



**AUSTRALIAN
SPELEOLOGICAL
FEDERATION**

CONSERVATION COMMISSION

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Promoting conservation and sustainable management
of Australia's cave and karst environments

Reply to: Dr Clare Buswell. Chair, Conservation Commission of the ASF.

12.4.2025

Darren Walsh,
Delegate of the Environmental Protection Authority.
Western Australia

Dear Darren Walsh,

Re: Arrowsmith Hydrogen Project
Other environmental factors: Landform

As the Chair of the Conservation Commission (herein The Commission) of the Australian Speleological Federation I made a submission requesting that this development was sent out for public review in 2022, and I welcome the opportunity to again comment on this proposal. I am aware of the current financial situation of IGE, and I offer this submission in good faith that the EPA will be better informed if or when this financial situation is resolved. Further, if another buyer is found for IGE and this development, then the issues raised herein must be resolved before any EPA decisions occur.

I am aware that the West Australian Speleological Group has undertaken some speleological surveys of the area as part of the consultation process that IGE engaged in during 2022/3. In particular, it allowed WASG to update some work on already known caves and karst found on the property involved. I am familiar with their report and that it has resulted in the removal of seven wind turbines, with an increase in the size and capacity of such. I am aware that IGE has now adopted an indicative layout approach, to use an avoidance management method during the construction phases of the development.

Landform Factor

The Commission is extremely concerned about the impacts on and the lack of understanding of the landform factor by the proponents that this development involves. It has been relegated to Other Environmental Factors, with the statement:

As the karst features have been identified prior to the implementation of the proposal and avoided, the values, sensitivity and quality of the environment will not be impacted. (Section 38, Referral Supporting Documentation, (7.5), p. 101.)

Further, it appears from the documents presented by IGE, that it is only concerned with two caves, River cave and Arramal cave, (AHP 1 Construction Environmental Management Plan, p. 31.) despite WASG clearly stating that upwards of 57 caves are known on the property. The removal of seven turbines from areas where caves have been found further demonstrates IGE's lack of understanding of the landform in the development envelop. Importantly, the use of the term 'karst feature' by IGE, is seriously misleading as karst is an interconnected landform, not simply a cave entrance open to the surface and its passages. Karst is a term used to define the dissolution of carbonate rocks, (limestone and dolomites) by acidic water. Rainwater, dissolves carbon dioxide from the atmosphere becoming acidic as it does so, reaching a pH of 5.6. When it encounters limestone, its acidity dissolves the limestone over time. It is this dissolution that makes karst a dynamic landform, with unique values. These values include the development of speleothems, which can tell us about past climatic change. (Woodhead 2019), soil sediments that often contain pollens and fossil material, (Sniderman

2016) and subterranean fauna. The proponent has not understood nor investigated these values.

Using only desktop studies, for subterranean fauna surveys is not adequate given the date those surveys occurred and the limited nature of the surveys themselves, predominately citing records from only River and Arramal Caves. (Bennelongia, Arrowsmith Subterranean Fauna Desktop Survey. Infinite Blue Energy. 2021. pp. 4, 8,13,14.) It is not appropriate to simply rely on a desktop summary of this fauna when developments such as IGE's will have profound impacts on the habitat within the landform. New sampling and analysis must take place. Recent subterranean invertebrate fauna surveys on the Nullarbor have found a new species of spider, now known to travel underground between caves. (Marsh 2023). Similarly new invertebrate fauna studies on Kangaroo Island have also found new species of troglobitic weevil previously unknown to science. (Pers Com: Hermes Escalona-Garcia. Oct 2024. CSIRO)

The material presented by IGE is subject to the misconception that just because you can't locate an entrance there is no cave present. The Commission would like to impress upon both the WA EPA and IGE the importance of using LIDAR surveys to find cave entrances in the landscape that are not visible due to the presence of impenetrable vegetation. It is the vegetation that has prevented WASG members from much exploration at Eneabba. The use of LIDAR to examine the karst landforms of the Western end of Kangaroo Island is a case in point. Prior to 2022, there were a total of 134 known caves on all of Kangaroo Island. This is after 40 years of exploration! The use of LIDAR, flown in late 2022, over the western end of Kangaroo Island, which comprises a national park and wilderness area, has doubled that number and it now stands at 274 caves. Figures 1 below shows the powerful the use of LIDAR in determining where possible cave entrances are in relation to the surface.

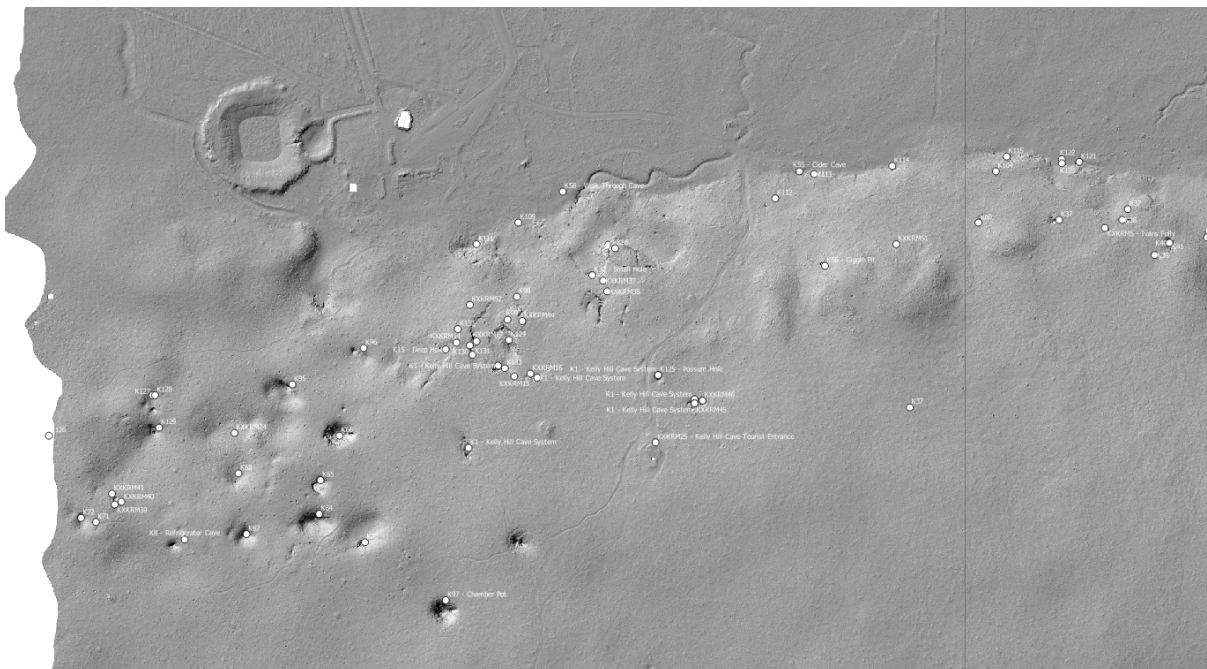


Figure One: LIDAR image, December 2022, Closeup of the Kelly Hill Show cave area, Kelly Hill Caves Reserve. Kangaroo Island SA.

Source. South Australian Speleological Council. Flown by Airbourne Research Australia.

Each of the new cave entrances are now being examined for the presence of vertebrate and invertebrate fauna and are being explored and mapped to understand both the extent of cave systems and hydrology of the area.

Importantly it must be pointed out that just because a human can't enter a cave from the surface does not mean that there is nothing to be found. As stated, cave systems are dynamic, not static environments, with change occurring due to ongoing chemical process. Changes on the surface to cave entrances for example, is influenced by water flows from flooding and subsequent surface collapse, or an underground cavern collapse, causing an opening to the surface to appear. In the latter case think of sinkhole collapses that are often reported in the media.

The proponents must acknowledge that just because a map of a cave has been produced, for example that of River Cave, that the map shows the complete cave. What the map actually shows, is the part of the cave system that can be *humanly accessed*. This means that the cave may well and truly continue, but that speleologists cannot reach it. It is thus incumbent upon IGE to understand that what you see on the surface is not what you get and similarly a cave map does not necessarily show the full extent of a cave system.

Karst is dynamic 3D the landform, where anything that occurs above ground impacts what lays below. Hydrologic changes to the surface, which in this case will include the building of roads, trenching for cabling, wind turbine footings, be they rock bolted or dug foundations, influences the drainage of water in karst landscapes. Such impacts include the silting of unseen voids and passages which then changes airflows, in cave temperatures, humidity levels. Cave systems contain rare vertebrate and invertebrate fauna, which are often specific to the caves in which they live and are habitat dependent. The impacts from the proposed construction will *permanently* change the subterranean environments and the habitats of fauna that live within.

Implications of blasting, crane and truck movements, construction of laydown areas, foundations for turbines and solar panels.

Any sort of development on karst must include the development of management plans that outline procedures for when voids are opened. IGE has not provided any management protocols to address this. Rather it is relying on avoidance of known features, restricting transport movements, dust suppression, employee induction, soil stabilization to avoid erosion. All these practices fail to deal with the real issues of breaking into a cave. What is the company going to do when, NOT IF, it opens a void. It cannot fill it full of concrete as doing so will severely impact the air flows, humidity and fauna found within the system. What does it do when an excavator falls into an unknown void? How does it deal with the safety of its workers in the first instance and how does it extract such machinery without further environmental destruction?

In Conclusion

The WA EPA must consider the lack of analysis undertaken in relation to the values of the landform - Karst - upon which this development is proposed. Specifically, it should note:

- The Commission recommends that any development must be preceded by intensive surveying of the landform, using both LIDAR and GPR.
- The Commission recommends that physical surveys of cave vertebrate and invertebrate fauna must be carried out and the desktop studies should not be used as a decider that there is nothing to impact upon.

- The Commission recommends that the proponent produces detailed protocols to manage the impacts of machinery opening unknown voids as part of the construction processes. That the development of these protocols involves the expertise of members of Australian Speleological Federation.

However, The Commission recommends that this development should not occur on this property given the irreversible impacts on the landform. Every cave is unique, and unlike above ground ecosystems which can and do recover, karst systems do not. Once destroyed the karst and the inter-connected systems found in this development envelop will be gone forever. **The precautionary principle must apply.**

Sincerely

Dr Clare Buswell.
Chair, Conservation Commission.
Australian Speleological Federation
<https://caveconservationaustralia.org/>
<https://caves.org.au/>

Select Bibliography

IUCN The Meaning of Nature. Clarification for strengthening protection and management.
https://iucn.org/sites/default/files/2025-01/meaning-of-nature_pdf-final.pdf

International Union of Speleology, IUCN. Guidelines for Cave and Karst Protection. 2nd ed. 2022.
<https://engage.iucn.org/system/files/2023-04/Guidelines-for-Cave-and-Karst-Protection-2022.pdf>

Marsh, J. R., Milner, S. J., Shaw, M., Stempel, A. J., Harvey, M. S., & Rix, M. G. (2023). 'A Case for Below-Ground Dispersal? Insights into the Biology, Ecology and Conservation of Blind Cave Spiders in the Genus *Troglodiplura* (Mygalomorphae: Anamidae).' *Insects*, 14 (5), 449.
<https://doi.org/10.3390/insects14050449>

Sniderman, J. M. K., Woodhead, J. D., Hellstrom, J., Jordan, G J., Drysdale, R N., Tyler, J. J., and Porch, N., 'Pliocene reversal of late Neogene aridification.' Proceedings of the National Academy of Sciences. February 2016. 113(8):1999-2004. DOI: 10.1073/pnas.1520188113

Woodhead, J. D., Sniderman, J. M. K., Maas, R., White, N., White, S., Hellstrom, J., and Devine, P., 'The antiquity of Nullarbor speleothems and implications for karst palaeoclimate archives'. *Nature: Scientific Reports* (2019) 9:603 DOI:10.1038/s41598-018-37097-2

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