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Dear Sonya

Re: Response to comments from OEPA on OB32 Troglofauna Assessment

Comments from the OEPA

"Subterranean fauna (troglofauna) – a habitat map and information on the range of surrogate species, to support the habitat argument"

"Provide a figure showing the known extent of Tertiary Detritals (likely Troglofauna Habitat) and additional information and figures indicating the known range of surrogate species."

Response

Two main issues to be addressed were identified within the EPA comments:

1. identification of potential habitat in the form of Tertiary Detrital in the local area and the continuity of this habitat from within to outside of the proposed mine pit.
2. the known range of surrogate species in relation to the extent of Tertiary Detrital and the proposed mine pit.

Tertiary Detritals in the Local Area and Habitat Continuity

The Tertiary Detritals (alluvium and colluvium) are widespread in the area surrounding OB32, as depicted by the surface geology in Figure 1. Mapped surface geology shows continuity of potential troglofauna habitat (in the form of Tertiary Detritals) well beyond the proposed mine pit along the valley between OB24 and OB25 and westwards of OB32 as well. However, it should be recognised this depiction of the extent of the Tertiary Detritals is surficial and there is lateral and vertical heterogeneity in the depth and composition of Tertiary Detritals on a scale of tens to hundreds of metres in a repeated, albeit variable, pattern (Penales 2013). It is very unlikely that the fine-scale heterogeneity has created isolated troglofauna habitats but vagaries in actual habitat suitability (abundance of suitable subterranean spaces) means troglofauna are likely to have patchy distributions.

Importantly, within the Study Area (including the proposed mine pit) there are no landscape features that are considered significant enough to interrupt the continuity of troglofauna habitat and create a barrier to dispersal. There are no mesa-type formations or deep valleys present, few

breakaways or rocky outcrops and no dykes or significant faulting that are likely to limit the ranges of species.

Known Range of Surrogate Species

Three species collected in the OB32 Study Area are considered to be useful surrogates for determining the likely ranges of "the three potentially restricted species" at OB32. They are the isopod *Troglarmadillo* sp. B38 (which may be viewed as a taxonomic match for nr *Andricophiloscia* sp. B17), the symphylan *Hanseniella* sp. B19 (which can be considered to have similar biology to Pauropodidae sp. B32), and the thysanuran *Trinemura* sp. B26.

The three surrogate species are likely to be troglobitic (as are the potentially restricted species). However, *Troglarmadillo* sp. B38, *Hanseniella* sp. B19 and *Trinemura* sp. B26 have been collected more frequently in the area and are therefore likely to provide more accurate information about the ranges of troglobitic species in the Study Area than is available for the potentially restricted species, which have been collected only once (nr *Andricophiloscia* sp. B17, Pauropodidae sp. B32) or twice (Palpigradi sp. B17).

Troglarmadillo sp. B38 has a known linear range of 2.3 km, *Hanseniella* sp. B19 has a known linear range of 4.5 km, and *Trinemura* sp. B26 has a known linear range of 2.9 km (Figure 1). *Hanseniella* sp. B19 is potentially the best of the surrogates as it co-occurs with nr *Andricophiloscia* sp. B17 and Pauropodidae sp. B32 in hole HST0213D where Tertiary Detritals are the only habitat present above the watertable (Figure 1).

All three surrogate species have demonstrated occurrences both within and outside of the potential mine pit within the mapped Tertiary Detritals, as shown in Figure 1, although occurrences are often where banded iron formation is also present or in close proximity.

Conclusion

Analysis of geological data and information on the distribution of surrogate species suggest that the potentially restricted species (Palpigradi sp. B17, nr *Andricophiloscia* sp. B17 and Pauropodidae sp. B32) are likely to have ranges extending beyond the proposed mine pit. Hence, the proposed mine development appears likely to pose little threat to the persistence of the three species.

Yours sincerely

Dr Stuart Halse
Bennelongia Pty Ltd

25 May 2015

Reference

Halse, S.A., and Pearson, G.B. (2014) Troglofauna in the vadose zone: comparison of scraping and trapping results and sampling adequacy. *Journal of Subterranean Biology* **13**, 17-34.

Penales J.A (2013) Homestead (OB32E) Drilling and Modelling Report. Unpublished report produced by BHP Billiton Iron Ore.

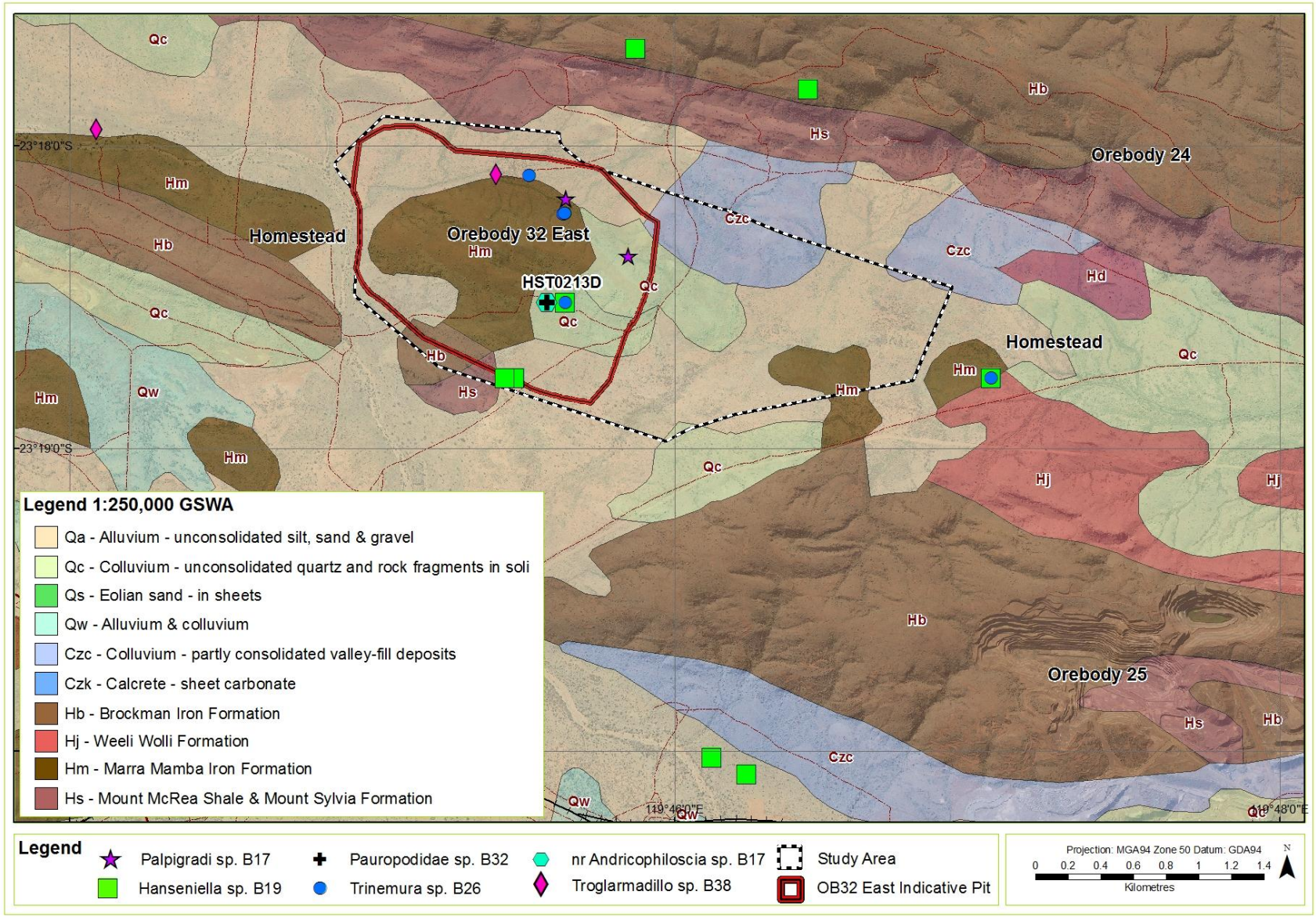

Figure 1. Surface geology in the OB32 Project Area (and surrounds) with known occurrences of restricted and surrogate species shown. Note that four species occur in hole HST0213D.