Appendix D

Agricultural Impact Statement – 41ha Review

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Rix's Creek Continuation of Mining Project

Agricultural Impact Assessment

Revised: Additional 41 ha

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Agricultural Impact Assessment

Revised (41 ha additional land)

An additional area in the Rix's Creek continuation project is to be assessed for agricultural impacts.

In the Rix's Creek continuation project this area was described as being disturbed under the current development consent approval DA49/94. To date the area has not been disturbed and was not assessed previously for loss of agricultural production.

The additional area covers 41 ha and consists of native pastures that have had a history of beef cattle grazing as part of a larger grazing enterprise. Management has been similar to that described in the original assessment. The beef cattle enterprise was conducted as part of the whole farm cattle breeding enterprise. Weaner cattle and cull cows are the main production from the area. Weaners are young stock sold through Singleton Saleyard generally at 7-9 months of age.

This beef enterprise is a common one conducted in the Hunter Valley region, particularly on lower quality pasture types.

The low productivity of the pastures is a consequence of the low natural fertility of the soils which support native pasture types with some introduced species.

Soils

The Soils and Land impact Assessment study conducted as part on the EIS (Appendix P) covered this 41 ha area.

Soil types found over this 41ha area include:-

- Eutrophic Brown Chromosol, and
- Subnatric Brown Sodosol.

Eutrophic Brown Chromosol soils were located within the steeper mid to upper slopes and ridgelines. They are limited to pockets of less than 20ha and are not contiguous.

These soils are of moderate fertility. The topsoil's are shallow in depth and slightly acidic. They have moderate Cation Exchange Capacities and are non-saline and non sodic, with moderate Organic Carbon levels. The subsoil's are mildly – moderately alkaline, heavy clay's with strong structure and high cation exchange capacity. They are sodic and imperfectly drained.

This soil type is potentially more productive for grazing enterprises than the more common subnatric brown sodosol's, though the available phosphorus in the topsoil is still low.

Subnatric Brown Sodosol soils have low natural fertility levels. The topsoil's are generally moderately acidic and non-saline, with moderate cation exchange capacity. Subsoil's are moderately alkaline, sodic, imperfectly drained and can be saline. Soil analyses (Appendix 1) show that topsoil organic carbon levels are low –moderate (under permanent native pasture).

Typically the topsoil's of these Subnatric Brown Sodosol's have a poor balance of cations, with the calcium/magnesium ration being low – very low and exchangeable sodium levels elevated.

Available soil phosphorus levels in the topsoil's are low. This limits the productivity of these soils and the types of pastures that can persist at these fertility levels.

These soils have low topsoil fertility and poor quality subsoil's, resulting in limitations for agriculture. Low intensity grazing of permanent pastures is the most common enterprise conducted on these soils.

Land Capability Impact Assessment.

The majority of the 41 ha area comprises Class 4 – Moderate capability land. This land has moderate to high limitations for high-impact land uses. These limitations restrict the potential for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations require specialized management practices with a high level of knowledge, expertise, inputs, investment and technology.

A small component is Class 5 – Moderate-low capability land. This land has high limitations for high-impact land uses. Grazing can be conducted on this land at low stocking rates and low productivity levels. Other enterprise alternatives are limited and unlikely to be practical or viable with the additional management requirements of this land.

The limitations need to be carefully managed to prevent long-term degradation.

Loss of Agricultural Production

The Agricultural Impact Statement for the continuation project looked at 170 ha of lost production and determined a loss of from $30,072 at 2014 cattle returns, up to $45,108 at the maximum improved production level with higher inputs, using the 2015 prices for beef cattle. This is a production level of $265 per hectare per year.

The additional 41 ha area is similar in agricultural capability to the entire 170 ha accessed for the EIS. The additional 41 ha would produce an additional $10,879. This would increase the total value of lost production to $55,987 using 2015 cattle prices.

Mitigation Measures DRAFT 2

Rehabilitated land is being grazed at Rix's Creek mine. The rehabilitated land is providing additional agricultural production in the form of beef cattle production. The productivity of the rehabilitated pasture is proving to be higher than the natural pasture base.

An area of the rehabilitation has been fenced off and grazed since the beginning of 2013. The area comprises 67 ha on the west pit out of pit overburden emplacement.

The rehabilitated area is a product of the rehabilitation methodology that has been explained in detail in the Rehabilitation Strategy Appendix Q of the EIS.

It has resulted in a pasture dominated by tropical summer grasses that are expressing a higher productivity for beef production than the original natural pastures.

Trials conducted at the site have indicated that the land is expected to be capable of higher productivity.

Comparisons of Pasture Productivity

Trials have been conducted at Rix's Creek mine, monitoring pasture quality; pasture quantity and species composition of the pasture under four different fertilizer treatments, with a comparison to native pasture. The trials show that the improved pasture species sown on rehabilitated sites were capable of producing more productive pastures that also have higher forage quality compared to local undisturbed native pastures.

Pasture grown on rehabilitated areas treated with biosolids produced more pasture, green leaf and total leaf dry matter over the two year trial period than other treatments and native pasture.

Biosoilds is an integral part of the rehabilitation practice implemented across the Rix's Creek mine site. It provides a source of nutrient and organic matter and has been used for many years due to the improved rehabilitation results achieved with its use. The trial shows that the advantages can result in greater beef cattle productivity when the rehabilitated land is grazed.

The ability of rehabilitated pasture to have higher productivity than native pasture has also been shown by several grazing trials conducted across the Upper Hunter.

NSW Department of Primary Industries (with support from the Upper Hunter Mining Dialogue) has conducted trials on two different mines in the Upper Hunter. A larger, scientifically analyzed trial has been conducted over a longer period by Glencore at their Liddell mine The four years of trial has experienced a range of seasonal conditions during the comparisons..

These trials have compared the growth rates of steers grazing pastures sown on land rehabilitated after mining with the growth rates of steers grazing adjacent native pasture sites. Comparison across the two studies and the three sites has shown that steers grazing rehabilitated pasture land have achieved growth rates equal to or well above steers grazing adjoining undisturbed native pastures. Tropical pasture grasses sown into the rehabilitated sites are able to provide higher pasture productivity than many of the native pasture species (Griffiths, McCormack and Nelson, 2016).

The pastures remained stable with pasture grass composition not changing more than normal seasonal variation and ground cover remained above 70 percent throughout the studies. Where soil fertility is highest the productivity level on the rehabilitated pastures is greater.

The studies indicated that the stocking rates could have been higher in some rehabilitated sites due to surplus herbage being available for grazing.

These formal trials support the Rix's Creek data that sustainable beef production can be conducted at higher production levels on rehabilitated pastures than native pasture.

The two studies, across the three sites provide strong evidence that with successful rehabilitation, selection of species and pasture management, rehabilitated mine land can be used for profitable grazing.

The 67 ha of rehabilitated land now being grazed would more than compensate for the lost agricultural production in the additional 41ha of native pasture unavailable for grazing.

Cattle grazing rehabilitated pastures at Rix's Creek west pit out of pit overburden emplacement.

Conclusion

The additional 41 ha area not available for grazing will result in an additional agricultural productivity loss of around $10,879. However, the grazing undertaken on the 67 ha of rehabilitated land will more than compensate for this loss of agricultural grazing production on the 41 ha of native pasture.

References:

Griffiths, N.W, Mc Cormick, L.H and Nelson, N.R. (2016) "Grazing on rehabilitated mine land - Upper Hunter Study", Proceedings of Australian Grasslands Conference, Armidale, June 2016.