NSW EPA

Our reference: : EF13/4246; SF17/46118
Contact: : Ms Sheridan Ledger; (02) 6333 3803

Mr Paul Freeman
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

5 July 2018

Dear Mr Freeman

MOOLARBEN COAL COMPLEX – OPEN CUT OPTIMISATION MODIFICATION RESPONSE TO SUBMISSIONS

I refer to the Moolarben Coal Complex Open Cut Optimisation Response to Submissions Report (RTS) and meetings attended by the Environment Protection Authority (EPA) held on 8 March and 26 June 2018 to discuss the RTS.

The EPA has undertaken a review of the RTS and comments are provided in Attachment A. Matters relating to noise and air quality have now been addressed with recommended conditions of consent either provided in the EPA's response to the exhibited environmental assessment or in Attachment A.

The remaining major issues associated with the Moolarben Coal Complex Open Cut Optimisation (the Proposal) can be summarised as follows:

1. The proposed salt load to be discharged to the upper Goulburn River;
2. The proposed increase in flows in the upper Goulburn River;
3. The quality of the proposed discharge waters;
4. The cumulative impact of the proposed discharges with those of the Ulan Coal Mine; and
5. The underground disposal of brine.

As requested by Department of Planning and Environment (DPE), the EPA is currently considering recommended conditions of consent regarding water and brine disposal and will provide these in due course.

Should you have any enquiries regarding this matter please contact Ms Sheridan Ledger at the Central West (Bathurst) Office of the EPA by telephoning (02) 6333 3803.

Yours sincerely

Sandra Jones 5/7/18

Dr Sandie Jones
Manager Regional Operations
Environment Protection Authority

PO Box 1388 Bathurst NSW 2795
Level 102, 346 Panorama Avenue Bathurst NSW 2795
Tel: (02) 63 333800
ABN 30 841 387 271
www.epa.nsw.gov.au

MOOLARBEN COAL COMPLEX – OPEN CUT OPTIMISATION MODIFICATION RESPONSE TO SUBMISSIONS – EPA COMMENT

AIR QUALITY

In response to the publicly exhibited environmental assessment for the Proposal (the EA), the EPA requested further information on five matters, being:

1. Provision of emissions estimates for the year 2011.
2. Justification for use of 90% emission control for watering roads.
3. Explanation and justification for estimated emissions for the Proposal being lower than estimates for modification 9. This should include a list of all relevant operational changes and explain, at least, the lower estimates for:
    - wind erosion from the stockpiles even though the description of the Proposal includes increase in stockpiles of both ROM coal and product coal;
    - wind erosion from mined areas – pit, overburden dumps, rehabilitated land;
    - loading of ROM coal from stage 2 – hauling, loading trucks;
    - overburden handling;
    - use of bulldozers at the CHPP;
    - handling coal rejects.
4. Assessment of 24-hour concentration of $PM_{2.5}$ using a clearly described and justified method and demonstrating it adequately assesses the potential for emissions to result in additional days exceeding the impact assessment criterion of 25 $\mu g/m^3$.
5. Detail on the operation of the predictive/reactive management scheme and its representation in the modelling, including:
    - statement of which level mitigation was simulated and the reduction in total emissions;
    - number of occasions in the modelled year on which the simulated control would be implemented and how long modified operation continues for each;
    - demonstration that the management scheme requires action in sufficient time to reduce emissions on the days predicting concentrations greater than the impact assessment criterion; and
    - tabulation of resulting increments and cumulative assessment for this simulation matching the results presented in appendix F for the standard simulations.

Review of response to matters raised

1. Emission estimates for 2011

The RTS (p16) clarifies that the 2011 emission inventory was that described in '*Moolarben Coal Project Stage 1 Optimisation Modification Air Quality and Greenhouse Gas Assessment*', Todoroski Air Sciences 7 May 2013.

Outcome: Issue resolved. No further action required.

2. Watering of roads

The RTS (p16) notes that previous work used an emission control efficiency of 80% for watering of roads. Control efficiency data is now available for road watering at the Moolarben Coal Complex and shows an

efficiency of 90%. This is documented in '*Draft Particulate Matter Control Best Practice Implementation Wheel Generated Dust and Disturbing and Handling Overburden in Adverse Weather Conditions*', Todoroski Air Sciences 14 August 2014 (TAS 2014).

EPA comment

TAS (2014) provides data indicating that watering of roads can reduce measured road-side concentration of dust by more than 90%. The results highlighted the potential effectiveness of watering but did not seek to determine usual performance. While watering is able to achieve 90% control, it has not been established this will be achieved at all times.

Outcome: Issue can be resolved via conditions of approval.

Recommendation: The EPA recommends a condition of approval requiring the proponent achieve and maintain control efficiency on dust from roads on the premises of 90% or greater at all times.

3. Reduced emission estimates

The RTS (p17) reproduces the EPA's comparison of emissions estimates from a previous assessment (modification 9) to those of the current assessment highlighting the differences cited by the EPA. As well as changed activity, estimation for emissions for two sources have changed – dozers on coal; and wind erosion. Construction of an additional conveyor to replace haul roads contributes significantly to reduced emissions.

The RTS (p17) claims that there are only minor changes to total emissions per unit of activity. Changes to mine design are identified as the main reason for reduced emissions with a small contribution from revised emission calculations.

EPA comment

The EPA notes the change to estimation for wind erosion and dozers on coal. The EPA also notes the revised mine design – replacement of haul road with conveyor, optimization of pit orientation, and the significant reduction in open cut operations for 2026 in the proposal.

Outcome: Issue resolved. No further action required.

4. Assessment of 24-hour $PM_{2.5}$ concentration

The RTS (p20) states that because there are no site-representative $PM_{2.5}$ data, it is not possible to undertake a contemporaneous (level 2) assessment. The RTS advises that as this approach is not possible and the EA used a regulatory approach from Victoria to estimate background concentration for use in a level 1 assessment. Background concentration was set to the 70th percentile of the calendar-day concentrations in the year.

The RTS then argues that as increments are modest – 9 µg/m^3 for the closest receptor, less than 5 µg/m^3 for the closest residential receptor – any exceedences are predominantly due to background concentrations. Given limited anthropogenic emissions in the locality, the RTS argues that it follows "*the risk of any adverse $PM_{2.5}$ impact is low*".

EPA comment

The RTS seeks to justify the approach taken in the EA. The RTS does not provide any additional analysis to support the adopted methodology and fails to demonstrate the assessment represents reasonable worst-case cumulative 24-hour $PM_{2.5}$ impacts. Further, the RTS does not demonstrate the Proposal will not result in exceedences of the impact assessment criteria for $PM_{2.5}$ concentration.

The *Approved Methods for the modelling and assessment of air pollutants in NSW* EPA 2017 (the Approved Methods) Level 1 assessment of 24-hour concentration requires use of the maximum background concentration. Level 2 assessment prescribes daily concentrations of project increment and

background air quality for each day in the analysis period. The Approved Methods do not recommend the use of the 70th percentile statistic as a sole background concentration for either a level 1 or level 2 assessment.

While a statistical analysis such as the adoption of statistical background thresholds provides some information about the likelihood of impact, the adoption of a single 70th percentile metric creates additional uncertainty in the assessment results and is not adequate by itself for evaluating the potential for additional exceedence days. The EPA notes the absence of site specific $PM_{2.5}$ data but does not agree this precludes a more detailed and robust analysis of daily varying $PM_{2.5}$ concentrations and hence impacts.

There is information available from which to construct a suitably detailed and more robust $PM_{2.5}$ assessment. Broad description of $PM_{2.5}$ concentrations in rural locations of NSW can be established by reference to available monitoring. This provides context and reference for any data set constructed for the project site. The EPA notes there are daily PM_{10} concentrations used within the air quality assessment to assist with this analysis.

Given the $PM_{2.5}$ assessment uncertainty, focus on all reasonable and feasible $PM_{2.5}$ emission controls is necessary. The EPA notes that diesel emissions can be a significant source of $PM_{2.5}$ emissions at mine sites, yet diesel emissions have not been quantified. The Proposal does not provide a commitment to controlling diesel emission via best practice methods.

Additionally, thorough demonstration of the efficacy of the existing reactive management strategy (discussed below) in managing $PM_{2.5}$ emissions under adverse conditions has not been provided in the RTS.

Notwithstanding the above discussion, the EPA notes that the cumulative assessment methodology adopted for 24-hour $PM_{2.5}$, unlike the PM_{10} assessment, did not subtract the incremental contribution from historic project activity to derive a non-mine background concentration. On this basis, if the background dataset is demonstrated as site representative for the project location, there could be a level of conservatism in the $PM_{2.5}$ assessment.

Recommendations:

1. The consent authority notes and considers the $PM_{2.5}$ assessment uncertainty and associated assessment results when determining the proposal.
2. The EPA recommends a condition of approval requiring the proponent implement all reasonable and feasible $PM_{2.5}$ emission controls, including evaluation and adoption of best practice diesel emission controls.

5. Predictive / reactive management scheme

The RTS refers to the current air quality monitoring plan (AQMP) and the real-time controls therein. Reactive management is proposed to mitigate predicted additional exceedence days of the 24-hour PM_{10} impact assessment criterion.

The RTS (p21) argues that as the predicted exceedence concentration is "*only marginally above the criterion of 50 µg/m³*", real-time controls would be sufficient to avoid the predicted exceedence.

The RTS (p24) states

> "*The resultant cumulative assessment for the modelled mitigation scenario is that cumulative 24-hour PM_{10} concentrations for all privately-owned receptors are predicted to be 49 µg/m³ or less*"

EPA comment

The RTS provides general advice regarding which activities were "paused" in the modelling scenario simulating implementation of reactive management. However, the RTS fails to establish that the modelled pause in activity reflects implementation of the existing reactive management system.

The RTS (p23) states that a modelling scenario was run wherein all activities were paused "during the 2 days when additional exceedences were predicted". This does not replicate implementation of the scheme, it merely shows that ceasing certain activities is sufficient to mitigate these predicted exceedences. Simulating implementation of the scheme requires determining when certain trigger concentrations were reached and reducing the activities identified in the scheme thereafter, with an appropriate lag for the operational change. As noted in the RTS this has not been attempted.

The RTS does not provide information showing that implementation of the predictive/reactive scheme mitigates the predicted exceedences of the 24-hour PM_{10} impact assessment criterion.

The EPA notes that while the scheme is predicated on PM_{10} concentration, it also reduces emissions of $PM_{2.5}$. It therefore offers a potential approach to mitigate predicted additional days exceeding the $PM_{2.5}$ 24-hour impact assessment criterion. The EPA notes the current uncertainty in the $PM_{2.5}$ assessment (described above) inhibits such an analysis.

Recommendation: The consent authority note that the RTS does not provide additional and robust analysis demonstrating the current reactive management system effectively prevents all potential additional exceedences of the 24-hr average PM_{10} and $PM_{2.5}$ impact assessment criteria.

BRINE DISPOSAL

The EA provided insufficient information to allow the EPA to provide comment regarding the suitability of the proposed options for the disposal of brine.

Consideration of alternatives

The EPA policy is that water pollution should first be avoided. Pollutants should only be specified on a licence, or be permitted, where the discharge in all practical terms is unavoidable and measures to control the pollutants and their impacts can be feasibly implemented. The disposal of brine underground is pollution of groundwater and therefore the proponent is required to assess the available options to prevent that pollution.

The EPA considers that other proven, cost-effective brine management options are available for the Proposal. The RTS does not sufficiently demonstrate that there is no other alternative to environmental discharge. Furthermore, the RTS does not adequately demonstrate pollutant impacts will be mitigated.

Therefore, the EPA does not support the proposed brine storage scheme.

Brine dilution

Brine production may exceed 2ML/d depending on treatment system efficiency. Although the discussion of brine density and mine infilling are conceptually correct, the supplemental groundwater report by HydroSimulations (RTS Attachment 4) presents an incomplete assessment of brine fate and transport.

Firstly, the RTS provides only a qualitative review of brine dilution. No estimates of initial brine concentrations, total brine production, or total salt mass are presented. No calculations are presented relating to brine dilution or groundwater concentrations over time.

Secondly, the effect of diffusion (solute movement in response to concentration gradients) is not examined. Given the salinity contrast between brine and ambient groundwater, and the relatively limited advection (groundwater flow) during the operational phase of the mining activities, diffusion could be significant in the proposed scenario.

Since the solutes of concern in the brine may be stable over time, additional evidence is required to demonstrate the groundwater system's capacity to attenuate solute concentrations. A quantitative

assessment of dilution and diffusion is required to support statements about brine fate and transport in the response to submissions.

Chemical compatibility of brine and coal seams

The RTS notes the brine would be stored in the coal seams from which it was derived. However, this is not a matter of replacing like-for-like.

Pre-treatment and reverse osmosis of mine water will fundamentally alter the composition of mine waters. The resulting brine will be at disequilibrium with coal seams and ambient waters. The disequilibrium can be due to the increased salinity, changes in ion ratios during brine concentration, or oxygenation of brine during pre-treatment and reverse osmosis. Disequilibrium may result in various geochemical reactions occurring between the coal seams, ambient water, and brine as they equilibrate. Such reactions may be beneficial, benign, or detrimental.

The RTS does not examine the consequence of this disequilibrium on groundwater quality in the coal seams. Additional information is required to demonstrate the chemical compatibility of brine with the receiving environment.

Impacts to receiving environments

In the absence of evidence to the contrary, it is assumed that groundwater will eventually discharge to surface water bodies unless the local hydrogeology has been fully characterised and groundwater discharge is unlikely to occur or solute concentrations meet the relevant environmental values.

No estimates of potential solute concentrations at receiving environments are presented in the RTS. While various processes are discussed, the RTS does not demonstrate that these processes would sufficiently decrease solute concentrations before discharge to nearby receptors.

Summary

1. The RTS does not sufficiently demonstrate that other alternatives to environmental discharge are impractical.
2. Dilution is only discussed in general terms, and a key solute transport process is omitted. Insufficient information is provided to demonstrate that solute concentrations will be attenuated in the subsurface.
3. The RTS does not discuss the compatibility of brine with the target coal seams or ambient waters. The suitability of the site for the proposed activity is not demonstrated.
4. The RTS does not provide an estimate of solute concentrations at nearby receptors.

WATER

At present, the Moolarben Coal Mine (Moolarben) is permitted to discharge 10ML/day in accordance with the Environment Protection Licence (EPL). The EPL includes discharge water quality limits for electrical conductivity (EC), pH, oil & grease, total suspended solids (TSS) and turbidity. It should be noted that while Moolarben is permitted via EPL conditions to discharge 10ML/day, no discharges have occurred since 2011. The discharges which occurred in 2011 were due only to a significant rainfall event which resulted in the Mudgee area being declared as a natural disaster area. In effect the Proposal will potentially result in an additional 20 ML/day discharge into the upper Goulburn River.

The RTS is not considered to have appropriately addressed the water related issues raised by the EPA and the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mines Development (IESC) in relation to the Proposal. The IESC (2017) stated that:

> *The proponent needs to assess the potential impacts of up to 20 ML/day sustained discharge on the Goulburn River (including the diversion channel), addressing:*
> *a. the identification of the in-stream macrophytes in the diversion channel;*

b. risks to the persistence and health of macrophyte beds, including their capacity to survive sustained higher flows;

c. potential consequences of sediment mobilisation should macrophyte cover be reduced;

d. the metal and other contaminant content of sediment within the channel and potential bio-concentration of metals and other contaminants in the macrophytes;

e. the capacity of the macrophyte beds to reduce turbidity of mine water discharge;

f. the potential geomorphological impacts (to sediment composition and depth) of up to 50 ML/day of cumulative mine discharge (from both Moolarben and Ulan mines) to the Goulburn River downstream of the diversion channel;

g. potential ecological effects of a reduction in low flows, changes to flow variability and geomorphology in the Goulburn River (as discussed in paragraph 5); and

h. avoidance and mitigation measures for potential hydrological, water quality and ecological impacts.

As the RTS has not addressed the issues raised previously, important issues remain which can be summarised as:

1. The proposed salt load to be discharged to the upper Goulburn River;
2. The proposed increase in flows in the upper Goulburn River;
3. The quality of the proposed discharge waters; and
4. The cumulative impact of the proposed discharges with those of the Ulan Coal Mine.

These issues are discussed further below.

Discharge salinity and metal concentrations

Discharge EC Limit

The ANZECC Guideline provides that 24 contiguous monthly samples from an appropriate reference site are required to develop site specific trigger values for the receiving waters, being the Goulburn River.

Research conducted by the EPA has found there is adequate data available to determine an appropriate reference site along the Goulburn River for the development of a site-specific trigger value for EC. The table below summarises the outcome of this research:

Location Description	Location Goulburn River	Period	80th percentile EC value
GS 210046 (Ulan)	Upstream of Ulan Coal Mine discharge point and mining disturbance	1968 – 1982 (n=50)	580
UCM SW01	Upstream of Ulan Coal Mine discharge point and mining disturbance	2007 - 2018	687
UCM SW02	Downstream of Ulan Coal Mine discharge point and mining disturbance	2007 - 2018	824

GS 210006 (Coggan)	Downstream of Ulan Coal Mine discharge point and mining disturbance	2012 - 2018	1247

The determination of the most suitable reference site is important as a large section of the Goulburn River flows through the Goulburn River National Park and the potential impact of discharges downstream users and the Hunter River Salinity Trading Scheme. The EPA considers that upstream site GS 210046 (Ulan) should be used as the reference point for determining a site-specific EC trigger value and therefore data from the upstream site GS 210046 (Ulan) is the most acceptable data to use to establish a site-specific trigger value for EC for discharges into the upper Goulburn River.

However, the ANZECC trigger values are not intended to be directly applied as regulatory discharge criteria, limits or conditions but are one factor considered by the EPA when exercising licensing functions and deciding what conditions to attach to the licence. The EPA will not permit a licensee to pollute "up to" the trigger values that maintain environmental values. In accordance with section 45 of the *Protection of the Environment Operations Act 1997* (POEO Act) licensees are expected to adopt a "reasonable level" of performance and ensure all practical measures have been considered and implemented where appropriate to mitigate the potential impacts of the discharge.

As stated previously, EPA policy is that water pollution (ie discharges to the environment) should first be avoided. When it cannot the NSW Water Quality Objectives and the ANZECC Guidelines are used. Where the environmental values are being achieved in a waterway, the EPA policy is that they should be protected and where the environmental values are not being achieved in a waterway all activities should work towards their achievement over time.

The EPA considers the approach suggested in the RTS based on a 900 µS/cm EC discharge limit is inconsistent with EPA policy and the AZECC Guideline.

Discharge Metal Limits

The EPA considers that UCM SW01 should be used as the reference site for determining site-specific metal trigger values and therefore data from monitoring location UCM SW01 should be utilised for the determination of metal trigger values for discharges into the upper Goulburn River. This alternate reference site location to that recommended for EC is due to no metal monitoring data being available from monitoring location GS 210046 (Ulan).

The RTS proposes a selective approach to deriving trigger values whereby the site-specific trigger value is proposed when it is less than the default trigger value and the default trigger value is proposed when it is less than the site-specific trigger value. This approach is inconsistent with the ANZECC methodology (see Figure 3.1.2 in ANZECC 2000).

Due to low flow in the upper Goulburn River which results in low dilution and having regard to the EPA policy of protecting environmental values, the site-specific trigger metal values should be used in preference to the default metal trigger values.

The EPA notes that proposed trigger values have been proposed for a small subset of metals, metalloid and non-metals. Further analysis is required to determine the trigger value for the wide suite of metals and major ions which may be in any discharge waters.

Discharge Volume

Natural Flows

Establishing what are 'natural' flows in the Upper Goulburn River catchment is difficult given the major changes that have occurred within the catchment including land clearing, the construction of open cut pits; underground mine workings; the establishment of Moolarben Dam; and the diversion of the Goulburn River adjacent to Ulan Coal Mine Limited (UCML) workings.

A Water Resources Commission gauging station (Stn210046) was previously located on the Goulburn River at Ulan. Data from this station is available from the Pinneena Surface Water Data Archive (NSW Office of Water 2009) for the period 10/3/1956 to 31/8/1982.

UCML's 2005 Annual Report identified that a Goulburn River gauging station (SW02) downstream of the mine was commissioned in May 2005. The EPA is aware that in November 2005 construction commenced on a second river gauging station upstream of the mine in the village of Ulan and the upstream gauging station (SW01) was commissioned in June 2006. The upstream station is located near the school at Ulan township and the downstream station is located under the bridge over the Goulburn River on Ulan Road. The earlier Water Resources Commission gauge (Stn210046) appears to be downstream of Moolarben Dam, but upstream of the new UCML upstream gauge (UCM SW01).

Median flow for the Water Resources Gauge (210046) over the period 10/3/1956 to 31/8/1982 was 2.225 ML/day. The EPA's review of the flow data from SW01 indicates that this gauge has not been functional for an extended period of time. Flow records for UCM SW02 have been recorded and reported in the Annual Environmental Management Report (AEMR) for the period 2008-2016.

There currently appears to be no appropriate daily monitoring of flows in the Goulburn River upstream of Ulan Creek and downstream of Moolarben Dam, the area where Moolarben are proposing to discharge. As a result, Moolarben are unlikely to be able to appropriately assess the impact of their discharge on the environment in terms of its 'natural' flow regime. Any discharges by Moolarben to the Upper Goulburn River will also add to the discharges being released by UCML.

Proposed Discharge Volumes

Appendix E of the EA provided the forecast groundwater inflows and modelled required discharge volumes under certain rainfall conditions. For ease, these are provided in the table below:

Year	Forecast groundwater inflows (Table 5.7 Appendix E of EA)	1%ile Annual controlled release (Table 6.1 Appendix E of EA)	10%ile Annual controlled release (Table 6.1 Appendix E of EA)	50%ile Annual controlled release (Table 6.1 Appendix E of EA)
2019	6.64	12.92	6.64	1.68
2020	10.56	16.92	8.35	3.44
2021	13.80	18.35	10.78	6.17
2022	13.71	18.49	13.00	8.35
2023	14.08	18.88	12.95	8.25
2024	14.56	19.13	14.62	9.52
2025	17.27	19.39	14.69	9.92
2026	16.74	20.00	15.67	11.01
2027	2.43	14.41	15.85	11.33
2028	3.65	13.17	8.41	1.93
2029	5.06	14.69	8.25	1.51

The RTS proposes a variable discharge volume relating to mining activities in underground 4 being:

- Up to 15 ML/day following commencement of first workings in UG4;
- Up to 20 ML/day following commencement of secondary extraction in UG4; and
- Up to 15 ML/day two years after completion of mining in UG4 (subject to site water balance review).

The proposed discharge volume is based on the 1%ile Annual controlled release which is considered by the EPA to a very conservative, "worst case" scenario. While the EPA appreciates the approach taken, justification for using the 1%ile volumes rather than the 50%ile volumes has previously been requested, as

it likely that 50%ile volumes may be a more accurate indicator of the discharge volume which are required in reality.

When considering the proposed discharge volumes, it should be noted that:

1. At 20ML/day this discharge will be greater than the 90th percentile of flows in the Upper Goulburn River based on DLWC gauging data.
2. At 10ML/day this discharge is equivalent to approximately the 85th percentile of flows in the Upper Goulburn River based on DLWC gauging data.
3. Any discharge from Moolarben will be in addition to discharges by UCML and the cumulative volume proposed is 40-50 ML/day of sustained flow.
4. A cumulative discharge of 40ML/day equates approximately to the 95th percentile of flows in this area based on DLWC gauging data.
5. Major geomorphic changes could occur in the river as the result of the combined (and sustained) maximum flow rates of up to 40-50 ML/day.

The IESC (2017) noted that:

> *..there will be more and longer low flow periods in the Goulburn River immediately downstream of the project site than at the gauging station. Low flows and flow variability are crucial to maintaining in-stream and riparian habitats that vary in size, substrate composition, flow and inundation (Rolls et al. 2012), and in many streams the native biota is adapted to the natural flow regime, including low flow. Artificially greater and more sustained flows may have the following impacts:*
> *a. Coarsen bed-sediments, reducing suitability of instream habitat for some water plants.*
>
> *b. Inhibit upstream migration by aquatic invertebrates and fish (especially small ones that cannot swim against the current). Many Australian native fish spawn at low flows, so this altered flow regime could potentially alter breeding success of some of these fishes.*
>
> *c. Altered conditions that may favour the invasion and establishment of exotic species that impact upon native ones.*

The RTS largely ignores the effects of Moolarben discharges on top of those of UCML (and other mines in the broader area). The cumulative impacts of both MCO and UCML discharges could be severe, given their location high in the headwaters of the Goulburn River. There is currently no appropriate monitoring of flows in the Upper Goulburn River to assess flow-related impacts.

Salt Load

Salt loads from discharges from UCML and Moolarben are important given the relatively low flows in the Upper Goulburn River catchment and because the discharges can potentially cause elevated salinity levels leading to adverse social and environmental outcomes. The recent reporting of extensive salt deposits on the banks of the Goulburn River is potentially one expression of this problem.

Currently there is no discharge from the Moolarben Coal mine, so no salt is currently being released from the mine via a discharge, even though Moolarben's EPL allow them to do so.

The EPA has prepared the following table which illustrates the potential salt load to the upper Goulburn River from a variety of discharge scenarios and the salt load of the "natural" or background flow load.

Monitoring Location	EC	TDS	Flow		Load mg/day	Load kg/day	Load tonnes/annum
	uS/cm	mg/L	L/day				
Potential Flow and EC							
	900	603	50000000		30150000000	30150	11004.75
	900	603	45000000		27135000000	27135	9904.275
	900	603	40000000		24120000000	24120	8803.8
	900	603	30000000		18090000000	18090	6602.85
	800	536	50000000		26800000000	26800	9782
	800	536	45000000		24120000000	24120	8803.8
	800	536	40000000		21440000000	21440	7825.6
	800	536	30000000		16080000000	16080	5869.2
	700	469	50000000		23450000000	23450	8559.25
	700	469	45000000		21105000000	21105	7703.325
	700	469	40000000		18760000000	18760	6847.4
	700	469	30000000		14070000000	14070	5135.55
	600	402	50000000		20100000000	20100	7336.5
	600	402	45000000		18090000000	18090	6602.85
	600	402	40000000		16080000000	16080	5869.2
	600	402	30000000		12060000000	12060	4401.9
Background Flow and EC							
GS 210046 (Ulan) 50%ile EC	432	289.44	2225000	Median Flow	644004000	644.004	235.0615
GS 210046 (Ulan) 80%ile EC	580	388.6	2225000	Median Flow	864635000	864.635	315.5918

The combined salt loads from both the UMCL and MCL discharges could potentially end up being approximately 35 times the background salt loads for the Upper Goulburn River. There is a clear need to better address the amount of salt proposed to be discharged to the Upper Goulburn River. There is little consideration in the EA or RTS of the cumulative impact of the total salt load from both mines (Moolarben and Ulan) or its potential downstream effects.