Report by the Mining & Petroleum Gateway Panel to accompany a Conditional Gateway Certificate for the West Muswellbrook Project

May 2015

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Executive Summary

The Mining & Petroleum Gateway Panel (the Panel) has determined an Application for a Gateway Certificate by IDEMITSU Muswellbrook Coal Company Limited (the Proponent) for its proposed West Muswellbrook Project situated in the Muswellbrook and Upper Hunter local government areas of New South Wales. The Gateway Panel finds that the Application does not meet all of the Relevant Criteria and consequently issues the Applicant with a Conditional Gateway Certificate. This report provides both the opinions and the reasoning of the Gateway Panel.

The Muswellbrook Coal Company Limited (MCC), the Proponent, is a wholly owned subsidiary of Idemitsu Australia Resources. This proposal is for an open-cut coal mine within a portion of Assessment Lease (AL) 19 located approximately 12 Km northwest of the town of Muswellbrook. The proposal crosses the Muswellbrook and Upper Hunter Local Government Areas. The Project Assessment Area (PAA) is 5,621 ha consisting of 3945 ha Project Disturbance Area (PDA) including a final void area of 324 ha as identified by the Proponent within the Project Boundary Area. The Project is located on land subject to the Upper Hunter Strategic Regional Land Use Plan.

The Project area contains 206 ha of NSW government designated potential Biologically Strategic Agricultural Land (BSAL). Detailed soil surveys and chemical analysis conducted by the Proponent have determined that the majority of these designated potential BSAL areas did not satisfy all BSAL criteria and therefore cannot be verified. However, the Proponent survey did identify an area of 204.6 ha of land that satisfied all BSAL criteria. The Proponent has identified 68.4 ha of this verified BSAL that lies within the mine disturbance area, which is expected to be lost in the mining operations. There are no stated plans to re-construct this BSAL in the rehabilitated landscape. The remaining 136.2 ha of verified BSAL that lies outside the mine disturbance area will not be impacted to the same extent.

The Project area contains 1,124.9 ha and 50.4 ha of Government-verified potential equine and viticulture Critical Industry Cluster (CIC) land, respectively. The Proponent has claimed that no CIC commercial activity is currently occurring on this land. Outside the planned Project area the closest vineyard is stated to be 2.8 km away and the closest horse stud to be 3.8 km away from the Project area boundary. As part of its Conditional Gateway Certificate the Gateway Panel requires clarification on whether these distances represent distance of Project boundary from the centre of these CIC operations or their nearest boundary to the Project.

The Gateway Panel considers the proposed mine development will have a significant impact on agricultural productivity through the permanent loss of 68.4 ha BSAL and 754 ha of government mapped CIC land within the mine disturbance zone. Although this mapped CIC land within in the PAA is not currently being used for commercial CIC activity, its permanent loss would potentially limit further development of CICs in this area.

The Proponent has identified that the Project will cause Level 2 impacts (as defined in the Aquifer Interference Policy (AIP)) to the alluvial aquifers associated with three drainage lines within the Project area (Sandy Creek North, Coal Creek and Sandy Creek South). This is an unacceptable level of impact to a highly productive aquifer without mitigation measures being undertaken. The Proponent has outlined

‘land acquisition and a make good strategy’ as their mitigation measures, but has not provided any details. Importantly, the Proponent does not agree with the government classification of these shallow alluvial water sources as a ‘highly’ productive aquifers and will undertake further studies to confirm or otherwise this classification.

If the further studies confirm the alluvium of Coal Creek is highly productive as defined in the AIP, then its removal by mining is a concern to the Gateway Panel.

The potential impact on the highly productive aquifers located outside of the PAA (Quaternary Hunter Alluvium and Triassic Narrabeen Group sandstones) is not likely to be significant. A cumulative impact study by the Proponent of all mines in the vicinity of MMC was not carried out and is required to confirm this conclusion.

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1 Purpose and Methodology

In accordance with the *Section 17H (2)(b), Part 4AA Mining and Petroleum Development on Strategic Agricultural Land, State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (the Mining SEPP), this report states the Mining & Petroleum Gateway Panel's (the Gateway Panel) reasons for the opinions expressed in the Conditional Gateway Certificate issued on this day to the West Muswellbrook Coal Company.

1.1 Terms of Reference

The Mining SEPP provides the Gateway Panel's Terms of Reference.

The Gateway Panel must determine an Application and issue a Gateway Certificate in accordance with *Section 17H* of the Mining SEPP.

Section 17H(4) provides the following *relevant criteria* for the Gateway Panel's determination and recommendations.

> *(a) In relation to biophysical strategic agricultural land- that the proposed development will not significantly reduce the agricultural productivity of any biophysical strategic agricultural land, based on a consideration of the following:*
>
> > *(i) any impacts on the land through surface area disturbance and subsidence,*
> >
> > *(ii) any impacts on soil fertility, effective rooting depth or soil drainage,*
> >
> > *(iii) increases in land surface micro-relief, soil salinity, rock outcrop, slope and surface rockiness or significant changes to soil pH,*
> >
> > *(iv) any impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy),*
> >
> > *(v) any fragmentation of agricultural land uses,*
> >
> > *(vi) any reduction in the area of biophysical strategic agricultural land,*
>
> *(b) in relation to critical industry cluster land-that the proposed development will not have a significant impact on the relevant critical industry based on a consideration of the following:*
>
> > (*i) any impacts on the land through surface area disturbance and subsidence,*
> >
> > *(ii) reduced access to, or impacts on, water resources and agricultural resources,*
> >
> > *(iii) reduced access to support services and infrastructure,*
> >
> > *(iv) reduced access to transport routes,*
> >
> > *(v) the loss of scenic and landscape values.*

Section 17H(5) states that in *forming an opinion as to whether a proposed development meets the relevant criteria, the Gateway Panel is to have regard to:*

(a) the duration of any impact referred to in subclause (4), and

(b) any proposed avoidance, mitigation, offset or rehabilitation measures in respect of any such impact.

1.2 Methodology

1.2.1 The Gateway Panel

The Gateway Panel that evaluated this Gateway Application is as follows:

Professor Snow Barlow, FTSE, FAIAST – Gateway Panel Chairperson – agricultural discipline

George Gates, PSM – Gateway Panel Member – hydrogeology discipline

Alice Clark, FAusIMM CP – Gateway Panel Member – geoscience and mining discipline

1.2.2 Gateway Panel meetings

The Gateway Panel has held the following meetings in relation to this Application.

- February 17th, Newcastle, following a ground tour of the Hunter Valley and its industries and an aerial tour of the West Muswellbrook Mine Project area
- May 14th –Phone conference
- May 19th – Phone Conference
- May 22th –Phone Conference

1.2.3 Meetings with the Applicant or third parties

The Gateway Panel did not hold any formal or information discussions directly related to this Gateway Application with either the Applicant or any stakeholder who may have an interest in this Project. The Gateway Panel (8 members minus A/Prof Brett Whelan) participated in a field trip to familiarise members of the Gateway Panel with the broad strategic agricultural land issues in the Hunter Valley on 16th and 17th February 2015. This included an aerial overview of the West Muswellbrook Mine Project area.

1.2.4 Referrals

In accordance with Section 17G of the Mining SEPP, this Gateway Application was referred to the Commonwealth Independent Expert Scientific Committee (IESC) and the NSW Minister for Primary Industries.

On March 11th 2015, the Gateway Panel received advice from the Commonwealth Independent Expert Scientific Committee (IESC, 2014).

The Gateway Panel received advice from the Minister for Natural Resources, Lands and Water on May 12th 2015

1.2.5 Document review

The Gateway Panel has reviewed the following documentation provided by the applicant as their initial submission for the Gateway Panel to assess.

West Muswellbrook Project Gateway Application Supporting Document, December 2014. *Pursuant to Part 4AA of the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)* 2007 by Idemitsu, La Terra Pty Ltd and Muswellbrook Coal Company Limited, for the Muswellbrook Coal Company. Document Number IDEM0523.1 Version D by Mr Terry Short.

West Muswellbrook Project Gateway Application Supporting Document Appendix A, *Detailed description of agricultural land uses, production systems and productivities for properties affected by the Project Assessment Area*. By Idemitsu, La Terra Pty Ltd and Muswellbrook Coal Company Limited, for the Muswellbrook Coal Company.

West Muswellbrook Project Gateway Application Supporting Document Appendix B, December 2014 *West Muswellbrook Project Biophysical Strategic Agricultural Land (BSAL) Site Verification report.* By SLR Consulting Australia Pty Ltd for the Muswellbrook Coal Company.

West Muswellbrook Project Gateway Application Supporting Document Appendix C, November 2014. *Report on West Muswellbrook Project Gateway Application Highly Productive Aquifer Groundwater Impact Assessment*, Project No. G1676. Prepared for Muswellbrook Coal Company Limited.

West Muswellbrook Project Gateway Application – Newspaper notification Advertisements, November 2014, Muswellbrook Coal Company Limited.

West Muswellbrook Project Gateway Application – Schedule of Lands, undated, Muswellbrook Coal Company Limited.

The Gateway Panel has reviewed the following publications relevant to this Gateway Application.

DP&I, 2012. *Upper Hunter Strategic Land Use Plan.* State of New South Wales through the Department of Planning & Infrastructure, September 2012.

DP&I, 2013. *Strategic Regional Land Use Policy, Guideline for Gateway Applicants, Fact Sheet, (the Guideline).* State of New South Wales through the Department of Planning & Infrastructure, September 2013.

DPI, 2013. *Agricultural Impact Statement technical notes: A companion to the Agricultural Impact Statement guideline.* State of New South Wales through the Department of Primary Industries, April 2013.

MPGP, 2013. *Mining and Petroleum Gateway Panel report to the Director General Dept. Planning and Infrastructure, Dec. 2013.*

NSW Agriculture, 2002. *Agricultural Land Classification.* Agfact AC.25.

NSW Government, 2007 *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, Part 4AA Mining and Petroleum Development on Strategic Agricultural Land (the Mining SEPP)*. NSW Legislation, State of New South Wales, 2007.

OEH, 2012. *The Land and Soil Capability Assessment Scheme: Second Approximation.* State of New South Wales through the Office of Environment & Heritage.

OEH and OAS&FS, 2013. *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land (BSAL).* State of New South Wales through the Office of Environment & Heritage and the Office of Agricultural Sustainability & Food Security.

With specific regard to its assessment of BSAL verification and potential mining and groundwater-related impacts, the Gateway Panel has, through its own enquiry, also considered the following publications.

Barnett B, Townley LR, Post V, Evans RE, Hunt RJ, Peeters L, Richardson S, Werner AD, Knapton A and Boronkay A, 2012. *Australian Groundwater Modelling Guidelines*, National Water Commission report, June 2012.

DTIRIS, 2012. *NSW Aquifer Interference Policy, NSW Government policy for the licensing and assessment of aquifer interference activities.* Department of Primary Industries, NSW Office of Water (NOW), State of New South Wales through Department of Trade and Investment, Regional Infrastructure and Services.

Kellett J K, Williams B G and Ward J K, 1987 *Hydrochemistry of the Upper Hunter River Valley*, N S W. BMR Rec. 1987/23

NSW Government, 2009. *Water sharing Plan for the Hunter Unregulated and Alluvial Water Sources*. Commenced 1-8-2009.

1.2.6 Field inspection

The Gateway Panel did not conduct an on ground field inspection for the assessment of this Gateway Application. However, Gateway Panel members undertook an aerial inspection of the proposed mine site on February 10, 2015.

2 The Proposed Project

Muswellbrook Coal Company (MCC) (the Proponent) is a wholly owned subsidiary of Idemitsu Australia Resources Pty Limited (Idemitsu). The proposed West Muswellbrook Project consists of the development of a multi-seam open-cut coal mining operation within a portion of Assessment Lease (AL) 19 **(Figure 1).**

The Gateway Panel notes that:

- The Project is located on land subject to the Upper Hunter Strategic Regional Land Use Plan (DP&I, 2012a).
- The Project Assessment Area (PAA) consists of 5,621 ha, the open-cut mine will occupy approximately 2,823.7 ha; a further 169.8 ha will be utilized for mining infrastructure, and 609.6 ha for out-of-pit emplacement. A single final 342.4 ha void will remain at cessation of mining.
- The proposed mining method is open-cut terrace mining of multiple coal seams to potentially extract up to 15 Mtpa of saleable coal for 30 years.
- Construction of surface water management structures to divert rainfall runoff away from the mining operation to avoid contamination and, protect the mine from inundation during rainfall events.
- Primary water demands are related to the Coal Handling and Preparation Plant (CHPP). CHPP infrastructure will be required to process 20 Mtpa of Run of Mine (RoM) coal. Water will be drawn

under license from the Hunter River and potentially piped from Muswellbrook Coal Mine to a storage facility on the PAA.

- The Proponent intends to acquire affected lands.
- Coal Creek will be diverted around the southern pit.
- Progressive rehabilitation is to be undertaken throughout the Life of Mine (LoM).
- The out-of-pit emplacement area will be contoured to ensure stability and re-vegetated. Rehabilitation of in-pit waste rock will continue through LoM.
- Prior to mine closure highwalls and lowwalls will be stabilised.

The Proponent of the Project is required to make a Gateway Application because:

- The proposed Project is a development specified in Clause 5 (Mining) of Schedule 1 to *State Environmental Planning Policy (State and Regional Development) 2011* for which a mining lease under the *Mining Act 1992* is required to be issued to enable the development to be carried out because there is no current mining lease in relation to the proposed development; and

- The proposed Project is on land shown on Map 6 Strategic Regional Land Use Plan, Upper Hunter (under the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*) as Strategic Agricultural Land (SAL) comprising Biophysical Strategic Agricultural Land (BSAL) and Critical Industry Clusters (CICs) equine and viticulture.

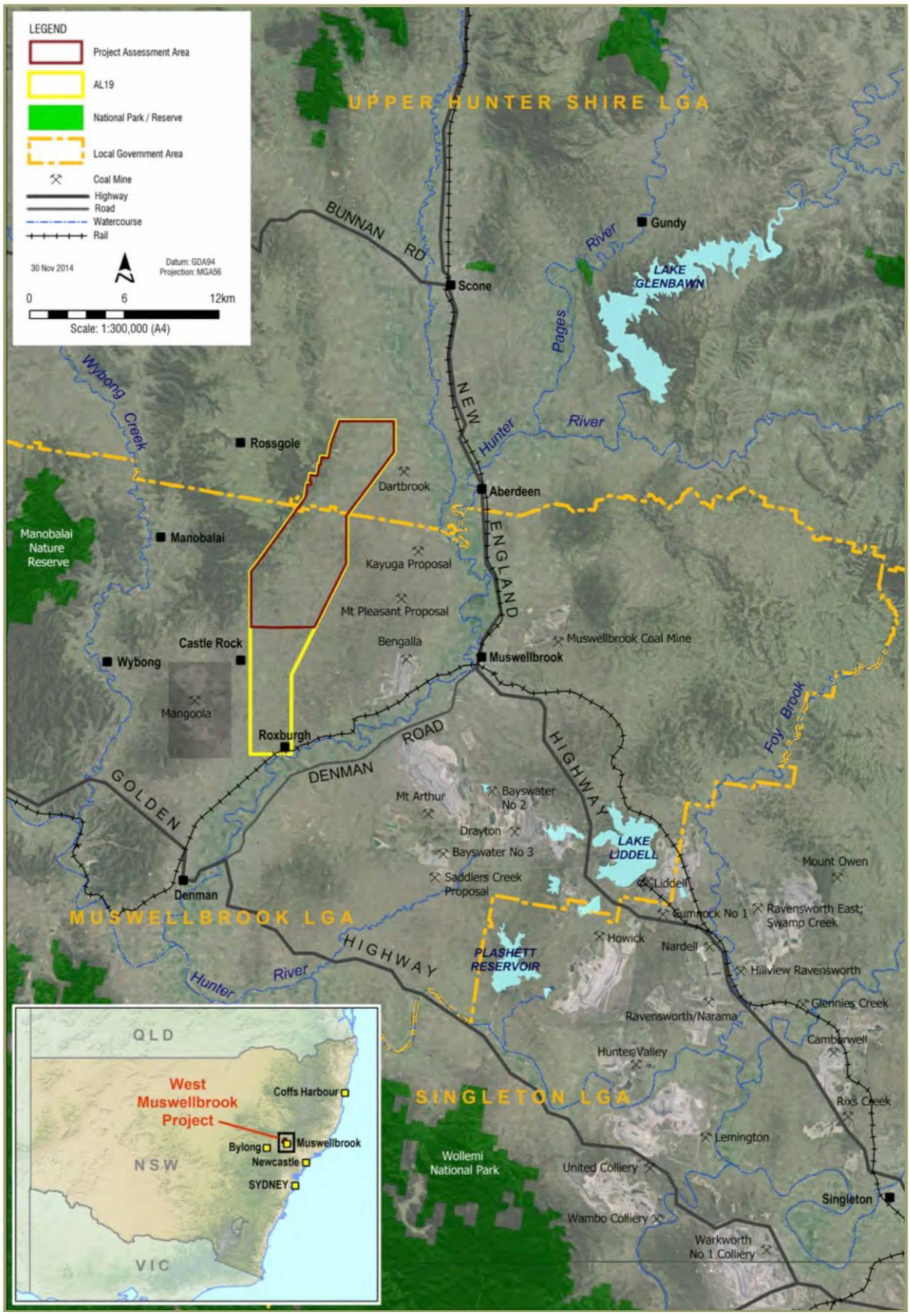

Figure 1: Project location within the region

(Adapted from West Muswellbrook Project Gateway Application Supporting Document, December 2014)

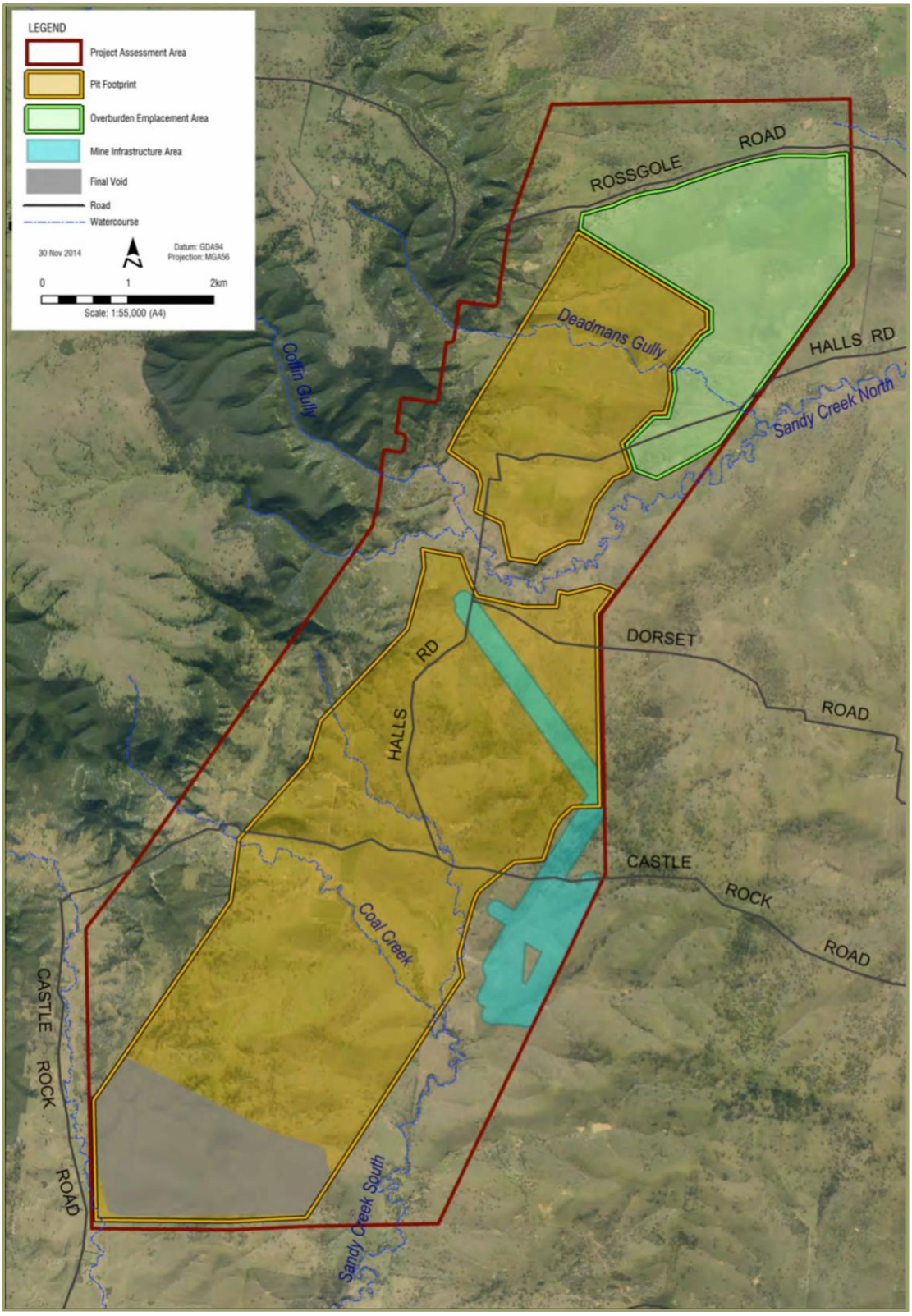

Figure 2: Project EL PAA location and mine layout

(Adapted from West Muswellbrook Project Gateway Application Supporting Document, December 2014)

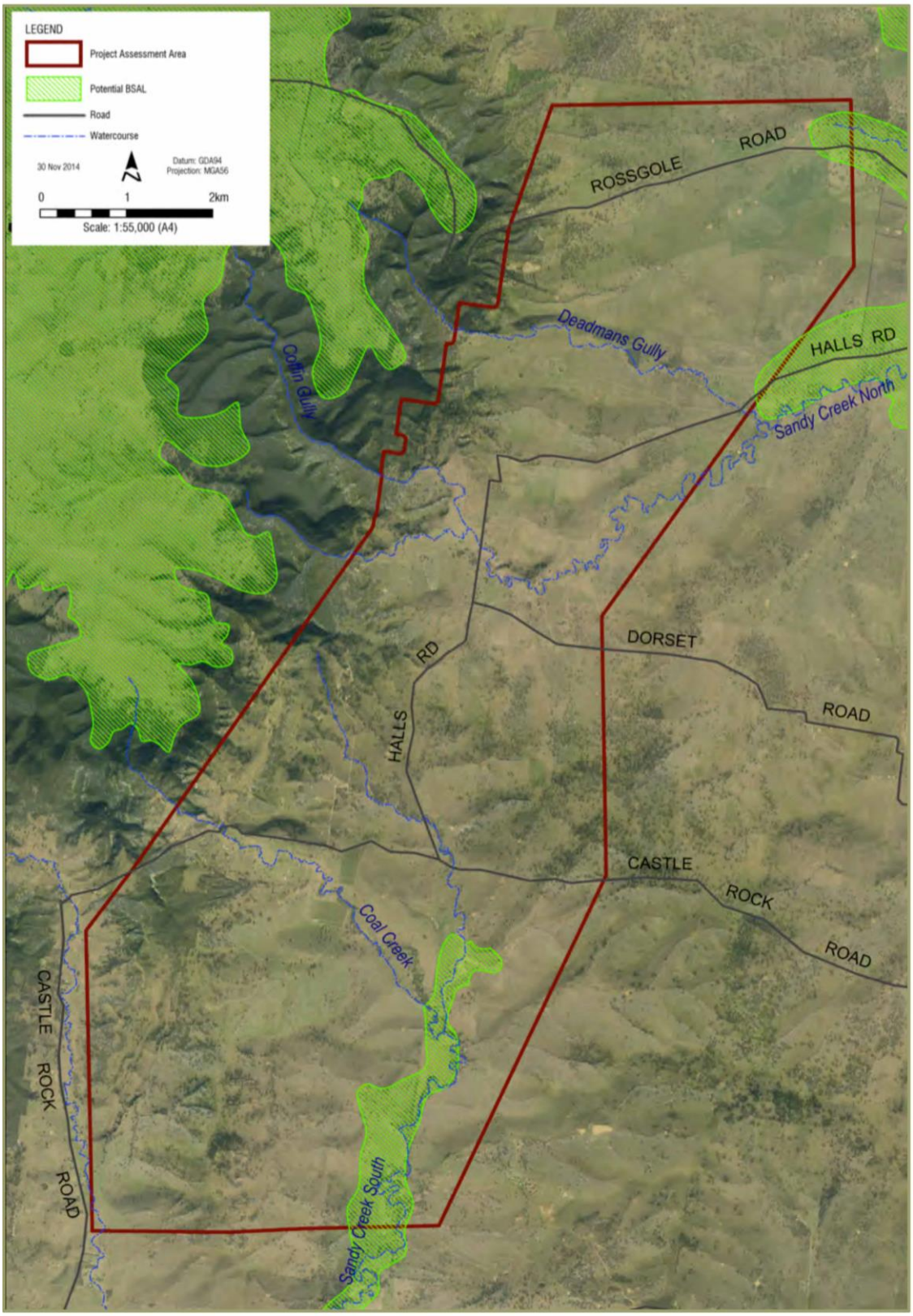

Figure 3: Geographical location of land designated by the NSW Government as potentially BSAL using the 1991 survey

(Adapted from West Muswellbrook Project Gateway Application Supporting Document, December 2014)

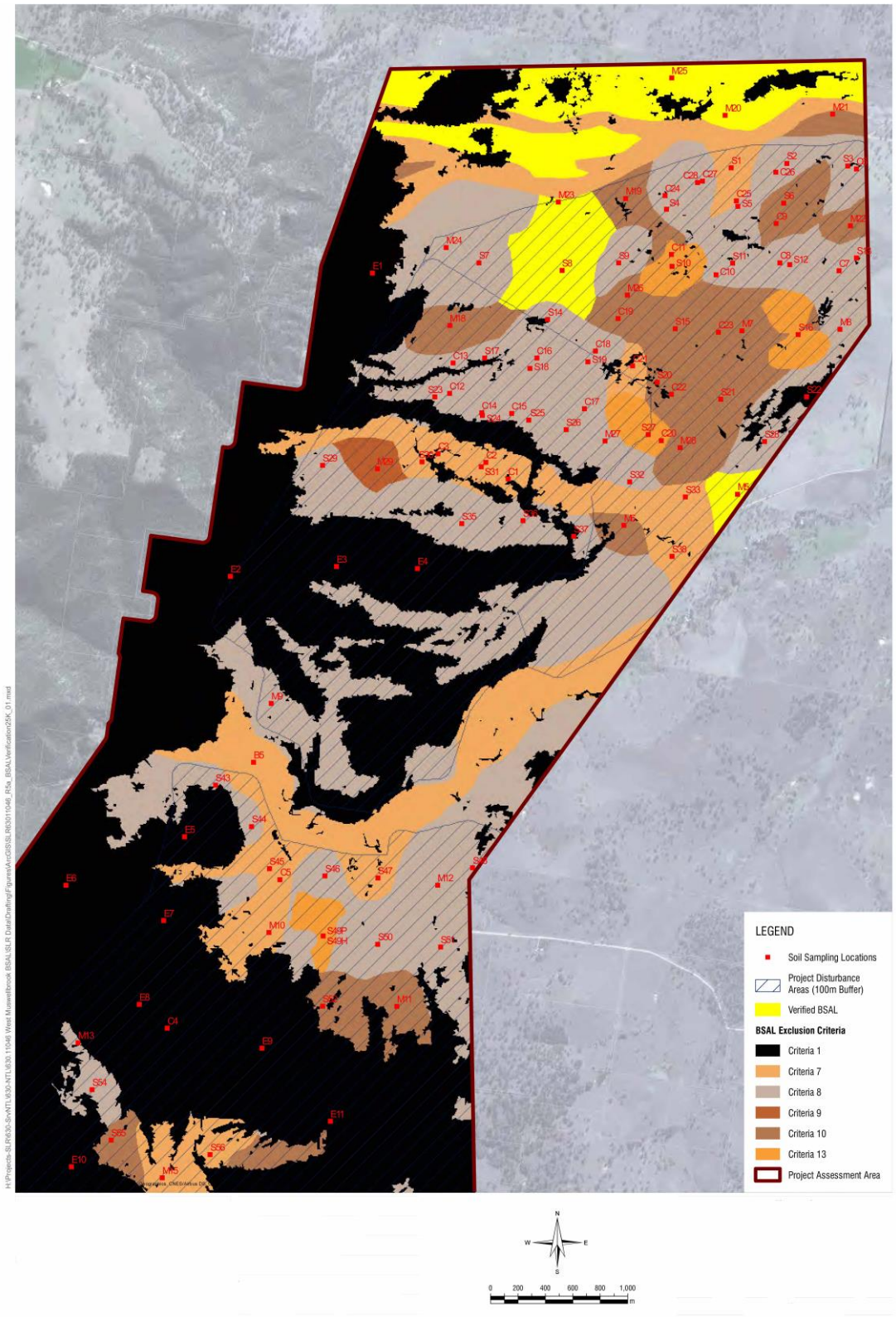

Figure 4a: BSAL verified by the Proponent through on ground soil survey and analysis in the Northern section of the PAA.

Scale 1:25000 (Adapted from West Muswellbrook Project Gateway Application Supporting Document Appendix B, December 2014)

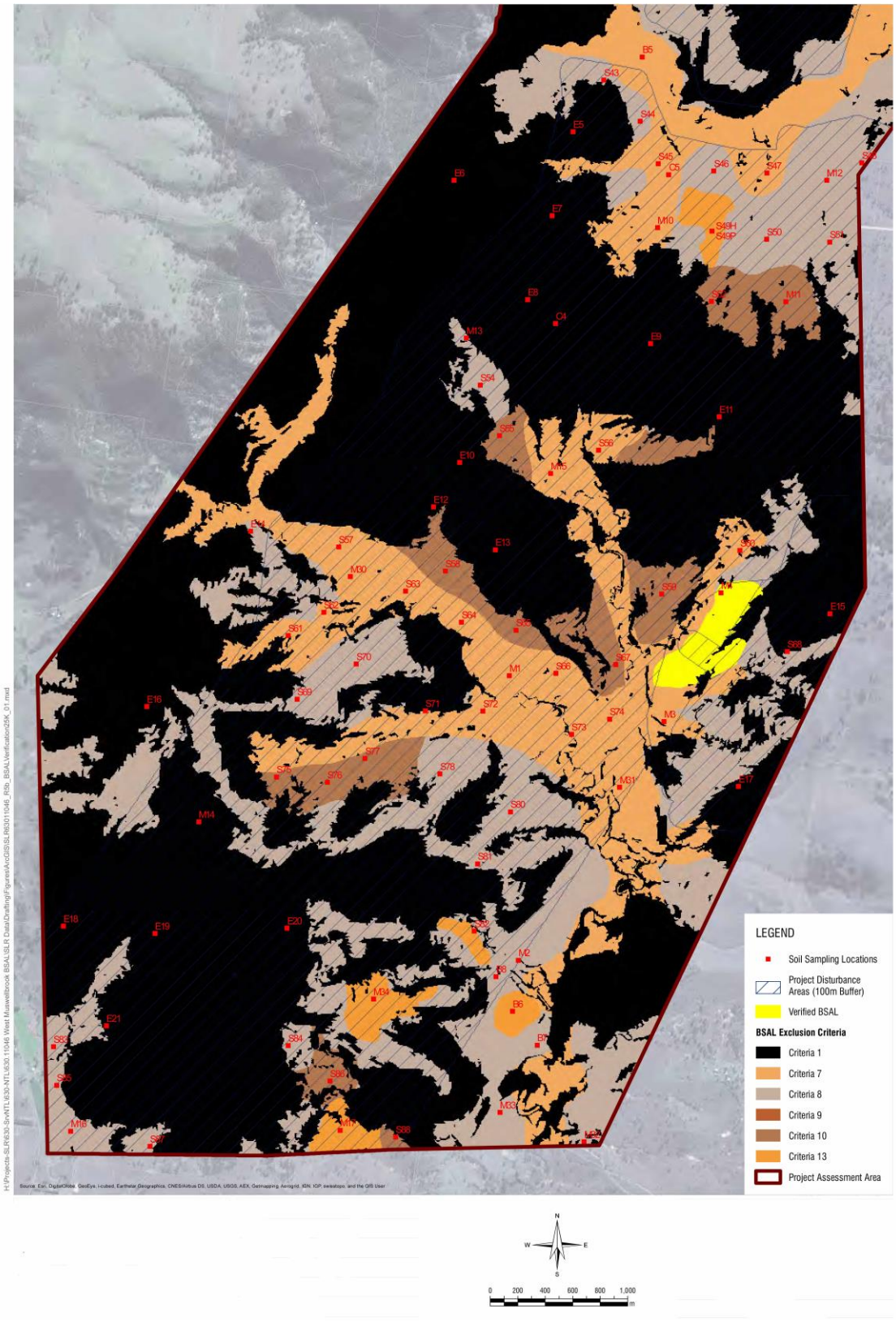

Figure 4b: BSAL verified by the Proponent through on ground soil survey and analysis Southern section of the PAA.

Scale 1:25000 (Adapted from West Muswellbrook Project Gateway Application Supporting Document Appendix B, December 2014).

3 Strategic Agricultural Land

3.1 Biophysical Strategic Agricultural Land (BSAL)

The PAA area has 206 ha of land designated and mapped by the NSW government as potential Biophysical Strategic Agricultural Land (BSAL) (Figure 3). Much of this potential BSAL lies within the proposed mine disturbance area. The Proponent has determined that much of this government mapped BSAL does not meet all the designated BSAL criteria and has proposed that this land is not BSAL. The Gateway Panel requests that the criteria used to exclude the following potential BSAL land be reviewed in terms of the following:

- The less than 20 ha extent criteria used to exclude site M34 is located on the South Eastern periphery of the PAA should be reviewed to determine whether there is contiguous BSAL land directly outside the PAA that might lead to the >20 ha criteria being satisfied.

- The chemical analysis used to determine that sites M2, M32 and M33 are not BSAL have been correctly adjusted for bulk density and saturation in the calculation of the salinity and chemical toxicity of these soils.

The Proponent through a soil survey and chemical analysis methodology has identified that the PAA contains 204.6 ha of verified BSAL (Figure 4a & Figure b) Much of this verified (136.2ha) BSAL lies in the Northern part of the Project area adjacent to Rossgole Road and is outside of the disturbance area (Figure 4a). The majority of the verified BSAL is located on Land and Soil Capability Class 2 and 3 indicating that it is capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation).

3.2 Class 2 and 3 land.

The majority of BSAL class 2 and 3 land is outside the mine disturbance area of the prosed mine. However a further 68.4 ha located within the proposed disturbance footprint and will be lost in the mining operation. This area is designated to be rehabilitated as part of the mine closure operations, but it is not clear whether it is intended to re-construct these BSAL soils as part of the rehabilitated landscape. The Gateway Panel recommends that the rehabilitation plan for any verified BSAL land removed as part of the mining operations be explicitly stated in the mine development application.

3.3 Critical Industry Cluster (CIC)

CICs are localised concentrations of interrelated productive industries based on an agricultural product that provides significant employment opportunities and contributes to the identity of the region. There are two CICs the viticulture and equine CICs in the Upper Hunter Region.

The PAA contains 1,124.9 ha and 50.4 ha of Government-verified equine CIC land and viticulture CIC land, respectively. The Proponent contends there are no substantive horse studs, vineyards, cellar doors or wine tourism enterprises currently operating within the PAA. The Gateway Panel agrees with this claim.

There are a number of substantive CICs operating in close proximity to the Project area. The Proponent has spatially mapped the proximity of these CIC enterprises. The closest vineyard is located within 2.7 km of the PAA. There are a number of horse studs within 4 km of the proposed mine operation with the closest being 3.8 km away.

The Proponent has made no assessment of the potential off site impacts of the mine on these operations in terms of noise, dust and amenity value. It is unclear whether this vineyard enterprise is a grape production enterprise only, or incorporates, winery, cellar door and/or wine tourism operations.

The Proponent does not consider these CIC enterprises will be impacted upon by mine operations. It is not clear from the application whether the stated distances between the CICs and the proposed mine have been measured from the closest boundary of these CICs or the centre of their operations. It is recommended that the basis for these measurements be clarified in any development application processes.

Within the planned Project area surface disturbances will impact 704.5 ha and 49.5 ha of Government-verified equine and viticulture CIC lands respectively. Although not quantified it is expected that this land will be permanently lost from these CICs by the development of the mine.

4 Assessment of Mining Disturbances

The Gateway process requires that the potential impact on BSAL and/or a CIC be evaluated as either:

- A **direct** mining effect whereby part or all of BSAL or a CIC is either removed, worked upon or subsided, or
- An **indirect** mining effect whereby the state of either the surface water or sub-surface water is significantly altered by mining which then has a direct impact on BSAL and/or a CIC.

4.1 Direct mining disturbances

4.1.1 Removal or working upon verified BSAL or mapped CIC land

The Project area contains 204.6 ha of verified BSAL, 1,124.9 ha of Government verified equine CIC land and 50.4 ha of Government verified viticulture CIC land (West Muswellbrook Project Gateway Application Supporting Document, December 2014).

The Project will cause significant direct impacts to verified BSAL, mapped equine CIC land and mapped viticulture CIC land within the Project Boundary as follows:

1. For verified BSAL: 68.4 ha will be permanently lost in mining operations and therefore directly impacted as a result of open cut mining activities.

2. For Government verified equine CIC land: open pit mining and associated activities will have direct and significant impact on 704.5 ha of verified equine CIC land mine. Post rehabilitation the Project will result in the permanent loss of 577 ha of verified equine CIC land.

   The Proponent refers to the “temporary” impact of 127.6 ha of verified equine CIC (included in the total of 704.5 above). However, the report provides no further mention of rehabilitation of this CIC land. It is recommended that where rehabilitation of CIC land is planned and accounted

for in totals of mining disturbance areas that further clarification and details of rehabilitation should be provided.

3. For Government verified viticulture CIC land, open pit mining activities will have direct and significant impact on 49.5 ha resulting in the permanent loss of this land.

The Proponent has not provided details of mitigation for its potential impacts on Government verified equine and viticulture land. The Proponent asserts that as these lands are not currently used for this purpose, nor have they ever been used for purposes connected with either equine or viticulture CICs. However, The Gateway Panel is not aware that current or past usage is a criteria for determining the significance of impact on NSW Government verified CIC lands.

4.1.2 Disturbance due to open cut mining

The Project will extract, by open cut mining methods, coal resources in the Upper Hunter Coal Measures of approximately 621 Mt of RoM coal over the LoM which is expected to run for up to 30 years. The mining area is described as being in the northern portion of AL 19 within the PAA for this Gateway Application.

Disturbance due to open cut mining operations will occur due to:

- Open pit mining within the Mining Area
- The establishment of mine infrastructure and access to the site.
- The establishment of CHPP infrastructure
- Waste management infrastructure

These disturbances will result in the permanent loss of 68.4 ha of verified BSAL. Further they will have significant impact on 704.5 ha of Government verified equine CIC land and 49.5 ha of Government verified viticulture. This impact will result in the permanent loss of 576.9 ha of Government verified equine and 49.5 ha of viticulture CIC lands.

4.1.2 Duration of impacts, mitigation and rehabilitation measures

The Life of Mine (LoM) for the Project is stated as up to 30 years.

The Project has selected the terrace mining method to remove, by open cut, the resource as this method purports to deliver more favourable outcomes in terms of final landforms while allowing timely rehabilitation, out-of-pit waste dump minimisation and a reduction in final void size.

The mine plan shows commencement in the northern portion of the PAA and progresses in a southerly direction with two pit areas developed. The terrace method requires a smaller initial box-cut (initial excavation to expose coal for mining) which therefore minimizes the area required for out-of-pit overburden emplacement. Additionally this method allows for progressive rehabilitation delivering areas for rehabilitation earlier in the mine schedule compared to other traditional open pit mining methods. The Proponent has provided information that the initial box-cut will have a footprint of 609.6 ha which will take 3 years to mine and will be fully rehabilitated by year 4 of the operation. From this point all excavated overburden will be placed ‘in pit’ as the mine advances south.

The application of this mining method provides evidence of the Proponents intent to minimize the duration of impacts and commence rehabilitation early in the mining process.

4.2 Indirect mining impacts

4.2.1 Impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy)

The Proponent has identified that the Project will cause Level 2 impacts (as defined in the AIP) to the alluvial aquifers associated with three drainage lines within the Project area (Sandy Creek North, Coal Creek and Sandy Creek South). This is an unacceptable level of impact to a highly productive aquifer without mitigation measures being undertaken. The Proponent has outlined 'land acquisition and a make good strategy' as their mitigation measures, but has not provided any details. Importantly, the Proponent does not agree with the government classification of these shallow alluvial water sources as a 'highly' productive aquifers and will undertake further studies to confirm or otherwise this classification.

If the further studies confirm the alluvium of Coal Creek is highly productive as defined in the AIP, then its removal by mining is a concern to the Gateway Panel.

The potential impact on the highly productive aquifers located outside of the PAA (Hunter Alluvium and Triassic Narrabeen Group sandstones) is not likely to be significant. A cumulative impact study by the Proponent of all mines in the vicinity of MMC was not carried out and is required to confirm this conclusion.

See Appendix A – Groundwater Assessment for further details on the hydrogeological assessment.

5 Gateway Panel Assessment of Impacts on Strategic Agricultural Land

The Gateway Panel has assessed and determined the potential impacts of the Project on BSAL as summarised in Table 1 and Table 2.

Table 1: Summary of Gateway Panel determination of impacts on BSAL

17H(4)(a) BSAL	Determined Impact
(i) any impacts on the land through surface area disturbance and subsidence	Significant
(ii) any impacts on soil fertility, effective rooting depth or soil drainage	Significant
(iii) increases in land surface micro-relief, soil salinity, rock outcrop, slope and surface rockiness or significant changes to soil pH,	Moderately significant
(iv) any impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy),	Significant
(v) any fragmentation of agricultural land uses,	Significant
(vi) *any reduction in the area of biophysical strategic agricultural land*.	Significant

Table 2: Summary of Gateway Panel determination of impacts on CICs

17H(4)(b) CIC	Determined Impact
(*i) any impacts on the land through surface area disturbance and subsidence*	Significant
(ii) reduced access to, or impacts on, water resources and agricultural resources	On site - significant Off site - not significant
(iii) reduced access to support services and infrastructure	Not significant
(iv) reduced access to transport routes	Not significant
(v) the loss of scenic and landscape values.	On site – significant Off site – moderately significant

5.1 Significance of the Project's potential impacts on BSAL

5.1.1 Impacts on the land through surface area disturbance and subsidence

The process of open cut mining means that all BSAL identified within the mine disturbance area will be subjected to surface area disturbance which will entail stripping of soil and landform rehabilitation following the mining procedure. The process of removal is expected to have a significant impact on the identified BSAL within this disturbance area. There are no expected subsidence impacts.

5.1.2 Impacts on soil fertility, effective rooting depth or soil drainage

The soil at the observation sites presently identified by the Proponent as meeting BSAL criteria are moderately high to highly fertile Brown Chromosols and Red and Black Vertosols. The Proponent's rehabilitation program states generally that stripped BSAL soil will be used in the reconstructed landform but its BSAL status will be lost because the horizon definition will not be maintained.

Unless the major soil layers from the above soils, especially of those of the Chromosols, are stored separately and reinstated together as a complete soil profile, the fertility and structural properties of the soils will not be maintained. It can be expected that soil fertility and effective rooting depth may be significantly reduced and infiltration and soil drainage rates significantly increased.

5.1.3 Increases in land surface micro-relief, soil salinity, rock outcrop, slope and surface rockiness or significant changes to soil pH

If reinstatement of the BSAL soil profiles removed in the mining process is attempted then the rehabilitation process should not affect the soil salinity and soil pH. The surface rockiness, number of rocky outcrops and surface slope can be expected to be within BSAL parameters. However the reinstatement process is not described by the Proponent and the Gateway Panel is unable to fully assess the significance of any impact.

5.1.4 Any Impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy)

It is considered that the water impacts of the proposed mine on the highly productive alluvial sediments (Sandy Creek North, Coal Creek, Sandy Creek South) will have a significant impact on bores/wells located in these aquifers. The mitigation measures proposed have not been set out in detail and would require more community consultation. The Proponent has not stated how the rules of the relevant water sharing plans will be implemented. In particular the Gateway Panel has concerns about how the Proponent would implement the cease to pump rule.

No work has as yet been done on-site to establish the presence and value of groundwater dependent ecosystems or whether they will be impacted by mining.

The long-term impacts on stream salinity have not been demonstrated.

See Appendix A – Groundwater Assessment for detailed hydrogeological assessment.

5.1.5 Fragmentation of agricultural land uses

In addition to the loss of BSAL land discussed below (5.1.6), the proposed Project will permanently remove 49.4 ha or more than 98% of the government verified Viticulture CIC land. It will also permanently remove 577 ha of the government verified Equine CIC land. The Gateway Panel considers that the Project will result in considerable fragmentation of agricultural land uses.

5.1.6 Reduction in the area of BSAL

The proposed mining project will result in the permanent loss of 68.4 ha of BSAL land. Although this BSAL soil will be used in rehabilitation, the proposed rehabilitation strategy acknowledges that the difficulty of successfully reconstructing the removed BSAL soils. Consequently the Project will result in the permanent loss of 68.4 ha of BSAL soils and a loss of agricultural productivity

5.2 Significance of the Project's potential impacts on CICs

The Project area contains 1,124.9 ha of Government verified equine CIC land and 50.4 ha of Government verified viticulture CIC land (West Muswellbrook Project Gateway Application Supporting Document, December 2014). The Proponent contends that there are no CIC enterprises operating within the PAA.

5.2.1 Any impacts on the land through surface area disturbance and subsidence

Notwithstanding that there are no current CIC businesses operating on this land, it is the Gateway Panel's opinion that the impacts on the verified CIC land will be significant because they will be mined as part of the open cut mining area. The land will almost certainly be lost to future CIC endeavours.

5.2.2 Reduced access to, or impacts on, water resources and agricultural resources

The Proponent has stated that the mining proposal will inevitably cause reduced access to, and impacts on, water resources and agricultural resources associated with Government verified CIC lands that are within the disturbance zone. The Gateway Panel agrees that it is unlikely that the affected land can be reinstated to the same level of productivity in a short period of time following mine closure and rehabilitation, if at all.

The Gateway Panel accepts that the core businesses of the equine and viticulture CICs outside of the PAA, in the surrounding locality, are likely to primarily rely on the Hunter River, Dart Brook and Kingdom Ponds surface water and groundwater sources, and these are not significantly affected by the Project.

5.2.3 Reduced access to support services and infrastructure

It is the Gateway Panel's opinion that any reduction of access to support services and infrastructure is not significant as there are no CIC businesses operating at present.

5.2.4 Reduced access to transport routes

It is the Gateway Panel's opinion that any reduction of access to transport routes is not significant as there are no CIC businesses operating at present.

5.2.5 the loss of scenic and landscape values

The proposed rehabilitation processes for the mine are based on previous landforms and natural landscapes using native plants. However, it is not proposed to reconstruct the soils removed in the rehabilitation process, which may restrict the redevelopment of natural ecosystems. From the details given in this application the Gateway Panel considers the potential loss of scenic and landscape values may be moderate.

6 Conditional Gateway Certificate

The Gateway Application for the West Muswellbrook Project proposes open cut coal mining within a portion of Assessment Lease (AL) 19 in the Upper Hunter Valley.

It is the opinion of the Gateway Panel that the Project:

- Would have direct and significant impacts on the agricultural productivity of verified BSAL within the PAA, as 68.4 ha will be permanently lost through mining activities;
- May have direct and significant impacts on the agricultural productivity of NSW Government mapped BSAL land but currently unverified, within the PAA which would be permanently lost through mining activities;
- Would have indirect and significant impacts on government mapped 'highly' productive alluvial aquifers, that transverse the PAA. This finding is subject to additional work by the Proponent to clarify the yield and salinity of the effected aquifers;
- Would have significant impacts on CIC lands located within the PAA through lost opportunity costs both during and after mining. Although there is no CIC businesses operating at present it is likely that these lands will be permanently lost to future equine and viticulture businesses.

Appendix A – Groundwater Assessment

Context and Background

The Gateway Panel has used the advice from both the Independent Expert Scientific Committee (IESC) and the NSW Office of Water (NOW) together with its own expertise in undertaking this assessment.

Hydrogeological Processes

The Gateway Panel considers the conceptualisation of the local and regional hydrogeology to be adequate for a Gateway application and that the processes of groundwater flow from one water source to another are plausible at a broad scale. More work is required to define the hydrogeological processes operating at a local scale. For instance little appears to be known about the effects of geological faults and volcanic intrusives on localised groundwater flow. Also a greater understanding of the connectivity between the shallow alluvium of Sandy Creek North, Coal Creek, Sandy Creek South and their associated ephemeral creeks would improve the estimates of stream flow losses that will occur if mining proceeds.

There is extensive discussion in the Gateway application about the classification of 'highly' productive aquifers on the PAA. The Proponent believes that the groundwater in the alluvium of Sandy Creek North, Sandy Creek South and Coal Creek does not meet the salinity and bore yield criteria in the Aquifer Interference Policy (AIP). Highly productive aquifers have total dissolved salts less than 1500 mg/L and are capable of yielding 5 L/s or more to a bore/well. The Gateway Panel has taken the position that there is not enough information to resolve this debate at present and has decided to accept the NSW Government maps as being correct. The collection of further data including pumping test data and additional groundwater quality data should clarify this situation. It is considered likely that during dry periods the brackish waters that seep from the Permian rocks into the shallow alluvium will dominate the water chemistry. After wet periods when creeks are flowing, recharge from this low salinity source will improve the quality of the underlying alluvial groundwater for a period of time (possibly months). The diversion of Coal Creek and removal of the associated alluvium is a concern to the Gateway Panel if its status is subsequently confirmed as a highly productive aquifer.

Groundwater Modelling

The MODFLOW-SURFACT software that was used for the groundwater flow modelling is considered appropriate to determine environmental impacts. The model satisfies the AIP requirement for a simple groundwater flow model and the calibration statistics are adequate for it to be used as a guide for water impacts and mine inflows at this Gateway stage of assessment. As pointed out by the IESC and NOW the model should be upgraded and recalibrated after improving the conceptualisation of the local groundwater flow system. A more detailed sensitivity analysis should be carried out to better define the uncertainty in the modelling. Other required improvements to the model are detailed in Table A1.

The Proponent has not modelled the cumulative impact on water resources of all mining in the surrounds of PA 19. The Gateway Panel agrees with the IESC that more work is required to determine the cumulative impacts of mining in this area.

Water Licences

The groundwater model predicts that during mining, the groundwater-take from highly productive alluvium associated with Sandy Creek North, Coal Creek and Sandy Creek South will peak at 225 ML/yr and 188 ML/yr from less productive Permian water source. These figures should be considered as initial estimates only, to be confirmed or otherwise by an upgraded groundwater flow model. It is noted in the NOW (2015) review that the Proponent has not identified the specific alluvial groundwater sources from which the Proponent will need to obtain water entitlements/licenses. MCC have indicated that they will obtain some water entitlements through the purchase of affected properties. Additional alluvial water entitlements may be purchased from the market. However no assessment has been made of the market depth to establish the availability of water that can be traded. Also no indication has been given as to how the Proponent will abide by the rules in the relevant Water Sharing Plans. The cease to pump rule which applies to both surface and groundwater users during droughts, is a point in case. The MCC already holds some volumetric entitlement in the Permian water source, and will investigate transferring this entitlement to PA 19. No strategy has been put forward to account for any water taken beyond the life of the mining operation.

Impact Assessment

The Gateway Process Guidelines require "*estimates of potential water level, quality and pressure drawdown impacts on groundwater dependent ecosystems."* The very limited work undertaken to date suggests no groundwater dependent ecosystems (GDEs) and no wetlands are present within the 1m drawdown extent in the highly productive groundwater sources. The Proponent proposes to conduct a targeted GDE assessment to confirm or otherwise this initial assessment.

McAlister and Dvoracek (2014) have identified that the Project will cause Level 2 impacts (as defined in the AIP) to the localised highly productive alluvial aquifers associated with drainage lines within the Project area. This is an unacceptable level of impact without mitigation measures being undertaken. The Proponent has outlined 'land acquisition and a make good strategy' as their mitigation measures, but has not provided any details.

There are 19 bores within the highly productive alluvium that are predicted to have drawdowns greater than 2.0 m. Twelve of these bores are situated along Coal Creek and will be removed by mining. The maximum drawdown at the seven remaining bores is predicated to between 2.0 m to 5.9 m.

Indications from the current modelling are that the Project will have no significant impact on the highly productive Triassic Sandstone to the west of the site or the Hunter Alluvial aquifer to the east of the site. The Gateway Panel believes this is plausible.

Further Work

There are some other explicit issues that have not been adequately addressed in the documentation provided. These include:

- The potential long term water quality changes (salinity) due to spoil emplacement and/or filling of the mine voids. The AIP allows an increase of no more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. The Gateway Panel requires a detailed assessment of the potential movement of salt from any out-of-pit spoil emplacement and also the pit voids, both backfilled and open.
- The skewed nature of baseline information to the alluvium. A better distribution of baseline data is required across the whole site. In particular, information is sparse for the Permian and Triassic rocks. The lack of measured data used to determine hydraulic parameters in these rocks is a concern.

Assessment against AIP Requirements

Table A1 provides the Gateway Panel's assessment against individual AIP requirements.

Table A1: Gateway Panel assessment for West Muswellbrook Project against AIP requirements

Requirement	Assessment	Recommendation
1. Estimates of all quantities of water that are likely to be taken from any water source on an annual basis during and following cessation of the activity	The water budget is preliminary. The results are from a model calibrated in steady state mode and run in transient mode. The Proponent has indicated that a more robust and detailed groundwater flow model will be built that more accurately depicts transient groundwater flow conditions.	Use a calibrated transient 3D groundwater flow model to re-calculate the volumes of water to be taken from each water source. Quantify any uncertainties in the groundwater modelling. Develop a plan for monitoring actual water take and how any changes from the predictions will be accounted for with water licences.
2. A strategy for obtaining appropriate water licenses for the maximum predicted annual take	The Proponent already holds some Permian water source groundwater entitlements and has indicated that all necessary water entitlements will be acquired through a combination of property acquisition, the trading market or from Government.	The Proponent should hold the necessary water licences before any mining is commenced.
3. Establishment of baseline groundwater conditions including groundwater depth, quality, and flow based on sampling of all existing bores in the area, any existing monitoring bores and any new monitoring bores that may be required under an authorization issues under the Mining Act 1992 or Petroleum (onshore) Act 1991	More work is required to establish baseline groundwater conditions. In particular the following is inadequately defined: • Potential effects of geological faulting and volcanic intrusions on groundwater flow; • The interaction between surface and groundwater in highly productive alluvial aquifers.	Undertake more studies to establish baseline groundwater conditions. Including: • Determining the likely effects of geological faulting and volcanic intrusions on groundwater flow. • Determining the interaction between surface water and groundwater in the NSW Government mapped highly productive alluvial aquifers.

	• Groundwater heads and hydraulic parameters for the 11 hydro-stratigraphic layers in the model.	• Ensure that sufficient water level, hydraulic parameters and water quality measurements are undertaken in all modelled layers to support and underpin a detailed groundwater flow model.
4. A strategy for complying with any water access rules applying to relevant categories of water access licences, as specified in relevant water sharing plans	Other than agreeing to hold the appropriate annual licence volumes in affected water sources the Proponent has not demonstrated how they would abide by Water Sharing Plan daily flow rules.	The Proponent should provide: • A strategy for mitigating the impacts of water losses from affected Creeks due to mining, during periods of restricted access, such as droughts.
5. Estimates of potential water level, quality or pressure drawdown impacts on nearby water users who are exercising their right to take water under a basic landholder right.	Basic landholder rights include extracting water for stock and domestic uses. A water licence is not required for this type of extraction in water sharing plan areas. Impacts are similar to 6 below.	• Same as 6 below.
6. Estimates of potential water level, quality or pressure drawdown impacts on nearby licenced water users in connected groundwater and surface water sources	Current estimates of impacts are based on a simple groundwater flow model that does not reflect all mining activities. The model gives broad results only as it is not calibrated in transient mode. The Gateway Panel recognises the limitations of the work to date and acknowledges the Proponents commitment to upgrade the model.	Using a calibrated transient 3D model re-quantify the impacts on nearby water assets (bores/wells and GDEs). This upgraded modelling and reporting should: • Capture the hydrogeological complexity of the site; • Use temporal input data; • Have distributed input parameters; • calibrate to transient water level records for current and new bores • Quantify any uncertainties in the groundwater/surface water connection through improved stage heights in the creek systems; • Undertake a parameter sensitivity analysis using a larger range for parameters to inform an uncertainty analysis; • Include climate change in the sensitivity analysis. • increase the model confidence class from level 1 to 2

		• Seek peer review of the model.
7. Estimates of potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems	Limited GDE studies have been undertaken. More work has been promised by the Proponent	Further assessment of Ecological impacts is required. See comments by IESC (2015)

8. Estimates of potential for increased saline or contaminated water inflows to aquifers and highly connected river systems	The Proponent has indicated that there will be no change in beneficial use of any aquifer or surface streams as a consequence of mining. Very little hydochemical work has been completed to determine baseline groundwater quality spatially over the site. Leachate tests are underway to establish the salinity and PH of waters passing through spoil. Results were not available for review. An estimate of the final void salinity is not available.	• Complete kinetic leachate test of spoil material and determine the risk of increased salinity to surface streams due to mining • Updated the assessment of the potential accumulation of salts in the final void. • Undertake long-term estimates of salinity increases in the final void and identify potential pathways for the transport of salts to water resources.
9. Estimates of potential to cause or enhance hydraulic connection between aquifers	Not considered to be a risk.	
10. Estimates of the potential for river bank stability, or high wall instability or failure to occur.	Insufficient detail supplied on the diversion of Coal Creek	More technical detail to be supplied on the diversion of Coal Creek.
11. Outline of the method for disposing of extracted water (in the case of coal seam gas activities.	NA	NA

References

IESC (2015), *Independent Expert Scientific Committee advice on West Muswellbrook Project.* 11 March 2015. **http://www.mpgp.nsw.gov.au/**

NOW (2015), *Technical Assessment by the NSW Office of Water for the Minister for Lands and Water West Muswellbrook Project* – Application for Gateway Certificate. **http://www.mpgp.nsw.gov.au/**

McAlister and Dvoracek (2014), *West Muswellbrook Project Gateway Application Highly Productive Aquifer Groundwater Impact Assessment Prepared for Muswellbrook Coal Company Limited Project No. G1676* November 2014, by AGE.