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**Subject:** 752 Dargues Reef - DoP question re Tablelands Basalt Forest

Dear All,

Mitch Bland has asked me to provide information about the significance of impact were the ~35 ha of identified Tablelands Basalt Forest (TBF) EEC at the Dargues Reef project site to be compromised or even destroyed by groundwater drawdown.

I remain of the view that such an impact is very unlikely given the measured depth of the groundwater; the nature of the vegetation community and its component species; local climate conditions (especially rainfall); and the known range (and thus, inferred climate / rainfall / soil moisture tolerances of the key species).

Assuming that as per DoP's hypothetical scenario, groundwater was drawn down to a depth that compromised the function of the TBF EEC on this site:

- it is not necessarily going to cause a terminal effect, as the species most likely to be compromised would be a subset of the tree canopy, and certainly would not include all or even the majority of plant species comprising the community;
- such impacts would be unlikely to kill any trees except under extreme drought conditions (severity and duration), and even then, it is likely that any such trees would have been already stressed by climatic factors that in the case of prolonged drought, could include 'natural' reduction in groundwater flows and increased groundwater depth (meaning that it would be difficult to say whether the stressing and death of any of the trees was due to mining impacts on groundwater or to climate impacts on groundwater, or to a combination of these causes);
- even the death of a component of the canopy species would not cause the extinction of the remnant TBF. The Final Determination for TBF (and most similar communities) recognises that the community can still be ecologically and legally extant even if there is no tree canopy, or only partial canopy, or just saplings/seedlings. Thus, even if in the most improbable of circumstances, the entire tree canopy of the community was destroyed by mining-related groundwater drawdown, the TBF community would not have been technically destroyed – just modified, albeit in a detrimental manner; and
- were mining-related groundwater drawdown to compromise the community, the most likely scenario would be the stressing and potential death of only the component of the tree canopy that might be reliant on the groundwater for survival during times of extreme soil moisture stress. If this component of the canopy died, it may regenerate when favourable climatic conditions returned. The dominant species, *Eucalyptus viminalis*, recruits seedlings readily and prolifically, as is evident by the extent of recruitment and regeneration within the TBF on this site. Even if *E. viminalis* did not recruit seedlings to replace lost adult trees, it is likely that the more drought-hardy *E. pauciflora* would fill this niche. Thus, the community may shift from a forest dominated by *E. viminalis*, to a woodland dominated by *E. pauciflora*. Such a change would still leave the community consistent with the definition of TBF, meaning that even in this unlikely scenario, groundwater drawdown would not destroy the community, but would only modify it.

Even in DoP's worst case scenario in which mining-related groundwater drawdown was somehow the cause of the complete demise of the TBF remnant on the project site, the following information should be considered:

Tozer *et al.* (2010 p23)\* state that the extant area of TBF EEC is 10,700 ha across their study area (which includes most of the known range of TBF), which represents 5-20% of the modelled original extent of this community; 280 ha is known to be reserved in conservation estate, and this represents <2% of the modelled original extent of the community. Even the complete destruction of the 35.3 ha of TBF on the project site (by whatever means), represents ~0.33% loss of the modelled/mapped extant area of the community across Tozer *et al.*'s (2010) study area. Such a loss is numerically insignificant, but I am always loathe to rely on simple numerical assessments of impact in such a context, as they fail to consider factors such as cumulative impact, the quality of the area that would be destroyed, and other relevant factors such as the role of a remnant in a habitat corridor etc. I have not considered all of these factors as I have not previously been required to assess the impact of the TBF remnant being completely or effectively destroyed. However, I believe that the total loss of the TBF remnant on the project site would not be considered significant by many consultant ecologists or regulatory authorities on the basis that a) it is a numerically very small % loss of the total area believed to be extant; b) the TBF remnant on the site is already significantly compromised by earlier impacts, and is severely threatened by weed invasion; c) there are better quality remnants within the region that, if needs be, could be secured as an offset for any loss or degradation of the community on the project site; and d) the majority of threats causing cumulative impacts on TBF in general, are largely beyond the control of regulatory authorities as they relate to the impacts of legal pastoralism or to wider ecological threats such as existing levels of fragmentation within rural landscapes, and to climate change. The loss of any area of a threatened ecological community is undesirable, but more often than not, decisions about such matters are pragmatic by necessity, as there are simply not the funds, nor often the legal means to protect all such remnants from what are often long-established threats associated with legal land uses.

In the case of the Dargues Reef proposal, the remnant TBF is proposed to be managed for conservation in a manner that exceeds the land manager's routine statutory responsibilities, which are largely related to the control of Noxious Weeds. The proposal includes measures to address all weeds, not just those subject to legal control obligations, and to address all other on-site threatening processes. Such measures go far beyond what most owner-managers of TBF remnants are legally obliged to do. Even if there were some modification of the community due solely to mining-related groundwater drawdown, it is likely that the benefits achieved by the proposed conservation management of the site would far exceed the impacts of any such detrimental modification. Without the proposed conservation management of the TBF remnant, it is at risk of being further compromised and ultimately destroyed by existing threats unrelated to the current mining proposal. Thus, the proposed mining project can be argued to enhance the likelihood that the TBF remnant on the site will be subject to at least a net improvement in its ecological condition.

\*Reference: Tozer, M.G., Turner, K., Keith, D.A., Tindall, D., Pennay, C., Simpson, C., MacKenzie, B., Beukers, P., and Cox, S. 2010. "Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands." *Cunninghamia*, 11(3): 35-406.

Regards,

*Dr Steven Douglas*