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16 April 2019

Gordon Kirkby
Commission Panel Member (Chair)
Independent Planning Commission NSW
Level 3, 201 Elizabeth Street
SYDNEY NSW 2000

Dear Commissioner,

RE: MOOLARBEN COAL COMPLEX – OPEN CUT OPTIMISATION MODIFICATION (05_0117 MOD 14) AND (08_0135 MOD 3) – RESPONSES TO REQUESTS FOR FURTHER INFORMATION

Please find enclosed our responses to the 8 April 2019 Independent Planning Commission's request for further information on the Moolarben Coal Complex Open Cut Optimisation Modification (the Modification).

We note that additional public submissions have been received since 8 April 2019. It is considered that the issues raised in these submissions have been addressed through the responses herein, the Response to Submissions for the Modification (dated May 2018) and the New South Wales Department of Planning and Environment's Assessment Report (dated February 2019). No additional specific response document is proposed to address these submissions.

Regards,

Michael Moore
Manager – Environmental Standards
Yancoal Australia Ltd

Enclosure 1 Responses to IPC Request for Further Information

ENCLOSURE 1

RESPONSES TO IPC REQUEST FOR FURTHER INFORMATION

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1. GROUNDWATER MODEL

IPC REQUEST FOR FURTHER INFORMATION

In regard to the groundwater model developed by HydroSimulations (2017), the Independent Planning Commission (IPC) noted the following:

> ***The Commission panel is interested in further understanding the reasons that lead to the revised groundwater model.***
>
> ***The Commission panel notes that the original Stage 1 application contemplated for potential discharges of treated water, and up to 10 mg/L per day as permitted in the respective Environmental Protection Licence (EPL).***
>
> ***The Commission panel notes that the existing conditions require for the groundwater model to be updated and recalibrated as the project progresses, and as such, new data has been gathered during monitoring, which has been used to update the groundwater model.***
>
> ***The Commission panel also notes that the original Stage 1 application and the Stage 2 application used the MODFLOW-SURFACT methodology (original model) and the new model uses ALGOMESH methodology (new model) which you have explained allows for additional input details into the model, and because of the information gathered for the update and other details, the project would now double its discharge limits from 10 mg/L to 20 mg/L.***

The IPC then requested:

> ***From the above, the Commission panel would like for the proponent to elaborate on the scope of the original model or details of the project that were not included or considered in the original model, which are now considered in the new model resulting in a doubling of the discharge limits. Why were those details not included in the original model? If the MODFLOW-SURFACT was used to update the model, would it had shown similar results to the ALGOMESH? Is the doubling of discharges related to the proposed increase in coal production and surface disturbance?***

YANCOAL RESPONSE

The minor changes in OC2 and OC3 open cut pit limits, associated surface disturbance and the increased open cut production rates proposed by the Moolarben Coal Complex Open Cut Optimisation Modification (the Modification) would have a negligible impact to groundwater when compared to the currently approved mining at the Moolarben Coal Complex. This conclusion is supported by the Independent Expert Scientific Committee on Coal Seam Gas and Large Scale Coal Mining Development's (2017) consideration of the Modification application (including Groundwater Assessment), stating that *"the proposed action is adjacent to, and mostly up-dip of, already-approved open-cut operations which means that there is unlikely to be substantial additional aquifer depressurisation as a result of the action"*.

It is a requirement of both Project Approvals for the Moolarben Coal Complex (i.e. 05_0117 and 08_0135) to validate the groundwater model by comparing monitoring results against modelled predictions. It is also both a requirement of Project Approval (08_0135) and good practice to update and if necessary recalibrate the groundwater model in consideration of new data (i.e. monitoring results, improved geological information, improved modelling techniques, etc.) as operations progress.

The Moolarben groundwater model was updated by HydroSimulations (2017) to incorporate up-to-date monitoring data, improved geological understanding and use of best practice numerical modelling software (i.e. MODFLOW-USG). This software did not exist at the time the MODFLOW-SURFACT models were developed for the original Stage 1 and Stage 2 approvals, and provides a significant advancement in groundwater modelling.

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The key factors that have resulted in increased predicted mine inflows, particularly when mining in the approved UG4 area commences, includes information that was either not available at the time of the development of the previous groundwater models or information that has been updated following assessment using the previous groundwater models, and are as follows:

1. Calibration of the groundwater model incorporating an up-to-date (at the time of model development) monitoring dataset with greater temporal and spatial extent and improved geological understanding in comparison to previous modelling.
2. Calibration of modelled mine inflows against actual inflows from UG1 and associated groundwater stresses as reflected in hydrographs. The previous modelling did not have site specific underground inflow data to calibrate against, as underground mining at the Moolarben Coal Complex had not commenced.
3. Calibration of modelled mine inflows against inflows from the Ulan Mine Complex, and associated groundwater stresses. The Ulan Mine Complex has experienced significant inflows during its underground mining, and consequently, has required discharges of up to 30 megalitres per day (ML/day) to the Goulburn River as authorised via Environment Protection Licence (EPL) 394. The current model uses updated publicly available monitoring data from the Ulan Mine Complex to calibrate against these increased inflows. Note inflows of 10 ML/day for the Ulan Mine Complex were included in the original Stage 1 groundwater model (Peter Dundon and Associates Pty Ltd, 2006).
4. Water stored in the Ulan East Pit recharging the coal seam to be mined for UG4 (note that UG4 is down dip from the Ulan East Pit), which has the potential to increase inflows to UG4 (Figure 1). Note potential recharge of the coal seam to be mined in UG4 from the Ulan East Pit was not considered a significant water source in the original Stage 1 groundwater model.
5. That proposed dewatering of UG4 in advance of mining operations via the approved Northern Borefield had not occurred, as was assumed in the prior model (i.e. no significant dewatering of UG4 has occurred).

Other changes to the model are documented in the Modification Environmental Assessment (EA) (e.g. increased production rate at UG1/UG4 resulting from the approved Moolarben Coal Complex UG1 Optimisation Modification).

If the updated information available from factors 1 to 5 above was used to recalibrate the previous model it would likely also predict increased inflows when mining commences in UG4. However, given MODFLOW-USG is recognised as best practice software, and given the significant effort that has been invested to update the Moolarben Coal Complex groundwater model, it is not proposed, nor warranted, to update the now redundant prior model using this new information.

As the Modification would have a negligible impact to groundwater when compared to the currently approved mining at the Moolarben Coal Complex, the proposed increase in controlled releases are largely the result of proactive water management planning with respect to Moolarben Coal Operations Pty Ltd's (MCO) investment in updating groundwater model software, recalibration in consideration of new monitoring data and ongoing reviews of the site water balance over a range of climatic sequences. It should be noted that the originally proposed discharge rate of up to 20 ML/day (i.e. "doubling") considered a 1%-ile climatic sequence to reflect the Project Approval (08_0135) requirement for mine water storages and diversions to be designed for a 1 in 100 year event (WRM Water & Environment [WRM], 2017), whereas previous site water balances undertaken for the Moolarben Coal Complex had considered up to a 10%-ile climatic sequence (WRM, 2013).

This proactive planning has also resulted in the decision to invest in water treatment technology at the Moolarben Coal Complex (subject to approval of the Modification) similar to the technologies adopted at other nearby operations. This technology will allow good quality surplus water (i.e. surplus to water demands on-site) to be released in a controlled manner to manage water inventories and avoid long-term accumulation of water on-site.

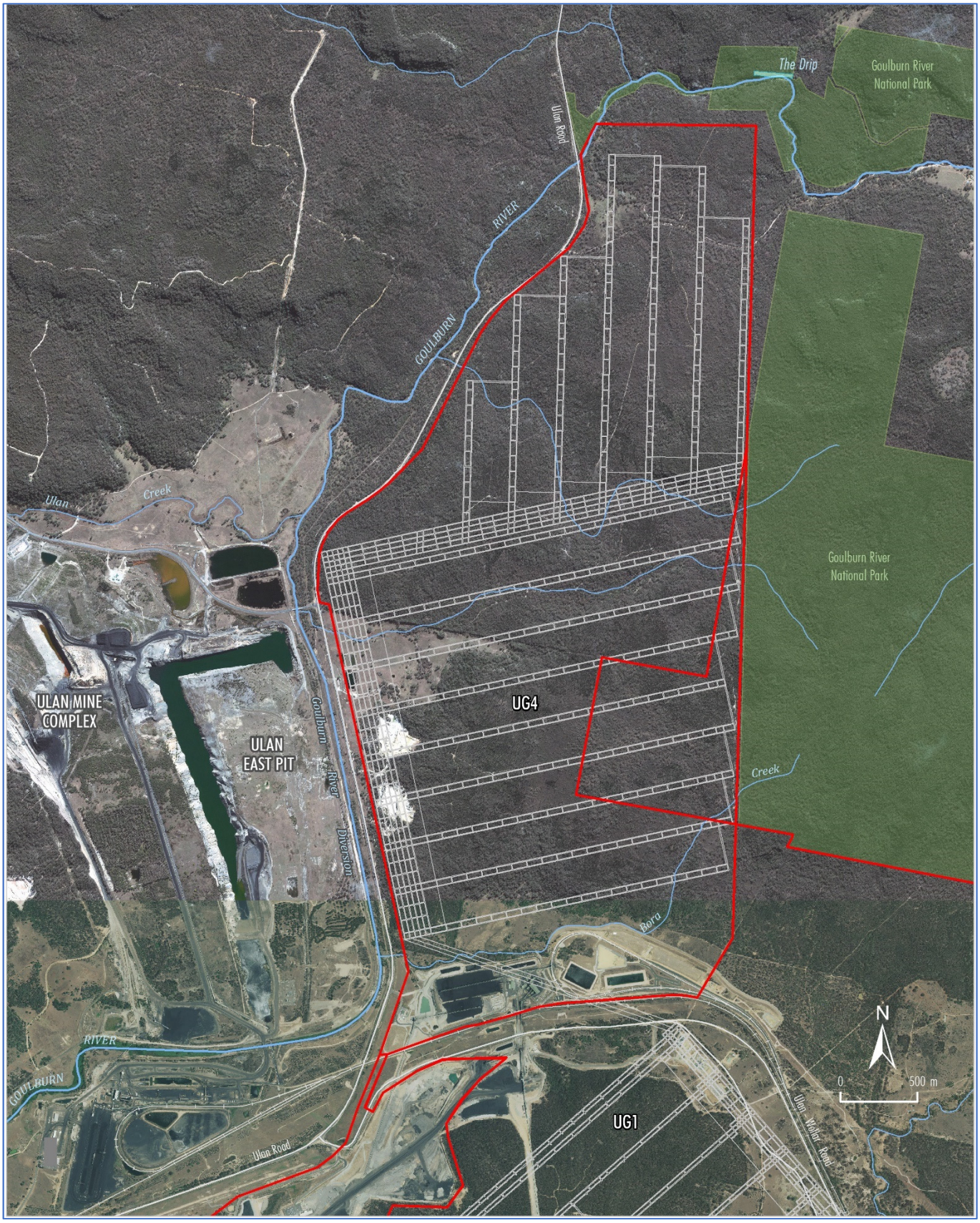

Figure 1
UG4 (Moolarben Coal Complex) and Ulan East Pit (Ulan Mine Complex)

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2. ELECTRICAL CONDUCTIVITY – SALINITY

IPC REQUEST FOR FURTHER INFORMATION

The IPC requested:

> ***The Commission panel notes that the new model indicates that a higher rate of discharge would potentially occur than what you had originally modelled, and that to date you have not been required to discharge except on one occasion.***
>
> ***From the above, the Commission panel would like the Proponent to confirm how the salinity balance for discharge into the local water system would change as a result of the potential additional discharges.***
>
> ***The Commission is particularly interested whether changes to the total load of salinity in the Goulburn River could potentially impact its levels, specifically at its confluence with the Hunter River and therefore impact the Hunter Salt Trading Scheme. Has the proponent undertaken any studies or assessments on the likelihood of this to occur?***

YANCOAL RESPONSE

Controlled releases from the Moolarben Coal Complex are **not** predicted to increase the salinity of the Goulburn River or the Hunter River (i.e. downstream of the proposed relocated discharge point) for the reasons that follow.

The Modification EA, Response to Submissions and development of the agreed revised salinity limit of 685 microSiemens per centimetre (µS/cm) have considered downstream water quality and the objectives of the Hunter River Salinity Trading Scheme (HRSTS).

Advisian (2017) considered the HRSTS in the *Controlled Water Release Impact Assessment for the Goulburn River* undertaken for the Modification EA as follows:

> *The HRSTS does not apply to discharges from the MCC. Notwithstanding, the proposed increase in discharge would result in negligible impacts to entities discharging under the HRSTS given the salt load from the MCC would represent a negligible proportion of the total salt load in the Hunter River during high flow and flood flow conditions.*

The above assessment by Advisian (2017) was in consideration of the originally proposed discharges of 20 ML/day at 900 µS/cm. The Modification now proposes to reduce MCO's currently authorised discharge salinity limit from 900 to 685 µS/cm and controlled releases would remain as per the currently authorised volumetric limit of 10 ML/day for the majority of the mine life. The effect of this would be a reduced salt load (compared to what is currently authorised and what was assessed in the EA) for the majority of the mine life when controlled release volumes are limited to 10 ML/day.

The NSW Environment Protection Authority (2018) describes the "*central idea of the* [HRSTS] *scheme is to only discharge salty water when there is lots of low salt, fresh water in the river*."

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Participants in the HRSTS are authorised to discharge water with salinity greater than 900 µS/cm during "high flow" events (i.e. greater than 1,800 ML/day in the middle Hunter River sector), subject to holding appropriate "credits" and salinity in the Hunter River remaining below the target level of 900 µS/cm[1].

The proposed controlled releases from the Moolarben Coal Complex are expected to have insignificant impact on HRSTS participants' ability to release water given:

- During high flow events, the proposed controlled release volume of 10 ML/day for the majority of the Moolarben Coal Complex mine life, and 15 ML/day during mining operations in UG4, is insignificant compared to the "high flow" threshold of 1,800 ML/day.
- The salinity of the proposed controlled releases (i.e. 685 µS/cm) would be lower than the HRSTS middle and lower Hunter River sector salinity target of 900 µS/cm (i.e. downstream of the confluence of the Goulburn and Hunter rivers).
- "High flow" events (under the HRSTS) would often be associated with higher flows in the Goulburn River, with increased contribution of rainfall leading to reduced salinity concentrations at the confluence of the Goulburn and Hunter rivers.

It is noted the Ulan Mine Complex, which has an authorised discharge point downstream of the Moolarben Coal Complex, has a licensed salinity limit of 900 µS/cm and controlled release volume of 30 ML/day.

Table 1 provides the 80%-ile salinity data recorded in the Goulburn River both upstream and downstream of the Moolarben Coal Complex. Upstream of the Moolarben Coal Complex (i.e. including sites unaffected by the Moolarben Coal Complex), the salinity of the Goulburn River is highly variable (i.e. up to 4,856 µS/cm). Further downstream the Goulburn River, salinity is **824 µS/cm** to **1,278 µS/cm** (Table 1). By comparison, controlled releases from the Moolarben Coal Complex would have a maximum of 685 µS/cm and would not increase these downstream salinity levels.

1 The salinity target for the sections of the Hunter River downstream of the confluence with the Goulburn River (i.e. the "middle" and "lower" sections covered by the HRSTS) is 900 µS/cm. The salinity target for the "upper" section of the Hunter River covered by the HRSTS, which is upstream of the Goulburn River confluence, is 600 µS/cm.

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Table 1
Summary of Goulburn River 80%-ile Salinity Data

Monitoring Station^	Location	Data Analysed	80th Percentile Salinity (µS/cm)
Upstream of Moolarben Dam			
SW08	Moolarben Creek	2005 – 2017 (field data)	4,856
		2005 – 2017 (laboratory analysis)	3,964
Upstream of Sportsmans Hollow/Goulburn River Confluence			
SW05	Moolarben Creek	2005 – 2017 (field data)	1,032
		2005 – 2017 (laboratory analysis)	913
Upstream of Bora Creek/Goulburn River Diversion Confluence (relocated EPL ID1) and UCML EPL ID3 and 19			
UCM SW01	Goulburn River	2007 – 2018 (continuous data daily averages)	687
		2007 – Sep 2017 (continuous data daily average)	714^^
GS 210046 (Ulan)	Goulburn River	1968 – 1988 (note: data at this site was collected sporadically [50 samples collected over 20 years] and as such does not meet ANZECC requirements for 24 contiguous months data)	580
SW12	Goulburn River	2005 – 2017 (field data)	657
		2005 – 2017 (laboratory analysis)	610
Downstream of Bora Creek Confluence (relocated EPL ID1) and UCML EPL ID3, 6 and 19			
UCM SW02	Goulburn River	2007 – 2018 (continuous data daily averages)	824
GS 210006 (Coggan)	Goulburn River	2012 – 2018 (continuous data daily averages)	1,247
GS 210016 (Kerrabee)	Goulburn River	1992 – 2019 (continuous data daily averages)	1,278
GS 210031 (Sandy Hollow)	Goulburn River	2002 – 2019 (continuous data daily averages)	1,154

^ Refer to Figures 2 and 3 for locations

^^ Data available at the time of analysis by Advisian (2017) for inclusion in the Environmental Assessment

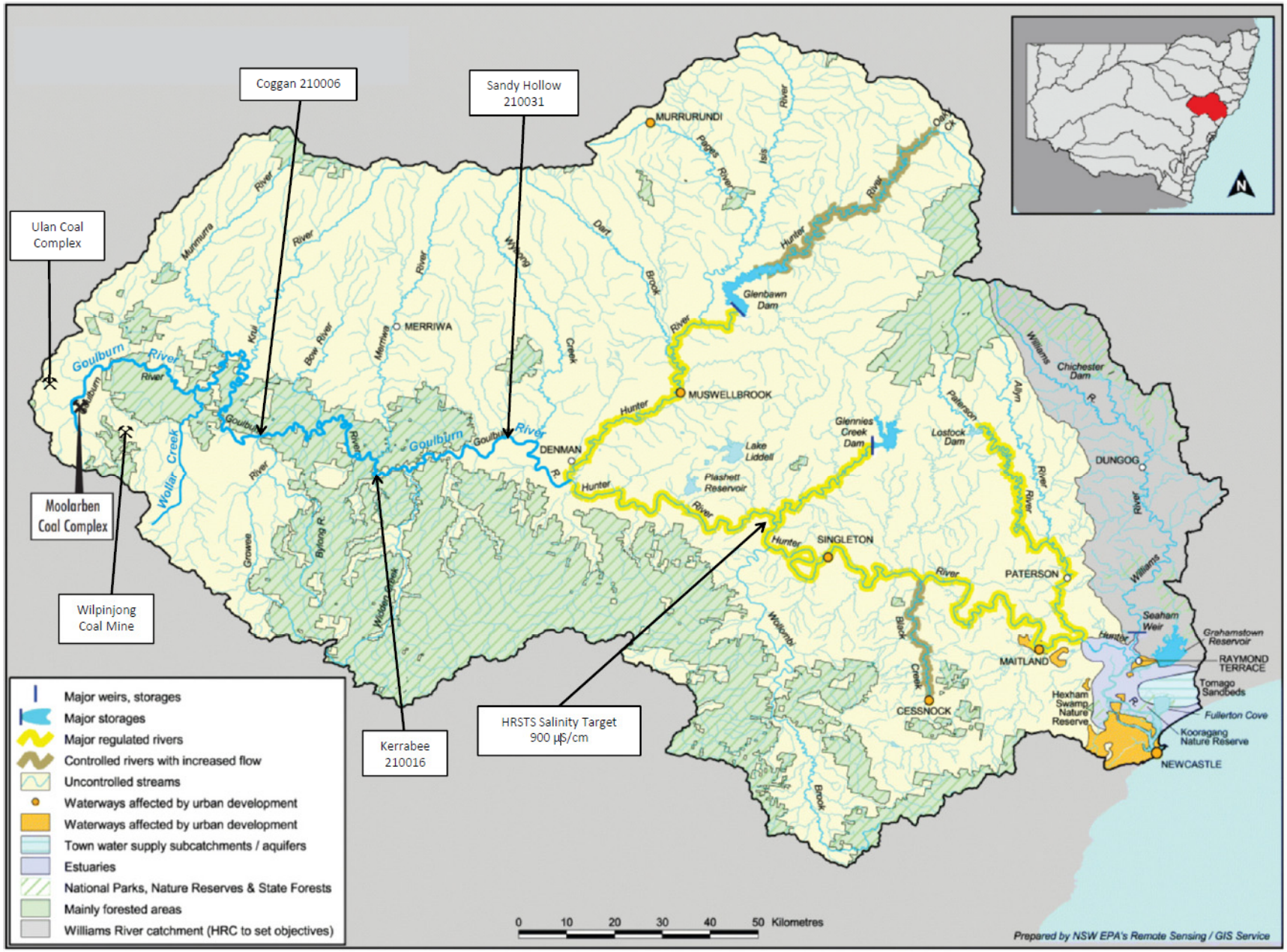

Figure 2
Hunter River Catchment

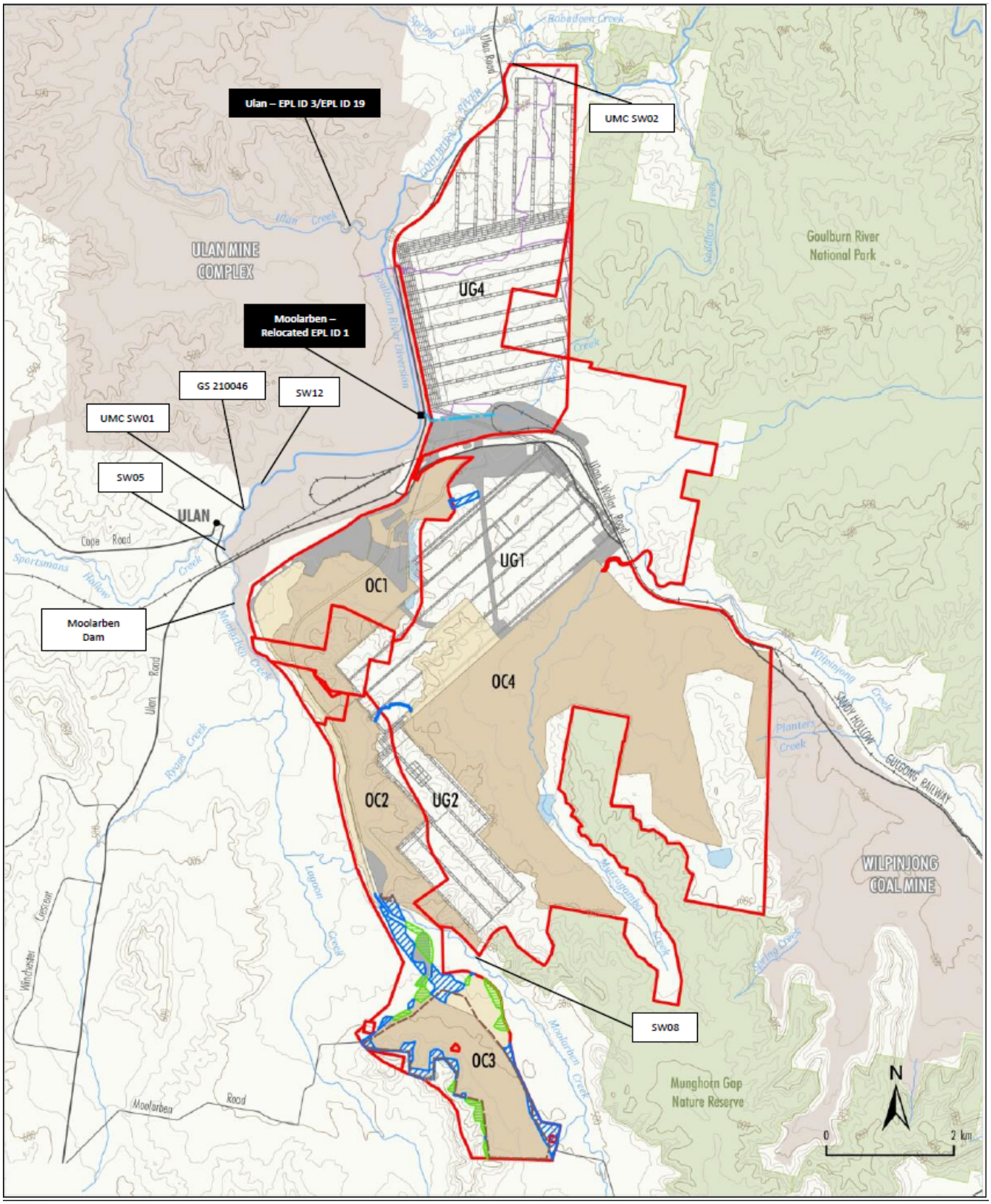

Figure 3
Surface Water Monitoring Locations and Licenced Discharge Points

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3. SCOPE 3 EMISSIONS

IPC REQUEST FOR FURTHER INFORMATION

In regard to Scope 3 emissions generated by the Modification, the IPC noted the following:

> ***The Commission notes that the Todoroski Air Science (TAS) report that accompanied the Environmental Assessment (EA) for the Moolarben modifications indicates that Scope 3 emissions would occur from the transportation; and from the end use of the product coal. The TAS report also indicates that Scope 3 emissions are not controlled by operators and that are understood to be considered in the scope 1 emissions from other various organisations related to the project.***
>
> ***The commission panel also notes as per the EA, that if coal from the Moolarben Coal Complex is combusted, the additional Scope 3 emissions would be approximately 7.3 Mt of CO2-e per annum; and that these "…would not physically occur in NSW or Australia as product coal would be exported to overseas customers;" as stated in your EA.***

The IPC then requested:

> ***From the above, the Commission panel would like for the proponent to further elaborate from the information it has provided on its EA on Scope 3 emissions on how it has been calculated, taken into consideration, and whether and how impacts from Scope 3 emissions, including coal burning from coal that would be extracted from the Moolarben Coal Complex, would/would not be felt in NSW or Australia, despite physically being transported and burned overseas.***

YANCOAL RESPONSE

As identified by the IPC the combustion of 3 million tonnes per annum (Mtpa) of coal (i.e. the proposed increase in annual ROM coal production) would result in approximately 7.3 million tonnes of carbon dioxide equivalent (CO_2-e) per annum. This is based on the 2017 National Greenhouse Account Factors (Commonwealth Department of the Environment and Energy, 2017) for bituminous coal, which is reproduced below.

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1\,000}$$

where:

E_{ij} is the emissions of gas type (j), (carbon dioxide, methane or nitrous oxide), from fuel type (i) (CO_2-e tonnes).

Q_i is the quantity of fuel type (i) (tonnes).

EC_i is the energy content factor of the fuel (gigajoules per tonne) according to each fuel in Table 1.

If ***Q_i*** is measured in gigajoules, then ***EC_i*** is 1.

EF_{ijoxec} is the emission factor for each gas type (j) (which includes the effect of an oxidation factor) for fuel type (i) (kilograms of CO_2-e per gigajoule) according to each fuel in Table 1.

For the burning of 3 Mtpa of bituminous coal, the calculation of these emissions is as follows:

$$Eij = \frac{3{,}000{,}000 \times 27 \times 90}{1{,}000} = 7{,}290{,}000 \text{ tonnes carbon dioxide equivalent}$$

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The proposed increase in annual production would generally bring forward coal that is already approved to be mined albeit at a reduced rate of production. As noted in the EA, the Modification would only change total life of mine run-of-min (ROM) coal by about 1%. Therefore, Scope 3 emissions associated with the Moolarben Coal Complex incorporating the Modification are largely the same as those associated with the assessed and approved Moolarben Coal Complex operations (i.e. incorporating the extraction, processing and sale of coal from Stage 1 and Stage 2 Projects up to 31 December 2038).

As noted by the IPC, Scope 3 emissions would occur as a result of transporting the coal to market and the burning of the coal overseas, as all coal from the Moolarben Coal Complex is exported.

Currently, 95% of Moolarben Coal Complex coal is exported to customers in countries that are signatories of the Paris Agreement (e.g. Japan, South Korea, China, Singapore, Malaysia and India) and therefore emissions inventories would be managed by these countries. The remaining 5% is sold to Coal Traders and MCO has no control on the end user of this coal.

Scope 3 emissions that occur in New South Wales (NSW) (i.e. rail transport) are already occurring and would be accounted in NSW's and Australia's greenhouse gas emissions inventories.

The extent to which Scope 3 emissions from the Moolarben Coal Complex impacts global climate change, and how this would/would not be felt in NSW or Australia, would be proportional to the contribution of these emissions to total global greenhouse gas emissions. The Modification would marginally increase the total life-of-mine open cut coal production by approximately 1% compared to the approved Moolarben Coal Complex. The Scope 3 greenhouse gas emissions from the end use of this minor increase in coal production and end use would be minimal compared to the assessed and approved total greenhouse gas emissions (including Scope 3 emissions from the burning of the coal) for the Moolarben Coal Complex and negligible in the context of global greenhouse gas emissions.

4. STATUS OF THE DRIP LAND HANDOVER

IPC REQUEST FOR FURTHER INFORMATION

The IPC stated:

> ***Various submissions have raised concerns in relation to handover of the land where the Drip sits, to NSW National Parks. The Commission panel would like the Proponent to provide an update on the status of the handover.***

YANCOAL RESPONSE

Land encompassing the "Drip" and the "Corner Gorges" (the Drip land) was handed over to the NSW Government in March 2018 with the land title now in the name of the Minister Administering the *National Parks and Wildlife Act 1974.*

MCO will also be handing over additional land surrounding the Drip land to the NSW Government, and both parties continue to work collaboratively to expedite the finalisation of the handover of this additional land.

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5. References

Advisian (2017). *Controlled Water Release Impact Assessment for the Goulburn River*.

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