Submission regarding Hume Coal EIS

Following are some technical concerns relation to the mapping and classification of native vegetation and Threatened Ecological Communities (TECs) listed in the same order that they are presented in Table 4.1 of the EIS. These issues are of concern in relation to the competence of the botanical assessment, though as the extent of clearing proposed is small and very limited in scope, much of what is provided below may be immaterial in determining the mine's direct effect on native vegetation:

PCT 838 is listed in the EIS, but the correct reference seems to be to 858 (an easy typo).

Some parts of Belanglo SF are mapped in a broadly adequate manner, but other areas are treated very simplistically or are entirely incorrect. In the latter instance, two pine plantation compartments are mapped as native forest - one compartment as '838', the other as 'Gully Gum / Narrow-leaved Peppermint' community (e.g. in throughout Fire Dam Creek). Fire Dam Creek's gully only retains native vegetation in the eastern section, most of which is better mapped as 1152 on the high ground that wasn't planted to pine because it is too rocky, with 1086b or 1107 in the more sheltered portion of the gully. It seems very strange that pine compartments, whether logged or standing, would be mapped as native vegetation, irrespective of the imagery used.

The EIS maps a form of PCT 1093 termed 'Gully Gum Scribbly Gum Woodland'. This PCT has not been previously described in Wingecarribee LGA. The stated interpretation of this community doesn't make sense to me. PCT 1093 is clearly a Tablelands community based around *Eucalyptus macrorhyncha*, *E. mannifera* and *E. rossii*, yet in the EIS, it is muddled in with *E. smithii* and *E. racemosa*. The areas that the EIS maps as 1093 are better classified as 1152, with smaller areas of 1150 and 1086a on slightly better soils or aspects on ridges and upper slopes, and 1086b in the gullies. There's very little gully habitat in this area, and very little Gully Gum (*E. smithii*). There's also no *E. racemosa* unless the consultants are using this species concept in its broadest sense as employed by the National Herbarium. That concept, which is not accepted in NSW, captures several taxa maintained as valid by the NSW Herbarium - the local one being mostly *E. sclerophylla*. As the consultants cite PlantNet as their source of taxonomic authority, it appears that *E. racemosa* is a misidentification of *E. sclerophylla*.

The EIS maps another form of PCT 1093 and terms it 'Brittle Gum / Scribbly Gum shrubby woodland'. This PCT has also not been described in this LGA and is primarily a Tablelands community. The consultants note that 1093 is not a good match for what they have observed in this regard. The relevant area is again better placed in PCT 1152.

The EIS maps PCT 1107 in three gullies in Belanglo SF, which is broadly fine for the western two, but not through Knapsack Gully, which is within the pine plantation. Most of that area mapped as 1107 is either highly modified bushland full of pines or is better classed as 1152. PCT 1107 really only occurs in deeper, wetter gullies and along larger streams.

The EIS maps a form of PCT 731 and terms it ‘Gully Gum Narrow-leaved Peppermint Tall Open forest’ with dominants of *E. radiata* and *E. smithii* over an exotic pasture and pasture weed understorey. This area may be difficult to classify properly given the apparent severity of modification for pastoralism. However, 731 is a very strange PCT allocation to make given how the relevant areas are described and named. Whilst not explaining this allocation, part of the problem may be that the consultants seem to have confused *E. smithii* (Gully Gum) with *E. elata* (River Peppermint) (this a common problem if you can't access fertile material and don't know local habitat associations). When this is corrected, along with an examination of geology and soils, PCT 1097 (Tablelands Basalt Forest TEC) and some areas of lower, colder, drier PCT 944 (SHSW TEC) are indicated. This means that the large area in the south east of the EIS study area that is mapped as 'Gully Gum / Narrow-leaved Peppermint open woodland' has not been identified correctly at the PCT or TEC level. The EIS doesn't consider Tablelands Basalt Forest to be present (despite Mt Gingenbullen being just outside their study area and being an obvious potential occurrence of TBF). I believe that most of the area identified as ‘Gully Gum Narrow-leaved Peppermint Tall Open forest’ should be mapped as 1097 with some areas of 944 and/or 731. Most importantly, it should be flagged as Tablelands Basalt Forest TEC and Southern Highlands Shale Woodland TEC, even if on-ground assessment may determine that the poor condition of the vegetation is such that it may not warrant treatment as either TEC in later stages of assessment.

The EIS maps and describes another area that is classified as PCT 731 – ‘Broad-leaved Peppermint Argyle Apple Grassy Woodland’. This is a relatively good fit with this PCT, which can capture the driest and lowest-growing form of Southern Highlands Shale Woodland TEC. PCT 731, via its SCIVI map unit parent, is recognised as part of Southern Highlands Shale Forest & Woodland TEC in the EPBC Act definition.

The EIS maps and describes another variant of 731 as ‘Broad-leaved Peppermint Narrow-leaved Peppermint Grassy Woodland’. This may be another form of the coldest and driest type of SHSW/SHSF&W again, but is perhaps not as close to the outer limit of that TEC's environmental parameters as the other form of 731 with *E. cinerea*.

It seems unsound to effectively ‘write off’ the vegetation in this area and some other parts of the study region, just because it reportedly has no mid-storey and has a largely exotic ground layer at the time of survey. The EIS only described observed vegetation condition, and does not take a precautionary approach in relation to potential levels of ecological resilience. Areas that currently appear to be in poor condition may recover significant diversity were grazing, fertilising, and other pastoral disturbances to cease or lessen in severity. There are numerous case studies documenting impressive levels of resilience in post-grazing and post-mowing/slashing native vegetation that might otherwise have been dismissed as too modified to recover. The EIS does not consider that information. This is important, even if thorough consideration determines that resilience is indeed low in some areas.

The EIS maps and describes 'Snow Gum Black Sallee grassy woodland and Paddys River Box population' as PCT 677. This PCT has not been previously known from this LGA or proximate areas. However, this choice of PCT is understandable given the paucity of information in VIS-C, and that many examples of ‘Snow Gum Grassy Woodland’ are often degraded and not in an ideal state for classification. I suggest that PCT 1191 and PCT 1100 are better allocations in the study area. In this LGA, these PCTs are not necessarily typical of their wider extent, as they are mainly associated with Tablelands environments, and at their eastern limits in Wingecarribee Shire. According to VIS-C, 1191 can include *E. aggregata* (Black Gum), which is actually what the consultants mean when they write 'Paddys River Box population', which occurs in part on Medway Rivulet at Oldbury Rd.

However, 1191 also includes the drier and grassy, not swampy, Snow Gum woodland along the Illawarra Highway and Golden Vale Road. I interpret 1191 to capture the drier snow gum grassy woodland with some minor low shrubby components in the driest sites with less soil development. Whereas PCT 1100 can capture the *E. aggregata* and *E. macarthurii* wet, grassy, swampy forests along drainage lines and in frost hollows. 1100 can have Snow Gum and Black Sallee as well, but the main difference is that 1100 has the wetter understorey and moisture-tolerant trees. It was pleasing to see that the EIS correctly identifies 'TSGGW' TEC, despite it not being reported in earlier regional scale mapping.

The consultants have sometimes confused the Endangered *E. macarthurii* with the Vulnerable *E. aggregata*, which is also listed as an Endangered Population in WSC LGA. They claim that the locations of *E. aggregata* are on freehold that they didn't have access to, such that these couldn't be verified or even seen. Yet there are trees of this species present on Council road reserves that are readily accessed, and others are easily seen on adjoining freehold from roadsides. However, the consultants claim they visited the main location but couldn't see the species! Quite likely, they were standing underneath it. It is readily distinguished from the more common *E. macarthurii*. There are not just 'historical records' of *E. aggregata*, as the EIS states: there are also modern records. However, it seems that the flora assessment was conducted some years ago, perhaps in 2013, so it may be that there were fewer database records for this species at that time. Nonetheless, the EIS doesn't deal with this issue adequately. In this context, the main concern in relation to *E. aggregata* at the species and population level is the potential for drying of its habitat due to groundwater drawdown, especially during droughts, which are increasingly likely to occur and to be greater in severity and duration. Groundwater and surface water supplementation may be appropriate for this species and population, and for any effected *E. macarthurii*.

The EIS briefly mentions Rare Or Threatened Australian Plants (ROTAPs) but doesn't explain how the claimed database search for such plants was conducted. Whatever the method, it failed miserably, as it did not detect a substantial number of ROTAPs known from the study area or a 10km buffer beyond it. Of those that are dealt with:

- *Geranium graniticola* hasn't been recorded in the area according to AVH (specimen database) and there are only three outlying eastern BioNet records (apparently but not definitely unvouchered). One appears to have been collected by the consultants preparing the EIS. Officially, this species is seen to be from higher elevations than the study area and further west than Wingecarribee LGA. There are two apparently unconfirmed records from this LGA – near Fitzroy Falls and the new Belanglo SF record, with another outside the LGA at Thirlmere. It is currently unclear whether this species is definitely present in or near the study area. If confirmed, the record in Belanglo SF represents a near-eastern limit of distribution and is therefore of additional ecological significance.

- *Eucalyptus apiculata* can be locally common in PCT 1152, so should have received more attention in survey and assessment, especially as 1152 is common on suitable habitat in the study area, and there are some planned losses of it for surface works. This species is present and documented in Belanglo SF, Medway Reserve and further upstream in heathy woodland along the Wingecarribee River. The flora survey again seems weakened by being several years old, especially in terms of it not dealing with more recent database records.

- *Pseudanthus divaricatissimus* has been reported by Mills at one site in Bangadilly NP plus there are records from Morton NP and Tallong. Two other records are a relatively recent collection by Keith at Medway; and an old and vague record from Boorman at 'Barbers Creek' where there is vegetation similar to 1152 but on Permian outcrops.

The EIS doesn't mention several other ROTAPs that warrant consideration, most notably *Grevillea raybrownii* and *Helichrysum calvertianum*, both WSC LGA endemics, and both present in and near Belanglo SF. I acknowledge that whilst the proposed extent of vegetation clearing for aboveground works is small and mostly within pastoral environments, there is some proposed clearing that could effect ROTAPs. In addition to the *Grevillea* and the *Helichrysum*, *Goodenia glomerata* is likely in the heaths on rock platforms. *Leptospermum rupicola* has been recorded once in the LGA (credibly) and could occur on moist cliff edges in Belanglo. *Monotoca ledifolia* warrants consideration, as does *Myoporum floribundum*, *Lissanthe sapida*, *Persoonia oxycoccoides*, *Pomaderris sericea*, *Rulingia hermaniifolia* (Wingello and Tallong), *Deyeuxia microseta* (Stingray Swamp), *Acacia jonesii* (known from Belanglo) and *A. subtilinervis* (known from Bangadilly NP and environs). *Persoonia mollis* ssp. *revoluta* has been recorded in Belanglo SF in places where the consultants would definitely have driven past it, yet it doesn't get a mention.

Beyond the above matters, I am concerned that whilst not principally intended to yield steaming coal for power generation, the project would still produce a large proportion of this product. The proportion is such that steaming coal is not simply a minor by-product. Were it primarily generating steaming coal, I could not support the proposal irrespective of local effects, simply because there are suitable alternatives to burning coal for electricity generation, and the ecological costs of coal combustion are very high.

Were the project generating a very high percentage of coking coal, its merits, in my eyes, would be relatively greater. Coking coal is important in steel making, and most Australians make daily use of steel in some form. To that extent, I'm effectively part of the steel industry, so would arguably be hypocritical if I objected outright to mining coking coal. Perhaps the greatest disappointment is that the project is entirely export-oriented, rather than using coking coal locally for steel making at Wollongong. It seems a poor use of the resource to export it as a raw product, at considerable cost in terms of transport emissions, only to import products derived from it.

Were the project to be approved, I consider it vital that carbon emissions be minimised at all stages of production, transport and end-use. I believe the project could and should be carbon-neutral, and that there is considerable potential to offset emissions by making use of renewable energy supplies and by resourcing landscape-scale strategic revegetation of the severely over-cleared 'Wingecarribee Plateau'. Without such offsetting, the project would add to the problem of carbon pollution driving global climate change. I don't see that as an acceptable outcome. Other ecological / hydrological considerations aside, it is potentially feasible, dependent on economics, for the project to proceed whilst also offsetting the full range of carbon pollution emissions. I acknowledge that this may not be feasible without changes to a range of taxes and duties that the project would otherwise incur.

The project could use 100% renewable energy for aspects of mine operation and production. There is potential for the project to generate at least some of its electricity were it to install wind generators and solar PV plus batteries. Ideally, it should not have a net draw on the electricity grid. Biodiesel could be used in place of conventional diesel, and electric vehicles (where safe) could be used and charged from renewable power.

Carbon offsetting through replanting is not an ideal solution to carbon emissions, but is useful and provides a range of other benefits including: improving water quality, especially through riparian plantings; improving viability of forest and woodland remnants and paddock trees that are otherwise likely to decline to extinction (this includes several TECs in or near the study area); improved pest management for pastoral enterprises; increased livestock shelter in what can be a cold, hot, and windy environment; reinstatement of habitat corridors that are beneficial in their own right but are additionally important for assisting species to adapt to climate change (this includes threatened species such as koala, and a range of birds); improved visual amenity if plantings are of appropriate density (not so thick as to block views).

The study area and environs includes the highly degraded Medway Rivulet catchment, which is in need of large-scale revegetation. Were this achieved, a habitat corridor linking the Shoalhaven catchment (headwaters of Bundanoon Creek near Werai) to the Hawkesbury-Nepean catchment could be recreated. Such a corridor would include increased protection of remnants and replanting relevant to the following TECs: Southern Highlands Shale (Forest &) Woodland; Tablelands Basalt Forest; Tablelands Snow Gum… Grassy Woodland; and Robertson Basalt Tall Open-forest. It would also include and support the threatened *Eucalyptus macarthurii* and *E. aggregata* (including the Endangered Population). A corridor reinstating the riparian and adjacent woodland and forest of the Medway catchment could also include cycleways and pedestrian routes subject to resolution of land access, ownership / purchase / lease and associated privacy considerations. Depending on the extent of offsetting required, other highly over-cleared catchments on the plateau may also be rehabilitated. In that manner, along with others suggested above, the mine could operate as carbon-neutral, whilst also funding much-needed public and ecological benefits from large-scale revegetation.

Sincerely,