umwelt
Environmental & Social Consultants

GLENCORE

RESPONSE TO MINECRAFT REPORT

Glendell Continued Operations Project

FINAL

August 2021

GLENCORE

RESPONSE TO MINECRAFT REPORT

Glendell Continued Operations Project

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Glencore

Project Director:	David Holmes
Project Manager:	Bridie McWhirter
Report No.	4166/R27
Date:	August 2021

Newcastle

75 York Street
Teralba NSW 2284

T| 1300 793 267
E| info@umwelt.com.au

www.umwelt.com.au

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Final	David Holmes	5 August 2021	Barbara Crossley	5 August 2021

Executive Summary

MineCraft were engaged by the Department of Planning, Industry and Environment (DPIE) to provide an analysis of the preferred mine plan (PMP) for which development consent is sought, and the various mine plan options considered by Glencore in the Mine Planning Options Report (Appendix 1 of the EIS). The MineCraft Report concludes:

> *"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 (Preferred Mine Plan) footprint are justified albeit the constraints could have been grouped differently into Northern, Southern and Ravensworth Homestead constraints."*

As part of their review, MineCraft also identified a hybrid mining scenario, alternate infrastructure location scenarios and alternate overburden emplacement scenarios for consideration. Specifically, these were:

- a scenario which includes a 200 to 300 m offset from Ravensworth Homestead (a hybrid of Options 6 and Option 7 considered by Glencore)
- the siting of the relocated Glendell MIA to the south (west of the current Glendell Pit)
- a realignment of Hebden Road to the north, and
- different overburden emplacement scenarios, including utilisation of West Pit and Bayswater North Pit (BNP) voids for overburden emplacement.

The options of mining around the homestead with an offset of 100m (Option 6) and or 200 to 300 m (hybrid option) have inherent risks from blasting and technical complexities associated with geotechnical stability concerns. Narrowing of the mine in order to mine around the homestead, and the resulting shallower mining depth with reduced recovery of coal, results in these options being economically unviable. Further, the homestead would be required to remain vacant for the life of the mine, and the post mining outlook and setting of the homestead under these 'mine around' scenarios would be greatly altered, diminishing some of the heritage values and post mining uses of the homestead. These options are therefore not considered to be reasonable and feasible.

The option of standing off the homestead 500 m was also considered in the EIS (Appendix 1, Option 7). Similar to the PMP, this option is subject to high mining ratios in the first eight to ten years of mining coupled with high capital expenditure on infrastructure and replacement mining equipment. This mine plan option materially restricts the mining footprint and sterilises almost 60% (78Mt) of the PMP total resource. As identified in the Mine Planning Options Report (Appendix 1 of the EIS), Glencore does not consider this Option to be feasible due to it being difficult to achieve a suitable return on the upfront capital investment required.

As neither Option 6 or 7 are considered to be feasible, these options represent a $0 NPV to the State of NSW relative to the base case.

The area to the south, identified by MineCraft as a possible MIA site, is space constrained and would present operational difficulties in terms of flood management and progressive rehabilitation of the Glendell Pit in-pit emplacement area. The potential western extension of the pit area (seen by MineCraft as an advantage in this scenario) would result in mining occurring closer than 200 m to Bowmans Creek, which would not satisfy the NSW Aquifer Interference Minimal Impact Considerations. This option is therefore not considered to be reasonable or feasible.

The realignment of Hebden Road to the north is similarly not considered to be reasonable or feasible due to a combination of financial, tenure, land use conflict and environmental considerations.

Glencore does not believe that the alternative overburden emplacement options identified by MineCraft provide any additional environmental benefit compared to the PMP. The BNP void is an integral part of the Greater Ravensworth Area Water and Tailings Scheme (GRAWTS) that provides long term operational flexibility and, based on current approvals and operational requirements, it is therefore not considered reasonable and feasible to backfill with overburden material as suggested by MineCraft. Further, the West Pit is already required to be filled, capped and rehabilitated under the Mount Owen consent, so there is no advantage in the alternative overburden emplacement option identified by MineCraft.

MineCraft commented that low coal prices observed in mid-2020 may result in the Project being uneconomic. However, long term investment decisions are not taken on short term spot prices. Additionally, prices have subsequently recovered, and both the January 2021 spot price and December 2020-January 2021 consensus pricing forecasts published by KPMG show coal prices which are similar to those used in the Economic Impact Assessment of the Project (refer to Appendix 30 of the EIS) and are well within the price sensitivity analysis assessed in the Economic Impact Assessment. An updated cost benefit analysis of the Project's value to the State of NSW using the more recent consensus forecasts indicates an NPV of $1.12 billion.

Glencore seeks approval of the full PMP, which includes the relocation of Ravensworth Homestead, in order to secure the economic viability of the Project. While the PMP requires the relocation of the Ravensworth Homestead, significant heritage values will be realised as a result of the proposed archaeological site investigation and salvage program which will improve the already comprehensive knowledge of the use of the site. This archaeological investigation program would not proceed in the absence of the Project. Further, both relocation options identified will enable greater community connection through enhanced accessibility and building repurposing to provide a beneficial end use. Not proceeding with the Project due to its potential impacts on the heritage values of Ravensworth Homestead come at an opportunity cost to the State of $1.12 billion in NPV terms ($2.65 billion in undiscounted terms) and the loss of the potentially significant community benefits realised through the relocation of the homestead.

Table of Contents

Figures

Tables

Attachments

1.0 Introduction

1.1 Background

The Glendell Continued Operations Project (the Project) Environmental Impact Statement (EIS) was placed on public exhibition from 14 December 2019 to 14 February 2020. During this time, 327 community submissions, 16 Interest Group submissions and 16 public agency submissions were received. Glencore provided Response to Submissions documents (Part A and Part B) in May and September 2020.

The Department of Planning, Industry and Environment (DPIE) engaged MineCraft Consulting Pty Ltd (MineCraft) to undertake an independent review of the alternate mine plan options included in the overall assessment findings of the EIS, specifically Section 8.1 of the EIS and in the Mine Planning Options Report, provided as Appendix 1 of the EIS.

The Mine Planning Options Report (Appendix 1 of the EIS) considered environmental and social constraints on mine planning for the Preferred Mine Plan (PMP) and included detailed consideration of eight alternate mining options (refer to **Figure 1.1**) which include the Option 1 – No Project option. MineCraft's Scope of Work from DPIE included a requirement to provide independent advice on:

- whether the reasons for not pursuing the alternative options identified in the Mine Planning Option Report have been sufficiently justified, and
- ensure that the Mine Planning Options Report identified all reasonable and feasible options for the continuation of mining at the site, having regard to constraints and design considerations including:
    - minimising or avoiding impacts on built and natural features, including:
        - Ravensworth Homestead
        - Hebden Road
        - Yorks Creek and Bowmans Creek (and associated alluvial aquifers)
    - minimising impacts on Biophysical Strategic Agricultural Land (BSAL)
    - minimising interactions with historical underground workings associated with the Liddell Mine
    - maintaining highwall stability, having regard to 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 to Glencore.

'Review of Glendell Continued Operations Project Mine Plan and Mine Plan Options' dated October 2020 (the MineCraft Report) prepared by MineCraft generally concluded that Glencore's reasons for not pursuing the eight alternate mine planning options considered were justified.

MineCraft concludes the following:

> "*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* (Preferred Mine Plan) *footprint are justified albeit the constraints could have been grouped differently into Northern, Southern and Ravensworth Homestead constraints.*"

As part of their review, MineCraft also identified a hybrid mine plan scenario, alternate infrastructure location options and alternate overburden emplacement options for consideration. Specifically, these were:

- a scenario which includes a 200 to 300 m offset from Ravensworth Homestead
- the siting of the relocated Glendell Mine Infrastructure Area (MIA) to the south (west of the current Glendell Pit)
- a realignment of Hebden Road to the north and
- different overburden emplacement scenarios, including utilisation of West Pit and Bayswater North Pit voids for overburden emplacement.

1.2 Purpose

This report has been prepared to respond to the MineCraft Report. This report addresses the following matters in relation to the MineCraft Report:

- MineCraft's review of the Preferred Mine Plan and eight different mine plan options considered by Glencore in the Mine Planning Options Report (refer to **Figure 1.1**)
- MineCraft's suggested hybrid mine plan scenario to evaluate a 200-300m offset from Ravensworth Homestead
- MineCraft's assessment of the Net Present Value (NPV) of the alternate mine plan options, particularly in regard to lower coal prices observed in mid-2020.
- the siting of the relocated Glendell MIA to the south (west of the current Glendell Pit)
- a suggested different scenario for realignment of Hebden Road
- suggested different overburden emplacement scenarios, including utilisation of West Pit and Bayswater North Pit voids for overburden emplacement
- inaccuracies and errors identified in the MineCraft Report.

In addition to the consideration of MineCraft's assessment of the NPV of the different options (which related to the value of the Project to a proponent), this report includes a consideration of the value to the State of project options that leave Ravensworth Homestead in its current location.

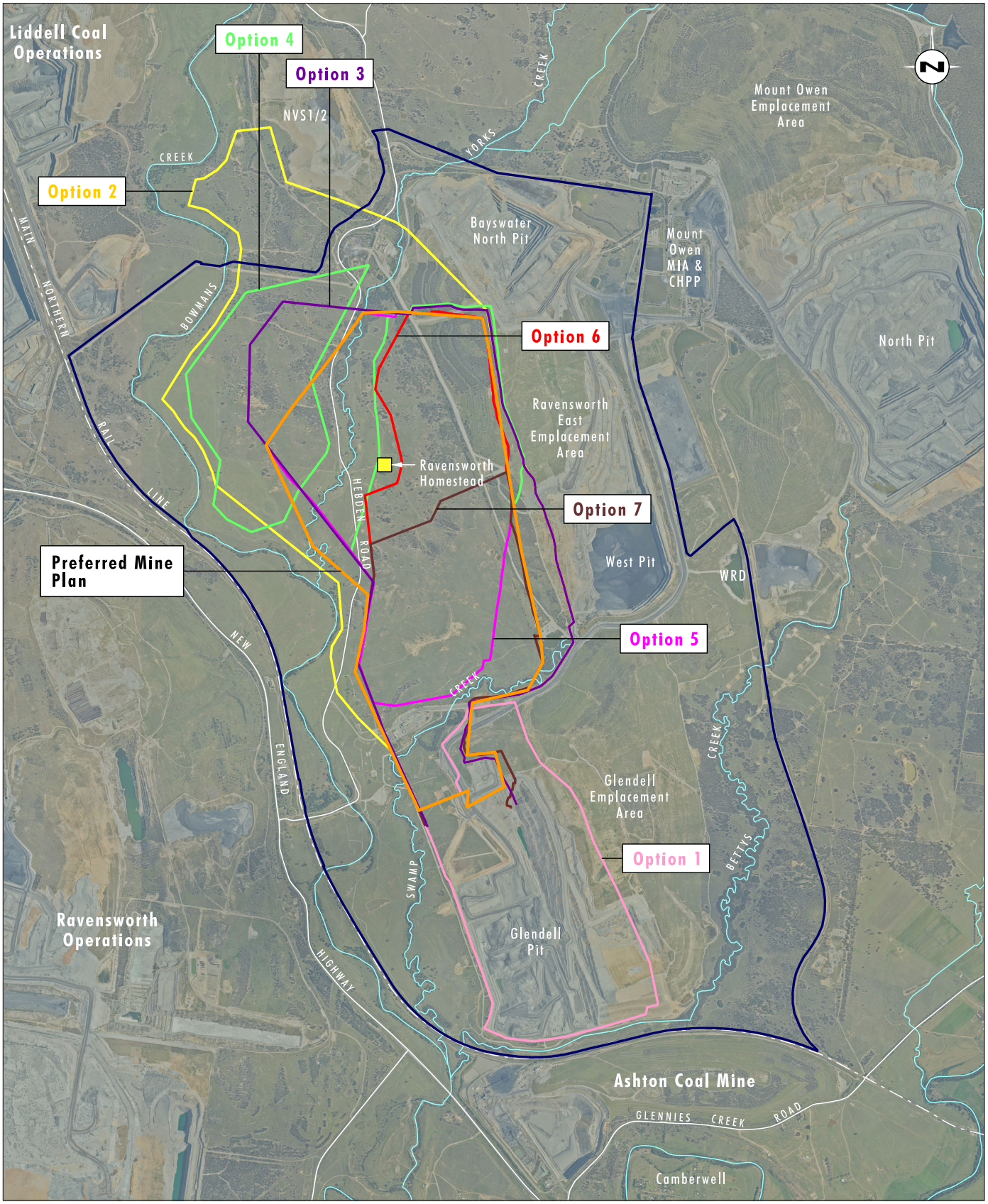


Image Source: Glencore (Dec 2018)
Data Source: Glencore (2019)
Note: Ravensworth Homestead to be relocated

0 0.5 1.0 2.0km
1:45 000

Legend

- Project Area
- Proposed Glendell Pit Extension
- Ravensworth Homestead
- Existing Option 1- Glendell Pit Shell
- Option 2 - Max Resource Mine Option Pit Shell
- Option 3 - HV Dyke Constrained Pit Shell
- Option 4 - Yorks Creek Offset Mine Option Pit Shell
- Option 5 - Swamp Creek Constrained Pit Shell
- Option 6 - Homestead Mine-around Pit Shell
- Option 7 - Homestead Southern Offset Pit Shell

FIGURE 1.1

Mine Planning Options considered in the Glencore Mine Planning Options Report

File Name (A4): R24/4166_684.dgn
20191122 13.13

2.0 Consideration of Mine Plan Options

Table 2.1 summarises MineCraft's review of the Preferred Mine Plan (PMP) and mine planning options identified by Glencore in the Mine Planning Options Report (Appendix 1 of the EIS) and also provides some additional commentary from a mine planning and environmental constraints perspective considered by Glencore in evaluating each of these options. As identified in **Section 1.1**, the MineCraft Report generally concluded that Glencore's reasons for not pursuing the eight alternate mine planning options considered were justified.

Section 2.1 provides more detailed commentary regarding the additional mine plan, infrastructure and overburden emplacement options identified by MineCraft for consideration. As discussed in **Section 1.0**, MineCraft's references to NPV in its consideration of the options relates to an assessed value of the option to the proponent (i.e., Glencore) and is not a reference to the assessed value of the option to the State of NSW. Further details on the estimated value to the State resulting from the PMP, and Option 6 (Homestead 100m mine around) and Option 7 (Homestead 500m standoff) are provided in **Section 3.0**.

Table 2.1 Summary of MineCraft review of Glencore's proposed mine plan options

Option	MineCraft Comment	Glencore Response
Glencore Preferred Mine Plan (PMP)	Glencore's reasons for deciding on the final PMP footprint are sufficiently justified.	***MineCraft Report conclusions are noted and agreed.***
Option 1: No Project (base case)	No evaluation provided other than to note the base case is provided as a reference case and to note the incremental benefit of the PMP to Glencore.	The base case is considered as this is a requirement of the NSW approvals process for coal mining projects. It also establishes a base case against which the benefits of the Project for the State and regional economy can be evaluated, and against which potential environmental and social impacts and costs can also be evaluated. As noted in the Economic Assessment (Appendix 30 of the EIS), the Project will result in significant benefits to the State of NSW and local region if it is approved, specifically $1.15 billion (in NPV terms) to the State. If not approved, there is a significant economic opportunity cost for both the State and regional economy.
Option 2: Maximum Resource Recovery	MineCraft concurs with Glencore that mining to the north and north west of the PMP footprint will be difficult due to the presence of old underground workings in the Liddell Seam with consequent high mining costs and no additional NPV contribution.	***MineCraft Report conclusions are noted and supported.***
Option 3: Hunter Dyke as Northern Limit	Option 3 is largely the same as Option 2 and provides no 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.	***MineCraft Report conclusions are noted and supported.***
Option 4: Yorks Creek Retained	MineCraft has no reason to disagree with Glencore's conclusions. The extent of resource sterilisation and inability to achieve a suitable return on capital investment as a result of the Option 4 truncated mine plan, coupled with the technical challenges of mining into the Liddell Underground Mine, make the option of stopping short of Yorks Creek [and Ravensworth Homestead] (with a potential satellite pit between Yorks Creek and Bowmans Creek) to be not reasonable as determined by Glencore.	***MineCraft Report conclusions are noted and supported. Option 4 is not considered to be feasible for economic and environmental reasons.***

Option	MineCraft Comment	Glencore Response
Option 5: Swamp Creek Retained **Continued use of existing MIA**	The *Mine Planning Options Report* (Appendix 1 of the EIS) identifies a range of technical and economic constraints to the option of avoiding Swamp Creek. Option 5 has the benefit of retaining existing Swamp Creek as well as the current Glendell MIA MineCraft have no reason to disagree with Glencore's conclusion that the option of commencing a new open cut immediately to the north of Swamp Creek is not considered reasonable nor feasible	***MineCraft Report conclusions are noted and supported. Option 5 is not considered to be feasible for predominantly economic reasons. Further this mine plan option would result in a potential additional void in the final landform and need for an out-of-pit overburden emplacement area.*** In addition to the technical mining and economic constraints identified in the Mine Planning Options Report it is noted that Swamp Creek is a highly modified creek system that has been truncated and realigned by mining over the past 30 years. The ecological, groundwater and surface water impacts associated with the removal of Swamp Creek required by the PMP are not significant and readily able to be managed. DPIE Water and Natural Resources Access Regulator (NRAR) did not object to the proposed Project. All biodiversity impacts associated with the removal of the degraded riparian vegetation will be fully offset in accordance with the principles of the NSW *Biodiversity Conservation Act 2016*.
Option 6: Homestead retained in place with 100m mining setback	Option 6 is not considered to be feasible for economic and environmental reasons. MineCraft considers the option of mining to within 100m around the homestead to be not a viable option primarily because of the likely blast damage to the Ravensworth Homestead and loss of the value of the site amenity, as well as site isolation and practical access.	***MineCraft Report conclusions are noted and supported. Option 6 is not considered to be feasible due to residual impacts on Heritage Values of Ravensworth Homestead*** It is noted that the objective behind any setback from Ravensworth Homestead is to avoid or reduce impacts to the heritage values of the homestead by leaving it in its current landscape setting. An aspect of these heritage values is the homestead's setting within a rural landscape, as identified by heritage landscape specialist Dr Geoffrey Britton (EIS Appendix 23). A mining setback of 100m is highly unlikely to achieve this objective, both during mining and in the final landform as the landscape changes from mining (overburden emplacements, mine void etc) would remain a significant feature of the immediate surrounds and viewshed. Further, as noted by MineCraft, likely blast damage on Ravensworth Homestead structures is also a key constraint for this option.

Option	MineCraft Comment	Glencore Response
		Glencore also notes that the geology is such that the strata underlying the homestead and to the east would be sloping into the active mining area and final void. This poses long term stability concerns with the highwall that require the laying back (and subsequent stepping up of the pit floor) or buttressing of the highwall to mitigate this risk. This highwall limitation would result in a further loss of resources and additional costs. This limitation is discussed further in **Section 2.2.1**
Option 7: Homestead retained in place, with 500m mining setback	Based on the economic analysis on the Project provided by EY in Appendix 30 of the EIS, MineCraft concurs that the Ravensworth Homestead and outbuildings should be relocated prior to the mining of the PMP. MineCraft identified that an alternate mine around scenario with a reduced setback (of 200-300m) may provide higher economic returns to both the State and Glencore than the 500m setback option (see **Section 2.1** below).	***MineCraft Report conclusions specific to Option 7 are noted and supported.*** Option 7 was identified as a mining option where the Ravensworth Homestead remained insitu with reduced impacts to the heritage values of the homestead complex when compared to Option 6. The 500m setback was considered, so as to represent a case to reduce the risk of blasting (vibration, overpressure and fly rock) impacts on Ravensworth Homestead. ***It is noted that MineCraft concur with the economic analysis (EY, EIS Appendix 30), which considers all external factors such as environmental and social aspects and concludes that the homestead should be removed prior to mining. Section 2.1 provides some further discussion on the feasibility of Option 7 (mining to within 500m of the homestead) from an investment perspective.*** Mining closer to Ravensworth Homestead (to within 200-300m), as suggested by MineCraft, will have similar issues to those identified for Option 6. Further discussion on the issues associated with a reduced mining setback is provided in **Sections 2.1** and **Section 2.2.1**
Option 8: Underground Mining	Underground mining is discounted by Glencore for a number of reasons, most of which relate to the area's complex geology. MineCraft accepts Glencore's position in relation to the difficulties of underground mining in the area. MineCraft also considered the potential for a punch highwall operation under Ravensworth Homestead from a mine around option but noted that this was also not viable. MineCraft concurred with Glencore's conclusion to discount underground mining options.	***MineCraft Report conclusions on Option 8 are noted and supported.***

2.1 Additional comments on Option 7

Option 7, which involves mining to within 500 m of the homestead, results in the sterilisation of 78 Mt of coal, which is approximately 60% of the PMP total resource. For the reasons outlined below, Glencore would not proceed with the Project if an approval for a significantly restricted mining footprint, consistent with Option 7, was granted. Section 3.9 of the Mine Planning Options Report summarised this as follows:

> ***[T}he loss of reserves and truncated mine life associated with this option means that it is difficult to achieve a suitable return on capital investment as upfront spend is required on the construction of a new MIA and purchase of mining equipment.***

It is important to realise that all the mine plan options that involve continuation of the existing Glendell Pit highwall to the north have a similar mining cost and mobile fleet capital profile to the PMP for the first eight to ten years of mining, which includes Option 7. The early years of mining have high mining costs that are driven by the relatively high (unfavourable) ratio of overburden to coal (mining ratio) and the complexity of mining through the narrow zone between the current and proposed mining areas. However, as mining progresses northwards through and beyond the location of the homestead, the mining ratio (and mining cost) declines.

Glencore has developed the PMP to leverage off existing infrastructure at the neighbouring mining complexes, assisting in the feasibility of the Project. Notwithstanding this, substantial upfront capital is required.

Glencore considers that the economic viability of the Project relies on the PMP. Option 7 would involve a mine life of approximately ten years due to the restricted mining footprint, which in comparison to the PMP, is a reduction in mine life of approximately 13 years. Due to the similar mining and capital costs between the PMP and Option 7, proceeding with Option 7 would pose a significant financial risk to Glencore particularly in the event that lower coal price scenarios are realised. Further the reduced mine life that Option 7 provides means that there is a limited time available to recover the associated high upfront capital spend and high operating costs attached to the early years of mining. Restricting the extent of the mining footprint, as would be the case under Option 7, sterilises low mining ratio (and low mining cost) coal that would otherwise be mined as part of the PMP. For the above reasons, Glencore does not consider Option 7 to be feasible.

2.2 MineCraft supplementary considerations

The MineCraft Report raised a hybrid mining scenario, alternate infrastructure location scenarios and alternate overburden emplacement scenarios for consideration. Specifically, these were:

- a scenario which includes a 200 to 300 m offset from Ravensworth Homestead (a hybrid of Options 6 and 7) (addressed in **Section 2.2.1**)
- the siting of the relocated Glendell MIA to the south (west of the current Glendell Pit) (addressed in **Section 2.2.2**)
- a realignment of Hebden Road to the north (addressed in **Section 2.2.3**) and
- different overburden emplacement scenarios, including utilisation of West Pit and Bayswater North Pit voids for overburden emplacement (addressed in **Section 2.2.4**).

2.2.1 200-300 metre Ravensworth Homestead Offset

This section provides further details on Glencore's response to MineCraft's suggested hybrid mining scenario, which is to consider a 200 to 300 m mining offset from the homestead.

In its consideration of Option 7 (500 m setback from the homestead), MineCraft note the following:

> *In **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 Yorks 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 metre 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 Yorks Creek would not be necessary and any changes to Hebden Road alignment would be minimised.*

The basic premise of this potential additional scenario presented by MineCraft appears to be that:

- this setback would be appropriate to manage potential impacts on the heritage value of Ravensworth Homestead and
- there is available space for a pit similar to the existing Glendell Pit between Ravensworth Homestead and the former Ravensworth East Mine and emplacement area, located to the east of the homestead.

The exercise in 'overlaying' the current Glendell Pit (as illustrated in Figure 12.1 of the MineCraft Report) appears to have been a visual exercise only, with no detailed analysis undertaken and appears to have assumed that all areas of the footprint have the same mining economics. Further it is noted that MineCraft consider that any coal lost could be made up in part by extending the PMP footprint further to the west. These assumptions are inaccurate and are considered further below in the context of the suggested alternative of a 200 to 300 m mining offset.

2.2.1.1 Geological and mine configuration constraints

MineCraft suggests that as part of a 200 to 300 m buffer it might be possible to mine to the east of the Ravensworth Homestead, up to the previously mined area at Ravensworth East mine and establish a similar sized mining operation to the existing Glendell Pit. Further, MineCraft suggest that the pit could then be further expanded as it progresses to the north to provide the coal lost from the PMP. In Figure 12.1 of the MineCraft Report, MineCraft provide an overlay of the existing Glendell Pit in this location for illustrative purposes with a 200 to 300 m buffer from the homestead, however it is noted that was a visual exercise and no detailed analysis of potential mining constraints was undertaken.

The overlay of the existing Glendell Pit is misleading in that it assumes that the geological conditions (and mining economics) present in the existing Glendell Pit would be directly applicable to the area to the east of the homestead. However, the configuration of the existing Glendell Pit, including features such as the highwall angles, mining depth, and available working area is largely dictated by the geological conditions at the existing Glendell Pit.

The geology in the Project Area has coal seams dipping to the north meaning that they get deeper as the mine progresses from the existing Glendell Pit and moves towards the Ravensworth Homestead and beyond. Further, the coal seams get deeper the further the mine progresses away from the Camberwell anticline (high point in the coal seams). The anticline runs north-south along the length of the Glendell Pit Extension and passes approximately 250 m to the west of the homestead.

A cross-section running east-west through the homestead and the proposed mining area is shown in **Figure 2.1** and illustrates the impracticality of attempting to design a mining scenario that leaves the homestead in-situ and positions the final mine highwall at either 200 or 300 m offset to the east, as suggested by MineCraft.

The cross-section in **Figure 2.1** shows that the shallowest and most productive parts of the mining cross section are located directly beneath Hebden Road, Yorks Creek and the homestead. As the mine progresses to the east of the homestead (and further down dip of the Camberwell anticline), the coal seams get deeper and, as shown on the cross-section, requires removal of larger quantities of waste material associated with the coal. It also includes rehandling of existing overburden material associated with the former Ravensworth East mine, from which no coal would be present. In addition, the design of an open cut pit to the east of the homestead would be limited in depth to either the Liddell Seam for a 200 m offset or the Arties Seam for a 300 m offset, in order to maintain a minimum mining width of 250 m in the base of the pit (a pragmatic mine width in order to achieve operational working space). Both of these seams are situated above the Barrett Seam (existing basal seam in existing Glendell Pit) and the Hebden Seam (basal seam in the Glendell Pit Extension).

The mining ratio for a pit 200 m to the east of the homestead with the basal seam being the Liddell Seam is 9:1 (overburden to coal), while the mining ratio for a pit 300m to the east of the homestead with the basal seam being the Arties Seam is 11.3:1. In comparison, the mining ratio of the Glendell Pit Extension at the location of the homestead is approximately 6.2:1. As noted earlier, higher mining ratios are unfavourable, and have substantially higher mining costs.

The combination of the reduced pit depth and greater ratio of waste to coal on the eastern side of the homestead results in uneconomic mining conditions for both the suggested 200 and 300 m offset mining scenarios.

In addition, detailed geotechnical stability considerations would be required in order to establish final highwalls adjacent to the homestead and on the eastern side of the pit where excavation is proposed to occur in the waste dump of Ravensworth East mine.

The underlying strata associated with the western wall adjacent to the homestead is dipping into the open cut void, posing long term highwall stability concerns that could result in the homestead being damaged or destroyed. It would be necessary to ensure a very high factor of safety for the highwall design to ensure the integrity of the homestead remains in-situ long-term. This would necessitate the highwall being laid back at a shallower angle than shown in **Figure 2.1**, subsequently further narrowing the pit.

Further, the eastern wall (where excavation is proposed to occur in mine waste associated with the Ravensworth East mine) would likely need to be laid back further to ensure it is stable in the long term.

These geotechnical considerations and the need to flatten the highwall angle on both the eastern and western sides of the pit would result in it being shallower again (in order to maintain a 250 m working width), thus further worsening the mining ratios.

As a result of the geology and technical mine design aspects discussed above, it is not economically viable to develop a narrow pit 200 to 300 m to the east of the homestead, nor is it possible to establish a pit of a similar size and depth to the existing Glendell Pit as suggested by MineCraft.

2.2.1.2 Impacts to heritage values

Mining to within 200 to 300 m of the Ravensworth Homestead has the potential to impact on the heritage values of the homestead due to potential blasting impacts and intrusion into the landscape setting. These impacts are similar to those already identified for Option 6 in the Mine Planning Options Report (refer to Appendix 1 of the EIS).

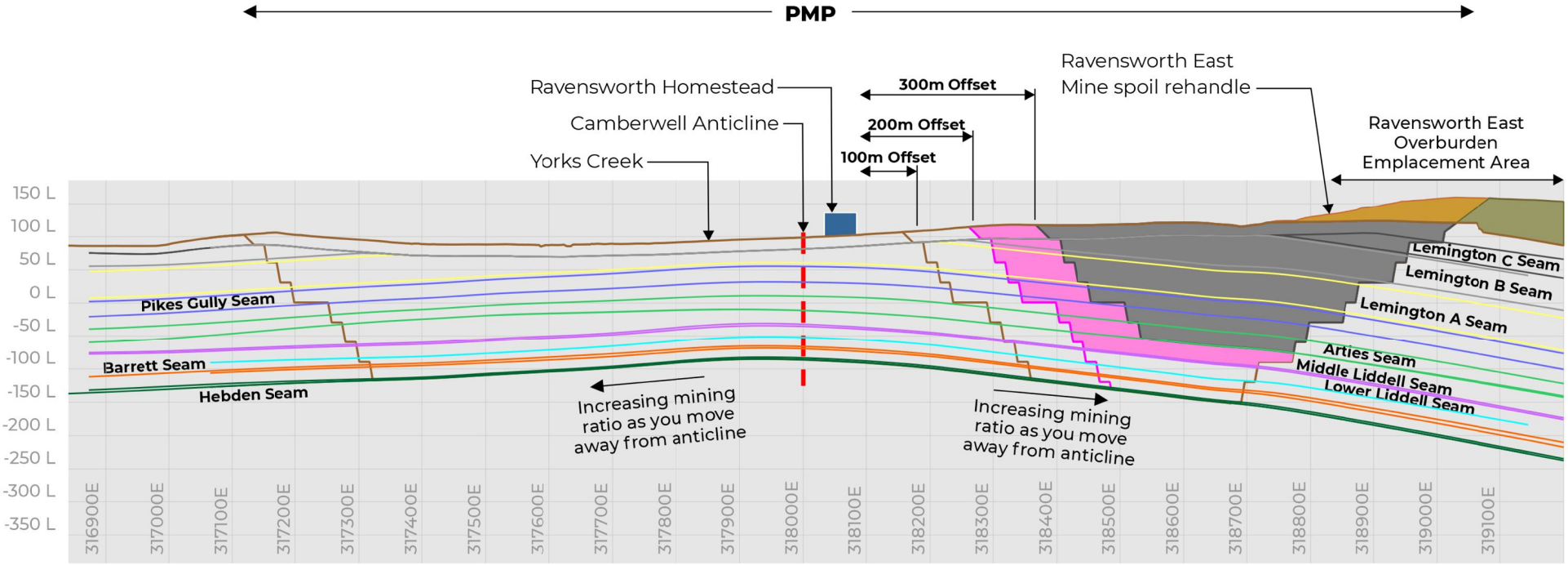
Blasting related impacts

Mining operations will require the blasting of rock and coal material as part of the mining process with blasting activities having the potential to generate excessive ground vibration and overpressure (shock wave) that can impact nearby structures.

For example, blasting related vibration could result in impacts to the stone structures forming the Ravensworth Homestead Complex. This includes the five stone structures being the homestead, the kitchen wing, the stables, the barn and the privy. These structures may require the installation of significant intrusive steel bracing structures fitted inside the buildings to try to retain structural integrity. This structural bracing in itself would result in removal of the floors, excavation of new concrete footings and damage to the heritage fabric such as the internal plaster lining. This would also require significant reductions in the scale of blasting such as maximum instantaneous charges and blast quantities resulting in more frequent smaller blasts and the introduction of inefficiencies and delays to the mining schedule.

The risk of blasting related impacts due to overpressure could also result in damage, in particular to exposed building components such as roof structures and window glass. Overpressure can be reliably managed at adequate buffer distances from the homestead, however the risk of unintended consequences rises considerably with reduced buffer distances such as MineCraft's suggested 200 to 300m offset. Overpressure impact mitigation at the homestead could involve removal and storage of all the windows, bracing of chimneys etc.

Blasting related impacts due to the risk of fly rock being ejected from each blast are also a key consideration. Whilst Glendell Mine utilises best practice blast design and initiation techniques, variable geological conditions can result in unexpected ejection of fly rock. A buffer distance of 500 m is recognised as the industry standard and appropriate by the NSW Resource Regulator. Glencore adopts the 500 m industry standard at all its other mining operations to reduce this risk, however the risk of fly rock damage increases considerably with a reduced offset such as 200 to 300 m suggested by MineCraft.



Note: Each seam contains multiple coal plies and interburden layers of varying thickness

FIGURE 2.1

Cross Section of PMP at Ravensworth Homestead showing 100m, 200m and 300m Mine Around Pits and Basal Seam

The blast design and initiation controls necessary to achieve a reduced risk of impacts from fly rock damage will add significantly to the cost of mining and will necessitate substantially more frequent, lower magnitude blasts. Precautionary measures to mitigate damage associated with vibration and overpressure risks (e.g. structural bracing) would have their own impacts on the heritage values of the homestead structures. These controls increase operating costs associated with the project, which, coupled with reduced coal extraction (see below), will significantly impact on the commercial viability of mining within 200 to 300 m of the homestead.

Impacts on landscape setting and outlook

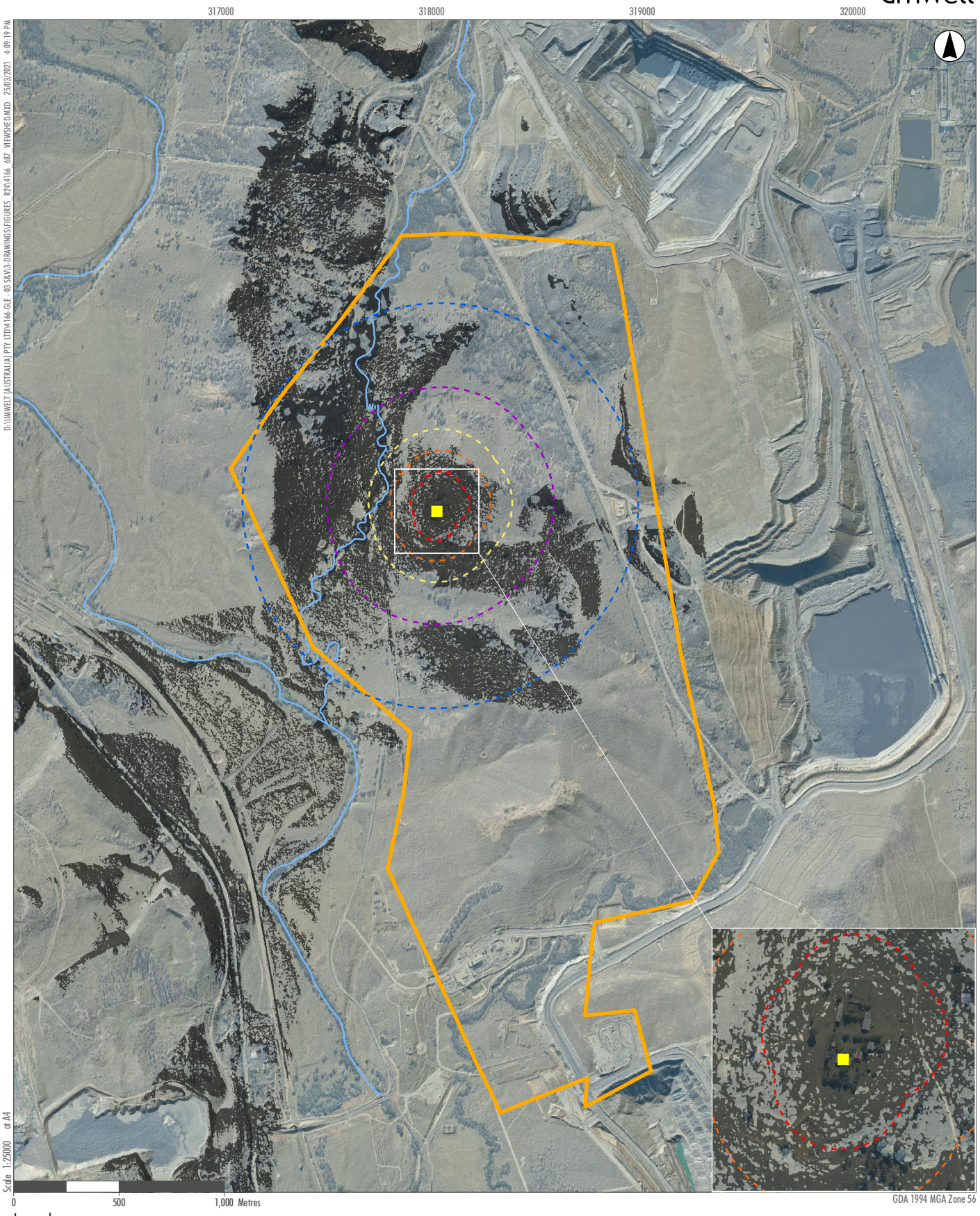
While it may be technically possible to mine to within 200 to 300 m of the homestead without damaging the structure itself due to blasting, much of the heritage values associated with its setting within the broader Estate would be significantly impacted by such a proposal.

The impact of the pit (and final void) being in close proximity to the Ravensworth Homestead is also significant. As noted in **Table 2.1**, the 500 m setback option (Option 7) was selected to reduce the risk of blasting impacts (vibration, overpressure and fly rock) on the homestead. In addition, the 500 m setback would also offer a visual buffer through having a greater separation distance and through screening provided by the natural terrain and existing vegetation. These benefits from the 500 m offset mine plan are significantly reduced or negated where mining occurs inside this 500 m setback from the homestead.

A pit that is located within 300 m of the homestead would be highly visible from the homestead complex and involve significant transformations of the landscape currently visible to the south from Ravensworth Homestead (i.e. the primary viewshed). **Figure 2.2** shows the areas visible from the Ravensworth Homestead and different setback distances from this point. As can be seen from **Figure 2.2** a pit crest located within 300 m of the homestead would include significant areas within locations visible from the main viewing location of the homestead.

These terrain transformations would be permanent, resulting in the homestead remaining in a heavily altered post-mining landscape. Furthermore, any screening measures to avoid views of the pit from the homestead would also alter its heritage values by also changing the visual outlook. In this regard, it is considered that this option would come with its own set of heritage impacts and has little benefit in terms of mitigating heritage impacts relative to the option of relocating the homestead to the proposed Ravensworth Farm site.

As with the 100 m offset option (Option 6), the Homestead would be subject to noise, dust and blast impacts. There would also be significant constraints on its use in the post mining landform due to the ongoing presence of the final void in close proximity to the homestead leaving the homestead in an unnatural landscape setting.



Legend

- Ravensworth Homestead
- Proposed Glendell Pit Extension

Viewshed Analysis from Ravensworth Homestead

- Not Visible
- Visible

Distance from Ravensworth Homestead Complex

- 100m
- 200m
- 300m
- 500m
- 900m

FIGURE 2.2

Visual Impacts of reduced pit offset from Ravensworth Homestead

Image Source: Glencore (July 2018) Data source: Glencore (2020)

2.2.1.3 Summary of Findings on 200-300m offset option

In summary, MineCraft's depiction of mining to the east of the homestead (MineCraft Report Figure 12.1) is misleading and highly conceptual. Further analysis shows that this hybrid scenario would significantly reduce resource extraction due to geotechnical constraints on mine wall slope, reduced pit depth and reduced operating room in the narrow mine zone around the Ravensworth Homestead. The resulting mine design would not reflect the image prepared by MineCraft. The significant mine design constraints will result in reduced resource extraction, lower mining rate, reduced employment and diminished economic returns. After further analysis, Glencore does not consider MineCraft's hybrid scenario involving mining to within 200 to 300 m of the homestead to be viable.

Irrespective of the constraints on mining, this option is not considered to offer any significant benefits over the proposed Ravensworth Farm relocation option, in terms of reduced impacts to the heritage values. Additionally, under this option, the homestead would remain isolated in a heavily modified post-mining landscape and would be unlikely to benefit from any future occupation or beneficial use that would assist in the long-term costs of maintenance of the building. Further, even if it were financially viable, to the extent that this option does have heritage benefits over the PMP by not relocating the homestead, these limited benefits would come at a significant economic opportunity cost for the State and local region during mining.

2.2.2 Southern MIA Scenario

The MineCraft Report suggested an alternate location for the new MIA coupled with removal of the western haul road (proposed Heavy Vehicle Access Road):

> ***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.***

Figure 2.3 shows an example location of where a Southern MIA location could be located. While it would be technically possible to locate a MIA in this area or design a different MIA layout for a different location to the west of the existing Glendell Pit, such a scenario is not reasonable or feasible for the following reasons:

- limited area available for required infrastructure (as can be seen from **Figure 2.3**, a significant redesign of the MIA layout would be required to 'fit' it to these areas).
- area between Swamp Creek and Bowmans Creek is subject to the following constraints:
    - located within Bowmans Creek floodplain and flood mitigation works would significantly increase costs and likely have impacts on flood flows
    - Main Northern Rail Line and
    - higher value agricultural land within this area which would be removed.
- constructing it between Glendell Pit and Swamp Creek is subject to the following constraints:
    - limited area available
    - would constrain final landform development and potential for release of rehabilitated run-off area until MIA is removed and rehabilitated.

The benefits of a Southern MIA scenario identified by MineCraft are that it could hypothetically allow the western extent of the PMP to be extended further to the west through the removal of the proposed Heavy Vehicle Access Road. However, the western limit of the pit is already largely constrained by the design objective of satisfying the Aquifer Interference Policy (AIP) minimum harm criteria of a minimum setback of 200 m from the high bank of Bowmans Creek. In this regard, the proposed siting of the MIA and the associated Heavy Vehicle Access Road do not constrain the western extent of the pit. Further, a haul road would still be required in order to access the MIA/Glendell Pit Extension as the pit progresses northwards.

Any advantages in terms of mineable area that would be gained by moving the MIA to the south are also unlikely to outweigh additional costs associated with management of flooding impacts from constructing in the southern area and operational efficiency losses associated with the pit moving away from a Southern MIA as mining progresses northwards.

Further, the location of an MIA to the south and the need to maintain a heavy vehicle access road to the MIA is also likely to complicate the management of final landform drainage in the southern areas of the in-pit emplacement. By locating the MIA in the north (as proposed), the southern areas of the Glendell Pit can be fully rehabilitated and released when rehabilitation meets appropriate criteria. On this basis, the release of clean catchment from these areas is not impeded by the proposed new MIA location.

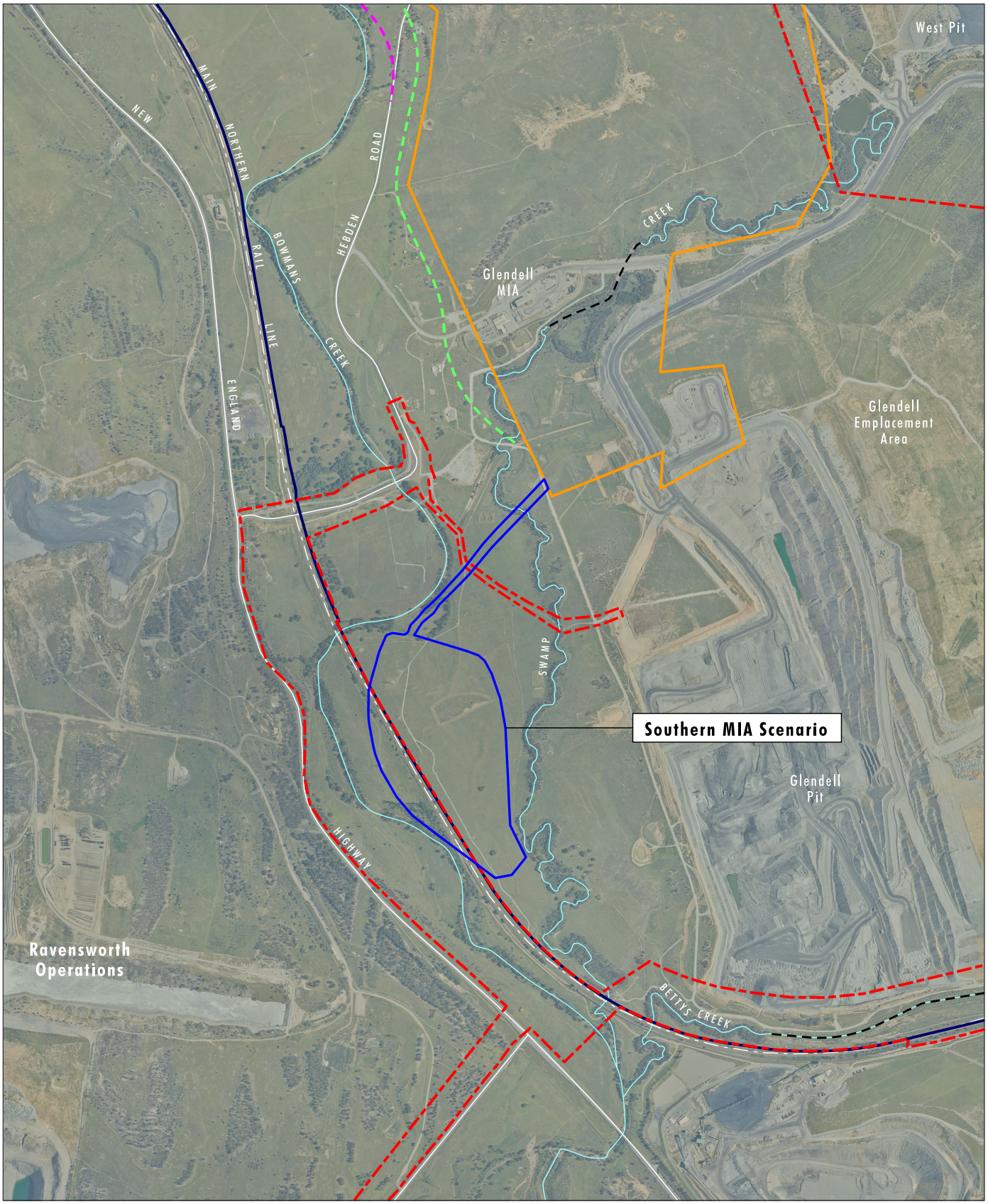


Image Source: Glencore (Dec 2018)
Data Source: Glencore (2019)
Notes: Ravensworth Homestead to be relocated, Mount Owen Consent Boundary assumes Narama Pipeline Modification is approved

0 0.25 0.5 1.0km
1:20 000

Legend

- Project Area
- Glendell Pit Extension
- Mount Owen Consent Boundary
- Ravensworth Homestead
- Existing Creek Diversion

Project Features:

- New Glendell MIA
- Heavy Vehicle Access Road
- Yorks Creek Realignment
- Hebden Road Realignment

FIGURE 2.3

Southern MIA Scenario

File Name (A4): R24/4166_686.dgn
20150309 9.47

2.2.3 Alternate Hebden Road realignment

The MineCraft Report suggested consideration of an alternate alignment to Hebden Road to the north:

> ***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.***

This option was identified and considered in the Mine Planning Options Report (refer Options 1 and 3 for the realignment of Hebden Road, reproduced as **Figure 2.4** for reference) but is not feasible as it requires bridges over the Main Northern Rail Line and Bowmans Creek and is considered cost prohibitive. Additional constraints associated with this option include:

- Glencore do not own all land on this alignment
- management of potential impacts on flood flows is likely to increase construction costs and may have impacts on riparian and aquatic biodiversity
- potential additional impacts on alluvium and BSAL
- increase in required disturbance area for the Project
- route is likely to involve potential interaction with cultural heritage sites.

Further, a northern alignment option for the relocated Hebden Road also results in the underutilisation of recent road bridge over the Main Northern Rail Line (completed in 2016) and roadwork upgrades constructed by Glencore as part of the Mount Owen Continued Operations (MOCO) Project.

The main road users of Hebden Road include local residents, Hebden Quarry, Wild Quarry, and Hunter Valley buses, all of which were consulted throughout the EIS process on the proposed realignment. It is also noted that no local residents from Hebden, or the quarries or bus company objected to the Project.

While it is acknowledged that this northern alignment option would reduce the need for blast related road closures, only low levels of traffic will be affected by blasting and procedures for notifying residents and other potential road users will enable them to plan trips to avoid inconvenience. The residual impacts on road users have been assessed in detail in the EIS and are considered minor and manageable. The costs of road closures associated with blasting have been assessed in the cost benefit analysis (refer Appendix 30 of the EIS and Section 4.7 of the Response to Submissions Report Part A (pages 63-65)) and are considered negligible.

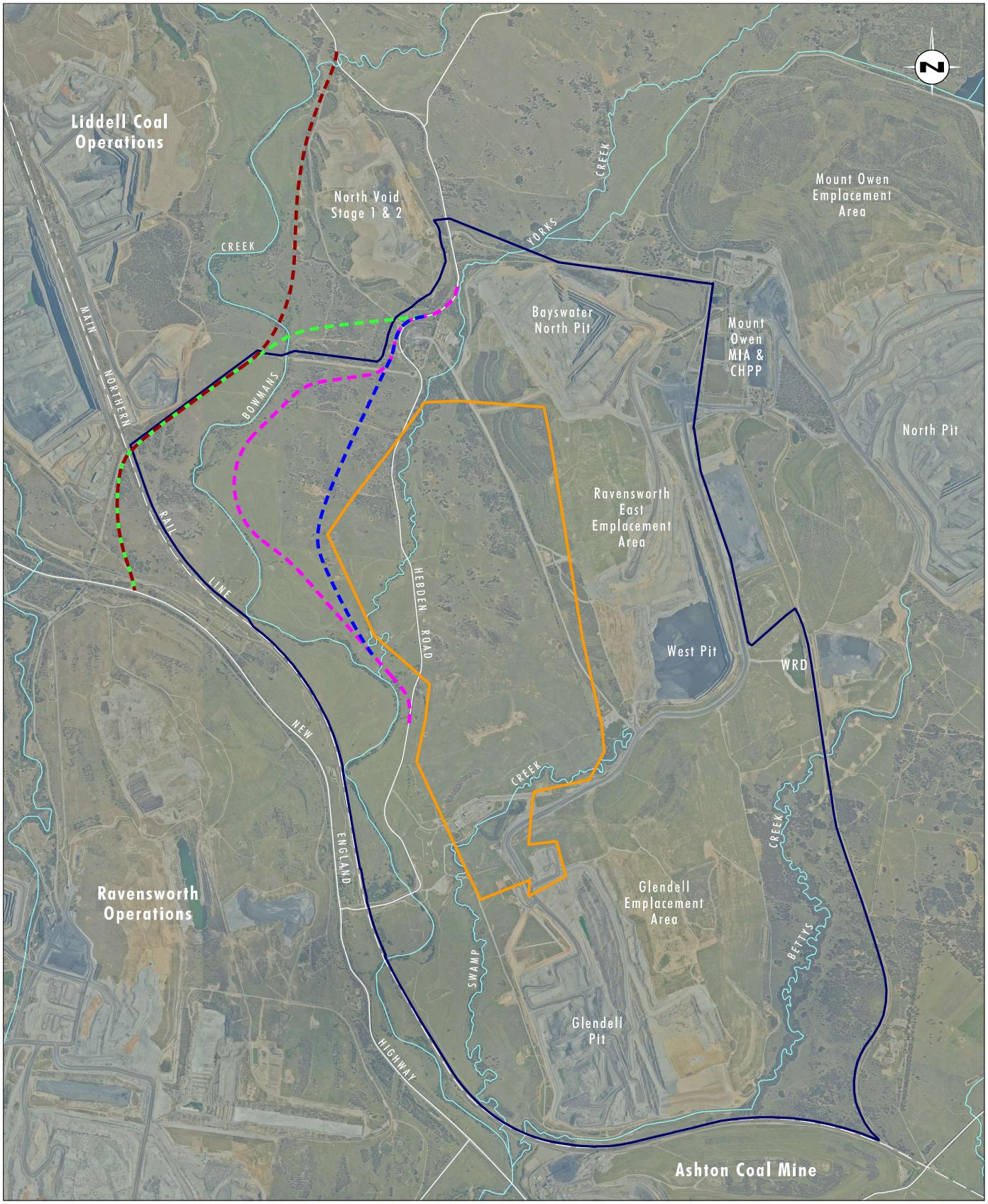


Image Source: Glencore (Dec 2018)
Data Source: Glencore (2019)

Legend

- Project Area
- Proposed Glendell Pit Extension
- Preferred Hebden Road Realignment
- Option 1
- Option 2
- Option 3

FIGURE 2.4

Hebden Road Realignment Options Identified in the Mine Planning Options Report

2.2.3.1 Consideration of Alternative Realignment Option 2

An additional alternate realignment option for Hebden Road (Option 2) was identified and considered in the Mine Planning Options Report (refer to Section 4.3 of the Mine Planning Options Report) which involves the relocation of Hebden Road immediately west of the Glendell Pit Extension and east of the proposed MIA location. This alternate realignment option was shown on Figure 19 of the Mine Planning Options Report and has been reproduced as **Figure 2.4** for reference. This option was considered not feasible for the following reasons:

- an additional bridge over the relocated Hebden Road would be required for movement of heavy mining equipment from the MIA to the Glendell Pit Extension
- higher number of road closures for blasting would be required during the mine operation due to the closer proximity to the Glendell Pit Extension including in the latter years of the mine life, in comparison to the Preferred Hebden Road Realignment
- the topography that this alternative alignment follows is more elevated relative to the Preferred Hebden Road Realignment and would have increased views of the final void to the east
- the relative travel distance between the preferred Hebden Road Realignment and Option 2 is not significant; with both options increasing travel time from the current Hebden Road alignment by less than one minute when travelling at the current speed limit of 80 km/hour.

Further, if the Ravensworth Homestead is relocated to the Ravensworth Farm recipient site to the north of the Glendell Pit Extension, this Hebden Road realignment option would change the approach direction to the homestead with access being from the east. In its current setting, the Homestead is approached from the west with this approach direction being reflected in the architecture of the buildings. A significant body of work has been completed in regard to retaining the heritage values of the homestead as part of its proposed relocation to the Ravensworth Farm site, including the topography, approach direction, setting and visual catchment of the recipient site and this alternate Hebden Road realignment option would significantly impact these heritage values.

2.2.4 Alternate spoil emplacement considerations

The MineCraft Report suggested the following in relation to alternate spoil emplacement scenarios:

> ***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, tailings placement could possibly change from the old West Pit to the Mount Owen Void, or part of it, and the West Pot 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.***

Glencore has, and will, continue to optimise overburden and tailings emplacement in the Mount Owen Complex, where feasible to do so. That said, there are material practical and schedule constraints to the scenarios raised by MineCraft, and these are outlined below.

2.2.4.1 West Pit

West Pit is already required to be capped and rehabilitated to a free draining landform under the existing Mount Owen Consent.

Based on current mine planning (including tailings contribution from the Project), West Pit would reach capacity in approximately 2028. Material for the capping of West Pit is already contemplated in the mine planning for operations approved under the Mount Owen Consent. The amount of overburden that will be able to be emplaced on West Pit will also be limited to capping material only of a minimal thickness as the tailings will not have strength to take a lot of material.

West Pit will require drying before any capping can occur and this is likely to take at least five years from tailings emplacement finishing. Accordingly, overburden from the Glendell Pit Extension could not be emplaced in West Pit until around 2033 under the current mine schedule. Furthermore, the progression of the Glendell Pit Extension to the north and in-pit backfilling would remove the haul route for efficient emplacement in West Pit during the later stages of the Project when the tailings may be adequately consolidated to enable emplacement.

Even if tailings emplacement finished earlier in West Pit and was transferred to the Bayswater North Pit (BNP) void or cells within North Pit, West Pit would not be sufficiently dried or consolidated within a time frame that would enable significant volumes of overburden from the Glendell Pit Extension to be emplaced on the tailings in a manner that improved operational efficiencies. The use of West Pit to avoid higher emplacement within the Glendell in-pit emplacement area (forecast to occur circa 2026) means tailings emplacement would need to cease this year (2021) for this to occur. However, the BNP void only becomes available as a possible alternate tailings emplacement facility in 2024 at the earliest. Accordingly, use of West Pit as an overburden emplacement option would not preclude the need for higher emplacement within the Glendell-in-pit emplacement area.

2.2.4.2 Bayswater North Pit

Mining in the BNP is scheduled to finish in 2023. Following this, the BNP void is planned to be used for water storage as part of the Greater Ravensworth Area Water and Tailings Scheme (GRAWTS). Additionally, under the Mount Owen consent, tailings generated at the Mount Owen Complex is permitted for emplacement at either in-pit cells within North Pit, the BNP void or other approved GRAWTS tailings emplacement facilities. As such, the BNP void is an integral part of the GRAWTS that provides long term operational flexibility based on current approvals and projected operational needs. Further, retaining the BNP void for use as a water storage is important to protect water security for the Mount Owen Complex in the event that any of the GRAWTS linkages to water storages at other operations became unavailable, and to prevent offsite discharges from the Mount Owen Complex given that no licensed discharge point exists. It is therefore not considered reasonable and feasible to backfill the BNP void as a Project commitment with overburden material as suggested by MineCraft.

Emplacement of further overburden in the BNP void has been considered in the Project Design, however due to the potential constraints associated with long-term water management requirements under the GRAWTS, it is not considered appropriate to include a specific commitment to fully backfill the BNP void.

3.0 Comments on Coal Price and NPV

3.1 Coal Price Sensitivity

Section 5.8 of MineCraft Report has included commentary on the viability and benefits of the Project having regard to spot prices for coal observed during a low point in the cycle during 2020 (after preparation of the Economic Impact Assessment for the Project). The relevant excerpt from the MineCraft report is reproduced below:

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 road. 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.

5.8.6 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 to 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	*96.50*	*51.00*	*73.91*
Average for Glendell (77% thermal)	*101.70*		

Source: EIS Appendix 30 and 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.

Coal, like almost all commodities, experiences fluctuations in prices which can vary significantly over the life of a Project. Glencore, like all mining companies, take a long term view when assessing projects of this nature as it represents a long term investment with decisions based on long run price projections that take into account predicted supply and demand trends.

The lower prices observed during the middle of 2020 (down as low as USD$50.14 in August 2020) were largely an artefact of short-term demand reductions associated with the COVID-19 pandemic and spot prices for thermal coal have largely recovered (USD$86.83/ in January 2021) to levels consistent with (or higher than) the price projections used in the Economic Impact Assessment prepared for the Project and contained in Appendix 30 of the EIS.

MineCraft's comment that there is a risk that the Project may be cash negative if the low point in the cycle observed in mid-2020 continued for the life of the Project does not reflect the historical price fluctuations of coal nor does the low price observed in mid-2020 reflect updated consensus forecast pricing. Indeed, the price fluctuations observed during 2020 are precisely the reason that consensus forecast pricing is used for the economic appraisal of coal mining projects rather than point in time spot prices which can be subject to significant short term fluctuations. Instead, this price variability is considered in the sensitivity analyses undertaken as part of the Economic Impact Assessment for projects.

The Economic Impact Assessment of the Project included in the EIS (Appendix 30) was prepared by Ernst & Young (EY) and relied on June/July 2019 consensus price forecasts prepared by KPMG (KPMG, 2019). **Attachment 1** to this report are new Appendices C and D to the Economic Impact Assessment which have been prepared by EY to provide updated consideration of recent price fluctuations and consensus forecasts. This updated assessment has used the December 2020 – January 2021 KPMG price forecasts, which are the most current at the time of writing. Appendix C contains a consideration of the December 2020 – January 2021 KPMG forecasts relative to the June/July 2019 forecasts used in the 2019 Economic Impact Assessment for the Project. Appendix D contains an updated CBA for the benefits of the Project to the State of NSW and the local region using the December 2020 – January 2021 KPMG forecasts.

The key points to note in response to the MineCraft Report, and from Attachment 1 are:

- The mid-2020 thermal coal prices identified by MineCraft have since recovered significantly, and as such represent short term price fluctuations for this commodity, and cannot be assumed to remain throughout the life of the Project
- the December 2020 – January 2021 long term price forecasts are within the 15% of the June/July 2019 KPMG Price forecast considered in the CBA sensitivity analysis in the Economic Impact Assessment completed for the Project
- the overall benefits of the Project to the State of NSW using the more recent December 2020 – January 2021 KPMG forecasts remain significant at $1,121.3 million[1] in NPV terms for the State of NSW ($2,654.9 million in undiscounted terms). This represents only a $28.6 million reduction in NPV relative to the forecast benefits using the 2019 coal price forecasts documented in the Economic Impact Assessment (Appendix 30 of EIS).
- there is no change to the forecast benefits to the local region from the Project.

While lower projected commodity prices do have implications for capital expenditure decisions and a reduced overall viability of a project may mean spend on capital is allocated elsewhere, these decisions are not based on short term price fluctuations. This is particularly the case where these price fluctuations are the result of relative short term economic circumstances like the COVID-19 pandemic. The low spot price for coal observed in mid-2020 is considered inappropriate to use as a guide for either investment decisions or the cost benefit analysis of a project's value to the State.

[1] 2019 Australian Dollars

3.2 General Comments on MineCraft NPV analysis

The analysis of the NPV of the various options presented in Section 5.9 of the MineCraft Report relate to MineCraft's estimated value of the Project to the Proponent. That is, the values presented in Table 5.5 appear to be estimates of the value of the different mine plan options to Glencore (analogous to the producer surplus in the EY Economic Impact Assessment) and are not an estimate of the value of the Project to the State of NSW as assessed by EY, and as requested by DPIE.

Glencore seeks approval of the full PMP for the Project to be economically viable. Approval of an alternate mine plan that materially restricts the mining footprint would result in Glencore not proceeding with the Project.

3.2.1 Opportunity cost of not proceeding with the PMP

As identified in **Section 3.1**, the NPV of the PMP to the State using updated coal and AUD forecasts is $1.12 billion. Option 7 (Homestead 500m standoff) has been presented and considered as a potential mine design which avoids significant impacts to the Ravensworth Homestead. However, as noted in **Section 2.1** , this Option results in the sterilisation of almost 60% of the PMP total resource and is not considered to be economically viable. Further, Option 6 (Homestead 100m mine around) is not considered technically or financially viable due to blasting impacts and geotechnical considerations. As a result, the opportunity cost to the State of the PMP not being approved is therefore $1.12 billion in NPV terms or $2.65 billion in undiscounted terms.

3.2.2 Theoretical benefits to State of Options 6 and 7

Appendix E in **Attachment 2** provides an assessment of the theoretical benefit of Options 6 (Homestead 100m mine around) and 7 (Homestead 500m standoff) to the State were they to be undertaken relative to the PMP. **Table 3.1** provides a summary of the results of this analysis and a comparison with the modelled benefits to NSW from the PMP.

Table 3.1 Estimated Benefits ($ million) to NSW from the Mine Plans Considered

Benefits	PMP*	Option 6 (100 m Homestead Mine Around)*	Option 7 (500 m Homestead Standoff)*
Direct Benefits			
1. Net producer surplus attributed to NSW	$0.0	$0.0	$0.0
2. Royalties, payroll tax & Council rates	$319.5	$239.3	$178.3
3. Company income tax apportioned to NSW	$49.9	$18.1	$31.8
Total direct benefits	**$369.4**	**$257.4**	**$210.1**
Indirect Benefits			
1. Net economic benefit to landholders	$0.0	$0.0	$0.0
2. Net economic benefit to NSW workers	$468.0	$384.3	$285.9
3. Net economic benefit to NSW suppliers	$286.3	$231.3	$161.6
Total indirect benefits	**$754.3**	**$615.6**	**$447.5**
Indirect (Environmental Costs)	$2.4	$2.3	$1.7
Total economic benefits	**$1,121.3**	**$ 870.8**	**$655.9**
Would the Project proceed with this Mine Plan	**Yes**	**No**	**No**
Benefit to the State	**$1,121.3**	**$0**	**$0**

^Real 2019 Australian Dollars. * NPV in 2019 Australian dollars based on a 7% discount rate.

As demonstrated in **Table 3.1**, even on a theoretical basis, the analysis of the different options shows that the PMP provides significantly higher benefits to NSW ($1,121.3 million) than Options 6 and 7 ($871 million and $656 million respectively). The direct benefits in all scenarios are primarily driven by royalties payable to the State with significant indirect benefits also derived from the benefits flowing to employees and suppliers. The quantified indirect environmental costs of all three scenarios are similar.

As Options 6 and 7 are not considered to be technically and/or economically feasible, in terms of actual benefit, these options represent a $0 economic benefit to the State of NSW, as demonstrated in **Table 3.1**. Even if Options 6 and 7 were viable, the analysis of the benefits of these options to the State show that the PMP has significantly greater benefits than options which avoid the relocation of the Homestead. The benefits of the PMP are approximately $465 million (70%) higher (in NPV terms) than the theoretical benefits provided by a 500 m standoff option. This is a significant incremental benefit provided by the Project.

3.2.3 Value to the State of retaining Homestead in situ

The cost benefit analysis of the PMP and Options 6 and 7 includes a consideration of costs of all environmental impacts with the exception of the intangible impacts to Aboriginal cultural heritage and the heritage associated with the Ravensworth Homestead. The cost benefit analysis does include costs associated with salvage of Aboriginal cultural heritage and, for the PMP, relocation and archaeological survey and salvage costs associated with the Ravensworth Homestead.

The mitigation and offsetting of impacts to biodiversity, surface and groundwater systems, and air quality, noise and visual amenity are included in operating expenses for the PMP and Options 6 and 7 and are therefore considered in the cost benefit analysis. The externalities associated with greenhouse gas emissions and costs to road users associated with blasting delays and increased travel times are also considered in the cost benefit analysis.

As has been detailed in the EIS and Response to Submissions documents, with the possible exception of the impacts on the Ravensworth Homestead, the Project's impacts on all aspects of the environment either meet relevant NSW guidelines or have been mitigated or offset to a level considered to be satisfactory to all relevant State and Commonwealth regulatory authorities.

The extensive historical heritage research and studies undertaken for the EIS have identified that the Ravensworth Homestead and associated Estate area have heritage values that are considered of State significance. It is noted that there is little guidance on the balancing of the significant estimated value of the Project to the State and Region against the intangible heritage values of Ravensworth Homestead. The CBA does not include a valuation of the heritage values lost by the relocation of the Ravensworth Homestead but does include consideration of the costs associated with the extensive salvage and mitigation measures proposed as part of its relocation under the Project (in excess of $20 million).

Significant heritage values will be realised as a result of the proposed archaeological site investigation and salvage program which will improve the already comprehensive knowledge of the use of the site. This archaeological investigation program would not proceed in the absence of the Project. Further, both relocation options identified will enable greater community connection through enhanced accessibility and building repurposing to provide a beneficial end use. The Social Impact Assessment undertaken for the Project (Appendix 11 of the EIS) identified that the majority of the Singleton Community saw substantial community value being retained or enhanced through the relocation options proposed. Accordingly, while the PMP would necessarily result in Ravensworth Homestead being relocated from its current location and a loss of some of its heritage values, the Project includes substantial mitigation measures that would also retain a significant amount of this heritage value (particularly in the case of the Ravensworth Farm option) and also result in overall improvement in the community value of the homestead through its relocation and beneficial use options.

The difference between the benefits assessed for Options 6 and 7 and the PMP provide a means of quantifying the potential value of Ravensworth Homestead (and its associated heritage values) to the State if it is left in situ. As noted in **Section 3.2.2**, these alternate options are not considered to be technically and/or financially viable. As a result, not proceeding with the PMP due to its potential impacts on the heritage values of Ravensworth Homestead come at an opportunity cost to the State of $1.12 billion in NPV terms ($2.65 billion in undiscounted terms).

4.0 Clarifications of MineCraft Report

There are a number of statements made in the MineCraft Report that require clarification in regard to accuracy or relevance. These issues are identified and clarified in **Attachment 3**.

5.0 Conclusion

A range of mine plan options were prepared by Glencore and considered in the EIS, in the context of significant geological, environmental and social constraints, and included various options that leave the Ravensworth Homestead in-situ. MineCraft were engaged by DPIE to provide an analysis of these options and as shown below, MineCraft concluded that the selection of the Preferred Mine Plan (PMP) shown in the EIS is justified:

"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 (Preferred Mine Plan) footprint are justified albeit the constraints could have been grouped differently into Northern, Southern and Ravensworth Homestead constraints."

In general, the findings of the MineCraft Report support the conclusions in the Mine Planning Options Report and the overall findings in the EIS (see in particular Section 8.1 of the EIS) in that the PMP, as proposed, is considered to provide the best balance between mine planning, economic, environmental and social outcomes.

MineCraft also suggested the consideration of an alternative scenario with a mining offset of 200 to 300 m from the homestead. In order to illustrate the concept of mining to the east of the homestead, MineCraft provided an overlay of the existing Glendell Pit in this location. This conceptualisation of mining in this area is misleading as the geological conditions for the existing Glendell Pit mining area are not directly comparable to the overlay area. The options of mining around the homestead with an offset of 100 m, 200 or 300 m have inherent risks from blasting and geotechnical stability concerns. Narrowing of the mine in order to mine around the homestead, and the resulting shallower mining depth with reduced recovery of coal, results in these options being economically unviable. Further, the homestead would be required to remain vacant for the life of the mine, and the post mining outlook and setting of the homestead under these 'mine around' options would be greatly altered, diminishing some of the heritage values and post mining uses of the homestead.

The option of standing off the homestead 500 m was also considered in the EIS (Appendix 1, Option 7). Similar to the PMP, this option is subject to high mining ratios in the first eight to ten years of mining coupled with high capital expenditure on infrastructure and replacement mining equipment. This mine plan option materially restricts the mining footprint and sterilises almost 60% of the PMP total resource making it unviable. As such Glencore do not consider Option 7 to be feasible due to it being difficult to achieve a suitable return on the upfront capital investment required. As this mine plan option is not considered to be economically feasible, this option represents a $0 NPV to the State of NSW.

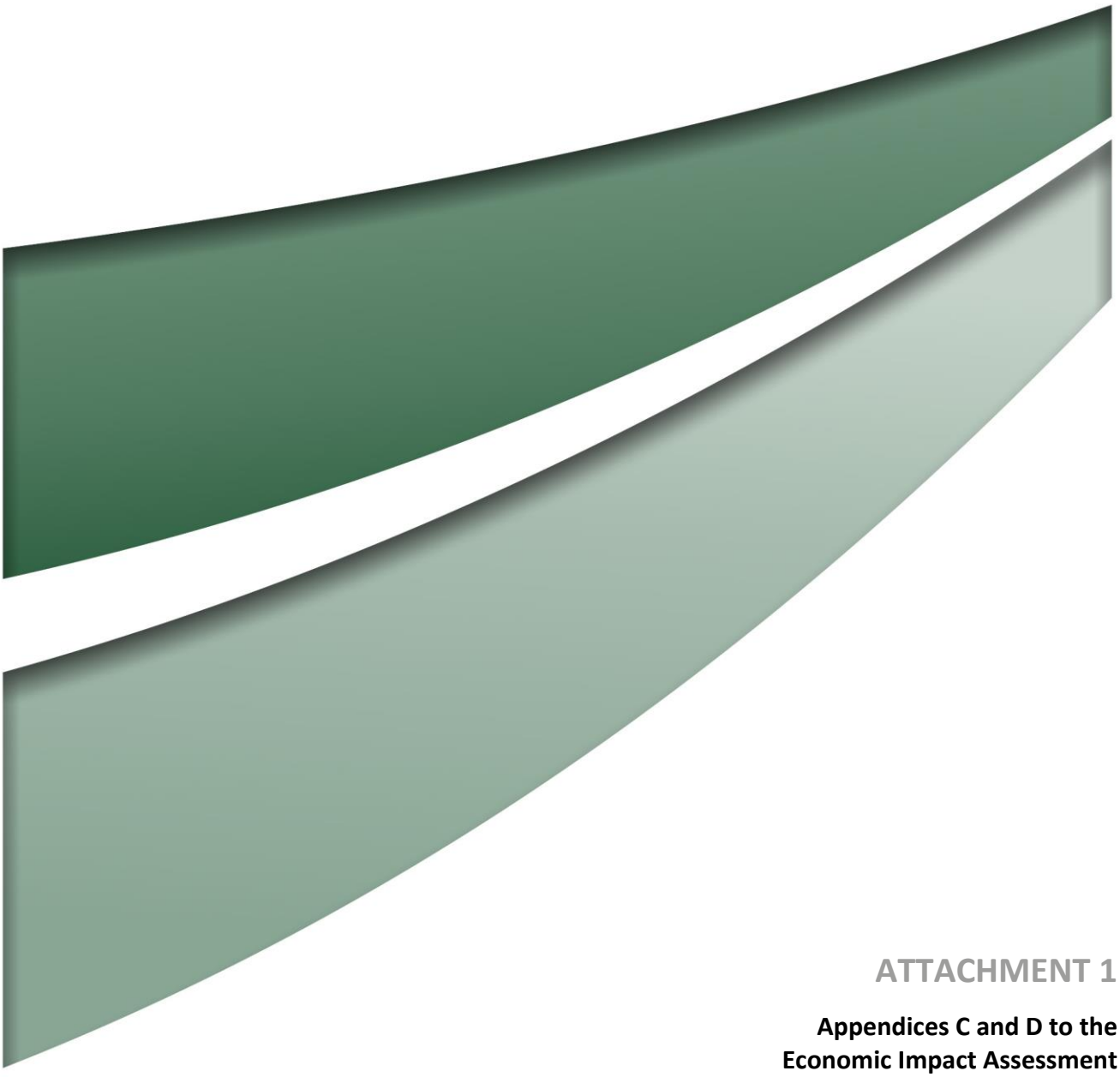
MineCraft also recommended additional consideration of refinements to ancillary aspects of the Project including establishing the MIA further to the south, an alternate alignment for Hebden Road, and backfilling some existing mining areas. These suggestions have been considered, and the responses are summarised below:

- MIA southern location – this option is subject to a range of practical and environmental constraints which increase capital and operational costs and complicate rehabilitation of the operation. The potential advantages of a southern MIA location do not outweigh the disadvantages.

- Alternate Hebden Road alignment – this option is proposed by MineCraft to reduce the impacts of road closures due to blasting, however those impacts were assessed in the EIS and found to be minor and manageable. This alternative alignment would be prohibitively costly due to requiring additional bridges over Bowmans Creek and the Main Northern Rail Line. This alternative is also subject to a number of environmental, land use and tenure constraints.

- Backfilling existing mine voids – the West Pit is already required to be filled, capped and rehabilitated under the Mount Owen consent, so there is no advantage in the option proposed by MineCraft. The BNP void is an integral part of the GRAWTS that provides long term operational flexibility, based on current approvals and operational requirements, and it is therefore not considered reasonable and feasible to backfill with overburden material as suggested by MineCraft.

Glencore seeks approval of the full PMP in order to secure the economic viability of the Project. While the PMP requires the relocation of the Ravensworth Homestead, significant heritage values will be realised as a result of the proposed archaeological site investigation and salvage program which will improve the already comprehensive knowledge of the use of the site. This archaeological investigation program would not proceed in the absence of the Project. Further, both relocation options identified will enable greater community connection through enhanced accessibility and building repurposing to provide a beneficial end use. Not proceeding with the Project due to its potential impacts on the heritage values of Ravensworth Homestead come at an opportunity cost to the State of $1.12 billion in NPV terms ($2.65 billion in undiscounted terms) and the loss of the potentially significant community benefits realised through the relocation of the homestead.



ATTACHMENT 1

Appendices C and D to the Economic Impact Assessment (Addendum to EY (2019) Economic Impact Assessment)

Economic impact assessment of the Glendell Continued Operations Project

Glendell Tenements Pty Limited

30 March 2021

Building a better working world

Release notice

Ernst & Young ("EY") was engaged on the instructions of Umwelt (Australia) Pty Ltd ("Client") to perform an economic impact assessment in relation to the proposed Glendell Continued Operations Project ("Project"), in accordance with the engagement agreement dated 29 August 2018, including the General Terms and Conditions ("the Engagement Agreement").

Pursuant to the terms of the Engagement Agreement, the report was issued on 29 October 2019 (the Main Report). However, we were recently instructed to undertake additional analysis on certain aspects of the Main Report. The outcome of the additional analysis is included in this Appendix dated 30 March 2021 (Appendix C and D to the Main Report). The Main Report and this Appendix C and Appendix D are hereinafter collectively referred to as the "Report". The results of Ernst & Young's work, including the assumptions and qualifications made in preparing the Report, are set out in the Report. The Report should be read in its entirety including the transmittal letter, the applicable scope of the work and any limitations. A reference to the Report includes any part of the Report. No further work has been undertaken by Ernst & Young since the date of the Report to update it. The readers must read this Appendix C and Appendix D in conjunction with the Main Report.

Ernst & Young has prepared the Report for the benefit of the Client and has considered only the interests of the Client. Ernst & Young has not been engaged to act, and has not acted, as advisor to any other party. Accordingly, Ernst & Young makes no representations as to the appropriateness, accuracy or completeness of the Report for any other party's purposes.

No reliance may be placed upon the Report or any of its contents by any party other than the Department ("Third Parties"). Any Third Party receiving a copy of the Report must make and rely on their own enquiries in relation to the issues to which the Report relates, the contents of the Report and all matters arising from or relating to or in any way connected with the Report or its contents.

Ernst & Young disclaims all responsibility to any Third Parties for any loss or liability that the Third Parties may suffer or incur arising from or relating to or in any way connected with the contents of the Report, the provision of the Report to the Third Parties or the reliance upon the Report by the Third Parties.

No claim or demand or any actions or proceedings may be brought against Ernst & Young arising from or connected with the contents of the Report or the provision of the Report to the Third Parties. Ernst & Young will be released and forever discharged from any such claims, demands, actions or proceedings.

Ernst & Young have consented to the Report being published electronically on the Client's website for informational purposes only. Ernst & Young have not consented to distribution or disclosure beyond this. The material contained in the Report, including the Ernst & Young logo, is copyright. The copyright in the material contained in the Report itself, excluding Ernst & Young logo, vests in the Client. The Report, including the Ernst & Young logo, cannot be altered without prior written permission from Ernst & Young.

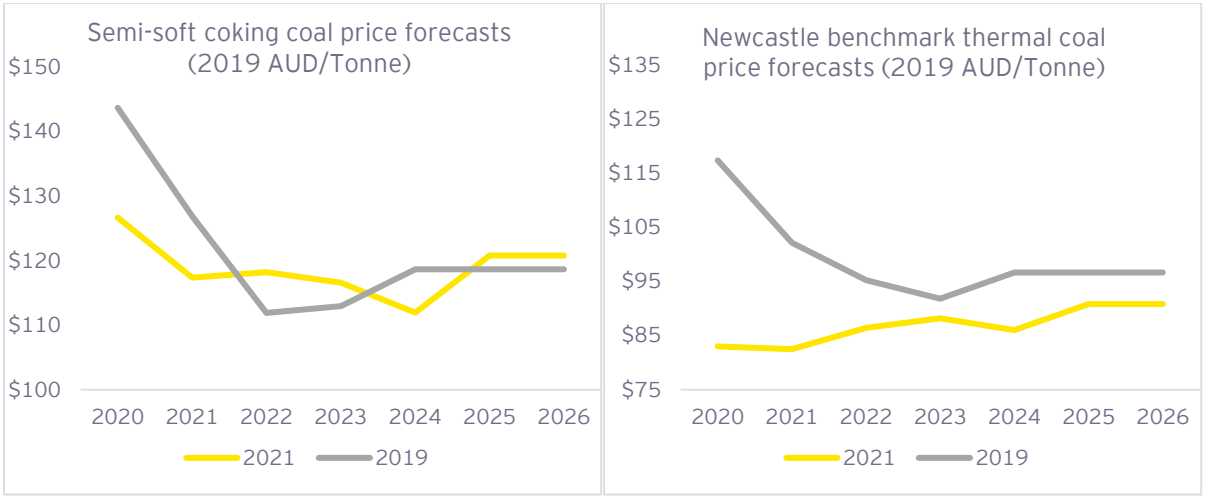
Ernst & Young's liability is limited by a scheme approved under Professional Standards Legislation.

Appendix C Coal price assumptions

Over the course of 2020, the global coal market has been impacted by the COVID-19 pandemic, resulting in changes in current and forecast coal prices. As such, the impact of recent changes in coal price forecasts on the net benefits of the Glendell Continued Operations Project to the State of NSW was assessed. No other changes in input assumptions were measured or tested in Appendix C and D, as outlined here. These Appendices are additional to the analysis undertaken in the *Economic impact assessment of the Glendell Continued Operations Project*, which was finalised on 29 October 2019 (Report).

The analysis of changes in coal price assumptions uses information from KPMG published Coal Price and FX consensus forecasts for December 2020/January 2021, updating the estimates of coal prices from the previous assessment. At the time of writing, these are the most recent KPMG forecasts available. The Report used information from KPMG published forecasts for June/ July 2019 to estimate the coal price assumptions. Figure C.1 below demonstrates the short-term changes in prices used for the economic analysis. On average, over the life of the Project (from 2021 onwards), the thermal coal price declined from $96.6 AUD per tonne in 2019 to $90.1 AUD per tonne today. However, this impact is partially offset by an increasing average price of semi soft coking coal from $118.5 AUD per tonne to $120.2 AUD per tonne over the lifetime of the project.

Figure C.1: Glendell Project, output prices, real 2019 Australian dollars, 2019 to 2025



Source: EY estimates based on, KPMG published Coal Price and FX consensus forecasts June/ July 2019 and September/ October 2020

KPMG publishes *Coal Price and FX consensus forecasts* in nominal US dollars to 2025. The semi-soft coking coal and thermal coal price forecasts are converted to nominal Australian dollars. The conversion is completed using the exchange rate forecasts from the KPMG report. From this report, the median exchange rate forecast varies marginally between $0.75 and $0.76 US dollars per AUD to 2025 and is fixed long term at $0.75 US dollars per AUD, which is similar to that used in 2019. In 2019, the exchange rate forecast ranged between $0.75 and $0.78 US dollars per AUD until 2023 and was fixed long term at $0.75 US dollars per AUD (as per the 2021 forecast). All nominal coal price forecasts for 2020 are converted into real 2019 figures using the August 2020 RBA consumer price index forecast, which indicates a slight weakening in inflation is expected over the 2020 – 2023 period, after which, the same long term inflation forecast of 2.5% per annum is used.

From 2025 and onward, we assume the coal prices and exchange rate remain at the published long-term rates.

In 2019, and consistent with the Guidelines, a systematic sensitivity analysis of the estimated net benefits was undertaken. In isolation, the estimated net benefit of the Project is most sensitive to

the coal price assumptions, but even assuming coal prices are 15 per cent lower than under the central case assumptions the potential net benefits are estimated at $1,054.5 million in NPV terms.

The currently forecast change in coal prices in December 2020/January 2021 is within the 15 per cent lower limit that was tested, and therefore the potential net benefits of the project remain within the central case and low coal price sensitivity used in the Report. Appendix D demonstrates the impact of recent coal price and exchange rate assumptions on the net benefits of the Project.

Appendix D Estimates of economic benefits

The impact of the change in coal price forecasts only (i.e. no other assumptions were adjusted) on the benefits and costs related to the Project, and as discussed in Appendix C, are shown here. Based on the 2020 coal price forecasts, the Project is estimated to provide a net benefit to NSW of $1,121.3 million in net present value (NPV)[1] terms (or $2,654.9 million in undiscounted terms), which is $28.6 million lower than the estimate found in the 2019 Report.

The estimated net benefit is comprised of $369.4 million (previously $398.0 million) and $754.3 million (which is unchanged) in potential direct and indirect benefits respectively. Incremental indirect costs of the Project remain unchanged at $2.4 million in NPV terms.

Table D.1: Central case – estimated potential direct and indirect benefits of the Project ($ million^) in 2019 and 2021.

Benefits	2019 NPV*	2021 NPV*
Direct benefits		
Net producer surplus attributed to NSW	-	-
Royalties, payroll tax and Council rates	333.3	319.5
Company income tax apportioned to NSW	64.7	49.9
Total direct benefits	398.0	369.4
Indirect benefits		
Net economic benefit to landholders	-	-
Net economic benefit to NSW workers	468.0	468.0
Net economic benefit to NSW suppliers	286.3	286.3
Total indirect benefits	754.3	754.3

*Source: EY estimated based on information from various sources. ^ Real 2019 Australian dollars. * NPV in 2019 Australian dollars based on a 7 per cent real discount rate.*

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

- Total corporate taxes of $155.8 million (previously $202.1 million) in NPV terms for Australia, of which $49.9 million (previously $64.7 million) is attributed to NSW.
- $319.5 million (previously $333.3 million) in other government revenue for NSW in NPV terms, the largest component of this being royalties of $282.4 million (previously $296.1 million), and net payroll taxes of $37.2 million remain unchanged.

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 and remains unchanged on the new coal price forecasts.

[1] All NPV figures reported are in 2019 Australian dollars based on a 7 per cent real discount rate (unless otherwise stated), as required by the Guidelines.

Table D.2: Central case - Project payments to State government ($ million^) in 2019 and 2020

Corporations tax paid to NSW	2019 NPV*	2021 NPV*
Coal sales revenue	3,737.7	3,595.4
Total Royalties paid	296.1	282.4[2]
Payroll tax	37.2	37.2
Council rates and land tax	-	-
Total Payments	333.3	319.5

*Source: EY estimates based on information provided by Glencore. ^ Real 2019 Australian dollars. * NPV in 2019 Australian dollars based on a 7 per cent real discount rate.*

The LEA considers the costs and benefits of the Project on residents of the Lower Hunter region of NSW. The analysis shows an estimated potential net benefit of $446.7 million to the region in NPV terms. This is driven largely by benefits to local workers and local suppliers and remains unchanged under updated coal price forecasts.

[2] In undiscounted terms, $679.7 million is estimated to be paid in royalties

EY | Assurance | Tax | Strategy and Transactions | Consulting

About EY

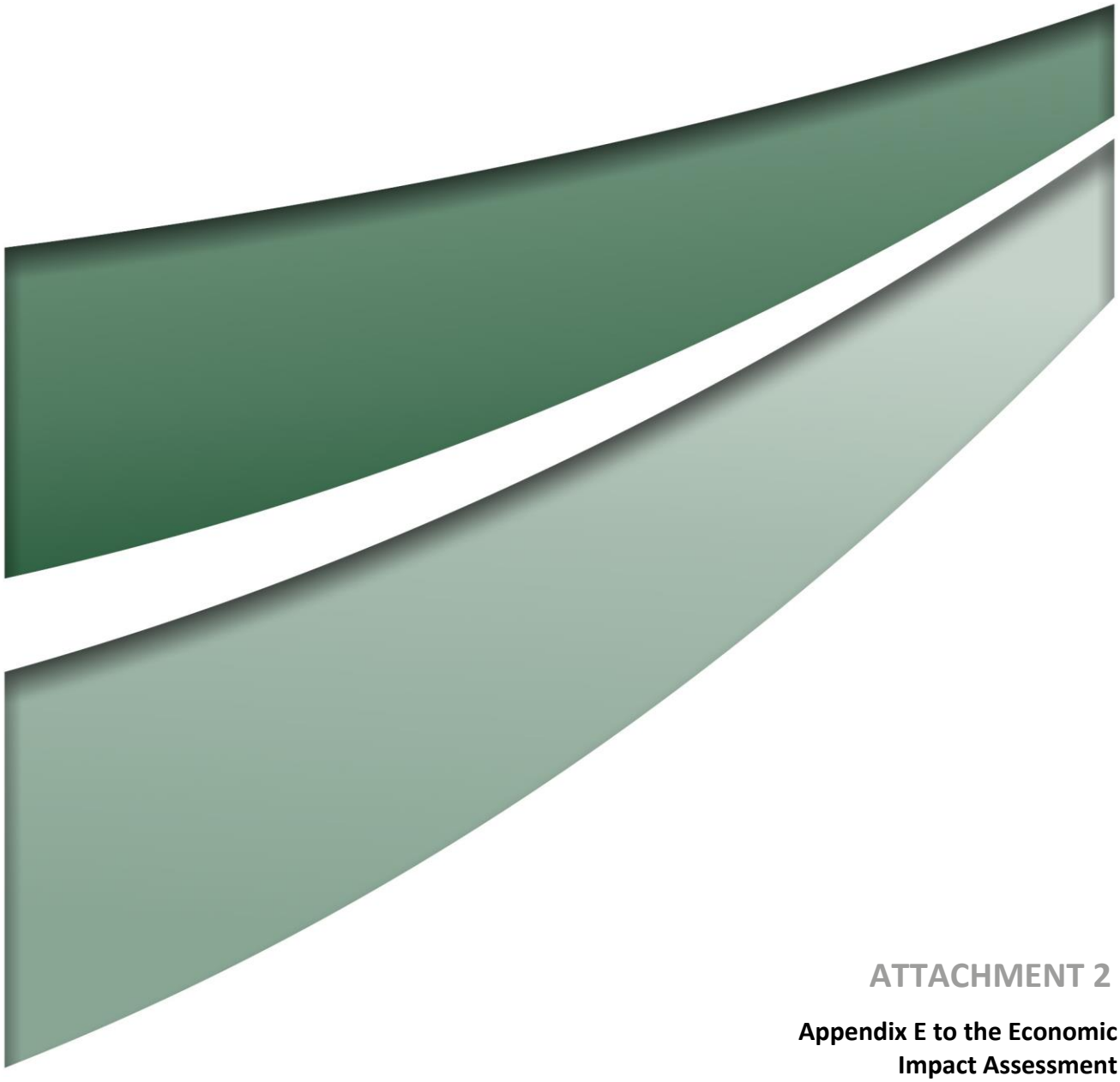
EY is a global leader in assurance, tax, strategy, transaction and consulting services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. Information about how EY collects and uses personal data and a description of the rights individuals have under data protection legislation is available via ey.com/privacy. For more information about our organization, please visit ey.com.

In line with EY's commitment to minimize its impact on the environment, this document has been printed on paper with a high recycled content.

Our report may be relied upon by Umwelt (Australia) Pty Ltd for the purpose of outlining the net economic impact of the Project to NSW only pursuant to the terms of our engagement letter dated 29 August 2018. We disclaim all responsibility to any other party for any loss or liability that the other party may suffer or incur arising from or relating to or in any way connected with the contents of our report, the provision of our report to the other party or the reliance upon our report by the other party.

ey.com



ATTACHMENT 2

Appendix E to the Economic Impact Assessment (Addendum to EY (2019) Economic Impact Assessment)

Economic impact assessment of the Glendell Continued Operations Project

Glendell Tenements Pty Limited

29 July 2021

Building a better working world

Release notice

Ernst & Young ("EY") was engaged on the instructions of Umwelt (Australia) Pty Ltd ("Client") to perform an economic impact assessment in relation to the proposed Glendell Continued Operations Project ("Project"), in accordance with the engagement agreement dated 29 August 2018, including the General Terms and Conditions ("the Engagement Agreement").

Pursuant to the terms of the Engagement Agreement, the report was issued on 29 October 2019 (the Main Report). However, we were recently instructed to undertake additional analysis on certain aspects of the Main Report. The outcome of the additional analysis is included in this Appendix dated 29 July 2021 (Appendix E to the Main Report). The Main Report and this Appendix E are hereinafter collectively referred to as the "Report". The results of Ernst & Young's work, including the assumptions and qualifications made in preparing the Report, are set out in the Report. The Report should be read in its entirety including the transmittal letter, the applicable scope of the work and any limitations. A reference to the Report includes any part of the Report. No further work has been undertaken by Ernst & Young since the date of the Report to update it. The readers must read this Appendix E in conjunction with the Main Report.

Ernst & Young has prepared the Report for the benefit of the Client and has considered only the interests of the Client. Ernst & Young has not been engaged to act, and has not acted, as advisor to any other party. Accordingly, Ernst & Young makes no representations as to the appropriateness, accuracy or completeness of the Report for any other party's purposes.

No reliance may be placed upon the Report or any of its contents by any party other than the Department ("Third Parties"). Any Third Party receiving a copy of the Report must make and rely on their own enquiries in relation to the issues to which the Report relates, the contents of the Report and all matters arising from or relating to or in any way connected with the Report or its contents.

Ernst & Young disclaims all responsibility to any Third Parties for any loss or liability that the Third Parties may suffer or incur arising from or relating to or in any way connected with the contents of the Report, the provision of the Report to the Third Parties or the reliance upon the Report by the Third Parties.

No claim or demand or any actions or proceedings may be brought against Ernst & Young arising from or connected with the contents of the Report or the provision of the Report to the Third Parties. Ernst & Young will be released and forever discharged from any such claims, demands, actions or proceedings.

Ernst & Young have consented to the Report being published electronically on the Client's website for informational purposes only. Ernst & Young have not consented to distribution or disclosure beyond this. The material contained in the Report, including the Ernst & Young logo, is copyright. The copyright in the material contained in the Report itself, excluding Ernst & Young logo, vests in the Client. The Report, including the Ernst & Young logo, cannot be altered without prior written permission from Ernst & Young.

Ernst & Young's liability is limited by a scheme approved under Professional Standards Legislation.

Appendix E Alternative mining plans

In this Appendix E, the potential economic benefits to the State of two alternative mining plans for the continued operations of the Glendell mine are considered, named the:

- "100m Homestead Mine Around" case[1] (Option 6)
- "500m Homestead Standoff" case[2] (Option 7).

The outputs are shown here to compare the projected benefits to the State of these alternative scenarios relative to the Project Case. Consistent with the Report on the Project Case, the key information provided in this annex focuses on:

- Key input assumptions
- Key financial metrics
- Economic benefits to NSW
- Economic benefits to Australia

The benefits realised by either option would be dependent on these cases proceeding and, in this regard, it is noted that Glendell has identified that Option 6 (the 100m Homestead Mine Around case) is not feasible on technical grounds, while Option 7 (the 500m Homestead Standoff case) has been identified as not being financially viable, as part of their Mine Planning Options Report[3].

This Appendix does not consider the technical or financial viability to Glendell of either Option 6 or Option 7 however, by not proceeding with either option, the estimated benefits to the State of NSW relative to the base case would be zero.

In this Appendix, the Project Case remains the same as used in the economic impact assessment of the Glendell Continued Operations Project, which was finalised on 29 October 2019 (*Economic impact assessment of the Glendell Continued Operations Project*).

1.1 Key input assumptions

The impact of the changes in the life of mine, capital and operational expenditure, coal output and total employment have been assessed for these two alternative mine plans and compared to the Project Case. Table E.1 below outlines the key assumptions that were utilised in addition to the updated coal price assumptions that were contained in Appendices C and D to the Main Report[4]. No other changes in input assumptions were measured or tested in this Appendix. This is additional to the analysis undertaken in the Economic Impact Assessment with the analysis of the Project Case being the same as presented in Appendix D.

[1] Option 6 in the Mine Planning Options Report (Glencore Coal Assets Australia, 2019)

[2] Option 7 in the Mine Planning Options Report (Glencore Coal Assets Australia, 2019)

[3] Glencore Coal Assets Australia, 2019, Mine Planning Options Report

[4] Appendices C and D use coal price information from the KPMG Coal Price and FX consensus forecasts for December 2020/January 2021.

Table E.1: Comparison of key assumptions

	Project Case	100m Homestead Mine Around	500m Homestead Standoff
Life of Mine (Years)	24	22	11
Total ROM Coal (Mt)	135.2	89.0	56.8
Saleable Coal (Mt)	86.1	56.2	35.3
Total saleable semi-soft coking coal (Mt)	20.1	12.1	6.9
Total saleable thermal coal (Mt)	66.1	44.0	28.4
Average Saleable Mt/Year	3.80	2.78	3.09
Proportion of Saleable Coal to ROM Coal (%)	63.7	63.1	62.1
Average Employment over life of Mine (individuals)	411	333	347
Average Operational Expenditure/product tonne ($)	69.4	77.5	71.6
Total Capital Expenditure ($ million)	870	613	499

Source: EY analysis, based on information provided by Glendell

The alternative scenarios are estimated to reduce the life of mine by 2 years and 13 years in the 100m Homestead Mine Around case and 500m Homestead Standoff case, respectively. The alternative mine plans are estimated to employ 333 and 347 individuals on average over the life of mine in comparison to the 411 workers currently estimated to be employed in the Project Case.

In net terms, Glencore advises that the production schedule will generate 86.1 Mt of saleable coal in the Project Case, with output falling to 56.2 Mt and 35.3 Mt in the 100m Homestead Mine Around and 500m Homestead Standoff cases, respectively. Overall, it is expected that the Project Case will produce around 3.8 Mt of saleable coal per year, the 100m Homestead Mine Around project is expected to produce around 2.8 Mt and the 500m Homestead Standoff project is expected to produce 3.1Mt of saleable coal per year. The Project Case is expected to produce the highest proportion of saleable coal to run of mine (ROM) coal, producing an estimated 63.7 per cent of saleable coal from a total ROM coal of 135.2Mt.

The total capital expenditure during the life of the project (which includes both expansionary and sustaining capital expenditure) is estimated to be $870 million, $613 million, and $499 million in real terms, for the Project Case, 100m Homestead Mine Around and 500m Homestead Standoff scenarios. For the 100m Homestead Mine Around case, the average operational expenditure per product tonne is estimated to be the highest, at around $77/product tonne produced. The expected operating costs for the 500m Homestead Standoff are estimated to be higher than the Project Case, at around $72/product tonne produced.

1.2 Key revenue and profitability metrics

Table E.2 outlines the financial assumptions used in the economic analysis of the Project Case and two alternate mining scenarios. Based on the updated coal price forecasts and output estimates (as outlined in Appendices C and D), revenue is expected to range from $3.6 billion in the Project Case to $2 billion in the 500m Homestead Standoff case in real NPV terms[5]. Profits are expected to range from $504.8 million in the Project Case down to $189 million in the 100m Mine Around case, in real NPV terms. The lower profits in the 100m Homestead Mine Around case are driven by increased operating costs in the latter half of the life of the mine's operations associated with mining occurring in close proximity to the Homestead. Regarding the profitability of the 500m

[5] All NPV figures are in 2019 Australian Dollars based in a 7 per cent real discount rate (unless otherwise stated)

Homestead Standoff case, the lowered profitability is driven by the shorter expected life of the mine and slightly higher operating costs.

Based on the output and coal price forecast assumptions used, it is expected that the project will generate $282m in royalties in the Project Case, in real NPV terms, falling to $208.8m and $155.6m in royalties in real NPV terms under the 100m Homestead Mine Around and 500m Homestead Standoff cases.

Table E.2: Revenue and profitability ($ million^)

	Project Case	100m Homestead Mine Around	500m Homestead Standoff
Revenue	$3,595.4	$2,657.6	$2,069.3
Operating Costs	$2,818.6	$2,251.9	$1,605.2
Royalties	$282.4	$208.8	$155.6
Sustaining Capital	$339.1	$282.5	$235.7
Expansion Capital	$176.3	$123.5	$117.8
Total Capital	$515.3	$406.0	$353.5
Depreciation	$272.0	$216.6	$132.8
Taxes	$155.8	$56.7	$99.4
Profit	$504.8	$189.0	$331.3

Source: EY analysis, based on information provided by Glendell. ^NPV in 2019 Australian dollars based on a real 7 per cent discount rate

1.3 Economic benefits to NSW

Table E.3 displays the total direct and indirect benefits and costs for the Project Case and two alternate mining scenarios. Overall, the Project Case provides a substantially larger economic benefit to NSW of $1,121 million, compared to $871 million and $656 million for the 100m Homestead mine around and 500m Homestead standoff scenarios respectively.

The net producer surplus attributable to NSW is assumed to be zero in all cases, as Glencore is 100 per cent foreign owned. Overall, the Project Case will deliver significantly higher benefits to the State than the other two scenarios. The Project Case will also generate indirect benefits for the state of NSW that are significantly higher than the indirect benefits from the other two cases considered.

Assuming 100 percent of employees are sourced from NSW, the net worker benefits for the Project Case, the 100m Homestead Mine Around case and 500m Homestead Standoff Case were calculated to be $468 million, $384.3 million, and $285.9 million respectively in NPV terms.

The net economic benefits to suppliers are predicted to amount to $286.3 million, $231.3 million, and $161.6 million in real NPV terms for the Project Case and alternate mining scenarios. Under the assumption that around 81 per cent of the inputs to the mine are sourced from NSW-based suppliers, which is kept consistent across the Project Case and two alternate scenarios, a predicted total indirect economic benefit of $754.3 million, $615.6 million and $447.5 million in real NPV terms for the Project Case and the two alternative mining plans is estimated.

Table E.3: Estimated total benefits for Project Case and two alternate mine plan scenarios ($ million^) in 2021 for the state of NSW

Benefits	Project Case*	100m Homestead Mine Around*	500m Homestead Standoff*
Direct Benefits			
1. Net producer surplus attributed to NSW	$0.0	$0.0	$0.0
2. Royalties, payroll tax and Council rates	$319.5	$239.3	$178.3
3. Company income tax apportioned to NSW	$49.9	$18.1	$31.8
Total direct benefits	$369.4	$257.4	$210.1
Indirect Benefits			
1. Net economic benefit to landholders	$0.0	$0.0	$0.0
2. Net economic benefit to NSW workers	$468.0	$384.3	$285.9
3. Net economic benefit to NSW suppliers	$286.3	$231.3	$161.6
Total indirect benefits	$754.30	$615.60	$447.50
Indirect (Environmental Costs)	$2.4	$2.3	$1.7
Total economic benefits	$1,121.3	$870.8	$655.9

*Source: EY analysis, based on information provided by Glendell. ^Real 2019 Australian Dollars. * NPV in 2019 Australian dollars based on a 7 per cent discount rate.*

1.4 Economic benefits to Australia

Table E.4 estimates the total additional benefits that would accrue to Australia for the Project Case and the two alternative mining scenarios. For Australia, the estimated total income tax apportioned to Australia is estimated to be $155.8 million, $56.7 million, and $99.4 million for the Project Case, 100m Homestead Mine Around case and the 500m Homestead Standoff case, respectively. This, together with royalties, payroll taxes and council rates result in total direct benefits attributable to Australia at $475.3 million, $296 million, and $277.7 million.

Regarding the indirect benefits, we assume that 100 per cent of workers are sourced from NSW, as such the worker benefits for all three cases are the same as for the analysis of predicted benefits to NSW. For the supplier benefits, we assume that broader inputs would be 100 per cent sourced from Australia (of which 81 per cent is attributable to NSW), which results in a predicted $353.5 million, $285.6 million, and $199.5 million indirect benefits accruing to suppliers.

The economic benefits to Australia for the Project Case and two alternate mining scenarios are estimated to total around $1,294.4 million (Project Case), $963.7 million (100m Homestead mine around), and $761.4 million (500m Homestead standoff).

Table E.4: Estimated total benefits of various mine plan scenarios ($ million^) in 2021 for Australia

Benefits	Project Case*	100m Homestead Mine Around*	500m Homestead Standoff*
Direct Benefits			
Net producer surplus attributed to NSW	$0.0	$0.0	$0.0
Royalties, payroll tax and Council rates	$319.5	$239.3	$178.3
Company income tax apportioned to Australia	$155.8	$56.7	$99.4
Total direct benefits	$475.3	$296.0	$277.7
Indirect Benefits			
Net economic benefit to landholders	$0.0	$0.0	$0.0
Net economic benefit to all workers	$468.0	$384.3	$285.9
Net economic benefit to Australian suppliers	$353.5	$285.6	$199.5
Total indirect benefits	$821.5	$669.9	$485.4
Indirect (Environmental costs)	$2.4	$2.3	$1.7
Total economic benefits	$1,294.4	$963.7	$761.4

*Source: EY analysis, based on information provided by Glendell. ^Real 2019 Australian Dollars. * NPV in 2019 Australian dollars based on a 7 per cent discount rate.*

EY | Building a better working world

EY exists to build a better working world, helping to create long-term value for clients, people and society and build trust in the capital markets.

Enabled by data and technology, diverse EY teams in over 150 countries provide trust through assurance and help clients grow, transform and operate.

Working across assurance, consulting, law, strategy, tax and transactions, EY teams ask better questions to find new answers for the complex issues facing our world today.

In line with EY's commitment to minimize its impact on the environment, this document has been printed on paper with a high recycled content.

Our report may be relied upon by Umwelt (Australia) Pty Ltd for the purpose of outlining the net economic impact of the Project to NSW only pursuant to the terms of our engagement letter dated 29 August 2018. We disclaim all responsibility to any other party for any loss or liability that the other party may suffer or incur arising from or relating to or in any way connected with the contents of our report, the provision of our report to the other party or the reliance upon our report by the other party.

ey.com

ATTACHMENT 3

Clarifications of MineCraft Report

Table A2.1 – Further Clarifications identified by Glencore in relation to the MineCraft Report

MineCraft Report Section No.	MineCraft Report Reference	Glencore Comment
Executive Summary	*'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.'*	This is incorrect. Mining has already turned to the north and the Preferred Mine Plan (PMP) would continue to the north through Swamp Creek. This comment also applies to Section 15.
Executive Summary	Table 1 Mine Constraint/Option Indicative NPVs for Comparative Use Only	Reference to 'Lemington UG' is incorrect. This should be a reference to Liddell UG. This also applies to Table 5.5 in Section 5.9 and Table 15.1 in Section 15.
2	*'Realigning Swamp Creek'*	The Preferred Mine Plan (PMP) is not proposing to realign Swamp Creek. A small section of Swamp Creek situated at the downstream end of the Mount Owen Complex water management system will be mined through by the Glendell Pit Extension. The Groundwater Impact Assessment (Appendix 16 of the EIS) concluded that the Project did not exceed the minimal harm criteria under the NSW Aquifer Interference Policy
2	*'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 summary of issues raised in this paragraph is not a reflection of submissions received on the Project. Public submissions on the relocation of the homestead were not a common issue raised, with primary concern coming from the Heritage Council in this regard.
2.1	Figure 2.2 PMP Area Showing Surrounding Mining Operations	The list of previous and current mining does not include Mount Owen North Pit. Figure 2.2 should also be updated to include a larger extent which includes Mount Owen Mine.
4.2	*'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, for example, creek realignment recommendations'*	Glencore cooperated in the Request for Information process by MineCraft. Topography data was available if required, however it was not requested.
5.2	*'SSCC represents 20% of product coal currently.'*	This is incorrect. The SSCC split is not assumed to be 20%. The actual SSCC split is approximately 23% and is based on seam coal quality.
5.4	*'To the East, Bowmans Creek and Swamp Creek flats are Biophysical Strategic Agricultural Land (BSAL)'*	This should be 'To the West, Bowmans Creek and Swamp Creek flats.....'

MineCraft Report Section No.	MineCraft Report Reference	Glencore Comment
5.5	*'It is not clear if this cap will have any impact upon the proposed Glendell Project'*	This is incorrect. Sections 7.13.4 and 8.2 of the EIS state that the Project fits within Glencore's committed production cap.
5.7	*'The current Glendell mining operation mines to the floor of the Arties seam'*	This is incorrect. Figure 3.8 of the EIS shows the target stratigraphy for the existing Glendell mining operation which mines to, and inclusive of, the Barrett seam.
5.9	Comparative NPV	As mentioned above, the NPV estimates presented by MineCraft appear to be based on discounted cashflows and present the value of the mine plan options and PMP to Glencore, and are not comparable to the Ernst and Young Cost Benefit Analysis provided in the Economic Assessment prepared as part of the EIS (Appendix 30), which quantifies the value of the PMP to the State. As currently worded, there is potential for a reader to confuse the NPV calculations of benefits to the State in the Ernst and Young Economic Assessment and the discussion around NPV in this section (NPV estimates by MineCraft are analogous to the net producer surplus provided in the Ernst and Young Economic Assessment).
5.9	Table 5.6 Surface Constraint or Option Impact on Recovered ROM coal	Numbers provided in Table 5.6 are not correct. For example, Option 4 should be PMP – 35Mt. Refer to Appendix 1 of the EIS.
8.3	*'This option potentially takes mining further North than the Maximum Resource Option 2, however it is also practically constrained by the Liddell Underground Workings'*	This is not correct. The Hunter Valley Dyke Constrained Option (Option 3) has the pit constrained at its northern end by the Hunter Valley Dyke. The Maximum Resource Option 2 would take mining beyond the Hunter Valley Dyke and towards/through Bowmans Creek.
13.3	*'Glencore's Integra underground mine, to the South-East, commenced as Glennies Creek Mine in 2002 extracting the Liddell seam and is now mining the Hebden/Barrett seams.'*	This is incorrect. Integra underground mine is still currently mining the Liddell seam.
Figure 14.3	*Glendell Pit and PMP Cross Section A-D*	Note that the spoil profile shown on these sections is indicative only and does not reflect the proposed final landform.
14.5	*'the Bayswater North pit currently being used by Glencore as a water storage.'*	This is incorrect. Bayswater North Pit is currently an active mining area, not a water storage. The Bayswater North Pit is approved for use as a water and/or tailings storage facility under the existing Mount Owen Consent.

umwelt
Environmental & Social Consultants

Newcastle | Perth | Canberra | Brisbane | Sydney | Orange

T| 1300 793 267 E| info@umwelt.com.au www.umwelt.com.au