Rylstone Region Coal Free Community

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PRIA Submission: Surface Water

Final

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Acknowledgement of Country

The RRCFC acknowledges that we live and work on Wiradjuri Country.

We acknowledge the Wiradjuri peoples as the traditional custodians of the land, and pay our respects to Elders past, present and future.

Executive Summary

2020 Strategic Statement and the PRIA process

The NSW Government June 2020 Strategic Statement on Coal Exploration and Mining outlines the NSW Government's approach to transitioning to renewable energy and supporting the economy and aims to improve certainty about where mining should not occur. It identified 14 potential future coal exploration release areas (NSW Government, 2020). The Hawkins and Rumker potential release areas were identified in this Statement; the Ganguddy-Kelgoola area, which sits adjacent to the Hawkins and Rumker areas, is also identified in this statement.

Following the release of the Strategic Statement, the NSW Government Advisory Body for Strategic Release has requested the Hawkins and Rumker areas be put through the Preliminary Regional Issues Assessment (PRIA) process (Department of Planning, Industry and Environment (DPIE), 2021). Ganguddy-Kelgoola is expected to go through the PRIA process in the near future once further exploration is completed.

The PRIA process, also set out in the Strategic Release Framework (NSW Government, 2020), is an initial assessment of social, environmental and economic matters relating to areas that could be released for exploration. In theory, it involves engaging with interested and potentially impacted stakeholders to identify issues for consideration.

RRCFC's Surface Water Submission

This report is the Rylstone Region Coal Free Community's (RRCFC's) submission to the PRIA process for the Hawkins and Rumker areas covering *Surface Water*. RRCFC 's submission recognises that coal exploration is a precursor to coal mining, and therefore it is predominantly the mining phase that is considered herein this submission.

Locality, position in the upper catchments of the landscape and values

The Hawkins and Rumker areas both straddle the Great Dividing Range, with each having a portion of their catchments falling east, into the Upper Hunter catchment, and west, into the Cudgegong River and Lawson Creek catchments. The majority of the waterways within the Hawkins and Rumker areas are first order and second order streams. These are small waterways, generally characterised by moderate to very steep slopes. Many of these are ephemeral waterways, with quick flowing waters following rainfall events and periods of dry in between. The only third order stream is the Growee River.

Growee, in the north-eastern portion of Rumker contains Biophysical Strategic Agricultural Land (BSAL) lands mapped through the valley.

Rylstone Dam is the water supply for the townships of Rylstone, Kandos, Charbon and Clandulla. The Rumker area sits over, or would interrupt flows from, 21 percent of the Rylstone Dam catchment area. Downstream of Rylstone Dam is Windamere Dam, which supplies Mudgee's town water. This is a drinking water supply for local communities and should be treated with the same sanctity and respect that Sydney's drinking water catchments are.

Mining risks and impacts

It is believed that mining in this area would be open cut or a mix of open cut and underground operations, but regardless of which approach to mining is taken in the Hawkins and Rumker areas, the risk of modification of the landform and detrimental water impacts is unacceptably high. Any open cut mine would present an extremely significant and irreversible interruption of the catchment flows.

Underground mining also has significant impacts on river health and water dependent ecosystems, including threatened species and endangered ecological communities.

There are rural properties, farms and small businesses throughout each of the Hawkins and Rumker areas. There are also a number of other properties between Rylstone Dam and Windamere Dam which rely on the water within the Cudgegong River for their water supply. These existing land uses and businesses are all sustainable long-term business and rely on the water resources within these catchments. All of these businesses are put at risk forever if mining operations are permitted. These demonstrably use or destroy the existing water resources and in these upper catchment areas there are no alternatives.

All water impacts will be acutely felt in the driest years. This area has been subject to a cycle of droughts as has the rest of Australia. Recently, it was also subject to the Black Summer fires, with the Gospers Mountain, Kerry's Ridge and Palmer's Oakey fires sweeping through many of the subject properties. In many parts of the region, there was not sufficient water locally to fight the fires. To put at risk any of the precious water in these catchments is simply a complete sell out of the local community and asking it to bear the high social costs of a short-term mining project.

As Mid-Western Regional Council recently advised DPIE (Appendix A), the recent drought has demonstrated water is a highly valuable resource and it does not support any potential threat to the existing town water supplies or the amount of water available for rural property owners for domestic and agricultural purposes.

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1 | Introduction

1.1 Preliminary Regional Issues Assessment (PRIA) Process

The NSW Government's Advisory Body for Strategic Release has asked the NSW Department of Planning, Industry and Environment (DPIE) to prepare a Preliminary Regional Issues Assessment (PRIA) (DPIE, 2021a) to consider the benefits, opportunities, risks and constraints of releasing two adjacent areas located near Rylstone in the Mid-Western Regional local government area (LGA).

These areas are shown in Figure 1 and include:

- Hawkins - an area of 14,900 ha located directly north of Rylstone, and
- Rumker - an area of 17,800 ha located directly northeast of Rylstone.

An initial assessment of resource potential undertaken by the Division of Mining, Exploration and Geoscience within the Department of Regional NSW has identified coal resources within the Hawkins and Rumker areas that could be mined by underground mining methods (DPIE, 2021a). It is noted that these areas could just as well be mined using aboveground methods.

In June 2020, the NSW Government released the Strategic Statement on Coal Exploration and Mining (NSW Government, 2020). The Strategic Statement outlines the NSW Government's approach to transitioning to renewable energy and supporting the economy and aims to improve certainty about where mining should not occur. It identified 14 potential future coal exploration release areas (NSW Government, 2020).

Adjacent to Hawkins and Rumker potential release areas is the area of Ganguddy–Kelgoola, which is slated to go through the PRIA process once further exploration is completed (NSW Government, 2020).

1.2 PRIA Preparation

The PRIA process is also set out in the Strategic Release Framework (NSW Government, 2020). It is an initial assessment of social, environmental and economic matters relating to areas that could be released for exploration. In theory, it involves engaging with interested and potentially impacted stakeholders to identify issues for consideration.

DPIE has engaged Resource Strategies to undertake 'preparation of a Preliminary Regional Issues Assessment document in relation to a defined area that could be released for coal exploration' for a sum of $167,156 (NSW Government eTendering, 2021).

On its website Resource Strategies (2021) says it facilitates development approvals for major mining and associated infrastructure projects and prepares comprehensive and timely environmental assessment documentation with the assistance of recognised experts across all environmental fields.

The DPIE undertakes the PRIA and submits this to the ABSR, which considers potential release areas, reviews reports and recommends assessment of the release of an area for resource exploration. The ABSR makes recommendations to the Minister for Regional NSW and these are considered by Cabinet and, if approved, the Minister for Regional NSW releases an area for exploration and invites companies to apply for a prospecting title.

1.3 Rylstone Region Coal Free Community

1.3.1 RRCFC

The Rylstone Region Coal Free Community (RRCFC) is a group of like-minded local residents and supporters of the Rylstone Region, committed to stopping further exploration of coal and approval of mines in our region. Our aim is to protect the land, heritage, culture and community for now and future generations. The RRCFC is self-funded and not affiliated with any political party.

1.3.2 Purpose of this report

This report is the RRCFC's submission to the PRIA process on *Surface Water*. Separate submissions for a range of other issues are also being submitted by the RRCFC. The RRCFC recognises that coal exploration is a precursor to coal mining, and therefore it is predominantly the mining phase that is considered in this submission. This submission considers the surface water of the Hawkins and Rumker potential release areas (herein referred to as areas). Both of these areas straddle the Great Dividing Range and are in the upper catchments of the Cudgegong River, Lawsons Creek and the Growee River. The majority of the waterways within the Hawkins and Rumker areas are first order and second order streams. These are small waterways, generally characterised by moderate to very steep slopes. Many of these are ephemeral waterways, with quick flowing waters following rainfall events and periods of dry in between. The waterways are sensitive and fragile environments. Given the scale of what is being proposed, any open cut mine would present an extremely significant and irreversible interruption of the catchment flows. Open cut mining has major impacts on streams, alluvial aquifers and alluvial soils. Underground mining would also severely impact the surface water resources of the Hawkins and Rumker areas.

Rylstone Dam is the water supply for the populations of Rylstone, Kandos, Charbon and Clandulla. Downstream of Rylstone Dam is Windamere Dam, which supplies Mudgee's town water. The Rumker area sits over, or would interrupt flows from, 21 percent of the Rylstone Dam catchment area. This is a drinking water supply for local communities and should be treated with the same sanctity and respect that Sydney's drinking water catchments are.

The RRCFC believes the cost to the water resources of this region is too high. It is the RRCFC's strongly held view that the PRIA should find that the proposed exploration areas should not be opened for exploration under the Strategic Framework that it recommends against release of the proposed areas, and the Advisory Board should rule that coal exploration should not proceed in the Hawkins and Rumker areas.

2 | Existing environment

The Hawkins and Rumker areas both straddle the Great Dividing Range, with each having a portion of their catchments falling east, into the Upper Hunter catchment, and west, into the Cudgegong River and Lawson Creek catchments (Figure 1).

2.1 Location

In total, there is 7,910ha of the upper Hunter catchment affected by the proposed mining, 14,965ha of the upper Lawson catchment creeks and 10,700ha of catchment that flows into the Cudgegong River. The details are provided below.

The Rumker area sits over, or would interrupt flows from, 21 percent of the Rylstone Dam catchment area.

2.1.1 Hawkins

Hawkins straddles two upper catchment areas: the Upper Hunter and the Upper Lawson Creek catchments.

- The Upper Hunter catchment portion of Hawkins is 4,787ha, with Ginghi Creek and Growee Creek rising in mountainous terrain and flowing northeast into the Bylong Valley.
- The Upper Lawson Creek catchment portion of Hawkins is 10,123ha in which there are numerous waterways. These include Breakfast Creek and Reedy Creek, which cross Hawkins after rising in Rumker, and Greenhills Swamp Creek, Long Gully, Horse Gully, Hawkins Creek and Lawson Creek, all of which rise in Hawkins. The Lawson Creek catchment waterways generally flow in a westerly direction, where Lawson Creek eventually joins the Cudgegong River below Mudgee.

2.1.2 Rumker

Rumker straddles three upper catchment areas: the Upper Hunter, the Lawson Creek, and the Cudgegong River catchments.

- The Upper Hunter catchment portion of Rumker covers an area of 6,123ha. It includes Sapling Creek, Sawyers Creek, Jumper Creek and Spring Log Creek, which rise in mountainous terrain and flow northeast into the Growee River in the Bylong Valley.
- In the Lawson Creek catchment portion of this Rumker, Breakfast Creek and Reedy Creek rise, then flow west into the Hawkins area. This covers an area of 4,842ha.
- In the Cudgegong River catchment, Coxs Creek and Dairy Swamp Creek rise, with their confluence on the southern boundary of Rumker before flowing into Rylstone Dam. This is an area of approximately 5,858ha. Another 1,022ha of Rumker drains into the Cudgegong below Rylstone Dam, where it flows west into Windamere Dam.

Additionally, there is an area of 5,554ha upstream of Rumker which drains through Rumker and into the Coxs Creek catchment and down to Rylstone Dam.

The majority of the waterways within the Hawkins and Rumker areas are first order and second order streams. These are small waterways, generally characterised by moderate to very steep slopes. Many of these are ephemeral streams, with quick flowing waters following rainfall events and periods of dry in between. The only third order stream is the Growee River.

2.2 Morphology

The majority of the waterways within the Hawkins and Rumker areas are first order and second order streams. These are small waterways, generally characterised by moderate to very steep slopes. Many of these are ephemeral streams, with quick flowing waters following rainfall events and periods of dry in between. The only third order stream is the Growee River.

2.3 Surface Water Sharing Plan Areas

The surface water sharing plan areas are shown in Table 1 and presented in Figure 2.

Table 1 Surface Water Sharing Plan Areas

Proposed Coal Release Area	Water Sharing Plan	Area (ha)
Hawkins	Hunter Unregulated and Alluvial Water Sources Water Sharing Plan 2009	4,814
Hawkins	Macquarie Bogan Unregulated and Alluvial Water Sources 2012	10,096
Rumker	Hunter Unregulated and Alluvial Water Sources Water Sharing Plan 2009	6,243
Rumker	Macquarie Bogan Unregulated and Alluvial Water Sources 2012	11,603
	Total	**32,755**

The Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources states that water must not be taken under an access licence when there is no visible flow, or where an access licence permits take from an in-river pool; when the volume in that pool is less than its full capacity (WRM 2020).

2.4 Natural springs

To understand the full extent of springs that may be present in the Hawkins and Rumker areas, use was made of Cardno (2020), which presented some mapping of springs within the Bowden's study area. This report indicated that there were 29 springs present within an approximately 320ha area. Extrapolating this to the 32,700ha of the Hawkins and Rumker areas, it would be reasonable to conclude that there would be over 3,000 springs within the proposed release area.

2.5 Biophysical Strategic Agricultural Land (BSAL)

Figure 3 shows Biophysical Strategic Agricultural Land (BSAL) for the Hawkins and Rumker areas (Earthscapes 2021). Growee, in the north-eastern portion of Rumker contains BSAL lands throughout the valley.

Department of Planning Industry & Environment (DPIE) describes BSAL (DPIE 2014) as:

> This land has the best quality soil and water resources and plays a sustaining role in the State's $12billion agricultural industry.

Agricultural land across the state was assessed against specific scientific criteria-levels of soil fertility, land and soil capability classes and access to reliable water and rainfall levels.

It is the inherent values of the land itself, rather than the agricultural activity it supports, which determine the BSAL classification.

Given the climate variability experienced in this country, the water resources are a critical part of this equation. In this instance, this water is the product of the runoff of the contributing catchment, of which a significant proportion, 6,242.6ha rises to the south-west and south, from the Rumker area.

It is probable that some of the river flats along Coxs Creek would also constitute BSAL for the same reason that the lands through Growee are – that is, alluvial flats are present and there are abundant water resources from natural springs and high rainfall due to the orographic effect of the areas proximity to the Great Dividing Range.

It is also noteworthy that there is a significant amount of BSAL downstream of Windamere Dam and further downstream of Hawkins in the Lawson Creek catchment.

2.6 Water Quality

There is not readily available water quality data for the small waterways within the two areas proposed for coal exploration. However, given that the majority of the waterways are in moderate to good condition, that a high proportion of the catchments have native vegetation present and that much of the riparian corridors of the waterways have native vegetation present, it is reasonable to assume that the water quality within the waterways would be moderate to good (SJ Landscape Constructions, 2002; Earthscapes 2021).

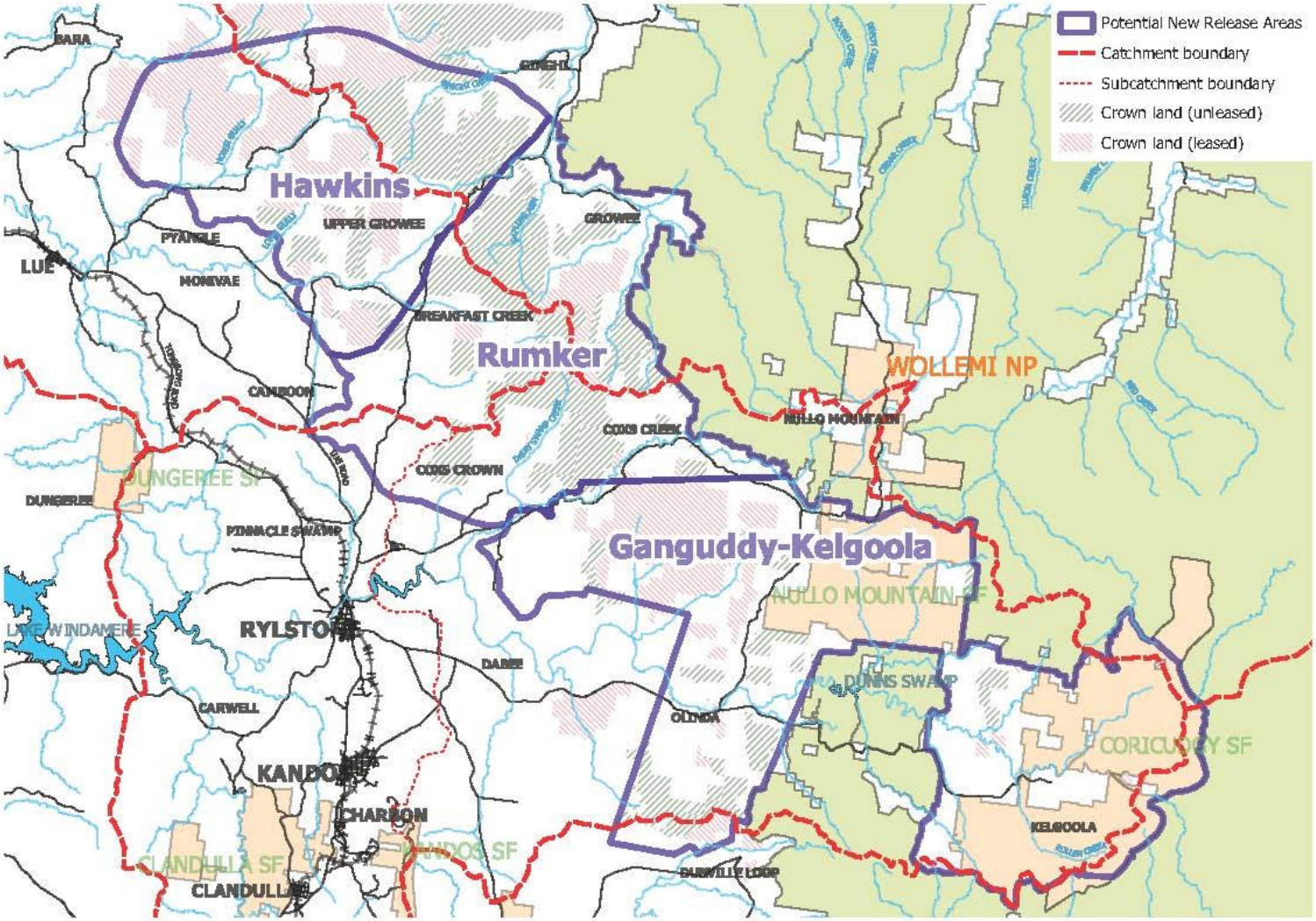

Figure 1 Water catchments within proposed exploration areas

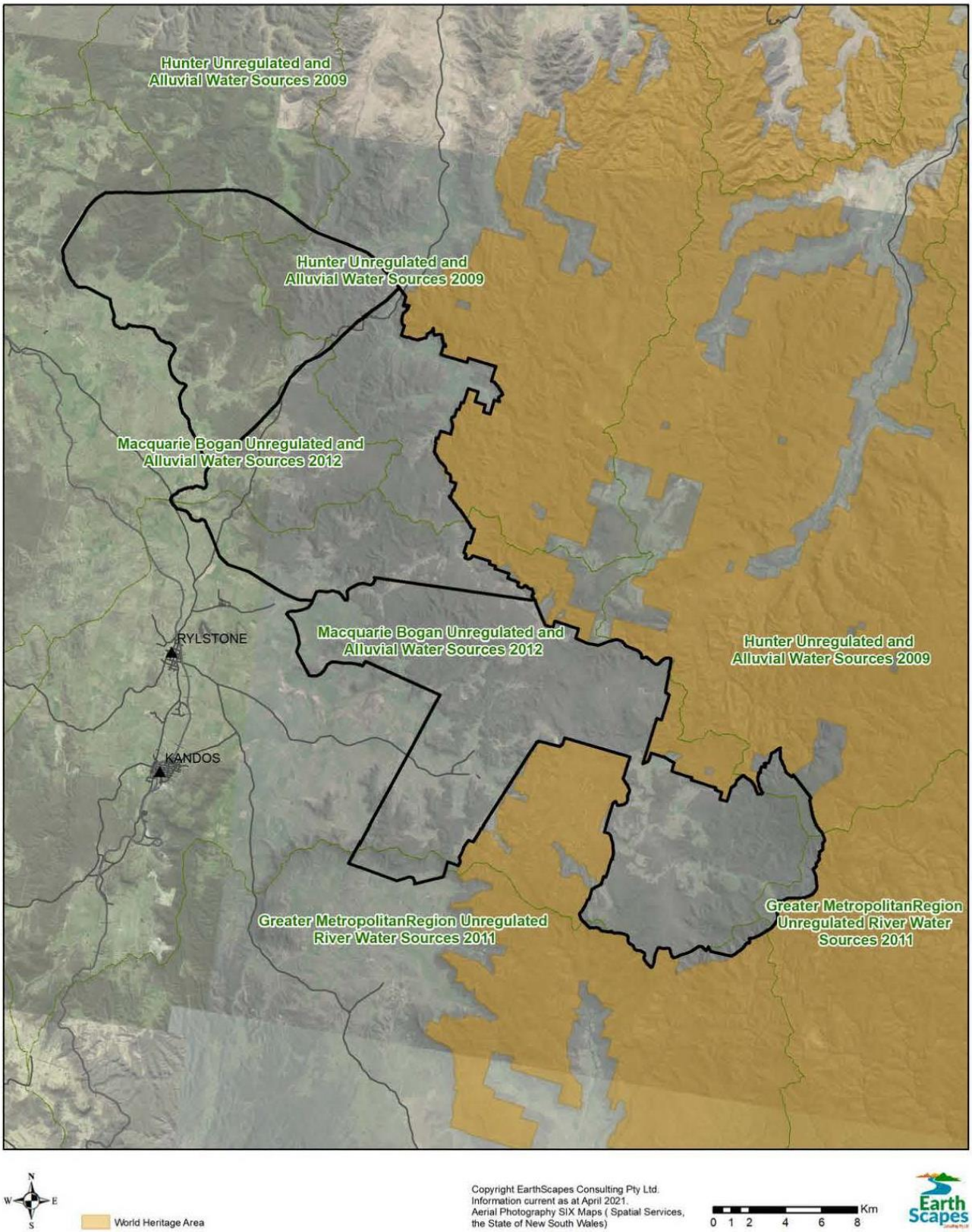

Figure 2 Surface Water Sharing Plan Areas
Source: Earthscapes, 2021

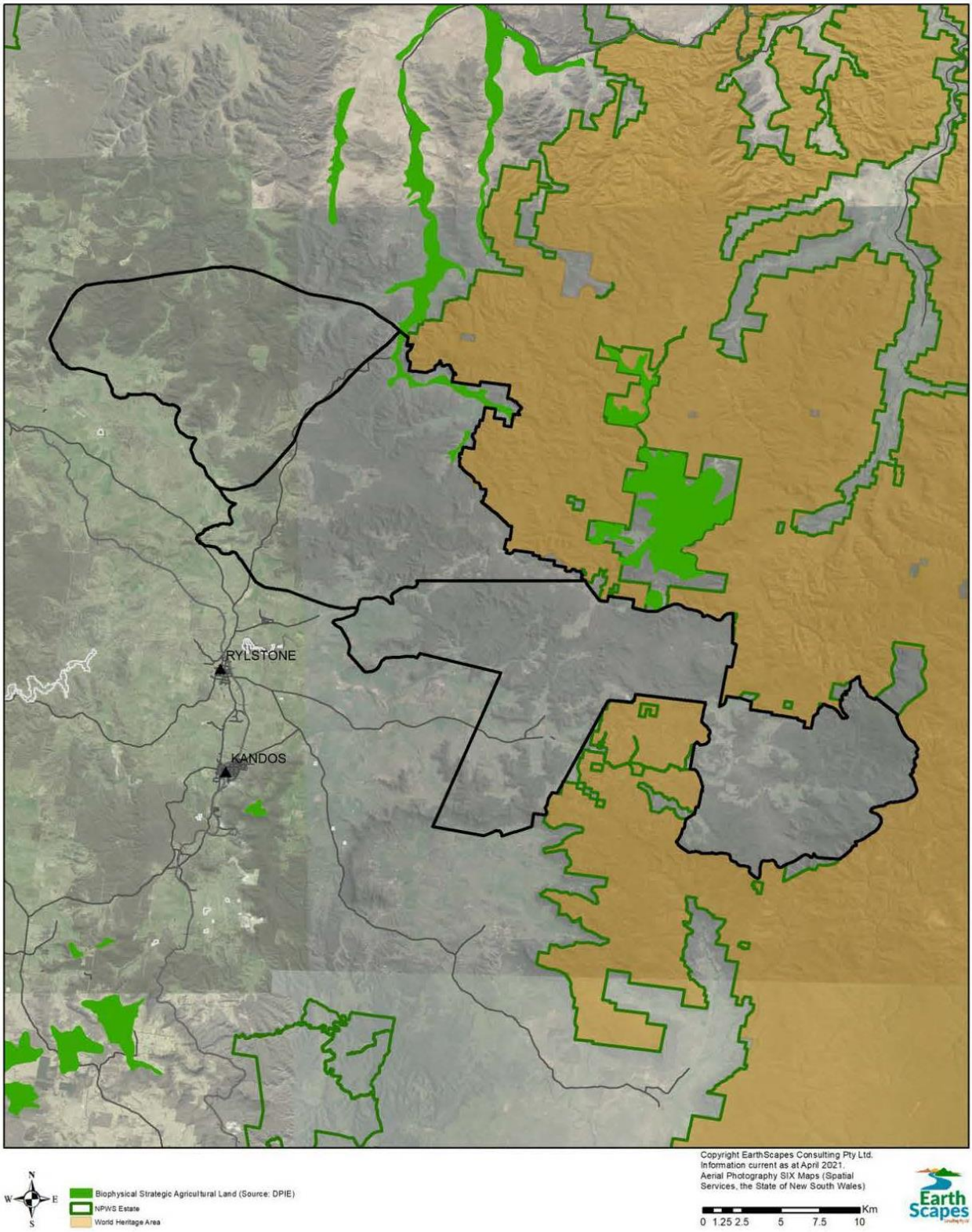

Figure 3 Biophysical Strategic Agricultural Land (BSAL)
Source: Earthscapes, 2021

3 | Water Uses

3.1 Rural communities

There are farms and small businesses throughout the Hawkins and Rumker areas, undertaking business activities including: grazing, cropping, orchards, vineyards, plantation forests, native forestry, sheep, cattle, horse and alpaca studs, poultry egg production, mineral water supplies, an olive press which presses for many olive growers in NSW, and boutique brewers. Tourism-based businesses include: accommodation (farm stays, bed and breakfast, rural and wilderness retreats), artisanal workshops, arts and crafts, Aboriginal cultural and heritage tours, and many more.

These land uses and business are all sustainable long-term businesses, and all rely on the water resources within these catchments.

There are also a number of other properties between Rylstone Dam and Windamere Dam which rely on the water within the Cudgegong River for their water supply and business viability.

3.2 Town water supply

Rylstone Dam is owned by Mid-Western Regional Council and is the water supply for the townships of Rylstone, Kandos, Charbon and Clandulla. Raw water is sourced from the dam and processed at the adjacent water treatment plant before being distributed to the Rylstone, Kandos, Charbon and Clandulla townships (MWRC, 2016).

Downstream of Rylstone Dam is Windamere Dam, owned by WaterNSW, which supplies Mudgee's town water. There are many properties downstream of both Rylstone and Windamere Dam that are dependent on the Cudgegong for their water supply and business viability.

The Rumker area sits over, or would interrupt flows from, 21 percent of the Rylstone Dam catchment area.

Downstream of Rylstone Dam is Windamere Dam, owned by WaterNSW, which supplies Mudgee's town water. There are many properties downstream of both Rylstone and Windamere Dam that are dependent on the Cudgegong for their water supply and business viability.

3.3 Recreation

Both Rylstone Dam and Windamere Dam provide recreational experiences. These are popular spots for boating, canoeing, fishing and swimming.

4 | Potential mining impacts

While the impacts from coal exploration activities upon surface water, as opposed to groundwater, may be minimal and managed with appropriate controls, it is an inescapable fact that a coal exploration licence is only being considered as a pre-cursor to opening up the area for mining. Therefore, it is predominantly the mining phase that is considered here.

The potential impacts of coal exploration and mining activities are:

- Interruption of catchment flows: the construction of mines within the Hawkins and Rumker areas would irrevocably change the existing catchment flows, regardless of what type of mining was proposed.
- Unsustainable water use. Mining operations use a huge amount of water. This is unsustainable in any location but particularly so in upper catchment areas such as Hawkins and Rumker areas.
- Reduction in surface water flows. The interruption of catchment flows and the unsustainable volume of water used by mines would interrupt the natural hydrological cycle. This will lead to a loss in water in the catchments.
- Erosion and sedimentation due to exploration and mine construction activities. This includes disturbance of creeks, rivers and floodplains due to bulk earthworks and construction of infrastructure and open-cut pits.
- Water contamination arising from coal washing operations and potential for untreated discharges being released into drinking water catchments.

The potential impacts on groundwater resources are anticipated to be highly significant, but this is covered in a separate submission by the RRCFC.

5 | Discussion of Risks

5.1 Interruption of catchment flows:

The construction and operation of mines within the Hawkins and Rumker areas would irrevocably change the existing catchment flows, regardless of the type of mine built.

Whilst DPIE's PRIA information (DPIE, 2021a) is based on the proposition that the mining could take place underground, the coal deposits in a number of places are shallow, in the order of 100m to 150m (pers. comm. G. Buchan 4 July 2021). It is anticipated these deposits could only feasibly be mined with open cut techniques. Further, the rapid increase in the size and capacity of surface mining equipment has made mega-scale open cut operations more feasible, with consequential increases in the depth at which open cut mining could be carried out and the ratio of overburden to coal profitably worked (Rutledge and Wright, 1985 in Hydrocology Consulting, 2014). **Open-cut mines are also favoured as they enjoy labour productivity gains of two to four times compared to underground mines** (Lucarelli, 2011 in Hydrocology Consulting, 2014).

Any open cut mine would be an extremely significant interruption of the catchment flows, particularly with the massive scale of deposit being considered in the Hawkins and Rumker area. Further, given the topography and sensitivity of the landscape in question, diverting clean water around any mine would create additional large-scale disturbance in the landscape. There would be long-term, permanent changes that would result from this level of disturbance. The nature of these impacts is discussed further in this section.

This long-term impact was considered in the Upper Hunter Strategic Review undertaken by the Department of Infrastructure, Planning and Natural Resources (DIPNR) (2005) (Smith, 2009). The Upper Hunter Strategic Review reported **that open cut mining can clearly have major impacts on streams, alluvial aquifers and alluvial soils. Mining which removes alluvium to reach coal beneath has an obvious impact on an alluvial aquifer, requiring it to be dewatered during mining, and with very little probability of successful restoration afterwards.** The Upper Hunter Strategic Review concluded: A formal policy should be developed to avoid or minimise potential impacts of coal mining on major streams and aquifers in the Hunter Valley and elsewhere in the State (DIPNR 2005 in Smith 2009)

It may well be that any mine would have an underground component, however there are still significant issues for water resources.

Subsidence caused by longwall mining has been found to have impacts on surface water assets including rivers and wetlands and associated ecosystems.

Underground coal mining close to or beneath alluvial aquifers, or open cut mining close to alluvial aquifers may lead to fracturing of the hard rock layers that confine the ground water. The result is that any significant degree of fracturing will establish additional conduits for increased movement of saline groundwater into the alluvial aquifers, and to surface water features (Smith, S. 2009).

The magnitude of changes in surface and subsurface flows is dependent on the extent to which subsidence changes the structure of the strata overlying the mined coal seams (Frazier et al. 2010; MSEC 2006; Sidle et al. 2000 in Commonwealth of Australia, 2015). The level of the impact is dependent on the degree of subsidence, and the substrate, slope, and geomorphology of the surface water environment (Frazier et al. 2010; MSEC 2006; Sidle et al. 2000 in Commonwealth of Australia, 2015).

Subsidence resulting from longwall coal mining has a range of impacts on topography. These include cracking, the formation of steps and voids, undulation and buckling of the surface. Subsidence and

changes in topography are not uniform but will vary depending on the compressive and tensile properties of the surrounding strata.

5.1.1 Geomorphological impacts

Alterations to the physical character of landforms occur as a result of topographic impacts associated with subsidence. Changes in topography (especially gradient) have the potential to affect geomorphological processes. **The nature and scale of potential geomorphological impacts on a reach or broader catchment area are complex.** Possible geomorphological impacts associated with subsidence include:

- Cracking of rock bars or fracturing of alluvial strata altering the permeability of a stream bed. This can lead to reductions in stream flow, which in turn has potential to affect physical processes and instream habitat. **Cracking in swamps has the potential to dewater and dry out these environments,** reducing vegetation cover and in turn increasing the susceptibility of these areas to erosion during extreme rainfall events (NSW DoP 2008 in Commonwealth of Australia, 2015).
- Lowering of channel bed and changes to channel grade. This could potentially **alter channel hydraulics** and patterns of sediment erosion, transportation, and deposition within an affected reach, with **impacts on the character and distribution of pools and riffles and stability of channel banks** (NSW DoP 2008; Lucas et al. 2009 in Commonwealth of Australia, 2015).
- **Depending on location and extent of subsidence on a watercourse, geomorphological impacts may extend beyond the reach and impact on the condition of the broader catchment.** Upstream or downstream deepening of stream beds following subsidence may lead to incision and destabilisation of incoming tributaries, resulting in increased sediment loads to waterways (Lucas et al. 2009 in Commonwealth of Australia, 2015).
- **Rock falls, slumping and erosion of channel banks. Fracturing of bedrock in cliff and gorge settings can lead to rock falls** (NSW DoP 2008; Total Environment Centre 2007 in Commonwealth of Australia, 2015). Slumping and erosion of channel banks may arise from cracking alluvial banks. Lowering channel beds can also affect channel bank stability (Lucas et al. 2009).

5.1.2 Hydrological impacts

Changes in topography can result in changes in surface runoff following rainfall events, which in turn alter soil moisture across the landscape and create areas of ponding (Frazier et al. 2010). **Surface and subsurface cracking can alter or create new flow paths, thus altering surface and groundwater flow.** The magnitude of change in surface and subsurface flow is dependent on the extent to which subsidence changes the structure of the overlying strata (Frazier et al. 2010; MSEC 2006; Sidle et al. 2000). Subsidence related impacts on surface water primarily occur in the following ways:

- **diversion of surface flows into subterranean flows** via fractures and joints in the bedrock, with water travelling through near-surface strata and potentially resurfacing further downstream
- **leakage through rock bars**, where water held in ponds and pools may leak through fractures and joints in rock bars and potentially resurface further downstream
- **infiltration into the groundwater system**, particularly where the water table is lower than the surface water level of the river
- **surface water flowing directly into the mine**
- ponding of surface water in subsided areas.

Diversion of surface flows through subterranean flows and rock bar leakages are the main types of surface water impacts that are likely to occur as a result of subsidence induced cracking. Infiltration of surface water into deeper groundwater can occur if a conduit is established for flow through to a deeper permeable horizon. Experience shows that in cases of increased surface flow diversion into subterranean flows and rock bar leakage, impacts are most obvious at times of low flows. **Partial and complete loss of surface flows downstream is shown to coincide with periods of low flow** (Jankowski 2008 in Commonwealth of Australia, 2015).

These effects have long been recognised by the NSW Government. The NSW Department of Environment and Climate Change (DECC) (2007) noted that longwall mining subsidence is frequently associated with cracking of valley floors and creek lines with subsequent effects on surface and groundwater hydrology. Of particular concern is the potential for longwall mining to affect upland swamps. Upland swamps, particularly peat swamps, are important to catchment hydrology and ecology because they absorb water and allow runoff for long periods after rainfall has ceased. Surface cracking as a result of longwall mining subsidence can have a variety of impacts on riverine features or attributes. These include:

- Loss of surface flows or water levels
- Loss of aquatic or instream habitats. Complete drying of river pools or wetlands has occurred. The loss of these surface features is potentially irreversible in some cases
- Loss of connectivity between pools as surface water is lost to subsurface flows
- Loss of water quality (Increased iron oxides, manganese, sulphides and electrical conductivity, and lower dissolved oxygen)
- Simplification of remaining instream habitat due to the growth of iron-oxidising bacteria which can also be seen as a rusty-coloured mass in the water

The DECC considered that much of the **impact/damage to natural features from longwall mining is unacceptable as many are irreversible and contrary to the principles of ecologically sustainable development.** Of key concern to DECC was that subsidence due to longwall mining has had significant impacts on river health and water dependent ecosystems, including threatened species and endangered ecological communities.

Regardless of which approach to mining is taken in the Hawkins and Rumker areas, the risk of modification of the landform and detrimental water impacts is unacceptably high. There will be open cut pits creating scars across the landscape and widespread topographic, geomorphologic and hydrologic changes across the landscape, leading to changes in and loss of surface water flows.

This will be exacerbated by large-scale industrial complexes built to support any mine as well as the infrastructure to support such a complex, such as new roads and railway lines built across, through or under the existing creeks, streams and rivers, which would interrupt these waterways and change the flow of water across the catchments.

There would be irreversible changes to the landform and the natural hydrological cycle that has been set up over millennia. These changes cannot be rehabilitated or artificially reinstated by a mining company using earthmoving equipment.

5.1.3 Impacts on BSAL

As discussed above, BSAL is that land which has the best quality soil and water resources (DPIE 2014) and plays a sustaining role in the State's $12billion agricultural industry. It is not just a matter of excluding the lands mapped as BSAL from potential coal exploration and mining areas. The water that supports the BSAL does not suddenly magically appear at the mapped areas. The water that supports the BSAL land moves through the surrounding catchment and then is available to support agriculture in the mapped areas. **Any mining within the supporting catchments threatens the water resource in**

the BSAL areas. If Rumker is mined, the BSAL area is at risk of losing the critical water which underpins its inherent value. There is also potentially BSAL along the Coxs Creek flats and it is present just downstream of Hawkins in the Lawson Creek catchment. Mining in Rumker also potentially affects 21 percent of the catchment contributing to Rylstone Dam, and then further downstream, Windamere Dam and BSAL below it.

In the Independent Planning Commission Statement of Reasons (2019) for its decision to reject the Bylong Coal Mine, it quoted the NSW Farmers, which said ***'With the greatest of respect, when you are talking about BSAL, we find its rehabilitation very hard to believe. You cannot unscramble the egg***.' The IPC agreed and stated it *'does not consider the Applicant's rehabilitation plan to restore….the BSAL impacted by the Project….to BSAL equivalent land to be feasible.'*

5.2 Unsustainable Water Use

Coal mines use a lot of water to produce coal, with water demands for a coal project typically including:

- miscellaneous uses, such as construction water
- coal-handling and preparation plant water
- mine infrastructure areas, such as workshops, vehicle washdown areas and other on-site facilities
- haul road dust suppression
- irrigation

A chart of the water use for mines is shown in Figure 4.

For the Hawkins and Rumker areas, it is anticipated that the volume of coal could be 910 megatonne (DPIE, 2021a). Given the rapidly diminishing world market for coal, it is reasonable to assume that any company seeking to mine this deposit and receive a commercial return would be pulling it out of the ground as fast as it possibly could. Given this, it would be reasonable to assume that 20 million tonnes per annum (Mtpa) would be extracted. (It is noted that even at this rate, it would take 45 years to deplete this deposit, around the year 2075, when it is highly unlikely there will be a demand for either domestic or export coal at this point in time. This allows a 10 year lead time between now and a hypothetical mine to be developed). To extract this volume of coal per annum would require an annual water demand of **12,000 ML/a. This is four times the volume of Rylstone Dam.**

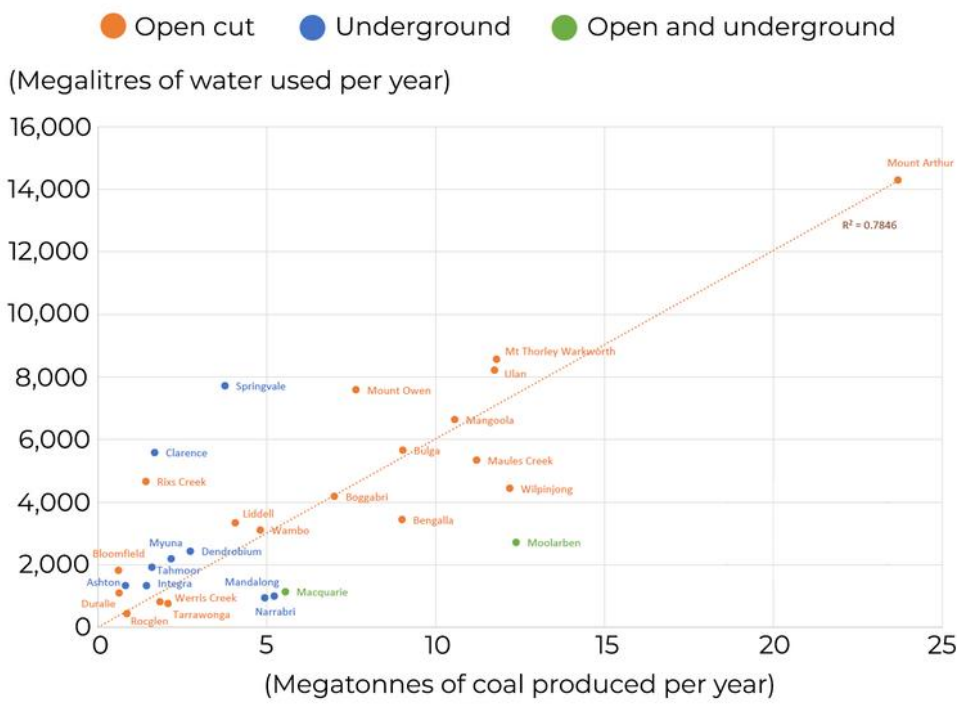

Figure 4 NSW Coal mine coal production vs water use
Source: Overton, I. 2020

About 80 percent of this water is freshwater from rainfall and runoff, extracted from rivers and water bodies, groundwater inflows or transferred from other mines. The other 20 percent comes from water already contained in tailings (mine residue), and recycled water or seepage from the mines. Almost all water used in coal mines is consumed and cannot be reused (Overton 2020).

The Hawkins and Rumker areas are in the upper part of the catchments. While mines use the term 'water make' to describe water that ends up in the mine, they do not in fact make water. Seepage into or from the mine is only water that would have become available at some other point in the catchment, either rising as a natural spring or as groundwater seeped into surface waterways further downstream in a catchment. It is not the mine's doing, but rather the mine is taking the water away from somewhere else it had naturally flowed.

The Australian climate is extreme, characterised by both short-term variability as well as medium to long-term wet/dry cycles. The extremity of these cycles will only be exacerbated as climate change continues influence weather patterns. In the past decade the Hawkins and Rumker areas have seen both their wettest and driest periods in recorded history (Bureau of Meteorology, 2021a). Further, there is significant variation across the catchments being considered, with rainfall on, or at the foothills of the ranges being higher, approximately 940mm on average per annum (BOM, 2021a) due to the orographic effect, and rainfall in the valley being several hundred millimetres lower at approximately 535mm on average per annum (BOM, 2021b). Some of the northern areas through Hawkins lie in a rain shadow and become desperately dry in drought years. Variations of up to 63 percent on these have been recorded in extreme years.

Any mining operation will consume what little water there is naturally in the three affected catchment areas.

A report by Hydrocology Consulting (2014) found that **there was a major flaw with NSW planning processes in that they do not require mining companies to demonstrate that there will be water available for their production needs. This is an unacceptable negative externality and to RRCFC's knowledge has not been addressed.**

5.2.1 A case study: Bowdens Silver Project

Mid-Western Regional Council (2020) provided the following advice to DPIE on the SSD 5765 Environmental Impact Assessment for Bowdens Silver Project:

> The significant and long-term water usage for the project remains a serious ongoing concern for Council, particularly in light of the recent drought conditions and rural hardship experienced across the Region. **The recent drought has demonstrated water is a highly valuable resource and Council does not support any potential threat to the existing town water supplies or the amount of water available for rural property owners for domestic and agricultural purposes.**

By comparison, however, the Bowdens project reported in the EIS that its average annual total site water demands would range between 1506 ML/a and 1807 ML/a. This range is dependent on the stage of production rather than consider what peaks may be during a severe drought.

As the Bowdens' site also sits in the upper catchment of Lawson Creek, it cannot meet its water demand locally nor via the Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources. Given this, it has an as yet underdeveloped plan to meet the mine water demand by transferring 5ML per day of water via a 60km pipeline (MWRC, 2020). Putting aside that this is highly unlikely to be feasible due to there not being any agreements in place for this water transfer to occur or the pipeline to be constructed, as well as there being approvals in place restricting those entities from supplying this water to Bowdens (Engeny, 2020), this case highlights **how unrealistic it is for a coal mine in the Hawkins and Rumker areas to source the water it needs for its operations**.

If it is accepted that a mine in the Hawkins and Rumker areas could supply approximately 20 percent from water already contained via groundwater intercept or other means, this leaves **a deficit of approximately 9,600ML/a, or 26ML per day. Even if it were in any way feasible to magic up that volume of water in this location, the use of such a high volume of water would cause extreme water stress to downstream water users and sensitive receiving environments.**

Not only would a mine in the Hawkins and Rumker areas greatly reduce the water available for other land uses within the catchment and cause extreme water stress to other water users and sensitive receiving environments. Given the Hawkins and Rumker areas location in the three upper catchments of the landscape, it is not feasible for it to source the water it would require from elsewhere. It is not acceptable to take what little water that already exists from the surrounding land and communities

5.2.2 Lost economic production

There are rural properties, farms and small businesses throughout the Hawkins and Rumker areas. Land uses include grazing, cropping, orchards, vineyards, plantation forests and native forestry (Earthscapes, 2021). Businesses include tourism-based enterprises such as farm stays, B&Bs and retreats, an olive press which presses for many olive growers in NSW as well as cattle, sheep, horse and alpaca studs, poultry egg production, artisanal workshops, mineral water supplies, boutique brewers and more.

These land uses and business are all sustainable long-term business and rely on the water resources within these catchments.

All of these businesses are put at risk if mining operations through either river extractions or seepage – which simply means drawdown of groundwater and springs from elsewhere - use all water available in the upper catchments.

There are also a number of other properties between Rylstone Dam and Windamere Dam which rely on the water within the Cudgegong River for their water supply. This water supply would be diminished.

All water impacts will be acutely felt in the most driest of years. This area has been subject to a cycle of droughts as has the rest of Australia. Recently, it was also subject to the Gospers Mountain, Kerry's Ridge and Palmer's Oakey fires sweeping through many of the subject properties during the Black Summer. In many parts of the region, there was not sufficient water locally to fight the fires. To put at risk any of the precious water in these catchments is simply a complete sell out of the local community and asking it to bear the high social costs of a short-term mining project.

5.3 Erosion and sedimentation

As discussed in the RRCFC's aquatic ecology submission, within the two proposed coal release areas, 88 percent of the waterways are in good or moderate condition and 98 percent of these waterways have a moderate or high stream fragility.

The creeks in this area are highly susceptible to erosion and sedimentation from exploration and mine construction activities, which includes disturbance of creeks, rivers and floodplains due to bulk earthworks and construction of infrastructure. The fragility of the waterways means that damage will easily occur, and further degradation will result.

Mines in this area do not have a reputation for sound environmental practices in regard to erosion and sediment control (pers. comm. G. Buchan 4 July 2021). Further, coal mining companies in the Hunter Valley have failed to set aside enough money to fill in their massive voids or maintain the vegetation required to restore the landscape once their mines come to the end of their lives (Hannam, P. 2021). **Given that any mine being developed in the Hawkins and Rumker areas will be done in an ever-diminishing market for coal and ever decreasing returns for this product, the financial viability of any mining operation will only be more precarious. This increases the risk that shortcuts will be taken, and the future communities and ecosystems of the Hawkins and Rumker areas will be left living with a mess that no one can afford to clean up. The RRCFC consider this is an unacceptable negative externality and the potential social costs for our region too high to risk.**

5.4 Contamination

The waterways in this area are in good condition and the water quality is good. The waterways run through highly sensitive environments and support life and livelihoods. This would be put at risk by mining in these catchments.

5.4.1 Increased salinity

During coal mining, salty water collects in mine pits, and has to be pumped out to allow mining to continue. What to do with this saline water is a major management problem for many coal mines (Smith, S. 2009).

Underground coal mining close to or beneath alluvial aquifers, or open cut mining close to alluvial aquifers may lead to fracturing of the hard rock layers that confine the ground water. The result is that any significant degree of fracturing will establish additional conduits for increased movement of saline groundwater into the alluvial aquifers, and to surface water features (Smith, S. 2009).

The Hawkins and Rumker areas lie across the Hunter River and the Murray Darling River catchments.

The Hunter region has been mined for many years now and provides a case study and clear examples of the risks to water quality and quantity by mining.

Since 1981, the area of the Valley cut open by mines has increased from 1,724ha to more than 31,500ha, or over 16 per cent of the upper Hunter Valley floor. The 26 coal mines and mine complexes currently operating in the Hunter comprise 42 open cuts pits and 15 underground works and produce about 142 Mtpa of saleable coal (Hydrocology Consulting, 2014).

In the Hunter region, coal companies mine the Permian coal seams, which are generally saline aquifers. A report by Hydrocology Consulting (2014) found the increasing connectivity between these formations and the productive freshwater alluvial aquifers of the river system as a result of the extensive open cut coal mining has increased the salinity of water resources. This report also highlighted the issue of mining contributing directly to salinity with discharges of mine affected water into waterways. Coal mines dewater substantial volumes of saline groundwater and discharge it into surface water sources. This mine dewatering is increasingly being found to be drawing water from alluvial aquifers and surface water sources which are now flowing into some mines.

This unaccounted loss of surface and alluvial groundwater compounds the poor quality of these water sources as it reduces base flows, which would otherwise dilute the Permian aquifer saline discharge. Hydrocology Consulting (2014) found the reduction in available volume and quality of both groundwater and surface water in the Hunter region is having a significant impact on sustainable rural industries. Agricultural water users in the Valley have identified fracturing of highly saline rock during open cut mining as one of the main causes of rising background salinity in the waterways.

Hydrocology Consulting (2014) also found there is a failure of the NSW Government regulators to prevent coal mines leaving final voids dotted throughout the Hunter Valley. This leaves a legacy of salinity and groundwater drawdown that continues for centuries after exploitation of the coal seams is finished. Final voids draw groundwater from surrounding aquifers and evaporation of this water renders it increasingly saline. It reported that research has already found that Hunter mine voids are reducing the base flow of the Hunter River. Water quality and its maintenance in post-mining voids have long-term implications for the entire community and ecosystem. Voids in the Hunter Valley alluvium, in particular, will continue to reduce base flow for centuries, placing even greater pressure on water storages to satisfy increasing water demands (Hancock et al, 2005 in Hydrocology Consulting, 2014).

The increase in salinity levels in any location is unacceptable; however, the contribution of mining to high salinity levels is of particular concern within the both the Hunter and the Murray Darling River systems. The Hunter River has already developed a major salinity issue, due to the coal mining operations already underway. The addition of further saline waters only exacerbates this.

High salinity levels already plague the Murray Darling River system and are leading to degradation of waterways, reduction in agricultural production and damaged ecosystems. Any discharge of saline water into the surface water of the Cudgegong River system or the Lawsons Creek system would increase the background salinity levels in these waterways. This is considered an unacceptable impact on downstream communities, industries that depend on that water and sensitive receiving environments.

5.4.2 Risk to drinking water catchment

The Rumker area sits over, or would interrupt flows from, 21 percent of the Rylstone Dam catchment area.

As part of the application for the Hume Coal and Berrima Rail Projects, to demonstrate neutral or beneficial impacts of the development on surface water, the project proposed to store any excess water in a surface water dam before pumping it underground to the voids behind the sealed

bulkheads. The storage of water underground was integral to on-site water management. Water balance modelling was presented. However, Water NSW maintained significant concerns that, without a water treatment plant or other suitable contingency measure, the project could result in untreated water discharges into Sydney's drinking water catchment (DPIE, 2021b).

The Hume Coal and Berrima Rail Projects (SSDs 7171 & 7172) Assessment Report (DPIE, 2021b) outlined DPIE's and Water NSW concerns regarding the viability of the water treatment methods proposed, the sensitivity of the downstream environment and risks to the downstream drinking water catchment. DPIE concluded there remained uncertainty about the potential surface water impacts on Sydney's drinking water catchment, given the mine design risks and the lack of a contingency strategy in the event that surface water discharge is required.

The inability to conclusively mitigate risk to surface water was one of the reasons for DPIE's recommending its refusal to the Independent Planning Commission. It found the project did not achieve a reasonable balance between recovering a recognised coal resource of State significance and minimising the potential impacts on the environment and surrounding land users as far as practicable.

There are strong parallels between the recently rejected Hume Coal and Berrima Rail Projects and any future mining in the Hawkins and Rumker areas. Any discharge of saline water into the surface water of the Cudgegong River system would contaminate the water in the Rylstone Dam. This is the drinking water supply for four townships and should be viewed as being as precious as Sydney's drinking water catchments are.

6 | Conclusion

The Hawkins and Rumker areas both straddle the Great Dividing Range, with each having a portion of their catchments falling east, into the Upper Hunter catchment, and west, into the Cudgegong River and Lawson Creek catchments. The majority of the waterways within the Hawkins Rumker area are first order and second order streams. These are small waterways, generally characterised by moderate to very steep slopes. Many of these are ephemeral waterways, with quick flowing waters following rainfall events and periods of dry in between. The only third order stream is the Growee River.

Growee, in the north-eastern portion of Rumker contains BSAL lands mapped through the valley. It is possible there is BSAL along the Coxs Creek flats, and it is present in the Lawson catchment downstream of Hawkins as well as downstream of Windamere Dam.

Rylstone Dam is the water supply for the townships of Rylstone, Kandos, Charbon and Clandulla. Downstream of Rylstone Dam is Windamere Dam, which supplies Mudgee's town water. The Rumker area sits over, or would interrupt flows from, 21 percent of the Rylstone Dam catchment area. This is a drinking water supply for local communities and should be treated with the same sanctity and respect that Sydney's drinking water catchments are.

Whilst the PRIA process is regarding coal exploration, this must be seen as a precursor for coal mining. A mine in this area would be open cut or a mix of open cut and underground operations.

Any open cut mine would present an extremely significant and irreversible interruption of the catchment flows. Open cut mining has major impacts on streams, alluvial aquifers and alluvial soils. Mining which removes alluvium to reach coal beneath has an obvious impact on an alluvial aquifer, requiring it to be dewatered during mining, and with very little probability of successful restoration afterwards. There would be long term, permanent changes that would result from this level of disturbance.

Subsidence resulting from longwall coal mining has a range of impacts on topography. These include cracking, the formation of steps and voids, undulation and buckling of the surface. Subsidence and changes in topography are not uniform but will vary depending on the compressive and tensile properties of the surrounding strata. Impacts from underground mining can include:

- Loss of surface flows or water levels
- Loss of aquatic or instream habitats. Complete drying of river pools or wetlands has occurred. The loss of these surface features is potentially irreversible in some cases.
- Loss of connectivity between pools as surface water is lost to subsurface flows
- Loss of water quality
- Simplification of remaining instream habitat

The impact and damage to natural features from longwall mining is unacceptable as many are irreversible and contrary to the principles of ecologically sustainable development. Of key concern is that subsidence due to longwall mining has had significant impacts on river health and water dependent ecosystems, including threatened species and endangered ecological communities.

Regardless of which approach to mining is taken in the Hawkins and Rumker areas, the risk of modification of the landform and detrimental water impacts is unacceptably high. There will be open cut pits creating scars across the landscape and widespread topographic, geomorphologic and hydrologic changes across the landscape, leading to changes in and loss of surface water flows.

There would be irreversible changes to the landform and the natural hydrological cycle that has been set up over millennia. These changes cannot be rehabilitated or artificially reinstated by a mining company using earthmoving equipment.

Any mining within the supporting catchments threatens the water resource in the BSAL areas mapped within them. If Rumker is mined, the Growee BSAL area is at risk of losing the critical water which underpins its inherent value.

Mining operations increase the salinity of the surrounding and downstream water resources. The increase in salinity levels in any location is unacceptable; however, the contribution of mining to high salinity levels is of particular concern within the both the Hunter and the Murray Darling River systems. Loss of water quality also occurs due to increased iron oxides, manganese, sulphides and electrical conductivity, and lower dissolved oxygen.

There are rural properties, farms and small businesses throughout each of the Hawkins and Rumker areas. There are also a number of other properties between Rylstone Dam and Windamere Dam which rely on the water within the Cudgegong River for their water supply. These existing land uses and business are all sustainable long-term business and rely on the water resources within these catchments. All of these businesses are put at risk forever if mining operations are permitted. These demonstrably use or destroy the existing water resources. In these three upper catchment areas there are no alternatives.

All water impacts will be acutely felt in the driest years. This area has been subject to a cycle of droughts as has the rest of Australia. Recently, it was also subject to the Gospers Mountain, Kerry's Ridge and Palmer's Oakey fires sweeping through many of the subject properties during the Black Summer. In many parts of the region, there was not sufficient water locally to fight the fires. To put at risk any of the precious water in these catchments is simply a complete sell out of the local community and asking it to bear the high social costs of a short-term mining project.

As Mid-Western Regional Council recently advised DPIE (Appendix A), the recent drought has demonstrated water is a highly valuable resource and it does not support any potential threat to the existing town water supplies or the amount of water available for rural property owners for domestic and agricultural purposes.

The RRCFC believes the cost to the water resources of this region is too high. It is the RRCFC's strongly held view that the PRIA should find that the proposed exploration areas should not be opened for exploration under the Strategic Framework that it recommends against release of the proposed areas, and the Advisory Board should rule that coal exploration should not proceed in the Hawkins and Rumker areas.

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Appendix A | MWRC Advice on Bowdens Silver Project

MID-WESTERN REGIONAL COUNCIL
PO Box 156, MUDGEE NSW 2850
86 Market Street, Mudgee | 109 Herbert Street, Gulgong | 77 Louee Street, Rylstone
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JR:CA:SSD5765

27 July 2020

Attention: Rose-Anne Hawkeswood
NSW Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Dear Rose,

RE: SSD 5765 ENVIRONMENTAL IMPACT STATEMENT

Thank you for providing Mid-Western Regional Council (Council) with the opportunity to provide input into the proposed Bowdens Silver Project. Council has reviewed the Environmental Impact Assessment (EIS) and wishes to provide the following comments for consideration.

WATER SUPPLY

The significant and long-term water usage for the project remains a serious ongoing concern for Council, particularly in light of the recent drought conditions and rural hardship experienced across the Region. The recent drought has demonstrated water is a highly valuable resource and Council does not support any potential threat to the existing town water supplies or the amount of water available for rural property owners for domestic and agricultural purposes.

Whilst the EIS identifies a range of potential water sources for the project, it does not consider the contingencies available for the project during prolonged periods of drought. If water is not available in the volumes required, the EIS does not consider the implications this will have on the project and the associated environmental impacts.

The proponent has also recognised that water security continues to be a critical issue for this project and the broader community, and has proposed to obtain excess water from either the Ulan or Moolarben Coal mines via a 59km water pipeline.

The EIS states that up to 5ML of water per day may be transferred via the water pipeline but formal agreements have not been established with either Ulan or Moolarben Coal mines in relation to water access and sharing. Given the significant amount of water required for the viability of this project, details of a guaranteed water supply and evidence of formal agreements should be provided before the project can be determined.