Mining & Petroleum Gateway Panel

Conditional Gateway Certificate
Bylong Coal Project

Part 4AA, Division 4 of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

Pursuant to clause 17H of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, we determine the application made by KEPCO Bylong Australia Pty Limited by issuing this certificate.

We certify that in the opinion of the Mining and Petroleum Gateway Panel, with regards to the relevant criteria in clause 17H(4) of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, the proposed development described in Schedule 1:

- meets the following relevant criteria:
  - 17H(4)(a)(iii)

- does not meet the following relevant criteria:
  - 17H(4)(a) (i),
  - 17H(4)(a) (ii),
  - 17H(4)(a) (iv),
  - 17H(4)(a) (v),
  - 17H(4)(a) (vi),
  - 17H(4)(b) (i),
  - 17H(4)(b) (ii),
  - 17H(4)(b) (iii),
  - 17H(4)(b) (iv),
  - 17H(4)(b) (v), and,
  - 17H(4)(b) (vi).

The reasons for forming the opinion on each of the relevant criteria, together with recommendations of the Gateway Panel, are contained in Schedule 2.

Terry Short	George Gates	Ian Lavering
Chairperson	**Member of the Gateway Panel**	**Member of the Gateway Panel**

Date certificate issued: 15 April 2014

This certificate will remain current for 5 years from the date of issue.

SCHEDULE 1

The site is located about 55 kilometres (km) northeast of Mudgee within the Midwestern Regional Council Local Government Area. The Project is located on land subject to the Upper Hunter Strategic Regional Land Use Plan (as per information in the accompanying Gateway Panel Report).

Development description:

The Bylong Coal Project proposes to develop an open-cut and underground coal mining complex that plans to recover about 121 million tonnes of Run-of-Mine (ROM) coal over a period of up to 29 years.

Applicant:

KEPCO Bylong Australia Pty Limited (KEPCO).

SCHEDULE 2

Relevant criteria	Consideration	Recommendations
17H4(a)(i), (ii), (v), (vi)	The proposal to remove 194.4 ha of verified BSAL soils from within the planned open-cut mining area and the 're-creation' of this BSAL elsewhere lacks precedence and necessary detail.	With regard to the removal and recreation of verified BSAL soils: 1. Undertake a risk assessment that identifies the hazards and proposes controls with respect to the movement of BSAL soils; 2. Identify a final location for the verified BSAL soils within the Project Boundary area; 3. Detail the methods proposed for the handling, storage and treatment of the verified BSAL soils; 4. Propose alternate mitigation measures to be implemented in the event that the methodology selected results in the loss of verified BSAL soils post-implementation.
17H4(a)(iv)	Significant impacts are anticipated on highly productive groundwater and the consequent connection between surface and groundwater in modeling requires more detailed evaluation.	1. Develop a more complex transient 3D numerical model for the EIS stage of the Development Application which includes improved time variant input data, more details on recharge, geological imperfections (dykes, sills & faults), fractures from subsidence, and a sensitivity/ uncertainty analysis. 2. Complete baseline studies for the project area to improve knowledge on water levels, and groundwater dependent ecosystems. 3. Provide an assessment of the hydrochemistry of spoil and tailings materials, and potential impact on nearby water sources. 4. Provide a strategy for complying with the rules of the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources. In particular the implication of reduced available water determinations (AWDs) and the cease to pump rule. 5. Supply a plan for monitoring actual water take and how any changes from the predictions will be accounted for with water licences and remediation.
17H4(a)(i)	Mine waste emplacements have been designed with steep slopes to minimize footprint disturbance areas.	1. Conduct an analysis of short and long term geotechnical stability risk of waste emplacement slope gradients. 2. Demonstrate that all final landform slope gradients are geotechnically stable in the long-term and have factors of safety of 1.5 or better. 3. Demonstrate that all final landform slope gradients are erosionally stable.
17H4(b)(i), (ii), (iii), (iv), (v)	NSW Government has verified 1,933 ha of land within the Project Boundary area as Equine CIC land. The potential impacts of the Project on the Equine CIC have not been properly assessed.	Using the Guideline for Gateway Applicants (September 2013) by Department of Planning & Infrastructure, provide a compliant and comprehensive assessment of the Project's potential impacts on the Equine CIC.

Note: Further information on the Gateway Panel's reasoning in relation to the relevant criteria is contained in the Gateway Panel Report available at: www.mpgp.nsw.gov.au

NSW GOVERNMENT Mining & Petroleum Gateway Panel

Report by the Mining & Petroleum Gateway Panel to accompany a Conditional Gateway Certificate for the Bylong Coal Project

15 April 2014

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Executive Summary

The Mining & Petroleum Gateway Panel (the Gateway Panel) has determined an Application for a Gateway Certificate by KEPCO Bylong Australia Pty Limited (the Applicant) for its proposed Bylong Coal Project in the Upper Hunter region of New South Wales (NSW). The Gateway Panel finds that the Application does not meet the Relevant Criteria and has decided to issue the Applicant with a Conditional Gateway Certificate. This report states the reasons for the formation of the opinions in the certificate.

The Bylong Coal Project proposes open-cut and underground coal mining within a Project Boundary area that incorporates 2,366 ha of Applicant-verified Biophysical Strategic Agricultural Land (BSAL) and 1,933 ha of Government-verified Equine Critical Industry Cluster (CIC) land.

With regard to BSAL, 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 Project Boundary area;
- Indirect impacts on verified BSAL within the Project Boundary area have not been assessed and are potentially significant; and,
- Indirect impacts on potential BSAL adjacent to the Project Boundary area have not been assessed and are potentially significant.

The Applicant asserts that Gateway requirements concerning the Equine CIC should not apply. The Gateway Panel rejects this assertion because:

- The NSW Government has verified 1,933 ha of land within the Project Boundary as Equine CIC, this mapping was available to the Applicant in October 2013 and the Applicant acknowledges the area of verified CIC in its Application;
- The Interim Verification Protocol relied upon by the Applicant was associated with draft CIC mapping and cannot be used with the current mapping and, as it has been superseded by a Government verification process, is obsolete; and,
- Verification of CIC land has never been a component of the Gateway Panel processes.

The Application is non-compliant with respect to its assessment of the Equine CIC and lacks proper assessment of potential impacts. It is the opinion of the Gateway Panel that the Project would have a significant impact on the Equine CIC because:

- There is 1,933 ha of verified Equine CIC land within the Project Boundary area;
- The Applicant has already directly impacted the Equine CIC through its acquisition of land, e.g. Bylong Park Thoroughbreds, and implemented land use change;
- The Project proposes a disturbance footprint of 2,667 ha for open-cut and underground coal mining;
- The Project proposes open-cut and underground coal mining that directly impacts lands within this CIC; and,
- The Applicant has misconstrued the Gateway process and failed to put forward a compliant or considered assessment of its potential impacts on the Equine CIC.

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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's) reasons for the formation of the opinion in the Gateway Certificate issued on this day to the Bylong Coal Project.

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.

Mr Terry Short, Chairperson – agricultural discipline;
Dr Ian Lavering – mining discipline; and,
Mr George Gates – hydrogeology discipline.

1.2.2 Panel Meetings

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

- On 11 February 2014 in Sydney; and,
- On 4 April 2014 in Sydney, following receipt of Referral Agency advice.

1.2.3 Meetings with the Applicant or third parties

The Panel did not hold any formal or information discussions in relation to this Gateway Application with either the Applicant or any stakeholder who may have an interest in this Project.

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. The Gateway Panel received advice from the IESC on 14 March 2014. The Gateway Panel received advice from the Minister for Primary Industries on 26 March 2014.

1.2.5 Submissions

On 20 January 2014, the Gateway Panel received the following advice through the Panel Secretariat, originating from NSW Primary Industries (Office of Agriculture and Food Security, OA&FS):

<Paraphrased> that the Applicant had likely misunderstood the verification requirements relating to Critical Industry Clusters and this would require correction for the Panel to make its assessment.

The Gateway Panel did not respond to this submission.

1.2.6 Document review

The Gateway Panel has reviewed the following documentation submitted by the Applicant.

Hansen Bailey, 2014. *Bylong Coal Project, Gateway Certificate Application, Supporting Document.* Prepared by Hansen Bailey, for Cockatoo Coal Limited, on behalf of KEPCO Bylong Australia

Pty Limited, 10 January 2014. As provided in Parts 1, 2 and 3, and with the following reports presented as Appendices.

AGE, 2013. *Bylong Coal Project, Gateway Groundwater Study.* Report No G1606/A. Prepared by Australasian Groundwater and Environmental Consultants Pty Limited for Hansen Bailey, December 2013 (presented as Appendix E).

Alan, A. 2013. *Bylong Coal Project, Visual Impact Assessment.* Report prepared by JVP Visual Planning & Design for Hansen Bailey Environmental Consultants on behalf of Cockatoo Coal Limited, December 2013 (presented as Appendix H).

Barnett, S. 2013. *Bylong Coal Project, Agricultural Impact Statement.* Report prepared for Hansen Bailey Environmental Consultants on behalf of Cockatoo Coal, December 2013 (presented as Appendix G).

MSEC, 2014. *Bylong Coal Project – Gateway Application. Subsidence Predictions and Impact Assessments for Natural and Built Features in Support of the Gateway Application.* Prepared by Mine Subsidence Engineering Consultants (MSEC) for Cockatoo Coal Limited, December 2014 (presented as Appendix I).

Runge Pincock Minarco, 2014. *Bylong Mine Plan Justification, Version 2.* Prepared for Cockatoo Coal Limited, January 2014 (presented as Appendix C with preface by Cockatoo Coal Limited dated December 2013).

SLR, 2013a. *Bylong Coal Project, Soil Assessment and Site Verification.* Report No Han01.005. Prepared by SLR Consulting Australia Pty Limited for Hansen Bailey, December 2013 (presented as Appendix D).

SLR, 2013b. Bylong Coal Project, Preliminary BSAL Rehabilitation Strategy. Report No Han01.005. Prepared by SLR Consulting Australia Pty Limited for Hansen Bailey, December 2013 (presented as Appendix J).

WRM, 2013. *Bylong Coal Project EIS – Preliminary Water Balance.* Prepared by WRM Water and Environment Pty Limited for Hansen Bailey, December 2013 (presented as Appendix F).

The Gateway Panel has also reviewed the following Referral Agency advice relevant to this Application.

IESC, 2014. *Advice to decision maker on coal mining project IESC 2013-040: Bylong Coal Project – New Development*. Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, Department of Environment, Canberra, 14 March 2014.

Minister for Primary Industries, 2014. *Advice prepared by the NSW Office of Water for the Minister for Primary Industries, Bylong Coal Project Application for a Gateway Certificate*, under covering letter of The Hon. Katrina Hodgkinson MP, Minister for Primary Industries, 26 March 2014.

With specific regard to its assessment of potential groundwater 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 modeling 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, 2012.

McNally G. and Evans R. 2007. *Impacts of Longwall Mining on Surface Water and Groundwater, Southern Coalfields, NSW.* Report by eWater CRC for NSW Department of Environment and Climate Change.

NSW Government, 2009. *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009.* NSW Legislation, State of New South Wales, 2009.

With specific regard to matters relating to geology and mining, the Gateway Panel notes the site of the proposed Project has been the subject of previous documented studies of coal and other mineral resources. These studies include those associated with intrusive Mesozoic Phonolite and Teschenite bodies know to occur east of the subject project area. The Panel has, through its own enquiry, also considered the following additional and relevant publications.

Bayly, K. W. 2012. *Not What It "Seams".* Proceedings of 38th Symposium on Advances in the Study of the Sydney Basin, Hunter Valley, NSW, May 10-11, 2012, http:www.smedg.org.au/Kim_Bayly_Coal_Seams_Aug2012.pdf (accessed 1 March 2014).

DRE, 2014. Department of Trade and Investment, Division of Resources and Energy, New South Wales Geological Survey, Digital Imaging Geological Systems (DIGS), GS2013/0657 (RE0004030), accessed 1 March 2014.

Hodkinson, I. 2013a. *Annual Exploration Report Exploration Licence No. 7765 (Murrumbo), near Mudgee, New South Wales, For the period 1 June 2011 to 31May 2012*. Cornubian Resources Pty Ltd, Geological Consultants Report on behalf of Laccolith Pty Ltd, April 2013, Report to NSW Trade & Investment, Division of Resources and Energy, DIGS, GS2013/0657 (RE0004030), accessed 1 March 2014.

Hodkinson, I. 2013b. *Annual Exploration Report Exploration Licence No. 7765 (Murrumbo), near Mudgee, New South Wales, For the period 1 June 2012 to 31May 2013*. Cornubian Resources Pty Ltd, Geological Consultant's Report on behalf of Laccolith Pty Ltd, October 2013, Report to NSW Trade & Investment, Division of Resources and Energy, DIGS, GS2013/0657 (RE0004030), accessed 1 March 2014.

Koo, E. K., Norman, A. and McDonald, I. 1995. *Sydney Basin, Western Coalfield*, pages 231-245, In, Ward, C.R., Harrington, H. J., Mallet, C.W. and Beeston, J.W., (Editors) *Geology of Australian Coal Basins*, Geological Society of Australia Inc., Coal Geology Group, Special Publication No.1.

The Gateway Panel has reviewed the following publications relevant to Gateway Applications.

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

DP&I, 2012b. *Draft guideline for site verification of critical industry clusters.* State of New South Wales through the Department of Planning & Infrastructure, November 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.

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 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, 2013.

1.2.7 Field inspection

The Gateway Panel did not conduct a field inspection for the assessment of this Gateway Application.

2 The Proposed Project

2.1 The Applicant

KEPCO Bylong Australia Pty Limited (KEPCO) is the Applicant for a Gateway Certificate for the Bylong Coal Project (the Project).

The Project is required to make a Gateway Application because:

- The Project is a proposed development specified in Clause 5 (Mining) of Schedule 1 to *State Environmental Planning Policy (State and Regional Development) 2011* that 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 development is on land shown on the Strategic Agricultural Land (SAL) Map in the Mining SEPP to be Strategic Agricultural Land (SAL).

2.2 The Proposed Project

According to the *Bylong Coal Project, Gateway Certificate Application, Supporting Document* by Hansen Bailey (2014), the proposed Project is located about 55 kilometres (km) northeast of Mudgee within the Midwestern Regional Council Local Government Area (Figure 1). The Project is a proposed open-cut and underground coal mining complex that plans to recover about 121 million tonnes of Run-of-Mine (ROM) coal over a period of up to 29 years. The Project is located on land subject to the Upper Hunter Strategic Regional Land Use Plan (DP&I, 2012a).

The following Project Overview is reproduced from Hansen Bailey (2014).

> *The Project mine life is anticipated to be approximately 29 years, comprising up to a two year construction period and a 27 year operational period, with underground mining operations commencing in Year 7. Various rehabilitation and decommissioning activities will be undertaken during both the course of, and following the 29 years of the Project.*

The Project main features are provided (Figure 2). Hansen Bailey (2014) continue that the Project generally comprises:

- *The initial development of two open cut mining areas with associated haul roads and Overburden Emplacement Areas (OEAs), utilising a mining fleet of excavators and trucks and supporting ancillary equipment;*
- *The two open cut mining areas will be developed and operated 24 hours a day, 7 days a week over an approximate 8 year period and will ultimately provide for the storage of coal processing waste products from the longer term underground mining activities;*
- *Construction and operation of an underground coal mine operating 24 hours a day, 7 days a week for a 23 year period, commencing in around year 7 of the Project;*
- *A combined extraction rate of approximately 6 Million tonnes per annum (Mtpa) ROM coal;*

- *Underground mining operations utilising longwall mining techniques with primary access provided via drifts constructed adjacent to the rail loop and Coal Handling and Preparation Plant (CHPP);*
- *The construction and operation of a CHPP with a designed throughput of approximately 6 Mtpa of ROM coal;*

Figure 1. Project location (after Hansen Bailey, 2014)

- *The construction and operation of facilities to support underground mining operations including (at least) personnel access to the underground mining area, ventilation facilities, workshop, offices and employee amenities, water and gas management facilities;*

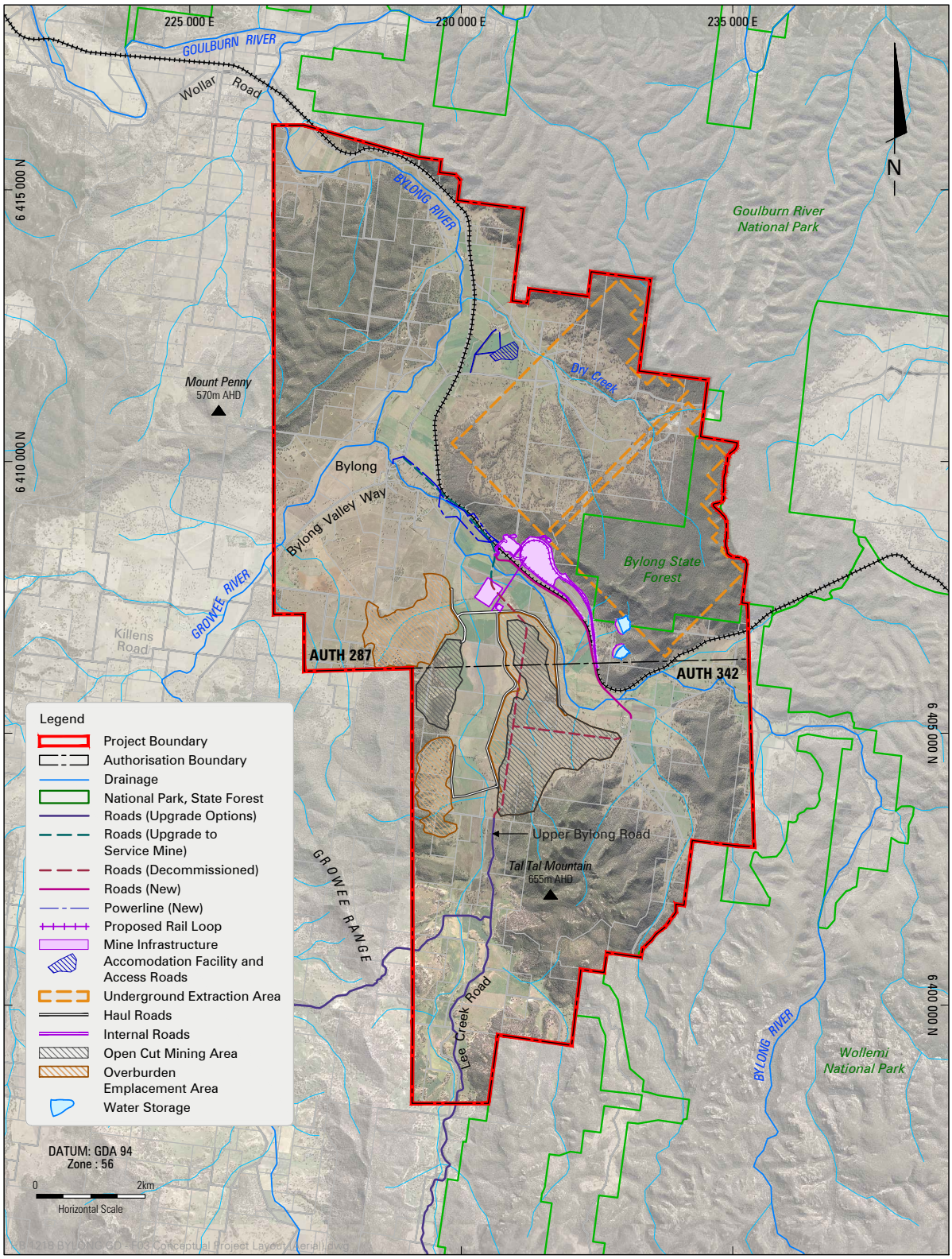

Figure 2. Project general features (after Hansen Bailey, 2014)

- *A workforce of up to approximately 1,000 during construction and 550 full-time equivalent employees during the operation of the Project at full production;*
- *The dewatering of fine reject materials through belt press filters within the CHPP and the co-disposal of dewatered fine and coarse reject materials within OEAs and final open cut voids (avoiding the need for a fine reject materials dam);*
- *The construction and operation of a rail loop and associated rail load out facility and connection to the Sandy Hollow-Gulgong Railway Line to facilitate the transport of product coal;*
- *The upgrade of Upper Bylong Road and the construction and operation of a Mine Access Road to provide access to the site facilities;*
- *Relocation of sections of some existing public roads to enable alternate access routes for private landholders surrounding the Project;*
- *The construction and operation of administration, workshop and other mining related facilities;*
- *The construction and operation of surface and groundwater management and water reticulation infrastructure including diversion drains, dams (clean, dirty and raw water), pipelines, pumping stations and associated infrastructure for access to water from the neighbouring groundwater aquifers;*
- *The installation of communications and electricity reticulation infrastructure;*
- *Construction and operation of an Accommodation Facility and associated access road from the Bylong Valley Way; and*
- *Infilling of mining voids, progressive rehabilitation of disturbed areas, decommissioning of Project infrastructure and rehabilitation of the land at the completion of mining operations.*

2.3 Potential and verified Strategic Agricultural Land (SAL)

The Project Boundary (refer to Figure 2) has a total area of 10,317 hectares (ha) and contains mapped SAL, both Biophysical SAL (BSAL) (Figure 3) and Critical Industry Cluster (CIC) for the equine industry (Figure 4). This mapping indicates 1,610 ha of potential BSAL soils and 1,933 ha of land within the Equine CIC land.

According to Hansen Bailey (2014) however, there is 2,366 ha of verified BSAL soils within the Project Boundary (Figure 5) and 367 ha of these will be impacted by the Project (Table 1). Inconsistently, SLR (2013a and 2013b) and Barnett (2013) discuss potential impacts to 401 ha of verified BSAL soils.

With regard to Equine CIC land, Hansen Bailey (2014) proposes that there are errors in both the DP&I (2012a) and Mining SEPP Critical Industry Cluster Land Map Sheet CIC_001 mapping. Hansen Bailey (2014) concludes that there is no Equine CIC land relevant to Project and therefore, no requirement for assessment of potential impacts.

The Project will disturb a total land area of 2,667 ha (Hansen Bailey, 2014).

Table 1. Nature and extent of proposed impacts to verified BSAL soils (after Hansen Bailey, 2014)

Type of impact	Mining disturbance type	Area (ha)
Direct and permanent	Open cut mining activities	194
Direct and temporary	Mine infrastructure	21
Indirect and temporary	Longwall mining subsidence	152
	Total	**367**

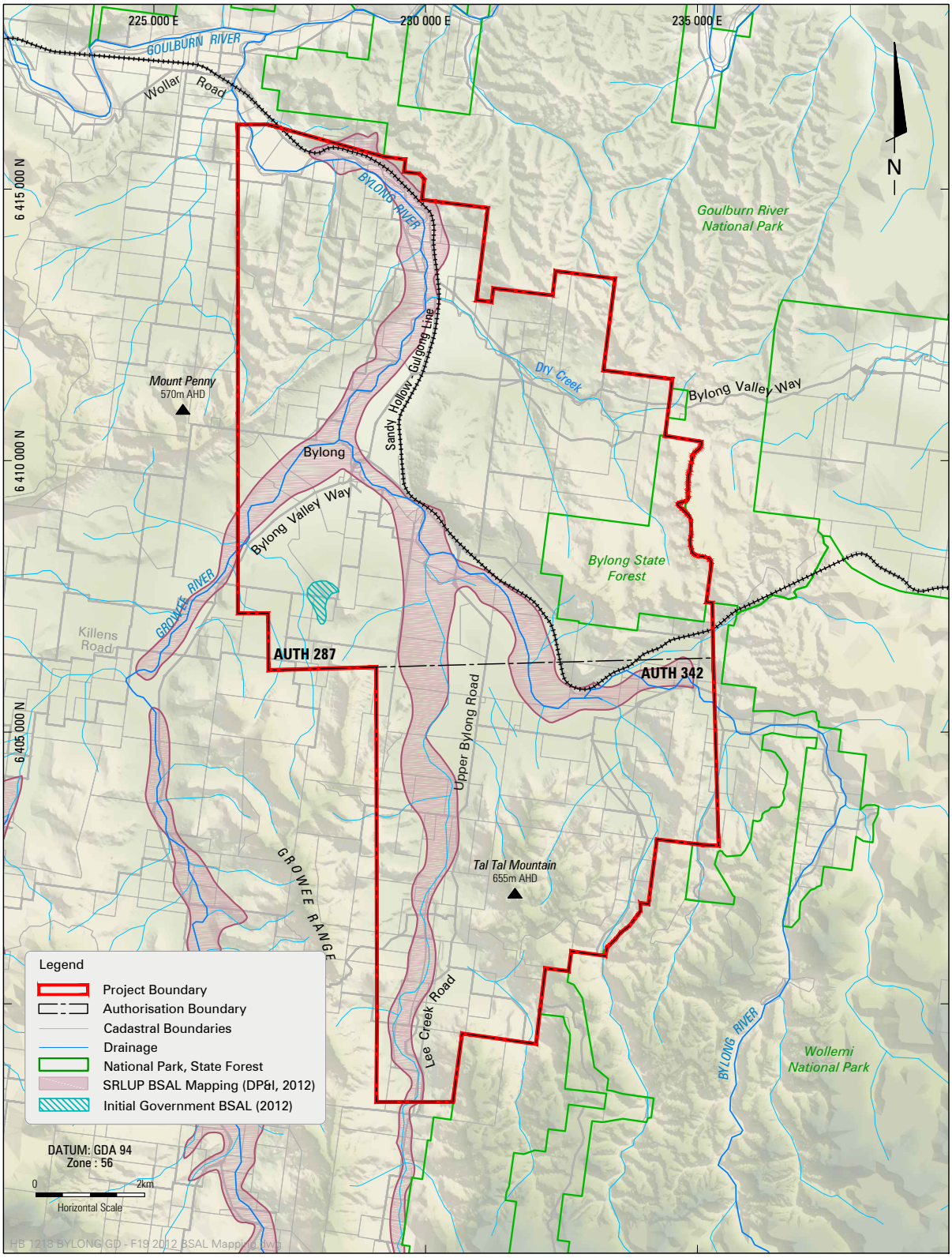

Figure 3. Potential BSAL within the Project Boundary area (after Hansen Bailey, 2014)

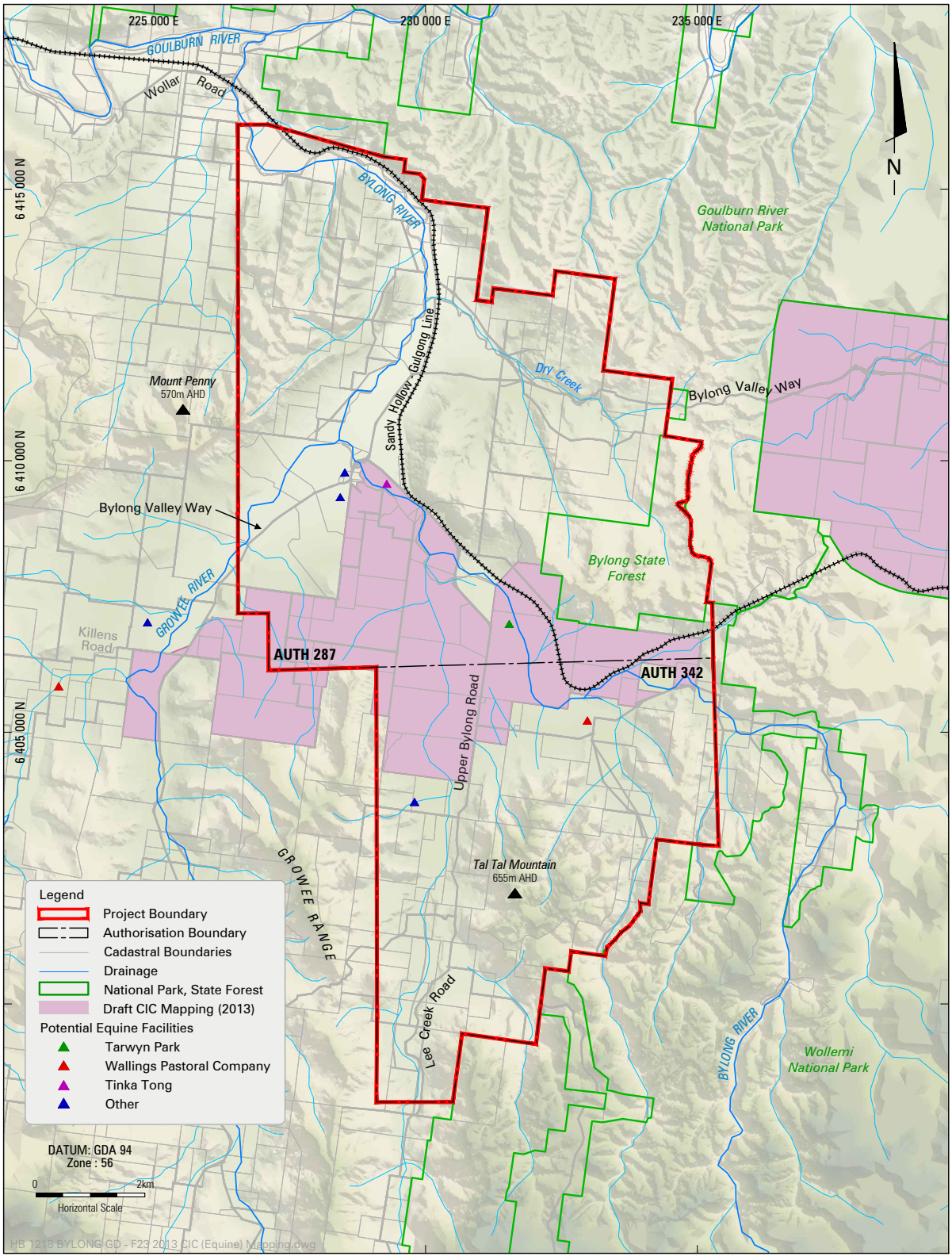

Figure 4. Equine CIC within the Project Boundary area (after Hansen Bailey, 2014)

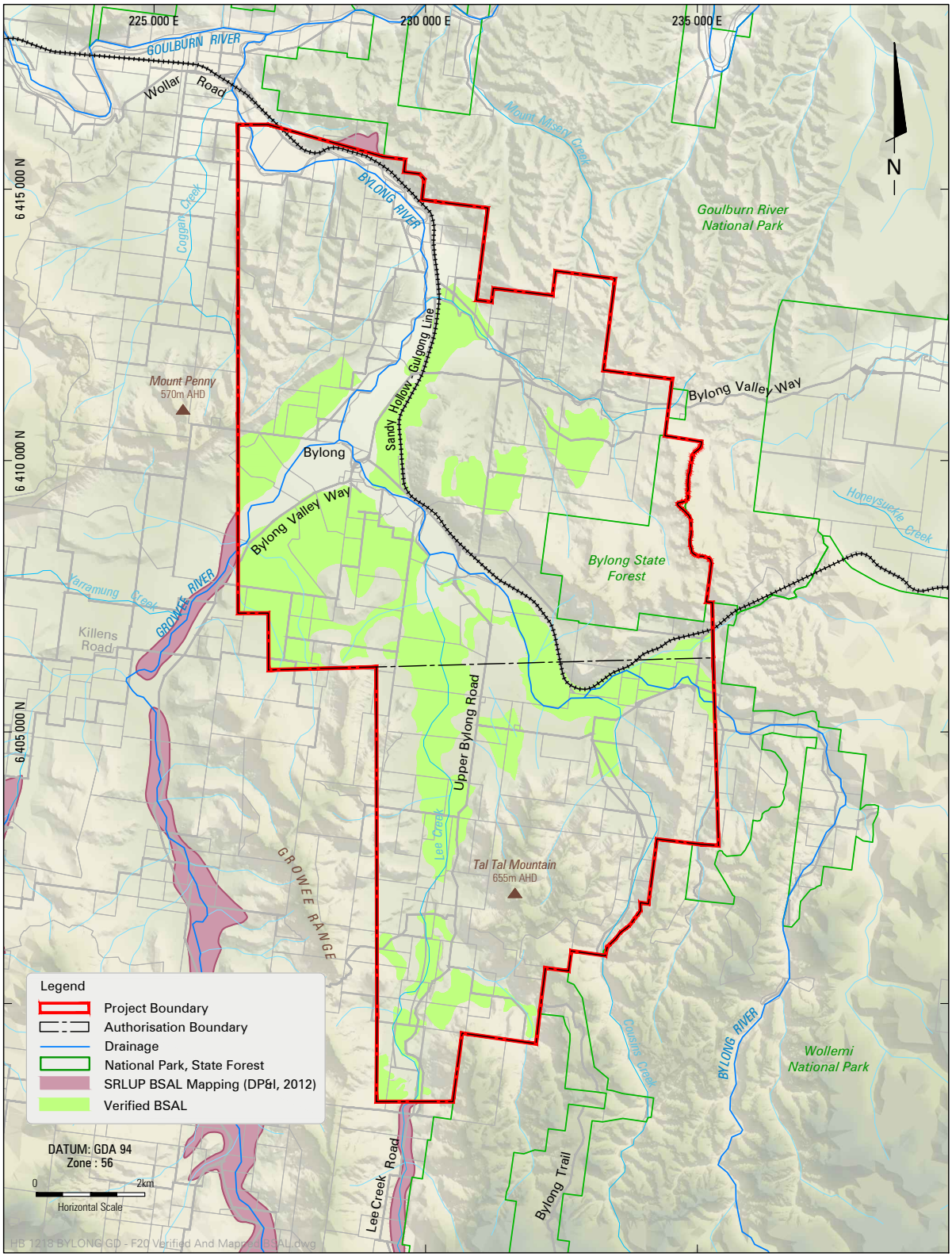

Figure 5. Verified BSAL (2,366 ha) within the Project Boundary area (after Hansen Bailey, 2014)

3 Strategic Agricultural Land Verification

3.1 Biophysical Strategic Agricultural Land (BSAL) verification

The Gateway Panel finds the Applicant's methodology for verification of BSAL within the Project Boundary area is generally acceptable for a Gateway Application with the following exceptions to method and reporting.

1. The Gateway Panel does not accept the Applicant's view that subsidence impacts on verified BSAL soils are by general rule, *"indirect and temporary"*;
2. The risk rankings used to determine the soil survey sampling density are (i) incorrect and (ii) ranked too low for the accurate verification of BSAL on land potentially affected by longwall mining subsidence. The potential impacts of subsidence on BSAL should have been assigned a higher risk ranking and the land surveyed at a larger scale, e.g. 1:50,000 or larger, rather than the 1:100,000 scale used (SLR, 2013a);
3. Access to reliable water supply is not a criterion for BSAL verification (e.g. p.43 of SLR, 2013a); and,
4. Suggested amendments to the verification protocol by OEH and OAS&FS (2013) should not be put forward in a Gateway Application (e.g. pp. 53, 63 and 74 of SLR, 2013a), nor should alternate verification outcomes based on these suggested amendments.

3.1.1 Verification of BSAL potentially affected by the Project

SLR (2013a) found 2,366 ha of verified BSAL within the Project Boundary area of 10,317 ha. Within areas that failed the verification procedure, about half was due to slope gradients exceeding the criterion threshold limit of 10%. Various other chemical and physical limitations were also present.

SLR (201ba and 2013b) concludes that 401.3 ha of verified BSAL would be impacted by the Project. In contrast, Hansen Bailey (2014) state the area impacted is 367 ha. The Panel surmises this inconsistency is likely associated with the area of verified BSAL affected by subsidence, i.e. 187 ha in SLR (2013a and 2013b) and 152 ha in Hansen Bailey (2014). Notwithstanding that the error amounts to a relatively small area of about 34 ha, this inconsistency frustrates assessment.

The Gateway Panel does not agree that the effects of subsidence on BSAL are necessarily or by general rule, *"indirect and temporary",* as stated by Hansen Bailey (2014) and SLR (2013a). In some cases this may be correct, but it cannot be applied by default and without justification. To the extent that surface subsidence is an inevitable consequence of longwall coal mining, it is also a direct impact on soils and other surface features. As to whether the potential impacts are temporary or otherwise, this must be assessed on a case-by-case basis.

OEH and OAS&FS (2013) provide clear guidance for the verification of BSAL on-ground, including the appropriate level of sampling density in soil survey based on an assessment of risk to agricultural resource and enterprises. As the minimum area criterion for BSAL verification is 20 ha, much care is needed when choosing appropriate soil survey scales. For example, a scale of 1:50,000 is equivalent to a single observation per 40 ha on ground. Reconnaissance-scales of 1:100,000 and 1:250,000 are far broader. Conducting soil survey for BSAL verification at these scales increases the likelihood of error in BSAL verification and mapping. Depending on the assessed risk to agriculture, appropriate

soil sampling densities can range from one site per 5 ha for high risks to one site per 400 ha for low risks (OEH and OAS&FS, 2013).

SLR (2013a) undertook a risk assessment to evaluate the risk of the Project's various mining disturbance types to soil resources and, it is stated, consequently to agricultural activities, and to assign appropriate soil sampling scales to affected lands. The results of this risk assessment are reproduced (Figure 6). The Panel is of the view that derived scales are generally appropriate, except where there is potential BSAL affected by subsidence. In this instance, SLR (2013a) has assigned a risk ranking of C (possible, probability) and 4 (minor and/or short-term, consequence), to derive a "low" risk outcome and a survey scale of 1:100,000. OEH and OAS&FS (2013) in providing examples of implications for consequence descriptors say that 4: *"Theoretically could affect the agricultural resource or industry in short term, but no impacts demonstrated."* It is the Panel's view that the potential impacts of subsidence on BSAL should have been assigned a higher risk and the land surveyed at a larger scale, e.g. 1:50,000 or larger.

Project Component	Risk Rating	Survey Scale
Unit	**Rating**	**-**
Open Cut Mining Areas	A1-A3 – High	1:25,000
OEAs	A1-A3 – High	
Raw Water Storage	A3 – High[1]	
Rail Loop	A3 – High[1]	
Dirty Water Dam	A3 – High[2]	1:25,000
Roads & Mine Infrastructure	A4 – Medium	1:50,000
Underground Extraction Areas on non-SRLUP mapped BSAL	B5 - Low	1:100,000
Underground Extraction Areas on SRLUP mapped BSAL – non alluvial influenced BSAL	C4 - Low[3]	
Nil Disturbance	Nil[4]	1:100,000 – 1:250,000

1 Project components will be left in place for future use

2 Area of land is small and impact on agricultural industries is minimal; however, as topsoil and subsoil will be significantly disturbed it has been assigned a high rating.

3 BSAL on elevated land is not predicted to impacted by subsidence

4 No survey required for BSAL verification. Survey scale nominated to satisfy typical project DGRs

Figure 6. Soil survey scales derived from risk assessment (reproduced from SLR, 2012a)

SLR (2013b) presents a preliminary BSAL rehabilitation strategy. Amongst other things, this document details the salvage of verified BSAL soils that would otherwise be significantly affected by open-cut mining operations and the replacement of these soils elsewhere to recreate an equivalent area of BSAL. The Panel considers this a worthy rehabilitation goal but is concerned that the location for soil replacement has not been identified in any documentation provided. SLR (2013b) say the location maybe within or surrounding the Project Disturbance Boundary while Hansen Bailey (2014) say it is off-site. This should be clarified and an appropriate location identified, preferably within the land area subject to this Gateway Application.

With regard to rehabilitation more generally, the Panel notes the approach of minimising OEA footprints would result in increased slope gradients in rehabilitation and final landforms to elevations well above that of adjoining low-lying topography. The Panel identifies this strategy increases the risk of erosional and geotechnical instability of the final landforms. The Applicant does

not present any assessment of short- or long-term stability of final landforms. This would be necessary and perhaps lead to design modifications to ensure final landform stability and the avoidance of impacts on adjacent areas of BSAL.

3.2 Equine Critical Industry Cluster (CIC) Verification

The Gateway Panel concludes the following with regard to the Applicant's verification of Equine CIC land.

1. The Applicant has misunderstood Gateway Application process requirements;
2. The Applicant's verification of the Equine CIC land is not relevant to this Gateway Application; and,
3. The Applicant has failed to address requirements for Gateway Applicants with respect to Equine CIC land (see DP&I, 2013).

3.2.1 Verification of the Equine CIC lands potentially affected by the Project

When the NSW Government released the strategic regional land use plan (DP&I, 2012), it made a commitment to verify with industry and the community that land mapped in the CICs was actually used for either equine or viticulture activity. As a result of this verification process, Planning & Infrastructure revised the maps and publically exhibited them for feedback between 4 October and 8 November 2013. In January 2014, the CIC Land Maps, which include Critical Industry Cluster Land Map – Sheet CIC_001, CIC_002 and CIC_003, were finalised and given legal effect through amendment to the Mining SEPP.

Preceding the NSW Government's verification of Equine CIC land, i.e. up until January 2014, an Interim Protocol (DP&I, 2013) provided a process for verifying whether or not land mapped as CIC met relevant criteria. The interim verification protocol stated the following.

> *"Applicants for State significant mining and coal seam gas proposals that are wholly or partially within a mapped CIC have two options:*
>
> - *Accept that their project site is located within the CIC and proceed directly to the Gateway process, or*
> - *Lodge a site verification application that the project site does not meet the CIC site verification criteria and therefore should not be subject to the Gateway process."*

If Applicants wished to contend the draft mapping of Equine CIC land, then they must have lodged a Site Verification Application to Planning & Infrastructure, prior to January 2014. The assessment of Site Verification Applications is not a function or responsibility of the Gateway Panel. Verification of Equine CIC land has never been part of the Gateway process.

Within the Project Boundary, the strategic regional land use plan (DP&I, 2012) indicated about 6,617 ha of Equine CIC land. In January 2014, the NSW Government verified Equine CIC lands in the Upper Hunter region and this revised mapping indicates 1,933 ha of Equine CIC land within the Project Boundary, as confirmed by Hansen Bailey (2014).

The Applicant has relied upon the interim verification protocol as reason to dispute draft- and Government-verified mapping of the Equine CIC land within the Project Boundary (Barnett, 2013; Hansen Bailey, 2014). It is the view of the Panel, that this is incorrect application of process because:

- The Applicant did not lodge a Verification Application to Planning & Infrastructure;
- The Interim Verification Protocol is now obsolete and can no longer be used; and,
- Verification of Equine CIC land was never a component of the Gateway process.

The role of the Gateway process with respect to CICs remains solely to assess the potential impacts of State Significant coal seam gas and coal mining proposals on those CICs.

The agricultural impact statement by Barnett (2013) states *"the overwhelming majority of the equine facilities within or in the locality of the Project Boundary do not meet the site verification criteria to be classed as an enterprise of the equine CIC"* and concludes the Project will not impact on Equine CIC land because there is none. The Gateway Panel rejects this view because its premise is incorrect.

4 Assessment of Mining Disturbances

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

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

Therefore, the assessment of mining disturbances must consider both direct and indirect impacts as defined above, noting that the Applicant has commissioned independent studies on surface subsidence (MSEC, 2014) and hydrogeological impacts (AGE, 2013) due to the proposed mine.

It is the Panel's view that if a concise 3D geological model of the underground mining area were presented in the Application it would assist establishing some geological basis for the mining justification aspects of the Application. It would also assist in developing an understanding of any risks to escarpment stability, valley related subsidence and closure movements, and the effects of faults [as noted in AGE (2013), Figure 5.14] and other geological structures within and proximal to the underground mining area. A significant lack of this data in the exiting Application limits consideration of the geological features, presumably upon which the underground component of the Mine Justification Report by Runge Pincock Minarco (2014) is based.

4.1 Direct mining disturbances

4.1.1 Removal or working upon verified BSAL or mapped CIC land

The Project will cause direct impacts to verified BSAL and mapped Equine CIC land within the Project Boundary as follows.

1. For verified BSAL, 215.7 ha will be directly impacted via proposed open-cut mining and associated activities; and,
2. For Equine CIC land, 1,933 ha will be directly impacted by proposed mining activities.

Of the 215.7 ha of affected verified BSAL, the Panel notes that 194.3 ha is proposed to be 're-created' to offset this impact (SLR, 2013b) and impacts on the remaining 21.4 ha may be temporary, if soils are carefully managed.

Barnett (2013) indicates the following direct impacts of the Project on Government-verified Equine CIC lands.

- *"The Project will directly impact 604 ha of the Wallings Pastoral Company property. Direct disturbance comprises 388 ha of open cut mining area, 11 ha infrastructure and 205 ha of OEA."*
- *"The Project will directly impact 109 ha of the Tarwyn Park property and indirectly through 24 ha of subsidence. Direct disturbance comprises 60 ha of open cut mining area and 25 ha infrastructure."*

The Applicant has not proposed to mitigate its potential impacts on Equine CIC land because it asserts those provisions of the Mining SEPP should not apply to the Project (Hansen Bailey, 2014).

The Gateway Panel does not accept this assertion and is of the opinion that the Applicant should have identified and assessed the potential impacts of the Project on the Equine CIC and proposed appropriate mitigation measures.

4.1.2 Disturbance due to longwall mining subsidence

The Project will cause direct impacts to 185.6 ha of verified BSAL due to subsidence form longwall mining. The Gateway Panel concludes that the subsidence study (MSEC, 2014) is generally adequate with respect to potential impacts on verified BSAL, but could be significantly improved by consideration of the following.

- Differences in the engineering properties of the Permian and Triassic stratigraphic sequences, which comprise the strata that longwall mining will impact;
- The propagation of fracture and faulting patterns in the sequences overlying the coal-bearing strata will vary notably from the general pattern modeled in the Application, and these variations will produce deviation from the general results which the modeling in the Application outlines; and,
- Clarification of the vertical versus horizontal occurrence (or not) of Mesozoic Teschenite or Phonolite in the underground mining area, i.e. depicted in Figure 7.19 of AGE (2013). MSEC (2014) (refer to Figure 1.2) show the Mesozoic Teschenite ("Mt" on map) underlies some 30 to 40% of the subsurface area proposed for longwall mining. An alternative is that the symbol "Mt" is an incorrect label, and the rock is actually Tertiary Basalt ("Tb").

MSEC (2014) predicts maximum vertical subsidence movement of 3,400 mm and surface cracks of 20 to 50 mm with some cracks exceeding 100 mm.

4.2 Indirect mining disturbances

4.2.1 Subsurface fracturing due to longwall mining

MSEC (2014) state the following:

> *"The extraction of supercritical longwalls is expected to result in fracturing from the seam up to the surface. At the magnitudes of the predicted subsidence, the overburden is expected to have undergone large blocky movements, resulting in a network of fractures which is likely to increase the hydraulic conductivity between the surface and the seam at the areas of shallowest cover, with reducing potential for connectivity as depth of cover increases. It is likely, therefore, that some of the surface water flows in the ephemeral streams would be lost into the mine workings during high rainfall events."*

The report also notes the higher potential for ponding to develop along the lower reaches of Dry Creek.

The Panel is concerned that the preliminary groundwater modelling completed to date does not include fractures that extend to the ground surface from the underground mine workings. The Panel requires that the updated groundwater model include the predictions of fractures back to the surface. This should improve the accuracy of the water budget for the underground mine.

The IESC suggestion that future iterations of the subsidence assessment should include a survey of the existing drainage lines and other surface water features and an assessment of their current

condition, including associated vegetation, to provide a baseline against which the predicted changes to the landform can be assessed, is endorsed.

4.2.2 Effects on adjoining BSAL

The Applicant verifies 2,366 ha of BSAL within the Project Boundary but provides insubstantial information of how verified BSAL within the Project Boundary but outside of planned disturbance areas is impacted or how potential BSAL outside of the Project Boundary is potentially, indirectly impacted by the Project.

5 Panel Assessment of Impacts on Strategic Agricultural Land

The Gateway Panel has assessed and determined the potential impacts of the Project on BSAL and the Equine CIC as follows (findings are summarised as Tables 2 and 3).

Table 2. 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 impact
(ii) any impacts on soil fertility, effective rooting depth or soil drainage,	Significant impact
(iii) increases in land surface micro-relief, soil salinity, rock outcrop, slope and surface rockiness or significant changes to soil pH,	No significant impact
(iv) any impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy),	Significant impact
(v) any fragmentation of agricultural land uses,	Significant impact
(vi) any reduction in the area of biophysical strategic agricultural land.	Significant impact

Table 3. Summary of Gateway Panel determination of impacts on the Equine CIC

17H(4)(b) Equine CIC	**Determined Impact**
(i) any impacts on the land through surface area disturbance and subsidence,	Significant impact
(ii) reduced access to, or impacts on, water resources and agricultural resources,	Significant impact
(iii) reduced access to support services and infrastructure,	Significant impact
(iv) reduced access to transport routes,	Significant impact
(v) the loss of scenic and landscape values.	Significant impact

5.1 Significance of the project's potential impacts on BSAL

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

There are 2,366 ha of verified BSAL within the Project Boundary area of 10,317 ha (SLR, 2013a). The Project proposes to disturb 2,667 ha of land in total, including direct impacts on about 401 ha of verified BSAL. These direct impacts include 21.3 ha for infrastructure, 185.6 ha via subsidence and 194.4 ha by open-cut coal mining.

If managed carefully, the Gateway Panel agrees with the Applicant that impacts due to mine infrastructure and subsidence could be mitigated to the extent that soils retain BSAL characteristics post-mining. However, subsidence has the potential to create ponding and significant periods of inundation will affect the chemical and physical fertility of affected soils, thereby impacting the agricultural productivity of verified BSAL.

The Applicant proposes to minimise the surface area occupied by mine waste emplacements. This approach results in increased slope gradients of final landforms. The Gateway Panel identifies a potential geotechnical stability risk in final landforms that could lead to landform failure, with impacts on surrounding verified BSAL. The Applicant does not provide any geotechnical stability assessment of proposed final landforms.

Considerable uncertainly remains in the Application with regard to the removal of 194.4 ha of BSAL soils from within the planned open-cut mining area and re-creation of BSAL elsewhere because:

- To the knowledge of the Gateway Panel, such an exercise has not been successfully completed at any other Australian coal mine;
- The Application does not identify a final location for the BSAL soils;
- SLR (2013b) does not provide enough detail in relation to how this 're-creation' can be achieved, e.g. soil handling techniques.

It is the Gateway Panel's opinion that impacts on the land through surface area disturbance and subsidence will significantly reduce the agricultural productivity of verified BSAL.

5.1.2 Any impacts on soil fertility, effective rooting depth or soil drainage

The Gateway Panel finds the impacts on fertility, rooting depth and soil drainage should be minimal where BSAL is potentially impacted by mine infrastructure and subsidence, providing any changes to surface water dynamics are managed properly. This should include the prevention of water ponding in subsidence depressions and the long-term inundation of BSAL soils.

However, it is the Gateway Panel's view that relocation of 194.4 ha of verified BSAL soils from within the open-cut mining footprint to another location has the potential to significantly reduce the agricultural productivity of that soil through impacts on soil fertility, effective rooting depth and soil drainage. These impacts will potentially manifest through soil handling techniques that lead to profile mixing and compaction.

It is the Gateway Panel's opinion that impacts on the soil fertility, effective rooting depth or soil drainage will significantly reduce the agricultural productivity of verified BSAL.

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

It is the Gateway Panel's opinion that the proposed Project should not significantly reduce the agricultural productivity of BSAL due to increases in micro-relief, soil salinity, rock outcrop, slope, rockiness or significant changes to soil pH.

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

The Gateway Panel concludes that the proposed Project has potential water level impacts that exceed the Level 1 Minimal Impact Considerations in the NSW Aquifer Interference (AI) policy for the 'highly productive' alluvial groundwater source associated with the Bylong River.

The simple groundwater flow model (a requirement of the AI policy) shows that 23 alluvial bores will experience a water level decline of greater than 2 m for an extended time, i.e. decades. The Gateway Panel notes that the Applicant has already purchased many of the affected properties and is in negotiations with other affected landholders to either purchase their land or mitigate the impacts.

The Gateway Panel finds that there is considerable uncertainty in the water budget results and water level impacts using the preliminary groundwater flow model. The proponent has however provided a pathway forward to develop a more complex and robust transient groundwater flow model that will be used in the EIS assessment. This will incorporate temporal data and include the results from ongoing work that will better define the hydrogeological complexities of the lease areas. This more detailed model should provide results that have a higher degree of certainty.

The output from the preliminary model is adequate for this Gateway assessment but should be considered as indicative only until the more detailed work that is proposed is carried out.

Insufficient work has been completed to predict long-term changes in water quality in the alluvium or in surface waters. A work program has been outlined but until this work is done the Panel is not in a position to comment on whether the proposed mine will change the beneficial use of the aquifer at some locations or meet the 1% minimal impact criteria for connected surface waters.

Desktop studies indicate that there are no known groundwater dependant ecosystems (GDE) in government data bases within or close to the lease boundaries. Detailed site work to look for GDEs is proposed but is not yet complete. The Panel cannot comment further at this time.

Appendix A provides some discussion and insights into the Panel's thoughts and highlights some areas that require further work and clarification. The Applicant has suggested many of the areas that need further work and these are generally supported by IESC and NOW comments. Table 1 in Appendix A shows the Panel's assessment in tabulated form against each of the information areas required by the AI Policy.

It is the Gateway Panel's opinion that mining impacts on highly productive alluvial groundwater will be significant for decades and unless mitigated will reduce the agricultural productivity of verified BSAL. Affected properties purchased by the proponent will have reduced agricultural output if water licences are diverted away from irrigation and used for mining purposes. Water level impacts caused by mining are temporary (decades) and will recover fully with time.

5.1.5 Any fragmentation of agricultural land uses

The Gateway Panel finds the Project will cause short- to medium-term fragmentation of agricultural land uses on verified BSAL due to proposed mining activities. This fragmentation is associated with verified BSAL directly impacted by subsidence (185.6 ha) and also that required for mine infrastructure (21.3 ha).

The Gateway Panel is of a view that the planned preservation, relocation and re-creation of 194.4 ha of verified BSAL from within the footprint of the proposed open-cut mine is a commendable objective. However, such an objective is not without risk to the verified BSAL, e.g. profile mixing, and reduced physical, chemical and biological fertility. In any event, it will cause short- to medium-term fragmentation of land uses associated with that 194.4 ha of verified BSAL, and if ultimately unsuccessful, the fragmentation will be permanent.

Of further concern to the Panel is land use on the balance of verified BSAL within the Project Boundary that will not be directly impacted by the proposed Project (1,965 ha) but may be indirectly impacted. The Gateway Panel concludes the Applicant has not provided an adequate assessment of these potential impacts.

It is the Gateway Panel's opinion that impacts causing fragmentation of agricultural land use will significantly reduce the agricultural productivity of verified BSAL.

5.1.6 Any reduction in the area of BSAL

The Panel finds the Project will directly impact about 401 ha of verified BSAL and has the potential to indirectly impact some of the remaining 1,965 ha of verified BSAL within the Project Boundary and BSAL external to this boundary. SLR (2013b) discusses mitigating the potential loss of 194.4 ha of verified BSAL due to open-cut mining operations, by its relocation to another area unaffected by open-cut mining. Barnett (2014) says this will *"compensate for direct and permanent impacts associated with open cut mining areas."* But neither SLR (2013b) nor Barnett (2014) put forward a suitable location for this verified BSAL to be permanently relocated, and neither provide any real insight to meeting the technically and scientific (and economic) challenges of moving that much BSAL (up to 1.5 million cubic metres of soil).

It is the Gateway Panel's opinion that impacts causing a reduction in the area of BSAL will significantly reduce the agricultural productivity of verified BSAL.

5.2 Significance of the project's potential impacts on the Equine CIC

The Project Boundary contains 1,933 ha of Government-verified Equine CIC land (Barnett, 2013). NSW Government has verified this land as being a part of the Upper Hunter Equine CIC.

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

Barnett (2013) states *"land and any associated equine enterprise within the Project disturbance has been verified as not meeting the definition or criteria of the equine CIC as outlined in* ***Section 3.2.*** *In this regard, the Project will not impact the equine CIC through surface area disturbance or subsidence."*

The Gateway Panel rejects this conclusion because:

- The NSW Government has verified 1,933 ha of land within the Project Boundary as Equine CIC, this mapping was available to the Applicant in October 2013 **and** the Applicant acknowledges the area of verified CIC (e.g. see Barnett 2013, p.14);
- The Interim Verification Protocol relied upon by Barnett (2013) was associated with draft CIC mapping (DP&I, 2012), can not be used with the current mapping and, as it has been superseded by a Government verification process, is obsolete; and,
- Verification of CIC land has never been a component of the Gateway process.

It is the Gateway Panel's opinion that impacts on the land through surface disturbance and subsidence will have a significant impact on the Equine CIC because:

- There is 1,933 ha of verified Equine CIC land within the Project Boundary area;
- The Project proposes a disturbance footprint of 2,667 ha for open-cut and underground coal mining;
- The Project proposes open-cut and underground coal mining that directly impacts lands within this CIC; and,
- The Applicant has misconstrued the Gateway process and failed to put forward a compliant or considered assessment of its potential impacts on the Equine CIC.

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

Barnett (2013) states: *"The Project disturbance footprint is not directly situated on land utilised for the operations of verified equine CIC enterprises. In this regard, the Project will not impact the equine CIC through reduced access to land resources."* The Gateway Panel rejects this conclusion.

It is the Gateway Panel's opinion that reduced access to, or impacts on, water resources and agricultural resources will have a significant impact on the Equine CIC for the reasons stated previously (refer to Section 5.2.1).

The Gateway Panel notes the Applicant has already directly impacted the Equine CIC through its acquisition of land, e.g. Bylong Park Thoroughbreds, and implemented land use change, i.e. in this instance, from thoroughbred horse breeding to cattle grazing. The nature and extent of these impacts have not been assessed in the Application.

5.2.3 Reduced access to support services and infrastructure

Barnett (2013) concludes with regard to support services and infrastructure that: *"The land and any associated equine enterprise within the Project disturbance footprint, Project Boundary and the broader locality have been verified as not meeting the definition or criteria of the equine CIC as outlined in **Section 3.2.** In this regard, the Project will not impact the equine CIC through reduced access to support services and infrastructure."* The Gateway Panel rejects this conclusion.

It is the Gateway Panel's opinion that reduced access to support services and infrastructure will have a significant impact on the Equine CIC for the reasons stated previously (refer to Section 5.2.1).

5.2.4 Reduced access to transport routes

Again, the Applicant's agricultural impact statement argues that *"the land and any associated equine enterprise within the Project disturbance footprint, Project Boundary and the broader locality have*

been verified as not meeting the definition or criteria of the equine CIC as outlined in ***Section 3.2.*** *In this regard, the Project will not impact the equine CIC through reduced access to road transport routes, services and infrastructure"* (Barnett, 2013). The Gateway Panel rejects this conclusion.

It is the Gateway Panel's opinion that reduced access to transport routes will have a significant impact on the Equine CIC for the reasons stated previously (refer to Section 5.2.1).

5.2.5 The loss of scenic and landscape values

Lastly, Barnett (2013) again states that *"the land and any associated equine enterprise within the Project disturbance footprint, Project Boundary and the broader locality have been verified as not meeting the definition or criteria of the equine CIC as outlined in* ***Section 3.2.*** *In this regard, it is considered that the Project does not significantly compromise the scenic and landscape settings of the equine CIC to the south of the Project Boundary."* The Gateway Panel rejects this conclusion.

It is the Gateway Panel's opinion that the loss of scenic and landscape values will have a significant impact on the Equine CIC for the reasons stated previously (refer to Section 5.2.1).

6 Conditional Gateway Certificate

The Gateway Application for the Bylong Coal Project proposes open-cut and underground coal mining within a Project Boundary area that incorporates 2,366 ha of Applicant-verified BSAL and 1,933 ha of Government-verified Equine CIC land.

The Application states that up to 401 ha of verified BSAL will be impacted and that various management measures will ensure that the agricultural productivity of that BSAL is not significantly affected (Hansen Bailey, 2014). With regard to

(a) the nature, extent and duration of potential impacts; and,
(b) the avoidance, mitigation, offset and rehabilitation measures put forward in the Application in respect of potential impacts,

it is the opinion of the Gateway Panel that

(a) the Project would have direct and significant impacts on the agricultural productivity of verified BSAL within the Project Boundary area;
(b) indirect impacts on verified BSAL within the Project Boundary area have not been assessed and are potentially significant; and,
(c) indirect impacts on potential BSAL adjacent to the Project Boundary area have not been assessed and are potentially significant.

The Application states the Project land *"does not meet the criteria to be classified as Equine Critical Industry Cluster"* and all Gateway requirements concerning the Equine CIC *"should not apply to the Bylong Coal Project"* (Hansen Bailey, 2014). The Gateway Panel rejects the premise, method and conclusion of the Applicant in relation to its assessment of potential impacts on the Equine CIC.

The Application is non-compliant with respect to its assessment of impacts on the Equine CIC.

With regard to

(a) 1,933 ha of Government-verified Equine CIC land;
(b) the nature, extent and duration of potential impacts on that land and the Equine CIC; and,
(c) the overt lack of any proper avoidance, mitigation, offset and rehabilitation measures put forward in the Application in respect of potential impacts,

it is the opinion of the Gateway Panel that the Project would have a significant impact on the Equine CIC.

Although not assessed by the Applicant, the Project has already directly impacted the Equine CIC through its acquisition of land, e.g. Bylong Park Thoroughbreds, and implemented land use change, i.e. in this instance, from thoroughbred horse breeding to cattle grazing.

The Application does not meet the Relevant Criteria (refer to Tables 2 and 3) and will be issued a Conditional Gateway Certificate.

Appendix A – Groundwater Assessment

Hydrogeology

The project correctly identifies the groundwater resources of the Bylong River alluvium as "highly productive" groundwater resources as they generally have total dissolved salts that are less than 1,500 mg/L and can yield water at a rate greater than 5 L/sec to a bore or well. The "less productive" groundwater resources are the Permian coal measures, Triassic sediments and Tertiary basalts that occur within the lease boundaries.

The complexity of the groundwater flow system is not yet sufficiently determined. For instance little is known about the location of geological faults or the impact of intrusive/extrusive volcanic rocks in the vicinity of the underground mine. There is also some doubt about the depth to the water table under the more elevated parts of the leases. Perched aquifers have been mooted as a possibility to explain water encountered at high elevations under hilly country. This is important information to get right as it will affect the mine inflow calculations.

The IESC believes that sediment compaction within the alluvium, at locations that have significant reduction in water levels, is a possibility. Whilst this is not considered to be a large risk the Panel agrees that it should be examined.

Groundwater Modelling

The MODFLOW-SURFACT software that was used to estimate pit inflows and local water level impacts is considered appropriate. The Panel agrees that the model is a Class 1 model (Barnet et al, 2012) and that it meets the AI Policy requirement for a simple model. The model has been developed in steady state mode and the calibration statistics are adequate for it to be used as a guide for assessing environmental impacts and mine inflows.

The model predicts that mining will cause a drawdown in water level up to a maximum of 18.5 m in one bore in the alluvium. In total 23 alluvial bores are impacted by drawdowns of 2 m or more. The predicted impacts are clearly greater than the Level 1 minimal impact considerations in the AI Policy thus further studies are required to fully assess the impacts. The drawdown contours provided should be considered as a guide until such time that a more robust and detailed model is available. The impacts will last the length of the mining operation, i.e. about three decades.

The drawdown impacts in the alluvium are likely to be sensitive to how surface water – groundwater interactions are handled in the model. For instance, in the sensitivity analysis applying a constant head of water in the Bylong River, buffered groundwater drawdown such that most bores in the alluvium north of the Eastern Open Cut Mining Area were unaffected by mining. The sensitivity analysis found that the river leakage rate was the most sensitive parameter to groundwater drawdown in the alluvium.

The Bylong River is an ephemeral river, so flow is not always present to recharge the alluvium. During drought times the impact of mining on alluvial water levels may be laterally more extensive and affect more bores than the current predictions. Any future modelling needs to more realistically handle surface water-groundwater connectivity. The Panel endorses the IESC recommendation to consider a variety of boundary conditions for streams across the model domain, including constant head or general head boundaries, river cells and drains to establish which is the most appropriate.

The proponent has stated that a more complex transient 3D numerical model will be developed for the EIS stage of the Development Application and that this will provide more certainty in the water budget and impact calculations.

The Panel believes that the development of a more complex model should include:

- Using time variant input data eg, stream flow, rainfall, ET, pumping data etc.;
- Distributed input parameters (T,Sy,Ss, River leakance);
- Better estimates of recharge, including consideration of the surface cracking that is likely to be experienced above the Underground Extraction Area in the vicinity of Dry Creek, as a result of subsidence;
- Improved hydrogeological knowledge on faulting, and the location of basalt flows, sills and dykes and their impact on groundwater flow.
- A sensitivity analysis that varies stream boundary conditions and justification of the conditions applied in the final groundwater model.
- An uncertainty analyses so the reader can gauge the probability of a particular outcome.

These modifications would more accurately represent the conceptual hydrogeology of the area and therefore improve confidence in the predictions of the impacts and mine inflows.

Water quality

A total of 295 water quality samples have been collected from 11 alluvial monitoring bores, six Permian monitoring bores and eight surface water sites. The analysis of samples includes EC, pH and a full major ion sample suites. The dataset represents a reasonable spatial and temporal set of baseline water quality within the lease boundaries.

Electrical conductivity (EC) for the alluvium ranges from 277 µS/cm to 2,547 µS/cm. The EC for the Permian Coal Measures ranges from 1,042 µS/cm to 2,774 µS/cm. Surface water sites average EC ranges from 224 µS/cm to 1,790 µS/cm .

The EC values for the groundwater in Permian sediments is low compared to some other sites in the Upper Hunter Valley.

The modelling shows that the proposed mining will induce drawdown in the alluvium in the first 10 years of the project when the open cut is active. This in turn will result in low salinity river water being drawn into the alluvium and eventually into the underlying bedrock. However post mining when water level recovery has occurred in the open cut areas (about 150 years after mining ceases) and equilibrium groundwater levels are approached the model predicts a 0.2 ML/day increase in surface flows post mining.

Whilst some detailed hydro-chemical work has been done to establish the groundwater quality of the alluvium and coal measures more work is required so that the post mining long term risk to surface waters can be established. The Panel endorses the IESC recommendations that more hydro-chemical characterisation of the coal measures and overburden, including the potential for saline and acid forming material be carried out.

KEPCO have identified that the effects of leachate from the disposal of fine and coarse reject material in the Eastern open cut may impact on the surrounding groundwater quality. They have

outlined a work proposal to better understand this issue and have undertaken to do the work for the preparation of the EIS. Until this work is done the Panel is not in a position to comment on whether the proposed mine will change the beneficial use of the aquifer at some locations or meet the 1% minimal impact criteria for connected surface waters, a requirement of the AI policy.

Subsidence and Groundwater Flow

The subsidence technical report (Appendix I) states that:

"The extraction of supercritical longwalls is expected to result in fracturing from the seam up to the surface. At the magnitudes of the predicted subsidence, the overburden is expected to have undergone large blocky movements, resulting in a network of fractures which is likely to increase the hydraulic conductivity between the surface and the seam at the areas of shallowest cover, with reducing potential for connectivity as depth of cover increases. It is likely, therefore, that some of the surface water flows in the ephemeral streams would be lost into the mine workings during high rainfall events."

The report also notes the higher potential for ponding to develop along the lower reaches of Dry Creek.

Of concern to the Panel is that the preliminary groundwater modelling completed to date does not include fractures that extend to the ground surface from the underground mine workings. The Panel requires that the updated groundwater model include the predictions of fractures back to the surface. This should improve the accuracy of the water budget for the underground mine.

The IESC suggestion that future iterations of the subsidence assessment should include a survey of the existing drainage lines and other surface water features and an assessment of their current condition, including associated vegetation, to provide a baseline against which the predicted changes to the landform can be assessed, is endorsed.

Water sharing Plan Rules

The Gateway application shows an understanding of the relevant water sharing plan (WSP) rules with respect to holding appropriate water access licences before mining is commenced. Predictions have been made, based on a preliminary groundwater model, on the number of unit shares needed to account for water taken from surface water sources, alluvial sources and porous rock aquifers on an annual basis. KEPCO already hold a significant quantity of groundwater access shares in the Bylong alluvium. They are prepared to acquire more shares, if needed, through the trading market.

The Panel understands that the daily flow rules within a WSP can be more restrictive during times of drought than the annual limitations and that any restrictions apply to both Unregulated River Access Licences and Groundwater Access Licences in highly connected systems such as the Bylong River. Known commonly as the cease to pump rule, it is generally invoked when the river flow falls below a specified flow or groundwater levels fall below a trigger level. NOW highlights water security for KEPCO as an issue for the proposed development. KEPCO have not indicated what they will do in the event of a cease to pump order being made.

There are 65 ML/y of unregulated surface water shares issued on the Bylong River. KEPCO require 215 ML/y of entitlement to cover their predicted surface water take. Because of the highly connected nature of surface water and alluvial groundwater the WSP allows for licence conversions

from surface to groundwater licences and visa versa in some situations. The Applicant has not demonstrated that it can obtain the necessary surface water licences. NOW approval will be required for any licence conversion to occur.

There is no water sharing plan, as yet, for the groundwater resources of the Porous rocks or basalts that occur within the leases areas. Both still have unassigned water so the proponent has the opportunity to acquire the necessary water licences (536 ML/y) via a controlled allocation order.

Surface Water

The Project is located within the catchment of the Bylong River, a tributary of the Goulburn River, which in turn is a tributary of the Hunter River. The Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources (2009) describes the connection between Bylong River flow and alluvial groundwater as highly connected. The Bylong River is ephemeral and drains generally northwards, from the south-east, through the Project Boundary. A number of tributaries feed into the Bylong River throughout the Project Boundary,

As a result of the proposed project, there is predicted to be an average reduction in baseflow to these streams of 0.58 ML/day (215 ML/y) during the 29-year mining period. Post mining, after groundwater levels have recovered to a new equilibrium there will be an increase in surface flows of 0.2 ML/day (73 ML/y) greater than pre-mining flows.

Hydro-chemical work is not sufficiently advanced in the Gateway documentation to assess if there will be any long-term impacts on surface water quality.

Table 1 below provides the Panel's assessment against individual AI policy requirements

TABLE 1

ASSESSMENT AGAINST AI POLICY 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 work was undertaken using a simple calibrated steady state model. The results whilst adequate at this early stage of planning are broad in nature. For an EIS the proponent needs to develop a more robust and detailed groundwater flow model using up to date data that will more accurately depict groundwater flow conditions.	Using a transient 3D groundwater flow model re-calculate the volumes of water to be taken from each water source. Provide this information in the EIS together with all assumptions made and data used. Include information on: • A strategy for accounting for any water taken beyond the life of the operation; • Quantification of any uncertainties in the groundwater or surface

Requirement	Assessment	Recommendation
		water modelling; • A plan for monitoring actual water take and how any changes from the predictions will be accounted for with water licences and remediation.
2. A strategy for obtaining appropriate water licenses for the maximum predicted annual take	The proponent holds 1950 ML/y in groundwater entitlements in the Bylong alluvium. KEPCO have indicated that more alluvial water entitlements will be acquired through property purchases. Current estimates are that they need 469 ML/y of alluvial water. Approximately 536 ML/y in groundwater entitlements are required in the Permian sediments. This water source is not under a water sharing plan and is not embargoed for the issue of further entitlement. It is unclear how KEPCO will obtain the 215 ML/y of surface water that is required to account for water take from the Bylong River and Lee Creek.	The proponent should demonstrate more clearly how they will obtain the necessary Unregulated Surface licences to account for their estimated 215 ML/yr water take.
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: • Water table depth under elevated country; • Potential effects of geological faulting on groundwater flows; • An understanding of how the basalts (including sills	Undertake more studies to establish baseline groundwater conditions. Including: • Determining the depth to water table under elevated country; • Determining the likely effects of geological faulting on groundwater flow; • Determining how the basalts (including sills and dykes) may affect groundwater flow;

Requirement	Assessment	Recommendation
	and dykes) may affect groundwater flow; • The interaction between surface and groundwater • The hydrochemistry of the spoil and reject material. • Groundwater recharge	• Determining the interaction between surface water and groundwater • Establishing the hydrochemistry of the spoil and reject material. • An assessment of Groundwater recharge
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 holding the appropriate licences the proponent has not demonstrated how they would operate the mine under the water sharing plan rules. In particular the implication of reduced available water determinations (AWDs), the cease to pump rule, and the one way trading rules between surface water and alluvial groundwater sources have not been discussed.	The proponent should provide a strategy for complying with the rules of the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources
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 but is required in non water sharing plan areas, such as for the Permian porous rocks. Impacts are similar to 6 below.	Same as 6 below.

Requirement	Assessment	Recommendation
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 are based on a simple model. The model gives broad results only. The results are satisfactory for the Gateway assessment but need to be upgraded for an EIS and Development application The proponent recognises the limitations of the work to date and has outlined a pathway to a more detailed groundwater model.	Using a calibrated transient 3D model re-calculate the impacts on nearby licenced water users. This updated modelling and reporting should: • Capture the complexity of the site • Use temporal input data • Have distributed input parameters • Quantify any uncertainties in the groundwater/surface water impact modelling
7. Estimates of potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems	Limited work has been completed to date (desk study only). Field studies are being undertaken to determine if GDEs are present. Detailed results are not available for the Panel to assess.	Undertake a detailed assessment on the potential impacts of mining on GDEs and report on mitigating options as necessary.
8. Estimates of potential for increased saline or contaminated water inflows to aquifers and highly connected river systems	The Panel is not in a position to comment on the potential for water quality changes until more work is completed. Some hydro-chemical work has been done to determine baseline groundwater quality of the alluvium and coal measures. Leachate tests of the spoil and the tailings materials have not been undertaken but are proposed for inclusion in an EIS.	Undertake studies to better characterize the hydrochemistry of spoil and tailings materials, including the potential for saline and acid forming drainage. The proponent should use these results together with the upgraded groundwater flow model to predict changes in water quality in both the alluvial aquifers and surface streams.
9. Estimates of potential to cause or enhance hydraulic connection between aquifers	The subsidence report (Appendix I) outlines the possible extent of fracturing above the underground mining site. This work will be refined	Include the fracturing results of the subsidence studies in the updated modelling for the EIS.

Requirement	Assessment	Recommendation
	for the EIS. The current model does not handle fracturing from the coal seams back to the surface. This is a concern to the Panel as inflows to the underground mine may be larger than predicted.	
10. Estimates of the potential for river bank stability, or high wall instability or failure to occur.	Not considered to be a risk to water resources.	NA
11. Outline of the method for disposing of extracted water (in the case of coal seam gas activities.	NA	NA

Mining & Petroleum Gateway Panel

Mr Mike Young
Director
Resource Assessments
NSW Department of Planning and Environment
GPO Box 39
Sydney NSW 2000

9th September 2016

Dear Mike

Bylong Coal Project (SSD 6367)
Gateway Certificate and Recommendations

Thank you for your request to the Gateway Panel to provide advice on the Bylong Coal Project

A Gateway Panel team of Professor Snow Barlow, Mr George Gates and Dr Ian Lavering has met to consider your request for advice on:

1. *Do the recommendations in Schedule 2 of the Gateway Certificate issued for the Bylong Coal Project on 15 April 2014 need to be revised due to the changes in the project description stated in KEPCO'S letter dated 20 October 2014?*

2. *If so, what revisions or additional advice would the Gateway Panel recommend?*

Mr Gates and Dr Lavering were part of the original Gateway Panel that assessed the Bylong Coal project in 2014.

The Gateway Panel advises that:

1. The recommendations of Schedule 2 of the Conditional Gateway Certificate issued for the Bylong Coal Project on 15th April 2014 do not need to be revised due to the changes in the project outlined by the KEPCO letter dated 20th October 2014.

2. To answer the above questions we have referred to the Bylong Coal Project EIS currently under consideration. We can also advise that KEPCO has substantially addressed the issues outlined in Schedule 2 of the Conditional Gateway Certificate.

3. To aid in your assessment of the Bylong Coal Project EIS, we have provided a summary of the actions taken to address the issues raised in Schedule 2 of the

Conditional Gateway Certificate - *please see attachment 1 to this letter.*

Thank you for the opportunity to comment on these proposed changes to the Bylong Coal Project. If you require clarification of any of the issues raised in this letter or Attachment 1 please contact Professor Snow Barlow as Chair of the Panel.

Yours sincerely

Professor Snow Barlow
Chair
Mining and Petroleum Gateway Panel

NSW Mining and Petroleum Gateway Panel Advice on the KEPCO Bylong Coal Project EIS in relation to recommendations in the Conditional Gateway Certificate of 15th April 2014			
Relevant	**Consideration**	**Recommendations**	***Advice***
17H4(a)(i), (ii), (v), (vi)	The proposal to remove 194.4 ha of verified BSAL soils from within the planned open-cut mining area and the 're-creation' of this BSAL elsewhere lacks precedence and necessary detail.	With regard to the removal and recreation of verified BSAL soils: 1. Undertake a risk assessment that identifies the hazards and proposes controls with respect to the movement of BSAL soils; 2. Identify a final location for the verified BSAL soils within the Project Boundary area; 3. Detail the methods proposed for the handling, storage and treatment of the verified BSAL soils; 4. Propose alternate mitigation measures to be implemented in the event that the methodology selected results in the loss of verified BSAL soils post-implementation.	**Satisfactorily Addressed** *Risks and potential hazards of relocation of BSAL soils discussed. Protocols and quality control measures identified* **Satisfactorily Addressed** *Proposed location of BSAL soils in the project area clearly identified areas of relocation appropriate for the redevelopment of productive BSAL soils in terms of slope and existing BSAL soils* **Satisfactorily Addressed** *Clear principles and methods for storage of relocation of BSAL soils outlined. Adequate monitoring and reporting procedures outlined for this storage and relocation*. **Addressed in Part** *Monitoring of productivity targets of relocated BSAL soils proposed together with research and development programs to assist in solving any emerging problems with relocated BSAL soils.* *In the event of failure to achieve objectives no detailed mitigation plan outlined*

17H4(a)(iv)	Significant impacts are anticipated on highly productive groundwater and the consequent connection between surface and groundwater in modeling requires more detailed evaluation.	1. Develop a more complex transient 3D numerical model for the EIS stage of the Development Application which includes improved time variant input data, more details on recharge, geological imperfections (dykes, sills & faults), fractures from subsidence, and a sensitivity/ uncertainty analysis.	**Satisfactorily Addressed** A comprehensive 3D numerical groundwater flow model has been developed and independently reviewed as 'fit for purpose'. The model is suitable to be used for estimating mine inflows and water level impacts. The model is calibrated over a short time period (2-3yrs) and predictions would be improved by updating the model on a regular basis (say 3-5yrs).
		2. Complete baseline studies for the project area to improve knowledge on water levels, and groundwater dependent ecosystems.	**Satisfactorily Addressed** Additional work was carried out to identify groundwater dependent ecosystems and potential impacts have been assessed. The existence of a perched water table above the longwall mining area has been identified. Its storage and flow characteristics are not well defined.
		3. Provide an assessment of the hydrochemistry of spoil and tailings materials, and potential impact on nearby water sources.	**Satisfactorily Addressed** A mine waste plan and a water management plan is to be developed to established ongoing monitoring and triggers for action. A slight increase in salinity is predicted to occur in the alluvial sediments and connected stream flow, in the long term.
		4. Provide a strategy for complying with the rules of the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources. In particular the implication of reduced available water determinations (AWDs) and the cease to pump rule.	***Addressed in part.*** KEPCO hold significant water entitlements and will use the water trading market if additional water is needed. It is not clear in the EIS, how a cease to pump order on pumping from the Bylong River or alluvial sediments, during extreme drought, would be handled e.g. stream flow losses caused by mining.
		5. Supply a plan for monitoring actual water take and how any changes from the predictions will be accounted for with water licenses and remediation.	**Satisfactorily Addressed** A water management plan will be developed in consultation with DPI Water to determine a suitable monitoring program and trigger levels.

17H4(a)(i)	Mine waste emplacements have been designed with steep slopes to minimize footprint disturbance areas.	1. Conduct an analysis of short and long term geotechnical stability risk of waste emplacement slope gradients. 2. Demonstrate that all final landform slope gradients are geotechnically stable in the long-term and have factors of safety of 1.5 or better. 3. Demonstrate that all final landform slope gradients are erosionally stable.	**Addressed satisfactorily** Geological detail has been provided. Geological imperfections are identified and analysis of their impacts demonstrated. Subsidence features are identified in general terms. Geological labelling of features is clarified
17H4(b)(i), (ii), (iii), (iv), (v)	NSW Government has verified 1,933 ha of land within the Project Boundary area as Equine CIC land. The potential impacts of the Project on the Equine CIC have not been properly assessed.	Using the Guideline for Gateway Applicants (September 2013) by Department of Planning & Infrastructure, provide a compliant and comprehensive assessment of the Project's potential impacts on the Equine CIC.	**Not Adequately Addressed** The panel does not accept that the Equine CIC within the project area is insignificant because of its relative size and location. In the past century this area has a history of distinguished and very successful horse breeding, particularly thoroughbreds. A comprehensive assessment of the alternative availability of the physiographic resources for horse breeding with the current CIC area has not been carried out. This should be done for the medium term future, beyond the life of the mine.