

Hornsby Quarry Road construction spoil management project. EIS

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I would like to make the following submission on the Hornsby Quarry fill proposal.

I have no objection to the proposal in principle and see it as a practical answer to stabilisation and eventual re-use of the quarry void. However I do have a scientific concern that has not been adequately addressed in the EIS and would like to make some suggestions about how and why it should be dealt with.

I was formerly the Head of Department of Physical geography at Macquarie University and have been an environmental consultant for nearly twenty years. My expertise is in soil science, geomorphology, geology and I have taken a particular interest in the diatremes of the Sydney Basin since the 1970s.

The Sydney Basin has one of the largest, if not the largest, concentrations of volcanic necks or diatremes in the world and this fact alone makes them a significant geodiversity feature (*sensu* AHC 2002). Within the area of the Sydney and Penrith 1:100,000 geological maps there are at least 53 such features. Most of the larger ones have been quarried and the smaller ones or those in conservation areas are more intact although they have usually been cleared and grazed at some time in the past.

The quarried sites have been studied and described in the geological literature to some degree, usually only from a perspective of their value as a construction material resource. With the partial exception of the Pennant Hills Quarry (Dundas Valley) and an early study of Hornsby (Benson 1911, 1914) none have been comprehensively studied and sampled in a scientific context. Over the years there has been considerable interest in these volcanic features and many notable overseas geologists have visited the quarries and commented on them. The Dundas Valley quarry has been filled with municipal garbage leaving only a tiny section of the quarry wall exposed and a scattered collection of poorly documented samples. If the partial filling of the Hornsby quarry goes ahead under this project then all deep sections of the pit will be sterilized from any future study.

Hornsby quarry is by far the best exposed diatreme cross-section and it is this exposure (the result of quarrying) that makes it particularly important as a geoheritage feature. The real value lies in the detail of the exposed faces and although simply viewing these faces is important to the general community the greatest value is in the opportunity that the faces provide for comprehensive scientific study. For example; little is known about the layering structure of the volcanic breccia and what this can tell us about the genesis of the feature. Equally little is known about the xenoliths that are abundant in the breccia. Two important types of xenoliths occur; basic igneous rocks drawn up from the mantle (perhaps as much as 20km below the Sydney Basin) and sedimentary rocks from late-Triassic and possible Jurassic sequences which occurred

above the present landscape at the time of eruption of the diatreme but which have since been totally eroded. Sampling the mantle xenoliths in diatremes is the only way that geologists can access the materials of the lower crust.

The EIS (Appendix I) acknowledges the loss of views of the quarry walls after the fill is placed and it comments on possible damage to the diatreme in the construction of the conveyor. Whilst it is important to be concerned about this potential damage to the diatreme as noted on pages 35 and 37 this 'damage' is insignificant in comparison to the total loss of scientific data that could be gained from a comprehensive geological study and sampling of all of the quarry faces.

The EIS proposes 'archival recording' of the deep quarry walls after the pit is dewatered and before filling commences but no details of this proposal are provided. Read at face value this statement (App I page 41) sounds like the sort of photo album that is commonly produced to record the condition of a heritage building before demolition. It is further proposed that this archival record should be lodged with Hornsby Council.

I am concerned that this approach and the proposed storage venue is quite inadequate for the observation and retention of the real geological value of the quarry section and that much more needs to be done. Any detailed study will be an added expense to the project and there are three approaches to getting it done (below). Such a study should cover at least the following objectives:

- Comprehensive detailed geological mapping of the entire quarry exposure.
- Detailed photography of key sections.
- Full description, including petrological studies of all rock types in the quarry.
- Examination and description of any exposed contact zones.
- Examination and description of the exposed regolith and natural soil sections.
- Examination and description of all xenoliths identified in the quarry.
- Collection of geo-located samples of all rock types and their transfer to a secure long-term repository such as one of the Londonderry Reference Collections maintained by the Geological Survey of NSW.
- A full report covering the above objectives and reviewing the nature of the diatreme in a global context.
- The record of this work should be available in multiple copies and archived in several places such as the State and National Libraries, Roads and Maritime Services files, Hornsby Shire Council Library and appropriate tertiary institution libraries.

Recommended action:

The opportunity for detailed scientific study of the quarry faces should be offered to those universities in Sydney with Geology Departments. The work could be undertaken as a research project by interested staff or presented as a potential PhD to post-graduate students. In either case assistance finding should be made available. This would probably be the cheapest option.

Alternatively geological staff of the Geological Survey of NSW should be requested to undertake an appropriate survey. Their costs may well be higher than the University approach and the available lead time may be short.

The third option would no doubt be the most expensive and that would be to engage consultants to undertake the study to a detailed brief.

However this proposal is tackled I would like to emphasize its importance and the fact that after pit dewatering there will only ever be one opportunity to examine the faces in detail that will be subsequently buried by fill.

References

Australian Heritage Commission 2002. *Australian Natural Heritage Charter, For the Conservation of Places of Natural Heritage Significance*, (Second Edition), Australian Heritage Commission, Canberra.

Benson W.N. 1911. The volcanic necks of Hornsby and Dundas near Sydney. *Roy. Soc. of NSW J. and Proc.* 44(4), 495-555

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