

# Response addendum PAC Shenhua Watermark Open Cut Mining Project

## Additional information Liverpool Plains Megafauna & Aboriginal History

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*This document is tabled to the PAC as additional information to the statements provided at the PAC*

After a full review of the Aboriginal Heritage Archaeological Impact Assessment (AECOM,) for the Shenhua Watermark Project (the report) it has become apparent that matters relating to ‘antiquity’ have not been comprehensively considered or addressed, this is somewhat strange considering the historic importance of the area in terms of Megafauna

“Predicting the nature and distribution of archaeological material in any given landscape requires a **detailed understanding** (our emphasis) of past human land use practices. Information regarding the way in which land and resources were used by Aboriginal people in pre-contact landscapes is available to archaeologists through two primary sources: ethno historical literature and **archaeological data**” (our emphasis)

This lack of a detailed understanding of matters relating to antiquity stems from the rather meager/selective review of past archaeological literature/data relating to the region, in particular Gorecki, P.P., Horton, D.R., Stern, N. and Wright, R.V.S. (1984). Coexistence of humans and megafauna in Australia: Improved Stratified Evidence. *Archaeology in Oceania* **19**, 117-119.

The Aboriginal history of the Liverpool Plains spans many thousands of years, with archaeological research to date demonstrating 20,000 years of Aboriginal history (Gorecki et al. 1984, Gaynor 1997). Older archaeological sites may still to be found in the region, with research in other areas demonstrating that Aboriginal people have occupied the NSW landscape for more than 42,000 years (Bowler et al 2003, OEH 2011).

In this context, it is understood that the earliest generations of Aboriginal people living on the Liverpool Plains may have come into contact with Australia’s megafauna – although the extent of this overlap (the number of years people and megafauna shared the same lands), and the ways in which people and megafauna interacted, are still subject to ongoing research and debate.

### **Megafauna of the Liverpool Plains**

Megafauna are defined as animals with an adult body weight of over 44 kilograms (Martin 1984), who lived in the Pleistocene on many continents, and who, with very few exceptions, became extinct in the late Quaternary, at or near the end of the last glaciation (Elias and Schreve 2006:3203).

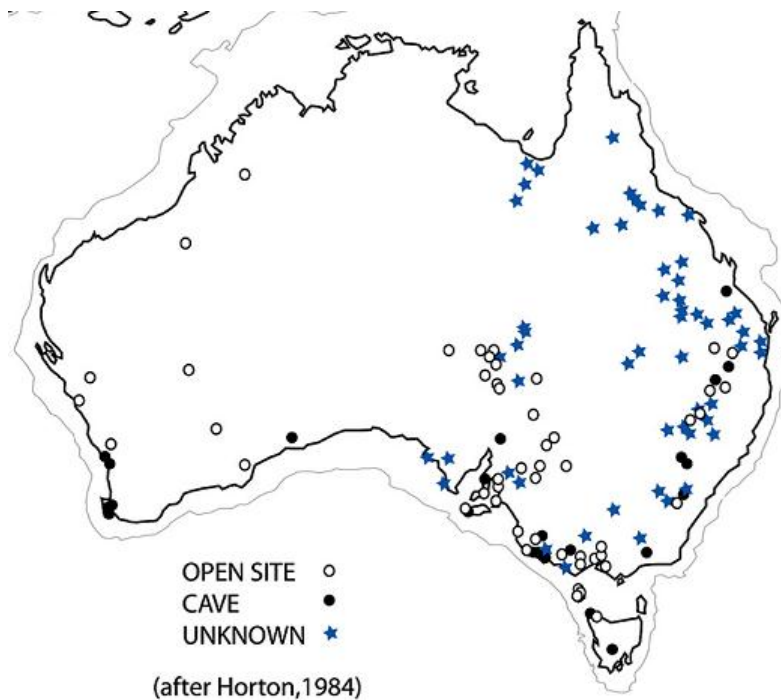
Research has suggested that in the late Quaternary (ie, within the past 1 million years), there were 32 megafauna species in Australia (Webb 2008:342), although extinctions over time mean that far less of these would have remained within the period of human occupation (ie, within the past 50,000 years) – with some researchers suggesting that only 13 megafauna species were present in the within the period of human history (Wroe and Field 2006; Field et al 2008:107).

In Australia, megafauna remains have been found at approximately 200 sites dating to the Pleistocene (Field et al 2008:109), found mainly in aeolian deposits – wind blown sand or dust – along the edges of former or present lake basins, river or swamp deposits, and coastal dune deposits (Roberts et al 2001:1890). Other significant megafauna fossil sites include caves and sink traps,

which have acted as natural traps and pitfalls and can have good conditions for preservation (Webb 2008:332).

Megafauna fossil sites show that these animals inhabited an area from Cape York to southwestern Australia and into the southern Lake Eyre Basin (refer to Figure below); although the majority of fossil sites occur in southeast Australia. This distribution has led some to suggest that the more stable water and fodder of southeast Australia drew greater megafauna numbers (Webb 2008:332), particularly at the end of the last ice age, when surface water became scarce and most inland lakes became completely dry (or dry in the warmer seasons) (Florek 2013).

**Figure: Late Pleistocene megafauna fossil sites (from Field et al 2008:108)**



The Liverpool Plains contains some of the earliest known megafauna fossil sites recorded by Europeans in Australia, and along with Wellington Caves and the Darling Downs, was one of Australia's three main fossil fields throughout the nineteenth century (Douglas 2004:247). Its' importance in understanding Australia's megafauna history – and understanding potential megafauna and human interactions – is still recognised today, for example:

*".....the area, given its locale, can be more reasonably thought of as a core area for megafaunal distribution, and we have evidence that the broad spectrum of megafauna has survived."* (Gorecki et al 1984:119)

Known megafauna fossil sites in the Liverpool Plains include the following locations:

- Mooki River. Although there is no published data on this site, Roberts et al (2001:1889) and Field et al (2008:110) describe that remains at this site were dated to 42,000 ± 4,000 BP, and included *Diprotodon optatum*, *Palorchestes azael*, *Phascolonus gigas*, *Thylacoleo carnifex*, *Macropus giganteus titan*, *Protemnodon sp.* and *Sthenurus andersoni*. Megafauna remains at this location were collected from a fluvial context.
- Cox's Creek. Two fossil sites along Cox's' Creek have been investigated, being Bando and Kenloi, although no excavation records are available for either site (Field et al 2008:112). At

Bando, *Diprotodon optatum* remains have been dated to  $54,000 \pm 6000$  BP, and  $53,000 \pm 5000$  BP (Roberts et al 2001:1890). At Kenloi, *Diprotodon optatum* remains were also found, dated to  $53,000 \pm 4000$  BP and  $51,000 \pm 4000$  (Roberts et al 2001:1890). Megafauna remains at these locations were collected from fluvial contexts.

**Figure: Excavation of megafauna along Cox's Creek (Thomson 2011, photo courtesy of SA Museum)**



- Tambar Springs. Megafauna was seen at this site in 1979 by a resident, whose observation led to an emergency dig by the Australian Museum in 1979 and 1980. This resulted in the recovery of most complete *Diprotodon* skeleton yet found in Australia, with more than half of the bones of one animal collected (Wright 1987:3). Later dating of sediments at the site provided a suggested date of 33,500 BP for the fossil remains. It has also been suggested that megafauna remains may have been removed from Tambar Springs in the 1920s by Anderson (1924). Although little detailed analysis of the *Diprotodon* skeleton has been conducted, on one rib, there is a small, square hole tentatively identified as having been made by a spear while the bone was still fresh (Musser 2013).

**Lime Springs.** Investigation of Lime Springs in the 1980s found megafauna remains from the following species: *Diprotodon*; *Macropus cf. titan*; *Protemnodon*; *Procoptodon*; and *Sthenurus*. Gorecki et al (1984:118) reported that megafauna remains were found within deposits dated to  $19,300 \pm 500$  years BP; although these dates are not confirmed through recent optical dating such as has occurred at other megafauna sites in the Liverpool Plains. Lime Springs was also found to include almost 2,000 stone artefacts evidencing past Aboriginal use of the site, although no definite evidence of overlap in megafauna and human use has been identified at this location. "We have been excavating at two sites on the Liverpool Plains, called Lime Springs and Trinkey. Both sites are spring-fed swamps, unimpressive depressions in the landscape. Each is less than 100m in diameter. Neither is identifiable as a site on aerial photographs, yet their unimpressive appearance belies their scientific importance. We discovered both sites by ground survey, and into the banks of the swampy depressions we dug blind, since no archaeological evidence outcrops on the surface. The sites are 3km apart. Both have essentially the same stratigraphy. The prehistoric stratigraphic units, from the top down, are: —

1. The Grey Silt, an aeolian dust dating to 6,000 years old: up to 0.8m thick.

2. The Black Swamp, an organic-rich black sandy clay dating from 6,000-c. 20,000 years old: up to 1.3m thick.

3. The Buff Silt, an aeolian dust c. 26,000 years old: up to 0.5m thick.

In substantiating a recent date of megafaunal extinctions it is the Black Swamp that holds the clues. Wherever we have dug, and at both sites, the Black Swamp contains stone artifacts and megafauna. All the mammalian remains (both extinct and extant species) have been identified from fragments of the enamel of their teeth. Bits of bone are fragmented, and nearly one third are burned, suggesting that they are the remains of human activity around the spring-fed swamps.

At Lime Springs (by far the richer of the two sites) extinct species present include *Diprotodon*, *Macropus titan*, *Protemnodon*, *Procoptodon* and *Sthenurus* (Gorecki et al. , 1984:118). In the same levels we found thousands of artifacts, including 1988 that were greater than 10mm in minimum dimension. From the point of view of the age of extinctions it is critical to note that the upper levels of the Black Swamp at Lime Springs (dated by analogy with Trinkey to 6,000 years old) have as much extinct fauna as the lower levels.

When we published the site of Lime Springs we had only one date, and that was for the base of the Black Swamp unit. Now we have several dates and they are all consistent.

We have the remarkable evidence of the megafauna living through to the Holocene. As my late mentor Louis Leakey used to say, the textbooks will have to be rewritten. Indeed a Holocene megafauna is not the only remarkable attribute of the Black Swamp unit at both sites, since we also find high groundwater discharge from the springs through the pleniglacial period centred on 18,000 years ago and which, to the south and west of the Liverpool Plains, has been shown to be exceptionally arid. Another unexpected discovery is cultural: at the top of the Black Swamp (and therefore dating to about 6,000 years ago) we find the first occurrence at our sites of the horsehoof cores of the Kartan industry. This industry (previously undated with any precision) is found in arid areas to the west; the Liverpool Plains represent the most easterly occurrence of this

fascinating prehistoric industry (Lampert, 1983). I will comment again on the significance of the Kartan industry when I describe the uppermost unit called the Grey Silt.

The sandy clays of the Black Swamp unit, though below the water-table, retain

well-differentiated cultural stratigraphy. We were able to use correspondence factor analysis of the excavated units, taking as data the counts of the rock types used to make artifacts, to demonstrate that the site was not disturbed (Gorecki et al, 1981:119). Since, in addition, we cannot differentiate the state of preservation of extant and extinct species we have very strong prima facie evidence for a Holocene megafauna on the Liverpool Plains." Wright R.V.S (1987) Proceedings of the Linnean Society of New South Wales. Volume 109).

... whilst some of the statements (largely to do with dating issues) in this extract, after

further research, have been held to be questionable by others in the field (see Roberts, R.G., Flannery, T.F., Ayliffe, L.K., Yoshida, H., Olley, J.M., Prideaux, G.J., Laslett, G.M., Baynes, A., Smith, M.A., Jones, R., Smith, B.L., 2001a. New ages for the last Australian megafauna: continent wide extinction about 46,000 years ago. *Science* 292, 1888–1892) it was the most up to date information available at the time. “The material record of this occupation is preserved in the archaeological sites of the Gunnedah Basin, most of which probably date to the period since the last Ice Age (after around 18,000 years ago). At Lime Springs, south of Gunnedah, stone artefacts associated with megafaunal marsupials have been excavated in deposits dating back 19,300 ± 500 years Before Present (BP; SUA-915). The Lime Springs assemblage shows change over time in artefact size, types and raw material proportions. The earlier assemblage consisted of small flakes of a variety of siliceous rock types, while the latter industry was what archaeologists have termed “Kartan”, with large horse hoof-type cores and scrapers, often of tuff (Gorecki *et al.*, 1984). “Kartan” artefact types were once thought to be Pleistocene in age (greater than around 11,500 years old), but this typological classification is no longer regarded as a chronological marker (Lourandos, 1997).” (Copper M. p.19). (This information is also published on the AAA website, <http://www.australianarchaeology.com/?s=Austarch&x=18&y=14>, accessed 11/11/2013).

- Reddestone Creek. Investigation of this location in the 1980s identified the following megafauna species at Reddestone Creek: *Protemnodon brehus*, *Procoptodon goliah*, *Genyornis*, *Sthenurus pales*, *Sthenurus sp*, *Procoptodon pusio*, *Protemnodon anak*, *Dirprotodon minor*, *Propleopus*, *Trichosurus*, *Phascolonus*, *Vombatus*, *Thylacoleo* and *Sarcophilus* (Horton and Connah 1981:43). Aboriginal stone artefacts were also recorded as part of this investigation, but no conclusive link was demonstrated between megafauna fossils and cultural deposits. At the location where remains were found, there appears to be a series of small springs which give rise to a water flow across the valley (Horton and Connah 1981:43). Investigation did not identify the likely age of megafauna remains or cultural deposits.

In addition to these known fossil sites, historic accounts also make reference to early European settlers finding megafauna remains in the Liverpool Plains, for example in a 1847 newspaper report on the finding of megafauna bones in the Wellington Caves, Darling Downs and Liverpool Plains, it was noted by an amateur geologist, Reverend W B Clarke:

These case studies are but one of the many indicators as to the high potential for Cultural and Scientific Values of High Significance, that lay waiting to be investigated within the fabric of the Liverpool Plains.

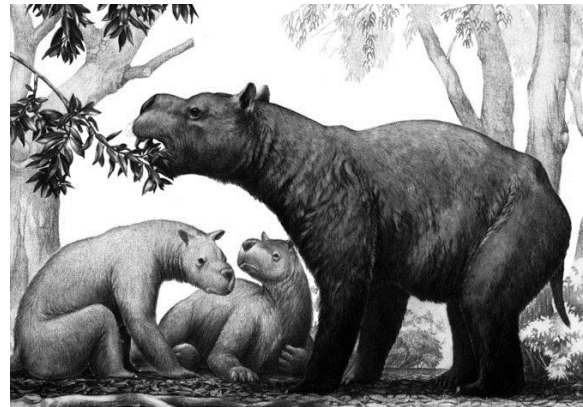
**Figure: Sydney Morning Herald, 30 November 1847 edition (extract)**

From depths in the Liverpool Plains, varying from 20 to 100 feet, bones of species of kangaroos and other animals have been frequently dug up by persons employed in making wells; and it has long been an amusement with the gentlemen squatters on Darling Downs to search for relics of the kind in the very prolific region along the Condamine.

Some of the megafauna species recovered from Liverpool Plains fossil sites are illustrated and described below.

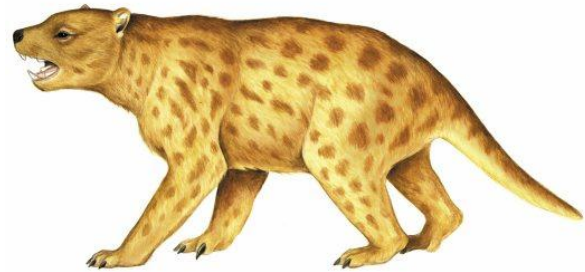
**Diprotodon optatum**

Diprotodon was the largest mammal ever to have lived, weighing up to two tonnes and growing up to 3 m long and 2.6 m high. Diprotodon was probably a browser, with a preference for semi-arid plains, savannahs and open woodlands. Remains have been found all across Australia, and in the Liverpool Plains, have been found along the Mooki River, Cox's Creek, Tambar Springs, Lime Springs and Reddestone Creek. Diprotodon remains from Tambar Springs show a small, square hole in one rib, tentatively identified as having been made by a spear while the bone was still fresh.



**Thylacoleo carnifex**

Often called the 'Marsupial Lion', this species was a leopard-like animal, and was almost certainly carnivorous and a tree-dweller. It would have been a fearsome predator or scavenger, with an enormous set of stabbing front teeth and powerful claws. The weight of Thylacoleo is estimated to have ranged from 90-160 kilograms, with it growing 1.5 m long and 75 cm tall. Thylacoleo remains have been recovered from Mooki and Reddestone Creeks in the Liverpool Plains.



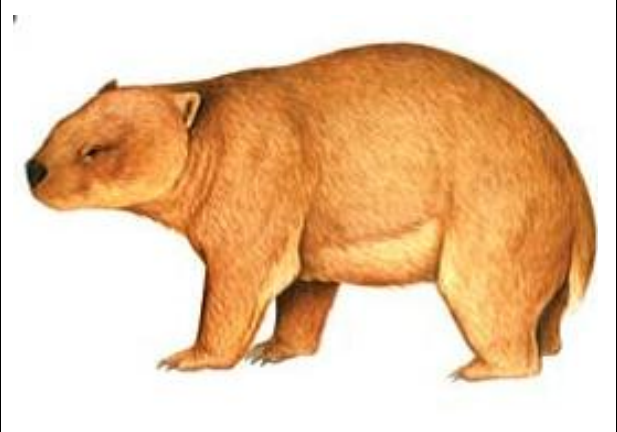
**Palorchestes azael**

Palorchestes azael was the size of a bull, and used its sharp claws to dig roots and tubers, and rip into tree bark. It was similar in appearance to a modern tapir, with retracted nasal bones on the skull suggesting a short trunk. It was a browser, with its teeth showing that it ate mostly abrasive vegetation. Palorchestes azael has been found in Queensland, NSW, Victoria and South Australia, and in the Liverpool Plains, has been found at Mooki Creek.



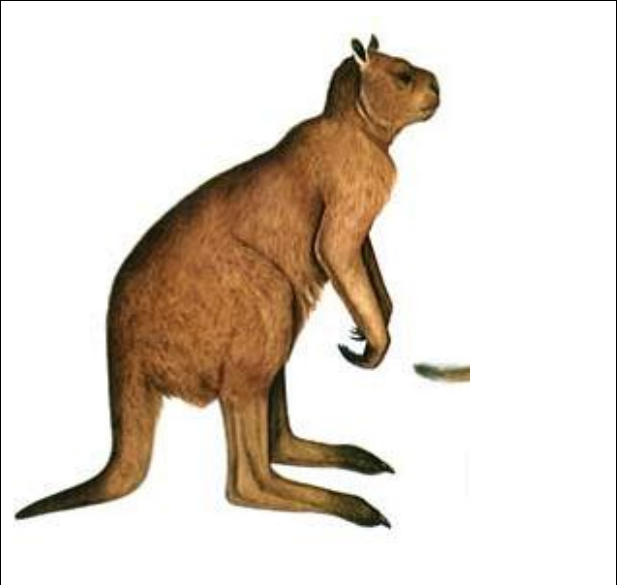
**Phascolonus gigas**

Phascolonus gigas – the giant wombat – weighed up to 200kg, and like modern wombats, was built for burrowing. It would have stood more than 1m high and about 1.8m long, with a skull 40cm in length. Its remains have been found at the Mooki River on the Liverpool Plains.



**Procoptodon goliah**

Procoptodon goliah was the largest kangaroo ever, weighing over 200kg and when standing on its tail, could reach over 3m high. It had a shortened flat face and forward-looking eyes, and enough power in its jaws to grind up very tough leaves. Remains of Procoptodon goliah are found all over the continent, in a variety of habitats. In the Liverpool Plains has been found at Lime Springs and Reddestone Creek.



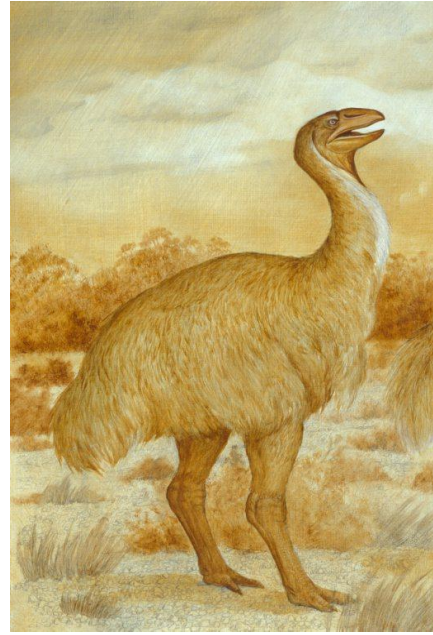
**Sthenurus andersoni**

Another extinct species of kangaroo, the Sthenurus sp. were twice as large as modern extant species, and closely related to Procoptodon sp. Sthenurus were grazers with very robust with powerful hind limbs, longer arms and phalanges than modern species and a short neck. Sthenurus remains have been found at Lime Springs, Mooki Creek and Reddestone Creek in the Liverpool Plains.



### **Genyornis newtoni**

Genyornis newtoni was a large, flightless bird, standing over 2 metres tall and heavily built with tiny wings and massive hind legs. Genyornis had a wide distribution in a variety of habitats, but seems to have preferred open forest and savannah-grasslands. The large numbers of Genyornis remains found in some sites suggests that they were flock animals. Genyornis remains are widespread in Australia, and in the Liverpool Plains, have been recovered from Reddestone Creek.



### **Megafauna extinction**

Globally, there was an extinction of large animals at or near the end of the last glaciation, with the 'Quaternary Megafauna Extinction' (QME) event eliminating two-thirds of all mammal genera and half of all large animals (over 44kg) between 50,000 and 3,000 years ago (Elias and Schreve 2006:3203, Corlett 2010:117). In Australia, 85% of Australia's megafauna became extinct, including 14 of 16 mammal species, 6 reptiles and at least 3 birds (Flannery 1990; Murray 1991; Roberts et al. 2001, Webb 2008:329).

The cause of this global extinction process is the subject of ongoing research and discussion, with some authors viewing environmental change as the primary agent, some viewing human actions as the primary agent, and others viewing that both environmental change and human actions were contributing factors.

The timing of the extinction is also subject to ongoing research and discussion, with some authors viewing it as a mass extinction event – a rapid 'blitzkrieg' occurring very shortly after human arrival – while others view it as a longer term extinction process occurring over as much as 100,000 years.

The diversity of opinions regarding the timing and cause of megafauna distinction reflects the fragmentary, sparse and poorly dated fossil record (Field et al 2008:99), to which new information is being added on a regular basis (Elias and Schreve 2006:3206).

The accurate dating of known fossil sites and known cultural sites is key to improved understanding of this issue. Although the Liverpool Plains contains significant and well known megafauna fossil sites, dates for these are limited, and the majority place megafauna within 42,000 and 53,000 BP. One site excavated in the 1980s provided a date of 19,300 ± 500 BP for megafauna at Lime Springs, but this date has not been subject to more recent investigation to confirm the date, which is 20,000 years younger than all other reliably dated sites.

It is in this context that the possible interaction between megafauna and Aboriginal peoples in the Liverpool Plains is considered.

### **Possible interactions between megafauna and Aboriginal peoples on the Liverpool Plains**



The presence of megafauna on the Liverpool Plains approximately 40,000 years ago suggests that megafauna could have overlapped with the earliest generations of Aboriginal people, as Aboriginal people are known to have occupied the NSW landscape for more than 42,000 years (Bowler et al 2003, OEH 2011).

Archaeological sites of this age are not yet known in the Liverpool Plains, although three archaeological sites do show Aboriginal history extending back 20,000 years, being the Crazyman Rockshelter near Coonabarabran (with cultural deposits dated to 20,310 BP; Gaynor 1997) and two spring fed swamps – Lime Springs and Trinkey – near Gunnedah (with cultural deposits dated to 22,000 BP; Gorecki et al. 1984; Wright 1985, 1986). As the region is subject to further archaeological investigation, more Pleistocene sites may be found, which may push back the known dates of Aboriginal history at a local level.

If megafauna persisted on the Liverpool Plains through to approximately 20,000 years ago – as suggested by 1980s excavations at Lime Springs and Trinkey – there could have been many thousands of years of interaction between megafauna and Aboriginal peoples in the area; although the reliability of this date has not yet been subject to more thorough research.

No archaeological site in the Liverpool Plains shows direct interaction between megafauna and Aboriginal people, although there is one tentative interpretation of a small, square hole on a Tambar Springs Diprotodon skeleton as being made by a spear while the bone was still fresh (Musser 2013).

Evidence of direct interaction between megafauna and Aboriginal people is incredibly rare, only being known at Cuddie Springs in NSW – where megafauna bones found in a clay pan (the bed of an ancient lake) included amongst them a stone tool lodged between a Diprotodon mandible and a Genyornis femur, and butchering cut marks have been found on megafauna bones (Dodson et al. 1993; Elias and Schreve 2006:3207; Field et al 2011:2).

Although direct evidence may still be found in the region for megafauna and human interaction, researchers have also identified that there are many factors that may result in such evidence never being found, such as (from Elias and Schreve 2006:3215):

1. Both the faunal and archaeological record is fragmentary in nature, meaning that a complete picture will never be found;
2. Dating techniques are never exact, and the estimates provided can include plus or minus centuries of time; always leaving some uncertainty of the timing of past events; and
3. The lifeways of early Aboriginal peoples in Australia left a very light archaeological footprint, which over time is further affected by decomposition of materials, erosion and the reworking of sediments; meaning that only a tiny fraction of the original material culture remains. This is particularly relevant to understanding megafauna and human interactions, as megafauna bone – in most circumstances – will decompose over time and not be preserved to modern day.

### **The megafauna in Aboriginal legends & the Namoi bunyip**

Prior to European invasion and the transformation of Aboriginal lifeways, Aboriginal peoples throughout Australia had strong oral traditions where knowledge was passed down from generation to generation in the form of story, song, dance, art, and material culture (Hamacher and Goldsmith 2013:2).


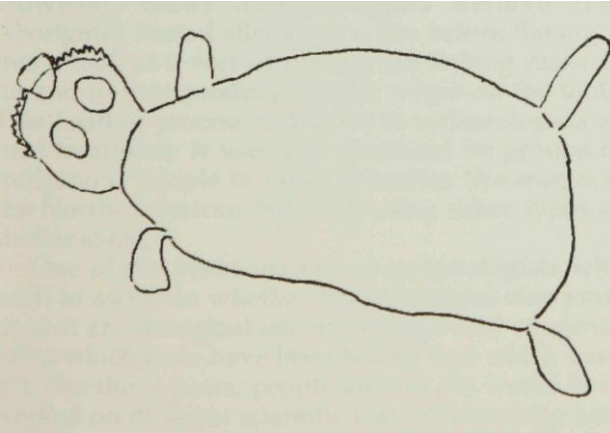
Researchers have suggested that a number of archaeological rock art sites include representations of megafauna, such as a Arnhem Land cave painting that depicts a large emu-like bird that has been interpreted as an image of *Genyornis newtoni* (Gunn et al 2011); see below figure.

**Figure: Arnhem Land cave painting and *Genyornis newtoni* compared**



It has also been suggested by some researchers that Aboriginal ‘bunyip’ stories may be related to megafauna bones observed by Aboriginal people around billabongs and waterways (see Anderson 1924 in Shuker 1995, Douglas 2004); and that the bones *Palorchestes azael* may be specifically linked to Aboriginal bunyip legends (Flannery 1983, Museum Victoria 2009:16).

Although this association is tentative only, it is noted that the bones of the *Palorchestes azael* have been found in the Liverpool Plains (along the Mooki River) and that Kamilaroi bunyip stories have been documented in the region, including a 1832 account of the ‘Namoï bunyip’ as told by a Kamilaroi man referred to as ‘Liverpool, King of the Eurambone’ to Thomas Mitchell while camped on the Namoï River. This account tells of an feared animal that would devour them if it catches them in the water, a sketch of which was made by ‘Liverpool’, compared below with *Palorchestes azael*

<b>Palorchestes azael</b>	<b>Genyornis newtoni</b>
	

What is not in dispute:

- is that megafauna coexisted with humans on the Australian continent - its just whether they died out approximately 60 – 40 ka. (shortly after humans arrived) or survived a lot longer possibly right up to 10 ka. years ago.
- is that unqualified evidence of this coexistence exists within the Liverpool Plains.

We simply do not believe that the archaeological investigation meets adequacy and that Mega Fauna possibilities scientifically addressed. The Liverpool Plains due to its historic international importance should not be disturbed by the irreversible impact of three gigantic open cut pits and the damage it will do to the cultural scientific, environmental especially soils and water. We also believe there is a trend to overstate the values of the economic benefit to the community.

The impacts to our ancient and highly important intact grinding groove sites GG1 and GG2 as a result of an approved mining operations is a loss to our culture and heritage which should not be allowed.

Of concern is that only 1.1% of the area was effectively surveyed as part of the archaeological assessment and of more concern was that the archaeologists drove over parts of the survey area by car rather than assessment by walking over the area. This approach is completely not in accordance with professional assessment standards. We note that the registered Aboriginal parties made repeated statements of concern over inadequacy and this is disregarded stating that once the mine has approval we can assess the area ....when its all too late to protect anything!

Gomerioi Traditional custodians comprising some members of the Redchief Local Aboriginal Land Council, Min Min Aboriginal Corporation and traditional owners comprising 181 people This additional information is also provided by the Aboriginal community who live in Breeza and this addendum is tabled by Mitchum Neave nominated spokesperson

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