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Major Projects
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Re: Submission – Objection – Angus Place Coal Mine Extension Project, Newnes Plateau, Centennial Coal Company Ltd
(https://www.planningportal.nsw.gov.au/major-projects/project/12641)

A scientific submission in response to the Amendment Report documents –
1/ "Amendment Report" 6/12/19
(https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-5602%2120200301T052004.193%20GMT)
2/ "Appendix I – Revised Biodiversity Impact Assessment" 6/12/19
(https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-5602%2120200301T052010.716%20GMT)

To the Committee,

I wish to contribute scientific information relevant to the proposed Angus Place Extension Project. I am an Independent Wildlife Ecologist and an expert in the Blue Mountains Water Skink (BMWSkink) with 8-years' experience researching this endangered reptile species. My current project is the longest, continual research project on the species to date. In 2012, it began as a PhD research project in the Shine Laboratory at the University of Sydney: a herpetological research team with over 30 years of experience. This data formed the basis of the BMWSkink monitoring component of the *Saving our Species Partnership Grants Program* "Swamped by Threats" project, which I've been heading from 2016 to present (https://www.lls.nsw.gov.au/regions/central-tablelands/key-projects/swamped-by-threats).

I am aware that "*Eulamprus leuraensis*, Blue Mountains Water Skink," is listed as "Endangered" under the federal *Environment Protection and Biodiversity Conservation Act 1999* and state NSW *Biodiversity Conservation Act 2016* (BC Act). So too is its rare "Temperate Highland Peat Swamps on Sandstone" (THPSS) habitat, in particular, "Newnes Plateau Shrub Swamps in the Sydney Basin Bioregion" (NPSS). Moreover, "Alteration of habitat following subsidence due to longwall mining" is listed as a "Key Threatening Process" under the BC Act.

My submission is in response to the aforementioned Amendment Report documents (1/ Report & 2/ Appendix I) and focuses on the Mining Project's predicted deleterious impacts on the endangered BMWSkink and its threatened habitat, hence warranting it as an objection.

Extirpation

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In contrast to the 2014 EIS, and based on the extensive monitoring data and analysis since the 2014 EIS it has been found that mining directly beneath lineaments or significant geological faults has triggered changes to hydrology in swamps overlying the Springvale Mine…

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Subsidence-related impacts are expected at Tri-star Swamp, Twin Gully Swamp, Trail Six Swamp, Birds Rock Swamp, Crocodile Swamp….These impacts may include vegetation dieback, major incision and erosion (in some instances down to bedrock), associated with loss of peat layer, significant loss of ecosystem function….As such, impacts to THPSS-associated threatened species are also likely in these locations; these species are the Blue Mountains Water Skink (Eulamprus leuraensis),…

I wish to report losses of and declines within populations of the BMWSkink from swamps overlying the Springvale and Angus Place Mines, which have been degraded by subsidence as a consequence of past and current longwall mining practices. I wish to report losses of populations in three swamps – Carne West, Junction and East Wolgan Swamps; and declines in abundances in two swamps – Gang Gang East and Gang Gang West Swamps. Carne West and Junction Swamps (and probably East Wolgan Swamp) previously contained BMWSkinks (NSW OEH, 2001, 2002, 2019), however, from our targeted trapping surveys we did not detect populations in these swamps (Gorissen et al. 2017a; Gorissen 2020). From our hydrological studies, we conclude that the BMWSkink is groundwater dependent, requiring a habitat with a high soil moisture content to survive (Gorissen et al. 2017a&b, 2018a). We measured very low to nil levels of soil moisture in Carne West, Gang Gang West, Junction and East Wolgan Swamps; and low levels of soil moisture in Gang Gang East Swamp (Gorissen et al. 2017a; Gorissen 2020). I therefore suggest that a change to swamp hydrology caused by subsidence from longwall mining, is extremely likely to lead to the extirpation of local populations of this endangered swamp specialist. This extends to populations currently inhabiting Tri-star, Twin Gully, Trail Six, Crocodile, and Sunnyside Swamps (NSW OEH, 2019, 2020), which are planned to be undermined. Considering BMWSkinks are more likely to occur in neighbouring swamps containing other skinks (LeBreton 1996), this is also a very likely outcome for potential populations in Bird Rock and Wolgan Swamps.

Habitat

The BMWSkink is dependent on water, occurring exclusively within THPSS sedge, shrub and hanging swamps: with no records in open forest/woodland, and very few records in heath and in the moist transition zone bordering swamps (Gorissen et al. 2017b, 2018a).

The NPSS recently undermined by Springvale Coal supported a population stronghold of the BMWSkink in this region. A significant alteration in hydrology of the swamps through loss of groundwater via subsidence has reduced the suitability of the habitat for the species. These three swamps have been severely degraded suffering a major

loss of live vegetation, understorey cover, surface water and soil moisture. From our studies on similarly disturbed swamps, we know that populations of BMWSkinks do not survive (Gorissen et al. 2017a). In turn, this habitat degradation has caused a substantial decrease in the number of individual skinks; has or is very likely to cause extinctions of all three populations; and, has resulted in a reduction in the number of populations and individuals throughout this region and in the species overall. Furthermore, recolonisation of these swamps following extirpation is extremely unlikely given the species' very limited ability to disperse (Dubey & Shine 2010b), and the now impoverished and unrecoverable condition of the habitat.

Genetics

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Given the current THPSS monitoring results, it is considered unlikely that the THPSS and associated threatened species will be lost in entirety.

Populations of the BMWSkink within each swamp are genetically distinct and thus unique (Dubey & Shine 2010b). Additionally, Newnes Plateau BMWSkinks are genetically distinct from those in the Blue Mountains (Dubey & Shine 2010a). To conserve the global genetic diversity of the species and hence maximise its resilience to negative impacts or adverse events we must conserve populations from both regions; and ideally, as many swamps within each of these regions as possible (Dubey & Shine 2010b). Such impacts include those that are likely to result in habitat degradation of swamps, especially future longwall mining practices and climate change. Under climate change, the greatest threat to population persistence for the BMWSkink is likely to be through habitat degradation from drying-out of swamps (Dubey & Shine 2011); as well as an increase in fire frequency (Gorissen et al. 2018b). Therefore, conserving as many swamps as possible is essential to the long-term survival of the entire species.

We evidenced a very rare dispersal event of the BMWSkink - an individual from Broad Swamp dispersed approximately 2 to 3km westerly to Carne West Swamp (Gorissen et al. 2018a). Dispersal is crucial to alleviating inbreeding, low genetic diversity and genetic bottlenecks in populations (Dubey & Shine 2010b). However, since the population at Carne West Swamp has been decimated, the lineage of this individual has likely been lost, and so too has the genetic diversity it afforded that population and the species globally. This also illustrates the necessity of maintaining habitat corridors and hydrological connections between swamps to assist in these rare dispersal events (Gorissen et al. 2018a). Irrespectively, a loss of one swamp means a loss in genetic diversity of the species overall, and a loss in species resilience to future threats such as climate change, which is predicted to occur in this region in future (Dubey & Shine 2010b).

Conclusion

My 8-years of research on the Conservation Ecology of the endangered BWWSkink shows that in order to conserve the species we must conserve its habitat. Since the species is

known only from approximately 70 swamps, habitat loss or degradation of any one of those swamps would further threaten this already endangered animal.

The NPSS proposed to be and already undermined represent a considerable proportion of the total habitat area used by the Newnes Plateau sub-population, and our surveys suggest that these swamps form the stronghold of the BMWSkink in this region. Significant alteration in the hydrology of these swamps, such as a severe loss of groundwater through subsidence, would substantially reduce habitat quality for this endangered reptile, and will inevitably lead to further extirpations of local populations. Considering this lizard species is imperilled by climate change, urbanisation, altered fire regimes and hydrological disturbance by longwall mining practices, to maximise its resilience to extinction we must conserve as many isolated swamps as possible. To protect the species, we must protect its habitat.

Regards,

Sarsha Gorissen, PhD

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