NSW GOVERNMENT | Planning, Industry & Environment

REVIEW OF

GLENDELL CONTINUED OPERATIONS

PROJECT MINE PLAN AND

MINE PLAN OPTIONS

Commercially sensitive information has been redacted from this report

OCTOBER 2020

MINECRAFT

REPORT TO:

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Director Resource Assessments
NSW Department of Planning, Industry & Environment
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REPORT ON:

Review of Glendell Continued Operations Project Mine Plan and Mine Plan Options

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EXECUTIVE SUMMARY

The Glendell Continued Operations Project is the extension of the existing Glendell Open Cut mine to the North commencing in 2021, referred to as the Project Mine Plan (PMP). The PMP formed the basis of the Environmental Impact Statement, completed in late 2019.

The transition from the current Glendell Mine into the PMP is difficult, due to the initial constrained pit access and the need for some waste rehandling, as mining turns to the North over the Swamp Creek alignment.

Initial PMP incremental ROM strip ratios in the first three years are about 8:1 and product coal ratios are about 12:1, which are high product ratios for a predominately thermal coal mine. A ROM coal contribution from the depleting Glendell Pit is used to blend these high initial ratios down and add to an increasing coal production in the years from 2021 to 2023. Hence any delay in project commencement may impact upon the project economics.

As mining in the PMP proceeds North, geological complexity increases so coal loss and dilution may increase more than experienced in the current mining operation. This change will particularly apply as mining progresses along the spine of the anticline in high dips and also when mining through the Hunter Valley Block Fault Zone.

MineCraft believes that Glencore has identified all the feasible alternatives for the continuation of mining at Glendell given the site's complex geology and the numerous surface constraints. MineCraft also concludes that Glencore's reasons for deciding on the final PMP footprint are sufficiently justified, albeit the PMP constraints could have been grouped differently into Northern, Southern and Ravensworth Homestead constraints.

Glencore provided mine schedules for most of the various mining constraints or options (except the maximum resource case and underground mining) but qualified them as being very indicative. The mine schedule for the PMP case, on which the EIS is based, is the only one where planned ROM coal production per annum reaches 10Mtpa in 2033/34 before then depleting. The mine fleet will have to increase to achieve this higher production rate and it will also necessitate having enough operating room in the pit in the years nominated.

Table 1 shows indicative NPVs for the various cases examined in this report and is based on coal prices used in the EIS and the various option schedules provided by Glencore. The NPV's shown are all provided for comparative purposes as per the Scope of Work required by PAG and are considered indicative only. Coal prices have reduced considerably since the EIS and may not have recovered from their current low prices before project commencement, potentially impacting upon the project economics.

Table 1
Mine Constraint / Option Indicative NPVs for Comparative Use Only

Mine Constraint	Option No	ROM Coal Mt	Mine Life Years	[redacted]	Difference from PMP Case $M
[redacted]		[redacted]	[redacted]	[redacted]	[redacted]
PMP Continuing Operations Increment		135.2	Yr 24	[redacted]	$0
No Extension Depletion in 2024	1	8	Yr 3	[redacted]	Includes closure costs
Maximum Resource Recovery	2	>150	Yr 27	[redacted]	Lemington UG limited
Hunter Dyke as Northern Limit	3	153.6	Yr 27	[redacted]	Lemington UG limited
York's Creek Retained	4	108.5	Yr 22	[redacted]	-$192
Swamp Creek Retained	5	99.7	Yr 18	[redacted]	-$320
Homestead Clearance 100m	6	97.1	Yr 22	[redacted]	-$230
Homestead Clearance 500m/900m NPV Based on 500m stand off	7	64.8	Yr 13	[redacted]	-$606
Underground Mining	8	N/A	N/A	[redacted]	0

Notes
[redacted]

In relation to the overall mine plan, if the MIA could be located to the South, the Western haul road would not be required and the PMP footprint could possibly be pushed further to the West. The tight spot along the Western flank of the PMP is shown in Appendix C.

The relocated Hebden Road is still an operational constraint to mining as it will probably need to be closed during blasting from time to time. If the road was redesigned to access the New England Highway to the North of the PMP, it may not have to be closed during blasting operations. The travelling distances to the New England highway would therefore be shorter.

Filling of old pit voids, should ideally be undertaken where feasible, however Glencore's position as stated to MineCraft, is that the alternative dumping sites near the PMP are both in use, and have unacceptable haul road distances and hence higher waste haulage costs.

A compromise solution might be reached where no change to the PMP dump plan occurs until Mount Owen Mine Operations cease. At that time, tailing placement could possibly change from the old West Pit to the Mount Owen void, or part of it, and the West Pit tailings be contained and capped. A fill buffer would be required to contain the tailings, prior to placing a thick capping layer in place.

The same principle would apply to the Bayswater North Pit. As the PMP mining activities approached it, a new water dam location may be found and then nearby blasted waste could be short hauled to it. This procedure, if followed, would see two pit voids closed and filled so that rehabilitation surface work could be completed. This dumping approach may be able to be assessed by further study.

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1.0 INTRODUCTION

The Planning & Assessment Group (PAG) of the NSW Department of Planning, Industry and Environment commissioned the services of MineCraft Consulting Pty Ltd (MineCraft) as an independent coal mine planning expert to conduct a review of the Glendell Continued Operations PMP and mine plan options, which are described in the project EIS and Appendices.

The Glendell Mine forms part of the broader Mount Owen Complex (MOC) with integrated coal handling and processing facilities, product transport, tailings disposal and water management systems. The Mount Owen CHPP is currently approved for up to 17Mtpa ROM coal throughput.

Glencore is seeking approval for the continued and extended operation of the Glendell Coal Mine, which is part of the Mount Owen Coal Complex, approximately 20km Northwest of Singleton in the Hunter Valley.

2.0 BACKGROUND

The existing development consent for the Glendell Mine permits open cut coal mining until June 2024. Glendell Mine is seeking approval to continue open cut mining to the North of its existing operations, as shown in Figure 2.1. The Project footprint (shown in orange outline), as proposed by Glencore, would mine approximately 135Mt of additional ROM coal. Other planning options shown in Table 2.1 are also shown in Figure 2.1.

Glendell Mine and Mount Owen Mine both operate seven days per week, 24 hours per day. Mining is undertaken by truck and excavator methods. Glendell's direct mine workforce is about 300 people.

Key aspects of the Glendell Continued Operations Project include:

- Mining additional coal including on-going overburden emplacement, mainly in-pit;
- Extending the mining life of Glendell Mine to 2044;
- Varying the annual production rate during stages of the Project to match existing capacity across the Mount Owen Complex. Production rate is increased from 7.1Mtpa to 10Mtpa for two years in 2033 and 2034;
- Utilising existing infrastructure at the Mount Owen Complex;
- Relocating a new Mine Infrastructure Area to a new location;
- Relocating Ravensworth Homestead;
- Realigning the lower section of York's Creek;
- Realigning part of Hebden Road;
- Realigning Swamp Creek; and
- Relocating powerlines.

The Project involves extending the life of the Glendell Mine until 2044 by expanding the current Glendell Pit to the North. The Project would increase production over time from approximately 4Mtpa ROM coal up to 6Mtpa, with a short term increase up to 10Mt per annum in 2033/34.

The EIS for the Project was placed on public exhibition from 11 December 2019 to 14 February 2020. Key issues raised in agency and community submissions relate to the proposed relocation of the Ravensworth Homestead, which is under consideration for listing on the State Heritage Register, as well as impacts on surface water resources and the local road network.

The EIS includes a Mine Planning Options Report (see Appendices 1 and 6 of the EIS) the conclusions of which are summarised in Table 2.1. This report identified various pit-shell options and overburden emplacement options which were considered by Glencore during the mine design phase of the Project as shown in Figure 2.1.

Table 2.1
Glendell's Summary of Mine Plan Options

Option	ROM tonnes (Mt)	Approximate Mine Life (Yrs)	Royalties[1] to State of NSW ($M)	Reasonable and Feasible Mine Plan?	Glencore Comments
Option 1: No project	12	3	0	No	If no project, then economic benefit of the project will be lost
Option 2: Maximum Resource Recovery	>150	>25	>780	No	Mining through Bowmans Creek and Liddell Underground is technically challenging. Diversion of Bowmans Creek unlikely to offset associated impacts. Also likely impacts on biodiversity and cultural heritage
Option 3: Hunter Valley Dyke Constrained	145	25	750	No	Technical challenges associated with mining into the Liddell Underground
Option 4: Yorks Creek Constrained	100	20	520	No	Truncated mine plan reduces ability to achieve a suitable return on capital investment
Option 5: Swamp Creek Constrained	100	18	520	No	Truncated mine plan reduces ability to achieve a suitable return on capital investment. Potential for additional void in final landform and need for out-of-pit overburden emplacement area
Option 6: Homestead Mine Around (within 100m)	89	18	460	No	Potential long term stability issues associated with highwall void to east of homestead. Homestead would be subjected to blast vibration and visual setting would change with void to east and dump to south
Option 7: Homestead 500m standoff (900m standoff)	57 (35)	10 (7)	290 (190)	No	Significant reduction in resource recovery and mine life making economically unviable with reduced revenue to the State
Option 8: Underground Extraction	10	5-8	50	No	Geology and geometry not favourable for underground mining. Also significantly reduced resource recovery (approximately 7% of PMP) for high capital expenditure
PMP: GCO Project	**135**	**22**	**710**	**Yes**	**PMP provides best balance between mine planning, economic, environmental and social outcomes**

(Source: Glendell Continuing Project EIS Appendix 1)

Notes:

1. In Option 1, the 12Mt ROM is that tonnage mined as the current Glendell Mine depletes (from 2020).

2. In Figure 2.1 the footprint of Option 3 along its Eastern Boundary is shown as more to the East than the PMP footprint – the reason for this is that further drilling and information was gained that caused the later PMP design to be tightened or the PMP pit narrowed inward.

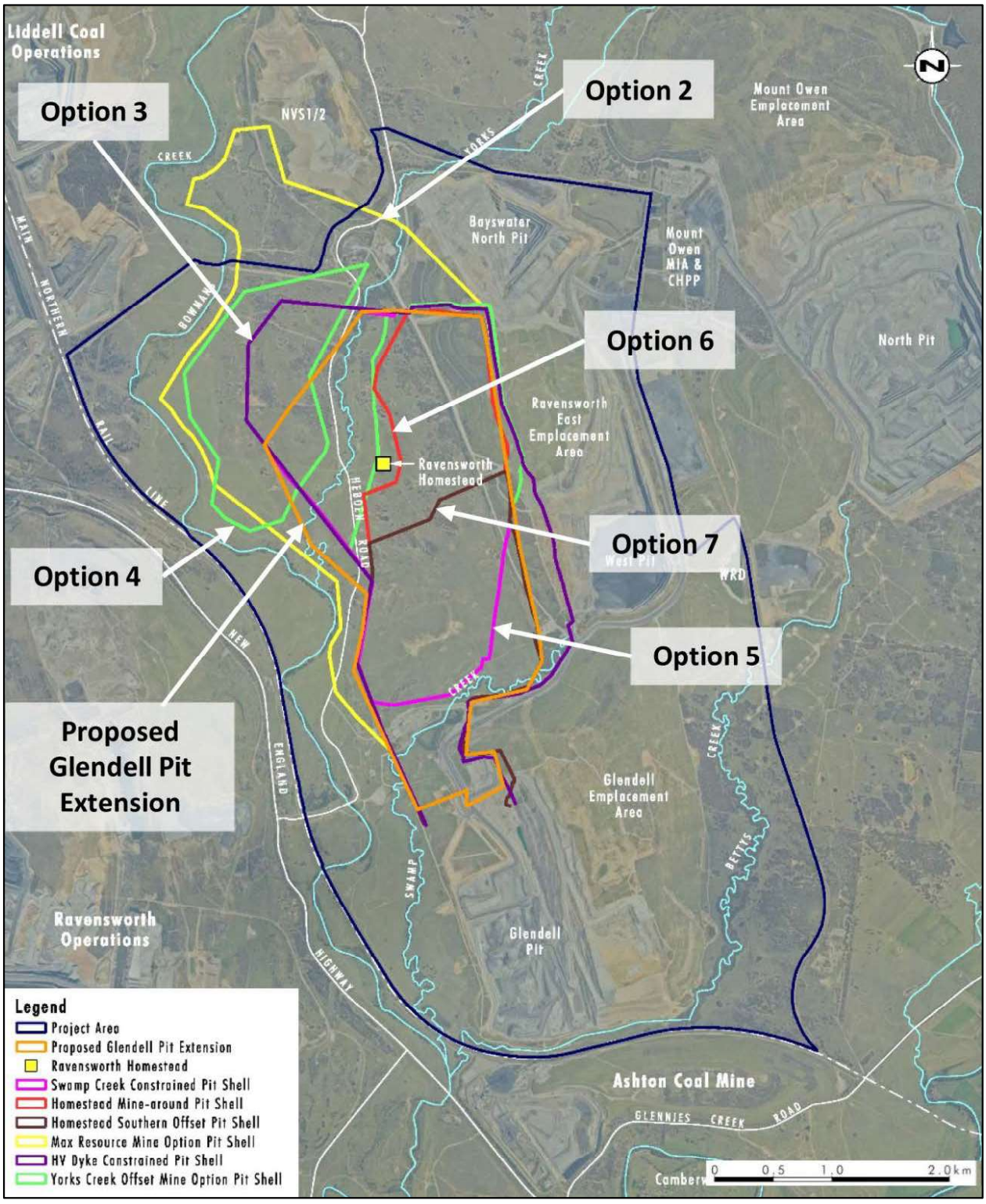


Figure 2.1
Glendell Mine Proposed Extension Shown in the Mount Owen Coal Complex

2.1 Previous and Current Mining

The Proposed Glendell Pit Extension represents one of the few remaining mineable resources in the Ravensworth area and is surrounded by previously mined areas and current mining operations (both open cut and underground) as shown in Figure 2.2:

- Ravensworth East to the East and North (both complete and active);
- Glendell Barrett Pit including Arties box cut to the South (active);
- Ravensworth Surface Operations to the West (active);
- Ravensworth Underground to the West (complete);
- Liddell Underground to the North-West (complete);
- Integra Underground to the East (active).

Figure 2.2
PMP Area Showing Surrounding Mining Operations

3.0 SCOPE OF WORK OUTPUTS SOUGHT BY PAG

PAG recognises that there are a number of particular surface constraints and design considerations which must be taken into account as part of any future mine plan for Glendell including:

- Minimising or avoiding impacts on built and natural features, including:
  - Ravensworth Homestead;
  - Hebden Road; and
  - Yorks Creek and Bowmans Creek (and associate alluvial aquifers);
- Minimising impacts on Biophysical Strategic Agricultural Land;
- Minimising interactions with historical underground workings associated with the Liddell Mine;
- Maintaining highwall stability, having regard to the location of the Camberwell anticline hinge;
- The need to rehandle material within the Ravensworth East Emplacement Area to facilitate the expansion of the Glendell Pit working area;
- Achieving a stable final landform which minimises the number and size of final voids and complements the surrounding landscape; and
- Optimising coal recovery, operational efficiency and capital return for Glencore.

To enable the Department to provide a thorough and detailed assessment of the Project, the PAG Group is seeking independent expert advice from MineCraft in regard to the Mine Planning Options 1 to 8 in Table 2.1:

- To ensure they identify all reasonable and feasible options for the continuation of mining on the site, having regard to the constraints and design considerations outlined above; and
- Whether the reasons for not pursuing the alternative options identified in the report have been sufficiently justified.

The objectives of the review required by PAG are as follows:

1. Undertake an initial review of the PMP Stage Plans as set out in Appendix 6 and the Mine Planning Options Report in Appendix 1 of the Glendell Continued Operations EIS.
2. Undertake a comparative revenue generation options assessment for the following pit shell designs, listed in Table 2.1:
   - The “Do Nothing Case” (Option 1);
   - The “Max Resource Mine Option Pit Shell” (Option 2), amended by splitting the pit shell to avoid Ravensworth Homestead, Hebden Road and Yorks Creek;
   - The “Yorks Creek Offset Mine Option Pit Shell” (Option 4) shown in Appendix 1, amended to avoid Ravensworth Homestead and Hebden Road;
   - The “Homestead Mine-around Pit Shell” (Option 6) shown in Appendix 1;
   - The “Homestead Southern Offset Pit Shell” (Option 7) shown in Appendix 1; and
   - Underground extraction of targeted seams (Option 8).

3. Critically evaluate the justification of the options presented for emplacement of overburden at the Mount Owen complex and/or nearby Liddell mine, and outline the relative costs and economic viability of using overburden from the Project to minimise the number and/or size of final voids at these sites.
4. In respect of the options outlined in point 2 and 3 above, MineCraft is required to, as a minimum:
   a) Examine and report on the:
      i. Potential implications for operational efficiency, "development float", mine sequencing and continuity of mining;
      ii. Changes in total coal recovery; and
      iii. Changes in the relative rate of return on capital and NPV and income to the State of NSW (refer to the Economic Impact Assessment in Appendix 30 of the EIS) using independent coal pricing assumptions and including analyses of sensitivity to coal pricing.
   b) Summarise the comparative review outcomes;
   c) Make recommendations for any additional information required from Glencore to inform the comprehensive assessment of the Project's proposed conceptual mine plan.

4.0 DATA SOURCES, METHODOLOGY AND QUALIFICATIONS

4.1 Data Sources and Methodology

The information used for this review was primarily sourced from public domain, primarily the Project EIS and supporting documents. Some confirmation information was provided by Glencore via an information request submitted through PAG, mainly related to resources, reserves and various mining schedules.

This review was conducted as a desktop exercise using reference information on the Project from the EIS and, in particular that contained in Appendices 1, 6 and 30. No site visit was conducted due to travel restrictions throughout Australia during May/July 2020.

Glencore provided data requested by MineCraft and provided a Project briefing and two presentations using WebEx technology. A total of three requests for additional explanatory data were submitted to Glencore and were answered in presentation format.

4.2 Qualifications

The lack of a site visit qualifies some commentary made on the various mine options as plans are restricted to plan view only and do not display the variations in topography that are particularly pertinent for open pit planning especially, for example, creek realignment recommendations.

4.3 Terminology Used by Glencore

Both Glencore in their mine planning discussion, and PAG in setting the review scope, refer to planning options. Another way of expressing the analysis is that most of the planning options analysed by Glencore could also be considered as surface mining constraint options.

In this sense the planning options could be broadly grouped as:

- Do Nothing (as a Base Case);
- Underground Mining; and
- Continue Glendell mining to the North dealing with the various surface constraints that apply including Ravensworth Homestead, various local creeks, roads and powerlines.

4.4 Thermal and Coking Coal Products

A number of mines in the Hunter Valley produce SSCC and thermal coal. Depending on coal prices and product coal demand SSCC can be sold into either the coking coal or the thermal coal market.

5.0 PMP GEOLOGY, STATUS, PLANNING AND ECONOMICS

5.1 Geological Setting

The coal seams of interest are all within the Wittingham Coal Measures. Exploration has shown that the coal seams in the project area are consistent with those now being mined at Glendell Mine, with some local variations in depth, coal quality, seam and interburden thickness.

Significant structural features in the proposed mine footprint include the:

- Camberwell Anticline which is centrally located within the proposed Project area, trending north-south with strata gently dipping (less than 20 degrees away from the fold axis, which plunges gently to the North);
- Hunter Valley Block Fault Zone which occurs in the North of the Project Area; and the
- Hunter Valley Dyke which is to the North of the Liddell Underground.

These features are located as shown in Figure 5.1.

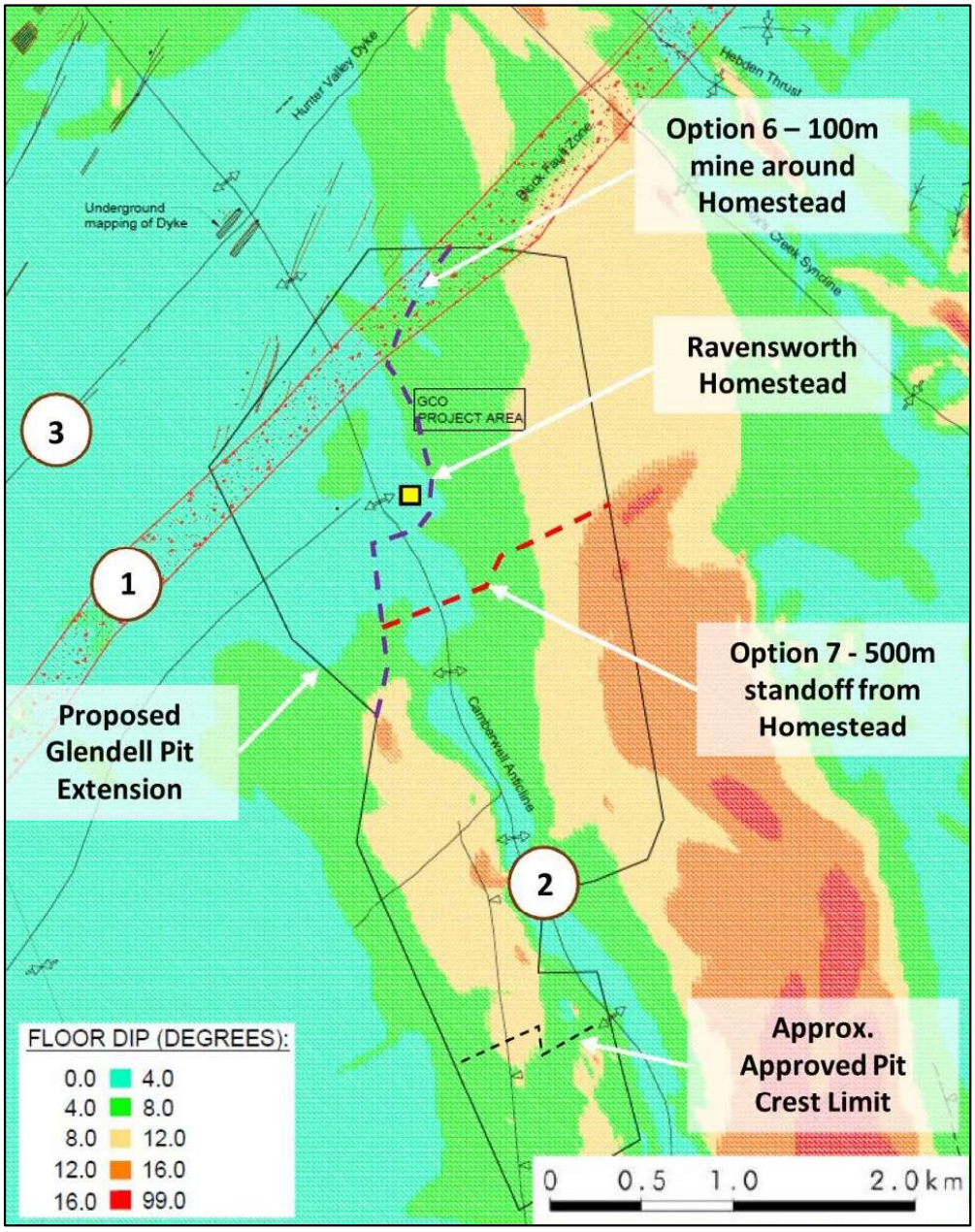
The first two of these features along with consequent smaller throw faulting steeply dipping floors add a significant degree of mining difficulty and will add to the coal loss and dilution that will take place as the mining operations proceed to the North.

5.2 Coal Seams Mined in the PMP

Exploration across the PMP area and subsequent coal quality analysis indicates that the resource will output similar types of coal products as are being produced from the coal seams mined in the current Glendell pit. [redacted]

SSCC is mainly sourced from the lower Arties and Liddell Seams. SSCC represents 20% of product coal currently. In the PMP it is assumed that it will represent the same proportion of product coal.

The basal seam as mining progresses to the North is the 2.7 meter thick Hebden Seam which, like the Barrett Seam above it, is predominately thermal coal.



Source: Glencore Presentation 1 June 2020

Figure 5.1
PMP Footprint in Relation to Major Geological Features

[redacted]

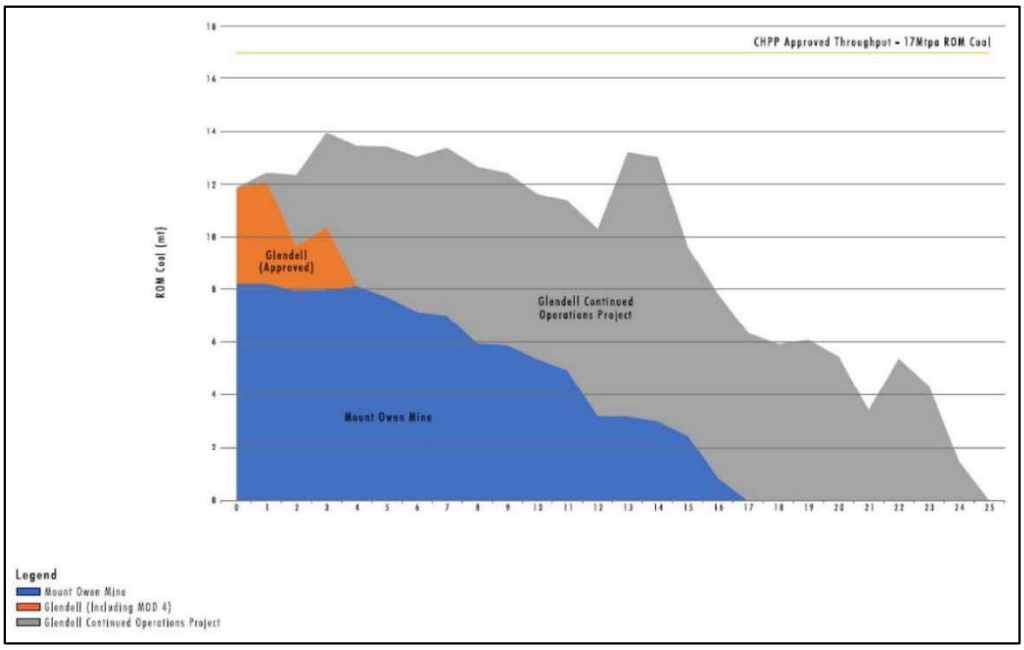
5.3 Glendell Current Status

Glendell Mine is one of three operating pits at the MOC, which also includes Mount Owen and Ravensworth East operations. Mining activities commenced at Glendell Mine in 2008. It currently has approval to mine up to 4.5Mtpa of ROM coal through to June 2024.

Blasted overburden is excavated in a series of horizontal 5m benches (lifts) and loaded into rear dump trucks for transportation to the overburden emplacement areas. In-pit dumping of overburden is optimised wherever possible. Material that cannot be accommodated in-pit is hauled to the ex-pit emplacement areas.

Coal is mined by excavators into rear dump trucks for transportation, via internal haul roads to the ROM coal receival point adjacent to the Mount Owen CHPP ROM pad where the majority of the ROM coal is directly fed to the CHPP.

The MOC combined mine schedule is shown in Figure 5.2. As can be seen, the intent is to keep the combined mine capacity as high as possible consistent with the Mount Owen CHPP capacity of 17Mtpa ROM. The Glendell PMP will be the last mine operating in the MOC with Mount Owen planned to complete mining in 2036/37. Of note is the peak output from the PMP where ROM production increases to 10Mtpa for two years before declining as the mine depletes.



Source: Glencore Presentation 1 June 2020

Figure 5.2
Indicative Mount Owen Complex ROM Coal Production Schedule

[redacted]

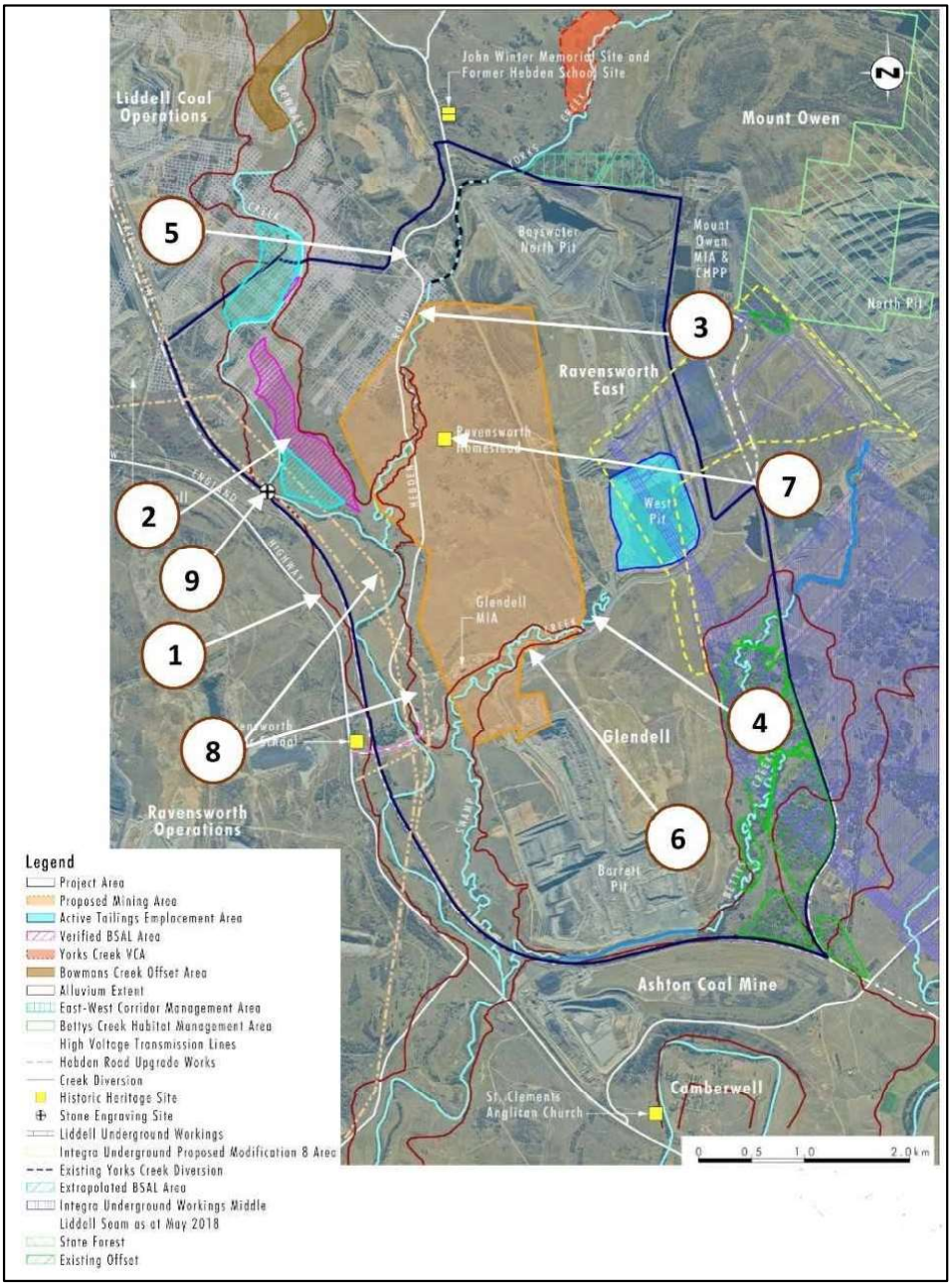
[redacted]

5.4 PMP Planning Considerations

In the Hunter Valley, where there are many competing demands for land use, surface constraints to mining are very real planning considerations. In this case, Glencore substantively owns all the involved land. In the case of the PMP, the Northern, Southern and Eastern sides have all been mined previously. To the East, Bowmans Creek and Swamp Creek flats are Biophysical Strategic Agricultural Land (BSAL). The surface constraints can be grouped as follows:

- Tenure constraints: These constraints do not apply to the PMP.
- Firm constraints: To the West and South of the PMP are the New England Highway and the railway line. Significantly, mine traffic accesses the mine from the New England Highway by an access road over the railway line. Hebden Road also uses the same access to the New England Highway. Also included in this category are the old mine workings in the Liddell Seam which are water filled and which Glencore believes constitute an unacceptable risk to mining further to the North than the PMP footprint.
- Negotiable at a cost:
  - Hebden Road and York's Creek to the Northwest; and
  - Powerlines to the West.
- Heritage or Anthropological sites:
  - Ravensworth Homestead and certain anthropological sites which are typically not easily assessed due to intangible factors.

Surface constraints to the PMP are shown in Figure 5.3.



Source: Glencore Presentation 1 June 2020

Key:
1 Bowmans Creek and associated alluvium.
2 Biophysical Strategic Agricultural Land (BSAL)
3 York's Creek (tributary Bowman's Creek)
4 Swamp Creek (tributary Bowman's Creek)
5 Hebden Road a public road owned by Singleton Council
6 Glendell mine Infrastructure Area (MIA)
7 Ravensworth Homestead
8 HV transmission lines both 330kV and 132kv and other utilities
9 Stone Engraving Site

Figure 5.3
PMP Area Surface Infrastructure and Constraints

5.5 Glencore's Production Cap

In February 2019, Glencore publically advised the financial markets they would broadly cap their total production at then current levels (approximately 145Mtpa). The split between thermal and metallurgical coal was not differentiated. It is not clear if this cap will have any impact upon the proposed Glendell Project (refer www.glencore/media/news).

5.6 Glendell Continued Operations Project

Key aspects of the Glendell Continued Operations Project plan are:

- Continued open cut mining operations beyond the existing Glendell Mine;
- Disturbance of approximately 750ha of primarily cleared rural land outside of areas already approved for disturbance;
- Emplacement of overburden from the new mining area and emplacement within the mine and working void to assist with creation of a final landform;
- No increase to the overall operational workforce at the Mount Owen Complex;
- An increase to the existing October 2019 approved rate of mining from 4.5Mtpa up to 6.0Mtpa (approximately) for most of the mine life and with a temporary peak of 10Mtpa. The peak increase coincides with the decrease in production rates at the other Mount Owen Complex pits to maintain the currently approved throughput at the CHPP;
- Continued use of the existing infrastructure and equipment (with the exception of the existing Glendell MIA) for the life of the Project with some minor additions to the existing mobile equipment fleet;
- The same open cut mining techniques will be used i.e. excavator and truck;
- No increase in annual train movements are proposed;
- A change in mine access along Hebden Road;
- A peak construction workforce of approximately 350 people and continued employment opportunities for the existing operational workforce at the Mount Owen Complex;
- A single final void will remain at the northern end of the new mining area resulting in no additional void in the final landform, which is consistent with the current approved Glendell Mine;
- Establishment of a final landform that utilises natural landform design principles and provides connectivity to established offsets and areas of existing vegetation.

5.7 Transition From The Current Glendell Pit

The transition from the current Glendell Pit to the PMP is quite difficult as it includes a pit narrowing which leads to high stripping ratios for several years until the pit widens out. Consequently, the average ROM ratio of 6:1 is not achieved until year 8 (source Glencore Presentation, 1 June 2020).

The current Glendell mining operation mines to the floor of the Arties seam, with the ROM strip ratio and coal quality making it uneconomic to mine deeper. Deposit characteristics within the Project area further to the North results in a decrease in the ROM strip ratio due to a thickening of the Hebden seam making it viable to mine to the floor of that seam.

5.8 Indicative Economics

5.8.1 Ernst Young Analysis EIS

Appendix 30 to the EIS undertaken by Ernst Young is the only source NPV analysis of economic data on the public record. It was completed in October 2019 at a time when both coking coal and thermal coal prices were gently declining. None of the recent drop in world demand and energy prices for oil, LNG and coal was evident at that time.

Due to the low current spot coal prices late in the second quarter of calendar 2020, Glendell Mine may be near cash negative based on what proportion of coal sales are under contract and the assumption that stripping costs are similar to those included in the total operating costs reported in the EY analysis.

In regard to economic benefits, it is appreciated that the Glendell Mine only has to continue to operate for the employees to gain their wage benefits and for NSW to receive benefits from royalties and payroll tax. It is the other taxation and related benefits of mining that flow to NSW and Australia more broadly that would be impacted by reduced or negative cash margins.

5.8.2 Operating Costs

[redacted]

Note 2033 is one of the years (Appendix 30 Mine Schedule) that production is planned to increase to 10Mtpa but as can be seen, there appear no assumed cost savings from the higher production rate. The costs shown above are consistent with current Hunter Valley mining costs.

5.8.3 Capital Costs

EIS Appendix 30 summarises the capital expenditure profile of both the Approved operations and PMP case. This indicates that the capital expenditure over the period 2021 to 2044 is $870M. In simple terms, this amounts to $10 per product tonne for the project which is considered a relatively

high capital requirement for a brownfield extension to current mining operations, not including any CHPP capital costs.

A summary of the required capital in Table 5.2 shows that, of the total $870M, $[redacted]M is for mine fleet replacement and sustaining capital, and $[redacted]M is project related infrastructure with a contingency of $[redacted]M (being 11% of the total). Whilst not individually tabulated, project infrastructure would include the new MIA with the heavy haulage access road, other access roads and the cost of removing various surface constraints. There is a high up-front cost of $[redacted]M for infrastructure in the first two years of the PMP (being 2021 and 2022).

[redacted]

5.8.4 Ernst Young NPV Analysis Outcomes

The EY analysis follows the guidelines for the economic assessment of mining and coal seam gas proposals released by the NSW Government in December 2015. All NPV figures were reported in 2019 Australian dollars based on a 7% real discount rate.

EY estimated the project to provide a net estimated benefit to NSW of $1,150M in net present value (NPV_7), comprised of $398M and $754.3M in potential direct and indirect benefits respectively. Incremental indirect costs of the Project are $2.4M in NPV_7 terms.

These estimates included the proposed expansionary and sustaining capital of $515.3M (in NPV_7 terms) and average real coal prices of AUD118.5 and AUD96.6 per tonne of semi soft coking coal and thermal coal respectively.

The direct benefits of the Project are a function of its profitability which, in turn, depends on the prevailing coal price. The EY analysis indicates the Project is estimated to generate potential in regard to:

- Total corporate taxes of $202M in NPV_7 terms for Australia, of which $65M is attributed to NSW;
- $333M in other government revenue for NSW in NPV_7 terms, the largest component of this being royalties of $296M, and net payroll taxes of $37M.

The indirect benefits of the Project are related to the linkages that it will have to the NSW economy through both the labour market and suppliers. The analysis shows that of the $754M in estimated potential indirect benefits:

- Worker benefits are estimated to be $468M in NPV_7 terms, from the additional ongoing employment attributable to the Project; and
- Supplier benefits are estimated to be $286M in NPV_7 terms based on the NSW based supplier inputs over the life of the Project of $1,419M in NPV_7 terms.

5.8.5 Current Coal Sales Prices

Coal prices historically vary in cycles and have fallen significantly since EY produced EIS Appendix 30 in 2019. Thermal coal prices have reduced significantly in two broad phases:

- Coal demand in Europe has generally fallen away throughout 2019 in response to a growing proportion of renewables in the power station fuel mix, particularly in Germany and Holland;
- Specifically in 2020 as a result of the impact on demand due to Covid19.

Metallurgical coal prices held up well until 2020 and have fallen as a result of Covid19 with the price falling away from USD150 to USD110/t. However lower coking grades have been particularly hard hit with SSCC, such as that sold by Glendell and a number of Hunter Valley Mines, falling to USD63/t in May 2020.

5.8.6 Coal Prices Used by Ernst Young

On average, over the life of the Project the EY thermal coal price assumption is AUD96.6 per tonne with a peak in 2021 at AUD102.2 declining to about AUD96.7 per tonne from 2024.

For SSCC the assumed price is AUD118.5 per tonne with a peak in 2021 at AUD126.9 declining to about AUD118.7 per tonne from 2024.

It is noted that coal prices for the export market is usually quoted on a Free on Board (FOB) basis from the port of Newcastle in USD. Current spot coal prices (July 2020) are shown in Table 5.3 compared to those adopted by EY in 2019.

Table 5.3
EY Analysis and Current Spot Coal Prices

	EY 2019 AUD/t	July 2020 USD/t	July 2020 AUD/t (69 US Cents)
SSCC	118.50	59.25	86.44
Thermal	96.60	51.00	73.91
Average for Glendell (77% thermal)	101.70		76.80

Source: EIS Appendix 30 and Platts

5.8.7 The Impact of Sustained Lower Thermal and Coking Coal Prices

The PMP economic analysis was completed in 2019. MineCraft readily acknowledges that coal prices will pass through a number of coal price cycles during the Project's life and that the current phase may represent a low part of the coal price cycle. Using the cost data in Appendix 30 with current spot coal prices indicates that in some years, the project will potentially be cash negative as shown in Table 5.4.

Table 5.4
The Possible Impact of Lower Coal Prices On Projected PMP Cash Margins

Typical Year 2026	Appendix 30 Coal Prices			Actual May 2020 Spot Coal Prices (Platts)	
Production	Mt	AUD/t	Revenue AUD M	AUD/t	Revenue AUD M
SSCC	0.9	$118.7	$107	$97.24	$88
Thermal	2.9	$96.7	$280	$64.57	$187
Total	3.8		$387		$275
Cash Costs			$283		$283
Annual Cash Margin			$104		-$9

Source: MineCraft and EIS Appendix 30
(Spot prices sourced from Platts)

5.9 MineCraft Review Commentary

MineCraft's review postdates the EY analysis by approximately one year. As can be seen in Table 5.3, spot market metallurgical and thermal coal prices have fallen significantly over the last year.

MineCraft acknowledges that Glencore would sell most the Glendell coal as a component of an MOC blend in accordance with contract prices, but nevertheless spot product coal prices can be used as a reasonable guide for the current analysis.

[redacted]

Comparative NPV

The requested work scope included a NPV comparison between the different options and the results of this are shown in Table 5.5. EY only reported key assumptions and selective results in the EIS so a complete synthesis and matching of EY's NPV calculations was not possible. Therefore an estimate of the comparative NPV's was made using the available information and adopting the same sales prices as per the EIS report. It is highlighted that the calculated NPV's are indicative and to be used for comparison only.

It is also noted that if current coal prices were adopted in the calculations, all NPV's would most likely be negative.

Table 5.5
Mine Constraint / Option Indicative NPVs for Comparative Use Only

Mine Constraint	Option No	ROM Coal Mt	Mine Life Years	[redacted]	Difference from PMP Case $M
[redacted]		[redacted]	[redacted]	[redacted]	[redacted]
PMP Continuing Operations Increment		135.2	Yr 24	[redacted]	$0
No Extension Depletion in 2024	1	8	Yr 3	[redacted]	Includes closure costs
Maximum Resource Recovery	2	>150	Yr 27	[redacted]	Lemington UG limited
Hunter Dyke as Northern Limit	3	153.6	Yr 27	[redacted]	Lemington UG limited
Yorks Creek Retained	4	108.5	Yr 22	[redacted]	-$192
Swamp Creek Retained	5	99.7	Yr 18	[redacted]	-$320
Homestead Clearance 100m	6	97.1	Yr 22	[redacted]	-$230
Homestead Clearance 500m/900m NPV Based on 500m stand off	7	64.8	Yr 13	[redacted]	-$606
Underground Mining	8	N/A	N/A	[redacted]	0

[redacted]

Comparative Coal Tonnes

The tonnages lost and gained in each of the options analysed are provided by Glencore and reported in Table 2.1. They are shown in Table 5.6 in relation to the PMP option tonnage of 135Mt.

Table 5.6
Surface Constraint or Option Impact on Recovered ROM Coal

Option	Tonnage Mt
Option 2 – Maximum Resource	PMP + 5-10Mt
Option 3 – Hunter Valley Dyke	PMP + 10Mt
Option 4 – Yorks Creek	PMP – 30Mt
Option 5 – Swamp Creek	PMP – 30Mt
Ravensworth Homestead Option 6 Option 7	 PMP – 41Mt (100m) PMP – 57Mt (900m)
Option 8 – Underground Mining	

Source: Glencore and MineCraft

In terms of working room and work in progress (i.e. uncovered coal inventory):

- Option 2, 3. Nil impact.
- Option 4. Nil impact for most of the mine life.
- Option 5. Significant impact if a new box cut is required and impact is immediate in terms of reducing NPV.
- Option 6/7. Each would have significant operational issues for Glencore. Work in progress and uncovered coal would decrease as the Ravensworth Homestead buffer were reached.
- Option 8. Not viable. No impact.

The EY analysis is based on 2019 coal prices and shows positive benefits to Glencore, Glencore employees, NSW and Australia. However, if the current low coal prices persist, Glencore may experience a significantly reduced return on the capital invested, in which case the project benefits may be limited to Glencore employees (from ongoing income) and the state of NSW (from royalties and payroll tax).

6.0 OPTION 1: NO PROJECT

6.1 The EIS Option 1 Description

The No Project Option entails the completion of mining of the approved Glendell Pit with operations finishing in 2023. As reported in the EIS the No Project Option would negate the assessed economic benefits of the project, which would be lost to both Glencore and NSW. This option therefore has not been pursued by Glencore. Should the project not proceed, there may be some potential benefits to the local community and environment realised by avoiding some of the impacts of mining and for Glencore for not having to:

- Divert York's Creek;
- Relocate Ravensworth Homestead; and
- Relocate a section of Hebden Road.

Glencore states the No Project Option benefits have to be balanced against the very significant 300 plus direct mine job losses from about 2023, as well the job equivalent losses of 1,450 people in the local community including mine servicing contractors. As mentioned in the EIS, Glencore would also have to undertake mine closure costs for Glendell Mine estimated in EIS Appendix 30 at $62M from 2024 to 2027.

6.2 Depleting Mine Schedule

The mine schedule for the remainder of the approved Glendell Mine is shown in Table 6.1.

[redacted]

The ROM coal stripping ratios are low as the bulk of the overburden has been removed and most of the remaining waste is interburden from between the coal seams.

6.3 MineCraft Review Opinion - Option 1 No Project

A No Project Option is typically included in options analysis as a reference case to the preferred case to demonstrate the incremental benefits and is usually dismissed as a likely option.

In this case the incremental benefit of the PMP is [redacted] using EIS coal prices. At current coal pricing the project revenue is reduced by [redacted]. Therefore, due to the project's relatively high capital cost and project ranking process amongst the Glencore Group projects, the PMP's ranking could likely change depending upon the coal sale price forecasts.

7.0 OPTION 2: MAXIMUM RESOURCE RECOVERY

7.1 The EIS Option 2 Description

The extension of mining further to the North beyond the PMP footprint would require mining through the former Liddell underground workings and Bowmans Creek. This option would extend the life of mining by potentially a further ten years beyond the PMP, but would require:

- Mining through the old flooded Liddell underground workings above which the overburden is likely to be fractured to a variable extent;
- Mining through Bowmans Creek which would have significant impact on Bowmans Creek and its associated alluvial aquifer. The diversion of Bowmans Creek to enable open cut mining would be extremely complex with its final reinstatement being over mine overburden;
- Alternative alignments for the diversion of Hebden Road and York's Creek;
- Impact on known features of Aboriginal cultural heritage value;
- Mining through additional areas of identified Biophysical Strategic Agricultural Land; and
- Lack of adequate void space in the existing Glendell Pit for overburden emplacement early in the mine life requiring overburden emplacement on previously rehabilitated overburden areas.

Based on the above technical and environmental aspects, extension of the PMP further North is not considered by Glencore to be reasonable and feasible.

7.2 Mining Schedule

Glencore did not prepare a mine schedule for this option.

7.3 MineCraft Review Opinion – Option 2 Maximum Resource Recovery

7.3.1 General

Given the mining complexity evident to the North of the designated PMP area, in part due to the presence of old workings in the Liddell seam, the small tonnage increment's profit contribution is nullified due to lower coal recovery and consequent higher mining costs.

MineCraft therefore concurs with Glencore that mining to the North of the PMP footprint will be difficult, with consequent high mining costs and no additional NPV contribution.

7.3.2 Mining to the West of the Current Glendell Pit

The various surface constraints on the Eastern side of the proposed PMP do not extend fully along the boundary of the current Glendell Pit except for the alluvials associated with Bowmans and Swamp Creeks. In the PMP design, Swamp Creek alignment is mined through and subsequently overburden is dumped over it.

MineCraft considered the option of mining the current pit further to the West so as to obtain additional low ratio coal. Glencore do not favour this option as a means of contributing low ROM ratio coal at Glendell, whilst the PMP is being initiated for reasons to do with intersecting what may be water filled alluvials associated with both Swamp and Bowmans Creeks, and the difficulty of establishing sufficient dump room.

After being provided with additional data on the extent of the Bowmans and Swamp Creek alluvials, MineCraft agrees that there are significant risks to mining the Glendell Pit further West with not much ROM coal upside. [Refer Appendix B which includes the additional data provided by Glencore].

8.0 OPTION 3: HUNTER VALLEY DYKE CONSTRAINED

8.1 The EIS Option 3 Description

This option mines additional coal resources and extends the duration of mining by a further five years beyond the PMP. Mining into the Liddell Underground workings however would require significant management of water from the flooded underground workings and potentially cause related strata failure risks. As a result of the uncertainty associated with being able to successfully seal the Liddell underground workings and control these risks, the option of mining through the Liddell Underground mine up to the Hunter Valley Dyke was not considered by Glencore to be safe, reasonable or economic.

8.2 Mine Schedule

An indicative mine schedule has been provided by Glencore for Option 3. The first seven years are shown in Table 8.1, and the whole schedule in Appendix A.

8.3 MineCraft Review Opinion – Option 3

Higher mining costs would apply to Option 3 than those in the PMP. The higher mining costs would derive from the loss of coal in the thick Liddell Seam and the more complex mining operation.

This option potentially takes mining further North than the Maximum Resource Option 2, however it is also practically constrained by the Liddell Underground workings.

Option 3 is largely the same as Option 2 and provides no potential economic benefit over the PMP case. The incremental coal (about 10Mt ROM) would be very difficult to recover. No contribution to projected NPV would be made by the incremental additional tonnage mined in this option.

9.0 OPTION 4: YORK'S CREEK CONSTRAINED

9.1 The EIS Option 4 Description

The truncation of the mine plan to standoff York's Creek results in the loss of 26.7Mt of ROM coal when compared to the PMP. Under a truncated mine plan, the reduced mine life and profitability results in this option being a less desirable investment choice for Glencore.

A range of different mine plan layouts were considered by Glencore whilst retaining the existing York's Creek alignment, including mining up to a southern offset from the creek only, and also the mining of a satellite pit on the northern side of the creek between York's and Bowmans Creeks into the former Liddell Underground workings.

The extent of resource sterilisation and inability to achieve a suitable return on capital investment as a result of a truncated mine plan, coupled with the technical challenges of mining into the Liddell Underground mine, make the option of stopping short of York's Creek (with a potential satellite pit between York's and Bowmans Creek) to be not reasonable nor feasible as determined by Glencore.

9.2 Mining Schedule

A mine schedule has been provided by Glencore. The first seven years and total are shown in Table 9.1. The full mine schedule is shown in Appendix A.

9.3 MineCraft Review Opinion – Option 4

MineCraft has no reason to disagree with Glencore's conclusions. This option would reduce ROM tonnage in the PMP down to 108.5Mt of ROM coal.

The strategy of combining the retention of York's Creek and the Ravensworth Homestead complex is shown in Figure 12.1 and possibly requires further consideration under a low coal price scenario.

10.0 OPTION 5: SWAMP CREEK CONSTRAINED

10.1 The EIS Option 5 Description

The option incorporates starting a new open cut mine immediately North of Swamp Creek and the existing Glendell MIA. The advantage of this option is that it retains the existing Swamp Creek alignment and associated alluvium as well as the current Glendell MIA, which are proposed to be mined through under the PMP.

The commencement of a new open cut mine immediately North of the existing Glendell MIA and Swamp Creek presents a number of challenges. Firstly, the startup costs are extremely high due to a high initial strip ratio as it takes time to develop the mine to its full depth and reach steady state production. Secondly, overburden from the new open cut mine would need to be hauled long distances to either the existing Glendell Pit void or Liddell voids (which are considered too far away) and this has an associated cost implication.

Additionally the loss of reserves, high upfront costs to establish the initial box cut and considerable capital investment required for this option, means that a suitable return on investment would not be achieved for Glencore shareholders. For these reasons the option of commencing a new open cut mine immediately to the North of Swamp Creek is not considered reasonable nor feasible by Glencore.

10.2 Mine Schedule

An indicative mine schedule has been provided by Glencore as shown in Table 10.1 which includes the first seven years and the total. The full mine schedule is shown in Appendix A.

10.3 MineCraft Review Opinion – Option 5

MineCraft has no reason to disagree with Glencore's conclusions. This option would reduce ROM tonnage in the PMP down to 98.1Mt ROM.

11.0 OPTION 6: HOMESTEAD MINE AROUND (WITHIN 100M)

11.1 The EIS Option 6 Description

Option 6 incorporated a plan to mine around the Ravensworth Homestead to within 100m of the buildings leaving the homestead in place. In comparison to the PMP, this would result in the sterilisation of approximately 46Mt of ROM coal.

Given the potential blast and vibration, Glencore considered that the option of leaving the homestead insitu and mining around it to within 100m is not a viable option.

11.2 Mining Schedule

A mine schedule has been provided by Glencore. The first seven years and total are shown in Table 11.1. The total schedule is included in Appendix A.

[redacted]

11.3 MineCraft Review Opinion – Option 6

MineCraft considers the option of mining to within 100m around the homestead to not be a viable option primarily because of likely blast damage to the Ravensworth Homestead and loss of the value of the site amenity, as well as site isolation and practical access.

Due to the planned depth of mining in the PMP down to the Hebden seam, Glencore did not consider other mine around options, such as a 300m standoff, that would be achievable mining to the Barrett Seam as per the current Glendell Pit.

12.0 OPTION 7: HOMESTEAD 500M STANDOFF

12.1 The EIS Option 7 Description

This option assumes continuation of the Glendell Pit to the North requiring mining through the upper section of Swamp Creek and the location of the existing Glendell MIA. The pit crest was then stopped a distance of 500m from the Homestead. Stopping the mine 500m from the Homestead sterilises approximately 80Mt of ROM coal and reduces the life of the mine by eleven years when compared to the PMP. Glencore indicates that if the Homestead was left insitu, it will continue to remain isolated, unoccupied and inaccessible while mining and rehabilitation activities are being undertaken.

A further standoff option involving the cessation of mining 900m to the South of the Homestead was also investigated (approximate southern boundary of the Core Estate Lands). Stopping the mine 900m from the Homestead reduces the proposed mine life by approximately 15 years and sterilises approximately 100Mt of ROM coal relative to the preferred option.

It is acknowledged that this option does provide potential benefits to the local community and environment in terms of reduced impacts on the Ravensworth Homestead (blast vibration, visual catchment and setting), however if left insitu, the Homestead will continue to remain isolated, unoccupied and inaccessible while mining and rehabilitation activities are being undertaken. For these reasons, the option of standing off the Homestead a distance of 500m or more is not considered reasonable or feasible by Glencore.

12.2 Mine Schedule

A mine schedule has been provided by Glencore. The first seven years and total of which are shown in Table 12.2. The full schedule is shown in Appendix A.

12.3 MineCraft Review Opinion Option 7

The singular option of standing off from the homestead and other buildings a distance of 300-500m depending on amenity and outlook with little to no blast vibration or blast damage is the preferred option for analysis. In proposing Option 7, Glencore's assumption is that northern movement of the PMP would stop 500 meters to the South and not mine around it to the East, as was proposed in Option 6.

Based on the project economics analysis provided by EY in Appendix 30 to the EIS, Minecraft concurs that the Ravensworth Homestead and outbuildings should be relocated prior to mining of the PMP.

12.4 Mining Around Ravensworth Homestead

MineCraft submits that in a low coal price regime similar to that currently pertaining, the value of coal recovered from beneath the Ravensworth Homestead complex will be lower than envisaged in the EIS Appendix 30 Economics, and the alternative of mining around the homestead and additionally not mining York's Creek as shown in Figure 12.1 could be evaluated further by Glencore.

The approximately 30Mt ROM lost with this design, which includes coal in the block fault zone, could be made up at least in part by taking the PMP footprint further to the West.

As a means of gauging just how much room there is mining around the Ravensworth Homestead to the East, the footprint of the current Glendell Pit is included in the Figure 12.1. It is appreciated this is a shallower operation than the planned PMP, which is designed to mine down to the predominately thermal coal Hebden Seam.

Figure 12.1 confirms that both a 200-300 meter buffer zone and a significant mining operation will fit to the East of the Ravensworth Homestead complex.

The design concept shown in Figure 12.1 has additional benefits in that any required changes to York's Creek would not be necessary and any changes to Hebden Road alignment would be minimised.

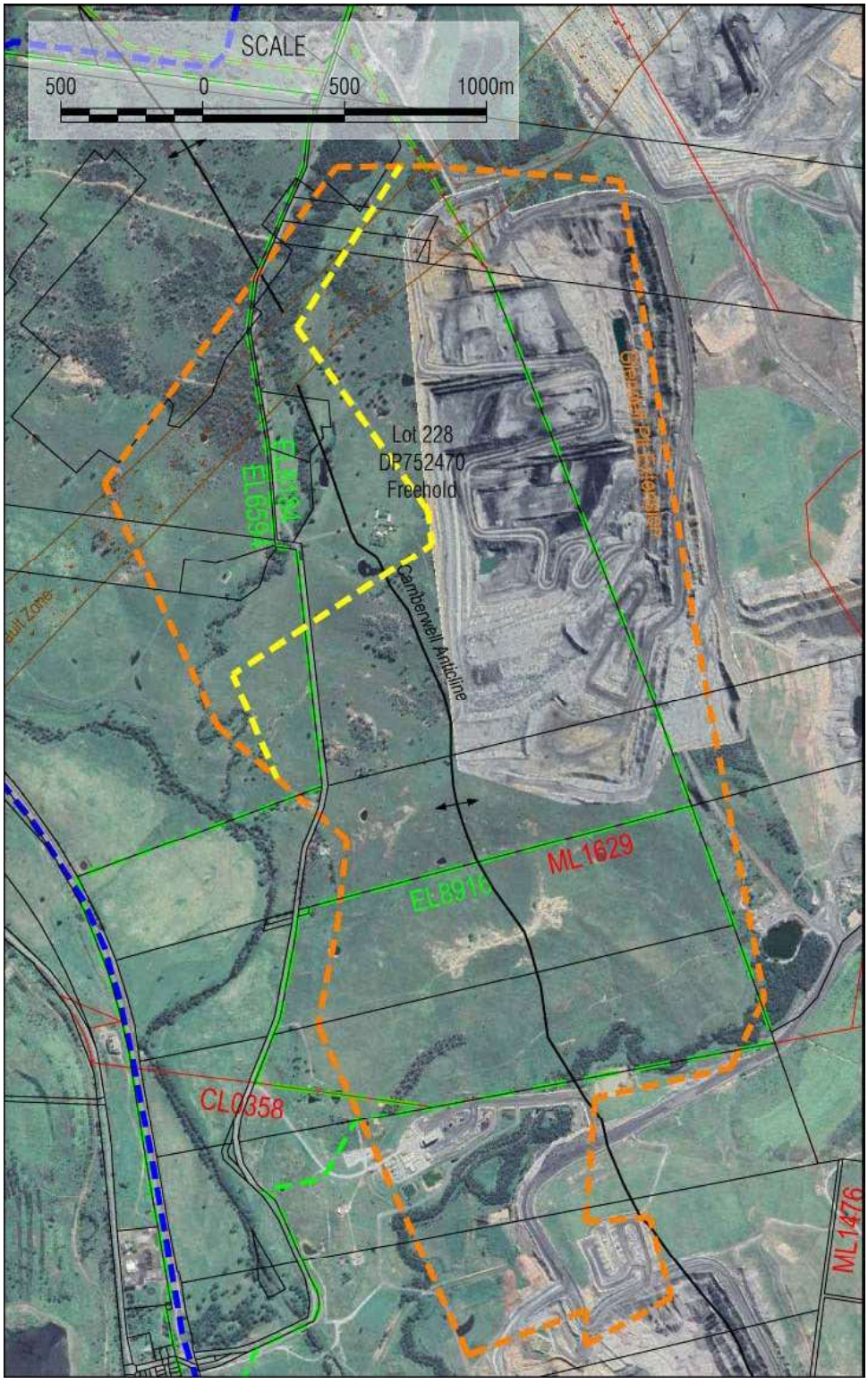


Figure 12.1
Working Around Ravensworth Homestead (200m buffer) and Not Mining York's Creek

13.0 OPTION 8: UNDERGROUND EXTRACTION

13.1 The EIS Option 8 Description

The benefit of using underground mining is that it would negate the need to construct a new MIA or relocate the Ravensworth Homestead and Hebden Road, and reduce impacts on Yorks and Swamp Creeks. However, underground mining is not considered economically viable for resource extraction in the area for the following reasons:

- The geometry of the resource is restrictive to underground mining as the Camberwell Anticline runs through the middle of the target resource area constraining the orientation of any underground mine and the operability of underground mining equipment;
- The geotechnical environment of the anticline and the intersecting Block Fault Zone increase the potential for localised stress concentrations increasing outburst risk. Also, there is additional potential for localised 2-5m faults which would make underground mining difficult;
- Underground mining would restrict recovery to one main seam group at most and would not enable recovery of coal seams less than 2m thick. The main target seam group would be limited to the Liddell seam (due to high quality and seam thickness); and
- There is a high capital cost associated with the establishment of an underground mine and the coal tonnes available for recovery within the resource area are insufficient to ensure the economic viability of the operation and provide a suitable return on investment;

For the above financial and technical reasons, underground mining extraction across the resource area is not considered feasible by Glencore.

13.2 Mining Schedule

No mine schedule was offered for the review by Glendell.

13.3 MineCraft Review Opinion 8

Underground mining is discounted by Glencore for a number of reasons, most of which relate to the area's complex geology. It is noted that Glendell Mine is surrounded by underground mines and consequently the option of underground mining was further reviewed by MineCraft. The nearby underground mines include Liddell, Cumnock, Ravensworth and Integra.

Ravensworth closed in 2014 after extracting its reserves in the Pikes Gully seam and had plans to subsequently mine to the Liddell and Barret Seams. Previous mining to the North in the Liddell Seam has left flooded underground areas which are the accepted northern constraint to the PMP. Glencore's Integra underground mine, to the South-East, commenced as Glennie's Creek Mine in 2002 extracting the Liddell seam and is now mining the Hebden/Barrett seams. Target seams of sufficient thickness for underground mining are the Liddell, Pikes Gully, Barrett and the Hebden.

MineCraft accepts however, Glencore's position in relation to the difficulties of underground mining in the area, however one further option that was briefly reviewed by MineCraft was a punch highwall mine beneath the Ravensworth Homestead. This option has two main issues preventing a recommendation for further study by Glencore. These issues are:

- The potential impact on ongoing open cut mining, caused by the need for pit operating room required for underground mine access off the pit highwall. The waste dumping back in pit would be severely impeded by lost dump space; and
- The required mining would have to take place in steeply dipping seams at gradients steeper than 1:10 which is considered technically challenging. Whilst LW extraction has been observed at gradients of 1:4 elsewhere in the World (e.g. China) and hence is technically feasible, this situation would result in low productivity due to the need to operate slowly and carefully, and would require specialised equipment.

The coal would have to be of high value to justify the expected low productivity and enhanced underground mining risks, and in this case, is not believed to be viable.

In summary MineCraft concur with Glencore's opinion to discount underground mining options.

14.0 PREFERRED MINE PLAN

14.1 The EIS Description

The PMP is considered by Glencore to provide the best balance between environmental and social impacts, and associated economic benefits to the residents in the local area and state of NSW.

The proposed mine layout and pit section views are shown in Figures 14.1 to 14.3. The PMP is bounded by the following constraints:

- Minimum 200m offset from Bowmans Creek high bank to the West;
- Ravensworth East former mine workings to the East and current Glendell mining to the South; and the
- Old Liddell Underground workings to the North.

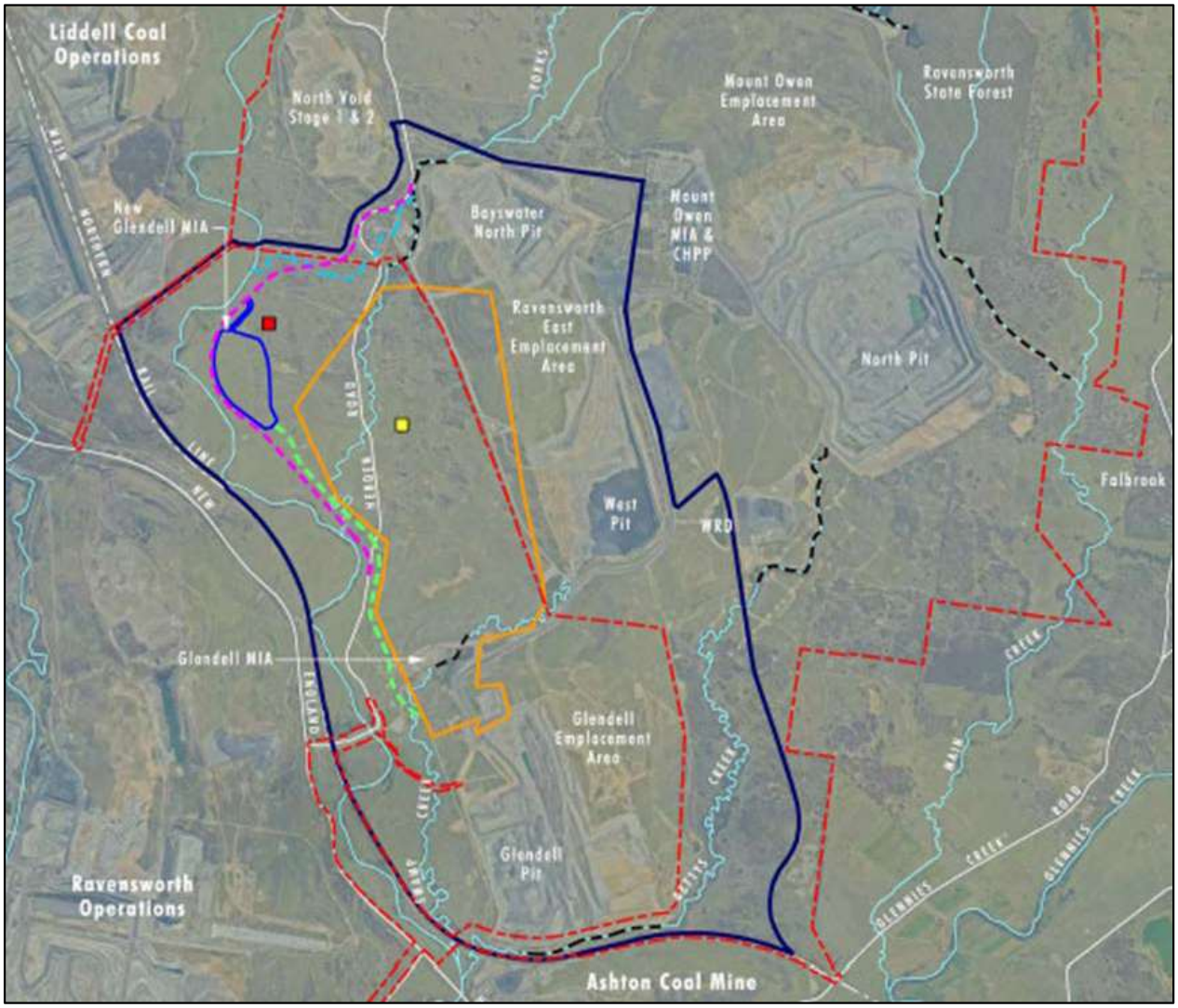
The PMP proposes mining through:

- A section of Swamp Creek that represents the headwaters of the existing creek, with the upstream catchment of Swamp Creek now part of the MOC Water Management System;
- The location of the existing Glendell MIA, requiring a new MIA to be constructed, and redesign of the Swamp Creek drainage area prior mining in the area;
- The site of the existing Ravensworth Homestead necessitating the need to record and salvage the associated archaeology before the Homestead complex is relocated to a new recipient site;
- A section of Hebden Road requiring the construction of a new section of road to the West of the proposed pit footprint; and
- A section of York's Creek requiring the construction of a new section of creek outline that will connect to Bowmans Creek to the North of the proposed pit footprint.

The northern limit of the PMP is defined by the location of the former Liddell Underground workings. Strip ratio considerations drive the depth of the pit, with mining initially progressing down to the Barrett seam, then stepping down to the Hebden seam as the seam thickens further to the North.

In addition to the increase in depth, the pit progressively widens and these conditions contribute to overburden emplacement dump heights being required to 200mAHD, rather than the 165mAHD in the current approved operations at Glendell.

The production rate for the PMP peaks at 10Mtpa ROM coal as the mine widens out and as it progresses further away from receptors in Camberwell.

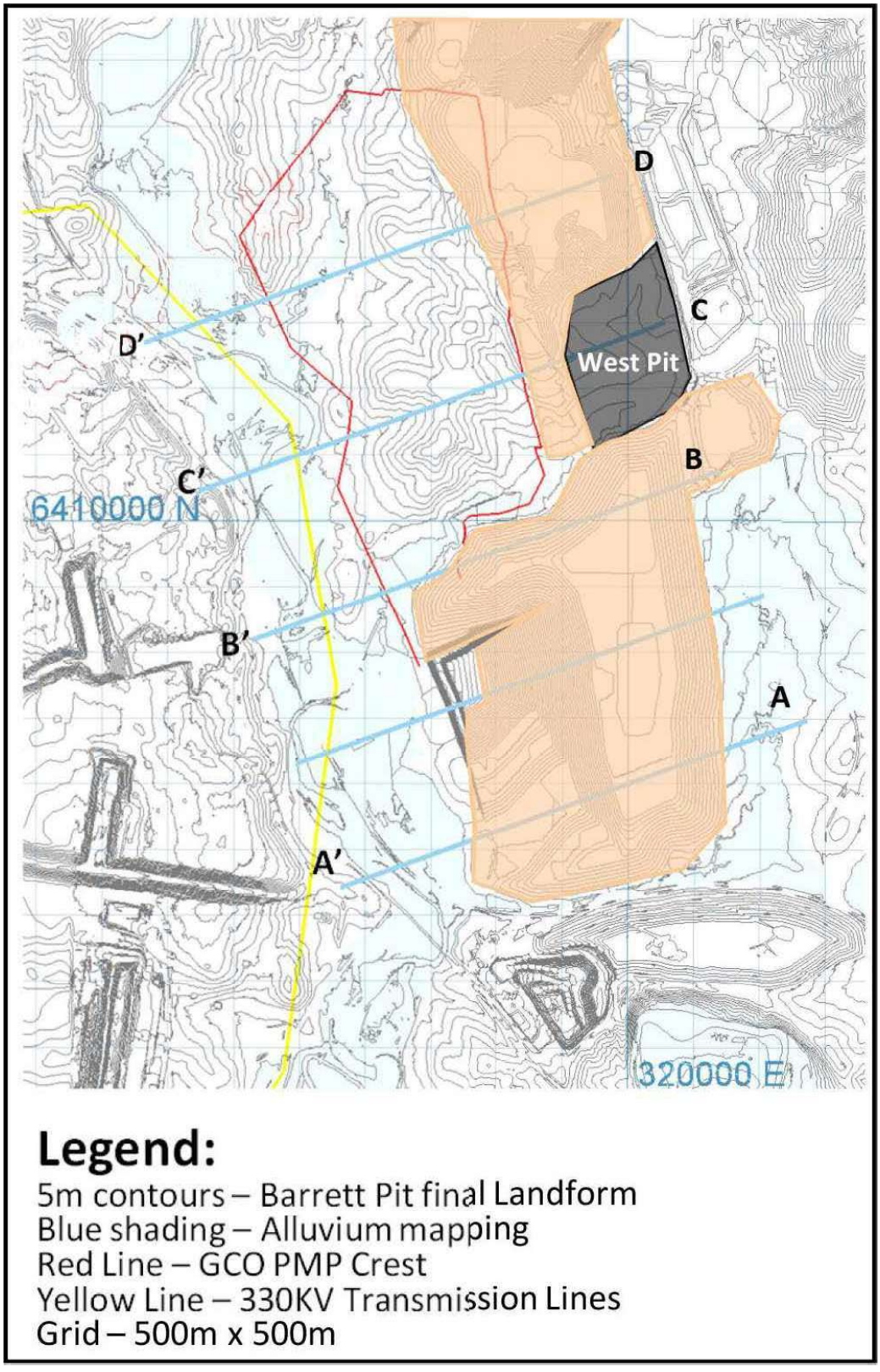


Source: Glencore

Figure 14.1
Glencore's Preferred Mine Plan Footprint (Orange Outline)

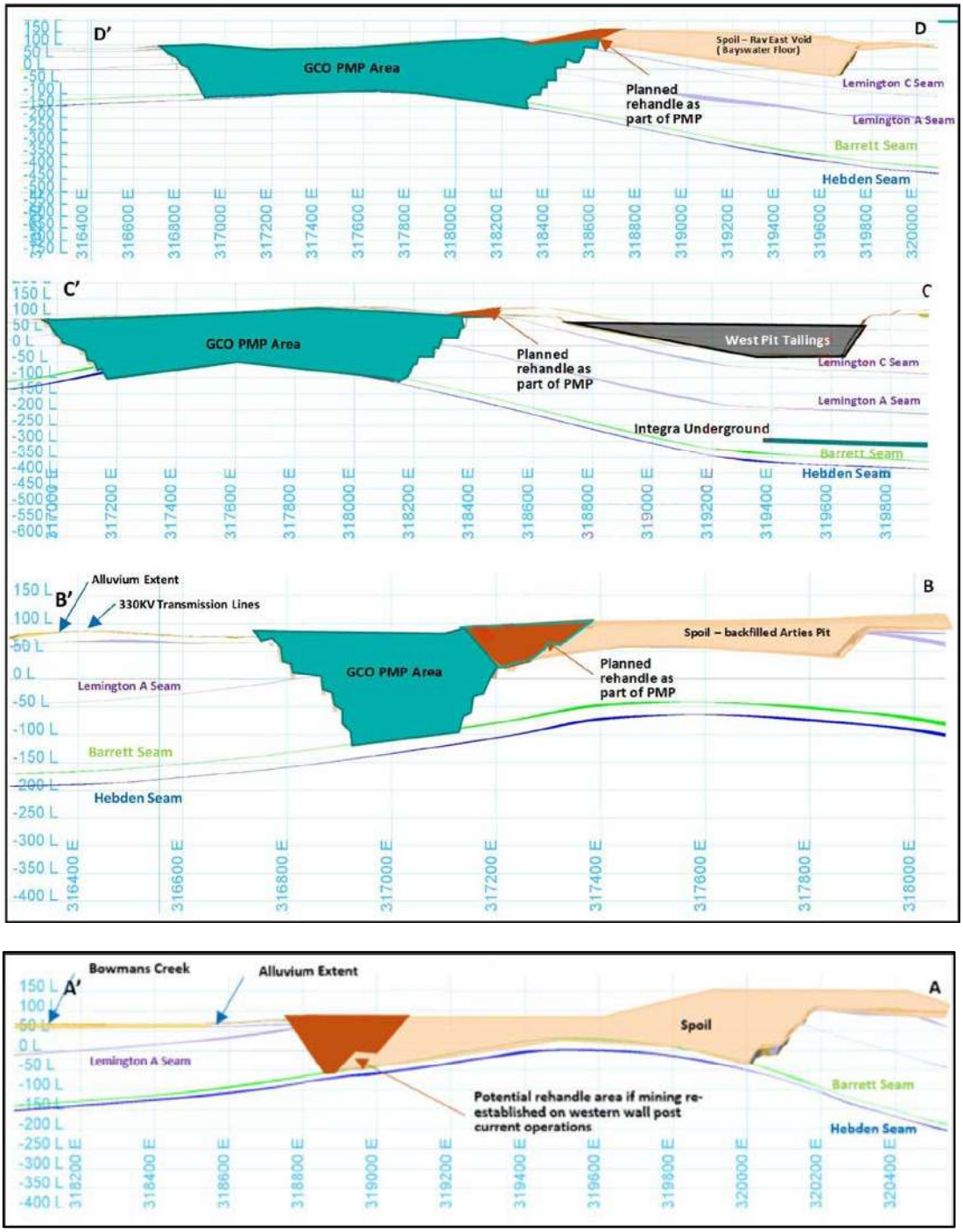
14.2 Mining Reserves

No discrete JORC reserves for the PMP were made available for the Review by Glencore. PMP coal reserves are publicly reported in with the Liddell reserves.



Source: Glencore

Figure 14.2
PMP Cross Section Key



Source: Glencore

Figure 14.3
Glendell Pit and PMP Cross Section A - D

The mine schedule shown in the EIS for the first ten years mines up to [redacted] BCM/year of waste and then in 2033-34 increases to [redacted] MBCM/year for less than two years, and then declines year by year to envisaged mine depletion in 2044. The ROM stripping ratio is about [redacted] and product coal ratio about [redacted], which is comparatively high for a predominately thermal coal mine. Over the life of the mine about [redacted] MBCM will be mined and transported to in pit or ex pit dumps.

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]					
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

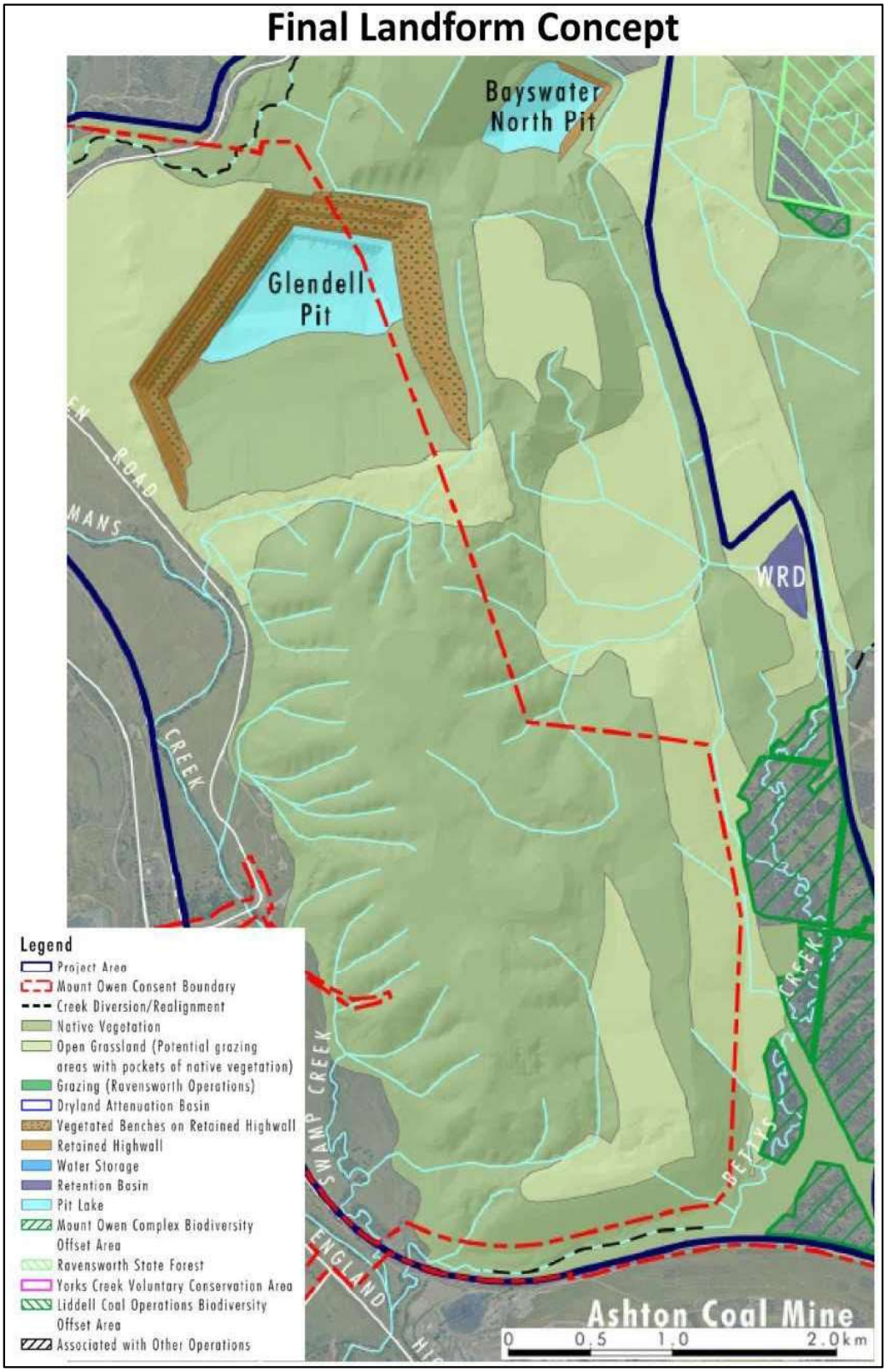
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]								
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

14.3 Overburden and Interburden Placement

Glencore considered a number of post mining final landform and final void concepts for the PMP. Relevant mine plan design features applicable to establishing the final landform and development of the PMP included:

- Re-establishment of Swamp Creek drainage area through the Ravensworth East final landform;
- Continued establishment of riparian vegetation along the diversion of York's Creek;
- Capping of completed tailings storage facility; and
- Establishment of a rehabilitated and stable landform, constituting a mixture of woodland and grassland areas, using natural landform design principles and revegetation techniques as shown in Figure 14.4.



Source Glencore Presentation 1 June 2020

Figure 14.4
PMP Final Landform Concept

14.3.1 PMP Final Void

Similar to the current approved Glendell Pit, Glencore proposes that the PMP will retain a final pit void.

The preferred void option (as included in the EIS) incorporates:

- Progressive filling of void as mining progresses to the North (involves filling of approved void);
- Incorporates natural landform design elements with a single void;
- Final void treatment to include battering of high wall weathered strata and internal backfill slopes for long term stability;
- Final void catchment area of approximately 321 hectares – no additional void in proposed final landform.

14.4 MineCraft Opinion of the PMP

MineCraft concludes that Glencore has identified all the feasible alternatives for the continuation of mining at Glendell given the site's complex geology and the numerous surface constraints. MineCraft also concludes that Glencore's reasons for deciding on the final PMP footprint are sufficiently justified.

14.5 Waste Dump Discussion

The objectives of designing waste dumps in open cut mines include:

- Be consistent in final post mining height with the surrounding topography of the mine;
- Be designed as much as reasonably possible to minimise the size of the final working void; and
- Utilise residual voids in reasonable proximity to the mining operations for filling rather than increasing design dump heights.

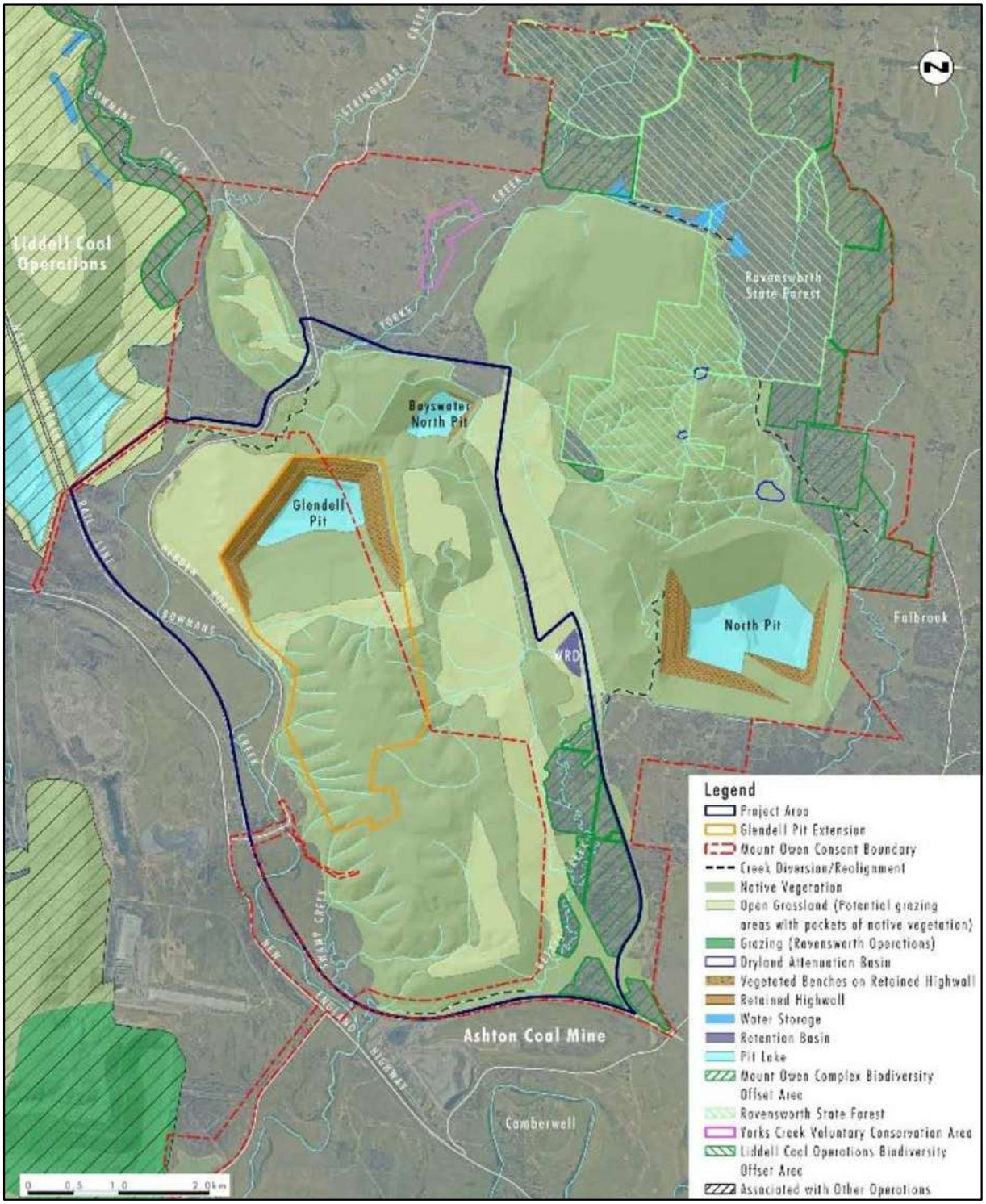
The PMP proposes to utilise the void space provided by the existing Glendell Pit for overburden emplacement from the Glendell Pit Extension however the plan includes the waste dump heights to rise from 165mAHD to 200mAHD.

It is noted that there are other nearby voids within proximity to the PMP as operations progress to the North including the West pit currently being used to store tailings (see section C-C in Figure 14.3) and the Bayswater North pit currently being used by Glencore as a water storage.

A waste dumping compromise might be reached where no change to the PMP plan occurs until Mount Owen Mine Operations cease. At that time tailing placement could possibly change from the old West Pit to the Mount Owen void, or part of it, and the West Pit slime dump be contained and capped. A fill buffer would be required to contain the tailings.

The same principle could apply to the Bayswater North Pit. As the PMP mining activities approached it, a new water dam location may be sourced and then nearby overburden would be short hauled to it.

These options may not incur any significant haulage cost increases over currently planned PMP dumping costs and may be able to be assessed by further study.



Source Glencore Presentation 1 June 2020

Figure 14.5
Glencore's Final Void Plan at MOC

15.0 SUMMARY

The Glendell Continued Operations Project is the extension of the existing Glendell Open Cut mine to the North commencing in 2021, referred to as the Project Mine Plan (PMP). The PMP formed the basis of the EIS, completed in late 2019.

The transition from the current Glendell Mine into the PMP is difficult, due to the initial constrained pit access and the need for some waste rehandling, as mining turns to the North over the Swamp Creek alignment.

Initial PMP incremental ROM strip ratios in the first three years are about 8:1 and product coal ratios are about 12:1, which are high product ratios for a predominately thermal coal mine. A ROM coal contribution from the depleting Glendell Pit is used to blend these high initial ratios down and add to an increasing coal production in the years from 2021 to 2023.

As mining in the PMP proceeds North, geological complexity increases, so coal loss and dilution may increase to much more than experienced in the current mining operation. This change will particularly apply as mining progresses along the spine of the anticline in high dips and also when mining through the Hunter Valley Block Fault Zone.

MineCraft believes that Glencore has identified all the feasible alternatives for the continuation of mining at Glendell given the site's complex geology and the numerous surface constraints. MineCraft also concludes that Glencore's reasons for deciding on the final PMP footprint are sufficiently justified, albeit the PMP constraints could have been grouped differently into Northern, Southern and Ravensworth Homestead constraints.

Glencore provided mine schedules for most of the various mining constraints or options (except the maximum resource case and underground mining) but qualified them as being very indicative. The mine schedule for the PMP case, on which the EIS is based, is the only one where planned ROM coal production per annum reaches 10Mtpa in 2033/34 before then depleting. The mine fleet will have to increase to achieve this higher production rate and it will also necessitate having enough operating room in the pit in the years nominated.

In accordance with PAG's scope, Table 15.1 shows indicative NPVs for the various cases examined in this report which are is based on coal prices used in the EIS and the various option schedules provided by Glencore. The NPVs shown can only be used in a comparative sense. If current coal prices were used all NPV's shown would be negative.

Table 15.1
Mine Constraint / Option Indicative NPVs for Comparative Use Only

Mine Constraint	Option No	ROM Coal Mt	Mine Life Years	[redacted]	Difference from PMP Case $M
[redacted]		[redacted]	[redacted]	[redacted]	[redacted]
PMP Continuing Operations Increment		135.2	Yr 24	[redacted]	$0
No Extension Depletion in 2024	1	8	Yr 3	[redacted]	Includes closure costs
Maximum Resource Recovery	2	>150	Yr 27	[redacted]	Lemington UG limited
Hunter Dyke as Northern Limit	3	153.6	Yr 27	[redacted]	Lemington UG limited
Yorks Creek Retained	4	108.5	Yr 22	[redacted]	-$192
Swamp Creek Retained	5	99.7	Yr 18	[redacted]	-$320
Homestead Clearance 100m	6	97.1	Yr 22	[redacted]	-$230
Homestead Clearance 500m/900m NPV Based on 500m stand off	7	64.8	Yr 13	[redacted]	-$606
Underground Mining	8	N/A	N/A	[redacted]	0

[redacted]

In relation to the overall mine plan, if the MIA could be located to the South, the Western haul road would not be required and the PMP footprint could possibly be pushed further to the West. The tight spot along the Western flank of the PMP is shown in Appendix C.

The relocated Hebden Road is still an operational constraint to mining as it will probably need to be closed during blasting from time to time. If the road was redesigned to access the New England Highway to the North of the PMP, it may not have to be closed during blasting operations. The travelling distances to the New England highway would be shorter.

It is noted that as operation proceed to the north the option of filling old pit voids may be possible however Glencore's position as stated to MineCraft, is that the alternative dumping sites are both in use and have unacceptable haul road distances and hence higher operating costs.

A compromise solution might be reached where no change to the PMP dump plan occurs until Mount Owen Mine Operations cease. At that time, tailing placement could possibly change from the old West Pit to the Mount Owen void, or part of it, and the West Pit tailings be contained and capped. A fill buffer would be required to contain the tailings, prior to placing a thick capping layer in place.

The same principle would apply to the Bayswater North Pit. As the PMP mining activities approached it, a new water dam location could be located and agreed, then nearby blasted waste would be short hauled to it. This dumping approach may be able to be assessed by study.

16.0 REVIEW REFERENCES

This review has been undertaken without a site visit due to travel restrictions due to the coronavirus. MineCraft has relied on:

- Data in the Glendell Continuing Operations EIS and Appendices; and
- Two presentations from Glencore in response to a series of questions put to them by MineCraft.

APPENDICES

Appendix No.	Description
A	PMP Mine Schedule and Indicative Schedules for Options Evaluated (source: Glencore)
B	Mining to West of Glendell Pit
C	Resource on Western Margin of PMP Consumed by Major Haul Road to MIA
D	Abbreviations and Units of Measurement

Appendix A

PMP Mine Schedule and Indicative Schedules for Options Evaluated (source: Glencore)

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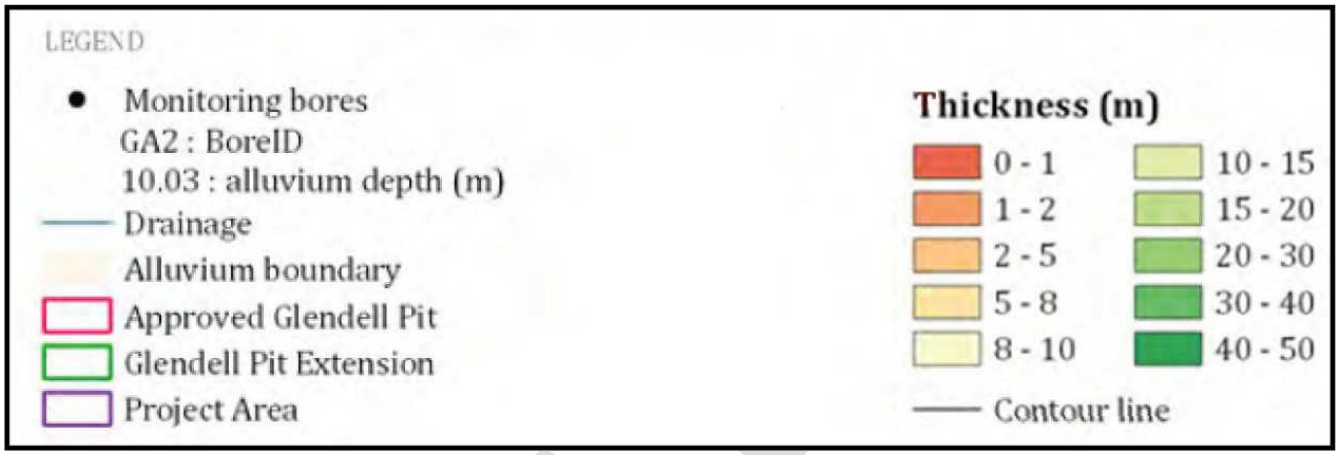
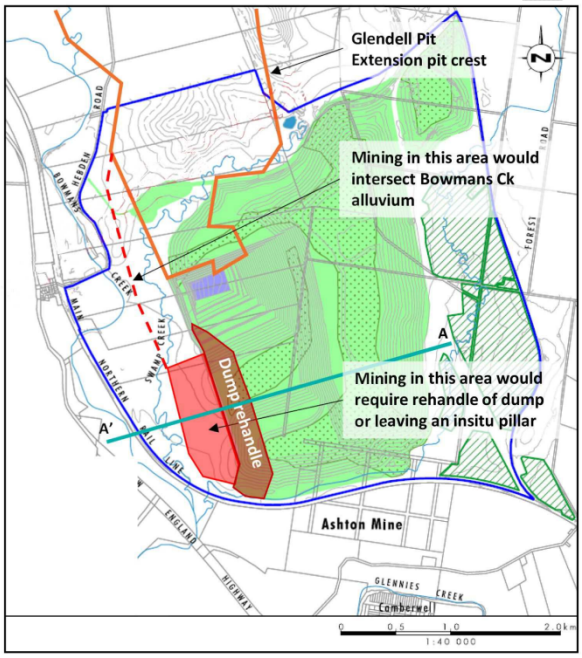
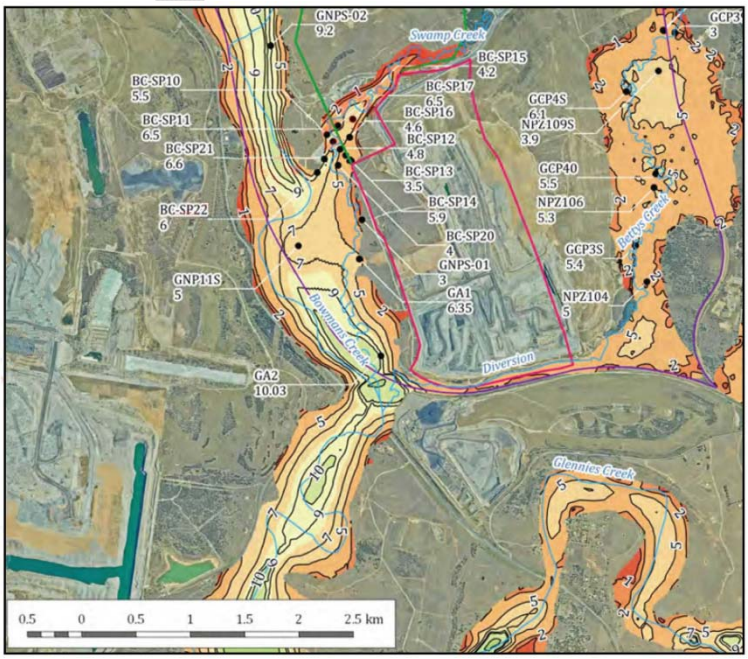
Appendix B

Mining to West of Glendell Pit

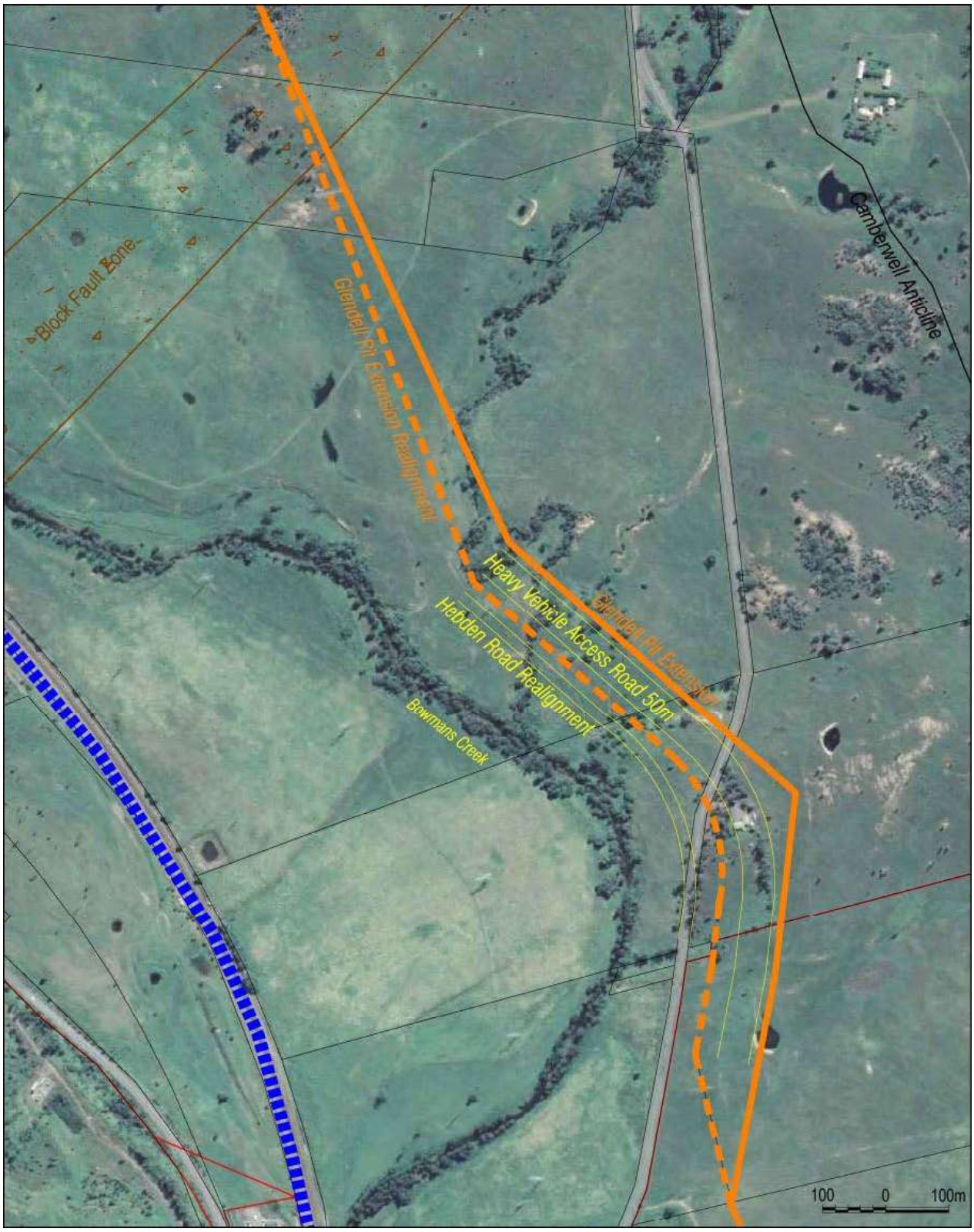

LEGEND
Monitoring bores
GA2 : BoreID
10.03 : alluvium depth (m)
Drainage
Alluvium boundary
Approved Glendell Pit
Glendell Pit Extension
Project Area
Thickness (m)
0 - 1
1 - 2
2 - 5
5 - 8
8 - 10
10 - 15
15 - 20
20 - 30
30 - 40
40 - 50
Contour line


Glendell Pit Extension pit crest
Mining in this area would intersect Bowmans Ck alluvium
Mining in this area would require rehandle of dump or leaving an insitu pillar
Dump rehandle
A
A'
Ashton Mine
Camberwell
GLENNIES CREEK
1:40 000


GNPS-02 9.2
Swamp Creek
BC-SP15 4.2
BC-SP10 5.5
BC-SP17 6.5
BC-SP16 4.6
BC-SP11 6.5
BC-SP12 4.8
BC-SP21 6.6
BC-SP13 3.5
BC-SP22 6
BC-SP14 5.9
BC-SP20 4
GNPS-01 3
GNP11S 5
GA1 6.35
GA2 10.03
Bowmans Creek
Diversion
GCP4S 6.1
NPZ109S 3.9
GCP40 5.5
NPZ106 5.3
GCP3S 5.4
NPZ104 5
Glennies Creek
0.5 0 0.5 1 1.5 2 2.5 km

Appendix C

Resource on Western Margin of PMP Consumed by Major Haul Road to MIA


Block Fault Zone
Glendell Pit Extension Realignment
Camberwell Anticline
Heavy Vehicle Access Road 50m
Glendell Pit Extension
Hebden Road Realignment
Bowmans Creek
100
0
100m

Appendix D

Abbreviations

Ad	air dried
Adb	air dried basis
Ar	as received
AUD	Australian dollars
BOW	Base of Weathering
BSAL	Biophysical Strategic Agricultural Land (creek flats)
CHPP	coal handling and preparation plant
CSN	crucible swelling number
CSR	coke strength after reaction
DCF	discounted cash flow
EIS	Environmental Impact Statement
EY	Ernst & Young – Author of EIS Appendix 30
FOR	free on rail
GCO	Glendell Continued Operations
GJ	Gigajoule
HCC	Hard Coking Coal
HELE	High Efficiency Low Emissions
IM	inherent moisture
IRR	Internal Rate of Return
Kpi's	Key performance indicators
Kt	thousand tonnes
LCO	Liddell Coal Operations
LOX	limit of oxidation
L/S	litres per second
LW	Longwall
M	Million
MIA	mine industrial area
ML	Mining Lease
MOC	Mount Owen Complex
Mtpa, Mt/a	million tonnes per annum
NPV	Net Present Value
PAG	Planning and Assessment Group, NSW Department of Planning, Industry & Environment (Client)
PMP	Preferred Mine Plan- as described in the EIS
RD	relative density
RL	Reduced Level
ROM	Run of Mine. The coal mined it will be a blend of coal, dilution and moisture.
SE	specific energy
SSCC	Semi Soft Coking Coal
TM	total moisture
Tph	Capacity - Tonnes per Hour
USD	United States dollars
VM	volatile matter

Units Of Measurement

AHD	Australian Height Datum
Bcm	Bank cubic metre
Cm	Centimetre
cu.m.	Cubic metre
Deg	Degree
G	Gram
GJ	Gigajoules
Ha	Hectare
H	Hour
Kg	Kilogram
Kl	Kilolitre
Km	Kilometre
km^2	Square kilometre
kN	kilo Newton
L/s	litres per second
M	metre (or milli)
m/s	metres per second
m^2	square metre
m^3	cubic metre
m^3/s	cubic metres per second
Mg	Milligram
MJ/kg	mega Joules per kilogram
ML	Megalitre
ML/a	megalitres per annum
Mm	Millimetre
mm/a	millimetres per annum
MPa	mega Pascal
Mt	million tonnes
Mtpa	million tonnes per annum
PJ	peta Joules
Ppm	parts per million
T	Tonne
t/a	tonnes per annum
t/hr	tonnes per hour
t/m^3	tonnes per cubic metre
µg	micro gram