

**Report by the Mining & Petroleum Gateway Panel
to Accompany a Conditional Gateway Certificate
for the Drayton South Coal Project**

April 2nd, 2015

Report by the Mining & Petroleum Gateway Panel to accompany a Conditional Gateway Certificate
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Executive Summary

The Mining & Petroleum Gateway Panel (the Gateway Panel) has determined an Application for a Gateway Certificate by Anglo American Coal Pty Ltd (the Proponent) for its proposed Drayton South Coal Project (the Project) in the Upper Hunter region 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.

This Gateway Application is a revision of a larger mining project application previously submitted for approval under Part 3A of the Environmental Planning and Assessment Act 1979 prior to the establishment of the Gateway Panel. The Panel has previously provided written advice on the impacts of the original mine proposal to the Director General of the Department of Planning and Infrastructure. The Project as now submitted proposes a smaller open cut coal mine located approximately 13 km south of Muswellbrook and within EL5460. A 1470.9 ha Project Disturbance Area (PDA) (including 100m buffer) is 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, and the proponent has identified 78.8 ha of Biological Strategic Agricultural Land (BSAL) within the PDA. There is no critical industry cluster (CIC) land, either equine or viticulture, mapped or located within the PDA.

The Gateway Panel records that much of the documentation provided by the Proponent for the Gateway Application is material that has been compiled for the previous, larger mine development and as such lacks specificity in some areas.

The Gateway Panel finds that the verification of BSAL within the PDA is incomplete and this has implications for assessing the full extent of the Project's impact on BSAL. However, it is determined that the open cut mining operation will have significant direct impact on the agricultural productivity of any BSAL verified within the PDA through surface disturbance, reduction in soil fertility and structure, alteration to effective rooting depth, increased drainage and fragmentation of land use following the proposed landform rehabilitation. More definitive information on the rehabilitation program is required to determine the direct impact on the final land surface slope and rockiness, soil salinity and soil pH.

The Gateway Panel also finds that there is likely to be no significant direct or indirect impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy) as a result of the Project. The water impacts of the proposed mine on the Hunter Alluvial aquifer will be less than the Level 1 minimal impact considerations in the AIP. However the Gateway Panel notes that updates and modifications to groundwater base data and modelling are required for an improved understanding.

The Gateway Panel recommends that the Proponent:

- Reassess current site survey data, and undertake further site observation as necessary, for the accurate verification of BSAL within the PDA.
- Update groundwater modelling to provide more accurate water flow and quality information.
- Provide a clearer program for proposed reinstatement of BSAL and the final land use of the rehabilitated landform.

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1 Purpose and Methodology

In accordance with *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 Gateway Certificate issued on this day to the Drayton South 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:

Associate Professor Brett Whelan, Chairperson – agricultural discipline;
Mr George Gates PSM – hydrogeology discipline; and
Mr Geoff Sharrock – mining discipline.

1.2.2 Gateway Panel Meetings

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

- On 13th February 2015 in Sydney, to consider the information included in the application
- On 13th March 2015 in Sydney, following receipt of Referring Agency advice.

1.2.3 Meetings with the Proponent or Third Parties

The full Gateway Panel (8 members minus A/Prof Brett Whelan) participated in a drive-over inspection of EL 5460 on the 16th Feb 2015 as part of a field trip to familiarise members of the Gateway Panel with the broad strategic agricultural land issues in the Hunter Valley. Anglo American Coal Pty Ltd (the Proponent) was represented by consultants from Australian Groundwater and Environmental Consultants Pty Ltd (AGE) and Hansen Bailey.

Nearby thoroughbred horse studs “Coolmore” and “Darley Woodlands” were inspected on the same day.

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 Natural Resources, Lands and Water.

On 23rd February 2015, the Gateway Panel received advice from the Commonwealth Independent Expert Scientific Committee (IESC, 2014). The Gateway Panel received advice from the NSW Minister for Natural Resources, Lands and Water on 4th March 2015.

1.2.5 Document Review

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

Australian Groundwater and Environmental Consultants Pty Ltd (AGE), 2012a. *Drayton South Coal Project Gateway Application – Appendix C, Groundwater Impact Assessment*, 163p.

Australian Groundwater and Environmental Consultants Pty Ltd (AGE), 2012b. *Drayton South Coal Project Gateway Application – Appendix C, Groundwater Impact Assessment Drawings 14-31, 18p.*

Australian Groundwater and Environmental Consultants Pty Ltd (AGE), 2012c. *Drayton South Coal Project Gateway Application – Appendix C, Groundwater Impact Assessment Drawings 32-40/Borehole Logs/Falling Head Test Analysis/Transient Validation Hydrographs/Spatial Distribution of Horizontal Hydraulic Conductivity/Cross Sections of Model Predictive Results, 83p.*

Drayton South Coal Project Gateway Application Schedule of Lands, *PDF as provided in the applicant's initial submission.*

Hansen Bailey, 2015a. *Drayton South Coal Project Gateway Certificate Application Supporting Document.*

Hansen Bailey, 2015b. *Drayton South Coal Project Gateway Certificate Application – Appendix F, Visual Assessment, 25p.*

Scott Barnett & Associates Pty Ltd (SBA), 2012. *Drayton South Coal Project Gateway Application – Appendix E, Agricultural Impact Statement, 100p*

SLR Consulting Australia Pty Ltd (SLR), 2015a. *Drayton South Coal Project Application for Gateway Certificate – Appendix B, BSAL Site Verification Assessment, 105p.*

WRM Water & Environment Pty Ltd (WRM), 2012. *Drayton South Coal Project Gateway Application – Appendix D, Surface Water Impact Assessment, 138p.*

The Gateway Panel has also reviewed the following documentation provided by the applicant as a revision to the original submission for the Gateway Panel to assess.

SLR Consulting Australia Pty Ltd (SLR), 2015b. *Drayton South Coal Project Application for Gateway Certificate – Appendix B, BSAL Site Verification Assessment: Revision 1, 117p.*

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

IESC, 2015. *Advice to the Decision Maker on Coal Mining Project, ISEC 2015-064: Drayton South Coal Project – Expansion.* Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, Department of Environment, Canberra, 23 February 2015.

Minister for Natural Resources, Lands and Water, 2015. *Including covering letter; Attachment A: Advice on the Gateway Certificate Application: Drayton South Coal Project; Technical Assessment by the NSW Office of Water for the Minister for the Natural Resources, Lands and Water, 4 March 2015.*

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.

Merrick, 2012. *Independent Groundwater Model Review by Heritage Computing for Drayton South Coal Project*. <http://www.mpgp.nsw.gov.au/>

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

NOW, 2015. *Drayton South Coal Project - Technical Assessment by the NSW Office of Water for the Minister for the Natural Resources, Lands and Water*, 4 March 2015.

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 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.

NSW Government, 2006. *Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2006*. NSW Legislation, State of New South Wales, 2006.

2 The Proposed Project

Anglo American Coal Pty Ltd (the Proponent) is the controlling partner in a joint venture that currently operates the Drayton Mine near Muswellbrook in the Upper Hunter Valley of NSW. The Drayton Mine is an open cut enterprise that began production of steaming coal in 1983 and currently operates under Project Approval 06_0202 granted on 1 February 2008 (expiring in 2017). The steaming coal is transported to the Port of Newcastle via the Antiene Rail Spur that was approved under Development Consent 106-04-00 (expires in 2025).

The proposed Drayton South project (the Project) is the development of a further open cut mining operation in an area to the south of the current mining operation (Figure 1). The project boundary is encompassed within Exploration Licence 5460 and the proponent has submitted that the Project Disturbance Area (PDA) will be approx. 1470 ha (Figure 2). The Project is located on land subject to the Upper Hunter Strategic Regional Land Use Plan (DP&I, 2012a).

Other notable elements of the proposed project are as follows:

- The continuation of operations at Drayton Mine as presently approved with minor additional mining areas within the East, North and South Pits;
- The development of an new open cut mining operation extracting up to 7 Million tonnes per annum of Run of Mine coal over a period of 15 years within the Drayton South area;
- The utilisation of the existing Drayton Mine equipment fleet;
- The employment of a workforce of up to 500 full-time equivalent employees;
- The use of Drayton Mine's final landform voids for rejects and tailings disposal and water storage;
- The utilisation of the existing Drayton Mine infrastructure including the Coal Handling and Preparation Plant, rail loop and associated loading infrastructure, workshops, bath houses and administration offices;
- The construction of a transport corridor to the Drayton South mining area;
- The continued utilisation of the Antiene Rail Spur off the Main Northern Railway to transport product coal to the Port of Newcastle for export;
- The realignment and upgrading of a section of Edderton Road;
- The installation of further water management and power reticulation infrastructure to support mining in the Drayton South area;
- Continuation of mutually beneficial arrangements with neighbours Macquarie Generation and Mt Arthur Coal Mine; and
- Progressive rehabilitation of disturbed areas as mining operations are completed.

The proponent of 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 for which a mining lease under the Mining Act 1992 is required to be issued because there is no current mining lease in relation to the proposed development.

The land within the PDA is entirely owned by the Proponent and is primarily used for beef cattle grazing purposes at present. Some winter fodder cropping is also undertaken to supplement cattle feeding. The types of industries surrounding the PDA include open cut coal mining, power generation, thoroughbred horse breeding, viticulture, dairy and beef cattle grazing (SBA, 2012).

An area of 218.2 ha was identified as verified BSAL within the PDA by SLR Consulting Australia (SLR, 2015a) in the original Gateway Certificate Application documentation (Figure 3). The Proponent subsequently submitted a revised BSAL Site Verification Assessment (SLR, 2015b) identifying a reduced amount (78.8 ha) of verified BSAL (Figure 4).

No equine or viticulture enterprises are located within the PDA.

3 Strategic Agricultural Land Verification

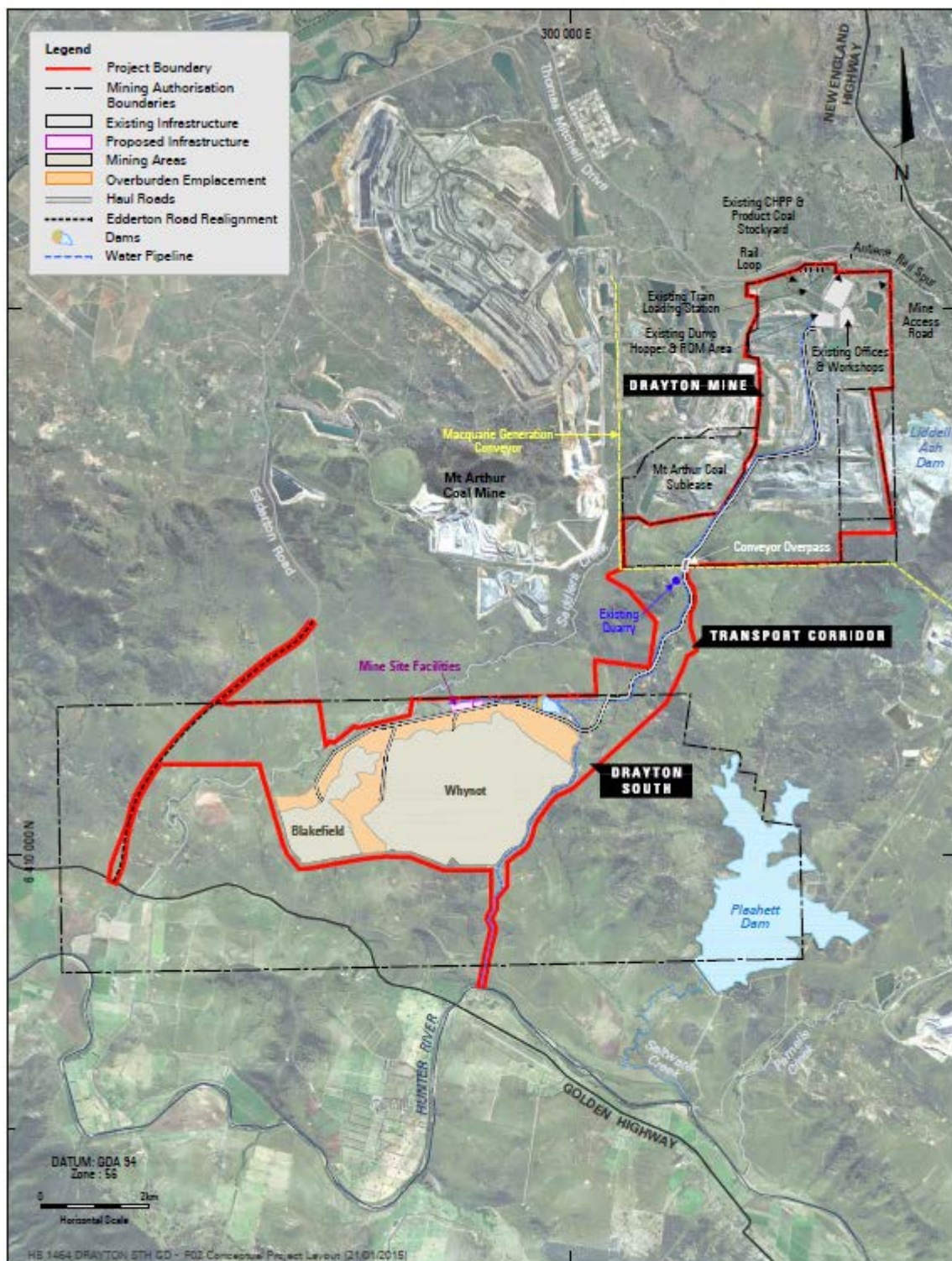
3.1 Biophysical Strategic Agricultural Land (BSAL) Verification

For the identification of BSAL within the 1,470.9 ha of the PDA the applicant has applied the Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land (BSAL Protocol) (OEH & OASFS, 2013). Through this process an area of 433.1 ha was excluded from more detailed site analysis due to proponent-identified failure of the land to meet slope and contiguous area criteria of the BSAL Protocol. An area of 1,037.8 ha within the PDA was subsequently considered for detailed site survey.

BSAL Protocol requires that a risk of impact to agricultural resources be qualified and used to determine the minimum observation site density for detailed soil surveys. The assessment conducted by the Proponent identified the project activity to be at high risk of significant impact to agricultural resources (SLR, 2015a) for which BSAL Protocol requires a minimum observation density of 1:25,000 (1 site per 25 ha).

The original BSAL Site Verification Assessment supplied by the Proponent with the Gateway Certificate Application (SLR, 2015a) allocated 46 sites within the survey area for detailed laboratory analysis (1 per 23ha) with a further 13 check sites (field description only). Analysis of the site data verified a total of 218.2 ha of BSAL. A subsequent revision of the BSAL Site Verification Assessment submitted by the proponent during the Gateway Application assessment process (SLR, 2015b) increased the number of laboratory analysed sites to 57 (1 per 18ha) with a total of 17 check sites. The total verified BSAL was reduced to 78.8 ha in this document.

The change in verified BSAL in the revision document (SLR 2015b) results from a modification to the original boundaries of Soil Units 1 and 2 (originally identified as BSAL) which reduce their extent, and the subsequent removal of Soil Unit 2 from identified BSAL. While the Gateway Panel acknowledges that increased site sampling and analysis has been used to inform these decisions, there remain some inconsistencies regarding the removal of Soil Unit 2 from verified BSAL, its dominant soil type and the drawing of its boundaries.



DRAYTON SOUTH COAL PROJECT



Conceptual Project Layout

Figure 2. Project boundary and the proposed Project Disturbance Area (PDA), (Hansen Bailey, 2015a).

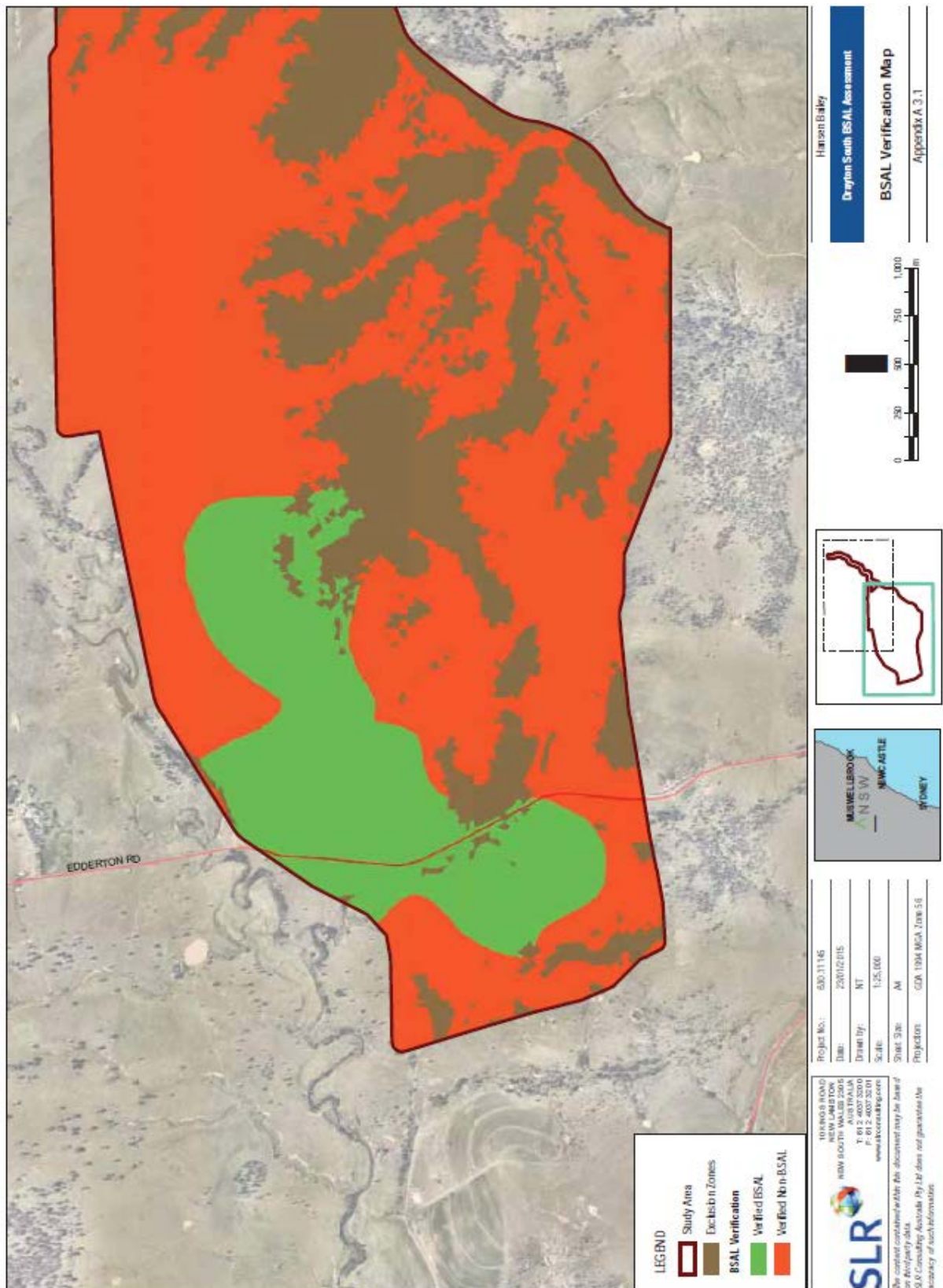


Figure 3. Map of verified BSAL within the proposed Project Disturbance Area (PDA) submitted by the Proponent with the Gateway Certificate Application (SLR, 2015a).

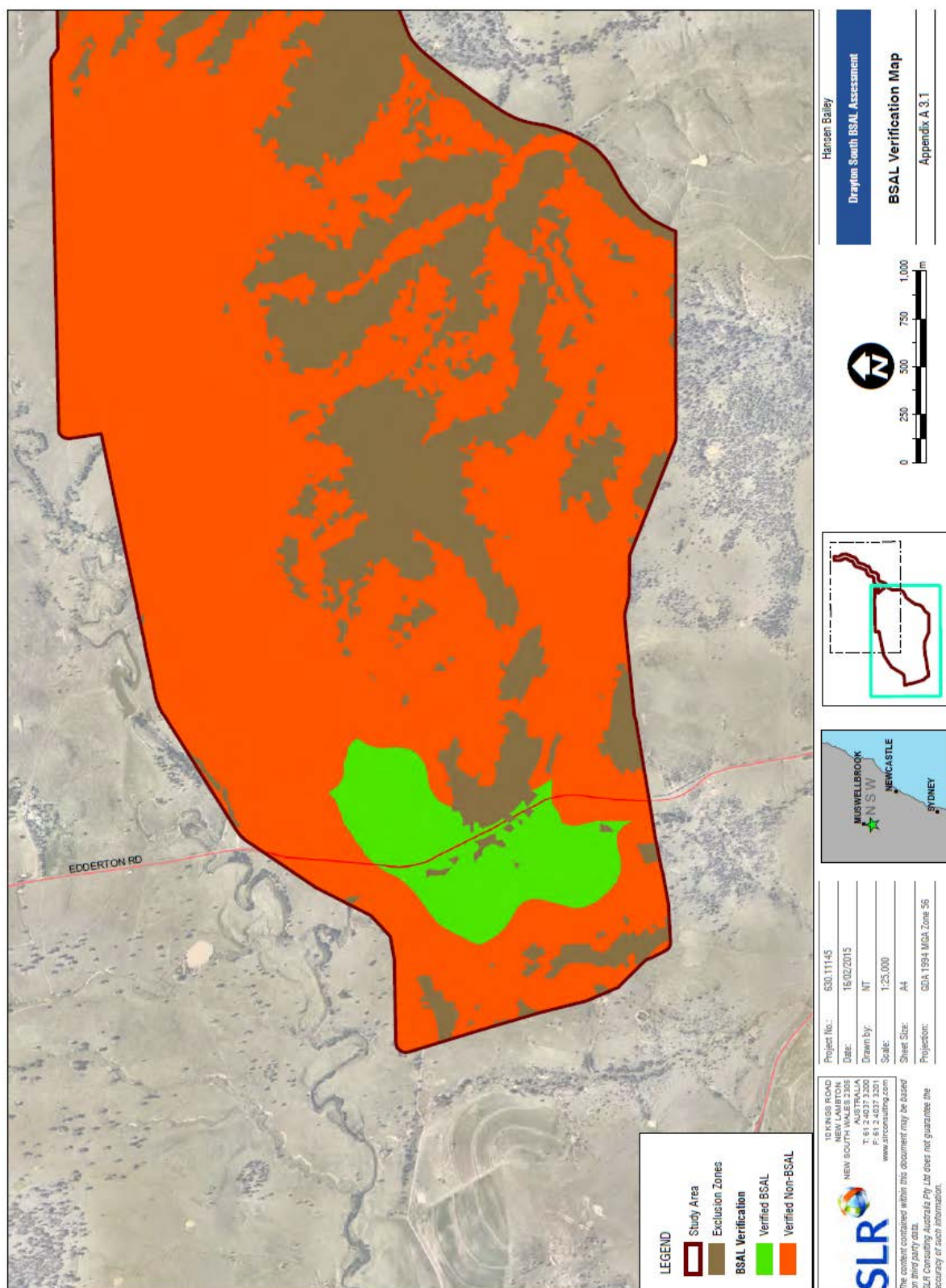


Figure 4. Map of verified BSAL within the proposed Project Disturbance Area (PDA) submitted by the Proponent in a revised BSAL Site Verification Assessment (SLR, 2015b).

Firstly, the justification for the re-classification of sites 11, 15 and 18 as non-BSAL (refer Figures 5, 6 and 7) based on failure to meet the salinity criteria (criteria 11) is difficult to corroborate based on data supplied. The soil salinity values as documented for Sites 11 and 15 do not exceed the criteria, and if the reported interpretation (SLR 2015b; Table 36) is applying a factor to convert values to saturated extract equivalence, this is certainly not explained or the texture assumptions elucidated. For Site 15, given the documented soil physical attributes, it is unclear how the site would fail the criteria using conversion factors suggested in the BSAL Protocol (OEH & OASFS, 2013). Site 18 is a check site and the salinity values are not reported. The BSAL Protocol requires a laboratory analysis to be provided in order to accurately assess a site against the salinity criteria.

Secondly, the dominant soil type for Soil Unit 2, as documented in Section 3.2, Table 10 (SLR, 2015b), is described as a 'Self-mulching brown Vertosol, deep, non-sodic with slightly saline subsoil and high CEC'. As the dominant soil type for Soil Unit 2, the properties recorded for this soil would qualify the Unit as BSAL.

Thirdly, in light of the above issues, the soil description provided for Site 10 (BSAL verified) and its location adjacent to the northern boundary of the revised Soil Unit 2, suggests that the site may be more accurately included within Soil Unit 2.

The Gateway Panel recommends that further investigation/clarification is required to correctly verify the extent of BSAL within the PDA, especially with regard to Soil Unit 2.

3.2 Critical Industry Cluster (CIC)

There are no viticulture or equine industry businesses on land within the proposed project boundary and PDA (Hansen Bailey, 2015a) so the assessment of impact on CICs is not triggered under the Gateway process.

However, equine and viticulture CICs are in proximity to the project boundary. It has been previously identified by the Gateway Panel (MPGP, 2013) that consequences of this proximity, such as loss of landscape values and impacts on the equine cluster viability, were the most material potential impacts of the mining operation as proposed at that time.

Given the significance of potential impacts and uncertainties with regard to mitigation, and the dearth of scientific literature concerning the potential impacts of open cut coal mining on nearby equine breeding enterprises, particularly with respect to environmental stressors such as noise, dust and vibration, the Gateway Panel concluded that the Precautionary Principle should be applied (MPGP, 2013).

The Gateway Panel acknowledges that the proponent has now submitted an updated mine plan with mine boundaries adjusted to be behind an identified ridge line on the southern boundary as recommended in MPGP, 2013. This will help reduce the visual impacts. Any impacts of the other potential stressors such as noise, dust and vibration appear to remain largely unknown.

4 Assessment of Mining Disturbances

The Gateway process requires that the potential impact on BSAL and/or a CIC is 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.

Therefore, the assessment of mining disturbance must consider both direct and indirect impacts as defined above.

4.1 Direct Mining Disturbances

The proposed open cut mine will directly disturb 1470.9 ha of land (the PDA) within EL 5460 through surface disturbance (Hansen Bailey 2015a).

4.1.1 Removal or Working upon Verified BSAL

All BSAL identified within the PDA will be removed during the course of open cut mining operations. The Gateway Panel believes that the exact area of BSAL remains to be accurately determined/clarified by the Proponent.

4.1.2 Duration of Impacts, Mitigation and Rehabilitation Measures

Agricultural operations on verified BSAL will cease until final landforming is completed according to the mining and rehabilitation schedule (Hansen Bailey, 2015a). The land where BSAL has been verified (SLR 2015a) and where the Gateway Panel believes further investigation/clarification is warranted, has been described as containing Land and Soil Capability Classes IV and V (OEH, 2012) and Agricultural Land Suitability Class 3 (NSW Agriculture 2002) by SBA (2015).

SLR (2015b) states that the Proponent is committed to progressively stripping and then reinstating the soils from the BSAL in the post-mining rehabilitated landform. How this will be achieved is not explained. The Gateway Panel notes that in the Agricultural Impact Statement (SBA 2015) the Proponent expects that post-mining, agricultural land within the PDA will no longer be available for agricultural purposes and instead rehabilitated to woodland communities. This outcome leads to the conclusion that the duration of impact on agricultural production from BSAL within the PDA would be indefinite.

The Proponent has proposed an offsite biodiversity offset of 2079 ha located near Murrurundi in the Liverpool Plains LGA (SBA, 2015). This land is described as containing Land and Soil Capability Classes between IV and VII (OEH, 2012) and Agricultural Land Suitability Classes between 4 and 5 (NSW Agriculture 2002) by SBA (2015). There is no verified BSAL or CIC enterprises on the offsite biodiversity offset.

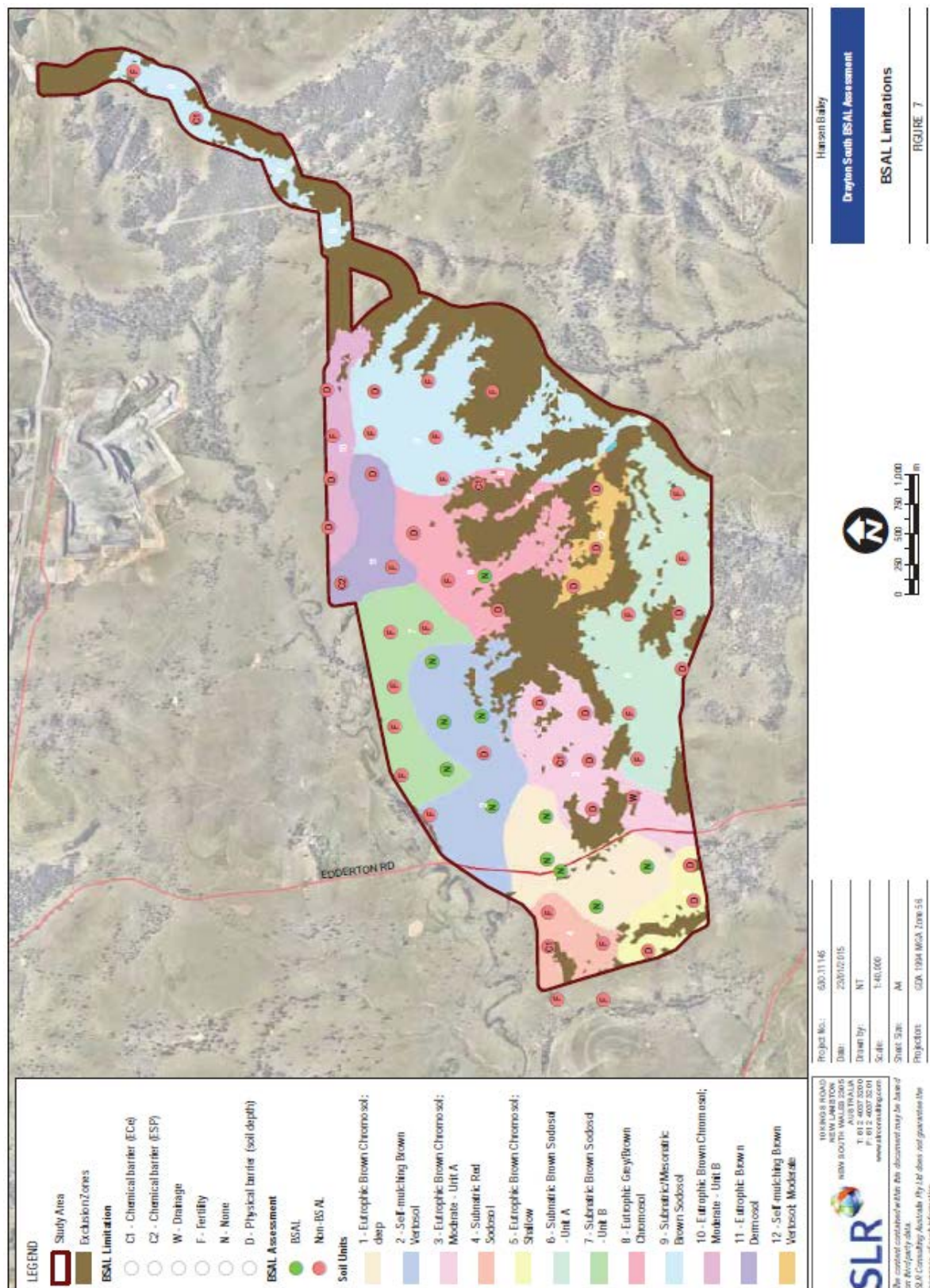


Figure 5. Map of originally identified Soil Units and the locations of originally verified BSAL observation sites and sites with BSAL limitations within the proposed PDA submitted by the Proponent in the original BSAL Site Verification Assessment (SLR, 2015a).

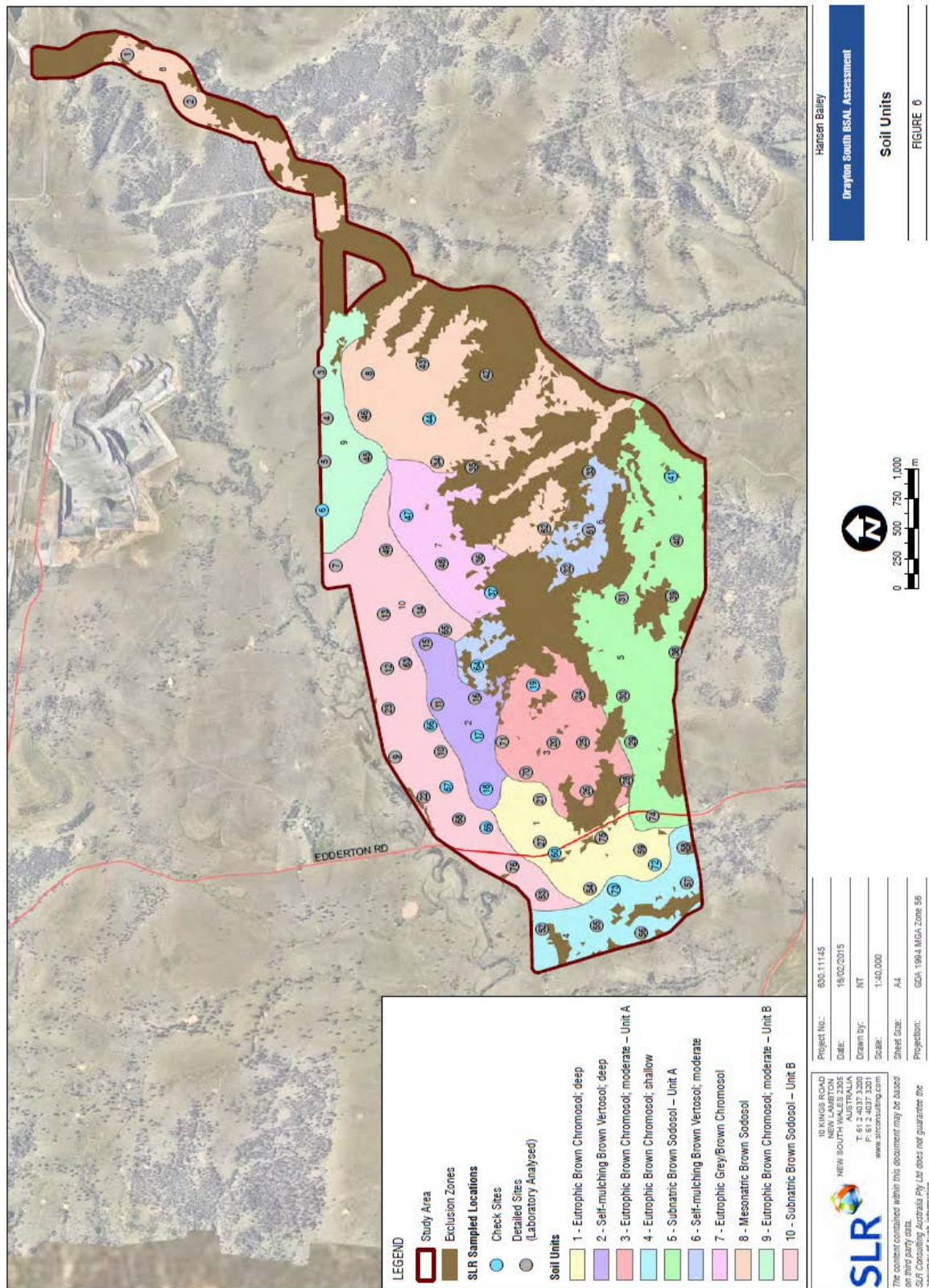


Figure 6. Map of reassessed Soil Units and the locations of all detailed and check observation sites within the proposed PDA submitted by the Proponent in a revised BSAL Site Verification Assessment (SLR, 2015b). Sites 52 to 75 are additional observation locations.

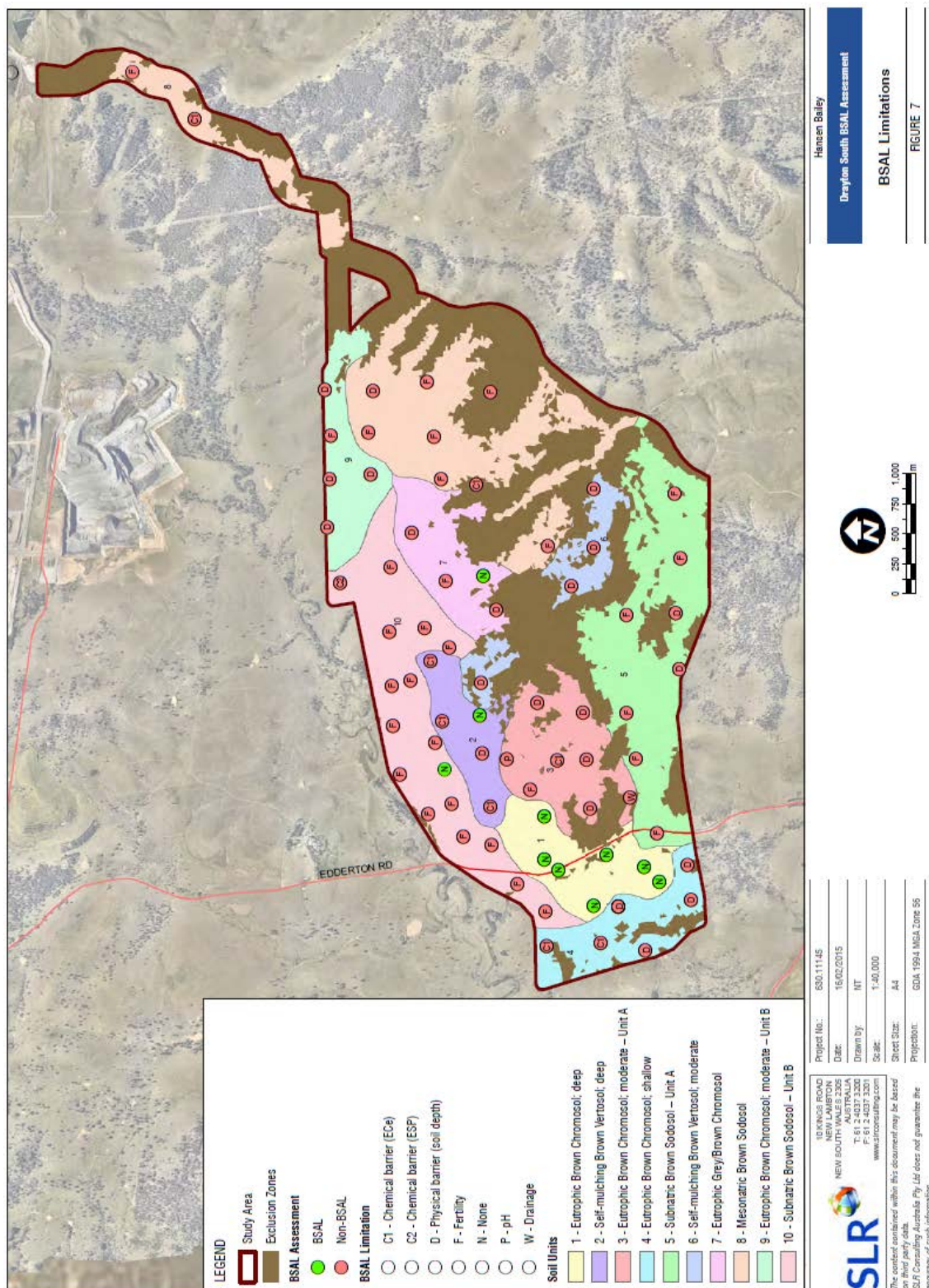


Figure 7. Map of verified BSAL observation sites and sites with BSAL limitations within the PDA submitted by the Proponent in a revised BSAL Site Verification Assessment (SLR, 2015b).

4.2 Indirect Mining Impacts

4.2.1 Impacts on Highly Productive Groundwater (Within the Meaning of the Aquifer Interference Policy)

Context and Background

This assessment should be read in conjunction with the previous Gateway Panel advice given to the Director General of the Department of Planning and Infrastructure (MPGP, 2013).

The Gateway application relies on groundwater modelling that was undertaken for a previous larger mine plan. The Gateway Panel agrees that the current smaller mine footprint should result in smaller water impacts. A better understanding of water impacts will only occur when an updated groundwater flow model is available for review.

The Gateway Panel has used the advice from both the Independent Expert Scientific Committee (IESC) (IESC, 2015) and the NSW Office of Water (NOW) (NOW, 2015) in undertaking this assessment.

Impact Assessment

The Gateway Panel considers the conceptualisation of the local and regional hydrogeology to be reasonable and that the processes of groundwater flow from one water source to another are plausible at a broad scale. At a local scale little appears to be known about geological faults and their effects on groundwater flow. Also a greater understanding of the connectivity between the alluvium and the Hunter River would improve the estimates of recharge processes in the modelling.

The Gateway application correctly identifies the Hunter River alluvium as a ‘highly productive’ groundwater source which meets 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 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 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 (IESC, 2015) and NOW (NOW, 2015) the model should be updated and recalibrated using up to date temporal data for rainfall, evapotranspiration and river flows. Other required improvements to the model are listed in Table 1 in Appendix A

The modelling predicts water impacts will be less than the Level 1 minimal impact considerations in the AIP. This is an acceptable level of impact. The advice provided by NOW (NOW, 2015) agrees with this assessment.

The current predictions of groundwater drawdowns show the development over time of steeply dipping cones of depression, located tightly around the mine site. Contours of drawdown pressure show that the decline is large in close proximity to the mine (10+m), reflecting the relatively low permeability of the Permian sediments. The impact on both the water table and pressure levels is very small at the Hunter River some 2Km to the south of the mine.

Whilst the cumulative impact approach adopted by the Proponent (adding together the impacts from other nearby mines via their modelling results) is not ideal, it is pragmatic and sufficient for the Gateway process.

The predictions of mine inflows require the Proponent to hold water licences of 76 units in the Hunter Unregulated and alluvial Water sources, 878 ML/yr in the Permian water source and 4 units in the Hunter Regulated River (NOW, 2015). These predictions require updating through the development of an updated groundwater model.

Water licences from the affected water sources are likely to be available through the trading market or through the NSW Government for the Permian water source. The volumes involved are not considered excessive. The proponent already holds 198 units of water from the Hunter Regulated River water source.

The Gateway Panel note that there are some explicit issues that have not been adequately addressed in the documentation provided. The first is the potential long term water quality changes (salinity) to the Hunter River and the second is impacts on Groundwater Dependent Ecosystems in Saddlers Creek. The Gateway Panel agrees with the IESC comment that an updated assessment of the potential accumulation of salts in the final void and the assessment of potential travel time of seepage to the Hunter River and its tributaries is needed (ISEC, 2015).

See Table 1 in Appendix A for the Gateway Panel's assessment against all AIP requirements.

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 follows (findings summarised in Table 1). There are no CIC operations within the Project Boundary.

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 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,	Potentially Significant impact
(iv) any impacts on highly productive groundwater (within the meaning of the Aquifer Interference Policy),	Not Significant
(v) any fragmentation of agricultural land uses,	Significant impact
(vi) any reduction in the area of biophysical strategic agricultural land.	Potentially Significant impact

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 PDA 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 BSAL. 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 (SLR 2015b) are moderately high to highly fertile Brown Chromosols and Brown Vertosols. The proponent's rehabilitation program states generally that stripped BSAL soil will be reinstated within the rehabilitated landform.

Unless the topsoil and subsoil, especially of the Chromosols, is 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 soils profiles 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 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 Hunter Alluvial aquifer will be less than the Level 1 minimal impact considerations in the AIP. This is an acceptable level of impact. This assessment takes into account the cumulative effect of other nearby coal mines. The cumulative impact work undertaken by the proponent is basic in its approach but is considered sufficient for a Gateway application.

5.1.5 Fragmentation of Agricultural Land Uses

The removal of land from agricultural production following landform rehabilitation (SBA, 2015) indicates significant fragmentation of agricultural land use will occur as a result of the Project.

5.1.6 Reduction in the Area of BSAL

The Gateway Panel recommends that further investigation/clarification be undertaken to better determine the extent of BSAL within the PDA. Until this is completed, and more detail of the proposed processes for BSAL restoration and woodland establishment are provided, the potential for reduction in BSAL (and its significance) cannot be adequately assessed.

6 Conditional Gateway Certificate

The Gateway Application for the Drayton South Coal Project proposes open cut coal mining within EL 5460. The Project Disturbance Area (PDA) of 1,470 ha incorporates at least 78.8 ha of proponent-verified 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 Disturbance Area.

7 Appendix A

Table 1. Gateway Panel Assessment for Drayton South Coal 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	<p>The water budget is out of date.</p> <p>The results are from a model calibrated in steady state mode and run in transient mode.</p> <p>The proponent has indicated that a more robust and detailed groundwater flow model will be built that more accurately depicts transient groundwater flow conditions.</p>	<p>Use a calibrated transient 3D groundwater flow model to re-calculate the volumes of water to be taken from each water source.</p> <p>Quantify any uncertainties in the groundwater modelling.</p> <p>Develop a plan for monitoring actual water take and how any changes from the predictions will be accounted for with water licences.</p>
2. A strategy for obtaining appropriate water licenses for the maximum predicted annual take	The proponent already holds some surface water entitlements and has indicated that all necessary water entitlements will be acquired through 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	<p>More work is required to establish baseline groundwater conditions. In particular the following is inadequately defined:</p> <ul style="list-style-type: none"> • Potential effects of geological faulting on groundwater flows; • The interaction between surface and groundwater near the Hunter River 	<p>Undertake more studies to establish baseline groundwater conditions. Including:</p> <ul style="list-style-type: none"> • Determining the likely effects of geological faulting on groundwater flow. • Determining the interaction between surface water and groundwater • Ensure that sufficient water level and water quality monitoring is undertaken in all major rock units affected by the impacts of mining.

Requirement	Assessment	Recommendation
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 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: <ul style="list-style-type: none"> • A strategy for mitigating the impacts of water losses from Saddlers Creek to the mine 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.	<ul style="list-style-type: none"> • Same as 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 are based on a groundwater flow model that does not reflect the new proposed mine plan. 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.	Using a calibrated transient 3D model re-quantify the impacts on nearby water assets (bores/wells and GDEs). This updated modelling and reporting should: <ul style="list-style-type: none"> • Capture the hydrogeological complexity of the site; • Use temporal input data; • Have distributed input parameters; • Quantify any uncertainties in the groundwater /surface water connection; • Use a variable boundary condition for the Hunter River; • Use shorter time steps; • Undertaking a parameter sensitivity analysis using a larger range for parameters Kv and Sy in keeping with advice from IESC (2015), & Merrick (2012); • Undertake an uncertainty analysis; • Include climate change in the sensitivity analysis.

Requirement	Assessment	Recommendation
7. Estimates of potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems	<p>Limited GDE studies have been undertaken.</p> <p>Saddlers Creek is highly modified from land clearing and cattle grazing.</p> <p>The IESC has requested further sampling of GDEs.</p>	Further assessment of Ecological impacts is required.
8. Estimates of potential for increased saline or contaminated water inflows to aquifers and highly connected river systems	<p>The proponent has stated that there will be no change in beneficial use of any aquifer or surface streams as a consequence of mining.</p> <p>Some hydrochemical work has been done to determine the baseline groundwater quality, and leachate tests conducted to predict the salinity in the final void. The results vary considerably and more work is required.</p>	<p>Update the assessment of the potential accumulation of salts in the final void and recalculate the potential travel times of seepage to the Hunter River.</p> <p>Include a simple uncertainty analysis using a range of hydraulic conductivity and porosity values.</p>
9. Estimates of potential to cause or enhance hydraulic connection between aquifers	Not considered to be a risk.	NA
10. Estimates of the potential for river bank stability, or high wall instability or failure to occur.	Not considered to be a risk.	NA
11. Outline of the method for disposing of extracted water (in the case of coal seam gas activities).	NA	NA