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NSW Planning and Environment
GPO Box 39
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Attention: Robert Byrne

Dear Robert

RE: WEST CULBURRA – FURTHER REVIEW

Further to previous reviews, I have been in discussions with Megan Kovelis of Martens and Associates regarding the stormwater management approach to West Culburra, specifically in response to a letter they sent directly to me via email on 30 January 2015 (attached). In this letter they outline further review of the literature regarding vegetation uptake rates for any flows out of a biofilter that would exfiltrate to surrounding subsoils. The basic premise of their approach is to allow for the loss of nitrogen and phosphorus that may be residual after treatment through a biofilter by assuming that this is taken up by vegetation interacting with the shallow groundwater zone. After approval was received from DoPE regarding our ongoing involvement, I sent an email back to them on 4 May 2015 outlining the following:

1. In terms of vegetation uptake rates, I still do not support the assumption that such uptake rates will be present on the site. While the US literature may quote some values, these would be highly site specific, dependent upon the underlying soil types (and their hydraulic conductivity) and on the background concentrations of the underlying groundwater. If anything, the increased hydraulic head on the groundwater at the West Culburra may lead to an increased flow of groundwater offsite, which in itself may also contribute to receiving environment nutrient loads. MUSIC modelling is by necessity a simplified representation of a site. As such, the inclusion of nutrient assimilation in a simplistic manner within your model really ignores the surface water/groundwater interactions which may lead to inadvertent effects that may not be beneficial to the receiving environment.
2. To have any degree of confidence that there would be any uptake, the relationship of groundwater nutrient concentrations to the likely concentrations coming out of the base of the biofilters would need to be established, and the infiltration rates assumed and therefore the residence time of infiltrated water in the uptake zone would also need to be confirmed. This would be best simulated by a proper groundwater model that could represent the groundwater/surface water interactions. I would still be concerned about the actual uptake rates present or able to be effected on-site. As far as I know, there is little data to look at low concentration uptake rates, most of the data collected on riparian zone interactions are for agricultural catchments with higher nutrient loads as per your literature review and as we know for vegetative treatments, the background concentration is the limiting factor in their efficacy. Until you could demonstrate that this has been properly accounted for, I do not support the use of vegetative uptake rates within the MUSIC model.

These comments were provided as part of ongoing assistance to Martens and Associates to resolve the outstanding issues regarding water quality management and were not meant to be a formal review, however Martens have requested that I document these in a formal letter to which they can respond.

I hope that this is suitable for your current purposes. Please feel free to contact me if I can be of further assistance.

Yours Faithfully
BMT WBM



Tony Weber
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Visiting Fellow – Australian National University