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12/07/2024

Dr Alison Cummings
Manager, Environmental Services
Coal and Central Compliance
Department of Environment, Science and Innovation
PO Box 3028, Emerald, Qld, 4720

Dear Alison,

Please see attached Newlands EA change amendment application (in pdf format). The link to the high resolution mapping has been sent previously by email.

Please let me know if you require any further information.

Yours sincerely

Craig Bushell
Environment & Community Manager
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Newlands EA Amendment

– Change Application

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Table of Contents

Acronyms and Abbreviations

Acronym	Meaning
ACARP	Australian Coal Industry's Research Program
AHD	Australian Height Datum
DESI	Queensland Department of Environment, Science, and Innovation
EA	Environmental Authority
EIS	Environmental Impact Statement
EM Plan	Environmental Management Plan
EP Act	Environmental Protection Act 1994
ERM	Environnemental Ressources Management Australia Pty Ltd
LOM	Life of Mine
LOD	Land Outcome Document
ML	Mining Lease
NOC	Newlands Open Cut
NCM	Newlands Coal Mine
NUMA	Non-Use Management Area
PMLU	Post-Mining Land Use
PRCP	Progressive Rehabilitation and Closure Plan
SKM	Sinclair Knight Merz
t	Tonnes

1. Introduction

This document has been prepared by Environmental Resources Management Australia Pty Ltd (ERM) on behalf of NC Coal Company Pty Ltd (NC Coal). It is intended to be read in support of an Environmental Authority (EA) Amendment Application in relation to the existing EA (EPML00817713), which covers various mining leases (MLs) (refer Section 1.1 for specific details) that form the Newlands Open Cut (NOC).

The purpose of this report is to accompany the application to amend an Environmental Authority submitted by NC Coal Company on 15 September 2023 (ref: A-EA-AMD-100440668). This document presents a change application to the amendment, as an 'other change' as defined in s238 of the *Environmental Protection Act 1994* (EP Act). The change application presents supporting information and additional detail to the original application. Table 1-1 below shows how the change application differs from the EA Amendment Application, and the changes being sought are as follows:

- A change is sought to the application regarding the designated Post Mining Land Use (PMLU) for the site. The current EA imposes a maximum 15% on slopes for land with a grazing PMLU. This change application is seeking to define and limit where land with a grazing PMLU would exceed a 15% slope.
- This change application also seeks to introduce a new amendment for the inclusion of additional Non-Use Management Areas (NUMAs). The existing EA amendment did not consider NUMAs. This change application is seeking to change the closure outcome of five final voids, resulting in five additional NUMAs.

Table 1-1 Change to EA Amendment Application being sought

Aspect	EA Amendment Application A-EA-AMD-100440668 (15 September 2023)	Change Application (this document)
Completion criteria for grazing PMLU	Removal of 15% maximum slope	Removal of 15% maximum slope.
	Inclusion of outcome-based completion criteria	Definition of the proportion of grazing land in slope classes 0-5%, 5-10%, 10-15%, 15-20%, 20-25%, 25-30%, and >30%
NUMAs	No change	5 additional NUMAs

This report contains the supporting information required by the EP Act within sections 3 and 4.

A Transitional Progressive Rehabilitation and Closure Plan (PRCP) has been prepared and submitted for NOC on 11 October 2023 and an updated Transitional PRCP is due 4 February 2025. This document outlines the final site design and the PMLUs. The Transitional PRCP proposes land uses at NOC that includes:

- Native ecosystem (light woodland with grazing as a management tool);
- Riparian corridor and water management;
- Managed resource protection; and
- Grazing.

There is also an existing NUMA in the Wollombi area, as provided for in the current EA.

It is intended that the amendments outlined above will:

1. Avoid potential inconsistencies that may arise between the EA and the Transitional PRCP;
2. Ensure land is utilised appropriately and to the highest potential; and
3. Avoid unnecessary rework.

This document is to be read in conjunction with the EA Amendment Application (15 September 2023 (ref: A-EA-AMD-100440668)).

1.1 Site Location

The NOC is an open cut coal mining operation, located within the Bowen Basin, approximately 130 km west of Mackay and 30 km north-west of Glenden. There are multiple different operational areas, including satellite deposits which make up the overall NOC site (refer to Figure 1-1).

The operations of the NOC are in the following areas:

- Newlands Main Deposit Operational area;
- Eastern Creek Operational area; and
- Suttor Creek Operational area (which includes the Wollombi Pit).

The MLs that form the NOC are listed in Table 1-2 below.

Table 1-2 Mining Lease

NOC Operational Areas	Mining Lease
Newlands Operational Area	ML4748 ML4771 ML4774 ML10176 ML10316 ML10317 ML10322 ML10348 ML10352 ML10361 ML10362
Eastern Creek Operational Area	ML4754 ML4755 ML10322

NOC Operational Areas	Mining Lease
	ML10352
Suttor Creek Operational Area	ML70460 ML4761

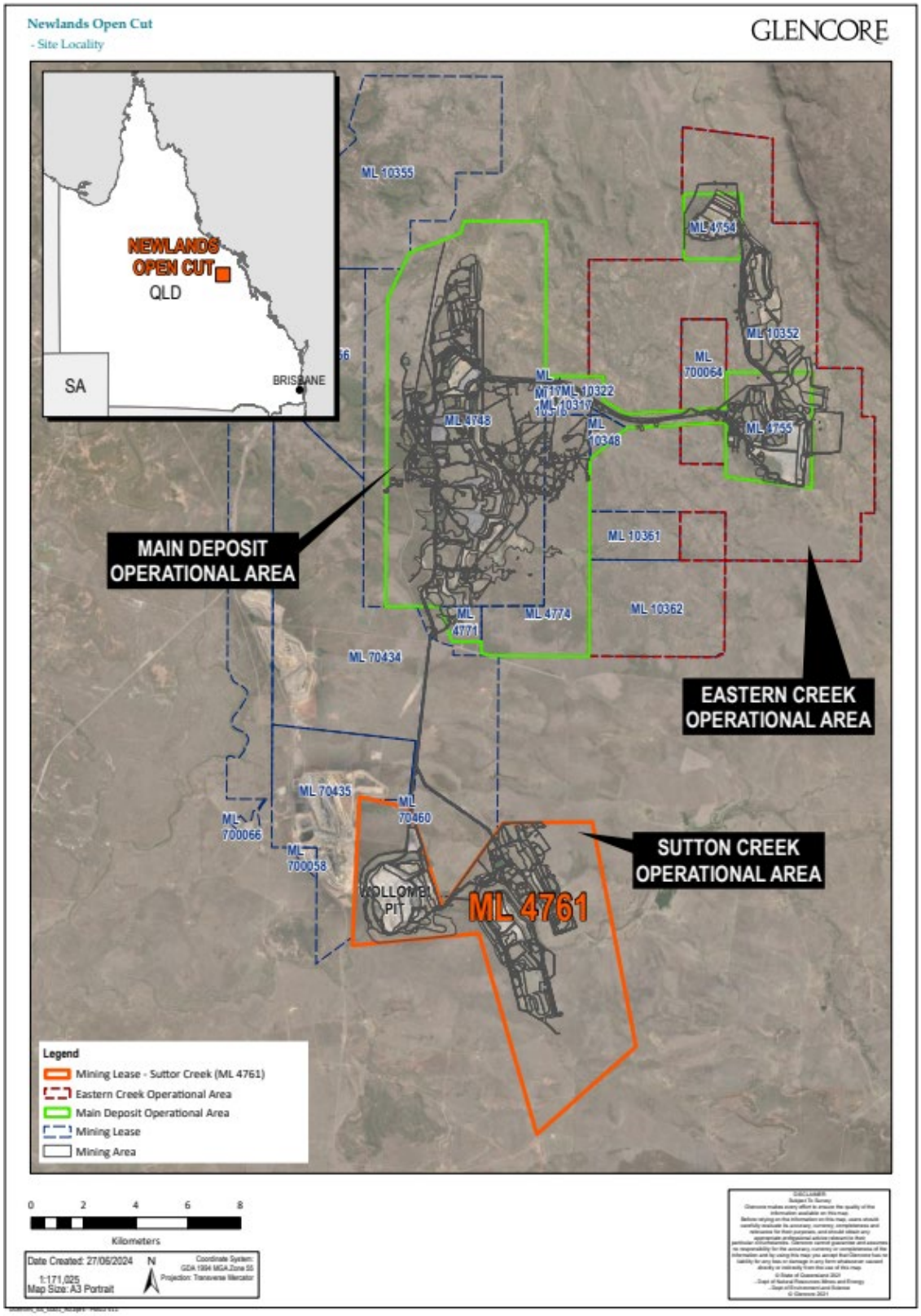

Figure 1-1 Newlands Open Cut

1.1 Approvals History

The NOC has a long history of operations and has been subject to several expansions, modifications, and updates to mining methods and areas over time. The current / latest version of the EA (EPML00817713) in place was approved by the Department of Environment and Science (DES) on 2 February 2023.

The application to amend the latest EA was submitted by NC Coal Company on 2nd June 2023. On the 19th June 2023, the department determined the application was not properly made. A revised application with additional information was provided on the 15th September 2023. This application was determined as properly made (ref: A-EA-AMD-100440668).

On the 5th December 2023, the department issued an information request related to the application to amend the EA.

On the 11th October 2023, NC Coal Company submitted an application for a proposed PRC Plan (ref: C-EATPRCP-100318349). The department issued an Information Request relating to the PRC Plan application on the 15th January 2024.

Based on a review of the Information Requests, and subsequent meetings with DESI, this change application for the EA amendment application (ref: A-EA-AMD-100440668) has been prepared. The intention of this change application is to avoid potential inconsistencies between the EA and the Transitional PRCP.

1.2 NOC closure stage update

NOC transitioned from operations to closure in early 2023.

The progression of the mine from operations to closure has implications for the management of the site. NOC is currently responding to the Transitional PRCP including Request for Information (RFI), issued by the Department of Science and Innovation (DESI) (ref: C-EATPRCP-100318349), including rationalising the groundwater monitoring network, updating models for closure and refining rehabilitation schedules.

In moving from operational to closure phases, potential inconsistencies have been identified between the current description of objectives in the conditions of the EA, and the milestones being developed as part of the Transitional PRCP. This EA change application, to the current EA Amendment Application addresses inconsistencies around:

- Grazing slope requirements; and
- Voids that are to be designated as NUMAs.

2. Rationale for Change Application

This section presents the rationale for the change application to EA Amendment Application submitted on 15th September (ref: A-EA-AMD-100440668), as outlined in Section 1.

NOC currently operates under EA EPML00817713 issued 2 February 2023. This change application proposes to amend the EA Amendment Application to include conditions relating to the PMLUs, NUMAs and rehabilitation requirements for different domains. The intention of this change application is that the EA be used as the as the primary Land Outcome Document (LOD) for the development of the NOC Transitional PRCP.

NC Coal has consulted extensively with the DESI to determine the appropriate outcomes for voids at NOC, and to reach an agreement relating to the completion criteria for rehabilitated land to meet the most productive use of land.

On the 5th December 2023, DESI issued an information request which outlined nine items relating to the proposed EA Amendment Application. The requested information is broadly summarised as:

- Provision of additional justification of the proposed changes to the slope limits for a grazing PMLU;
- Justification for the selected PMLU for a given area;
- Additional information relating to the Completion Criteria for the PMLUs;
- Additional discussion around the impact of erosion on grazed steeper slopes;
- Additional assessment of the proportion of slopes within the mining areas;
- Assessment of the potential impact of under-grazing of steep slopes;
- Further information on existing rehabilitation success of grazing areas on the mine;
- Provision of maps with slope assessments for the different PMLUs; and,
- Updated PMLU outcomes for void lakes

On the 9 May 2024, DESI met with NC Coal to discuss the slopes and PMLUs as they relate to the NOC. NC Coal raised the suitability of land with slopes >15% for use as grazing land, and the practicalities of assigning and managing small discrete areas of land >15% slope as a different PMLU to surrounding flatter areas. NC Coal also identified that the surrounding landscape, which was predominantly used for grazing, included a number of natural features and areas with slopes >15%, including escarpments which are ultimately not dissimilar to the proposed highwalls. DESI acknowledged that it would not be practical to define and manage small areas of land with slopes >15% as a separate PMLU.

On the 14 May, DESI provided written feedback to the discussions from the meeting on 9 May 2024 clarifying their position and outlining their expectations. The advice included confirmation that slopes up to 20% may have potential to support grazing, depending on the management strategies applied, and that areas with a small portion of slopes >20% may be included in a PMLU of grazing. This statement included some examples based on images of slope maps provided in the meeting on the 9 May 2024. The advice detailed that voids, highwall, setback area, bund and fencing should be excluded from the areas designated as having a grazing PMLU, noting that the area between the exclusion bund to the highwall would not have safe access to support an outcome such as grazing. Therefore, this

change application to the EA Amendment Application is proposing areas of suitable for a grazing PMLU supported by slope mapping.

In the same meeting, NC Coal discussed the results of preliminary modelling which indicated that some of the final voids at the site would form permanent water bodies, likely with elevated salinity. In the Transitional PRCP, NC Coal's position was that, while water quality did not meet the stock water quality guidelines, the open water and drainage features would contribute to additional micro-climates and microhabitat areas which would increase diversity across the landscape. DESI advised NC Coal they did not support a PMLU for pit lakes with permanent water with a Total Dissolved Solids (TDS) above 4,000 mg/l once a steady state water level has been achieved. DESI recommended that NC Coal apply to amend their EA to include these pit lakes as NUMAs to address the Transitional PRCP requirements. Therefore, this change application for the EA Amendment Application is proposing five NUMAs due to their predicted water quality being higher than 4,000 mg/L TDS or approximately 5,970 µS/cm Electrical Conductivity (EC) at steady state water level condition based on Stock Water Drinking Guidelines (ANZG, 2023).

2.1 Grazing on slopes

Rehabilitation has been completed across approximately 20% of the NOC site, on a range of landforms. As the site advances through the closure program, a number of elements of the site's rehabilitation are being refined. This includes the final landform for the former open pits which are proposed to have PMLU which includes some of the rehabilitated land being used for grazing.

As more detail becomes available closer to the site's closure, the final landform can be designed with a higher degree of accuracy. Schedule H of the EA outlines the conditions relevant to land rehabilitation. Outlined in this table is the requirement for a slope angle of <15% for grazing areas, as well as requirements for diversity and abundance of groundcover.

As the final landform design is being refined, the maximum 15% final slope requirement is proving to be particularly restrictive, and placing an unnecessary constraint on the productive use of the land greater than 15%. The slope angle requirements are resulting in a significant amount of rework and ground disturbance in order to accommodate a grazing PMLU. The intention of the rehabilitation requirements outlined in Table H1 of EA Schedule H is to ensure the final landform is safe, stable, and non-polluting and suitable for its intended PMLU.

The requirement for a 15% maximum slope angle (as outlined in Table H1 of EA Schedule H) is considered overly restrictive. Without consideration of other land stability factors, the slope angle itself will not necessarily lead to a stable landform for grazing.

2.1.1 Slope Mapping

The final landform design for NOC has been an iterative process, involving consideration and integration of a range of technical studies and optimisations of the landform. As part of the closure planning and preparation works completed for the NOC, a series of maps have been produced which show the slopes across the landscape currently (where the bulk of land forming rehabilitation works have been completed) and for proposed landforms in areas where landscaping is ongoing.

The maps presented in Appendix A provide a breakdown of the slopes by subcategory, for ease of identification of areas <5% slope, to areas >30% slope. These maps cover the three operational areas (Main Deposit, Eastern Creek, Suttor Creek) including both areas disturbed by mining and undisturbed areas. The maps exclude NUMAs which are discussed further in Section 2.2. Where highwalls remain

in the landscape, these are indicated as having a slope interval as >30% and are in fact much steeper than 30%. Some of the areas included in the slope maps include the final voids, which are expected to form permanent water bodies and contain water quality suitable for classification as livestock consumption and a grazing PMLU.

2.1.2 Planning for Post Mining Land Use

Table 2-1 describes the proposed PMLU and the equivalent PMLU references in relevant LODs.

Table 2-1 PMLUs and LOD equivalents

PMLU	EA[1]	NCEP[1]	W2SAP[1]
Grazing	Grazing	Land Suitability Class Class 5 (unsuitable for grazing) Land Suitability Class Class 4 (suitable for grazing)	Land Suitability Class 4 (suitable for grazing)
Light Woodland (with grazing as a management tool)[4]	Natural communities	Four voids retained	
Managed Resource Protection[3]	NA	NA	NA
Riparian Corridor and Water Management[2]	Native*Eucalyptus tereticornis/Corymbia tessellaris* community	NA	NA
NUMA	Wollombi NUMA	NA	Land Suitability Class Class 5 (unsuitable for grazing), ie non-beneficial use

1: EA = Environmental Authority; NCEP = Newlands Coal Extension Project; W2SAP = Wollombi No. 2 Surface Area Project
2: Land both disturbed and undisturbed by mining activities
3: Land not disturbed by mining activities
4: Retained voids and highwalls other than designated NUMAs

2.1.3 Proposed PMLUs

On the basis of the above, and with consideration to the slope classification and discussions with DESI, it is proposed that the PMLUs as nominated in Figure 2-1 to Figure 2-7 below be applied to the NOC. The determination of NUMAS for voids at Ramp 13N, Banrock Saddlers, Ramp 15-17, Ramp 18-20, and Ramp 6N is discussed in Section 2.2.

Most of the areas unaffected by mining within the NOC MLs were grazed prior to commencement of mining and continue to be grazed to present day. The predominant PMLU for these areas is light woodland and grazing.

The grazing PMLU will contain a diversity of self-sustaining grasses and native vegetation targeted for those areas with favourable grazing attributes and a potential for the land to become adequately productive. The grazing PMLU has been determined in consideration of slope, with areas containing substantial portions of land with slopes >15% not included within the grazing landscape. The focus of the PMLU boundaries is to define areas that can be sensibly managed and separated from adjacent areas with different PMLUs.

The Light Woodland (with grazing as a management tool) PMLU contains a diversity of native vegetation types. This is a complex and heterogeneous PMLU, with high habitat variability across multiple footprints. This PMLU is expected to include steep rocky cliffs and scarps, and other areas deemed unsuitable for cattle grazing as a primary land use. The highwalls and area to the bund or fencing, while not suitable for grazing, are areas considered to provide habitat for a range of native fauna and increase the habitat diversity of the pre-mining NOC MLs and therefore have been included in this PMLU (where not defined as a NUMA).

In addition to Figure 2-1 to Figure 2-7 below, high quality maps are provided in Appendix B, along with a series of slope maps which present the slope categories for the areas with a grazing PMLU in Appendix C.

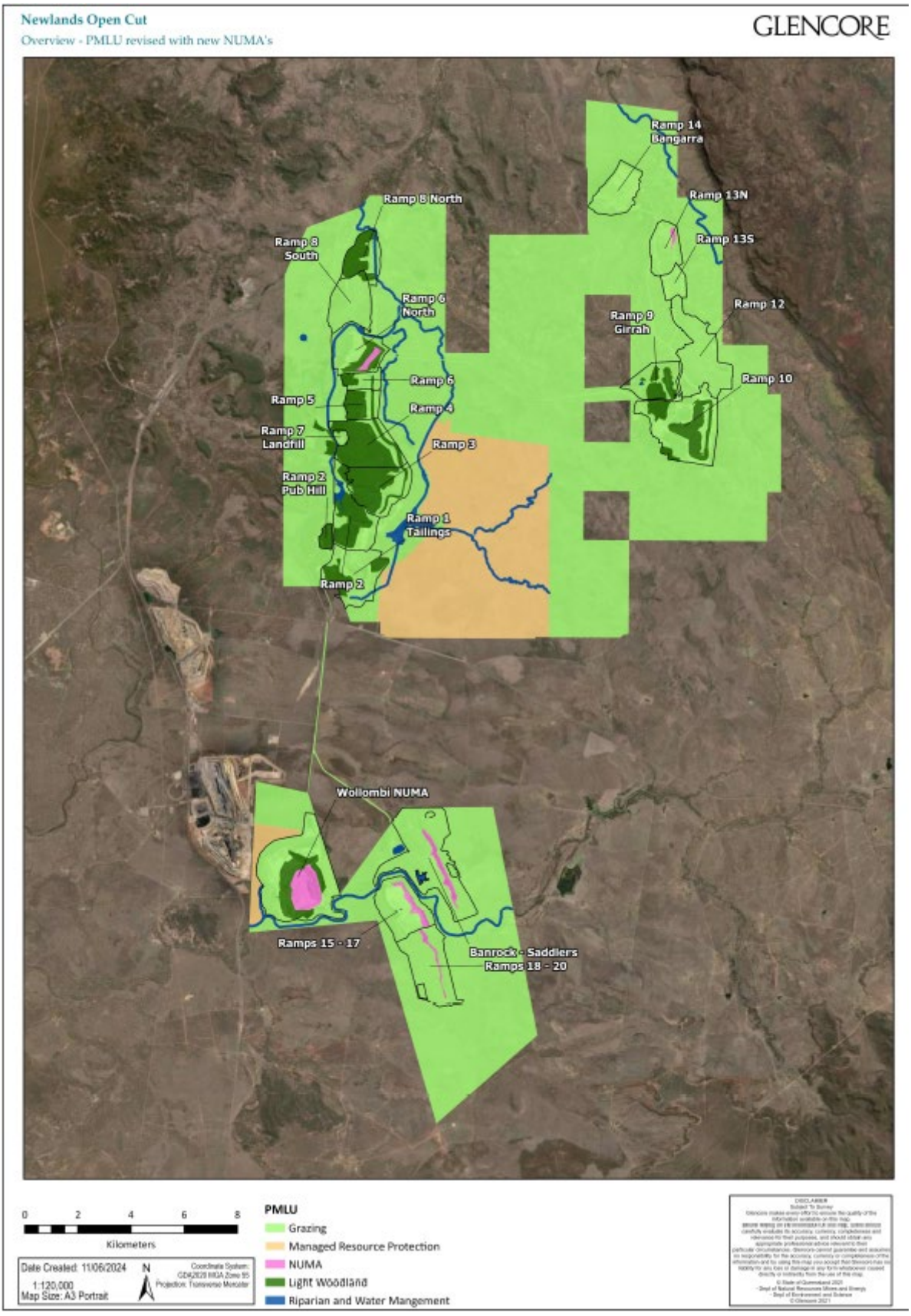

Figure 2-1 Post Mining Land Uses Overview

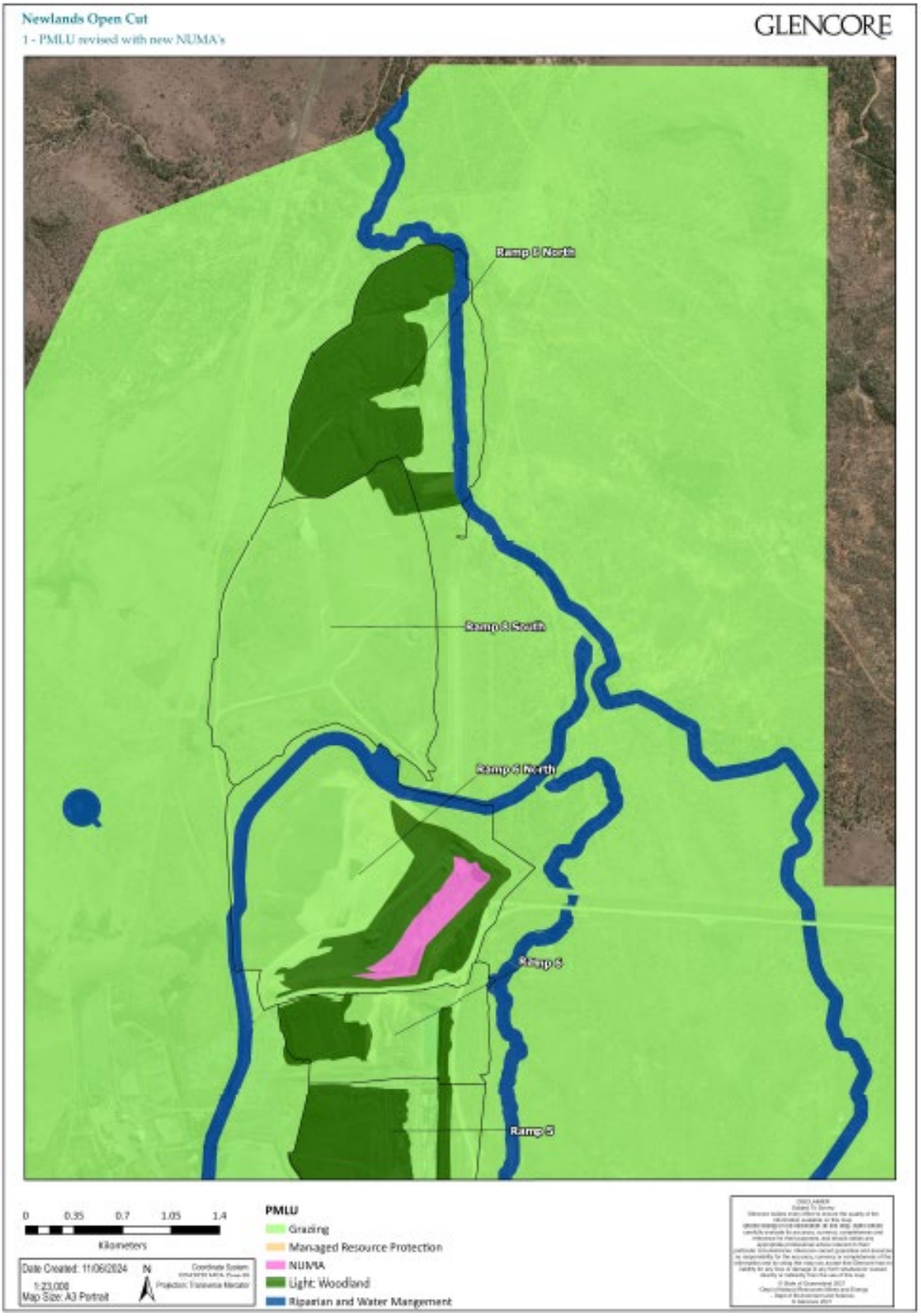

Figure 2-2 Main Deposit PMLUs Map 1 of 2

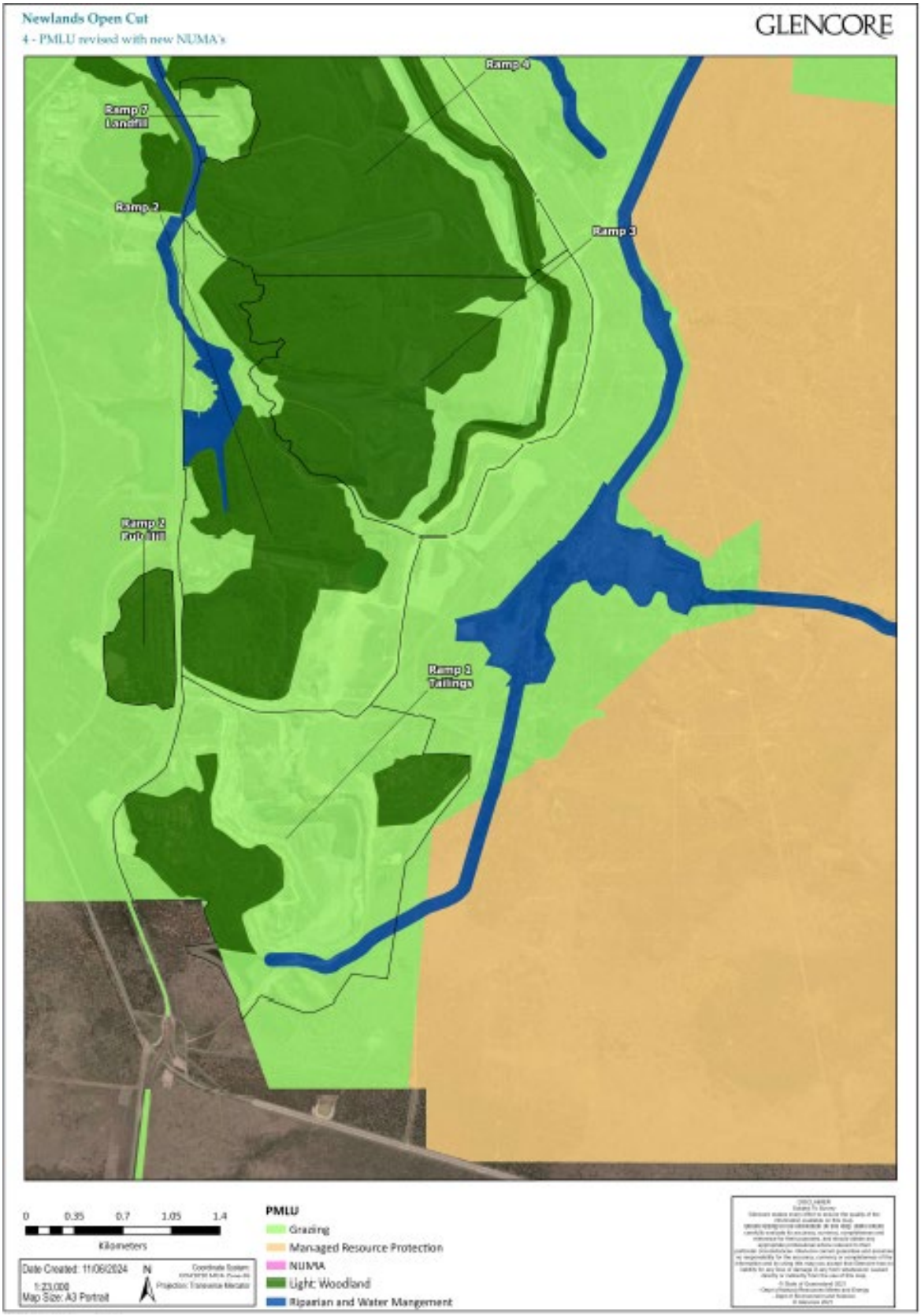

Figure 2-3 Main Deposit PMLUs Map 2 of 2

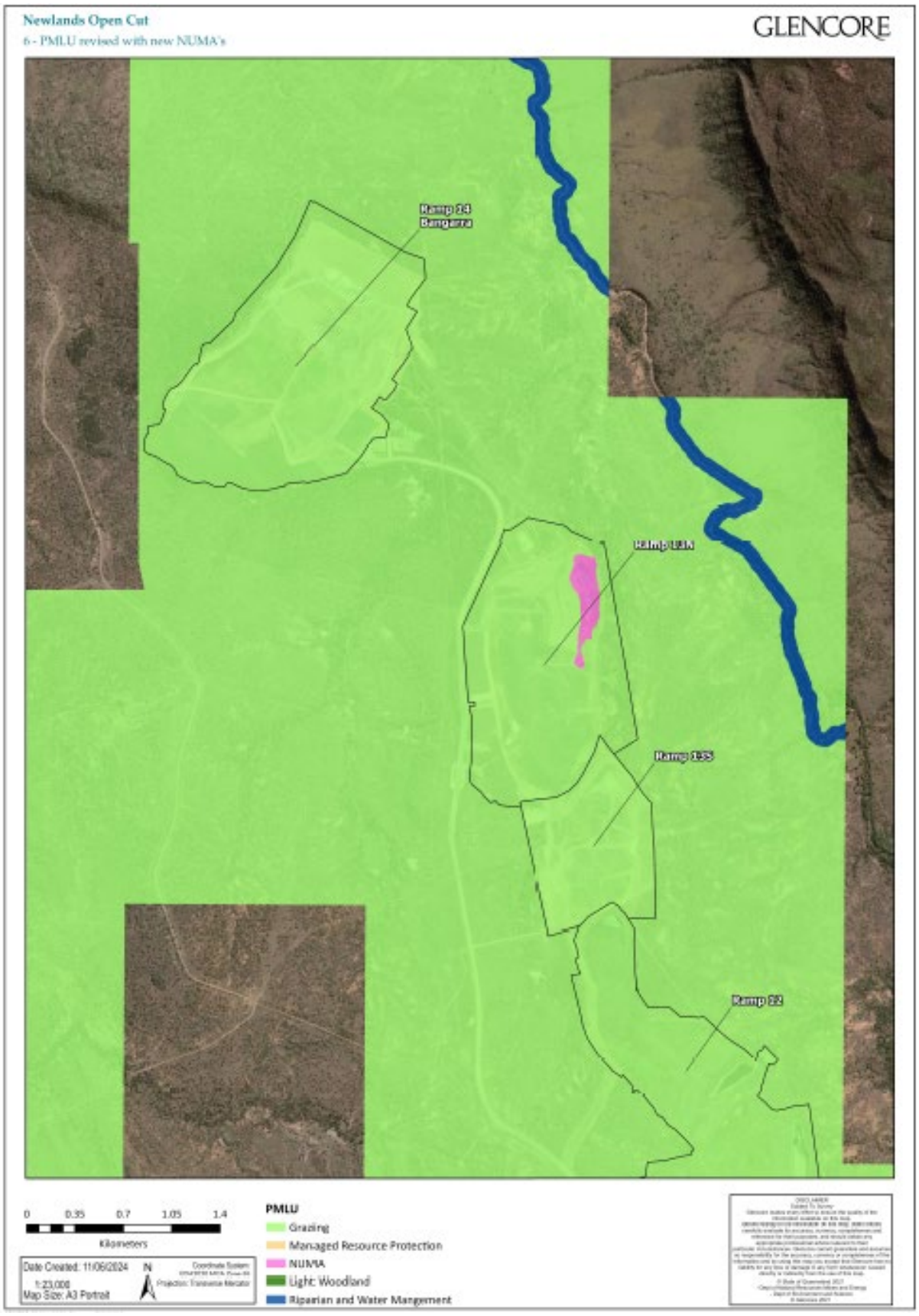

Figure 2-4 Eastern Creek PMLUs Map 1 of 2

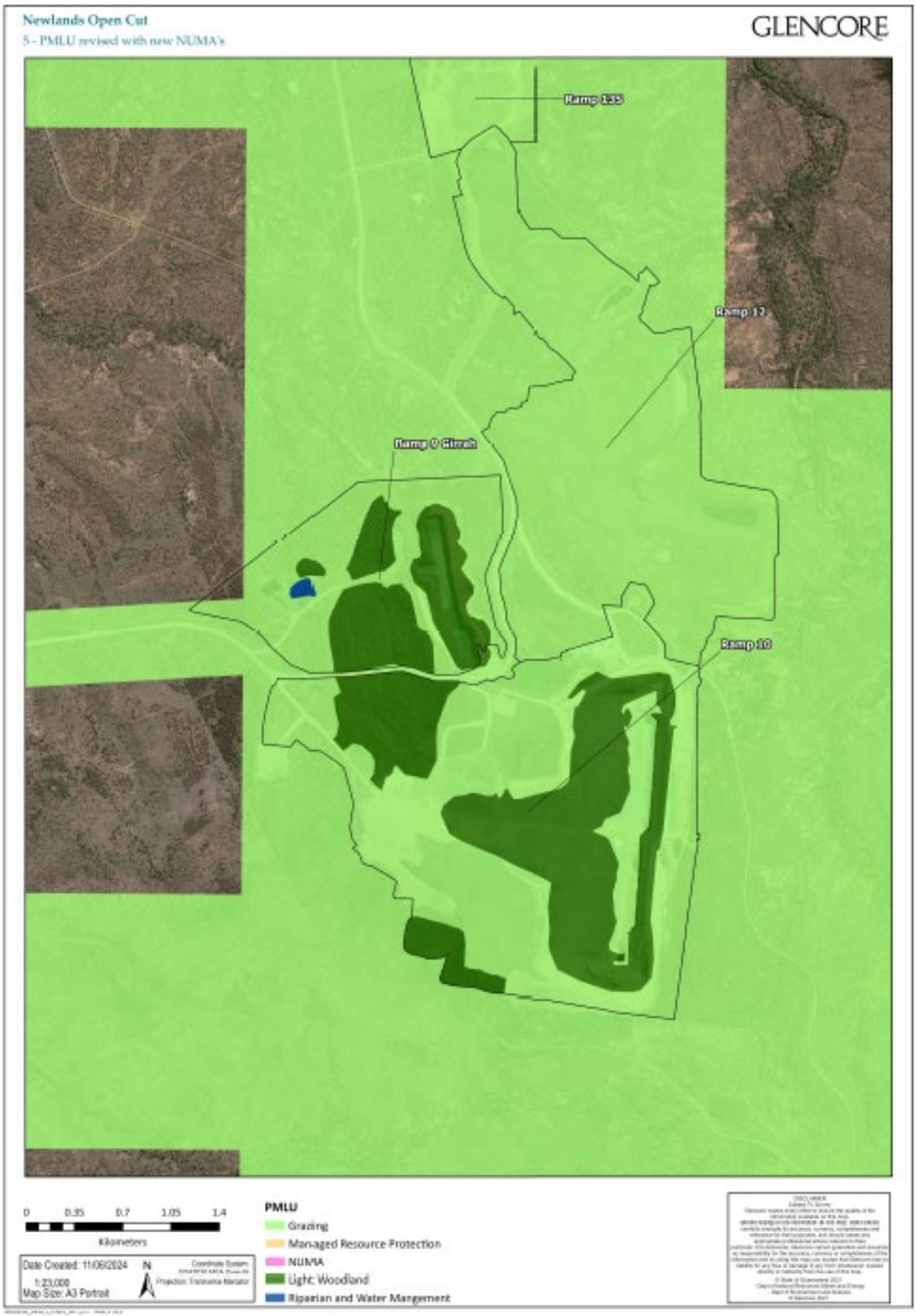

Figure 2-5 Eastern Creek PMLUs Map 2 of 2

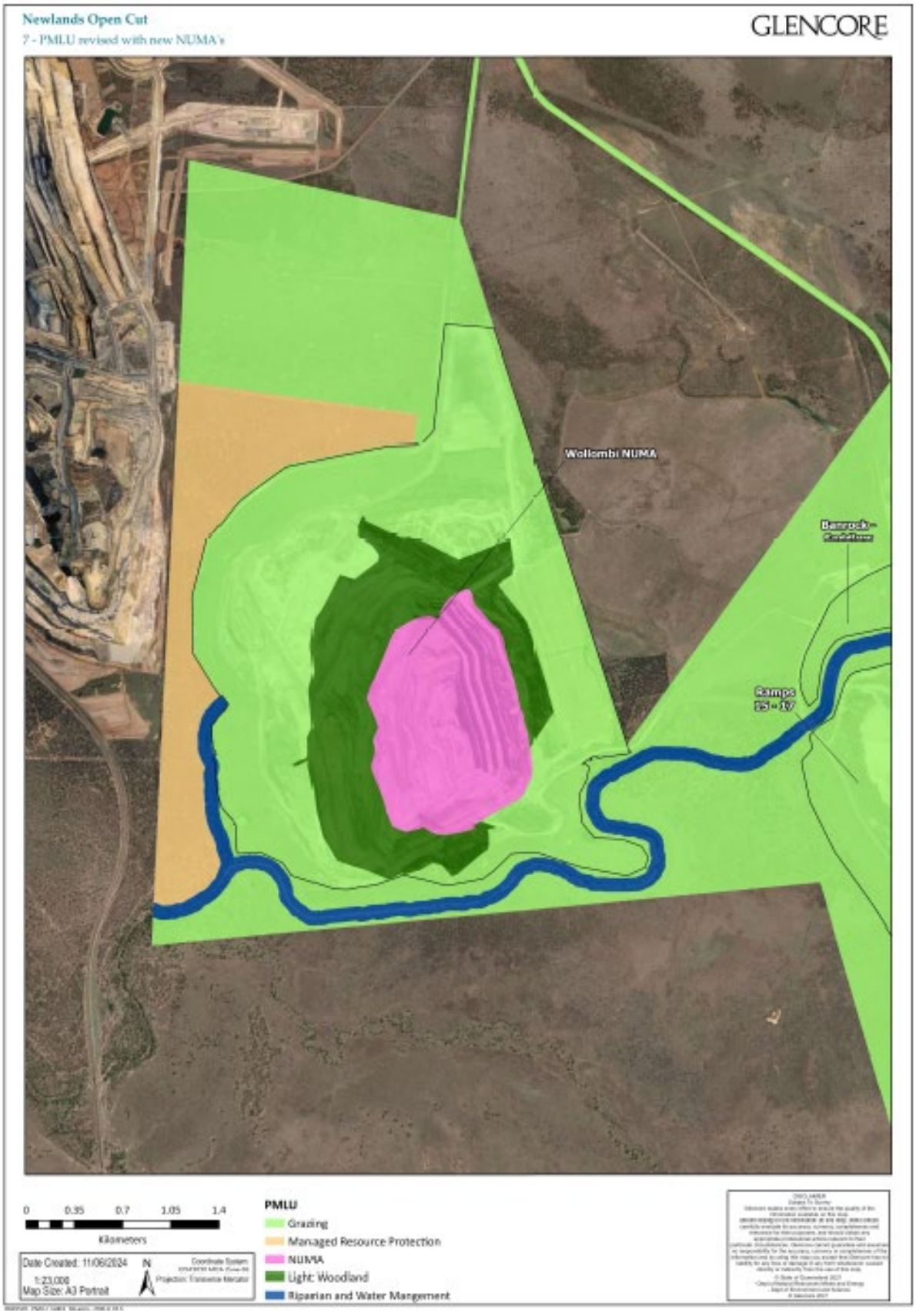

Figure 2-6 Suttor and Wollombi PMLUs Map 1 of 2

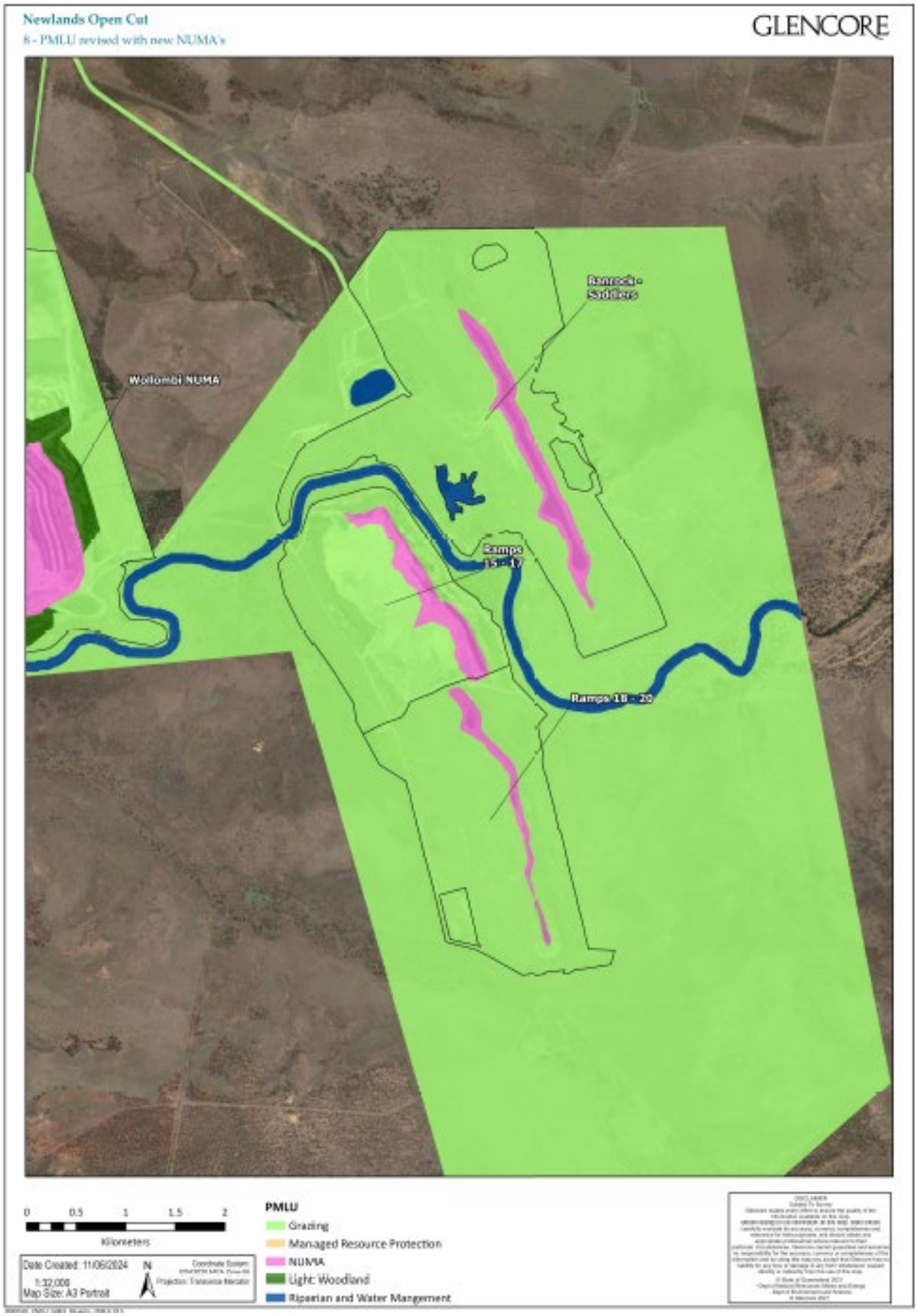

Figure 2-7 Suttor and Wollombi PMLUs Map 2 of 2

2.2 Void Closure Outcomes

2.2.1 Water Quality Modelling

Updated ground water modelling covering a period up to 400 years post closure indicates that a number of voids will, in time, contain pit lakes with a steady state EC close to or beyond the 5,970 µS/cm at steady state water level conditions, based on the Stock Water Drinking Guidelines (ANZG, 2023). DESI have indicated that this salinity can be considered to be the threshold level beyond which pit water (and concomitantly the pit itself) has no use, and when a NUMA designation may be the most appropriate closure outcome.

One of these, Wollombi Pit, is already designated as a NUMA under the current EA. As shown in Table 2-2, Banrock-Saddlers, Ramp 15-17, Ramp 17-20, Ramp 13N and Ramp 6N are also projected to reach an EC close to, or beyond, the Stock Water Drinking Guideline at a steady state water level.

Table 2-2 EC Predictions after 100 years and at Steady State water level

Mining Area	Void Name	Estimated time to reach steady state water level (Years post closure)	EC after 100 years (µS/cm)	EC @ Steady State water level (µS/cm) (initial estimates)	Proposed PMLU
Eastern Creek	Ramp 10	230	2,100	3,000	Grazing
	Ramp 12S	65	2,200	2,200	Grazing
	Ramp 13N	120	5,500^	7,000	NUMA
	Ramp 14	162	2,700	3,200	Grazing
Suttor Creek	Banrock-Saddlers	67	17,000* 6,800*	16,000* 6,000*	NUMA
	Ramp 15-17	140	11,800* 4,500*	13,000* 5,500*	NUMA
	Ramp 18 -20	140	11,800* 4,500*	13,000* 5,500*	NUMA
	Wollombi Pit	489	16,000* 6,000*	N/A	NUMA
Main Deposit	Ramp 1-6	223	2,200	3,000	Grazing
	Ramp 6N	90	6,000	6,000	NUMA
	Ramp 8N	70	2,400	2,000	Grazing
	Ramp 8S	66	3,300	3,000	Grazing

*Upper and lower bounds of the sensitivity scenario.

2.2.2 Planning for Voids in the Landscape

Table 2-3 presents evidence from a list of previous approval documents (including a LOD) indicating that final voids with pit lakes were always envisaged as part of the closure landscape throughout the

mine history from at least the start of the present century. References relating to Wollombi void are excluded, as it is already a NUMA.

Table 2-3 Final Void Outcome History

Document	Final Land Use for Voids
Plan of Operations (2019-2021)	**Section 3.3 (Post mining land uses and non-use-management areas (voids)), last paragraph:** *'It is also anticipated that some areas on the mining lease will have land use constraints. Residual mine voids or non-use-management-areas (NUMA's) are likely to be left post rehabilitation, which may not be able to support a productive post-mining land use at relinquishment.'* **Section 7 (Action Program) Table 7-1 2019 Environmental Action Plan, line H1:** *'EA Commitment: Land disturbed by mining must be rehabilitated in accordance with Table H1 – Rehabilitation Requirements. Action: Residual voids will be rehabilitated in accordance with Table H1 however it is noted that this will result in some Non-Use-Management-Areas.'*
LOD: Newlands Coal Extension Project EIS Report (2013)	This EIS Report covers that EIS for the further development of the Eastern Creek Ramps. Key points: • There will be four final voids • Voids will be unsuitable for grazing or agricultural purposes • Voids will not be rehabilitated with self-sustaining flora and fauna habitats. **Section 2.4.2 (Operation), third paragraph:** *'With the exception of final voids, land disturbed by open cut mining would be progressively rehabilitated over the life of the project. Rehabilitated mine areas (waste rock dumps and final voids) would be unsuitable for grazing or agricultural purposes.'* **Section 4.5.2.2 (Description of Land Values), first paragraph:** *'At the end of the mine's life, 4 final voids with areas of approximately 99ha, 78ha, 38ha and 29ha would remain permanently.'* **Section 4.18.1.2 (Rehabilitation and Decommissioning), second paragraph:** *'As a result to WRC's comments, the proponent responded that the cessation of mining the residual voids would be prepared to address public safety and prevent land animal entry. The final plan for the residual voids would be developed as part of the final decommissioning plan that, under the Xstrata Sustainable Development policy, is required to be available 5 years prior to cessation of mining.'* **Section 4.18.2.1 (Rehabilitation and Decommissioning), second paragraph:** *'With the exception of final voids and infrastructure areas such as haul roads, ROM stockpile areas, hardstand areas, water management structures and dams, the post-mining land use for most areas disturbed by open cut mining operations would be rehabilitated with self-sustaining flora and fauna habitats. It was further stated that final voids would be secured and remain after mining operations have ceased. These would be demonstrated to be geotechnically stable and non-polluting.'* **Section 4.18.2.1 (Rehabilitation and Decommissioning), sixth paragraph:** *'At the end of the mine's life, 4 final voids with areas of approximately 99ha, 78ha, 38ha and 29ha would remain permanently. Residual voids would be prepared to address public safety and prevent land animal entry. The final plans for the residual voids would be addressed as part of Xstrata Coal's Sustainable Development policy 5 years prior to cessation of mining. The water balance of the residual voids carried out for the EIS indicated that the voids would become permanent groundwater sinks, but there would be no danger of them overtopping.'*
Newlands Plan for Environmental Management (2013)	**Section 1.2 (Project Overview) –** **Newlands Main Deposit Operational Area, seventh dot point:** 'Final voids and permanent water storages will be left at mine closure.' **Suttor Creek Operational Area, fourth dot point:** 'Final voids and permanent water storages will be left.' **Section 3.4 (Open Cut Process), last dot point:** *'Final voids will remain at the completion of mining.'* **Section 3.9 (Mine Rehabilitation), first dot point:** *'The final void and permanent water storages are to be left as is.'* **Section 3.9 (Mine Rehabilitation), last dot point:** *'The final void will be fenced and bunded to prevent access. The final void will then collect water from direct rainfall and runoff from the rehabilitated landform.'* **Section 5.4.3 (Potential Impacts on Environmental Values) – Final Voids:** *'The primary objective of final void design is to make the voids safe to ensure public safety. This will be achieved by re-contouring batters and discouraging public access.* *The impacts associated with the final void include:* *• Declining water quality over time within the void* *– It is expected that the salinity of the pit lakes will increase over time due to evapo-concentration effects. The rate of increase will be dependent on the relative abundance of the inflows to the lake (i.e. contribution of groundwater relative to surface runoff and incident rainfall), which varies with each pit lake investigated.* *– The available geochemical analyses for the surface operations associated with the Newlands mine indicate that there is a low acid mine drainage risk. Given that it is likely that the pit lake's water will remain circum-neutral, it is unlikely that elevated metal concentrations will be observed in the water column.* *• Potential discharge of poor-quality water* *– The results of the assessment suggest that even under extremely wet periods the rise in water level is significantly less than the freeboard between the steady state pit lake level and the spill point.* ***Newlands Main Deposit Operational Area*** *No residual voids will remain within the Newlands Main Deposit Operational Area. All existing pits and voids will be back filled with tailings and rejects materials produced across each of the operational areas.* ***Eastern Creek Operational Area***

<table>
<tr><th>Document</th><th>Final Land Use for Voids</th></tr>
<tr><td></td><td>At the completion of mining four final voids will remain, two associated with Eastern Creek West pits, and one each for Eastern Creek East and Eastern Creek South pits.
Suttor Creek Operational Area
At the completion of mining three final voids will remain, one each for the Suttor Creek East pits, Suttor Creek West pits and the Wollombi pit.'
Section 5.6.5 (Commitments) – Post-Mine Landform/ Newlands Main Deposit and Suttor Creek Operational Areas, second paragraph:
'The final void and permanent water storages are to be left as is.'
Post-Mine Landform/ Eastern Creek Operational Area, second paragraph:
'Four final voids will result from the Eastern Creek Operational Area when open cut mining is completed.'</td></tr>
<tr><td>Newlands EMOS (2002)</td><td>Section 5.1.3 (Land Suitability), first paragraph:
'On average, the slope angle of spoil heaps will exceed those of the original topography and final voids with steep high walls and end walls (approximately 60 degrees) will be left.'
5.2.1.1 (Groundwater) – Suttor Creek, fourth paragraph:
'The final voids are expected to contain water at a level in equilibrium with the natural groundwater table.'
6.1.3.1 (Land Suitability Management Strategies) – Suttor Creek, last paragraph:
'Permanent water storages (including the final void) will be left after mining and are not considered in the land suitability classification determinations presented here.'
6.1.3.2 (Land Suitability Management Strategies) – Newlands, second to last paragraph:
'Final voids will remain following mining where not used for coarse or fine reject emplacement. Highwalls will be left as a safe and stable barrier to the final voids and will be fenced with appropriate signage to prevent access by fauna, people and vehicles.'
'Commitment 9. Within all areas except final voids, permanent water storages, and overburden dump areas at Suttor Creek, the existing land suitability class will be returned.'
'Commitment 16. Final voids will remain following mining where not used for reject emplacement.'</td></tr>
<tr><td>Newlands EMOS (2001)</td><td>Section 5.2.1.1 (Groundwater – Suttor Creek), fourth paragraph (re Suttor groundwater):
'The final voids are expected to contain water at a level in equilibrium with the natural groundwater table. This expectation is based on the assumption that the flow rate of water between pit and aquifer is unlimited give the size of the aquifer and the high permeability of the aquifers.'
Section 5.2.1.2 (Groundwater – Newlands), second paragraph (re Newlands):
'As for the pits at Suttor Creek, the pits [at Newlands] are likely to be a sink for groundwater although the impact of this on the water table is likely to be very small give the relative size of the pit compared with a large groundwater resource. Based on this premise, increased pit water salinity is likely to occur over time as evaporation of saline groundwater inflow occurs. The magnitude of this increase is unknown.'
Section 5.2.1.2 (Groundwater – Newlands), third paragraph:
'The more extensive and regional coal aquifer will be drawn down to some extent by pit pumping activities and will be potentially affected by existence of the final void as a window in the water table.'
Section 6.1.3.1 (Land suitability – Suttor Creek), last paragraph (re Suttor land suitability):
'Permanent water storages (including the final void) will be left after mining and are not considered in the land suitability classification determinations presented here.'
Section 6.1.3.2 (Land suitability – Newlands), second to last paragraph (re Newlands land suitability):
'Final voids will remain following mining where not used for reject placement. High walls will be left as a safe and stable barrier to the final voids and will be fenced with appropriate signage to prevent access by fauna, people, and vehicles.'</td></tr>
<tr><td>Letter from Newlands to Dept. Of Mines and Energy Emerald (10 Nov 2000). – REVISED EMOS FOR SUTTOR CREEK PROJECT (PJ 700120)</td><td>Section 4.3 (Department of Natural Resources), paragraph 7:
'The final voids are expected to contain water at a level in equilibrium with the natural groundwater table. This expectation is based on the assumption that the flow rate of water between pit and aquifer is unlimited given the size of the aquifer and the high permeability of the aquifers (i.e. Pit water level will quickly stabilise at an equilibrium level with the surrounding groundwater level).'
Section Issues to be Addressed After Discussions with DME, last paragraph:
'Further discussion of the three end of mine final voids is included in sections 3.4, 4.2.3.2, and 4.3.1.2.'</td></tr>
<tr><td>Suttor Creek EMOS (2000)</td><td>Section 3.4 (Mine Plan), fourth paragraph:
'Three separate final voids with a combined area of approximately 50 ha will be created due to the reserve configuration and mining methods.'
Table 3.1. Type and approximate area of disturbance within the total disturbance area.
<table><tr><th>Disturbance type</th><th>Area (ha)</th></tr><tr><td>Overburden dump</td><td>450</td></tr><tr><td>Infrastructure</td><td>500</td></tr><tr><td>Voids</td><td>50</td></tr><tr><td>Total</td><td>1000</td></tr></table>Section 4.2.3.2 (Environmental Impact), first paragraph:
'On average, the slope angle of spoil heaps will exceed those of the original topography and three final voids with steep high walls and end walls (approximately 60 degrees) will be left.'
Section 4.3.1.2 (Environmental Impact), fifth paragraph:
'The final voids are expected to contain water at a level in equilibrium with the natural groundwater table.'</td></tr>
</table>

2.2.3 Proposed Additional NUMAs

2.2.3.1 Voids

On the basis of the above, it is proposed to nominate Ramp 13N, Banrock Saddlers, Ramp 15-17, Ramp 18-20, and Ramp 6N voids as NUMAs. The NUMA is a subset of the final void and includes the high and end walls (with appropriate offsets), the pit lake, and part of the low wall at the predicted maximum pit lake level. The NUMA includes all locations above the highwall and end wall where the Factor of Safety (FoS) is less than 1.5. Therefore, the boundary of the NUMA extends to the safety bund which is typically offset 50 m from the crest of the highwall.

The low wall will be reshaped to a slope that is safe and stable, growth medium applied, and seeded with a grass and tree mix. The upper weathered zone of the high and end walls of the void will be laid back to a maximum average slope of 22% and vegetated to stabilise the crest of the final void. The material generated from the layback will be pushed into the void. Fencing and abandonment bunds will be installed above the high and end walls.

A pit lake will develop within the void, with a water quality that is expected to become more saline over time. Various landform design scenarios were considered to assess how they may affect the future water level and quality. The selected design minimises the interaction between pit water and the environment, including aquifers, by minimising the catchment inflows and lowering the pit lake water surface elevation by:

- Contouring of the final landform to maximise external discharge to the surface water system; and
- Providing at least 0.1% Annual Exceedance Probability (AEP) flood immunity of the final residual void from surrounding drainage surfaces through the design of the final landform.

2.2.4 Footprint

The NUMA footprints for each relevant Ramp are shown in Appendix B. The indicative dimensions, including length, width, depth, and area of the proposed additional NUMAs are presented in Table 2-4. The indicative dimensions of the NUMAs have been determined based on the elevation of the maximum (steady state) modelled water level anticipated in the void, and includes the highwall, and distance from the highwall to the crest of the safety bund. The distance from the highwall to the safety bund has been determined as the distance that allows the highwall to achieve geotechnical stability with a minimum FoS of 1.50.

It should be noted that these areas are indicative and subject to minor refinement through detailed design.

Table 2-4 Proposed additional NUMAs and indicative dimensions

Ramp	Area (ha)	Length (m)	Width (m)	Depth (m)
Main Deposit				
Ramp 6N (NUMA void)	24	1,200	300	40
Eastern Creek				
Ramp 13N (NUMA void)	10	820	200	15
Suttor Creek				
Banrock-Saddlers (NUMA void)	60	3,300	180	20
Ramp 15-17 (NUMA void)	50	2,000	190	25
Ramp 18-20 (NUMA void)	25	2,800	90	5

3. Description of Environmental Values

A brief description of each Environmental Value (EV) as relevant to the change application is provided below. These align with the EA Amendment Application already submitted and relate only to land that has been disturbed by mining.

3.1 Water

NOC is located in the headwaters of the Burdekin River catchment. The Burdekin River catchment is the second largest catchment in Queensland and covers an area of 133,432 km^2. Waterways within the Burdekin River catchment vary from largely sandy, ephemeral creek systems to permanently flowing rivers and creeks.

The northern part of NOC is drained by three creeks, including Eastern Creek in the homonymous part, Wilson Creek in the central part between Eastern Creek and Main Deposit, and Cerito Creek further west at Main Deposit. All of these creeks flow into Kangaroo Creek, which itself flows into Rosella Creek, then the Bowen River, and then the Burdekin River just downstream of the Burdekin Falls Dam, the largest dam in Queensland. The Burdekin River discharges into the Pacific Ocean near Ayr.

Suttor Creek is within the Suttor/Belyando Rivers catchment. Suttor Creek flows in an easterly direction past the township of Glenden before reaching the NOC ML. Suttor Creek flows from east to west through the Suttor Creek mining area at NOC. The creek has been diverted on a number of occasions to facilitate continued open cut mining in the area. The catchment area of Suttor Creek at the Suttor Creek area is 575 km^2. Waters from the Suttor Creek area discharge to the Suttor and Boundary Creeks, which then flow to the Suttor River. The Suttor River discharges into the Burdekin River within the impoundment area of the Burdekin Falls Dam.

Proposed NUMAs are within their own, isolated catchments, without hydrological connection to the rivers and creeks described above.

3.2 Groundwater

The NOC covers a number of geographical areas, and significant aquifers within these areas are often of limited extent. Three main groundwater bearing units are recognised across the site:

- Quaternary alluvium – The Quaternary alluvial sediment is distributed along channels associated with the present-day creek systems. Although the alluvium can form localised aquifers when sufficiently thick, generally the sediments are expected to be thin and dry but short-term saturation of these deposits may occur following significant rainfall events;
- Tertiary basalt and basal sands – Tertiary basalts are up to 60 m thick and fresh below the base of weathering (approximately up to 20 m). The Tertiary basalt contains water within joints, fractures, and connected vesicles. Basalt commonly has poorly interconnecting joint and fracture sets, and low storage meaning that whilst basalt yields reasonably high volumes of water for a short period, high flows are often not sustainable. In the NOC area the basalt is not regarded as a significant aquifer as it is generally massive (lacking joints or fractures) and can be thin and dry. However, where the basalt is sufficiently thick and fractured moderate yields of groundwater can be obtained. Occasional flows of several litres per second have been recorded in these areas. Basal sands underlie the basalt in places, these are not laterally extensive and generally confined to the deepest areas of the paleochannels, they are considered to be hydraulically connected to the overlying basalt;

- Permian coal measures – The Permian coal measures comprise coal seams, mudstones, siltstones, and sandstones. The coal seams are typically the most permeable lithology within the coal measures and can support moderate yields. The coal measures interburden (mudstone, siltstone, and fine sandstone) is typically of low permeability relative to the coal seams and although groundwater may be associated with secondary porosity (joints and fractures) and faulting; and
- Rewan Formation – The Rewan Formation is largely regarded as an aquitard.

The water table is a subdued reflection of the topography in the shallow strata flowing from the areas of elevated topography towards lower lying landscapes and potential discharge areas where water pressures are lower. Groundwater flow across the area is generally aligned with the regional drainage including Suttor Creek in the south and Eastern Creek in the north. Regional groundwater flow in the Suttor Creek and Wollombi area is typically to the north-east turning westward. Across the northern part of NOC (Main Deposit and Eastern Creek), regional groundwater flow is westward turning northward. Locally the direction of groundwater flow will be affected by pit dewatering (passive inflows) and water storage/management systems in residual voids and former underground workings.

Recharge to the groundwater systems within the region is very low, and only a small proportion of rainfall reaches the groundwater systems. This is typical of semi-arid areas in Central Queensland where the evaporation rate is significantly higher than rainfall, minimising deep drainage to groundwater. Significant recharge of the groundwater system only occurs after prolonged rainfall events that can saturate the soil and subsoil profile and allow deep drainage of rainfall to occur.

Whilst the volume and rate of groundwater recharge is very difficult to measure directly, it can be inferred from other measurements. The indicators of very low recharge include the lack of any baseflow discharge in the creeks, the depth of groundwater, the brackish to saline nature of the groundwater and the high evaporation rates relative to rainfall. The high evaporation rates commonly prevent the soil reaching field capacity inhibiting deep drainage of rainfall to groundwater. The typically saline nature of the groundwater is a result of evaporative concentration of salts within the soil profile due to the high evaporation rates, with the salts flushed into the aquifers when occasional periods of persistent rainfall occur.

As there is no permanent baseflow in the creeks, the groundwater flow is only through the gravels in the bed of the creeks where the groundwater levels are high enough, with the subsurface water removed by evapotranspiration. Where groundwater levels in the alluvium are close to or above the ground surface forming pools, direct evaporation can remove groundwater from the system. Deeply rooted vegetation along the creek lines will also contribute to evapotranspiration of water from the alluvium.

Similarly, within the proposed NUMA void lakes, evapotranspiration will result in the removal of surface water, to be balanced out by subsurface groundwater inflow. Lake levels are likely to fluctuate between dry and wet periods. Evapotranspiration will cause the void lakes to become more saline over time to the extent that void lake water will exceed 5,970 µS/cm.

3.3 Wetlands

No wetlands are known from the NOC Mining Leases.

3.4 Land

3.4.1 Topography

The NOC is located within the southern catchment area of the extensive drainage system of the Burdekin River Basin. The landforms found within the catchment are relatively complex due to variations in the underlying geology and geomorphic processes over time. Dissected and gently undulating plateaus, high plains and igneous intrusions are prominent along the Connors Range with tertiary basalts and minor sediments pocketing the western side of the range and the southern hills and tablelands. Gently undulating hills and ridges, and level to gently undulating plains and lowlands dominate the lower catchment, particularly along the Bowen River section.

The natural topography of the land is gently undulating, generally slopes from south to north, with rare hills and ephemeral streams, occasionally containing semi-permanent waterholes. The highest point at NOC is approximately 400 m AHD and the lowest point is approximately 240 m AHD. The steep escarpment of the Redcliffe Tablelands is located just outside the eastern extent of the NOC MLs.

3.4.2 Soils

Soils at NOC have developed in a climate of low rainfall and high temperatures. While, the low rainfall at the site has prevented leaching of the soils, seasonal drought, dry conditions, and high temperatures has also restricted the generation of organic matter, resulting in relatively low (top) soil fertility, in common with soils of the wider region.

The main soil types include red or yellow duplex soils and cracking clays (sodosols and vertosols, respectively). Smaller areas of massive earths (kandolsols) occur near the extremities of the MLs. The cracking clays (vertolsols) in large parts of the MLs, particularly in Suttor Creek / Wollombi and along the haul road, have shrink – swell properties, and thin, surface crusty horizons 30 mm or less thick. When dry, open cracks occur at some times during most years. These soils are typical of Brigalow and Semi Evergreen Vine Thicket vegetation, though often cleared for agricultural purposes. The loamy duplex soils (sodosols) occur on undulating plains with some stony ridges and rock outcrops. They have a texture contrast between the A and B horizons. They are typically sodic and highly erosive when the surface is disturbed. At NOC, these soils are primarily covered with eucalypt woodlands. The massive earths (kandosols), such as those along Eastern Creek, have weak profile development, are high in sodium, with a low nutrient status. They are very vulnerable to erosion and dryland salinity when vegetation is removed.

3.4.3 Flora and Fauna

The site consists of a relatively flat to undulating landscape, with vegetation and habitats disturbed by grazing, land clearing, and some cultivation (in Suttor) before the commencement of mining activities. Apart from disturbed areas consisting of previously cleared woodlands or improved grasslands, the three main remnant vegetation associations occurring, both pre-mining and currently, include:

- Eucalypt (Eucalyptus spp.) dominated woodland, prominent in the northern part of NOC MLs (Eastern Creek and Main Deposit), dominated by Narrow-leaved ironbark (Eucalyptus crebra), Variable Bloodwood (Corymbia erythrophloia), and Mountain Coolibah (Eucalyptus orgadophila), the latter of which also occurs widely around the Suttor Creek area;
- Brigalow (Acacia harpophylla) dominated woodland and semi-evergreen vine thicket elements (often co-occurring), often mixed with the Eucalypt woodland and grasslands, but

dominates the vegetation in parts of the central part of the site, within and around the Newlands Nature Reserve and west of the Main Deposit; and

- Native grasslands cover large areas in the south and central part of the site, largely outside the mined areas, with smaller areas located among the Eucalypt woodland in the north. They are often mixed with other, non-grassland communities.
- A number of fauna surveys have been undertaken at the NOC MLs:
- A survey undertaken in 1978 at the Main Deposit area detected 94 vertebrate fauna species, including one amphibian species, nine reptile species, 65 bird species and 19 mammal species (Newlands Pty Ltd, 2001);
- Fauna surveys for the Eastern Creek Extension Project undertaken in 2007, 2008, and 2011 (KBR 2012) detected a total of 191 fauna species, including 11 amphibians, 43 reptiles, 102 birds and 35 mammals; and
- The fauna survey for the Wollombi No. 2 expansion undertaken in 2005 (SKM 2005) detected a total of 124 fauna species, including 11 frogs, 21 reptiles, 72 birds and 20 mammals.

Rehabilitation and revegetation can be expected to provide fauna habitat through the long-term establishment of native trees and shrubs of species similar to the undisturbed areas. Hill and slopes on the ex-pit waste rock dumps and low walls into retained Fvoids will provide additional microclimates, adding variation in ground solar exposure, drainage patterns and, in the long term, soil formation patterns, providing opportunities particularly for ground dwelling fauna. Ground dwelling reptiles and amphibians can be sensitive to this.

Further habitat will be created in retained voids where access and grazing by cattle is impeded and where the PMLU is a light woodland. These areas will provide further native vegetation habitat and increase the diversity of fauna habitat within the NOC site, by introducing cliff habitat within some of the high walls created by mining and remaining post-mining. There will also be areas of open water and wetlands within remaining voids and drainage features. These habitat areas will have the following fauna features:

Highwall cliffs at a number of voids in each of the three main areas that provide opportunities for roosting, denning and perching of a number of fauna species. In particular, habitat will be provided for bats and birds within cracks, holes and ledges provided by the cliffs. These areas will also provide protection from predators and launch points for flight.

Species within or adjacent to the NOC MLs potentially utilising this habitat may include, for example, Greater Northern Freetail Bat *(Chaerephon jobensis)*, Little Bent-wing Bat *(Miniopteris australis)*, Little Pied Bat *(Chalinolobus picatus)*, Lesser Long-eared Bat *(Nyctophilus geoffroyi)*, birds such as swallows and raptors and possibly the migratory species Rainbow Bee-eater *(Merops ornatus)* and potentially the Northern Quoll *(Dasyurus hallucatus)*.

The proposed changes to the EA relate specifically to land which has been disturbed by mining and is being rehabilitated to a grazing land PMLU.

3.5 Land Use

Pre-mining land use both within the NOC MLs and in surrounding areas consisted primarily of grazing on native and improved pastures, with tracts of remnant native vegetation on the low sloping lands, floodplains, and watercourses. The rockier steep slopes had no or minimal grazing value. Minor dry land cropping of sorghum occurred at Suttor Creek Station. Areas within the NOC MLs not used for mining and associated activities continue to be used for grazing.

3.6 Air

No changes to air quality are expected. No changes to Schedule B (Air) of the EA are requested.

3.7 Acoustic

No changes to the acoustic environment are expected. No changes to Schedule D (Noise) of the EA are requested.

3.8 Waste

General waste will be managed in accordance with NOC Waste Management Plan. No changes to Schedules C (Waste Management) or J (Sewage Treatment) of the EA are requested.

4. Likely Impact of Proposed Amendment on Environmental Values

In accordance with Section 226A(1)(f) of the EP Act, the impact of the proposed EA amendment to which this change application relates on relevant EVs is required to be assessed, through the provision of:

- a description of the EVs likely to be affected by the proposed amendment (see Section 0);
- details of emissions or releases likely to be generated by the proposed amendment;
- a description of the risk and likely magnitude of impacts on the environmental values; and
- details of the management practices proposed to be implemented to prevent or minimise adverse impacts.

Given the nature of the proposed amendments as documented in this change application, it is not anticipated that there will be any change or impacts on EVs, nor the currently adopted management practices. This section details how the proposed changes would not result in a significant negative affect on the EVs at the site.

4.1 Grazing on slopes

Proposed changes to the completion criteria for land with a grazing post mining land use, as outlined in table H1 of the EA. Changes relate to the removal of the blanket 15% maximum slope angle is considered in the following sections.

4.1.1 Details of Emissions or Releases Likely to be Generated

The proposed changes to the EA Amendment Application will not result in any increase in emissions or releases. On the contrary, remobilising equipment to reshape some of these areas to achieve the 15% maximum slope gradient would require emissions from mine equipment. Therefore the proposed changes to the wording in Schedule H and Table H1 in the EA will result in a decrease of emissions from mine equipment.

4.1.2 Description of Risk and Likely Magnitude of Impacts

The site is currently in the closure and rehabilitation phase, this includes decommissioning and demolition of existing infrastructure areas, and significant reshaping of the land to its final landform. The rehabilitation work is detailed in the rehabilitation plans and the draft Transitional PRCP (currently being updated in response to the RFI received 15 January 2024).

The proposed change applies to the completion criteria for land with a grazing PMLU. The changes are not likely to have any significant environmental impacts as the rehabilitation goals for the Site remain unchanged. The goals are still to deliver a safe, stable, non-polluting landform that is acceptable for its intended PMLU. The proposed changes allow a small portion of land with slopes >15% to be included in a PMLU of grazing. The maps provided demonstrate that the majority of the surrounding area is relatively flat. It is not considered to be feasible or practical to manage these areas as separate PMLUs.

The proposed changes will apply specifically to areas of the site identified as having a grazing post mining land use. The proposed changes will not substantively affect the areas of the site which have been marked for other post mining land uses.

In terms of the magnitude of impact, there is a substantial amount of earthworks and land reshaping being undertaken across the site. However, the areas of the site which are intended to remain at 15% or above are not contiguous, and are generally near former pits and overburden dumps. Remobilising earthwork equipment to these areas is likely to cause substantial impact to surrounding land.

Figures F1 – F3 in Appendix C, present the areas of the site which would be affected by the proposed changes. The total area of grazing land that is expected to remain above a 15% slope is broken down by management area in Table 4-1 below.

The review of spatial data provided in Appendix C are based on the latest lidar survey of the site (for already rehabilitated areas) and the final landform designs (for areas yet to be rehabilitated). The spatial analysis takes an average slope angle for land within a 1m x 1m area, while this provides an accurate view of the slope of the land, it is very difficult to account for average slopes over a larger area (i.e. from the toe to the crest of a bank). Close inspection of the spatial data shows that across the site, many of the areas with slopes >15%, are interspersed with flatter areas. The slope angles presented above are therefore conservative and likely overestimate the amount of land at a given angle.

Contour banks are used in some areas across the site as part of water/erosion management. The presence of contour banks can affect the average slope angle of a given area. These areas are still considered to be structurally and erosionally stable.

As visible in the figures provided, these areas with slopes above 15% tend to be located near former pits. These areas tend to be well away from established watercourses and tributaries. Therefore, the impact of the proposed change on surface water (as an environmental value) will be minimal (even if erosion does occur). The magnitude of the impact of the proposed change on land use (as an environmental value) would affect the 1,814ha of land within the disturbance footprint.

Table 4-1 Amount of grazing land by slope percentage

Slope Angle Class	Main Deposit		Eastern Creek		Suttor Creek	
	Grazing area (ha)	Percentage	Grazing area (ha)	Percentage	Grazing area (ha)	Percentage
0 – 5 %	862.18	34.95	533.31	28.57	571.99	28.29
5 – 10 %	624.38	25.31	478.14	25.61	442.78	21.90
10 -15 %	345.32	14.00	333.24	17.85	349.99	17.31
15 – 20 %	222.67	9.03	318.09	17.04	290.05	14.34
20 – 25 %	153.80	6.23	99.44	5.33	187.90	9.29
25 – 30 %	80.32	3.26	45.71	2.45	85.91	4.25
> 30 %	178.05	7.22	59.07	3.16	93.44	4.62
Total	2466.71	100.00	1866.99	100.00	2022.05	100.00
Total >15 %	634.83	25.7	522.31	28.0	657.30	32.5

4.1.3 Management Practices

As mentioned in Section 2.1, factors affecting ground stability are multi-faceted. Rehabilitation of the site, including grazing land, will be managed in line with the current GCAA rehabilitation monitoring process at NOC, and land will be managed in accordance with the Biodiversity Management Plan. For areas where grazing is active, this includes a variety of monitoring techniques including remote sensing, ground based transects and grazing trials. Inspections of each paddock are undertaken fortnightly during strategic grazing periods, with notes of any evidence of overgrazing and resulting erosion being marked with GPS waypoints.

The ongoing monitoring of grazing land through the rehabilitation process allows for the implementation of adaptive grazing techniques. Adaptive grazing is a holistic approach to carefully control livestock density in a particular area based on the condition of the land to meet the required objectives. Where the need is identified, stock rates and grazing time to minimise the impact of hooves on land can be reduced promptly.

Furthermore, areas where adaptive grazing has been implemented are subject to more extensive monitoring. Where appropriate, biomass monitoring can be undertaken to track the performance of adaptive grazing and identify evidence of overgrazing. Where overgrazing is identified, stock can be excluded from the area for further investigation and ongoing monitoring.

Should individual areas demonstrate they are not achieving the desired outcomes (i.e.. The landform is not stable), corrective actions can be taken to address the specific issues identified in line with the sites current Biodiversity Management Plan (PLN Biodiversity Management NEWCX-1552257159-4413). In some cases temporary measures can be installed as a detailed schedule of maintenance is developed. In response to overgrazing the temporary control would be revising the stocking rate per ha and/or reducing the duration of grazing. Long term maintenance actions may vary depending on the root cause of the issue, but can include reshaping/reworking the profile of the land, rehabilitation maintenance, soil amelioration, and/or reseeding.

In addition to the management measures outlined above, GCAA anticipate being involved in a 3 year research program, partnering with CQU (through the Australian Coal Industry's Research Program). The research program will assess the effectiveness adaptive grazing management practices to disrupt geomorphic patterns and damage associated with overgrazing. The study will focus on livestock impacts under continuous and adaptive grazing management systems on stability indicators on steep gradients.

The study includes allowing the intermittent grazing of paddocks for ≈7 day intervals, followed by a recovery period which will be dependent on regrowth of dry matter. Livestock will not be allowed to return to a paddock until key regrowth milestones have been achieved. The study also aims to remove livestock from steep grazing areas prior to significant rainfall events, only allowing return to these areas once appropriate soil draining has occurred.

4.2 NUMAs

4.2.1 Details of Emissions or Releases Likely to be Generated

Proposed NUMAs are within their own, isolated catchments, without hydrological connection to the rivers and creeks. The selected design minimises the interaction between pit water and the environment, including aquifers, by minimising the catchment inflows and lowering the pit lake water surface elevation. Therefore, no emissions or releases to the surrounding environment are likely to be generated.

4.2.2 Description of Risk and Likely Magnitude of Impacts

Table 4-2 presents the residual void risk of the proposed NUMA voids in terms of size and permanence of water body, overtopping, and water quality risks. As presented in Section 2, pit lake water of each of the proposed NUMA voids is likely to be near or beyond the salinity threshold of 5,970 µS/cm based on the Stock Water Drinking Guidelines (ANZG, 2023) at steady state water level. However, the selected void design minimises the interaction between pit water and the environment, including aquifers, by minimising the catchment inflows and lowering the pit lake water surface elevation.

Table 4-2 Residual Void Risk

Residual Void	Size (ha) and Permanence of Waterbody	Overtopping Risk	Water Quality Risk	NUMA
Ramp 13N	10ha surface area Permanent Lake	None	At or beyond stock water quality threshold. EC stabilises to 7000 µS/cm) after 120 Years	NUMA. Across pit lake to safety bund/fence
Banrock-Saddlers	60ha surface area Permanent Lake	None	At or beyond stock water quality threshold. EC stabilises to 16,000 µS/cm) after 67 years	NUMA. Across pit lake to safety bund/fence
Ramp 15-17	50ha surface area Permanent Lake	None	At or beyond stock water quality threshold. EC stabilises to 13,000 µS/cm) after 140 years	NUMA. Across pit lake to safety bund/fence
Ramp 18-20	25ha surface area Permanent Lake	None	At or beyond stock water quality threshold. EC stabilises to 13,000 µS/cm) after 140 years	NUMA. Across pit lake to safety bund/fence
Ramp 6N	24ha surface area Permanent lake	None	At or beyond stock water quality threshold. EC stabilises to 6,000 µS/cm) after 90 years	NUMA. Across pit lake to safety bund/fence

4.2.3 Management Practices

4.2.3.1 Void stability

Buttresses with a nominal height of 10 m have been incorporated into the void design to provide geotechnical stability to high and end walls if present. The minimum FoS varies from 1.28 to above 2.00 across the NOC voids.

Highwalls that remain will have a safety bund, fence, and warning signage around their perimeter. The location of this infrastructure will be offset from the highwall by a distance that achieves at least a FoS of 1.50. The maximum offset between the highwall and bund that meets this criterion is 90 m.

Where geotechnical stability cannot be achieved by buttressing, or where this is not practical, highwalls will be blasted and laid back. The assessment is void specific and therefore some voids at NOC have buttressing solutions and some have the highwalls completely removed.

Low walls will be reshaped to achieve a gradient that is erosionally stable. The gradient is calculated based on the spoil properties within the void and the drainage network density.

4.2.3.2 Surface water interaction

Voids will be isolated from floodplains by constructing permanent landforms between the void and floodplain. A two-dimensional flood model has been developed for the whole site and used to assess and design permanent landforms around voids. The flood model demonstrates that all voids have at least 0.1%AEP flood immunity from mainstream flooding.

Most voids have a small, isolated catchment entering them. The catchment is created from reshaped spoil. None of the voids at NOC interact with defined “watercourses” under the *Water Act 2000* (Qld) to avoid impacts in downstream environments.

4.2.3.3 Void rehabilitation strategies

The void rehabilitation strategies have been customised to the unique characteristics of each void. All voids will undergo reshaping works to minimise their footprint and maximise land use outcomes. Low walls will be reshaped, topsoiled, and seeded.

Highwalls that are retained will be geotechnically stable and incorporate buttresses at their base. Weathered zones near the surface will be laid back, rock mulched in the lower segment and vegetated to stabilise the crest. The material generated from the layback will be pushed into the void.

4.2.3.4 Safety Features

The following safety features will be present in relation to the proposed NUMAs:

- Signage – Warning signage at 50 m intervals around the final void rim will be placed to warn of the void related risks and deter public access;
- Fencing and abandonment bund – an abandonment bund and fence will be installed around the final void edge to prevent vehicular access and deter animal access; and
- Safe egress – the maximum 22% slope on the low wall will allow for safe egress from the final void.

5. Proposed Amendment to EPML00817713

The proposed EA Amendment Application relates to Table H1 which specifies the Completion Criteria and Rehabilitation Requirements for land disturbed by mining. The proposed changes affect the rehabilitation objectives, and completion criteria in Table H1 of EA Schedule H where the current rehabilitation objective is tied to a maximum slope of 15%. Importantly, the changes will not affect the rehabilitation goals for each domain/mine feature.

Note that the wording currently in Table H1 is not a standard condition. The proposed changes to the wording in Table H1 are shown in red in Table 5-1.

Table 5-1: Table H1 – Rehabilitation Requirements, from Schedule H of the EA

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
Overburden	In and out of pit dumps, roads, open pit and ramps, stripped topsoil, cleared area	Safe and stable	Safe for humans and animals	Structural and geotechnical adequacy minimal erosion	Up to 15% slopes for box cut and external batters, except for areas defined in attached plans which outlines indicative areas where the slope angle will exceed 15%. ~~Figure 4a: Areas Rehabilitated Prior to 2013 and Figure 4b: Areas Rehabilitated Prior to 2013, which are permitted to have a slope at the angle of repose.~~ Minimal slumping or gullying after 5 years (<2% planimetric surface). Engineered drop structures in place and functioning.
		Non-polluting	Water quality solute concentrations met	Table F3 receiving water contaminant limits at downstream monitoring points	Water quality within the receiving water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void.
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) or Grazing area ~~(<15% slope)~~	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. >70% overall ground cover. Evidence collected during established rehab / IDC monitoring program.
Rejects	In and out of pit reject storage areas / dumps	Safe and stable	Safe for humans and animals	Structural and geotechnical adequacy. Minimal erosion.	Up to 10% slopes for external batters. Fully capped with no spontaneous combustion. Minimal slumping or gullying after 5 years (<2% planimetric surface).
		Non-polluting	Water quality solute concentrations met	Table F3 receiving water contaminant limits at downstream monitoring points	Water quality within the receiving water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void.
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) or Grazing area ~~(<15% slope)~~	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. >70% overall ground cover. Evidence collected during established rehab monitoring program.
Diversion	Licensed diversion channel – including subsided areas of the Cerito Creek South Diversion	Safe and stable	Safe for humans and animals	a. Structural, geotechnical, and hydraulic adequacy. b. Minimal erosion.	Meet engineering design criteria – consideration for natural, ephemeral geomorphic processes. Drainage lines and drop structures functioning.
		Non-polluting	Water quality solute concentrations within 80%ile	Table F3 receiving water contaminant limits at downstream monitoring points	Water quality within the receiving water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void.
		Self-sustaining	Native *Eucalyptus tereticornis / Corymbia tessellaris* community	Species diversity and multiple canopy layers – ground, middle and upper.	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. >80% overall ground cover (embankments only). Evidence collected during established rehab monitoring program.
Drain	Unlicensed diversion drain	Safe and stable	Safe for humans and animals	Structural, geotechnical, and hydraulic adequacy	Resembles regional ephemeral, gully lines (analogue site) – show natural geomorphic processes. Drainage lines and drop structures functioning.
		Non-polluting	Water quality solutes within the 80%ile	Table F3 water contaminant limits at downstream monitoring points	Water quality within the receiving water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void.
		Self-sustaining	Native *Eucalyptus tereticornis / Corymbia tessellaris* community	Species diversity and multiple canopy layers – ground, middle and upper.	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. Evidence collected during established rehab monitoring program.

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
Levee	Constructed embankment – Including subsided areas of Levee 5 and Levee 7	Safe and stable	Protects infrastructure, humans, and animals	Structural, geotechnical, and hydraulic adequacy. Minimal erosion	Align with design criteria: 1:100 ARI plus 1 metre freeboard. Rock armour intact. Drop structures functioning.
		Non-polluting	Water quality solute concentrations within 80%ile	Table F3 receiving water contaminant limits at downstream monitoring points	Water quality within the receiving water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void.
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) and/or sustainable grazing area ~~(<15% slope)~~	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. >70% overall ground cover. Evidence collected during IDC monitoring program.
Dams	Tailings and sediment dams – Including subsided areas of Highwall Dam	Safe and stable	Protects infrastructure, humans, and animals	Structural, geotechnical, and hydraulic adequacy. Minimal erosion.	Final structure is stable with no subsidence. Gully and rill erosion <0.3 metres. Bywash / spillway must have adequate capacity. Sign off by post mining landholder (for retained structures only) – asset transfer agreement.
		Non-polluting	Water quality solute concentrations within 80%ile	Table F3 receiving water contaminant limits at downstream monitoring points	Water quality within the receiving water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void. No acid mine drainage or discharges. No contamination to groundwater.
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) and/or sustainable grazing area ~~(<15% slope)~~	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. Photographic evidence collected during rehab monitoring program.
Residual Voids	Mining pits, borrow pits and quarries – Excluding NUMAs ~~Wollombi Pit NUMA and Wollombi Pit Low Wall~~	Safe and stable	Safe for humans and animals	Geotechnical stability	Coal seams with an ISCP Classification of greater than are to be fully capped with no Spontaneous Combustion. No public access to high wall and end wall (bunding and security fencing as a minimum).
		Non-polluting	Water quality solute concentrations met	Table F5 onsite water storage contaminant limits	Water quality within the receiving water contaminant limits in **Table F5 – Onsite water storage contaminant limits.** In the event that the water quality within the residual voids exceeds the contaminant limits defined in **Table F5 – Onsite water storage contaminant limits**, the environmental authority holder must implement measures to prevent access to waters by all livestock.
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) and/or grazing area ~~(<15% slope)~~	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. >70% overall ground cover above natural ground level Evidence collected during established rehab monitoring program.
	Non-use management area (NUMA)– Including: • High wall; • End wall; • Maximum elevation of Pit Lake water level; and • Locations between	Safe and stable*	Safe for humans and animals	Geotechnical and erosional stability	The following matters are certified by an appropriately qualified person accredited by a credible external body: a) NUMA extents as depicted on attached plans; ~~extent no greater than 2 km length, 1 km width and 300 m in depth~~ b) Coal seams with an ISCP Classification of greater than are to be fully capped and no spontaneous combustion observed; c) Residual void is safe to humans and animals; d) High and end wall weathered zone treatment – i Maximum slope of 22%; ii >50% overall vegetative ground cover.

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
	the highwall and the crest of the safety bund or fence. ~~Wollombi Pit non-use management area (NUMA) – Including:~~ ~~• High wall;~~ ~~• End wall;~~ ~~• Pit Lake to an elevation 20 m above the maximum water level; and~~ ~~• Locations above the High wall and end wall with a factor of safety less than 1.5.~~ ~~See Figures 6a and 6b for indicative extent.~~				e) Achievement of surface requirements – i Fencing and abandonment bunds are erected above the high and end walls; ii Warning signage posted at 50 m intervals above high and end walls;
		Non-polluting	Water quality solute concentrations met	Void water contaminant levels and depth of water	The following matters are certified by an appropriately qualified person accredited by a credible external body: a) Achievement of sufficient improvement: i Residual void will not cause environmental harm outside of the relevant tenure boundary; ii Residual void water quality and quantity will not cause harm to the surrounding environment. b) Water levels within the residual void do not extend beyond the NUMA footprint as shown on the attached plans. ~~reach the maximum operational WSL (water surface level) of 2,195m RL.~~
		Self-sustaining	Not Applicable	Not Applicable	No self-sustaining requirements
	~~Wollombi Pit~~ Low Walls ~~See Figures 6a and 6b for indicative extent.~~	Safe and stable	Safe for Humans and animals	Geotechnical and erosional stability	The following matters are certified by an appropriately qualified person accredited by a credible external body: ~~(a) Maximum external slope of 15 %;~~ ~~(b) Maximum internal slope of 15 %; and~~ (a) Slope class areas are aligned with the attached plans. Minimal slumping or gullying after 5 years (<2% planimetric surface).
		Non-polluting	Water quality solute concentrations within 80%ile	Table F3 receiving water contaminant limits at downstream monitoring points	Water quality within the receiving water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void.
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) and/or grazing area ~~(<15% slope)~~	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years.' >70% overall ground cover. Evidence collected during established rehab monitoring program.
Infrastructure	Haul roads, hard stands, sediment dams, easement, transmission lines, airstrip, and car parks	Safe and stable	Protects retained infrastructure, humans, and animals	Geotechnical adequacy Minimal erosion	Final landform is stable. Sign off by post mining landholder (for retained structures only) – asset transfer agreement.
		Non-polluting	Water quality solute concentrations within 80%ile	Table F3 receiving water contaminant limits at downstream monitoring points.	Water quality within the receiving water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void. No contaminated mine drainage or discharges.
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool)	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. Evidence collected during rehab monitoring program.

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
			and/or grazing area ~~(<15% slope)~~		
	Buildings, conveyors, rail line	Safe and stable	Protects retained infrastructure, humans, and animals	Geotechnical adequacy. Minimal erosion. Product stewardship performance Condition of retained equipment	Final landform is stable. Manage waste to meet the waste management hierarchy of control. Sign off by post mining landholder (for retained structures only) – asset transfer agreement.
		Non-polluting	Water quality solute concentrations within 80%ile	Table F3 receiving water contaminant limits at downstream monitoring points.	Water quality within the receiving water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void. No contaminated mine drainage or discharges. Contaminated soil to be remediated (to meet the criteria stipulated in the Newlands Waste Management Procedure) or placed within the Ramp 7 Landfill.
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) and/or grazing area ~~(<15% slope)~~	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. Evidence collected during rehab monitoring program.
Contaminated Land	Landfill, protective bunds and around other infrastructure	Safe and stable	Protects retained infrastructure, humans, and animals	Geotechnical adequacy. Minimal erosion.	Final landform is stable. Must be a non-combustible environment.
		Non-polluting	Water quality solute concentrations within 80%ile	Table F3 receiving water contaminant limits at downstream monitoring points. Table F2 release contaminant limits.	Water quality within the EA Groundwater, the receiving water, and the release water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void. No contaminated mine drainage or discharges. Contaminated soil to be remediated (to meet the criteria stipulated in the Newlands Waste Management Plan) or placed within the Ramp 7 Landfill. Other chemical contamination is to meet the EP Regs (Waste Management) 2000.
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) and/or grazing area ~~(<15% slope)~~	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. Evidence collected during rehab monitoring program. No visible surface rubbish.
Exploration	Tracks, drilling sumps and bore holes on MLs (not including EPCs)	Safe and stable	Protects humans and animals	Minimal erosion	Gully and rill erosion <0.3metres. Holes grouted and cut off below ground surface. Sumps filled in.
		Non-polluting	Water quality solute concentrations within 80%ile	Table F3 receiving water contaminant limits at downstream monitoring points.	Water quality within the receiving water and release water contaminant limits during runoff events. Note: The above water quality contaminant limits do not apply to any surface runoff which drains to a residual void.
		Self-sustaining Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) and/or sustainable grazing area ~~(<15% slope)~~	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. Evidence collected during established rehab monitoring program.

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
Subsidence	Subsidence within General Areas	Safe and stable	Safe for humans and animals	Structural and geotechnical adequacy. Minimal subsidence induced cracking and erosion	No tension cracks greater than 20 mm wide and 10 m long. Drainage features within subsided areas resemble drainage lines outside of subsidence areas.
		Non-polluting	Surface water quality suitable for environmental values	Water quality at downstream receiving water monitoring point WQS5 (Kangaroo Creek Downstream)	Surface water quality at downstream monitoring point WQS5 less than or equal to receiving water contaminant trigger levels in Table F3 of the EA or water quality at upstream monitoring point WQS7
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool) and/or sustainable grazing area	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 (6 in grazing areas) species present and evidence of recruitment (regrowth) during past 5 years. >70% overall ground cover. Soil disturbance within 50 m of Threatened Ecological Communities (TECs) are rehabilitated with native vegetation.
	Subsidence within Newlands Nature Refuge and Wollombi Offset Area	Safe and stable	Safe for humans and animals	Structural and geotechnical adequacy. Minimal subsidence induced cracking and erosion.	Impacts upon TECs will be avoided when undertaking any surface stabilisation and soil remediation and rehabilitation works. Surface cracks in subsided areas will only be remediated where they are assessed as a high erosion risk where cracks >0.3m wide pose a safety concern to personnel or may endanger native fauna or livestock. This risk is assessed on the basis of post-subsidence visual inspections.
		Non-polluting	Surface water quality suitable for environmental values	Water quality at downstream receiving water monitoring point WQS5 (Kangaroo Creek Downstream)	Surface water quality at downstream monitoring point WQS5 less than receiving water contaminant trigger levels in Table F3 of the EA or water quality at upstream monitoring point WQS7
		Self-sustaining	Native ecosystem (light woodland with grazing as a management tool)	Species diversity and multiple canopy layers – ground, middle and upper	Minimum of 10 species present and evidence of recruitment (regrowth) during past 5 years. >70% overall ground cover. Soil disturbance within TECs are rehabilitated with native vegetation

6. Conclusion

The purpose of this report is to propose a change the EA Amendment Application (ref: A-EA-AMD-100440668) to EA EPML00817713 at NOC in the Bowen Basin. This change application constitutes an 'other change' under section s238 of the EP Act.

The current EA Amendment Application submitted by NC Coal Company on 15 September 2023 (ref: A-EA-AMD-100440668) is proposed to be changed as follows:

- Defines and limits where land with a grazing PMLU would exceed a 15% slope angle; and
- Seeking to change the closure outcomes for five final voids, creating an additional five NUMAs (other than the existing Wollombi NUMA).

The magnitude of the impact of the proposed change on land use (as an EV) would affect 1,814ha of land within the disturbance footprint which has a slope angle >15%, and five final voids with permanent lakes with elevated salinity.

This modification will apply to Table H1 of schedule H of the EA which outlines rehabilitation requirements and completion criteria for areas disturbed by mining. The amendment is sought to align the primary LOD with the Transitional PRCP, for which the DESI RFI is due to be responded to by 3 February 2025. The Transitional PRCP proposes PMLUs that include native ecosystem (light woodland with grazing as a management tool), riparian and water management and grazing.

It is intended that the EA Amendment Application as modified by this change application will:

- Avoid potential inconsistencies that may arise between the EA and the Transitional PRCP;
- Ensure land is utilised to the highest potential; and
- Avoid unnecessary rework.

7. References

ANZG 2023. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at *www.waterquality.gov.au/anz-guidelines*

Kellogg Brown & Root Pty Ltd 2012. *Newlands Coal Extension Project. Environmental Impact Statement.*

Landline Consulting, December 2022. *Grazing Steep Slopes at Newlands.*

Queensland Department of Environment and Science (DES), 2021. *Guideline – Progressive rehabilitation and Closure Plans (PRC Plans). Document ID. ESR/2019/4964, Version 2.00, Last reviewed 17 March 2021.*

Queensland Department of Environment and Science (DES), 2020. *Guideline – Major and minor amendments. Document ID. ESR/2015/1684, Version 10.00, Effective 29 Sept 2020.*

SKM 2005. *Newlands Coal Mine. Extension into the Wollombi No2 Surface Area.. Environmental Impact Statement.*

Appendix A - Newlands Open Cut Post Mining Slope Classification

Appendix B - Proposed PMLU maps for NOC

Appendix C - Slope Assessment of Areas with a Grazing PMLU within the Disturbance Footprint

Appendix D - PMLU maps with void features identified

GLENCORE