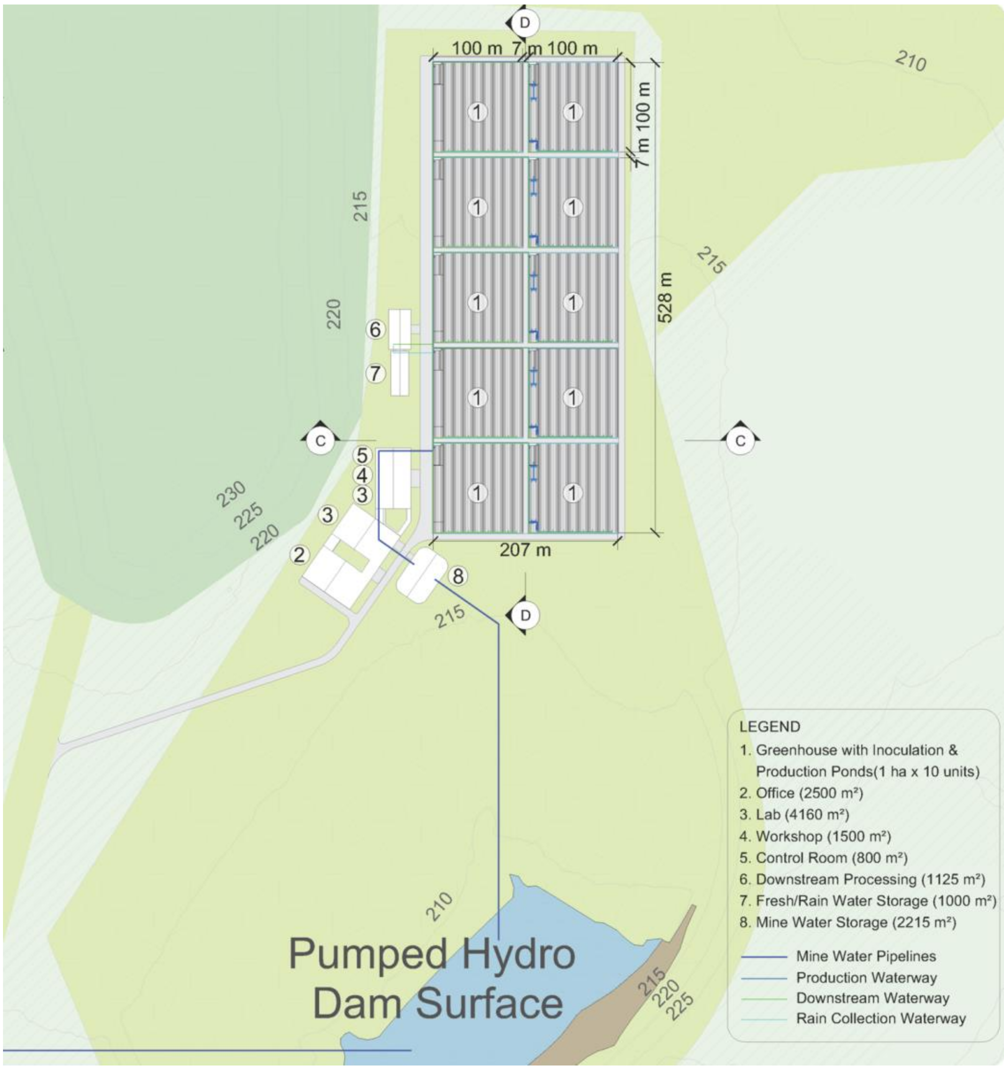


Figure 5-16 Proposed Layout of Algae Ponds and Support Infrastructure

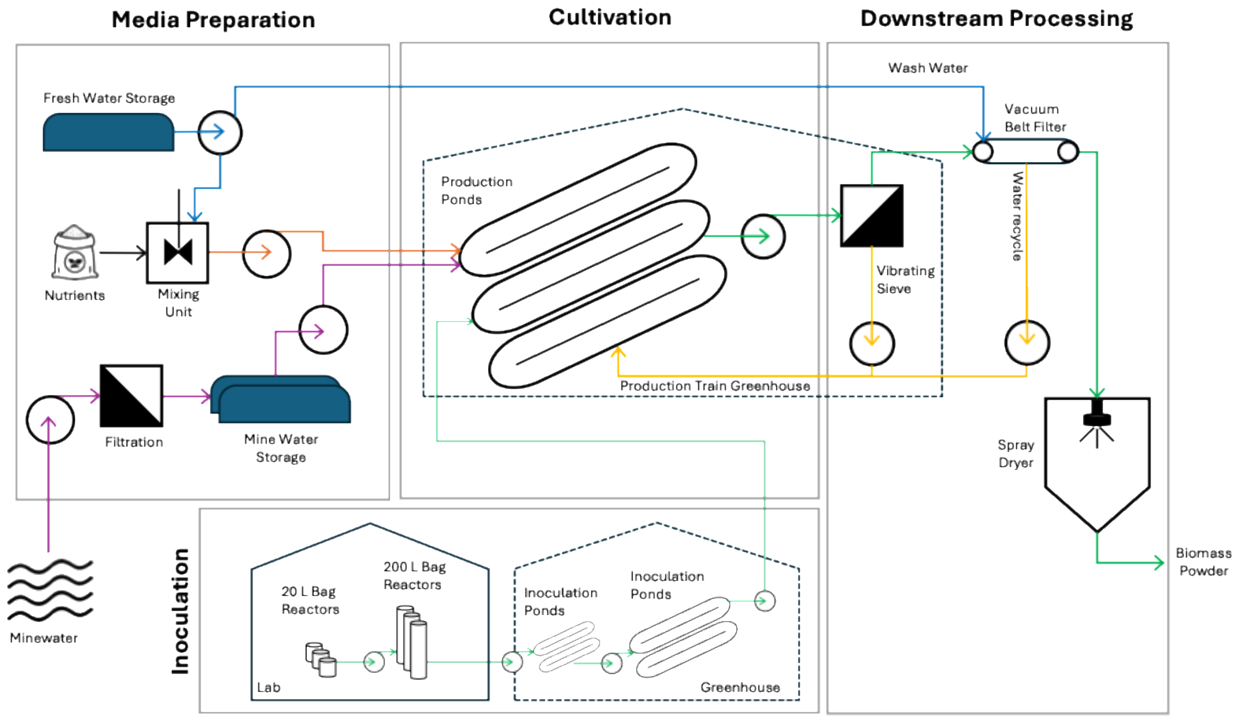


Figure 5-17 Schematic Overview of Algae Production Facility

5.9.3.4 Alage Production System Water Balance and Quality

An operational water balance for the algae production facility has been developed, based on the system design elements (see Section 6 of **Appendix AL**). The water balance includes:

- initial water from the void lake to fill ponds
- make up water from the void lake to balance any losses of water
- evaporation
- rainwater collection from the roof of the system
- recovery of water from the biomass during harvesting
- loss of water during harvesting
- water for washing biomass
- blowdown or flushing of water to clean ponds if required to maintain water quality, with blowdown water returned to the void.

The potential void water geochemistry has been assessed to determine its suitability for Spirulina production. Both the result of predictive void hydrogeochemical modelling (see Section 5.8) and data from water in existing voids in the Bowen Basin was assessed. Spirulina is a robust, halotolerant cyanobacterium capable of growing across a wide range of salinity and ionic conditions, provided key macronutrients, trace elements, alkalinity, and pH are maintained within suitable operating ranges. Mine void water can contribute several nutrients required for Spirulina growth, including sodium, sulphate, chloride, calcium, magnesium, boron, and trace metals.

Whilst Spirulina is routinely cultivated at higher salinities than those predicted for the Project's final void (see Section 5.8.5), salinity is not expected to constrain growth and may reduce osmotic stress relative to conventional high-salinity production systems.

While the predicted pH of void water (see Section 5.8.5) remains marginally below the optimal cultivation pH, it does not represent a constraint, as alkalinity and pH are routinely adjusted in commercial systems through the addition of bicarbonate or carbonate salts.

Several essential macronutrients, including nitrogen, phosphorus, potassium, and inorganic carbon, are present at concentrations well below Spirulina growth requirements and will require supplementation.

Measured and modelled void water compositions indicate the presence of a range of trace elements that are either essential micronutrients for Spirulina growth or occur at low concentrations unlikely to inhibit cultivation. From a biological performance perspective, manganese, molybdenum, zinc, selenium, and magnesium all serve recognised micronutrient or macronutrient roles in Spirulina metabolism. The modelled concentrations of these elements (see 5.8.5) fall within ranges compatible with sustained growth and do not indicate a risk of growth inhibition under the alkaline operating conditions planned for cultivation. Aluminium, while not a required nutrient, is present at low concentrations in the modelled scenarios and exhibits limited bioavailability at elevated pH, such that it is not expected to adversely impact culture performance.

From a product quality perspective, Spirulina is known to biosorb certain trace elements, and elements such as zinc, molybdenum, selenium, and manganese warrant routine monitoring where biomass is intended for food, feed, or nutraceutical markets. The concentrations modelled for the Project do not inherently preclude production of compliant biomass. However, confirmation of trace element uptake and final biomass composition will be required through pilot-scale cultivation and compositional analysis. Aluminium, copper, chromium, nickel, cadmium, and lead occur at low modelled concentrations and are not expected to accumulate to concerning levels under controlled cultivation conditions.

Standard quality assurance practices, including periodic elemental analysis of harvested biomass and adjustment of cultivation conditions where required, are expected to be sufficient to manage trace metal and micronutrient risks. These practices are routine in commercial Spirulina production and will be implemented during pilot and pre-commercial phases to confirm product suitability for target markets.

Salinity and individual ion management will be achieved through maximising internal water recycling efficiency, preferential use of low salinity rainwater for wash water dilution, controlled alkalinity adjustment, the precipitation of divalent ions (e.g. calcium and magnesium carbonates) where appropriate and periodic blowdown or partial pond flushing. The need for, and frequency of, blowdown will depend on seasonal evaporation rates, rainfall availability, nutrient dosing practices, recycling efficiency, and performance targets.

Overall, the predicted void water provides a suitable and manageable base for Spirulina cultivation, provided that macronutrient supplementation, pH and alkalinity control, and targeted ion management are implemented. These measures are standard practice in commercial microalgae systems and will be progressively validated and optimised during pilot and precommercial phases to ensure stable operation and product safety.

5.9.3.5 Void Water Balance

Void water balance modelling was undertaken inclusive of algae production and stock watering (see Sections 8.5 and 8.7 of **Appendix I**). For this scenario, the initial void water and make up void water volumes required for the system were derived from the water balance analysis undertaken for the algae production facility (see Section 6 of **Appendix AL**). In addition, an estimate of the blowdown water volumes and quality was factored into the model. A conservative estimate of volumes (i.e. likely to overestimate volumes requiring blowdown) and quality (i.e. a high salinity of around 15,400 µS/cm) in blowdown water was modelled to test whether the whole system (i.e. void and algae production) would retain salinities suitable for stock watering.

The void modelling demonstrates that void lake levels are 10 m lower than for the base case (see Section 5.6.3.2) at around 140 mAHD, and hence there is no risk of spilling to the environment, and the void would continue to be a groundwater sink.

The modelled salinity levels for the combined system are presented in Figure 5-18, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The overall system quality demonstrates that salinities remain below the LDWG value, even for the 95th percentile (very dry conditions). Void water is therefore suitable to support the proposed stock watering PMLU over the 500 years simulation, and would continue to provide a range of salinities that are suitable to algae production.

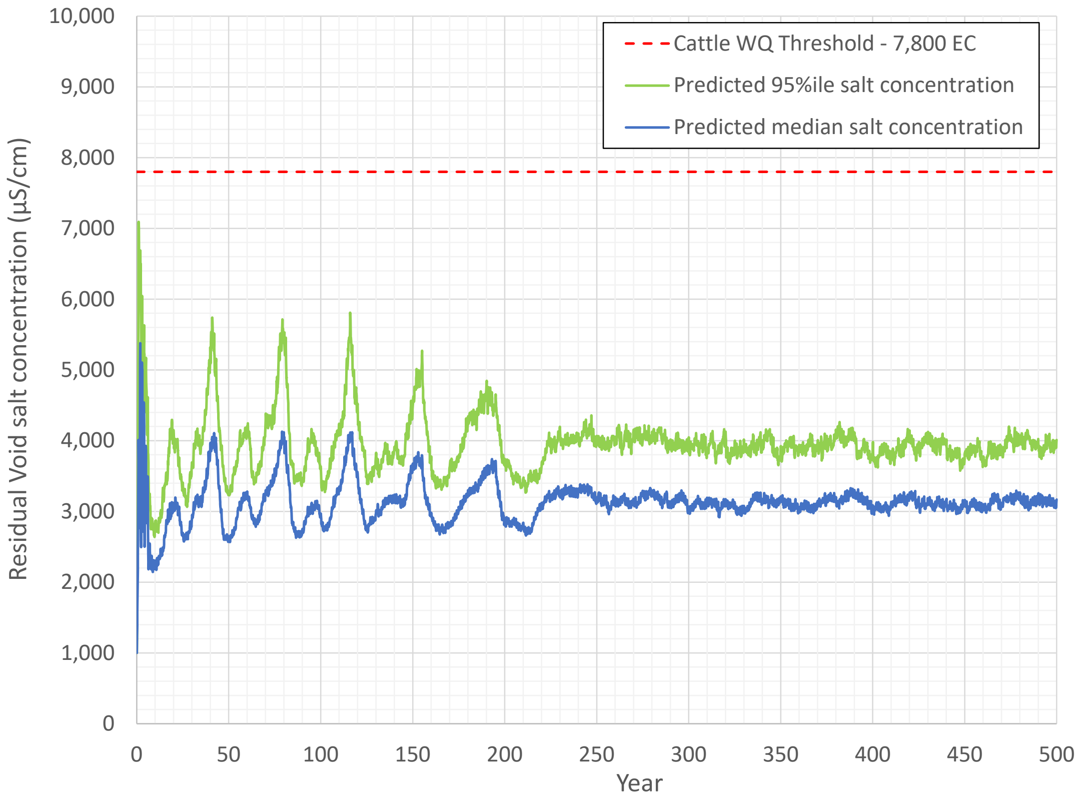


Figure 5-18 Long Term Void Salinity – Algae Production and Stock Watering

5.9.3.6 Commercial Feasibility

Section 4 of **Appendix AL** examines the potential microalgae products and pricing. Existing markets show price ranges for Spirulina products as a dietary supplement between AUD $26 and $169 per kilogram. Other products can be derived from Spirulina including pet food supplements, livestock protein supplements, biofertilisers, omega rich oils, nutraceuticals for therapeutic uses and carbon products from cellulose.

Section 8 of **Appendix AL** examines the capital expenditure (CAPEX) and operational expenditure (OPEX) of the proposed algae production facility. CAPEX and OPEX estimates are interpreted as a ±50% Class 4 estimates. Total CAPEX is estimated at $25M. Annual OPEX is estimated at $6.7M.

Under the CAPEX and OPEX estimates, and the modelled design and operating conditions for the algae production facility, annual biomass production of around 453,000 kg forecast. To recover costs, these values correspond to implied biomass prices of approximately:

- $20.3 per kg to recover total estimated annual costs
- $14.8 per kg to recover operating costs only.

These values sit below the lower bound of retail prices observed for Spirulina powder on the Australian market.

Based on these Class 4 cost estimates, an illustrative revenue scenario was examined to provide commercial context. Using a representative retail price of $65/kg and assuming that approximately 50% of end-market value is absorbed by downstream activities such as transport, packaging, marketing, certification, and wholesaler distribution, the implied revenue available at the plant gate would be approximately $14.7 million per year. Under these assumptions, the indicative plant gate revenue exceeds the modelled operating cost and aligns with recovery of total estimated costs, suggesting that the system sits within a promising commercial envelope.

Within this context, the estimate suggests that biomass production costs are aligned with prevailing market benchmarks, particularly where access to premium domestic, differentiated, or higher value product segments can be achieved. Further value creation may also be realised through improved productivity, operational cost reductions, or alternative downstream processing pathways, including higher value fractions and multi product biorefinery strategies.

5.9.3.7 Risk Assessment and Recommendations

A high-level assessment of risks associated with the proposed algae production facility, as a PMLU, was undertaken (see Section 9 of **Appendix AL**). A qualitative strengths, weaknesses, opportunities and threats analysis was undertaken as complementary framing exercise to contextualise risks associated with the proposed PMLU. Risks were assessed in terms of a standard risk matrix combining likelihood and consequence, and evaluated before and after risk mitigation strategies.

The following risks, with their residual risk ratings (i.e. after mitigation measures) were identified:

- Regulatory and governance - key regulatory pathways (post closure void water use, end of waste determinations, and the interface between mining, environmental, and planning legislation) remain unresolved, although early industry–government engagement and identified mitigation pathways may reduce residual risk over time (low to moderate residual risk).
- Environmental - trace metal absorption, water management, and long-term salinity drift in cultures require monitoring and engineered controls, but are considered manageable within conservative operating envelopes, subject to pilot-scale validation (low to moderate residual risk).
- Technical, and research and development - Spirulina cultivation in void water is technically plausible. However, further precommercial validation is required to confirm productivity, water chemistry stability, downstream down-stream processing performance, and long duration operations at scale (low to moderate residual risk).
- Market and commercial - While Spirulina markets are established, market acceptance and offtake for products derived from mine void water remain dependent on certification, transparency, and prevailing market conditions at the time of closure (low residual risk).
- Social - The concept aligns with regional employment and transition objectives, although workforce capability would need to be managed through staged development and targeted training (low residual risk).

Pilot scale validation and further refinement of system design, technoeconomic modelling, and downstream processing assumptions are recommended to improve confidence in cost structure and operational performance. The key recommendations from the assessment of the algae production as a commercially and technical feasible PMLU are to:

- encourage the collaborative development of a regulatory pathway for void water-based PMLUs
- progress pre-commercial validation of the proposed technology.

5.9.3.8 Conclusion

The proposed algae production facility represents a technically and commercially plausible and environmentally aligned PMLU concept, with potential to contribute bioeconomic value, and environmental and socially aligned outcomes, subject to further validation, regulatory clarity, and market conditions. The concept is informed by approximately six years of experimental research and early pilot scale evidence, indicating technical feasibility under managed conditions. The analysis of potential cost and revenue streams indicates that the algae production facility is commercially viable.

5.9.4 Pumped Hydro Scheme

5.9.4.1 Background

Stanmore commissioned GHD to develop a concept for a floating small scale PHES ('pumped hydro') system utilising water from the residual void to generate electricity during periods of peak demand. A pumped hydro system requires the movement of water under gravity to generate power, with water moving between an upper storage and a lower storage. The pumped hydro system assessed for the Project includes a dam at surface (the upper storage) with water released to the void lake (lower storage) to generate power. Water will be released from the upper storage to turbines during periods of high demand for power (e.g. evening and morning shoulder periods). Water will be pumped back to the upper storage during periods of low demand for power (e.g. in the middle of the day). The upper storage will be a repurposed sediment dam utilised during the Project's operations. Above ground pipelines between the upper storage dam and the void lake will facilitate the movement of water.

5.9.4.2 System Design

Power will be generated using barge / pontoon mounted pump turbines located on the void lake. The pumped hydro system is intended to generate <5 megawatts (MW), enabling connection to the local 6 kilovolt (kV)/66kV network established for the Project to support the dragline operation, which is connected back to the State and national electricity market (NEM) grid. The pumped hydro scheme is intended to generate a sustainable revenue stream for the owner of the pumped hydro infrastructure.

Repurposing the void and sediment dam avoids major civil works typically associated with PHES and can support a beneficial PMLU based on a small scale generating turbine concept. Capital costs are reduced by utilising the existing power supply infrastructure. The concept study provided preliminary engineering, plant selection, operational modelling, cost estimation, and risk assessment to inform the potential commercial and technical feasibility of the proposed PHES scheme.

Infrastructure for the PHES scheme is located outside the 0.1% AEP flood extent for the final landform (see Figure 5-1 and Figure 5-3).

The PHES scheme was based on the following configuration:

- Pumps and turbines mounted on a floating barge / pontoons within the pit, reducing the need for deep excavation or structural foundations. Various turbine configurations were assessed, with pontoons with a buoyancy of around 28 t required to support the turbines.
- Pipelines (500 – 900 mm) connecting the upper storage to the void lake, pumps and turbines, supported by floats in the pit area.
- A generating capacity <5 MW (typically 2 – 4 MW) requiring a daily operating cycle with around 8 hours pumping time and 5 hours power generation.
- The potential to align pumping power requirements to a solar farm under consideration for IPC.
- Net operating head between the upper storage and void lake of 50 – 60 m.

The equipment required for the PHES scheme is readily available.

5.9.4.3 Void Water Balance

Void water balance modelling was undertaken inclusive of the PHES scheme, algae production and stock watering (see Sections 8.5 and 8.8 of **Appendix I**). For this scenario, additional water is required at an annual rate of 100 ML/year to sustain the net water demands and losses from the overall system. For this scenario, it has been assumed that this additional water would be sourced from the Sunwater pipeline allocation, with 100 ML/year representing less than 10% of the existing Sunwater allocation available to IPC.

Void water levels remain similar to the base case with stock watering only (i.e. around 150 mAHD, see Section 5.6.3.2) and hence there is no risk of spilling to the environment, and the void would continue to be a groundwater sink.

For salinity, the results have been presented as the total system salinity (final void and upper storage, with algae production and stock watering). The modelled salinity levels for the combined system are presented in Figure 5-19, showing the median (50th percentile) and 95th percentile results from the stochastic climate assessment. The overall system quality demonstrates that salinities remain below the LDWG value, even for the 95th percentile (very dry conditions). Void water is therefore suitable to support the proposed stock watering PMLU over the 500 years simulation, and would continue to provide a range of salinities that are suitable to algae production.

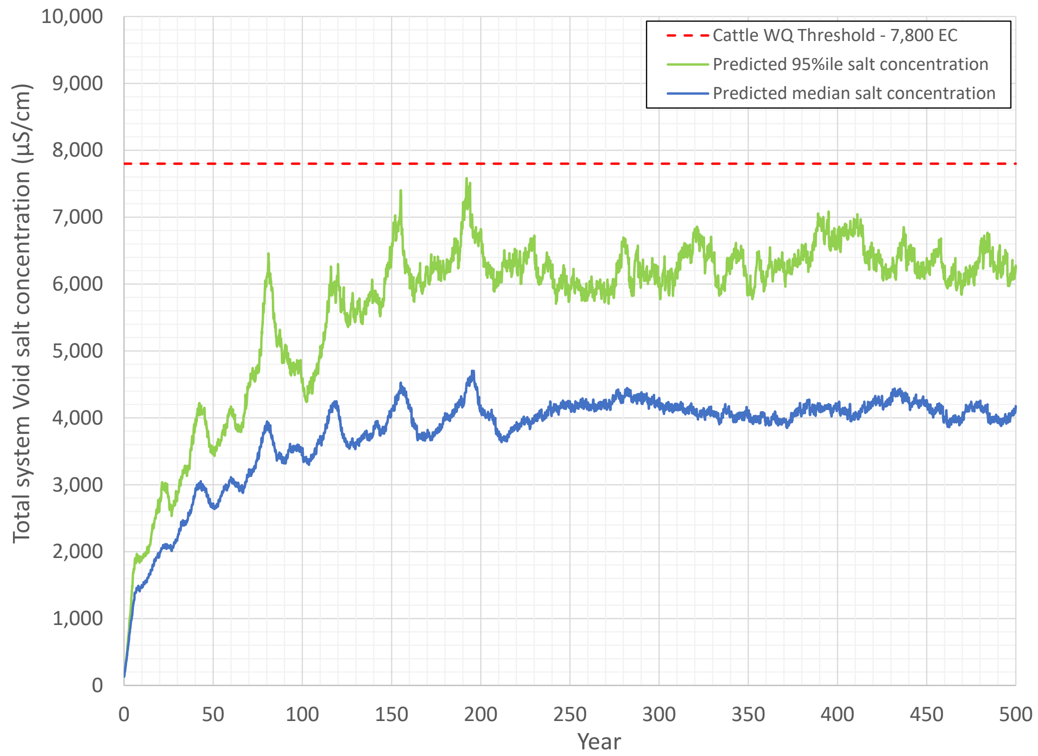


Figure 5-19 Long Term Void Salinity – PHES Scheme, Algae Production and Stock Watering

5.9.4.4 Commercial Feasibility

Electricity price assumptions for the costs of pumping water during periods of low demand, and for revenue generated from selling power during periods of high demand, were factored into the modelling. A utilisation factor was modelled for the number of days when the turbines were operational. Price and utilisation assumptions were derived from 2025 Queensland NEM actual wholesale prices, with an assumed price cap and floor and monthly operating rules.

The PHES scheme has a round trip efficiency of around 65%, where the round trip efficiency is the ratio of electrical energy delivered during generation to the electrical energy consumed during pumping. There is an opportunity during the detailed design phase to increase the round trip efficiency with further input from suppliers and engineers.

A discounted cashflow model was developed for the small-scale pumped hydro concept. The analysis focused primarily on operating cash flows because these most directly reflect dispatch performance, electricity price spreads, cycling frequency and operating efficiency. It is expected that the low capital costs (circa $6.7M) of the PHES scheme could be borne by Stanmore as part of the rehabilitation and closure costs.

The steady state operating margin (around $141,000 per annum) indicates that, under the selected dispatch profile and price inputs, the PHES scheme can generate positive annual operating cash flows.

The PHES is subject to risks requiring further evaluation:

- There is variability in the NEM that determines the 'buy' price to pump water and the 'sell' price assumed during the daily high value market period for power generation.
- Configuration of plant and equipment within the void lake.

5.9.4.5 Conclusion

The concept study demonstrates the potential commercial and technical feasible of the PHES scheme, with the ability to provide a positive income stream from a PMLU utilising void water.

5.9.5 Irrigation Water

An option was considered to utilise water in the residual void for irrigation, with water quality improved to a standard suitable to irrigate various crops through a reverse osmosis (RO) plant.

It was found that the volume of water within the void would be depleted (i.e. the lake would become dry) through irrigation of an area of less than 10 ha. This represents an immaterial proportion of the Winchester Downs landholdings (tens of thousands of hectares) and is not viable to supplement farming operations. In addition, the capital and operating costs of irrigation equipment and an RO plant, including brine management, do not support the limited area of irrigation that would result. This option was not further considered.

5.9.6 Aquatic Ecosystem

Whilst aquatic ecosystem values may 'naturally' result from a water storage with reasonably low salinity, it was not considered that there was sufficient scientific evidence to support this as a PMLU for the residual void.

5.9.7 Findings

Based on the assessment of the technical, commercial and environmental feasibility of the assessed PMLU options, Stanmore has proposed the following PMLUs associated with the residual void as part of the closure landform:

- stock watering using water in the void lake
- algae production facility
- pumped hydro scheme.

5.9.8 Post Mining Land Use Options – Other Areas

The proposed PMLU in the majority of the closure landform, other than the residual void and infrastructure areas to support the associated PMLUs, is grazing. This aligns with the pre mining land use of the Project area and the landholder's preferences.

The following rehabilitation areas have PMLUs that are not associated with the residual void lake or grazing:

- A woodland PMLU is proposed on the internally draining low wall slope immediately above the void lake. This area has been shaped to ≤25%, which is generally considered too steep for grazing, but which can support a woodland PMLU providing erosional stability with a rock armoured slope.
- The crossings of the Isaac River and Cherwell Creek will be rehabilitated to riparian habitat as these areas contained riparian habitat pre mining.
- Conrock Gully diversion will be rehabilitated to a riparian habitat, similar to sections of the existing Gully with woodland, riparian habitat, with rehabilitation commencing during operations once the diversion is constructed.

These rehabilitation outcomes were considered the most suitable PMLUs for these disturbance areas, and therefore, other options were not required to be evaluated. Section 5.10.5 provides a summarised assessment of the suitability of the Project's planned PMLUs.

5.10 Progressive Rehabilitation and Closure Plan

5.10.1 Overview

As explained in Section 5.2, the Project requires a PRCP and PRCP schedule under the EP Act, with the PRCP schedule requiring approval from the administering authority before the Project can commence (i.e. in combination with the Project's EA and MLs). The PRCP (**Appendix AB**) and draft PRCP schedule (**Appendix AC**) detail the Project's progressive rehabilitation and closure planning to achieve a final landform that is safe, stable, non-polluting and supports the planned PMLUs in a sustainable manner.

The PRCP is the supporting planning document for the PRCP schedule and provides:

- the baseline information related to the Project
- the justification for the final landform and planned PMLUs
- outlines how the final landform and PMLUs will be achieved by closure.

The PRCP schedule specifies the timing of the progressive rehabilitation and closure, as linked to rehabilitation milestones (RMs) for each rehabilitation area (RA).

The following sections will provide a summary of the key components of the PRCP (**Appendix AB**).

5.10.2 Baseline Information and Project Description

Establishing the baseline scientific information and understanding all the key elements of the Project were integral in assisting the development of the Project's PMLUs and guiding mine planning to allow the efficient and progressive development of the Project's final landform to support the planned PMLUs.

The required baseline information for the Project's progressive rehabilitation and closure planning is provided in **Chapters 6**, **7**, **8**, **9**, **10**, **11** and **12**, which represents the climate, land, surface water, hydrology and geomorphology, groundwater, terrestrial ecology, and aquatic ecology, respectively. A description of all key elements of the Project is provided in **Chapter 4**.

Summaries of the Project description and baseline information are components of the Project's PRCP (Sections 2.1.1 and 2.1.2 of **Appendix AB**, respectively).

5.10.3 Design for Closure

The Project's progressive rehabilitation and closure planning process proactively considered closure design during the development of the Project's mine site to maximise the progressive rehabilitation of the land to a stable condition and minimise the long-term management requirements and costs.

A summary of the Project's design for closure is provided in the Project's PRCP (Section 2.1.3 of **Appendix AB**), as informed by the landform design process described in Section 5.3 to Section 5.8.

5.10.4 Rehabilitation Planning

5.10.4.1 Relevant Activities and Rehabilitation Areas

Under the EP Act, 'relevant activities' in the context of the Project's progressive rehabilitation and closure refer explicitly to the mining activities authorised by the Project's EA, and can be defined as the operational processes that cause environmental disturbance.

RAs are specific, mapped zones within the Project's disturbance area that have been designated for progressive rehabilitation through detailed mine planning. Each Project RA is planned to be progressively rehabilitated to a specific PMLU that is safe, stable, non-polluting and sustainable.

The Project's progressive rehabilitation has been optimised in the PRCP schedule based on the current life of mine plan and is designed to ensure the safe and efficient extraction of the coal resource, the best possible availability of disturbed areas for progressive rehabilitation, and the achievement of the proposed PMLU for each RA. The Project's draft PRCP schedule is provided in **Appendix AC**.

Table 5-2 provides the planned RAs for the Project's relevant activities, and includes the intended PMLU, predicted duration, size/extent and planned progressive rehabilitation availability for each RA. The Project's RAs are shown in Figure 5-20. The Project's conceptual final landform and PMLUs are displayed in Figure 5-1. The RAs are detailed in Project's PRCP (Section 2.1.4.1 of **Appendix AB**).

5.10.4.2 Rehabilitation Areas and Milestones

RMs are required for all RAs and identify each significant event or step necessary to progressively rehabilitate the disturbed land to its PMLU.

A high level summary of the Project's RMs is provided in Table 5-3. As required by the PRCP Guideline, only PMLU areas where significant disturbance will occur are mapped as a RA and incorporated into the PRCP schedule. The timing associated with the Project's RMs is explained in Section 2.3.2.1 of **Appendix AB**.

The Project's minor ancillary activities, which may include roads, access tracks and culverts, fences, underground services, low-impact telecommunication facilities, electrical sub-stations and switch yards, transmission grid works and supply network works, storage depots, pipelines and pumps, groundwater bores, gas drainage bores, monitoring and investigation works and exploration activities, were not designated as RAs. Disturbance from minor ancillary activities will be rehabilitated in accordance with the provisions detailed in the Eligibility criteria and standard conditions for exploration and mineral development projects (DEHP, 2016).

5.10.4.3 Rehabilitation Milestones Criteria

The milestone criteria for the Project's RMs are provided in Section 2.3.2 and Table 12 of **Appendix AB**. Specific, measurable, achievable, reasonable/relevant and time-specific (SMART) principles were applied in developing the Project's RMs, with consideration given to the following parameters:

- Milestone criteria have been developed using the technical assessments completed for the Project's EIS that underpin progressive rehabilitation and closure.
- Milestone criteria development has considered the principles of industry best practice.

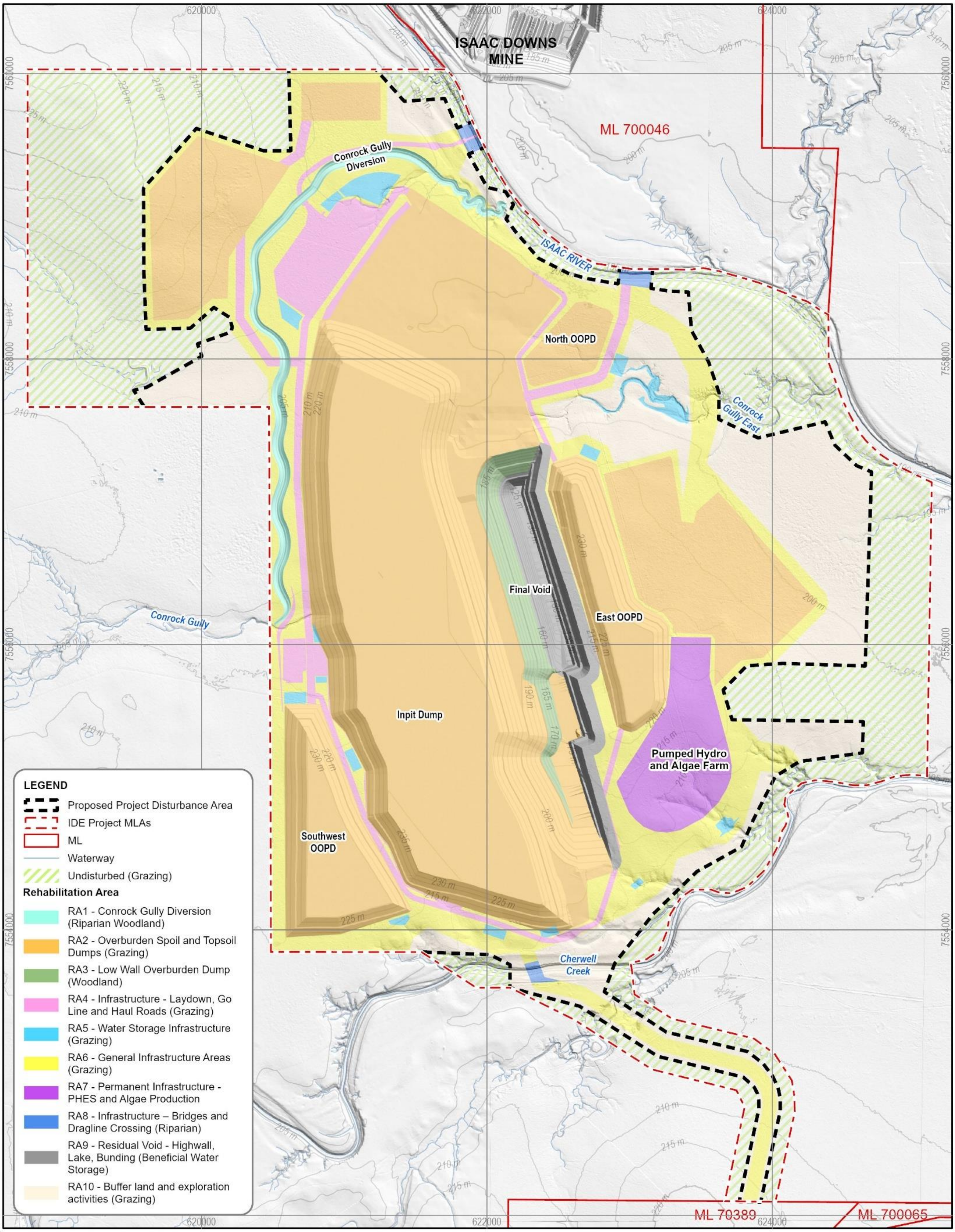
Table 5-2 Project Rehabilitation Areas, Relevant Activities and associated Post-mining Land Uses

Rehabilitation Area (RA)	Post-mining Land Use (PMLU)	Relevant Activity	Predicted Duration (Years)+	Size (ha)	Availability for Progressive Rehabilitation#
RA1	Native vegetation (riparian woodland)	Conrock Gully diversion	16	34.4	10/12/2028
RA2	Grazing	Overburden and topsoil dumps (out-of-pit and in-pit)	32	1074.9	10/12/2031
RA3	Native vegetation (woodland)	Final Low Wall overburden dump (≤25%)	20	36.9	10/12/2043
RA4	Grazing	Infrastructure - laydown, go line and haul roads	15	106.9	10/12/2043
RA5	Grazing	Infrastructure - water storages	15	23.9	10/12/2043
RA6	Grazing	General infrastructure areas - not contaminated	25	368.8	10/12/2038
RA7	PHES and Algae Production	Permanent PMLU infrastructure area	5	65.9	10/12/2043
RA8	Native vegetation (riparian)	Infrastructure – bridges and dragline crossing (Isaac River and Cherwell Creek)	20	6.7	10/12/2048
RA9	Beneficial Water Storage	Residual Void (void highwall, pit lake, safety setbacks, bunding and fencing))	15	71.0	10/12/2043
RA10	Grazing	Buffer land and exploration activities	20*	290.6*	10/12/2043*

* = Buffer land is unlikely to be disturbed. Availability, duration and size only apply if the buffer land is disturbed by the Project's mining activities.

= The nominated date of availability for progressive rehabilitation is based on Project commencement and duration in accordance with the timeframes in Table 5-3. If these timeframes change then the date of availability for progressive rehabilitation would change.

+ = The predicted duration for a RA is the period from commencement to completion of rehabilitation.



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ISAAC DOWNS EXTENSION

Rehabilitation Areas

Figure 5-20

Table 5-3 Project Rehabilitation Milestones

Rehabilitation Milestones		Maximum Expected Duration (Years)
RM1	Infrastructure decommissioning and removal	1
RM2	Identification, remediation and removal of contaminated land	1
RM3	Landform establishment	2
RM4	Surface preparation	2
RM5	Revegetation: • Grazing PMLU • Native vegetation (riparian woodland) – Conrock Gully diversion PMLU • Native vegetation (woodland) – Final low wall batter (≤25%) PMLU • Native vegetation (riparian) – River/creek crossings PMLU	2
RM6	Achievement of surface requirements: • Grazing PMLU • Native vegetation (riparian woodland) – Conrock Gully diversion PMLU • Native vegetation (woodland) – Final low wall batter (≤25%) PMLU • Native vegetation (riparian) – River/creek crossings PMLU	 5 10 10 10
RM7	Achievement of the post-mining land use to a stable condition: • Grazing PMLU • Native vegetation (riparian woodland) – Conrock Gully diversion PMLU • Native vegetation (woodland) – Final low wall batter (≤25%) PMLU • Native vegetation (riparian) – River/creek crossings PMLU	5**
RM8	Achievement of post-mining land use water quality	5**
RM9	Functioning stable water supply source for RM10 and cattle • Achievement of stable final landform for the final void • Achievement of safety requirements • Achievement of final void water quality	10*
RM10	Achievement of permanent infrastructure – PHES and/or algae production PMLUs	5*

* = From the end of mining operations.

** = RM7 and RM8 are expected to run concurrently after RM6 is achieved.

5.10.4.4 Community Consultation

Community consultation forms an important part of the Project's progressive rehabilitation and closure planning and is an integral component of the Project's PRCP. The proponent has consulted with key stakeholders about the Project's proposed final landform and PMLUs, and has developed a community consultation plan to facilitate on-going engagement with the community on the Project's progressive rehabilitation and closure planning. Through this consultation process, the proponent is committed to delivering long-term beneficial and sustainable outcomes for the rehabilitated mined land at the end of the Project's life.

Sections 2.2.1 and 2.2.2 of **Appendix AB** outline the PRCP related consultation completed to-date and details the PRCP's community consultation plan, respectively. **Chapters 3** and **21** provide further details on the Project's consultation and social impact management for the EIS, respectively.

5.10.5 Post Mining Land Uses

The PMLUs planned for the Project are outlined below and are defined with their applicable RAs in Table 5-2, Figure 5-1 and Figure 5-20:

- Native vegetation (riparian woodland) – Conrock Gully
- Grazing
- Native vegetation (woodland) – final low wall batter (≤25%)
- Native vegetation (riparian) – river/creek crossings
- Final void - beneficial use water storage
- Permanent infrastructure – PHES and/or algae production.

In terms of local and State government planning strategies and schemes, the proposed PMLUs are consistent with the Isaac Regional Planning Scheme (2024)[5] and Mackay, Isaac, and Whitsunday Regional Plan (2012). Section 2.3.5 of **Appendix AB** provides further details detail on the consistency between the PMLUs and the local and State government planning strategies and schemes.

5.10.5.1 Native Vegetation (Riparian Woodland) – Conrock Gully

The diversion of Conrock Gully is described in Section 5.3.3.2.

The Conrock Gully diversion functionally connects with the existing watercourse within the Project area, was aligned to minimise interference with mining infrastructure, and was designed to remain within the Project area. The proposed diversion channel possesses similar dimensions to the Conrock Gully existing channel, and has a similar design capacity. The Conrock Gully diversion includes a number of meanders that have been introduced at the upstream end of the diversion, which results in a length of channel and bed slope similar to the existing Conrock Gully channel. The diversion's meanders have similar amplitude, wavelength, sinuosity, and bend radius to bends found in the existing creek channel.

The Conrock Gully diversion is supported by a Functional Design Report that was developed by an AQP to address the objectives, design criteria and required outcomes of the 'Guideline: Works that interfere with water in a watercourse for a resource activity—watercourse diversions authorised under the Water Act 2000 (DNRME, 2019)'. The Conrock Gully diversion's Functional Design Report is provided in Appendix D of **Appendix J**. The geomorphic assessment within the Functional Design Report demonstrates that the diversion design reasonably matches the existing Conrock Gully geometry. The design hydraulic conditions of the diversion are similar, and generally improved, to those in the existing Conrock Gully channel, and are consistent with the 'ACARP guideline: Bowen Basin River Diversions Design and Rehabilitation Centre (Hardie and Lucas, 2002)' for channel-averaged shear stress, stream power and velocity.

Revegetation of the land adjacent to Conrock Gully diversion channel with a self-sustaining groundcover will facilitate erosional stability and topsoil retention during rainfall and flood events, and the re-established native shrub and tree cover will enhance the riparian zone and support the return and improvement of native fauna habitat. The native flora species selection for rehabilitation will be consistent with the local surrounding environment (Appendix 3.3 of **Appendix AB**).

The permanent diversion of Conrock Gully will be substantially similar to the existing Conrock Gully, and therefore, will function in a similar manner for the purpose of operating the Winchester Down property as a pastoral business.

[5] https://www.isaac.qld.gov.au/Residents/Planning-and-Development/Planning-Scheme

Therefore, once the native vegetation (riparian woodland) – Conrock Gully PMLU is established in accordance with the PRCP schedule (**Appendix AC**), it will be safe and structurally stable, not cause environmental harm, and will be sustainable under natural conditions. In addition, this PMLU will be integrated into current land uses, and is consistent with how the land was used before the mining activities were carried out.

5.10.5.2 Grazing

Grazing is the primary land use within the Project area, and is one of the two predominant land uses in the vicinity of the Project. The grazing PMLU will allow the return of the land to the Winchester Downs landowner in a productive state for reintegration into their pastoral business. The grazing PMLU will also allow the return of a majority of the land associated with the State Reserve (Lot 9 GV33) to a productive state for its reintegration into the reserve and continued use as a stock route. Further details on the properties associated with the Project is provided in Section 7.3.2.1 of **Chapter 7**.

A majority of the Project's land disturbed by mining will be returned to a grazing PMLU, which from an agricultural perspective will be beneficial to the landowners, the region and Queensland. The grazing PMLU will return the land to its pre-mining land suitability class (majority class 4, see Section 7.3.19 of **Chapter 7**). Final landform geotechnical and erosional stability assessments confirm that long-term the land will remain geotechnically stable and will erode at an acceptable rate, which supports the rehabilitation of the land to a grazing PMLU (**Appendix H** and **Appendix D**, respectively).

The return of the majority of the land to a sustainable grazing condition is likely to be a part of two separate compensation agreements under the *Mineral Resources Act 1989* between the proponent and the two landowners.

Revegetation of the mined land to a sustainable state will involve the use of a pasture seed mix that is compatible with surrounding non-mined land. The Project's planned pasture seed mix for the grazing PMLU is provided in Appendix 3.2 of **Appendix AB**. The self-sustaining groundcover will facilitate erosional stability and topsoil retention, and will also provide habitat for local ground-dwelling fauna.

In terms of local and State government planning strategies and schemes, the grazing PMLU is consistent with the Isaac Regional Planning Scheme (2024) and Mackay, Isaac, and Whitsunday Regional Plan (2012). Section 2.3.5 of **Appendix AB** provides further details detail on the consistency between the PMLUs and the local and State government planning strategies and schemes.

Therefore, once the grazing PMLU is established in accordance with the PRCP schedule (**Appendix AC**), it will be safe and structurally stable, not cause environmental harm, and will be sustainable under natural conditions. In addition, this PMLU will be integrated into current land uses, and is consistent with how the land was used before the Project's mining activities were carried out.

5.10.5.3 Native Vegetation (Woodland) – Final Low Wall Batter (≤25%)

The development of the Project's final void involved assessed of options using multiple inputs from specific models (e.g. surface water, groundwater, void geochemistry and mine design) to establish the best possible final geometry (e.g. size, surface area, depth, and catchment) to return a suitable water quality to support the use of the final void (pit lake) as a beneficial water storage PMLU for grazing and a suitable water source for the Project's other proposed PMLUs (permanent infrastructure – PHES and/or algae production). The development of the Project's final void design is detailed in Section 5.6.

As a result of the Project's final void design and the progression of the final stages of mining to achieve this design, the final low wall batter that drains directly to the void, and is above the predicted void water level, possesses a slope of ≤25%. Consequently, the native vegetation (woodland) – final low wall batter (≤25%) PMLU was developed to ensure long-term erosional and geotechnical stability, and an ecological benefit for this specific rehabilitation area.

Landform stability modelling and a geotechnical assessment were completed by AQPs to demonstrate the long-term stability of final landform, including the final low wall batter (**Appendix D** and **Appendix H**, respectively). **Appendix H** demonstrates that the Project's final landform, including the final low wall batter, meets or exceeds the design acceptance criteria for the Project's final landform of a factor of safety of ≥1.5, and therefore, demonstrate the long-term stability of the Project's final landform. **Appendix D** demonstrates that after 300 years of simulation of the Project's main in-pit landform (which includes the low wall batter), southwest out-of-pit dump and east out-of-pit dump are stable under the current climate change predictions for the region, and are predicted to typically erode at the acceptable erosion rate of ≤5 t/ha/y. The landform stability modelling report also advises on the recommended rehabilitation actions required to achieve long-term stability for the low wall batter PMLU, which includes achieving a groundcover level of ≥30% with rock armouring comprising fresh non-carbonaceous sandstone and fresh carbonaceous sandstone.

Revegetation of the final low wall batter with a self-sustaining groundcover and appropriate rock armouring will facilitate erosional stability and topsoil retention during rainfall and flood events, and the re-established native shrub and tree cover will improve the habitat for local native fauna. The native flora species selection for rehabilitation will be consistent with the local surrounding environment (Appendix 3.3 of **Appendix AB**).

Therefore, once the native vegetation (woodland) – final low wall batter (≤25%) PMLU is established in accordance with the PRCP schedule (**Appendix AC**), it will be safe and structurally stable, not cause environmental harm, and will be sustainable under natural conditions. In addition, this PMLU will be integrated into current land use, and is consistent with how the land was used before the mining activities were carried out.

5.10.5.4 Native Vegetation (Riparian) – River/Creek Crossings

The Project will require a primary access including a bridge over the Isaac River, a temporary bed-level crossing of the Isaac River to walk the dragline to and from the Project area at the start and finish of mining operations, and a secondary access including a bridge over Cherwell Creek.

There are no other feasible alternative access options for the Project. The Project's primary access connects with IDM's road network and provides connection with the Peak Downs Highway for off-site travel, and with the existing ROM coal haul roads for hauling ROM coal to the Isaac Plains Mine cola handling and preparation plant.

These access routes intersect ecologically sensitive areas associated with the Isaac River and Cherwell Creek crossings. Therefore, the native vegetation (riparian) – river/creek crossings PLMU was developed for the rehabilitation of the Project's crossing infrastructure within existing riparian areas to ensure long-term erosional and geomorphic stability and an ecological benefit from the re-establishment of the riparian zone.

Revegetation of the land adjacent to each crossing with a self-sustaining groundcover will facilitate erosional stability and topsoil retention, and the re-established native shrub and tree cover will enhance the riparian zone and support the return and improvement of native fauna habitat. The native flora species selection for rehabilitation will be consistent with the local surrounding environment (Appendix 3.3 of **Appendix AB**).

Therefore, once the native vegetation (riparian) – river/creek crossings PLMU is established in accordance with the PRCP schedule (**Appendix AC**), it will be safe and structurally stable, not cause environmental harm, and will be sustainable under natural conditions. In addition, this PMLU will be integrated into the current land use, and is consistent with how the land was used before the mining activities were carried out.

5.10.5.5 Final void - Beneficial use water storage

The development of the Project's final void for the long-term use as a suitable water source for livestock (cattle) is provided in Sections 5.6, 5.7, 5.8 and 5.9. Section 5.9.2 confirms the use of the final void's water as a beneficial PMLU for livestock (cattle) watering.

The beneficial water storage PMLU will provide the Winchester Downs landowner with a sustainable additional water source for their pastoral operations.

Therefore, once the beneficial water storage PMLU is established in accordance with the PRCP schedule (**Appendix AC**), it will be safe and structurally stable, not cause environmental harm, and will be sustainable under natural conditions. In addition, this PMLU will be integrated into the current land use, and whose use will deliver, or is aimed at delivering, a beneficial environmental and economic outcome.

5.10.5.6 Permanent infrastructure – PHES and/or algae production

The development of the Project's final void for the long-term use as a suitable water source for the Project's proposed PMLUs (permanent infrastructure – PHES and/or algae production) is provided in Sections 5.6, 5.7, 5.8 and 5.9. Section 5.9.3 details the use of algae production as a PMLU. Section 5.9.4 details the use of PHES as a PMLU.

Therefore, once the permanent infrastructure – PHES and/or algae production PMLU is established in accordance with the PRCP schedule (**Appendix AC**) and has reached a commercial stage of development, it will be safe and structurally stable, not cause environmental harm, and will be sustainable under natural conditions. In addition, this PMLU can be integrated into the current land use or developed by a third party as a future productive land use, and whose establishment will deliver, or is aimed at delivering beneficial environmental and economic outcomes.

5.10.5.7 Final Landform 3D Design

Three dimensional (3D) imagery of the Project at the end of mining (approximately Year 16) and after completion of all RMs is provided in Figure 5-21 to Figure 5-28. Figure 5-21 provides a composite image of the Project at the end of mine life with various areas at different stages of rehabilitation, or recently completed active mining. The imagery in Figure 5-22 to Figure 5-28 has been developed to represent the PMLUs for each RA at completion of all RMs. The location of the viewpoint for each image is shown on Figure 5-22.

Datum:	GDA2020 Zone 55
Scale:	See Scale Bar
Date:	10/06/2026 9:06 AM
Drawn:	Minserve
Source:	Minserve/Stanmore
File:	20260606 End of Mining Aerial.aprx

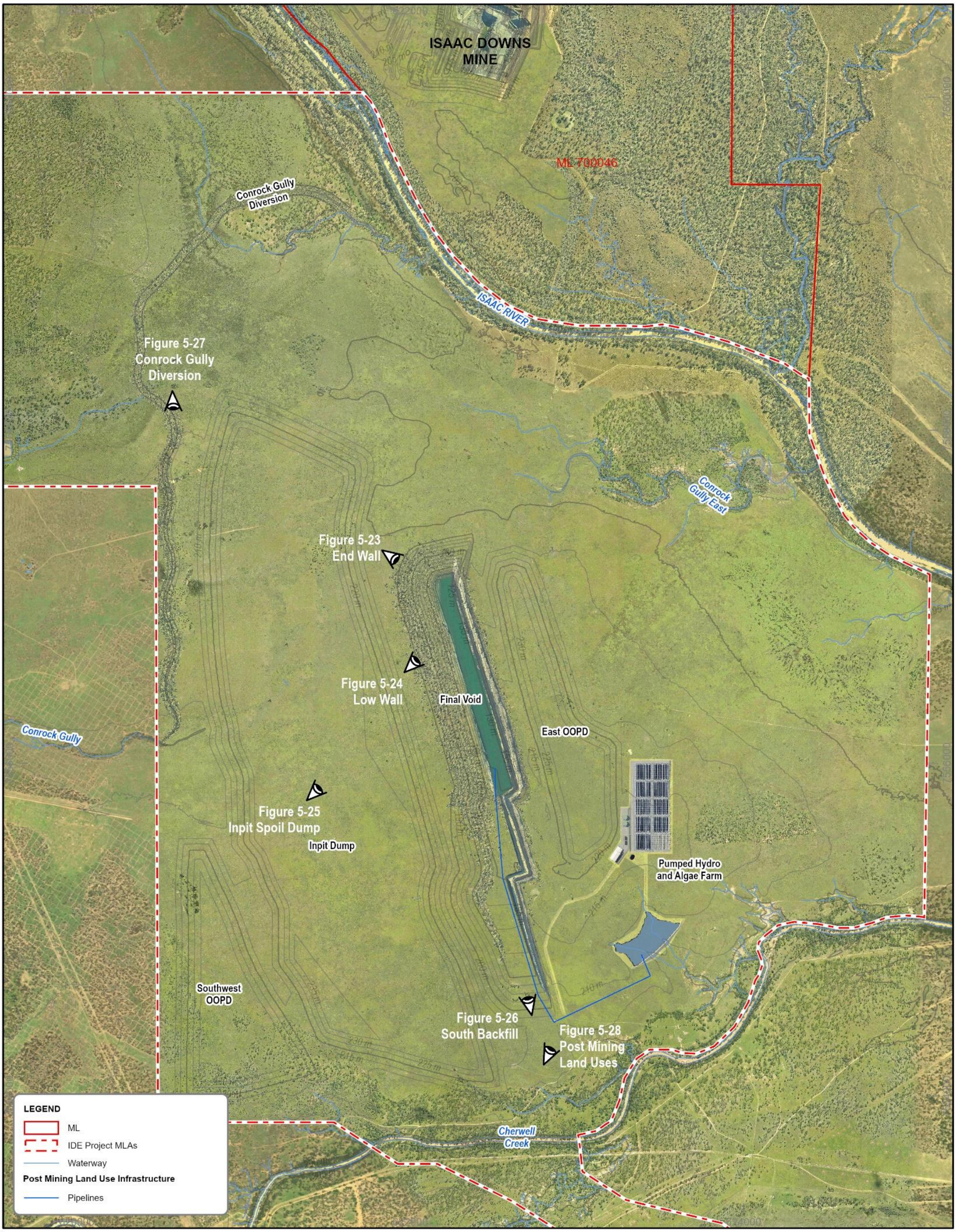
DISCLAIMER: Third party data sources are used in this map compilation. Minserve makes no warranty regarding this data's accuracy or currency.

stanmore

ISAAC DOWNS EXTENSION

End of Mining Imagery

Figure | 5-21



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Scale:	See Scale Bar
Date:	10/06/2026 2:57 PM
Drawn:	Minserve
Source:	Minserve/Stanmore
File:	20260525 Final Landform Image.aprx

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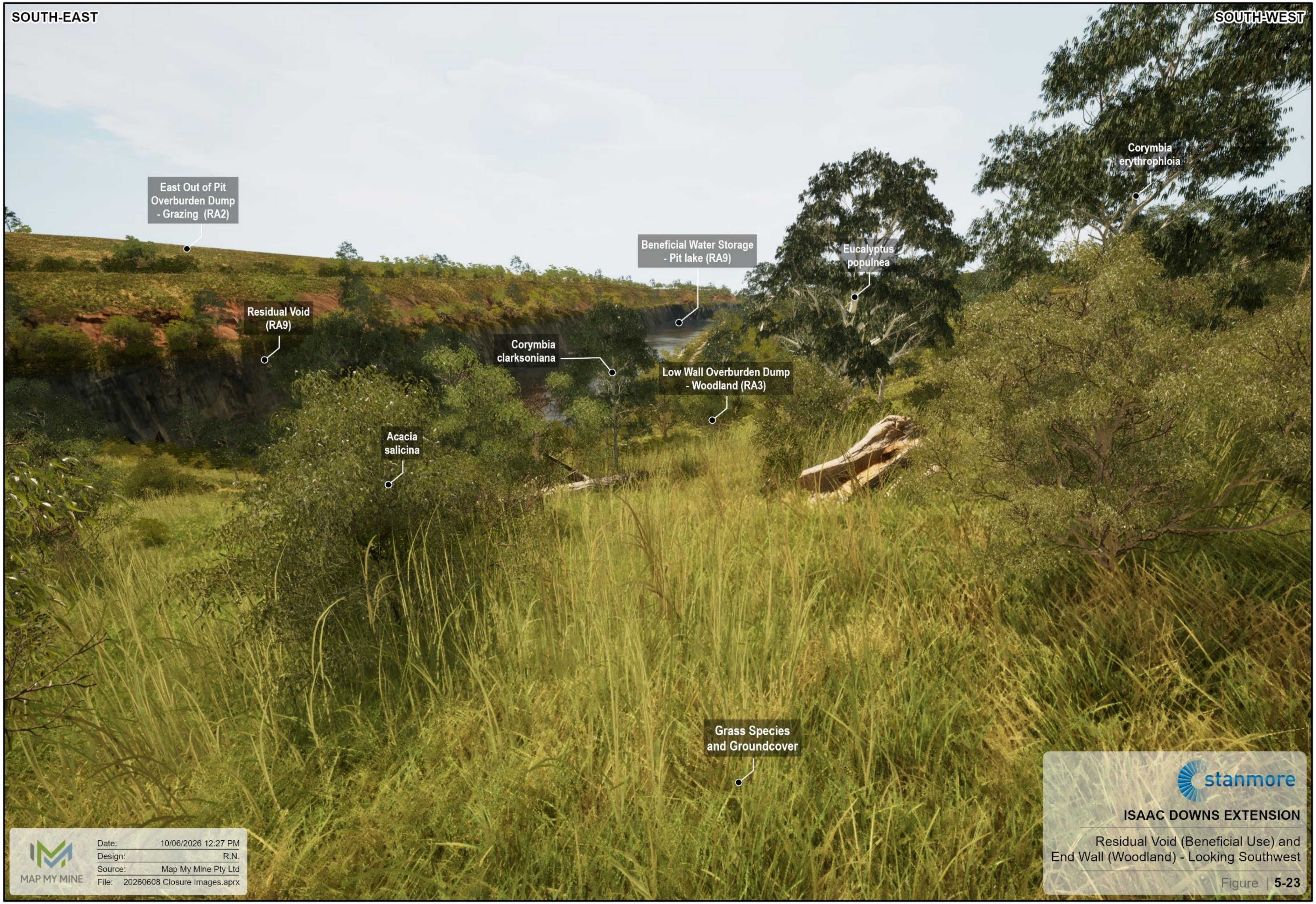
ISAAC DOWNS EXTENSION

Final Landform Closure Imagery and View Points

Figure | 5-22



MAP MY MINE

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Design:	R.N.
Source:	Map My Mine Pty Ltd
File:	20260608 Closure Images.aprx

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ISAAC DOWNS EXTENSION

Residual Void (Beneficial Use) and End Wall (Woodland) - Looking Southwest

Figure | **5-23**

ISAAC DOWNS EXTENSION

Residual Void (Beneficial Use) and Low Wall (Woodland) Looking Northeast

Figure | 5-24

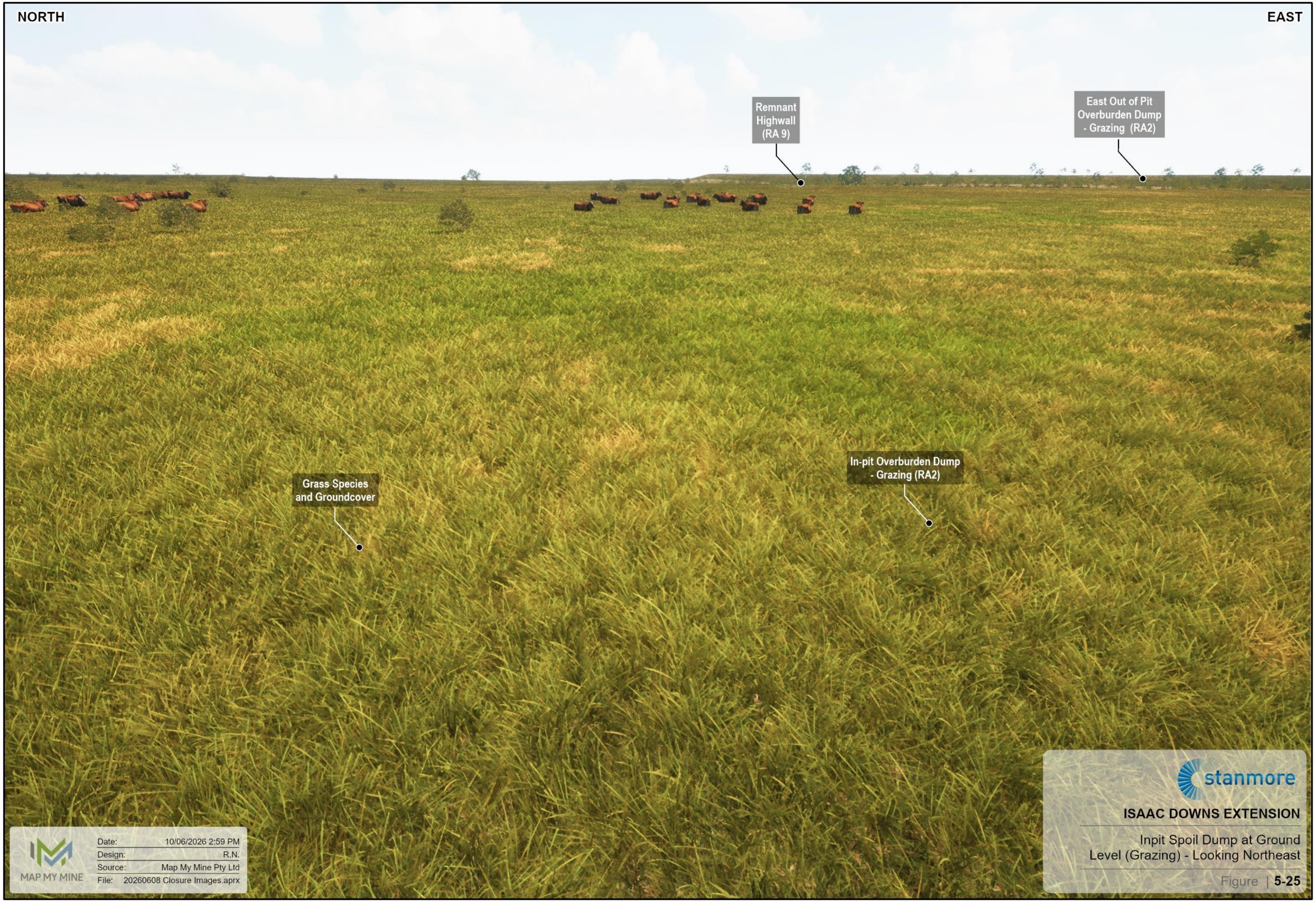
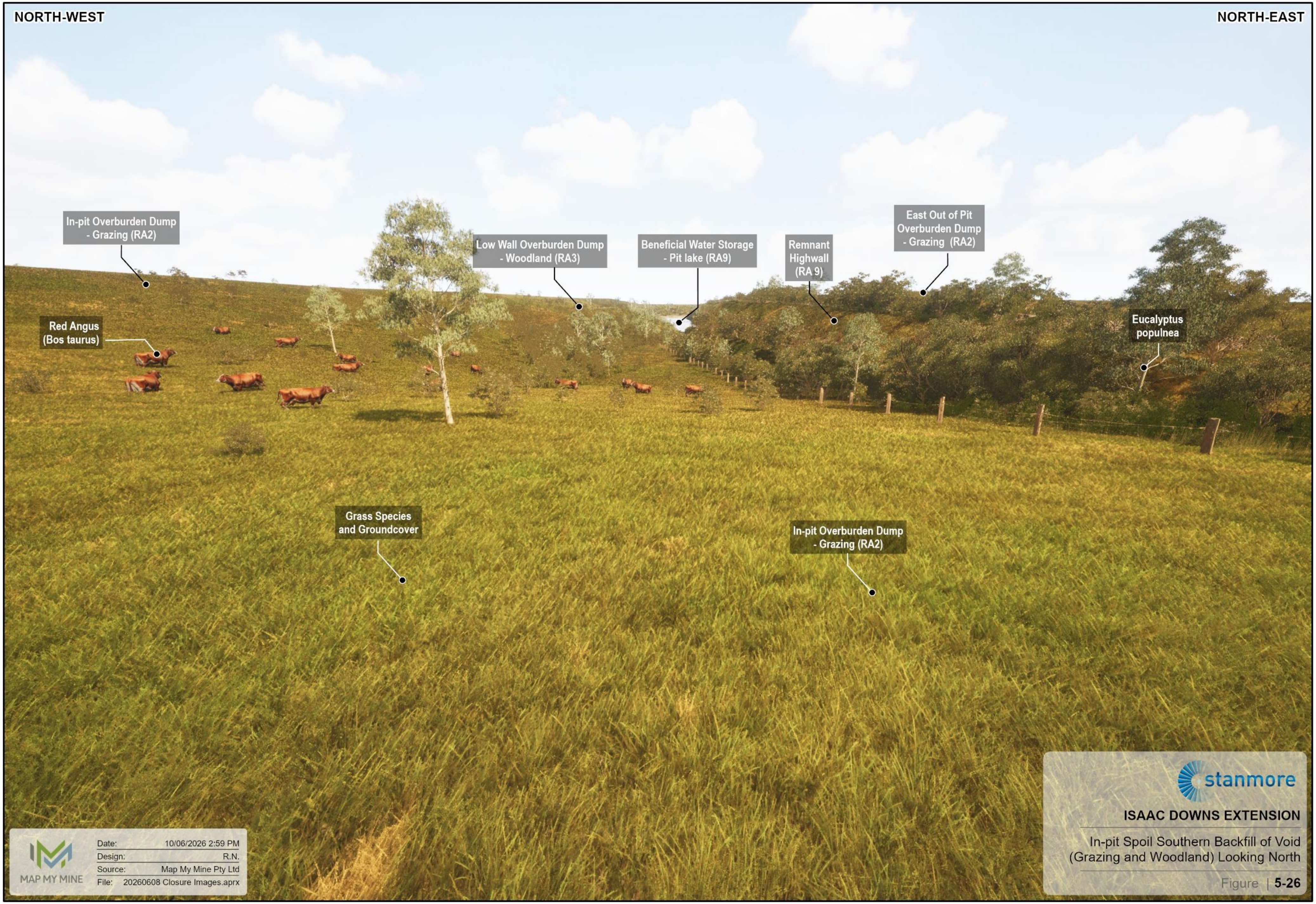

NORTH
EAST
Remnant Highwall (RA 9)
East Out of Pit Overburden Dump - Grazing (RA2)
Grass Species and Groundcover
In-pit Overburden Dump - Grazing (RA2)
MAP MY MINE
Date: 10/06/2026 2:59 PM
Design: R.N.
Source: Map My Mine Pty Ltd
File: 20260608 Closure Images.aprx
stanmore
ISAAC DOWNS EXTENSION
Inpit Spoil Dump at Ground Level (Grazing) - Looking Northeast

Figure | 5-25



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ISAAC DOWNS EXTENSION

In-pit Spoil Southern Backfill of Void (Grazing and Woodland) Looking North

Figure | **5-26**

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ISAAC DOWNS EXTENSION

Conrock Gully Diversion
(Riparian Woodland)

Figure | **5-27**

MAP MY MINE

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ISAAC DOWNS EXTENSION

Residual Void (Beneficial Use), PHES and Algae Production - Looking Northeast

Figure | **5-28**

5.10.6 Rehabilitation Practices and Milestones

5.10.6.1 Overview

The following technical studies were completed for the Project to both inform the final landform design and to address and support the planned rehabilitation practices for progressive rehabilitation and closure:

- flood modelling (**Appendix J**)
- void water balance modelling (**Appendix I**)
- void hydrogeochemical water quality modelling (**Appendix M**)
- final landform geotechnical assessment (**Appendix H**)
- baseline soil assessment (**Appendix E**)
- materials characterisation and final landform erosional stability modelling (**Appendix D**)
- groundwater modelling (**Appendix K**)
- mine waste geochemical characterisation and assessment (**Appendix F**)
- terrestrial ecology assessment (**Appendix P**).

The outcomes of these assessments are summarised in **Chapters 7**, **8**, **9**, **10** and **11** for land, surface water, hydrology and geomorphology, groundwater and terrestrial ecology, respectively, and were used to support the Project's PRCP (Section 2.6.1 of the **Appendix AB**) and PRCP schedule (**Appendix AC**).

Sections 5.3, 5.4, and 5.6 detail the evaluation processes undertaken using the Project's various technical assessments to establish the design of the Project's final landform, overburden dumps and final void, respectively.

5.10.6.2 PRCP Guideline Requirements

To meet the requirements of the PRCP Guideline, the Project's PRCP addresses the following key rehabilitation criteria:

- Hydrogeology (Sections 2.6.1.1 of **Appendix AB**).
- Flooding (Sections 2.6.1.2 of **Appendix AB**).
- Waste characterisation (Section 2.6.1.3 of **Appendix AB**).
- Soil assessment (Section 2.6.1.4 of **Appendix AB**).
- Landform design (Section 2.6.1.5 of **Appendix AB**).
- Cover design (Section 2.6.1.6 of **Appendix AB**).
- Water management (Section 2.6.1.7 of **Appendix AB**).
- Revegetation (Section 2.6.1.8 of **Appendix AB**).

The information provided in these sections of the PRCP supports the Project's progressive rehabilitation and closure planning and helps demonstrate how a safe, stable and non-polluting final landform will be achieved to support the planned PMLUs in a sustainable manner. This information has also contributed to the development of the criteria for specific Project RMs.

5.10.6.3 Landform Establishment (RM3)

Landform establishment is a key step in the rehabilitation of mining disturbance. The Project's final landform is based on the assessment outcomes provided in Sections 5.3, 5.4 and 5.6, and as a result, will form the landform establishment requirements for RM3 and will guide mine planning over the life of the Project. Noting that mine planning is the one of key factors in the facilitation of progressive rehabilitation as prescribed by the PRCP schedule.

For the Project, RM3 applies to all RAs, except RA7, RA9 and RA10 (Table 5-2).

5.10.6.4 Surface Preparation (RM4)

Surface preparation is a key step for those rehabilitation areas requiring revegetation, and as a result, it applies to the following Project PMLUs:

- Native vegetation (riparian woodland) – Conrock Gully
- Grazing
- Native vegetation (woodland) – final low wall batter (≤25%)
- Native vegetation (riparian) – river/creek crossings.

Therefore, RM4 applies to all RAs, except RA7, RA9 and RA10 (Table 5-2).

Surface preparation for the Project will comprises the return of a growth media (e.g. topsoil), contour ripping to improve water infiltration, rock armouring to assist slope stabilisation (RA3), and if required, soil amelioration to improve fertility and/or reduce dispersion. Surface preparation is outlined in Section 2.6.1.8.3 of **Appendix AB**.

5.10.6.5 Revegetation (RM5)

Revegetation is a critical rehabilitation step for establishing the selected flora for the Project PMLUs listed in Section 5.10.6.4. Once established, revegetation also aids slope stability, minimises erosion, protects against flood scour, and contributes to the improvement of surface runoff water quality.

The final void - beneficial use water storage and permanent infrastructure – PHES and/or algae production PMLUs do not possess specific revegetation requirements due to their unique nature. Section 5.9 details the requirements for these PMLUs.

Section 2.6.1.8 of **Appendix AB** provides the revegetation requirements for the Project, and are categorised into the following management steps:

- Objectives (Section 2.6.1.8.1 of **Appendix AB**)
- Species of conservation significance (Section 2.6.1.8.2 of **Appendix AB**)
- Surface preparation and topsoil quality to support vegetation establishment and management (Section 2.6.1.8.3 of **Appendix AB**)
- Plant species (see Section 2.6.1.8.4 of **Appendix AB**)
- Vegetation establishment and management methods (Section 2.6.1.8.5 of **Appendix AB**)
- Revegetation monitoring (Section 2.6.1.8.6 of **Appendix AB**)
- Revegetation monitoring – analogue reference sites (Section 2.6.1.8.7 of **Appendix AB**)
- Revegetation milestones and objectives – grazing (Section 2.6.1.8.8 of **Appendix AB**)
- Revegetation milestones and objectives – woodland habitat RE benchmarks – RE11.3.25 and RE11.5.3 (Section 2.6.1.8.9 of **Appendix AB**)
- Revegetation milestones and objectives – revised benchmarks – RE11.3.25 and RE11.5.3 (Section 2.6.1.8.10 of **Appendix AB**).

RM5 applies to all RAs, except RA7 and RA9 (Table 5-2).

5.10.6.6 Achievement of Surface Requirements (RM6)

Achievement of the surface requirements requires up to 10 years (Table 5-3) because it must allow for the gradual establishment of the required vegetation to their milestone success criteria, which may also be impacted by external factors, such as climatic conditions (e.g. rainfall, drought and extreme weather events), poor nutrient levels, poor seed quality and timing of the rehabilitation activities. As highlighted in Section 5.10.6.5, the positive progression of revegetation also assists in the improvement of surface water quality (runoff).

The surface criteria for the Project will be achieved through the successful monitoring of revegetation (Section 2.6.1.8.6 of **Appendix AB**), groundcover establishment (Table 15 of **Appendix AB**), erosion status

(Table 17 of **Appendix AB**), surface water (Section 2.8.6.2 of **Appendix AB**) and groundwater (Section 2.8.6.3 of Appendix AB), against their applicable milestone success criteria. This monitoring will be conducted by an appropriately qualified person.

RM6 is a key monitoring phase of the Project's progressive rehabilitation towards closure.

RM6 applies to all RAs, except RA7 and RA9 (Table 5-2).

The Project's rehabilitation monitoring is further discussed in Section 5.10.8.

5.10.6.7 Achievement of the PMLU and the PMLU Water Quality (RM7, RM8)

Achievement of a stable PMLU and PMLU water quality are demonstrated by positive long-term-monitoring results that when scientifically analysed confirm that the applicable milestone completion criteria are properly established.

RM7 and RM8 are the certification phases of the Project's progressive rehabilitation and allow the eventual progression to closure by demonstrating that the PMLU is safe, stable, non-polluting, sustainable and the associated water quality is acceptable (i.e. surface water and groundwater). This certification is undertaken by an appropriately qualified person. Closure of the Project will be achieved when the PRCP schedule is fully completed and the EA and MLs are subsequently surrendered.

RM7 applies to all RAs, except RA7 and RA9, and RM8 applies to all RAs, except RA3, RA7, RA9 and RA10 (Table 5-2).

5.10.6.8 Other Project Rehabilitation Milestone (RM1, RM2, RM9, RM10)

RM1 involves the decommissioning and removal of the Project's infrastructure and is described in Section 5.5. RM1 applies to all RAs, except RA1, RA7, RA9 and RA10 (Table 5-2).

RM2 involves the identification, remediation and validation and/or removal of contaminated land in accordance with the requirements of Chapter 7, Part 8 of the EP Act. RM2 only applies to RA4 and RA5 (Table 5-2).

RM9 involves the establishment of the final void as a beneficial water storage PMLU and is described in Sections 5.6, 5.7, 5.8 and 5.9. RM9 only applies to RA9 (Table 5-2) and can only be undertaken after the cessation of mining activities.

RM10 involves the establishment of the final void - beneficial use water storage and permanent infrastructure – PHES and/or algae production PMLUs, with algae production described in Section 5.9.3 and PHES described in Section 5.9.4. RM10 only applies to RA7 (Table 5-2) and can only be undertaken after the cessation of mining activities.

5.10.7 Risk Management

In accordance with section 126C(1)(f) of the EP Act and Section 3.7 of the PRCP Guideline, the Project's PRCP risk assessment has identified the risks of the planned PMLUs not achieving a stable condition, and has presented how these risks will be managed and minimised. In summary, the Project's PRCP risk assessment confirmed that with the application of the proposed mitigation measures to the assessed risk events, the residual risks would be low to medium. Section 2.7 of **Appendix AB** provides the Project's risk assessment.

5.10.8 Monitoring and Maintenance

As outlined in Sections 5.10.6.5, 5.10.6.6 and 5.10.6.7, monitoring of the milestone success criteria for the RMs associated with each of the Project's PMLUs, as outlined in Table 12 of **Appendix AB**, is critical to demonstrating rehabilitation success and certifying that the PMLU is safe, stable, non-polluting, sustainable and the associated water quality is acceptable (i.e. surface water and groundwater).

Monitoring of the milestone success criteria for the RMs associated with each of the Project's PMLUs also allows areas of sub-standard rehabilitation to be identified and repaired, and if required, further investigations to be conducted to identify new methodologies or measures to re-establish rehabilitation success.

The Project's planned monitoring and maintenance regime for progressive rehabilitation and closure is provided in Section 2.8 of **Appendix AB** and comprises the following components:

- Rehabilitation milestone monitoring (Section 2.8.1 of **Appendix AB**)
- Grazing and native vegetation (woodland) monitoring – general requirements (Section 2.8.2 of **Appendix AB**)
- Grazing rehabilitation monitoring (Section 2.8.3 of **Appendix AB**)
- Native vegetation (woodland) monitoring (Section 2.8.4 of **Appendix AB**)
- Native vegetation (riparian woodland) – Conrock Gully PMLU – diversion monitoring (Section 2.8.5 of **Appendix AB**)
- Water quality monitoring – surface water and groundwater (Section 2.8.6 of **Appendix AB**)
- Groundwater level monitoring (Section 2.8.7 of **Appendix AB**)
- PMLU achievement schedule (Section 2.8.8 of **Appendix AB**)
- Data analysis and reporting (Section 2.8.9 of **Appendix AB**)
- Maintenance (Section 2.8.10 of **Appendix AB**)
- Quality assurance and data management (Section 2.8.11 of **Appendix AB**).

5.10.9 PRCP Schedule Audits

As required by sections 285-288 of the EP Act, the proponent, as the PRCP Schedule holder, will commission an independent rehabilitation auditor every three years to conduct an audit of the PRCP schedule and submit an audit report four months after the end of the audit period.

5.11 Conclusion

The Project's progressive rehabilitation and closure planning described in the PRCP (**Appendix AB**) and draft PRCP schedule (**Appendix AC**) that were developed in accordance with the PRCP Guideline.

Numerous technical assessments were completed to develop, support and inform the final landform design (including a residual void), the planned PMLUs, the PRCP and PRCP schedule. These technical assessments are provided as appendices to the Project's EIS.

Key mine planning constraints that informed the Project's final landform design included locating the residual void out of the 0.1% AEP floodplain, identifying PMLUs for the residual void, a permanent diversion of Conrock Gully, tenement and proposed disturbance area boundaries and economic considerations. Stakeholder, including landholder, and community consultation has informed, and will continue to inform, the Project's PRCP.

Detailed option analyses were completed to guide the design of the Project's final landform, including dumps and residual void. The Project does not propose a NUMA as part of the closure landform.

The Isaac River levee will be decommissioned and rehabilitated post mining, allowing for a similar floodplain as existed pre-mining. The northern portion of the pit area will be backfilled to pre-mining topographical levels to achieve this outcome.

An objective of final landform design was to maximise in-pit dumping, with around 90% of overburden dumped in-pit, and thereby minimise out of pit dumping and the size of the residual void.

The location and design of dumps was informed by floodplain extents, tenement boundaries, ecological values, the location of infrastructure required to support Project activities, and economics. Dump design was informed by slope angles, soils proposed for use as a growth media, geochemistry of spoil, vegetation cover, landform erosion modelling, ability to support the proposed PMLU (primarily grazing), and geotechnical modelling.

A residual void lake will form in the void post mining, with the residual void geometry and catchment influencing the long term lake levels and quality. Options for the configuration of the residual void and its catchment were assessed, with the objective of achieving lake volumes and quality that would support one or more PMLUs. Residual void numerical water balance modelling, inclusive of all water inputs and outputs over 500 years post mining, was completed for several void configuration options. The preferred option is to minimise the lake surface area (i.e. minimise void size) whilst maximising the catchment from the in-pit dump. Void water geochemistry modelling demonstrates that the preferred residual void configuration can provide a PMLU of livestock drinking water supply for cattle over the long term. Modelling demonstrates that the preferred residual void configuration will be geotechnically stable and act as a permanent groundwater sink.

Two additional PMLUs were assessed as being technically and commercially feasible, based on the use of water from the residual void, namely PHES and algae production. The proposed algae production facility is backed by research from the University of Queensland, with void water volumes and quality able to support the facility. PHES is based on a small scale system, largely utilising infrastructure that supported mining.

Ten RAs have been defined for the Project's PRCP. Each RA is planned to be progressively rehabilitated to a PMLU that is safe, stable, non-polluting and sustainable. RMs have been developed for these RAs, and identify each significant event or step necessary to progressively rehabilitate the disturbed land to its PMLU. RM criteria have been developed for the draft PRCP schedule, informed by the technical assessments completed for the Project, to assess whether a RM has been successfully achieved. The draft PRCP schedule describes the timing of completion of each RM for each relevant RA.

The Project's planned PMLUs are grazing (e.g. dumps and infrastructure areas) native vegetation (riparian woodland) along Conrock Gully, native vegetation (woodland) for the final low wall batter of the in-pit dump, native vegetation (riparian) for river/creek crossings, beneficial use water storage for the residual void, and permanent infrastructure for the PHES and/or algae production facility.

The Project's progressive rehabilitation and closure achieves the applicable environmental objectives and performance outcomes of the EP Regulation. Technical assessments completed for the EIS demonstrate that the Project's planned PMLUs for the final landform are safe, stable, non-polluting, sustainable, and beneficial for post mining landholders, other stakeholders and the community.

5.12 References

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