Objection to Exploration Licence 4244 Ridgelands Coal

Abstract

The full report addresses Essential Community Services and infrastructure that may be impacted by exploration, knowledge of threatened species and ecological communities within the proposed exploration licence area, knowledge of significant landscape, environmental, cultural and heritage features in the area that should be protected and recognised view corridors or scenic landscapes and sites of importance to the local or broader community, including recreation areas outside of urban areas (such as swimming holes in rivers or sporting areas) and other potential economic and social impacts on the community or individuals.

Wybong Action Group submits that any and every application for a Licence to explore the Ridgelands region should not be accepted, with the following issues again arising:

1. The lease area is an essential primarily natural ecosystems which comprises a corridor along the Great Eastern Ranges from the Victorian Alps to the Atherton Tablelands (Pulsford et al 2004), extending more than 2800 km along the eastern seaboard and containing Australia's richest areas of terrestrial biodiversity (Pulsford and Worboys in press).

2. A large part of the lease area constitutes the Mangoola Mine Northern Biodiversity Corridor designed to link to the large area of heavily vegetated Crown land to the north of the project site.
3. Over 520 square kilometres (approx 20% and increasing) of the Hunter Valley floor is subject to open-cut coal mining (Connor et al. 2004 p. 48) and the overall size of the valley floor spans approximately 2750 sq km. Land use patterns in the Hunter have left it seriously give rise to changed landscapes including loss of remnant vegetation and biodiversity,,, and an increasing production of rehabilitated landscapes.
4. The Manobalai NR and the footslopes, timbered ridge lands and forested mountains of the proposed Ridgelands Exploration Lease Area now forms the largest remaining unit of remnant native vegetation on the floor of the Hunter Valley within the Muswellbrook Shire not denuded of native vegetation.
5. The Upper Hunter Valley and in particular the Ridgelands ELA is an area of bio-geographical interest being located in an area that receives species from west of the Great Dividing Ranges, from coastal areas, and from northern and southern NSW. The area is also topographically varied and includes riparian areas, flat areas, hillsides and rocky slopes. Consequently, the large patch of forest, woodland and grassland habitats of Manobalai NR and surrounds supports a high diversity of native flora and fauna including a substantial array of flora and fauna that are listed on the TSC Act and/or the EPBC Act.
6. According to Abel Ecology (2005) Anvil Hill (and the Ridgelands ELA are) at the junction of a number of bioregions and botanical divisions, and contains both flora and fauna species from east and west of the Great Dividing Range. A number of species found in this area are at the limit of their ranges. As a result of the lack of reservation of the biota of the Hunter Valley Floor (97% cleared), the high biodiversity of the area, the mature age of the vegetation, habitat diversity, corridor connectivity and broadacre clearing of the adjacent Anvil Hill area, the Ridgelands ELA should be considered vital for immediate action for conservation through expansion of the Manobalai NR, wildlife refuges, conservation agreements, re-zoning or managed in trust.
7. There is as yet no comprehensive assessment of the vegetation of the Exploration Area.
8. Detailed studies of surface and groundwater interactions specifically relating to salinity have not been undertaken in the Wybong Creek catchment, however, despite this being identified as the main source of solutes to the upper Hunter River.[1]
9. Wybong Creek is highly connected to an alluvial aquifer system[2] and while regional hydrochemical studies have been conducted in the upper Hunter Valley, hydrogeology has not been addressed specifically within the Wybong Creek catchment (Kellett *et al.* 1987; Creelman 1994).
10. The rock is fractured and/or faulted below the surface also, with fracturing occurring at depths in excess of 300 m (Leary and Brunton 2003; Brunton and Moore 2004).[3]
11. Though geological mapping in the Wybong Creek catchment itself is limited, deep and **frequent fracturing and faulting is noted in geological reports**, with some of these vertical faults connecting the Narrabeen Group to the deeper Permian Coal Measures

[1] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, p 6

[2] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5, P35

[3] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P62

(Leary and Brunton 2003; Brunton and Moore 2004; Umwelt Environmental Consultants 2006).

12. No detailed analysis has been made of the species that could be impacted most by reduction in connectivity through:
    a. Clearance of vegetation for exploration
    b. Increased Isolation/fragmentation and increased genetic isolation
    c. Increased competition for resources
    d. Increased incidence of disease
    e. Increased threat of death
    f. Human interaction
    g. Operational impacts of exploration
    h. Edge impacts of exploration
    i. Risk of spread of Introduced species
13. Transportation

    Transport to the likely sites of deep drilling is by predominantly poorly maintained, undulating and winding rural road of 5m width or less, light construction or gravel roads.

    The unusual mix of heavy vehicle movements associated with deep drilling has high risk potential that cannot be mitigated[4] for replication of the fatal accident David Patten and an unexpected heavy and wide Xstrata Mangoola Mine load.

    Similarly, Thomas Mitchell Drive and Edderton Road

14. Social Impact

    The social impact is that community or part thereof is destroyed and a further part has its marketability destroyed.

    The fractured communities that remain continue to be affected by operational noise, fine particulate airborne dust, dust deposition, tainted rain water etc and their properties and investments stripped of genuine market value.

    Community and Individual impacts are documented in the work of Dr Linda Connor, Sydney University[5] and Dr Carmen Lawrence, University of Western Australia.

    "Significant expressions of distress linked to negative changes to interviewees' sense of place, well-being, and control". Pollution can affect well being both through an awareness of the adverse health and ecosystem effects of pollution as well as through the direct health effects." [6]

15. Economic

[4] Patten, D, Family Disappointed at RTA response to Inquest

[5] 2004 'Environmental change and human health in Upper Hunter communities of New South Wales', EcoHealth, 1(Suppl. 2), pp. 47-58., 2010 'Environmental Injustice and air pollution in coal affected communities, Hunter Valley, Australia', Health and Place, 16, pp. 259-266., 2009 'Not Just a Coalmine: Shifting Grounds of Community Opposition to Coalmining in Southeastern Australia', Ethnos, 74:4, pp. 490-513.,
2008 Connor, L. 'Jero Tapakan: Stories and Friends, Telling and Being', The Asia Pacific Journal of Anthropology, 9:3, pp. 177-188., 2008 Connor, L., Higginbotham, N., Freeman, S. and Albrecht, G. 'Watercourses and Discourses: Coal Mining in the Hunter Valley, NSW', Oceania 78:1, pp. 76-90.

[6] Dr Carmen Lawrence, University of WA, 3 May 2011, in "Economic Growth and Human Wellbeing"

For the rural landholder exploration represents an immediate loss of external marketable interest in their property and investment.

The actuality of exploration causes increased risk of death or injury to person and wildlife, further loss of land value, infrastructure damage and loss of amenity.

The local economy, already overheated in respect of skilled labour shortage, accommodation, tradespeople, inflation and higher prices will be further overheated by Ridgelands Exploration requirements.

16. Application Timeline

9/2008 The Ridgelands Coal Mining Titles were held and offered for exploration and mining by tender (Dec 2008) by the Director-General, NSW Dept Primary Industries - Individual and community Objections were lodged to Tender - The single applicant for the Ridgelands Coal Mining Exploration Lease was Xstrata Plc

22/4/09 The Petroleum Exploration Lease Allocated to Sydney Gas (PEL4) continues as AGL. Previously 2D Seismic survey and cores at Black Springs and Dry Creek by Sydney Gas.

22/04/09 The Ridgelands Coal Mining Titles were again offered for exploration and mining by tender (Dec 2008) by the Director-General, NSW Dept Primary Industries - Individual and community Objections again lodged to Tender

13/05/2009 BoTai Consortium (OGL & QinHe China State Coal) and Xstrata apply. The Ridgelands Coal Mining Exploration Lease was not allocated

16/12/2009 Mayor Martin Rush and Muswellbrook Shire Council object to the tender of Ridgelands ELA

6/2/2010 The Ridgelands Coal Mining Exploration Lease Remains Unallocated

30/3/10 Announcement to ASX - "Chinese company Botai Consortium, in conjunction with the Qinhe Energy, has recently won by open tender the rights to own the major Ridgelands coal lease west of Newcastle from the New South Wales Government."

12/4/10 Dept Industry & Investment NSW - The Ridgelands EOI process "is still ongoing and no exploration licence application has been made over the area nor has any exploration licence been granted to any party over the area in question."

12/4/10 *Botai correct incorrect claim of award of Ridgelands Coal Exploration Lease to ASX*

10/2010 The Ridgelands EOI process "is still ongoing and no exploration licence application has been made over the area nor has any exploration licence been granted to any party over the area in question." Dept Industry & Investment NSW.

11/2010 Ridgelands Coal (unconfirmed OGL, QinHe China State Coal and others) reported payment of $121 million, $20 million non-refundable or as per the tender.

6/5/2011 Ridgelands Coal on Ministerial invitation formally apply for an Ridgelands Coal Exploration Licence 4244.

22/5/2011 Application approval delayed by 60 day moratorium on issue of all new licences by NSW Government

18/8/2011 FOI shows Ridgelands ELA to have its origin and conclusion by the former minister.

23/8/11 No further information available on progress of Ridgelands Coal Pty Ltd application. Consortium consists of more than OGL & QinHe??..

02/2/2012 Muswellbrook Council apology on mine

12/2/12 New Application, Same Proponent, new solicitor, denied knowledge of 6 May 2011 Application as initially did DPI.

"work program" not provided by the applicant with the Application (as required)[7]

[7] Public Comment Process for the exploration of coal and petroleum, including coal seam gas, DPI, 2012. p5

restricted offer and subsequent withdrawal of extension of time
withdrawal of Dept undertaking to incorporate submissions made to earlier undetermined 6 May 2011 Application

17. Comment on Proposed Work Program

"At this early stage of planning, over the life of the exploration program, it is envisaged that the drilling work will involve about 180 boreholes of which approximately two thirds will be open chip holes to assess the structure and extent of coal seams and one third will be partly cored holes for coal quality analyses."[8]

The proposed work program cannot be commented on as the only detail of the proposed work program provided is the nomination of 180 core holes exploring 3 different coal measures over 3 years to a depth of 1500m.

It is noted that the Applicant also applies to undertake Seam Gas Testing [9] although Petroleum Licence PEL 4 is held by AGL and the Applicant has no licence to engage in petroleum exploration.

18. Potential environmental impacts of the proposed work program

1. Clearance of vegetation and direct removal of flora and vegetation communities and their habitat, including foraging and breeding habitat.
2. Increased Isolation/fragmentation and increased genetic isolation
3. Increased competition for resources
4. Higher incidence of Disease
5. Increased threat of death
6. Impact of increased Human interaction
7. Operational impacts
8. Edge impacts
9. Impact of Introduced species
10. Aquifer contamination
11. Groundwater contamination
12. Noise
13. Amenity
14. Property value

19. Past environmental performance of the applicant

(and in the case of corporate applicants, its Directors) in carrying out mining and exploration activities – We are unable to comment as despite inquiries no details have been provided by the Applicant on the shareholders or financial details of Ridgelands Coal P/L. Previous indications (from media) indicated BoTai Corporation (being Overseas & General Limited, Singapore SX 30% and QinHe Energy Coal, China State Owned 70%.)

[8] Document titled "Ridgelands Coal Resources Proposed Exploration in ELA 4244" provided to public 5/3/2012
[9] Document titled "Ridgelands Coal Resources Proposed Exploration in ELA 4244" provided to public 5/3/2012

We cannot evaluate the past environmental performance of the applicant (and in the case of corporate applicants, its Directors) in carrying out mining and exploration activities on the information provided by the Applicant.

20. Financial Resources of the applicant

We are unable to comment on the financial resources of the Applicant to carry out the exploration program as despite inquiries no details have been provided by the Applicant on the shareholders or financial details of Ridgelands Coal P/L. Previous indications (from media) indicated China State Owned.

We cannot evaluate the financial resources of the Applicant to carry out the exploration program on the information provided by the Applicant.

21. Conclusion

a) The Ridgelands has Tier 1 Terrestrial Biodiversity Habitat, contains Tier 1 Strategic Agricultural Land and is Priority Landscape Offset[10].

b) The work program supplied by the applicant is non-specific and vague. It provides no detail on activities and there is too much uncertainty to be able to provide specific comment or on which to make a decision to accept the application.

c) For example the applicant has no idea on the stage of the exploration given numbers of coreholes have been drilled, seismic and other studies conducted in the area or which cores will target which coal measures, or locations.

d) The community believes that the number of existing coreholes, the seismic and airborne magnetic surveys and geological reconnaissance mapping already undertaken fully support the 2005 conclusion that The Wybong Creek Catchment within the Study Area appears to have no foreseeable coal exploration potential."[11]

e) The community does not have the expertise of government or industry to identify procedural weaknesses in coal drilling programs, identify CEEC's, EEC's , species etc .

f) Inappropriate location – biodiversity, remoteness, cumulative impact degree of faulting and fracturing, coal seam aquifers linked to lunar saline release

g) Better sustainable uses, precautionary principle, Bio-banking, "Like" for "equally at risk of extinction or marked decline"

h) Ridgeland Coal Exploration Licence Tender and Selection process. Ridgelands Coal claim award of tender but clarify this as a "Ministers Invitation to Apply"

i) Process needs to quickly evolve into one wherein before an application for exploration is accepted the Minerals and Energy Department must consult with other agencies and publicly disclose those agency and any other information

[10] UHSRLUP

[11] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5, P98

necessary to the making of a proper decision or used in the making of a decision at the commencement of the Public Consultation Process.

j) Public Process needs to be 60 days (not 28)

Recommendations

The author, the Members of Wybong Action Group, Residents of Ridgelands, Contributors individually and severally, the Common Rare and Endangered Species of the Ridgelands Biota and the Common Good humbly recommend that the Minister:

A. Decline to Issue the Exploration Licence for Ridgelands.,

Or

B. Decline to Issue the Exploration Licence for Ridgelands without consideration of the completed UHSRLUP.,

Or

C. Decline to Issue the Exploration Licence for Ridgelands on grounds that Ridgelands Coal Work Program provides insufficient information on which to make a decision to the exploration lease application.,

Or

D. Decline to Issue the Exploration Licence for Ridgelands on grounds of Ridgelands Coal not being viable for coal extraction due to its Tier 1 Strategic Agricultural Land, Tier 1 Terrestrial Biodiversity, Priority Landscape Offset classification[12] and the integral role of Ridgelands ELA in the sustainability of the ecology of the Hunter and Greater Eastern Ranges, the application of Intergenerational Equity, the Precautionary Principle and the Principles of Sustainable Development,

Or

E. Decline to Issue the Exploration Licence for Ridgelands on grounds of Ridgelands assessment for Coal Extraction being non-viable due to the high occurrence of faulting, permeability and other gross geological flaws[13],

Or

F. Decline to Issue the Exploration Licence for Ridgelands on grounds of risk to sustainable agriculture in the Goulburn-Hunter River Catchment associated with the long term impact on agriculture from any increase in salinity associated with output flows from the Wybong Creek Catchment,[14]

Or

G. the NSW Government offer the applicant an opportunity to explore a substitute lease area in lieu of Ridgelands,

Or

H. Issue the Ridgelands Exploration Licence with conditions (compliance penalties)
    a. that require the applicant to produce a Preliminary EIS identifying existing landuse, schedule of lands, flora and fauna including habitats and foraging areas, Soils, Water, Geology, Hydro-Geology, Transport, Risk Assessment, Equipment to be used, Disturbance types and durations, drill hole details etc prior to commencement of **any** drilling or exploration involving disturbance,

    Or

    b. that require the applicant to engage in community consultation by exhibiting and taking submissions on exploration eg. Core locations, core

[12] UHSRLUP 2012

[13] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5

[14] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia,

depth, size of drilling rig, clearance area, hours, etc prior to commencement of **any** drilling or exploration involving disturbance,

And

c. that require the applicant to establish an independently chaired CCC to ensure no loss of biodiversity and minimise human and social impact, and in doing so to:
    - engage an independent and public peer review of existing water management data and data systems for the Ridgelands area and publicly report findings and make recommendations for an ongoing discovery, public monitoring and analysis of surface, aquifers, groundwaters and hydrogeological features within the EL, and,
    - engage an independent and public peer review of and make annual recommendations concerning an ongoing fauna, flora, micro-climate and habitat survey of the EL, and,
    - conduct and publicly report ongoing base-line community health studies

prior to commencement of **any** drilling or exploration involving disturbance,

And

I. specifically excluding all and **any** exploration that is for purposes not requisite to the gaining of coal.

John Shewan
President
Wybong Action Group
23/3/2012

Objection to Coal Exploration Licence Application #4244 Ridgelands Coal

By Wybong Action Group 23 March 2012

For and on Behalf of the Members of Wybong Action Group, Residents of the Ridgelands area, the Common Rare and Endangered Species of the Ridgelands Biota and the Common Good.

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Note: Potential impacts cannot be considered as the work program provides no locations, dates or times for work, generically however impacts could be taken to include: 41
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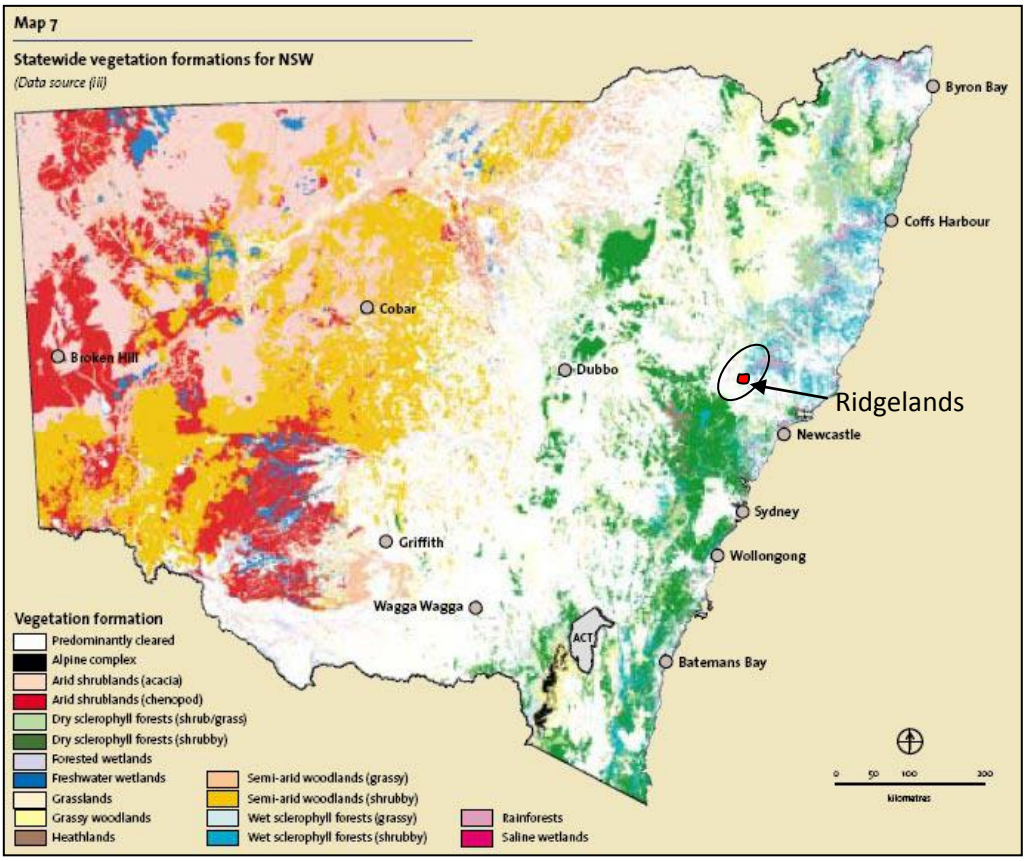
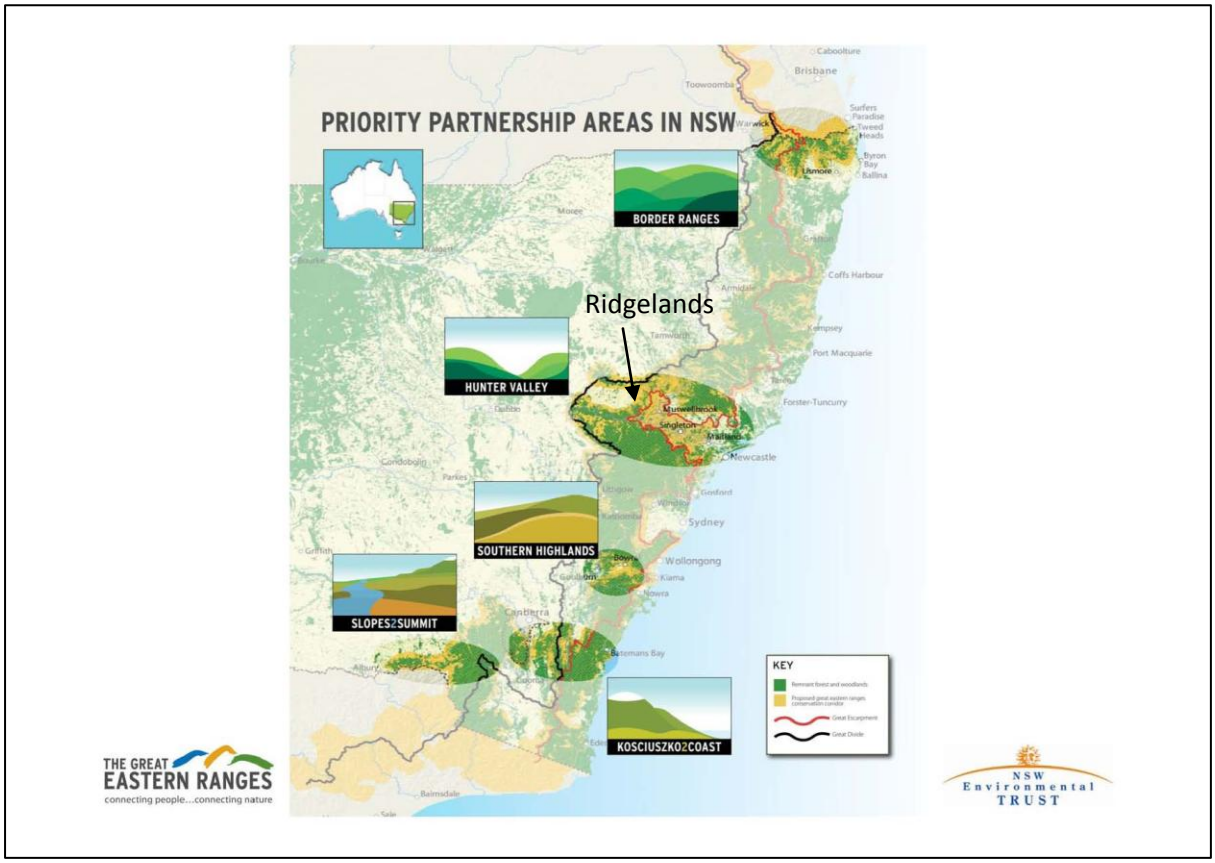
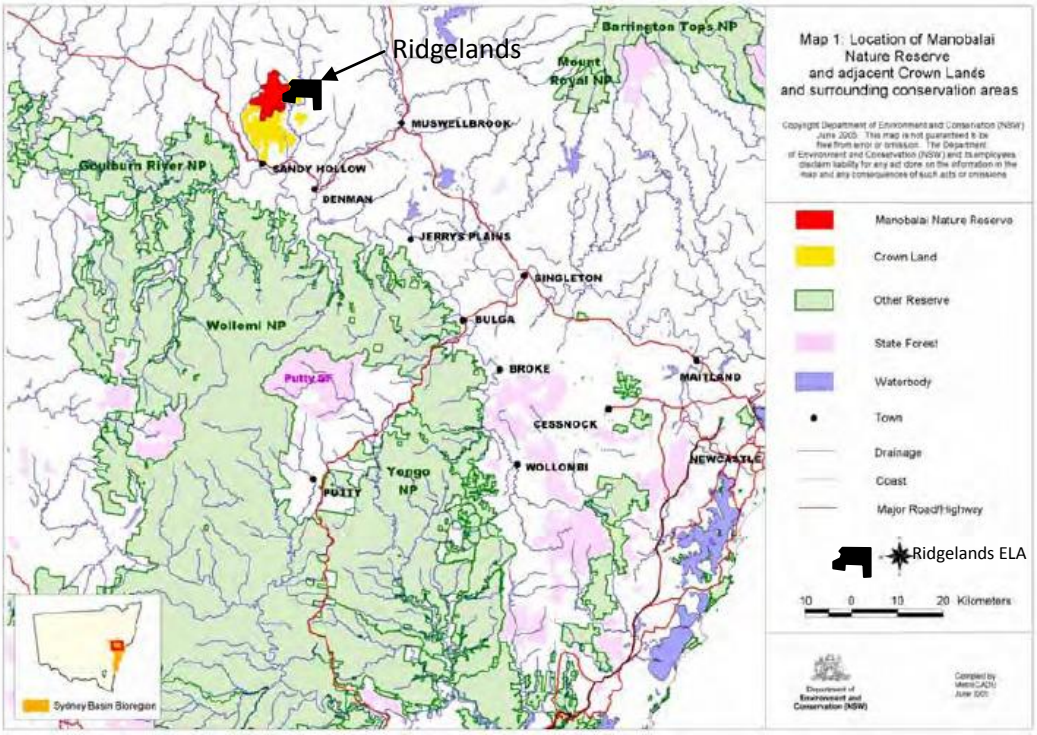
Some of the reluctance to make a forthright biblical argument against the industrial rape of the natural world seems to come from a suspicion that this rape originates with the bible wherein it does not for how can you love your neighbour if do not keep your filth out of his water supply, your poison from his air or your rapaciousness from consuming his land? It is the function of mankind to tend, nurture, dress and keep the Garden to bless the Land Created of the Lord they God. [1]

[1] "The Gift of the Good Land", Wendell Berry, Northpoint Press, 1981

1. Location

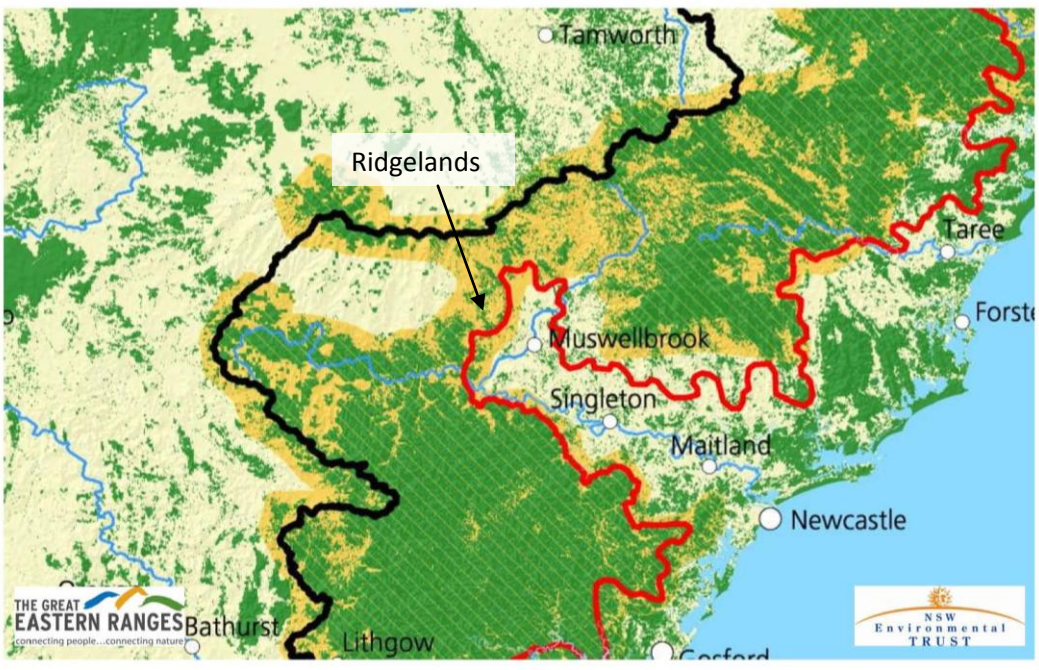

Map 7
Statewide vegetation formations for NSW
(Data source (iii))
Byron Bay
Coffs Harbour
Cobar
Broken Hill
Dubbo
Ridgelands
Newcastle
Sydney
Griffith
Wollongong
Wagga Wagga
ACT
Batemans Bay
Vegetation formation
Predominantly cleared
Alpine complex
Arid shrublands (acacia)
Arid shrublands (chenopod)
Dry sclerophyll forests (shrub/grass)
Dry sclerophyll forests (shrubby)
Forested wetlands
Freshwater wetlands
Grasslands
Grassy woodlands
Heathlands
Semi-arid woodlands (grassy)
Semi-arid woodlands (shrubby)
Wet sclerophyll forests (grassy)
Wet sclerophyll forests (shrubby)
Rainforests
Saline wetlands
0 50 100 200
kilometres

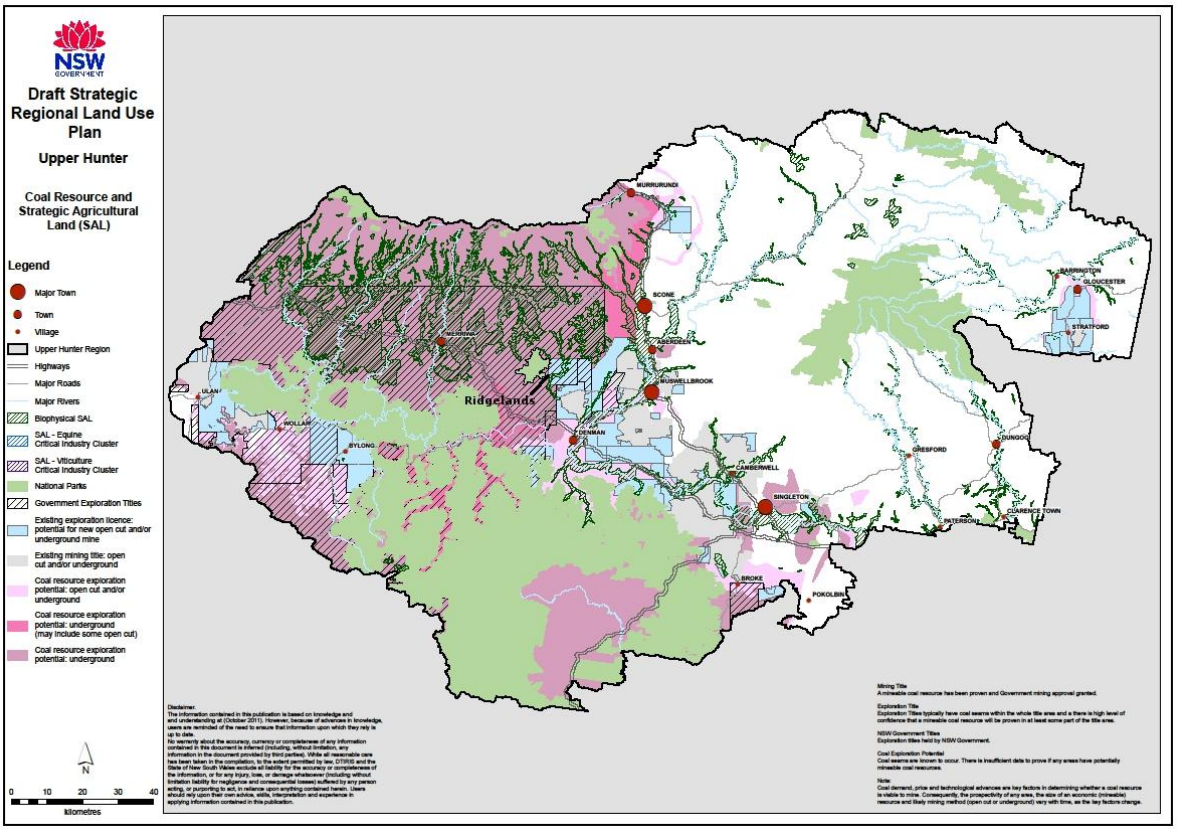

PRIORITY PARTNERSHIP AREAS IN NSW
BORDER RANGES
Ridgelands
HUNTER VALLEY
SOUTHERN HIGHLANDS
SLOPES2SUMMIT
KOSCIUSZKO2COAST
KEY
THE GREAT EASTERN RANGES
connecting people...connecting nature
NSW Environmental TRUST



Map 1: Location of Manobalai Nature Reserve and adjacent Crown Lands and surrounding conservation areas

The Vertebrate Fauna of Manobalai Nature Reserve and Adjacent Crown Land





2. Physical Description

The Wybong Creek catchment is located in the upper Hunter Valley of New South Wales, Australia, and contains award winning beef and wine producing operations.[2]

The topography of the Ridgelands Coal Exploration Lease Area (ELA) varies from the mountainous lands, rocky outcrops and escarpments of Manobalai Nature Reserve and ridge land to the west (280-400m) through steep footslopes to narrow plains abutting Dry Creek and Wybong Creek (at approx 160m ASL).

In the centre the ELA the terrain rises from Dry Creek Valley to mountainous terrain, escarpment and ridge land (280-400m) before declining through steep hilly footslopes through undulating land and alluvial plain to Wybong Creek (at approx 160m ASL) from where it again rises through alluvial plain, undulating land, foot slopes and escarpments to mountainous lands (at approx 280-300m ASL).

To the east and south of the ELA are the South-Eastern ranges of Manobalai Nature Reserve, High Peak and Black Jack Mountain. In the centre of the ELA is the dominant feature of Wybong Creek, a permanent water source subject to the Wybong Creek Water Management Plan (NSW).

Behind the South-Eastern ranges of Manobalai Nature Reserve abutting the Ridgelands ELA immediately along its southern border is the Anvil Hill (Mangoola) MLA.

[2] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, p ix, 2010

Further to the south (approx 6km) are Anvil Hill, Limb of Addy Hill (approx 300m ASL), Western Rocks (approx 300m ASL) the geologically, archaeologically and visually dominant feature of Wallaby Rocks (approx 260m ASL) and the Manobalai Southern Crown Lands.

3. Diverse micro-refugia[3], habitat and nationally significant biodiversity corridor

The Alps to Atherton Initiative aims to connect and conserve ecosystems along more than 2800 km of the great eastern ranges of Australia from Walhalla in Victoria to Atherton in far north Queensland.

The area covered by the Alps to Atherton Initiative comprises a corridor of primarily natural ecosystems along the Great Eastern Ranges (Pulsford et al 2004), which extend more than 2800 km along the eastern seaboard and contain Australia's richest areas of terrestrial biodiversity (Pulsford and Worboys in press).

These Ranges comprise substantial sections of the Great Dividing Range and the Great Escarpment, and extend from the forests and woodlands of south-eastern Victoria near Gippsland, north into NSW, around and through the Australian Capital Territory and Kosciuszko National Park, through the large reserves north-west of Sydney (that is, the Blue Mountains and Wollemi national parks), and north to the subtropical forests north of Cairns in Queensland.

The importance of continental scale connectivity conservation has been described (in Soule and Terborgh 1999 and Hilty et al 2006) and recognised as being critical by the Papallacta Declaration1 (IUCN WCPA 2006) which stated:

"maintenance and restoration of ecosystem integrity requires landscape-scale conservation. This can be achieved through systems of core protected areas that are functionally linked and buffered in ways that maintain ecosystem processes and allow species to survive and move, thus ensuring that populations are viable and that ecosystems and people are able to adapt to land transformation and climate change."

We call this proactive, holistic, and long-term approach connectivity conservation.

Similar projects globally include:

- Yellowstone to Yukon (Y2Y) in the USA and Canada (Tabor and Locke, 2004,Chester 2006)
- the Terai Arc in Nepal (Gurung 2004)
- the Cape Floristic Region of South Africa (Sandwith et al 2004)
- the biodiversity conservation corridors of Bhutan (Sherpa et al 2004).

It is also contains areas identified by Centennial Coal and Xstrata Mangoola as **essential** to the Anvil Hill (Mangoola Mine) Biodiversity Offset and Biodiversity Corridor Strategy necessary to ensure that the Director-Generals primary objective of "no net loss of flora and fauna values in the medium to long term" for Anvil Hill (Mangoola) Mine is met.

[3] A novel approach to quantify and locate potential microrefugia using topoclimate, climate stability, and isolation from the matrix, MICHAEL B. ASHCROFT, Australian Museum , 21` Jan 2012

Over 520 square kilometres (approx 20% and increasing) of the Hunter Valley floor is subject to open-cut coal mining (Connor et al. 2004 p. 48) and the overall size of the valley floor spans approximately 2750 sq km. Land use patterns in the Hunter have left it seriously give rise to changed landscapes including loss of remnant vegetation and biodiversity,,, and an increasing production of rehabilitated landscapes.

The Manobalai NR and the footslopes, timbered ridge lands and forested mountains of the Ridgelands ELA now form the largest remaining units of remnant native vegetation on the floor of the Hunter Valley within the Muswellbrook Shire not denuded of native vegetation.

Table 6.8: Locations of botanical significance and high conservation priority in the study area and recommended actions

Wybong Uplands	Rugged sandstone and their footslopes between escarpment Wybong & Mangoola	One of the largest expanses of remnant vegetation; very high species diversity; many threatened species and some areas with relatively little disturbance.	Protection through conservation agreements. Future protection as a nature reserve or as a managed trust reserve should be investigated.

4. Aboriginal, Multi-Cultural and Natural Heritage

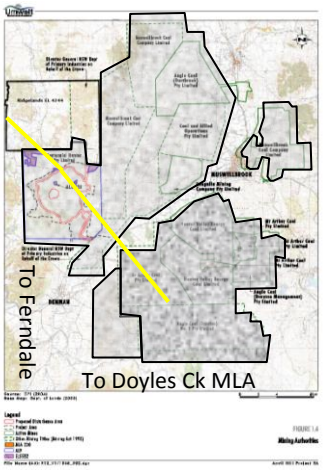
We acknowledge the Wanarua people as the traditional occupants of the Land and acknowledge the continuation of the spirits of our ancestors today.

The area proposed for the ELA is an area with aboriginal and European cultural heritage, recognised, high biodiversity habitat, mixed old growth and natural regeneration (Tier 1 Terrestrial Biodiversity and Priority Offset Landscape Area – UHSRLUP 2012).

References to Wybong occur in early settlement manuscripts including the journals of Ludwig Leichardt and concerning Joe Govenor, Jimmy Govenor, Jacky Underwood.

The area proposed for the ELA is an essential bio-diversity corridor providing connectivity between Wollemi World Heritage Area and the Greater Eastern Rainforests World Heritage Area. It was traditionally a transient location, just a bit off the beaten track, as some would say.

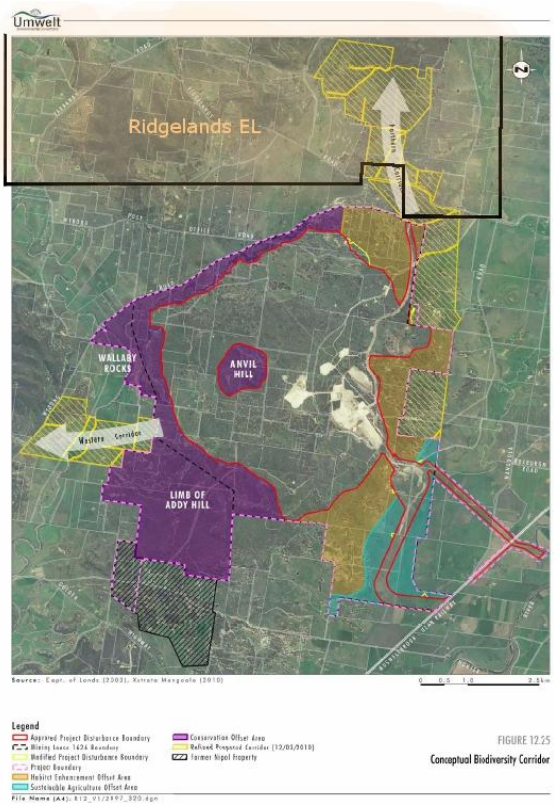
5. Infrastructure

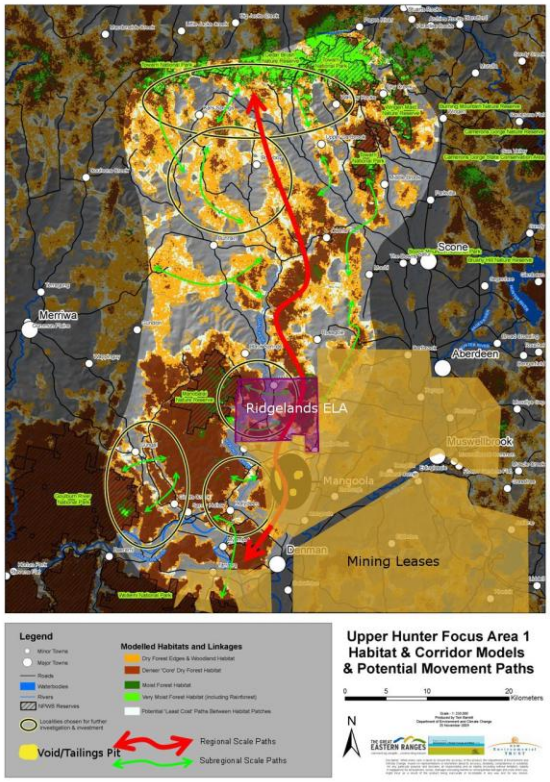


A 500 kV Transmission Line traverses the area through the South-Eastern ranges of Manobalai Nature Reserve and north-west through Manobalai Nature Reserve.

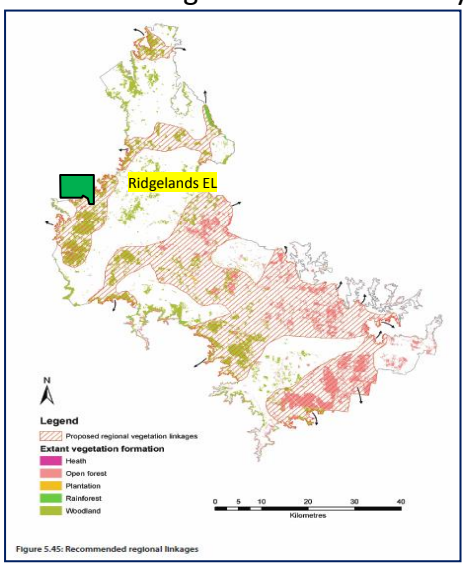
"The northern corridor has been designed to link to the large area of heavily vegetated Crown land to the north of the project site. The western corridor has been designed to provide a link between the high conservation value area within the existing offset areas on and to the south of Limb of Addy Hill and link this to a large area of heavily vegetated Crown land to the west of Wybong Road. The corridors presented in **Figure 12.25** are considered conceptual until the Offset Strategy required in schedule 3, clause 38 of the Project Approval is subject to further consultation with DoP and DECCW.[4]

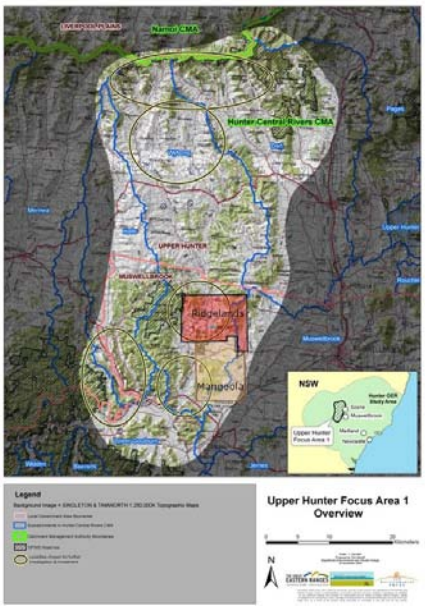
[4] Xstrata Modification 4, Dec 2010.





As regards the abutting Anvil Hill (Mangoola) Coal Mine it is important to note that no areas set aside for corridors currently function as ecological corridors. All of them comprise substantial areas of grassland and require revegetation and regeneration before they could function as ecological corridors. It is estimated to take between 10 and 20 years for vegetation to develop sufficiently to allow some native fauna to utilise these corridors. Consequently there will be a reduction in connectivity in the short to medium term until such vegetation can develop[5]. The proposed Exploration Lease Area impacts regions that had been designated as Biodiversity Corridor[6].





[5] IHAP Report p29
[6] Anvil Hill Environmental Assessment, Centennial Coal, August 2006

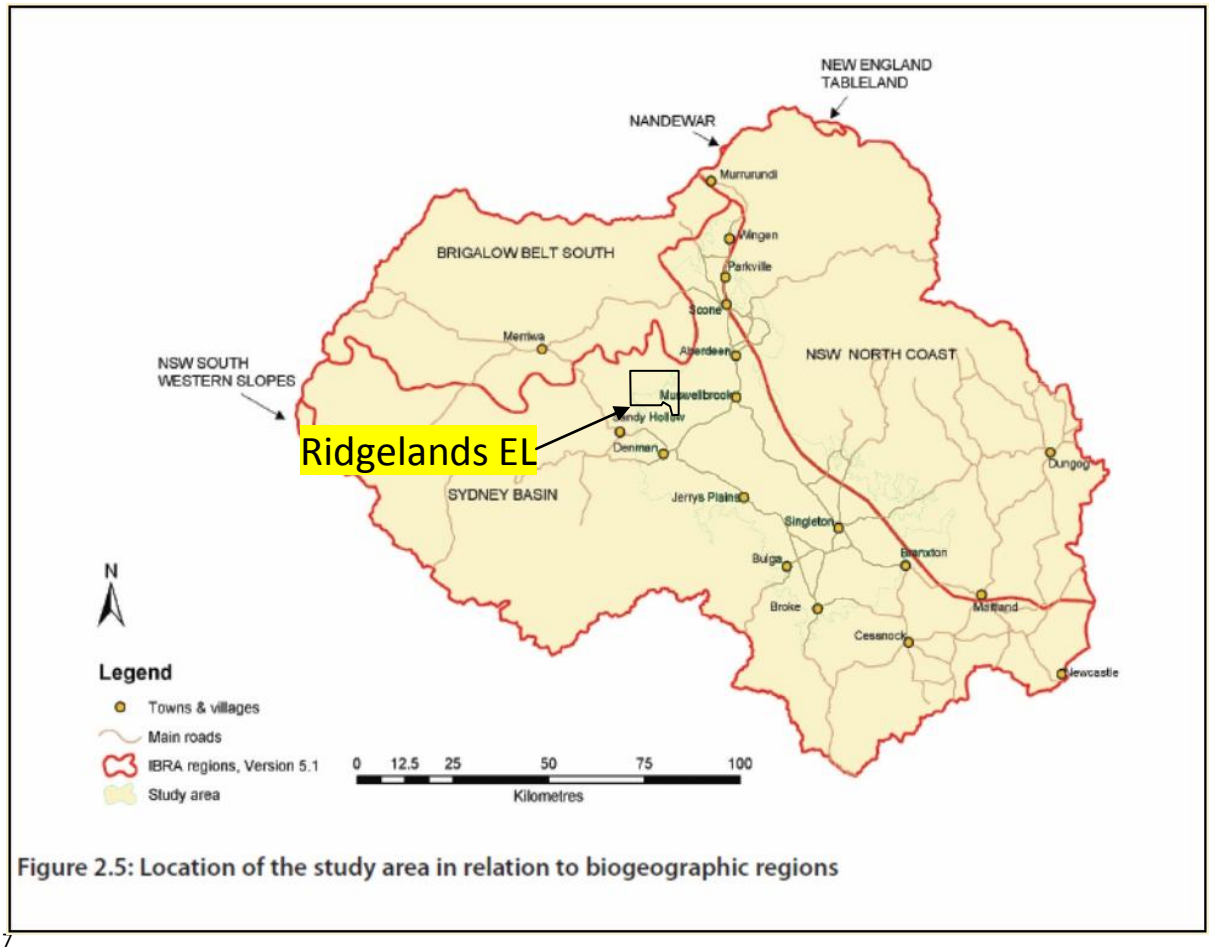


Figure 2.5: Location of the study area in relation to biogeographic regions

[7]

Moreover, the Upper Hunter Valley and in particular the proposed Ridgelands Coal Exploration Area is an area of bio-geographical interest being located in an area that receives species from west of the Great Dividing Ranges, from coastal areas, and from northern and southern NSW. The area is also topographically varied and includes riparian areas, flat areas, hillsides and rocky slopes. Consequently, the large patch of forest, woodland and grassland habitats of the proposed Ridgelands Coal Exploration Area and surrounds supports a high diversity of native flora and fauna including TSC Act and/or EPBC Act listed species and habitats.

Xstrata Mangoola P/L are developing a large area of land – over 2,000 ha abutting the Ridgelands ELA to open cut mining. Of this, 1304 ha contains treed native vegetation which supports a high level of biodiversity. According to Abel Ecology (2005) Anvil Hill (and the Ridgelands ELA are) at the junction of a number of bioregions and botanical divisions, and contains both flora and fauna species from east and west of the Great Dividing Range. A number of species found in this area are at the limit of their ranges. As a result of the limited reservation, high biodiversity, the mature age of the vegetation, habitat diversity and corridor connectivity, and broadacre clearing of the adjacent Anvil Hill area the Ridgelands ELA should be considered vital for immediate action for conservation.[8]

[7] HRVP Volume 1 - Main Report and Appendices, p10
[8] HRVP Volume 1 - Table 6.8: Locations of botanical significance and high conservation priority..

6. Flora and Fauna

The biota of the Ridgelands is common and shared with that of Wollemi, Myambat, Anvil Hill, Manobalai Nature Reserve, Castle Rock and contains TSC and EPBC listed species, unmapped CEEC's, *micro-refugia* and habitat.

Ridgelands is also an area of faunal refuge from the mining lands adjacent. The region has accepted sightings and habitat for the brush-tailed rock wallaby and other rare/threatened species. No formal ecological studies have been conducted in the Ridgelands area.

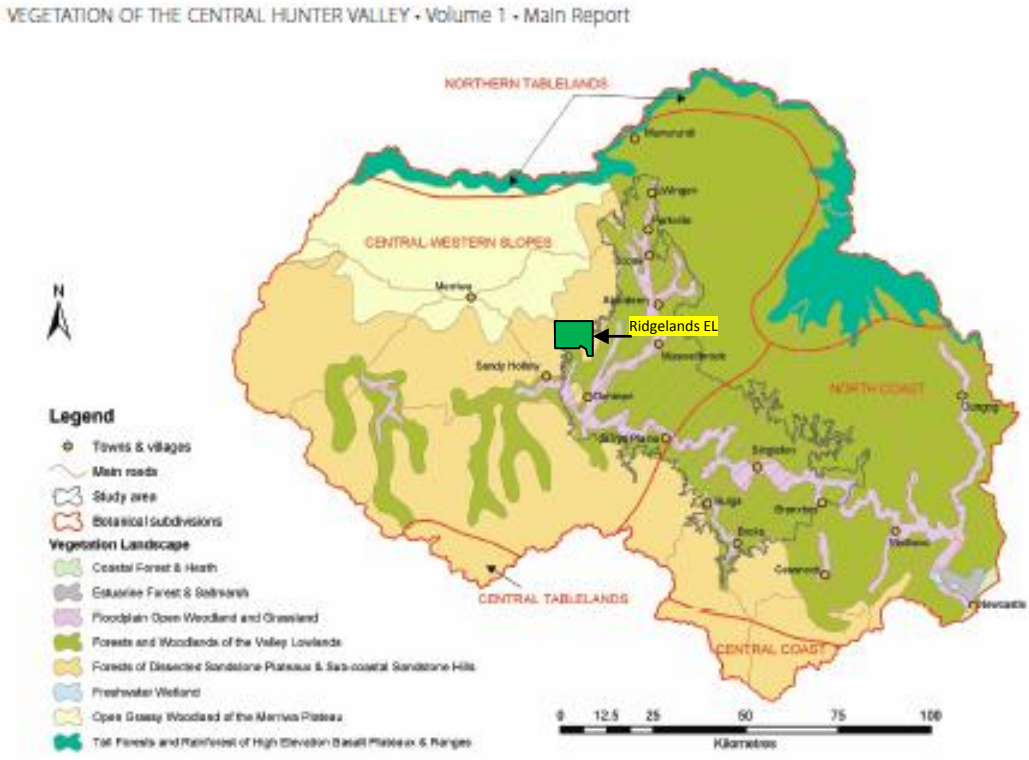


Figure 2.4: Location of the study area in relation to botanical subdivisions and vegetation landscapes (HCMT 2003)

[9]

> "The conservation of biodiversity has traditionally been based on static maps of species' distributions (Margules & Pressey, 2000), but there is increasing awareness that conservation planning needs to evolve to cope with the dynamic nature of biodiversity (Pressey et al., 2007). One way this can be achieved is by protecting locations that are important for ongoing ecological and evolutionary processes, an important example of which is refugia (Klein et al., 2009).
>
> Refugia are locations that have stable and unusual climates with intrinsic conservation value because they:
> (1) buffer species from climate variability and therefore enhance the ability of species to persist when the climate is unsuitable elsewhere;
> (2) foster genetic isolation that can enhance evolutionary processes; and

[9] HRVP Volume 1 - Main Report and Appendices, p10

(3) enhance the diversity of environmental conditions and thus increase the potential for higher biodiversity (Noss, 2001; Tzedakis et al., 2002; Forest et al., 2007; Johnson & Stinchcombe, 2007; Kozak et al., 2008; Stewart et al., 2010)."

"Some refugia are also known to harbour rare or endemic genotypes or species (e.g. the Wollemi pine; Wollemia nobilis; Offord, 2011), but even those that do not contain these have conservation value because the processes they support may still offer future protection for species that are not currently rare or threatened (Mosblech et al., 2011). Refugia have been roadly classified as either macrorefugia or microrefugia, where macrorefugia are regions with favourable climate and microrefugia are small areas of favourable climate within a region of generally unfavourable climate (Bennett & Provan, 2008; Rull, 2009). [10] "

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions.
Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°; ^^ rounded to 0.01°).
Copyright the State of NSW through the Office of Environment and Heritage.
Search criteria : Public Report of all Valid Records of Animals and Plants in Manobalai NR NPWS Reserve returned a total of 2,618 records of 441 species.
Report generated on 10/03/2012 5:53 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Records	Info
Fauna	Mammalia	Macropodidae	1215	*Petrogale penicillata*		Brush-tailed Rock-wallaby	E1	3	
Flora	Flora	Rhamnaceae	5592	*Pomaderris queenslandica*		Scant Pomaderris	E1	2	
Fauna	Aves	Cacatuidae	265	*^Calyptorhynchus lathami*		Glossy Black-Cockatoo	V	6	
Fauna	Aves	Psittacidae	260	*Glossopsitta pusilla*		Little Lorikeet	V	10	
Fauna	Aves	Strigidae	246	*^^Ninox connivens*		Barking Owl	V	1	
Fauna	Aves	Strigidae	248	*^^Ninox strenua*		Powerful Owl	V	3	
Fauna	Aves	Tytonidae	250	*^^Tyto novaehollandiae*		Masked Owl	V	1	
Fauna	Aves	Climacteridae	8127	*Climacteris picumnus victoriae*		Brown Treecreeper (eastern subspecies)	V	13	
Fauna	Aves	Acanthizidae	504	*Chthonicola sagittata*		Speckled Warbler	V	8	
Fauna	Aves	Neosittidae	549	*Daphoenositta chrysoptera*		Varied Sittella	V	10	
Fauna	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*		Koala	V	2	
Fauna	Mammalia	Petauridae	1136	*Petaurus australis*		Yellow-bellied Glider	V	1	
Fauna	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*		Yellow-bellied Sheathtail-bat	V	2	
Fauna	Mammalia	Molossidae	1329	*Mormopterus norfolkensis*		Eastern Freetail-bat	V	1	
Fauna	Mammalia	Vespertilionidae	1353	*Chalinolobus dwyeri*		Large-eared Pied Bat	V	3	
Fauna	Mammalia	Vespertilionidae	1834	*Miniopterus schreibersii oceanensis*		Eastern Bentwing-bat	V	1	
Fauna	Mammalia	Vespertilionidae	1332	*Nyctophilus timoriensis (South-eastern form)*		Greater Long-eared Bat	V	1	
Fauna	Mammalia	Vespertilionidae	1025	*Vespadelus troughtoni*		Eastern Cave Bat	V	1	

[11] Extract of Data for Manobalai NR

Fauna Species
Lizards/Snakes
Blue Tongue Lizard
Eastern Stone Gecko
Worm Lizard
Lesueur's Velvet Gecko
Red Belly Black Snake
Brown Snake
Echidna
Black Snake
Goanna
Eastern Bearded Dragon
Mammals
Eastern Grey Kangaroo
Swamp Wallaby
Eastern Cave bat
Wombat
Brushtailed Rock Wallaby
Frogs
Small Grey-Brown frog (to 3cm)
Green Frog
Long Neck Turtle

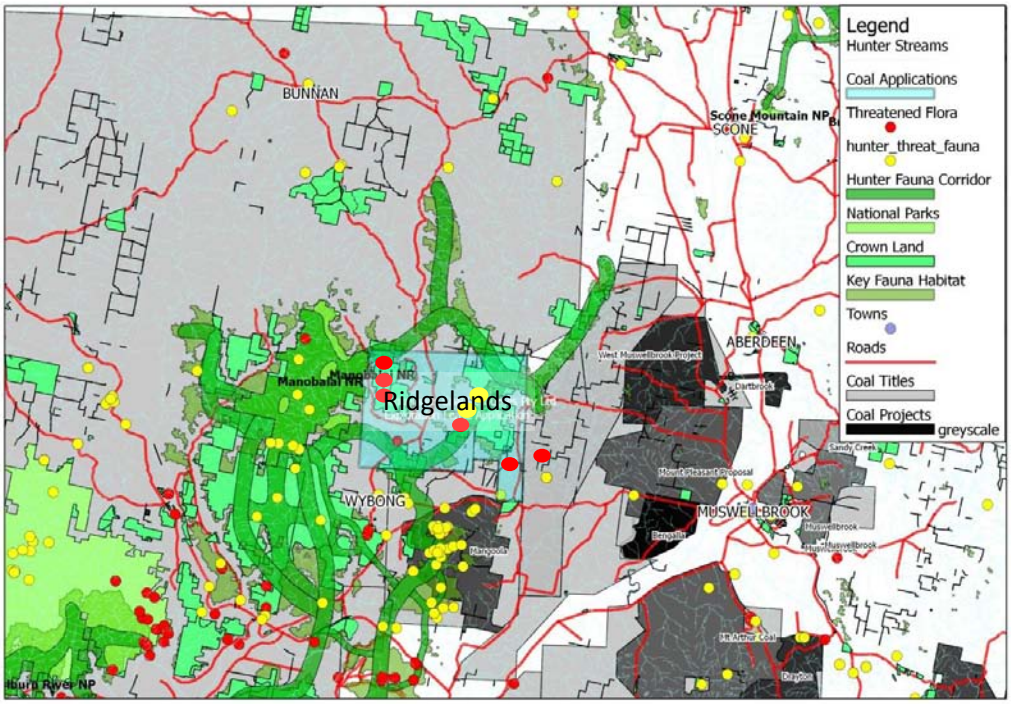
Fauna Species
Birds
Barking Owl
Black Cockatoo
Brown treecreeper
Diamond Firetail
Galah
Fairy Martin
Magpie
Pied Currawong
Speckled Warbler
Sulfur Crested Cockatoo
Turquoise Parrot
Wedge Tailed Eagle
Willy Wagtail
Brown Goshawk
Common Bronzewing
Crested Pigeon
Blue Wren
Yellow plumed Honeyeater
Yellow faced Honeyeater
Eastern Rosella
Crimson Rosella
Red Rumped Parrot
Superb parrot
Pied Currawong

Flora
Ironbark
Black Cypress
Rough Barked Apple
Yellow Box
White Box
Forest Red Gum
Casuarina Glauca
Native Olive
Melaleuca
Grevillia
Port Jackson Fig
Spotted Gum
Stringy bark
Native Bamboo
Kangaroo Grass

Figure 1 Typical Occupiers Species List

[10] Michael B. Ashcroft, John R. Gollan, David I . Warton and Daniel Ramp, Australian Museum, Jan 2012.

[11] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5, P10



Ridgelands Threatened Flora and Fauna, Reserved lands and Biodiversity Corridors .

There is no comprehensive assessment of the vegetation of the Application Area.

Detailed studies have been undertaken in some areas of Crown land (mainly national parks and nature reserves), the most comprehensive adjacent studies being the Hunter Remnant Vegetation Project[12] (Hunter-Central Rivers Catchment Management Authority), NPWS Flora and Fauna Survey Manobalai Nature Reserve and Anvil Hill Ecological Assessment. [13]

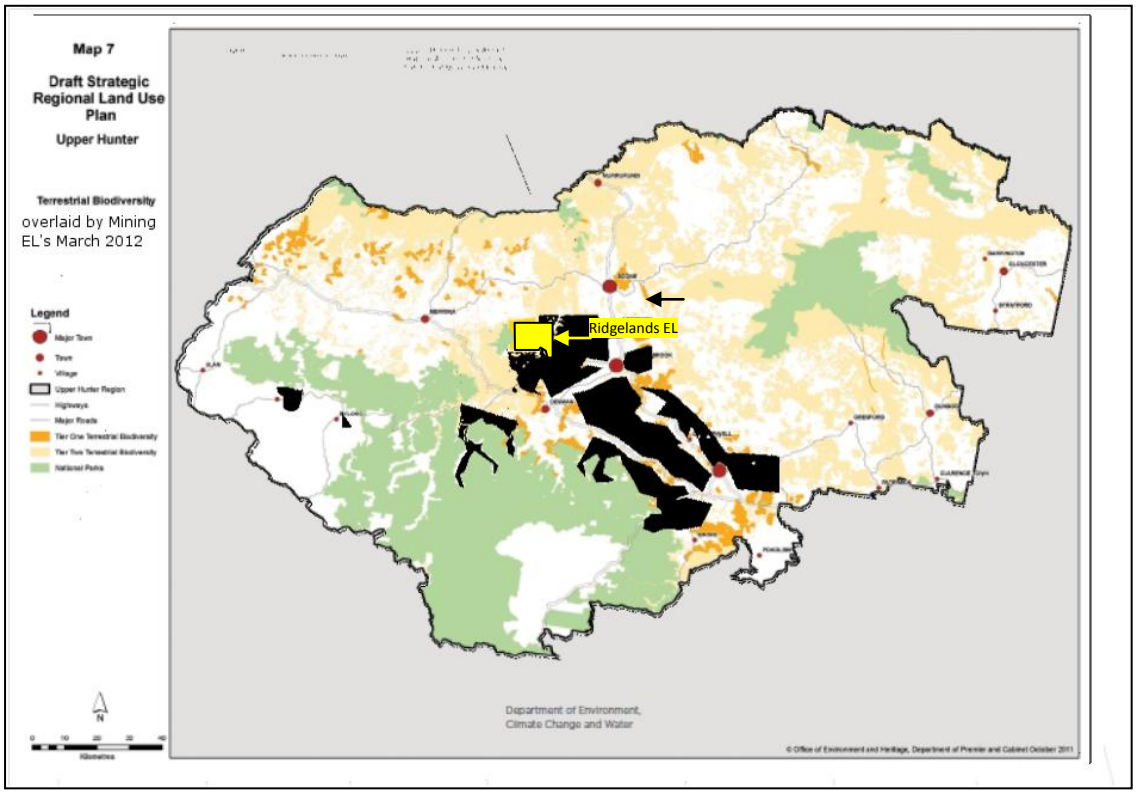
Over the past seven years, the HCRCMA study has surveyed and mapped native vegetation remnants on private and Crown land across the 22,000 km2 of the Hunter Catchment, providing a valuable and comprehensive picture of the state of the Catchment's native flora. The study focuses on the valley floor, where the impacts from activities in the Catchment are greatest.

> "Much of the clearing undertaken since the first century of European settlement was either encouraged by, or of little interest to, the government. Land management practices inimical to remnant native communities and sustainable land use continue, despite abundant evidence that land management that is sympathetic to the conservation of plants and animals is also critical for the long-term sustainability of farming enterprises, and to the needs of urban and industrial areas (HCMT 2003). Despite these practices, some sizeable areas of regrowth exist as a result of the easing of some land management practices which suppressed regrowth in the past. Other remnants were either deliberately or inadvertently spared, for example Ravensworth State Forest, Singleton Military Area, Myambat Military Area and the Wybong Uplands, as well as steep areas on private land.

[12] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5, P79

[13] DEC (2005), The Vertebrate Fauna of Manobalai Nature Reserve and Adjacent Crown Lands

Animal communities also continue to suffer from large-scale removal of native vegetation and reduced vegetation diversity. Many forest and woodland dwelling animals are now uncommon to rare on the valley floor where most clearing has taken place, and are now found only on the slopes and rugged areas where disturbance has been limited. For example, the valley once contained substantial populations of the Australian bustard (Araeotis kori), a species now only found west of the Great Dividing Range (Albrecht 2000), while the emu (Dromaius novaehollandiae), now restricted to the Merriwa district and west, once ranged around the lower reaches of the Hunter River (Sokoloff 1978). Mammals such as the spotted-tailed quoll (Dasyurus maculatus) and the koala (Phascolarctos cinereus) were once more common than they are today" [14]

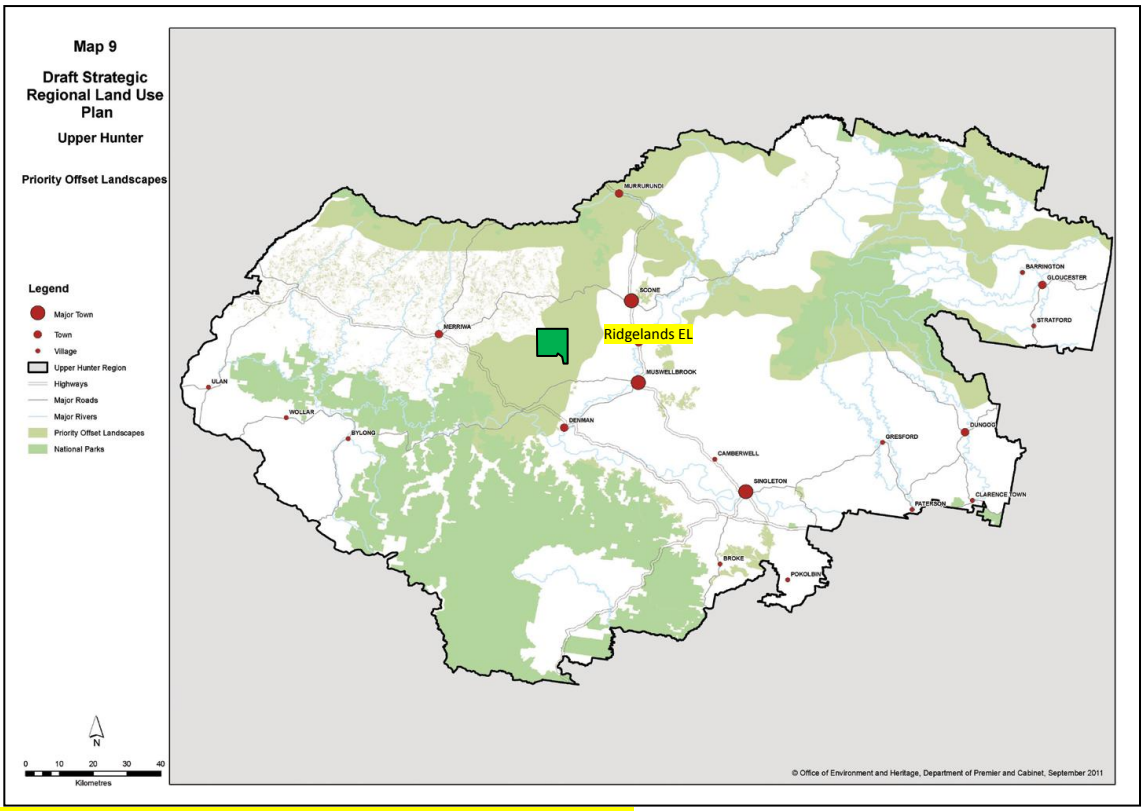


Ridgelands contains Tier 1 Terrestrial Biodiversity[15]

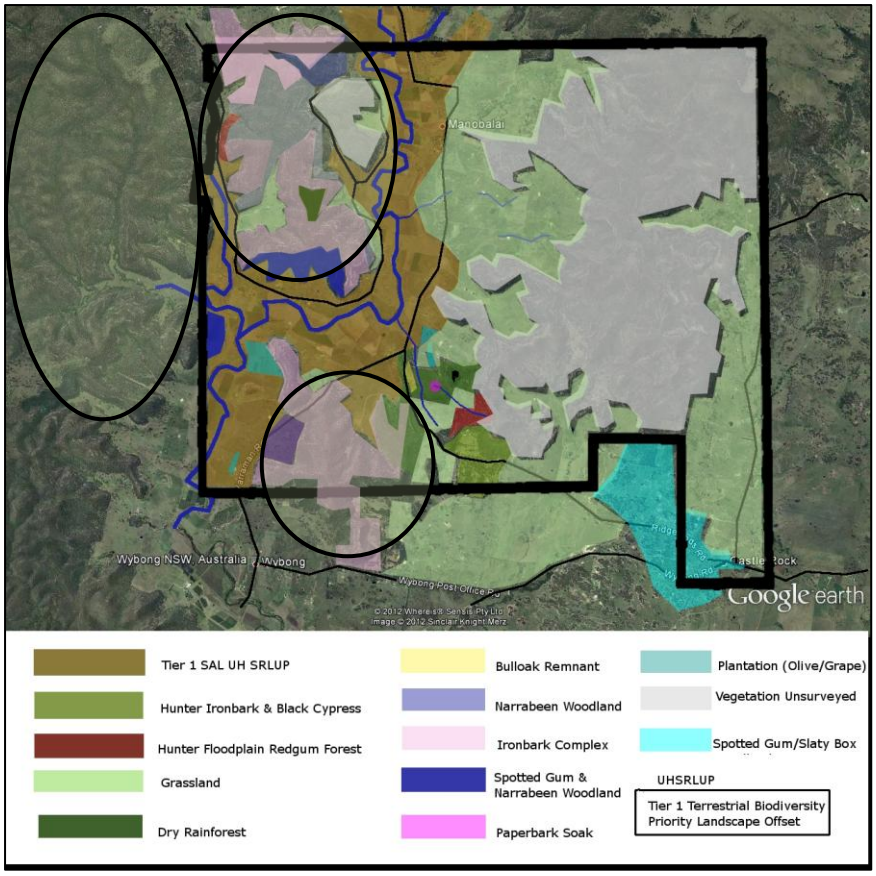
- Wybong Creek and Cuan Cua Creek in the Ridgelands ELA are Biophysical SAL. Proposals for CSG and coal extraction require and Agricultural Impact Statement and Scientific Panel Referral.
- Manobalai Range corridor in the Ridgelands ELA, which provides nearly continuous dry forest habitat between Wollemi National Park and the Liverpool Range is Priority Landscape Offset and should not be mined.
- Ridgelands ELA contains Tier 1 Terrestrial Biodiversity and should not be mined.

[14] Peake, T.C. (2006). The Vegetation of the Central Hunter Valley, New South Wales. A report on the findings of the Hunter Remnant Vegetation Project. Hunter–Central Rivers Catchment Management Authority, Paterson. P 6

[15] Upper Hunter Strategic Regional Land use Plan



Ridgelands is designated Priority Offset Landscape



Vegetation of the Ridgelands area – from DEC (2005), The Vertebrate Fauna of Manobalai Nature Reserve and Adjacent Crown Lands.

NPWS Survey area

7. Salinity in the Wybong Creek Catchment

Solute concentrations in Wybong Creek are often too high for irrigation use, however, with previous research showing that the saline and Na-Cl dominated water discharged from Wybong Creek decreases water quality in both the Goulburn and Hunter Rivers into which it flows. This study therefore aimed at identifying the source of solutes to the Wybong Creek catchment and the processes which cause salinisation of surface water, soil (regolith) and groundwater.

Surface water was sampled at ten sites along Wybong Creek over three years, while groundwater was sampled from most of the bores and piezometers occurring in the Wybong Creek valley. Surface and groundwater in the upper catchment were dominated by Na-Mg-HCO3. Ratios of 87Sr/86Sr and cation/HCO3 indicated these facies were due to silicate weathering of the Liverpool Ranges, with localised groundwater bodies recharging in the Liverpool Ranges and discharging in the upper Wybong Creek valley. Wybong Creek became saline, and Na-Mg-Cl dominated in the mid-catchment area, with salinity doubling between the 55 and 60 km sample sites on some dates. Changes in surface water chemistry occurred independently of surface water input from tributaries, with abrupt salinity increases within a pool between these sites attributed to groundwater input via fractures beneath the Creek.[16]

Groundwater samples from Manobalai were instead found to be amongst the most fresh and the most saline within the Wybong Creek catchment, and changed salinity abruptly down-gradient along a transect. Groundwater flow occurred through fractures in the Narrabeen Group sandstones and conglomerates, with vertical groundwater flow via fractures causing abrupt changes in salinity. Ratios of Na/Cl, Cl/Br and 87Sr/86Sr indicated saline groundwater at Manobalai and in the lower catchment was influenced by a marine endmember and halite dissolution. A poor chemical relationship between indicated this marine endmember was not evapoconcentrated rainwater.

The occurrence of saline surface and groundwater in the Wybong Creek catchment was instead attributed to discharge from the regional groundwater system occurring in the Wittingham Coal Measures, with the abrupt increases in salinity at Manobalai indicating mixing between local, intermediate and/or regional groundwater systems. The occurrence of salinity in both the Hunter River and Wybong Creek catchments is a naturally occurring phenomenon with salinity mitigation difficult due to the regional extent of the saline groundwater systems.

Salinisation is therefore a risk to ecosystem, economic and agricultural productivity, with the prevention of further salinisation an important part of sustainable land-use practice.
Detailed studies of surface and groundwater interactions specifically relating to salinity have not been undertaken in the Wybong Creek catchment, however, despite this being identified as the main source of solutes to the upper Hunter River.[17]

[16] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, p ix, 2010
[17] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, p 6

The high solute loads delivered into the Goulburn and Hunter Rivers by Wybong Creek can be sourced to groundwater influxes in the mid-lower catchment.[18] Geological reports commissioned by Centennial Coal identified the Newcastle Coal Measures (formerly the Wollombi Coal Measures) as the source of solutes to Wybong Creek (Umwelt Environmental Consultants 2006).[19]

The influence of a vegetation cover change from 100 % Eucalyptus dominated woodland, to 10 % cropland, 74 % grassland, and 16 % Eucalypt forest[20] also remains to be determined.

8. Aquifers

Aquifers and groundwater bodies are largely undescribed within the Wybong Creek catchment, despite discharging groundwater causing salinisation of surface water and soils (Chapters One and Two).

Only the surficial geology is described in maps of the catchment (Glen and Beckett 1993), with no known hydrogeological maps occurring. The fractured escarpments and outcrops are known to contain groundwater, and are comprised of Narrabeen Group sandstones and conglomerates, and the Liverpool Range Volcanics. Groundwater also occurs within the quaternary alluvium which covers the valley floors.

A hydrogeological report conducted at the Mangoola Coal Mine in the south-east of the catchment indicates complex vertical groundwater flow between surficial alluvium and deeper coal formations (Umwelt Environmental Consultants 2006). The sparse geological knowledge of the catchment complicates the identification of solute sources and groundwater flow paths in an area where complex flow is already likely to occur.[21]

Regional hydrochemical studies have been conducted in the upper Hunter Valley, although hydrogeology has not been addressed specifically within the Wybong Creek catchment (Kellett *et al.* 1987; Creelman 1994).

Eight hydrochemical regions with distinctive chemistry occur in the upper Hunter Valley, with these groups distinguished by canonical and principle component analyses (Kellett *et al.* 1987).

Wybong Creek was placed in the TRIAS group in this study, with the low to moderate salinity of this Na-Mg-Cl-HCO3 dominated group related to chemical weathering of the Triassic Narrabeen Group.

The Na-Cl dominated saline groundwater of Big Flat Creek, which occurs in the south-eastern Wybong Creek catchment, was instead related to groundwater discharge from the Wittingham Coal Measures (Group WI2) and/or other units deposited or influenced by marine conditions.

[18] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P47
[19] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P 7
[20] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P22
[21] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P51

9. Soils, Geology & Goundwater

Uplift and erosional unloading has lead to fracturing within the Permian Coal Measures, with groundwater flow lines in the coal measures related to faulting, fracturing, structure-jointing, thrusting and cleat directions (Creelman 1994). Halite (NaCl), bloedite (Na2Mg(SO4)2·4(H2O)), and thenardite (Na2SO4) occur as salt efflorescences in the Wittingham Coal Measures, despite the occurrence of a regional groundwater body (Kellett *et al.* 1987). The presence of these highly soluble minerals is anomalous with the age of the 300 million year old coal measures and led Kellett *et al.* (1987) to the conclusion that groundwater was trapped within the coal measures until they were tectonically uplifted during the Tertiary, allowing molecular diffusion towards fractures to drain salts from the coal.[22]

The rock is fractured and/or faulted below the surface also, with fracturing occurring at depths in excess of 300 m (Leary and Brunton 2003; Brunton and Moore 2004).[23]

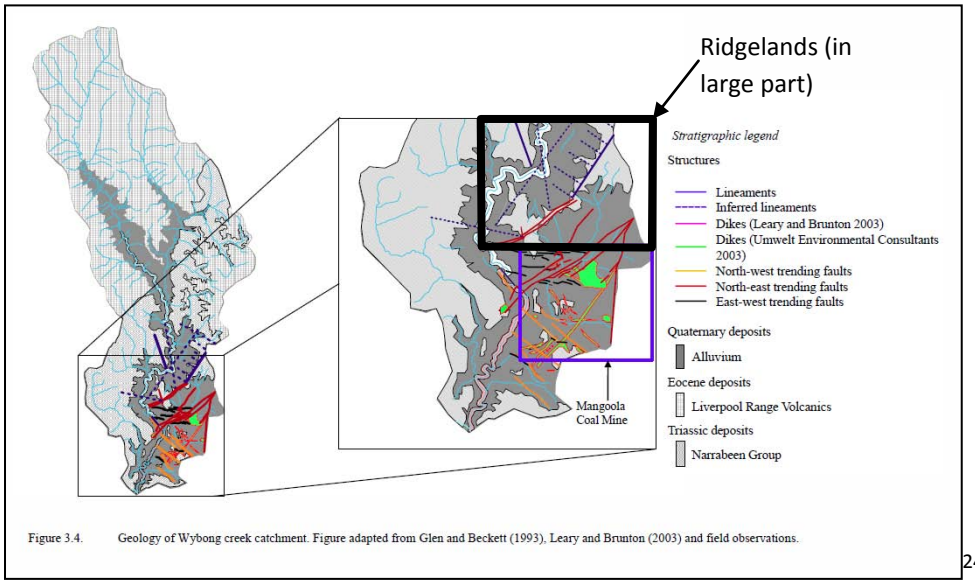


Figure 3.4. Geology of Wybong creek catchment. Figure adapted from Glen and Beckett (1993), Leary and Brunton (2003) and field observations.

[24]

Groundwater in the lower catchment has not evolved from groundwater sourced in the Narrabeen Group nor the Liverpool Range Volcanics.[25] The groundwater can be divided into two groups, constituting groundwater systems in the upper and lower catchment.

Groundwater flow in the upper catchment occurs as localised systems which recharge on isolated topographic highs in the Liverpool Ranges and discharge in adjacent topographic lows.

Chloride dominated groundwater in the lower catchment did not source solutes from chemical weathering of the Narrabeen Group.

[22] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P55
[23] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P62
[24] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P67
[25] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P80

Saline and Na-Cl dominated springs, scalds and seeps in the mid-catchment are instead indicative of discharge from intermediate and/or regional groundwater systems.

Abrupt and significant changes in groundwater chemistry within the alluvium and fractured Narrabeen Group were also indication of intermediate and/or regional groundwater systems.

Groundwater discharge and recharge within the alluvium and fractured Narrabeen Group was likely to occur as vertical groundwater flow due to fracturing and higher hydraulic conductivity of these formations than the smectitic clays occurring above.

This vertical groundwater flow makes it difficult to predict groundwater flow paths. The dipping of strata and topography in opposite directions, indicates groundwater recharging in the Liverpool Ranges may be forced to flow up dip before discharging into the fractured Narrabeen Group.

Solutes occurring in this groundwater may be acquired from the deeper Permian Coal Measures in the mid-lower catchment area between recharge and discharge, with further geochemical investigation necessary to identify the source of solutes to the groundwater described.[26] The evaporation of rainwater is not directly causing saline groundwater formation or large increases in groundwater salinity such as occurs in central Australia (e.g., Jankowski and Jacobson 1989; Petrides *et al.* 2006) [27]

The Wittingham Coal Measures are, therefore, not the only possible source of Na-Cl dominated water to the Wybong Creek catchment. They are the most likely, however, given the current geological and hydrochemical results.[28]

Though geological mapping in the Wybong Creek catchment itself is limited, deep and frequent fracturing and faulting is noted in geological reports, with some of these vertical faults connecting the Narrabeen Group to the deeper Permian Coal Measures (Leary and Brunton 2003; Brunton and Moore 2004; Umwelt Environmental Consultants 2006).

Groundwater dominated by Na-Cl is discharged from the Wittingham Coal Measures via the Mt Ogilvie fault just east of the Wybong Creek catchment and causes abrupt increases to surface and groundwater salinity in other parts of the Hunter Valley, with discharge via a fault in Big Flat Creek in the south-eastern part of the Wybong Creek catchment also giving rise to abrupt increases in salinity (Creelman 1994).[29]

Discharge of saline groundwater from the Permian Coal Measures indicates that salinity in the Wybong Creek catchment is a largely natural occurrence, and differs from the dryland salinity that is typically identified within Australia.

[26] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P82
[27] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P95
[28] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P99
[29] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P107

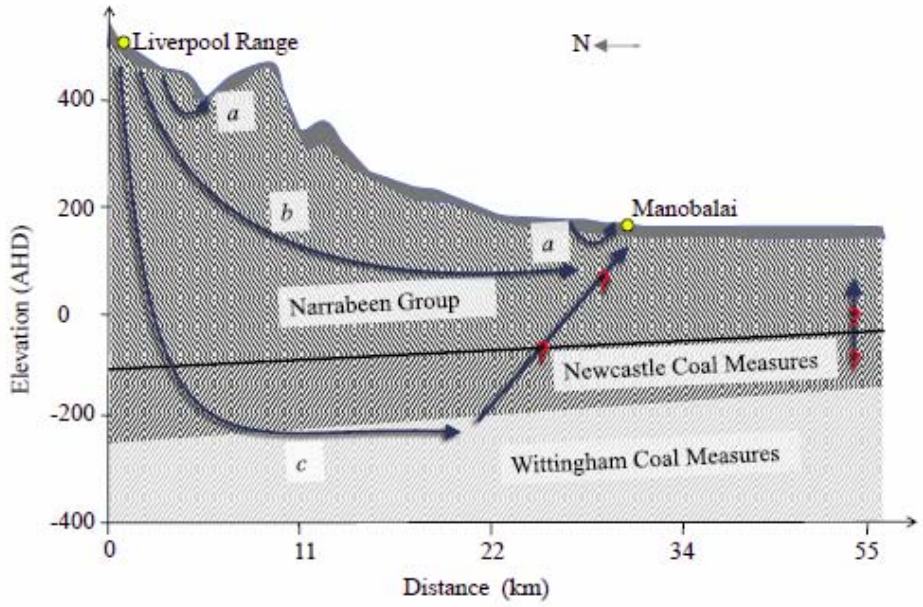


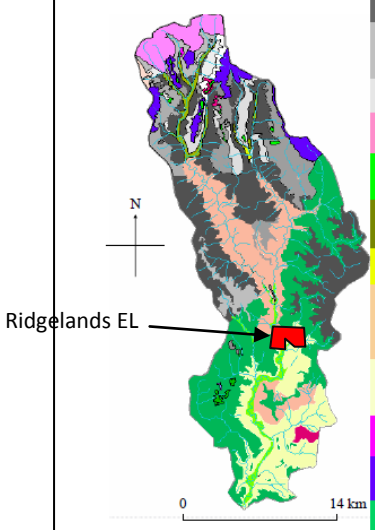
Figure 4.11. Conceptual model of groundwater flow in the Wybong Creek catchment depicting (a) local; (b) intermediate; and (c) regional groundwater systems. Hypothetical fracture flow directions are indicated by (?).

The poor geological knowledge of the Wybong Creek catchment was a serious limitation to a more precise understanding of saline groundwater flow. Further research which identifies the faults and fractures which allow saline groundwater to move to the Earth's surface is required, with a focus on point source discharge from these conduits required for salinity mitigation and management strategies in the catchment. Long-term studies which identify changes in groundwater height and salinity over time would indicate whether anthropogenic activity was exacerbating the primary salinity that occurs in the catchment.

Analyses for hydrocarbons are necessary in order to constrain these as a constituent of groundwater in the Wybong Creek catchment. If they are present, they could be used as a geochemical tracer to identify groundwater discharge from the coal measures in other parts of the Hunter Valley.[30]

Regolith within the Manobalai field site was largely non-saline, though solutes in alluvial samples in the valley floor were dominated by Na and Cl. Alluvial fill was derived from the weathering of the Triassic Narrabeen Group that surrounds Manobalai.

[30] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P108



RG – Rossgole	Tertiary olivine basalt. Local relief 60 – 120 m; slopes 2 – 7 %. Black earths on steeper slopes; euchrozems on less steep slopes.
AH – Ant Hill	Tertiary olivine basalt. Local relief 100 –180 m, slopes 5 – 15 %. Black earths on mid-lower slopes; red clays on upper slopes; brown clays on mid-slopes; grey clays in poorly drained watercourses; euchrozems on well drained slopes.
Aha – Ant Hill: outcrops	Similar to Ant Hill, but with minor cropping occurring on gently sloping benched areas.
CB – Coober Bulga	Tertiary olivine basalt. Local relief < 600 m; slopes > 33%. Red euchrozems and black earths on steeper slopes; black earths and prairie soils on less steep slopes.
CE – Cranbourne	Tertiary olivine basalt. Local relief to 30 m; slopes 0 – 7 %. Black earths on steeper slopes; euchrozems on the plateau.
ER – Erin	Tertiary olivine basalt. Local relief 0 – 70 m; slopes 1 – 8 %. Black earths on upper and lower slopes.
YM – Yarramoor	High energy narrow floodplains and low terraces of the Liverpool Ranges.
WP – Wappinguy	Permian and Jurassic quartz and lithic sandstone, shale, conglomerate and siltstone; local relief 40 – 80 m, slopes 15 %. Red solodic regoliths with yellow, brown and grey solodic regoliths on mid-lower slopes; siliceous and earthy sands, gleyed soloths, red earth euchrozem intergrades, and occasional prairie regoliths on lower slopes. Red and yellow euhcrozhems have moderate-high salinity.
SY – Sandy Hollow	Quaternary colluvium derived from sandstone, conglomerate and shale. Relief 20 – 40 m, slopes to 10 %. Yellow and red solodic regoliths on mid-upper slopes; Siliceous and earthy sands on lower slopes. High salinity in sodic regoliths.
CR – Castle Rock	Permian sandstone and conglomerate. Local relief 40–80 m; slopes 1 – 5 %. Stony solodic soils on flat slopes and alluvial soils in drainage lines.
GG – Galla Gilla	Tertiary olivine basalt. Local relief 50 – 200 m; slopes > 33 %. Lithosols on steeper slopes; black earths/euchrozems on side slopes.
LP – Lees Pinch	Triassic sandstone. Relief 100 – 300 m, slopes 10 – 30 %. Shallow siliceous sands, shallow loams. Some yellow and brown earths, yellow and grey soloths on the breaks of slope. Yellow podzolic regoliths and earthy sands on upper slopes. Low-high salinity.
MP – Munghorn Plataeu	Triassic sandstone and shale. Relief 20 – 60 m, slopes 2 –10 %. Siliceous sands on crests; sandy yellow earths on lower slopes; yellow soloths on drainage lines.
MW – Merriwa	Alluvial and gently undulating rises up to 12 m above the stream bead. Alluvial soils, chernozems, prairie soils, grey clays, and black earths on second terraces.

Figure 5.3. Soil landscape series' of the Wybong Creek catchment. Adapted from Kovac and Lawrie (1991) and McInnes-Clarke (2002).

The research presented here indicates that groundwater in the Wybong Creek catchment is instead saline before it is discharged into the regolith and is therefore almost certainly a naturally occurring processes[31]

Saline groundwater discharged into Wybong Creek in the mid-catchment area does not acquire the majority of solutes from the regolith, however, but is discharged from a saline aquifer below the Narrabeen Group via fractures in the rock[32]

Salinity fluctuations in Wybong Creek are a result of Earth tides, which cause changes in the volume of saline groundwater discharged directly into the Creek from a confined aquifer below. [33]

There are two main sources of solutes to surface and groundwater in the Wybong Creek catchment. Solutes in the upper catchment are largely sourced from chemical weathering of the locally occurring Liverpool Range Volcanics, while those in the lower catchment most likely arise due to discharge of regional groundwater and dissolution of halite from within the Wittingham Coal Measures.

These Permian Coal Measures and the Narrabeen Group sandstones and conglomerates dip below the Liverpool Ranges, with groundwater recharging in the Liverpool Ranges possibly forced to flow up dip due to topographic drive.

[31] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P149
[32] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P155
[33] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P179

This provides a mechanism by which saline regional groundwater from the Wittingham Coal Measures has the potential to discharge via fractures in the mid-lower Wybong Creek catchment.

Wybong Creek is highly connected to an alluvial aquifer system.[34]

Aridity is an important factor contributing to salinity in the catchment, with decreased regolith salinity and increased surface water salinity during the low flow conditions which occur during droughts.

Geology is the most important factor contributing to salinity in the catchment, with groundwater discharge from the Wittingham Coal Measures giving rise to the saline and Na-Cl dominated surface water delivered into the Goulburn and Hunter Rivers by Wybong Creek.

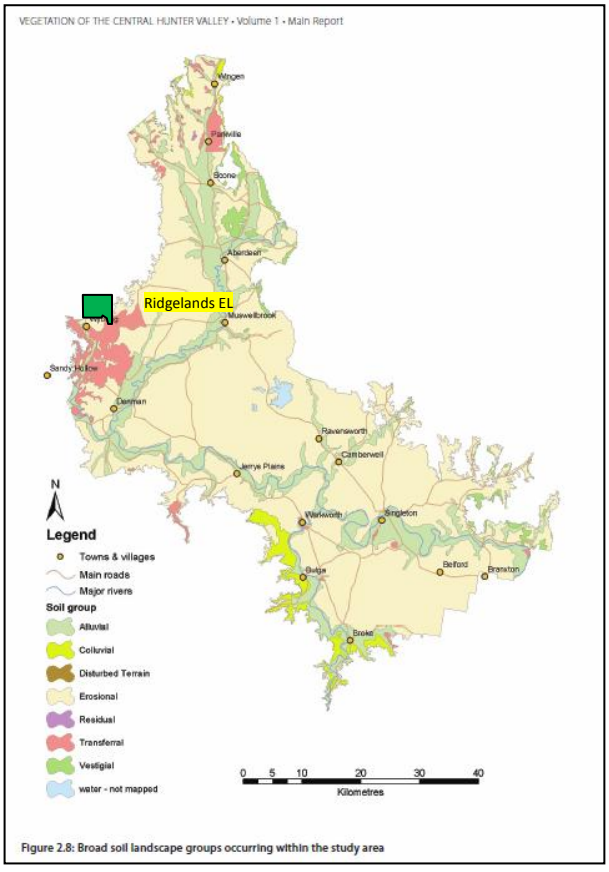


Figure 2.8: Broad soil landscape groups occurring within the study area

This is in contrast with other catchments in Australia which largely suffer from secondary salinisation processes whereby salinity is brought about by dissolution of salt stores within the regolith and/or changes to the hydrological cycle. The primary salinity that occurs in the Wybong Creek catchment is, therefore, unusual in coastal Australian catchments.

The sustainability of farming in the Wybong Creek catchment depends on the limitation of saline surface and groundwater for irrigation use to prevent further soil/ regolith salinisation. Irrigation using Wybong Creek surface water should, therefore, only occur during high-flow or flood events, with the use of groundwater limited to all but a few bores in the upper catchment. Groundwater pumping would lower water tables at the Manobalai field site and alleviate scalding.[35]

Salinisation is a natural process occurring in the catchment, however, the absence of erosion and/or slaking soils at Manobalai indicates that the current non-intensive farm practices occurring at the site are likely sustainable[36]

[34] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5, P35
[35] HVRP,p18
[36] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia, P194

9.1 Prior exploration

9.1.1 Geology

The Ridgelands exploration area is situated on the north-western fringe of the Hunter Coalfield. The Hunter Coalfield is part of the Sydney Basin, which forms the southern section of the Sydney-Gunnedah-Bowen Basin, a composite structural basin extending for 1700 kilometres from southern New South Wales to central Queensland.

The surface geology of the Ridgelands exploration area is predominantly Narrabeen Group with Quaternary alluvial sediments along the Wybong Creek valley and its major tributaries. To the north, extensive Tertiary basalt overlies the Narrabeen Group strata. This represents the southern limit of the basalts covering the Liverpool Range. Newcastle Coal Measures (formerly Wollombi Coal Measures) outcrop in the east of the exploration area.

The main target seams in the Ridgelands exploration area are the Great Northern and Fassifern seams. The depth of cover ranges from less than 100 m in the central part of the area, to over 400 m in the west. Secondary target seams occur below the Fassifern seam.

9.12 Coal Quality

The Great Northern and Fassifern seams are well developed in the western half of the Ridgelands exploration area, however both seams split in the east.

The Great Northern seam ranges in thickness from 1.1 - 4.9 metres, and has a raw ash content of 16 - 28% (ad) (Table 2).

The fully developed Fassifern seam ranges from 5.5 - 7.0 metres in thickness. A potential underground working section has been identified comprising the middle and lower parts of the seam. This section is 2 - 5 metres thick, with raw ash content generally ranging from 18 - 28% (ad) (Table 3).

The coal in both seams is slightly lower in rank than other Hunter Valley coals, however it is considered that both seams could produce coal suitable for the domestic and export thermal markets.

9.1.3 Structure

In the Ridgelands exploration area the strata generally strike north-south, and dips to the west at a low angle. The dip steepens through the central part of the area. This may be due to draping of the target sequence over thick channel deposits which are developed in the eastern part of the area.

A major thrust fault, the Mt Ogilvie Fault, which is well defined to the south of the Hunter River, is inferred to exist trending north-north-west through the Ridgelands exploration area terminating near its northern boundary.

Several of the Ridgelands boreholes intersected fractured/faulted zones. However, based on structure contour plans drawn on several horizons and various cross sections through the

Ridgelands area, no obvious large scale faults have been recognised (Brunton & Moore 2004). It is possible however that smaller scale faults may exist in the area.

9.1.4 Igneous Activity

Igneous activity in the Ridgeland exploration area includes:

- Basalt to the north-east of the area, equivalent to the Tertiary Liverpool Range basalts to the north.
- Intrusive sills in the north-eastern, southern and western parts of the area. DM Doyles Creek DDH 14, intersected numerous intrusive sills throughout the borehole, which had destroyed many of the coal seams.
- North-east trending dykes intersecting the southern boundary of the area.
- Several small igneous plugs.

9.1.5 Alluvium and Aquifers

Quaternary alluvial sediments occur along the Wybong Creek valley and its major tributaries. There are aquifers associated with the alluvial sediment throughout the area which contain water of variable quality.

9.1.6 Gas

The gas content of the potentially mineable seams or surrounding strata in the Ridgelands exploration area has not been evaluated. A current Petroleum Exploration Licence overlies the area.

Within the Ridgelands coal exploration area the Great Northern and Fassifern seams contain more than 500 million tonnes of in situ coal resources from about 100 metres to about 400 metres depth of cover. The resources underlie the Wybong Creek and associated water aquifers.

10. Recent Assessment of Mining Potential

The Class 1 and 2 lands reflect the extent of productive soils, suitable climate and availability of irrigation. Class 1 and Class 2 lands occur along the main river valleys (the Pages and Hunter Rivers, Dart Brook and Wybong Creek) and are typically associated with fertile alluvial soils and their associated aquifers.[37]

"d) The Wybong Creek Catchment within the Study Area appears to have no foreseeable coal exploration potential."[38]

h) Although Wybong Creek (and its alluvium) is relatively saline in its lower reaches, the upper reaches support irrigation of improved pasture and cropping. Any further increase in salinity would result in crop yield reductions. Wybong Creek is suitable for watering most stock.[39]

[37] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5, P95
[38] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5, P98
[39] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5, P118

11. Impact of Exploration

A Ridgelands Coal ELA will likely result in the removal of large amounts of habitat that will in the short and longer term negatively impact upon connectivity between tracts of habitat in the wider locality, leaving small, fragmented and isolated pockets of habitat, negating prospects for success of the Greater Eastern Ranges Initiative and impacting the Bicentennial Trail. It will impact upon a variety of fauna and also flora, as propagules for many plants are spread by animal vectors. No detailed analysis has been made of the species that could be impacted most by such impacts upon connectivity.

NSW landscapes reflect a long history of Aboriginal management. These landscapes have changed significantly over the past 220 years following European settlement and this has resulted over time in significant changes to their biodiversity. More than 70 NSW species are now presumed extinct and over 1000 are listed as threatened. The great majority of those listed are from the best-known groups of species: birds, mammals and vascular plants.

The Hunter Valley .. (including the study area in its entirety).. is considered to be one of the most important biogeographic barriers and conduits in eastern Australia." [40]

12. Direct impacts of deep drilling (ie to 1500m)

Deep Drilling Methods

Diamond Drilling

A truck mounted rig with support vehicles is used to extract a continuous cylinder of rock. Diamond drilling involves the use of water and drilling fluids that are contained in either an in-ground sump or above ground tanks, and requires significant site preparation and rehabilitation. Most exploration for coal and minerals uses a combination of diamond and reverse circulation drilling.

Rotary Mud Drilling[41]

Rotary mud drilling is most often used for petroleum and deep stratigraphic drilling. This method produces fine rock fragments and uses water and drilling fluids to lubricate the drill bit and return the rock fragments to the surface. The drilling fluids are contained in either in-ground sumps or above ground tanks. The drilling rigs are usually larger than for other methods and require more support vehicles and site preparation.

Direct impacts include, but are not be limited to:

1. Clearance of vegetation: the clearing of vegetation will pose an important impact from the Project. This impact will come from the direct removal of flora and vegetation communities and their habitat, as well as the removal of foraging and breeding habitat for fauna. All vegetation communities and flora within the Proposed Exploration Drilling Area are removed for the exploration rig assets, access and operation. The removal of this vegetation within each of 180 Proposed Exploration Drilling Areas is likely to reduce the level of flora biodiversity within the Proposed Exploration Drilling Areas and has the potential to do so with fauna also.
2. Isolation/fragmentation and increased genetic isolation: the clearing of vegetation within the Proposed Exploration Drilling Areas will increase fragmentation within the lease area physically and within alienated species genetically at higher risk of extinction.
3. Increased competition for resources: the removal of large areas of habitat for fauna species will create the need for individuals to disperse into new areas and compete with existing residents for foraging, roosting and breeding resources. Such resources

[40] HVRP, p137

[41] http://www.dpi.nsw.gov.au/minerals/community-information/exploration

will include suitable hollows, territories and home ranges, mates and other habitat features such as specific feed species and foraging resources, where the habitat is isolated, overcrowding can occur, further exacerbating conflict for resources. Increased competition is likely to cause the death of individuals, either due to direct conflict, resulting injuries or starvation.

4. Disease: the incidence of disease is often increased when normal population thresholds are pressured, and overcrowding occurs. This is particularly so with fauna species, when overcrowding facilitates the rapid spread of some diseases throughout a population.
5. Increased threat of death: the removal of habitat within Proposed Exploration Drilling Area's will increase the potential for fauna deaths due to vegetation clearing. This would be particularly true for hollow-dependent species. The significant increase of vehicle usage within the Proposed Exploration Drilling Areas is also likely to increase the potential for vehicle collisions with fauna species.
6. Human interaction: the increased presence of humans within the Proposed Exploration Drilling Areas may cause disturbances to flora and fauna species. Increased usage of the Proposed Exploration Drilling Areas is likely to increase the incidence of human-induced impacts such as damage to vegetation from vehicles or trampling, increased rubbish and alteration to normal behaviour patterns due to human presence.
7. Operational impacts: include impacts from operational activities, such as disturbance to normal behaviour patterns due to relocated electromagnetic fields, noise, vibration, lighting or dust. Such disturbances may cause areas of previously suitable habitat to become sub-optimal, and may cause fauna species to vacate areas of previously suitable habitat.
8. Edge impacts: many native species are known to be sensitive to edge effects. Such edge effects result in deterioration of the quality of vegetation as habitat along the interface with cleared or disturbed environments. Such habitat deterioration can result from impacts such as increased weed invasion, rubbish, increased predation, increased presence of introduced species or increased human presence. The clearing of vegetation within the Proposed Exploration Drilling Areas will increase edge effects to large amounts of remaining vegetation. The clearing of vegetation within and surrounding the Proposed Exploration Drilling Areas will increase edge effects to large amounts of remaining vegetation.
9. Introduced species: importation of materials to the Proposed Exploration Drilling Areas, management activities, increased human presence and clearing of vegetation all have the potential to increase the incidence of introduced species within the Proposed Exploration Drilling Areas. Weed species may be brought into the Proposed Exploration Drilling Areas with imported materials, or encouraged by removal of native vegetation. Introduced fauna species such as foxes, rabbits and feral cats may increase within the Proposed Exploration Drilling Areas due to the alteration in land use. An increase in introduced species within the Proposed Exploration Drilling Areas could have considerable impacts on existing native species.

10. Soil compaction and remediation associated with multiple vehicle movements of varying tonnage and content, containment of contaminated surface material and waters together with the risk of aquifer Interference with potential to destroy agriculture within the valley

11. Means for containing contaminant drilling mud at 1 in 100 rainfall [in a solidic erosional/ transferral soil profile]

12. Means of transferral and safe disposal of contaminant drilling mud Decommissioning. Sealing. Rehabilitation

13. Risk Management associated with deep drilling.

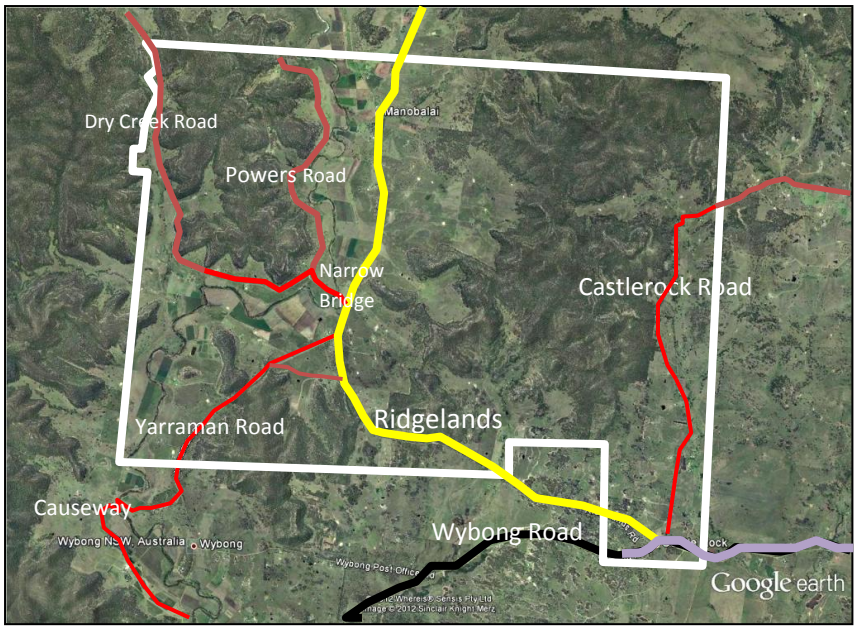
Sidoarjo and Surabaya, Indonesia, May 2006
The mud began to surface at the end of May. The cause, according to mining and environmental sources interviewed by the *New York Times*, was the failure of the drilling contractor to seal the walls of an 8,500-foot (2000m) deep well with concrete.

20 November, 1980, Lake Peigneur, Louisiana, USA

Due to a miscalculation, the 14-inch (36 cm) drill bit entered the mine, starting a chain of events which turned what was at the time an almost 10-foot (3.0 m) deep freshwater lake into a salt water lake with a deep hole.

Similar Groundwater problems to those associated with East End Mine, Pilliga, Tara etc.

13. Transportation



Local Roads
Key
Black – sealed 4.5/5m width
Purple – sealed 6m width
Yellow – sealed 4/4.5m width
Red – sealed 3.5m width (one lane)
Brown – earth or gravel

Major Roads

13.1 Major Transport Routes

The major State Highway Transport Routes are the New England Highway and Golden Highway. Council Roads to the Ridgelands area are Thomas Mitchell Drive, Edderton Road, Bengalla Link Road, Bengalla Link Road Extension, Wybong Road, Yarraman Road, Ridgelands Road, Wybong PO Road, Mangoola Road, Reedy Creek Road and Castlerock Road.

13.1.1 New England Hwy

The New England Hwy operates at peak capacity from Mayfield to Muswellbrook. Northbound overtaking opportunities are limited between Singleton and Branxton. 11,000 plus vehicles per day (est 2012) including explosive, petrol, diesel and other hazardous goods loads, frequent Mine Related Heavy Haulage. There are also various mine related closures or restrictions on passage of highway traffic.

13.1.2 Thomas Mitchell Drive

Thomas Mitchell Drive itself was initially a council gravel road that was sealed as a bypass thoroughfare of Muswellbrook toward Denman. Its use has grown beyond its economic life and it is unsafe for carriage of the daily mixture of B-Double diesel and explosive loads, other industrial and general public travel.

Thomas Mitchell Drive should provide the major access to the Muswellbrook West Mines, including any exploration and mining in the Ridgelands region for all heavy and hazardous loads however Thomas Mitchell Drive is inadequately designed, constructed and maintained to fulfil this purpose with safety.

13.1.3 New England Hwy - Thomas Mitchell Drive – Intersection

This intersection is deficient in all design respects for safety of intended use of carriage of deep drilling machinery, B-Double Diesel, Ammonium Nitrate and other bulk, bulky, heavy, oversize, chemical, toxic loads and commuters. Safe intersection sight distances, deceleration, turning lanes and circles, surface condition, edges, construction quality, line marking, maintenance, enforcement, management of driver fatigue and roadside fencing are all deficient.

14. Golden Hwy Intersection Denman

This intersection is unusual to the point of causing actual driver confusion, with 3 facing stop signs, with the through traffic approach obscured by a levee bank and has limited turning circles. Verges and centrelines are often crossed by slow turning heavy vehicles with limited stability. Bollards protecting a major Telstra below surface junction point are often destroyed by long vehicles turning.

Numerous school buses use this intersection. A primary school is located some 200m from this intersection.

Narrow Culvert approaching Mt Arthur Mine on Thomas Mitchell Drive

Typical Road edge on Thomas Mitchell Drive and 'standard' for Muswellbrook Shire Council Roads

14.1 Wybong Road (East)

Unimproved section. 4.5-5m width, centre marked, uneven and distorted surfaces. Fastest and most direct route to Muswellbrook CBD, Aberdeen, Scone. This section of road is to be closed by Mt Pleasant Mine in the near future. It is typical of the substandard roads servicing the Ridgelands area.

Accident on Wybong Road (East) 20/3/2012

14.2 Bengalla Link Road & Extension

The Bengalla Link Road and Extension completed construction in 2010 to service the Mangoola (Anvil Hill) Mine and incidentially, the public. It is to be closed and relocated by the Bengalla Mine Continuation Project.

14.3 Wybong Road (Upgrade)

This road, completed in 2010 as a condition of consent for the Mangoola (Anvil Hill) Mine is the major road to the Ridgelands area from Muswellbrook. It is 100km/hr, has some unevenness and surface distortion on western end bridge approaches due to substandard base used in construction by Xstrata PLC.

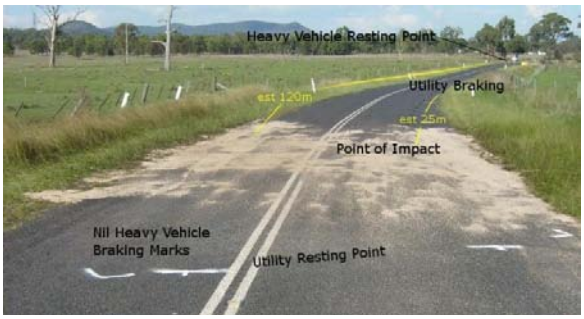
Wybong Road Upgrade deterioration at less than 6 months post opening.

14.4 Ridgelands Road Intersection

At Ridgelands Road Xstrata have constructed an intersection with Wybong Road that unduly restricts traffic movements to/from Ridgelands Road to low speeds of 0-20km/hr into a traffic stream of 100km/hr+. Note the school bus requiring >50% of the road surface on turn.

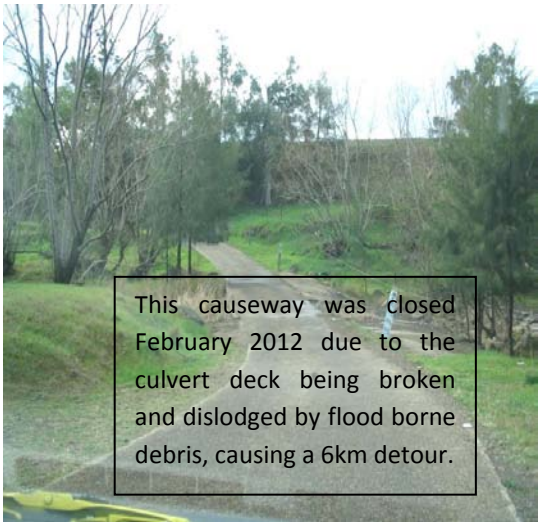
14.5 Wybong Road (West)

"Maintained" section. Unsuitable to 100 km/hr, sharp curves, Bi-Centennial Trail, Native animals. Deep, narrow culverts, 4.5-5m width. Scene of decapitation fatality of David Patten, 7 Jan 2010, (pictures below) when his vehicle was cut in half by the bucket of an excavator being hauled for Xstrata[42]. Numerous unreported 'run-off-road', near miss and native animal collisions occur on this road



14.6 Yarraman Road

Yarraman Road is a one lane sealed road with a causeway unsuited to articulated vehicles.

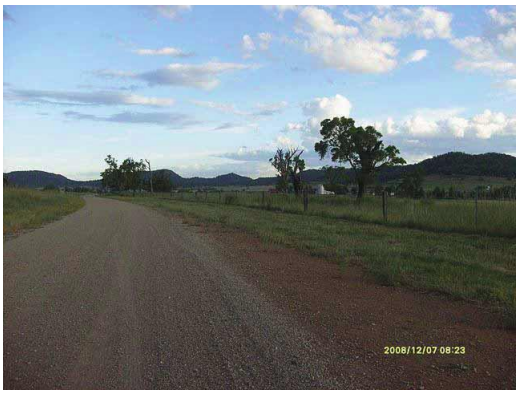


Yarraman Rd Wybong Creek Causeway

[42] Newcastle Herald, 27 Feb 2012 Coroner calls for review of safety controls for heavy mining traffic on narrow country roads. The present graduation of escorting arrangements from flashing lights, to pilots, and ultimately to police escort considers the width of the load but not the width of the load relative to the width of the road on which the load is being carried".

Yarraman Road

Yarraman Road



Dry Creek Road

Yarraman Rd Causeway following flood damage to the structure from Feb 2012.

14.7 Public Comment On Thomas Mitchell Drive, Edderton Road & Wybong Road

Wybong Road repair
10 Nov 06 | WYBONG Road is one of Muswellbrook Shire's most notorious and forgotten roads, residents who have waited years for it to be fixed claim. The residents say the road is narrow and patchy. Len Hamson said he was so sick of asking council to cut back

Xstrata application put to vote
04 Jul 08 | an internal road from Wybong Road to the mine's Coal Handling Preparation Plant (CHPP), and would include an upgrade to the road's intersection with Wybong Road. Also part of the application is the establishment of a 650 square metre temporary site

State omits Mangoola Coal mine consent conditions
15 Aug 08 | 's owners which would include restriction of the use of Wybong Road west to the early works construction period of eight months. At Monday night's council meeting, the council voted to express its concerns to NSW planning minister Frank Sartor. Several

Bengalla Link Rd opens
11 Sep 09 | Muswellbrook. Bengalla Link Road will benefit both the community and industry serving as a link between Denman Road and Wybong Road and between Bengalla Coal Mine and Xstrata Mangoola Open Cut Coal Mine. The initial section of the road was constructed when

Man dies in Muswellbrook crash with semi
08 Jan 10 | nine people have died as a result of the separate crashes. Yesterday's accident happened about 4.50pm near the Wybong and Yarraman roads intersection. Investigations continued late into the night and Wybong Road was closed in both directions

Muswellbrook Shire Council withdraws Anvil Hill mine support after crash
12 Jan 10 | to begin construction in November, prior to the completion of the required Wybong Road upgrade. But the project has been thrown into chaos after a contractor at the mine was killed on the road. The man, Dave Patten, 55, was driving a ute along

Wybong residents' anger over fatal smash
13 Jan 10 | ANGRY Wybong residents say that planning authorities ignored years of warnings that the narrow, winding Wybong Road would not support heavy vehicle traffic from the Mangoola mine at Anvil Hill. Wybong Action Group spokesman John Shewan said

Muswellbrook council told of traffic travelling to Anvil Hill
14 Jan 10 | November to allow construction to start at Anvil Hill, despite advice from Xstrata that trucks would need to use the western part of Wybong Road. Briefing papers given to councillors in November and seen by The Herald include an October 29 letter to the

Request for traffic plan
22 Jan 10 | Muswellbrook Shire councillors have requested a revised draft Construction Traffic Management Plan (CTMP) from Xstrata following the January 7 fatality on Wybong Road. An extraordinary council meeting was held on Monday night to discuss the issue

Wybong residents' road woes
11 Feb 11 | Wybong Road. "The upgraded section of road constructed by Mangoola has undergone some premature failures of the base course, which is the top 150mm, and as such temporary repairs and maintenance have had to take place. "As this work is conducted, some

Family grieving on legal road to nowhere
24 Feb 12 | of the narrowest points on Wybong Road. The prime mover was 3.4metres wide at its broadest. The road was 5.35metres wide. All vehicles were travelling between 80 and 100km/h, and within the speed limit. Although there was an escort vehicle, it was a

Muswellbrook mayor slams department
27 Feb 12 | after Dave Patten was killed by a truck carrying a wide load of mining equipment on one of the narrowest parts of Wybong Road on January 7, 2010. Patten failed to pull off the road in time to avoid a collision with a prime mover and trailer headed for

Crash on Edderton Road
08 Jun 11 | Traffic on Denman Road was delayed this morning after a motorcycle accident on Edderton Road. The crash happened shortly before 8am. The road is closed in both directions. Motorists are advised to use the Golden Highway and Denman Road. See

Two men airlifted after car accident
08 Jul 11 | Two men in their 20s were airlifted the John Hunter Hospital, Newcastle, on Wednesday night. Police said a 29-year-old Jerrys Plains man was travelling south on Edderton Road at 7.10pm when the vehicle rounded a bend and passed a car that was in

Driver's plea: fix the road
10 Oct 11 | Aberdeen mother Amy Richards has been left car-less and thousands of dollars out of pocket over an incident she says could have been avoided. Mrs Richards believes a little bit of tender loving care on Muswellbrook's Edderton Road would have saved

Road reopened after crash
08 Feb 12 | EDDERTON Road has reopened following this morning's (Wednesday) fatal accident. Police spent most of today investigating the crash where a four wheel drive left the road and crashed into a tree about 4.35am. The name of the deceased man has not

Speed review for back road black spot
17 Feb 12 | A speed zone review of Edderton Road will be conducted by the Roads and Maritime Services as early as next month. The announcement of the review comes after two accidents on the road in nine days, one a fatality. The RMS told the Chronicle this

Potholes raise safety concerns
21 Aug 09 | AN increasing number of potholes on Thomas Mitchell Drive is a concern for mine worker Josh Hynes, who is lobbying Muswellbrook Shire Council to improve the road. However, the council has its own concerns, admitting it needs funding assistance for

Muswellbrook roads need upgrade before mine expands
18 Jun 10 | Muswellbrook Shire Council will not support the $300 million Mt Arthur Coal MAC20 expansion set to start next year unless the mining company or the state government significantly upgrades Thomas Mitchell Drive and Edderton Road. Muswellbrook Shire

Man cut from car, flown to Newcastle
31 Jan 11 | A 28-year-old man who was cut from his car was flown to Newcastle's John Hunter Hospital on Monday morning after a crash near Muswellbrook. The two-car crash happened at 6.50am at the intersection of Thomas Mitchell Drive and Carramere Road. The

Coal mine expansion ready to roll
01 Apr 11 | with the community, council and other stakeholders and will invest $7 million towards the upgrade of Thomas Mitchell Drive. Mr Sullivan said the additional production would help supply rapidly expanding international thermal coal markets. The NSW

$6.27m allocated to roads
13 May 11 | and not by a small margin. "The new $6.27 million road capital program will include the first year of a two-year program of reconstruction and widening of Thomas Mitchell Drive, together with various intersection upgrades and rural and urban road

Vehicle rolls onto roof on highway
03 Jun 11 | Thomas Mitchell Drive at 6.10pm when for an unknown reason he crossed onto the wrong side of the road, hit an embankment and rolled. The car came to rest on its roof. The man was trapped for a short time before being taken to Singleton Hospital

Mine road unsafe: residents
09 Sep 11 | An upgrade of Muswellbrook's Thomas Mitchell Drive is due to start by May next year. The busy road has been deteriorating for several years and community members Peter Kennedy and John Shewan this week raised concerns about its safety. The men say

Orica's road to Denman
20 Jan 12 | , trucks would turn on to Thomas Mitchell Drive, left on to Denman Road, then right on to Palace Street where they would travel past St Joseph's Primary School, and along the Golden Highway to Rosemount Road. The proposed storage facility, the former

Decision moves to Denman
03 Feb 12 | hall meetings and there is considerable community interest related to the Orica development in Denman." Up to 1600 tonnes of ammonium nitrate a day could be trucked around Denman, on the Golden Highway, along Denman Road and Thomas Mitchell Drive

Speed review for back road black spot
17 Feb 12 |" He said the council's current focus was on a $7 million reconstruction and rehabilitation project on Thomas Mitchell Drive. Meanwhile, Mt Arthur Coal has plans to relocate or upgrade a section of Edderton Road

Orica talks continue
16 Mar 12 | changes to the Orica proposal, including that the transport of ammonium nitrate on large trucks be moved from Thomas Mitchell Drive to the Golden Highway. The development committee is made up of representatives of the Muswellbrook police, the Roads and

15. Social Impact

The social impact is that community or part thereof is destroyed and a further part has its marketability destroyed.

The fractured communities that remain continue to be affected by operational noise, fine particulate airborne dust, dust deposition, tainted rain water etc and their properties and investments stripped of genuine market value.

Community and Individual impacts are documented in the work of Dr Linda Connor, Sydney University[43] and Dr Carmen Lawrence, University of Western Australia.[44]

[43] 2004 'Environmental change and human health in Upper Hunter communities of New South Wales', EcoHealth, 1(Suppl. 2), pp. 47-58., 2010 'Environmental Injustice and air pollution in coal affected communities, Hunter Valley, Australia', Health and Place, 16, pp. 259-266., 2009 'Not Just a Coalmine: Shifting Grounds of Community Opposition to Coalmining in Southeastern Australia', Ethnos, 74:4, pp. 490-513.,
2008 Connor, L. 'Jero Tapakan: Stories and Friends, Telling and Being', The Asia Pacific Journal of Anthropology, 9:3, pp. 177-188., 2008 Connor, L., Higginbotham, N., Freeman, S. and Albrecht, G. 'Watercourses and Discourses: Coal Mining in the Hunter Valley, NSW', Oceania 78:1, pp. 76-90.

[44] Dr Carmen Lawrence, University of WA, 3 May 2011, in "Economic Growth and Human Wellbeing"

> "Significant expressions of distress linked to negative changes to interviewees' sense of place, well-being, and control". Pollution can affect well being both through an awareness of the adverse health and ecosystem effects of pollution as well as through the direct health effects.

There is significant loss in the connectiveness of cultural heritage, from song lines, sacred places, a collective memory, to exploration, Ludwig Leichardt, William Cox and historically recorded accounts.

02/2/2012 Muswellbrook Council apology on Mangoola Mine
By Joanne McCarthy, Newcastle Herald
"A Hunter community "shattered" by a coal mine has received an apology from the council that wouldn't listen. Muswellbrook mayor Martin Rush has apologised to Wybong residents for the council's support for Mangoola coal mine in 2007, and in 2004 when it was known as Anvil Hill. "There is a great deal of shame that council supported that development and I apologise to the Wybong community and others that it did so over the objections of its own residents," Cr Rush said this week. "Although the NSW government approved it, council supported it and for that, it is right for the council to apologise."

He said the mine had cost the Wybong community too much.

More than half Wybong valley's population, or more than 400 people, have left because of property buy-outs.

It "opened up a new front in the middle of a productive agricultural belt and in an area identified as a critical biodiversity link between Wollemi National Park and the Greater Eastern Ranges", Cr Rush said.

Road infrastructure approved for the project was "woefully inadequate to support traffic generated by the mine", and the company had struggled to comply with consent conditions, leading to breaches and fines.

Mangoola owner Xstrata has been fined for releasing sediment-laden dirty water into Wybong Creek and for disturbing aboriginal artefacts. The mine was the subject of many noise complaints last year.

"No part of the environmental impact statement disclosed that there would be such large dislocation of a rural community," Cr Rush said.

The apology follows the release of the council's draft land use management strategy in which councillors endorsed what has become known as the "Mangoola clause".

"Council acknowledges that the Mangoola coal mine project has secured approval, but notes that the project presents with substantial land use conflict. Council will not support any intensification of extraction or the expansion of the disturbance footprint presently permitted in respect of that mine," the draft strategy said.

Wybong Action Group president John Shewan said his group "acknowledged and accepted the belated apology to a community "absolutely shattered" by the mine.

He said the group needed council support to oppose the nearby Ridgelands exploration lease area and Yarrawa project.

An Xstrata spokesman said the company would not comment."

Photos provide an indication as to the ambience of the Ridgelands environment - at the interface of the eastern extremities of the bio-regions.

Wallaby Rock

High Peak

Anvil Hill (pre-Mangoola Mine)

16. <u>Economic Impact</u>

For the rural landholder exploration represents an immediate loss of external marketable interest in their property and investment.

Typical condition of Mine-Owned Property

The actuality of exploration causes increased risk of death or injury to person and wildlife, further loss of land value, infrastructure damage and loss of amenity.

The local economy, already overheated in respect of skilled labour shortage, accommodation, tradespeople, inflation and higher prices will be further overheated by Ridgelands Exploration requirements.

17. Application Timeline

- 9/2008 The Ridgelands Coal Mining Titles were held and offered for exploration and mining by tender (Dec 2008) by the Director-General, NSW Dept Primary Industries - Individual and community Objections were lodged to Tender - The single applicant for the Ridgelands Coal Mining Exploration Lease was Xstrata Plc

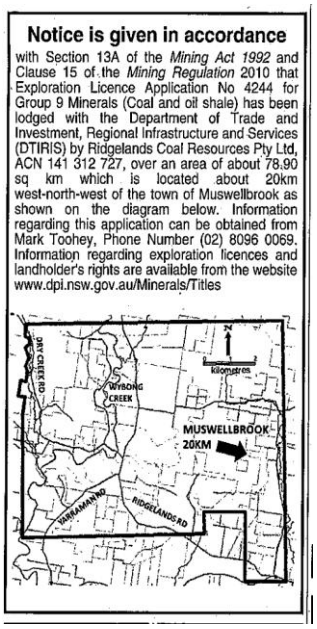
- 22/4/09 The Petroleum Exploration Lease Allocated to Sydney Gas (PEL4) continues as AGL. Previously 2D Seismic survey and cores at Black Springs and Dry Creek by Sydney Gas.

- 22/04/09 The Ridgelands Coal Mining Titles were again offered for exploration and mining by tender (Dec 2008) by the Director-General, NSW Dept Primary Industries - Individual and community Objections again lodged to Tender

- 13/05/2009 BoTai Consortium (OGL & QinHe China State Coal) and Xstrata apply. The Ridgelands Coal Mining Exploration Lease was not allocated

- 16/12/2009 Mayor Martin Rush and Muswellbrook Shire Council object to the tender of Ridgelands ELA

- 6/2/2010 The Ridgelands Coal Mining Exploration Lease Remains Unallocated



Notice is given in accordance

with Section 13A of the *Mining Act 1992* and Clause 15 of the *Mining Regulation* 2010 that Exploration Licence Application No 4244 for Group 9 Minerals (Coal and oil shale) has been lodged with the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS) by Ridgelands Coal Resources Pty Ltd, ACN 141 312 727, over an area of about 78.90 sq km which is located about 20km west-north-west of the town of Muswellbrook as shown on the diagram below. Information regarding this application can be obtained from Mark Toohey, Phone Number (02) 8096 0069. Information regarding exploration licences and landholder's rights are available from the website www.dpi.nsw.gov.au/Minerals/Titles

- 30/3/10 Announcement to ASX - "Chinese company Botai Consortium, in conjunction with the Qinhe Energy, has recently won by open tender the rights to own the major Ridgelands coal lease west of Newcastle from the New South Wales Government."

- 12/4/10 Dept Industry & Investment NSW - The Ridgelands EOI process "is still ongoing and no exploration licence application has been made over the area nor has any exploration licence been granted to any party over the area in question."

- 12/4/10 Botai correct incorrect claim of award of Ridgelands Coal Exploration Lease to ASX

- 10/2010 The Ridgelands EOI process "is still ongoing and no exploration licence application has been made over the area nor has any exploration licence been granted to any party over the area in question." Dept Industry & Investment NSW.

- 11/2010 Ridgelands Coal (unconfirmed OGL, QinHe China State Coal and others) reported payment of $121 million, $20 million non-refundable or as per the tender.

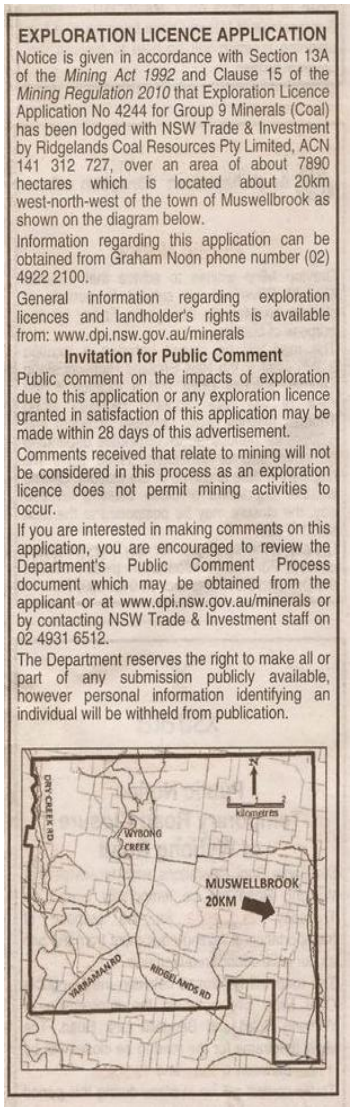
- 6/5/2011 Ridgelands Coal on Ministerial invitation formally apply for an Ridgelands Coal Exploration Licence 4244.

- 22/5/2011 Application approval delayed by 60 day moratorium on issue of all new licences by NSW Government

- 18/8/2011 FOI shows Ridgelands ELA to have its origin and conclusion by the former minister.

- 23/8/11 No further information available on progress of Ridgelands Coal Pty Ltd application. Consortium consists of more than OGL & QinHe??..

- 02/2/2012 Muswellbrook Council apology on mine



EXPLORATION LICENCE APPLICATION

Notice is given in accordance with Section 13A of the *Mining Act 1992* and Clause 15 of the *Mining Regulation 2010* that Exploration Licence Application No 4244 for Group 9 Minerals (Coal) has been lodged with NSW Trade & Investment by Ridgelands Coal Resources Pty Limited, ACN 141 312 727, over an area of about 7890 hectares which is located about 20km west-north-west of the town of Muswellbrook as shown on the diagram below.

Information regarding this application can be obtained from Graham Noon phone number (02) 4922 2100.

General information regarding exploration licences and landholder's rights is available from: www.dpi.nsw.gov.au/minerals

Invitation for Public Comment

Public comment on the impacts of exploration due to this application or any exploration licence granted in satisfaction of this application may be made within 28 days of this advertisement.

Comments received that relate to mining will not be considered in this process as an exploration licence does not permit mining activities to occur.

If you are interested in making comments on this application, you are encouraged to review the Department's Public Comment Process document which may be obtained from the applicant or at www.dpi.nsw.gov.au/minerals or by contacting NSW Trade & Investment staff on 02 4931 6512.

The Department reserves the right to make all or part of any submission publicly available, however personal information identifying an individual will be withheld from publication.

- 12/2/12 New Application, Same Proponent, new solicitor, denied knowledge of 6 May 2011 Application as initially did DPI.
- "work program" not provided by the applicant with the Application (as required)[45]
- restricted offer and subsequent withdrawal of extension of time
- withdrawal of Dept undertaking to incorporate submissions made to earlier undetermined 6 May 2011 Application
- lawfulness of conversion of lands previously zoned 7L1 and 7L2 in MLEP 1985 to RU1 MLEP 2009 thereby diminishing the environmental protection available. Lands that were zoned 7L1, 7L2 should more rightly have been zoned E3 – Environmental Management,, to be in accordance with Ministerial Directive.

"A draft LEP that applies to land within an existing environmental protection zone or land otherwise identified for environmental protection purposes in a LEP shall not reduce the environmental protection standards that apply to the land (including by modifying any development standards or subdivision controls that apply to the land)"[46]

[45] Public Comment Process for the exploration of coal and petroleum, including coal seam gas, DPI, 2012. p5

[46] Local planning directions issued by the Minister for Planning under section 117(2) of the Environmental Planning and Assessment Act 1979, 19 July 2007

18. Proposed Work Program

"At this early stage of planning, over the life of the exploration program, it is envisaged that the drilling work will involve about 180 boreholes of which approximately two thirds will be open chip holes to assess the structure and extent of coal seams and one third will be partly cored holes for coal quality analyses."[47]

19. Comment on Proposed Work Program

The proposed work program cannot be commented on as the only detail of the proposed work program provided is the nomination of 180 core holes exploring 3 different coal measures over 3 years to a depth of 1500m.

It is noted that the Applicant also applies to undertake Seam Gas Testing. [48] Petroleum Licence PEL 4 is held by AGL and the Applicant has no licence to engage in petroleum exploration.

20. Potential environmental impacts of the proposed work program

Potential impacts cannot be considered as the work program provides no locations, dates or times for work, generically however impacts could be taken to include:

a) Clearance of vegetation and direct removal of flora and vegetation communities and their habitat, including foraging and breeding habitat.
b) Increased Isolation/fragmentation and increased genetic isolation
c) Increased competition for resources
d) Higher incidence of disease
e) Increased threat of death
f) Impact of increased human interaction
g) Operational impacts
h) Edge impacts
i) Impact of Introduced species
j) Aquifer contamination
k) Groundwater contamination
l) Increased or changed noise
m) Loss of amenity Amenity
n) Loss of Equity Value of property

21. Past environmental performance of the applicant

(and in the case of corporate applicants, its Directors) in carrying out mining and exploration activities – We are unable to comment as despite inquiries no details have been provided by the Applicant on the shareholders or financial details of Ridgelands Coal P/L. Previous indications (from media) indicated BoTai Corporation (being Overseas & General Limited, Singapore SX 30% and QinHe Energy Coal, China State Owned 70%.)

[47] Document titled "Ridgelands Coal Resources Proposed Exploration in ELA 4244" provided to public 5/3/2012
[48] Document titled "Ridgelands Coal Resources Proposed Exploration in ELA 4244" provided to public 5/3/2012

We cannot evaluate the past environmental performance of the applicant (and in the case of corporate applicants, its Directors) in carrying out mining and exploration activities on the information provided by the Applicant.

22. Financial Resources of the applicant

We are unable to comment on the financial resources of the Applicant to carry out the exploration program as despite inquiries no details have been provided by the Applicant on the shareholders or financial details of Ridgelands Coal P/L. Previous indications (from media) indicated China State Owned.

We cannot evaluate the financial resources of the Applicant to carry out the exploration program on the information provided by the Applicant.

23. Conclusion

a) The Ridgelands has Tier 1 Terrestrial Biodiversity Habitat, contains Tier 1 Strategic Agricultural Land and is Priority Landscape Offset[49].

b) The work program supplied by the applicant is non-specific and vague. It provides no detail on activities and there is too much uncertainty to be able to provide specific comment or on which to make a decision to accept the application.

c) For example the applicant has no idea on the stage of the exploration given numbers of coreholes have been drilled, seismic and other studies conducted in the area or which cores will target which coal measures, or locations.

d) The community believes that the number of existing coreholes, the seismic and airborne magnetic surveys and geological reconnaissance mapping already undertaken fully support the 2005 conclusion that The Wybong Creek Catchment within the Study Area appears to have no foreseeable coal exploration potential."[50]

e) The community does not have the expertise of government or industry to identify procedural weaknesses in coal drilling programs, identify CEEC's, EEC's , species etc .

f) The information to be sought from within the community and elsewhere should be required from within government and elsewhere and provided publicly 28 days pre-closure of the public exhibition period

g) Inappropriate location – biodiversity, remoteness, cumulative impact degree of faulting and fracturing, coal seam aquifers linked to lunar saline release

h) Better sustainable uses, precautionary principle, Bio-banking, "Like" for "equally at risk of extinction or marked decline"

[49] UHSRLUP 2012

[50] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5, P98

i) Ridgeland Coal Exploration Licence Tender and Selection process. Ridgelands Coal claim award of tender but clarify this as a "Ministers Invitation to Apply" – An ICAC reference for the payment of $121m should be made.

j) Process needs to quickly evolve into one wherein before an application for exploration is accepted the Minerals and Energy Department must consult with other agencies and publicly disclose those agency and any other information necessary to the making of a proper decision or used in the making of a decision at the commencement of the Public Consultation Process.

k) Public Process needs to be 60 days (not 28)

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24. Recommendations

The author, the Members of Wybong Action Group, Residents of Ridgelands, Contributors individually and severally, the Common Rare and Endangered Species of the Ridgelands Biota and the Common Good humbly recommend that the Minister:

A. Decline to Issue the Exploration Licence for Ridgelands.,

Or

B. Decline to Issue the Exploration Licence for Ridgelands without consideration of the completed UHSRLUP.,

Or

C. Decline to Issue the Exploration Licence for Ridgelands on grounds that Ridgelands Coal Work Program provides insufficient information on which to make a decision to the exploration lease application.,

Or

D. Decline to Issue the Exploration Licence for Ridgelands on grounds of Ridgelands Coal not being viable for coal extraction due to its Tier 1 Strategic Agricultural Land, Tier 1 Terrestrial Biodiversity, Priority Landscape Offset classification[51] and the integral role of Ridgelands ELA in the sustainability of the ecology of the Hunter and Greater Eastern Ranges, the application of Intergenerational Equity, the Precautionary Principle and the Principles of Sustainable Development,

Or

E. Decline to Issue the Exploration Licence for Ridgelands on grounds of Ridgelands assessment for Coal Extraction being non-viable due to the high occurrence of faulting, permeability and other gross geological flaws[52],

Or

F. Decline to Issue the Exploration Licence for Ridgelands on grounds of risk to sustainable agriculture in the Goulburn-Hunter River Catchment associated with the long term impact on agriculture from any increase in salinity associated with output flows from the Wybong Creek Catchment,[53]

Or

G. the NSW Government offer the applicant an opportunity to explore a substitute lease area in lieu of Ridgelands,

Or

H. Issue the Ridgelands Exploration Licence with conditions (compliance penalties)
    a. that require the applicant to produce a Preliminary EIS identifying existing landuse, schedule of lands, flora and fauna including habitats and foraging areas, Soils, Water, Geology, Hydro-Geology, Transport, Risk Assessment, Equipment to be used, Disturbance types and durations, drill hole details etc prior to commencement of **any** drilling or exploration involving disturbance,

Or

[51] UHSRLUP 2012

[52] Coal Mining Potential in the Upper Hunter Valley – Strategic Assessment, NSW Department of Planning 2005, ISBN: 0 7347 5661 5

[53] Origins of salinity and salinisation processes, in the Wybong Creek Catchment, New South Wales, Australia,

b. that require the applicant to engage in community consultation by exhibiting and taking submissions on exploration eg. Core locations, core depth, size of drilling rig, clearance area, hours, etc prior to commencement of **any** drilling or exploration involving disturbance,

And

c. that require the applicant to establish an independently chaired CCC to ensure no loss of biodiversity and minimise human and social impact, and in doing so to:
   i. engage an independent and public peer review of existing water management data and data systems for the Ridgelands area and publicly report findings and make recommendations for an ongoing discovery, public monitoring and analysis of surface, aquifers, groundwaters and hydrogeological features within the EL, and,
   ii. engage an independent and public peer review of and make annual recommendations concerning an ongoing fauna, flora, micro-climate and habitat survey of the EL, and,
   iii. conduct and publicly report ongoing base-line community health studies

prior to commencement of **any** drilling or exploration involving disturbance,

And

I. specifically excluding all and **any** exploration that is for purposes not requisite to the gaining of coal.

Other conditions must await details of proposed works.

Contributors

Individually and severally.

Graham Brown	Tom Perkins	Jim & Wendy Morgan
Keith & Deborah Campbell	Duncan Connell	Sharyn Munro
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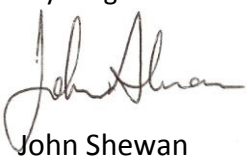
David & Edna Clay	Jayden Connell	Bev Smiles
Paula & David Stevenson	Dylan Turnbull	Craig & Kaye Power
Kim L Hahn	Len & Jean Hamson	Dave & Cathy Burton
John C Thomson	Glenn & Cathy Cameron	Jim & Ilsa Walsh
Cathy Johnson	Vaida and Carl Peteraitis	Peter Kennedy
Anthony Shewan	Louise Shewan	Nicholas Litchfield
Suzanne Moore	Emmanuel Shewan	Jessie Shewan
Michael & Viki Tanzer	Kevin Budden & Salvina Bezzina	John Shewan

Wybong Action Group Acknowledges the Wannarua People as the First People of the Ridgelands.



John Shewan
President
Wybong Action Group