Desktop Report on Culturally Modified Trees along Planned Road Works of Southern Deviation Route of Option 1

for the Western Highway between Ararat and Beaufort, Victoria

Prepared for Gillian Trebilcock, Daylesford, Victoria

31 August, 2017

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30 August, 2017

Executive Summary

This desktop study examines existing research on Culturally Modified Trees (CMTs), including showing that modified hollow trees were part of the pre-European landscape's ethno-architecture, and enabled a number of activities to be carried out within their interior spaces. CMTs have remained largely invisible to Traditional Owners (TOs) within this landscape since the TOs, the Djap Wurrung, were displaced as land managers. Archaeologists also are often simply unaware of these trees as CMTs, and their protection is therefore not guaranteed. It is regrettable that these large and impressive but temporary features are not recognisable for their unique cultural origin. With a dearth of oral history on this topic, only an archaeological methodology for the identification of culturally modified habitation trees is now possible. An archaeological methodology with criteria to identify CMTs has been developed and now applied to determine if six trees located within Option 1 Route and previously not identified as CMTs, qualify to be recognised as such.

Data comparison across a large number of older trees has provided the criteria to differentiate between natural and culturally modified tree hollows. By applying the criteria, the orientation, entrance shape and size, internal shape, size and characteristics of the lining of the culturally-made hollows can now be predicted and identified and with markedly statistical differences to naturally burnt hollow trees. A mistaken identity of old and large gum trees having been burnt out and hollowed during former natural bush fire events has become acceptable and unquestioned by everyone: landowner, TO, fire-expert and archaeologist alike, as the reason for their existence in the southern Australian landscape.

The current desktop study investigated six trees being possible CMTs along the land marked out for the widening of the Western Highway near Ararat in Victoria. By applying the criteria for CMTs it is beyond doubt that the two large hollowed trees fall into the category of Habitation Trees. These trees are striking examples and require protection. It is recommended that these two trees are archaeologically excavated, which failed to occur during test pits for the Complex CHMP 12327 as their cultural construction and connections were not recognised in CHMP 11812. The remaining other four trees are considered to have scars that are also a consequence of Aboriginal modification for cultural purposes.

Introduction

This desktop study examines existing research on Culturally Modified Trees (CMTs), including showing that modified hollow trees were part of the pre-European landscape's ethno-architecture, and enabled a number of activities to be carried out within their interiors. CMTs have remained largely invisible to Traditional Owners (TOs) within this landscape since the TOs, the Djap Wurrung, were displaced as land managers. An archaeological methodology with criteria to identify CMTs has been developed and used to recognise CMTs following this displacement.

Western Highway duplication is considered a high impact activity and was proposed in an area of cultural sensitivity. Accordingly, under Regulations 44(1)(e), CHMPs 11812 was commissioned by the Roads Corporation (VicRoads) in 2011 as a mandatory CHMP under the *Aboriginal Heritage Regulations* 2007.

The activity area is located along the existing Western Highway between Pope's Road and Ararat, some 70 km west of Ballarat (Fig1.). The activity area is located within the Ararat Rural City Council and incorporates the Parishes of Ararat, Langi-Ghiran, Gorrinn, Buangor and Colvinsby. The planned road works including off-ramps on Section 2B will cover a length of 12.5 kms.

Under Aboriginal Heritage Act, 2006 (AHA06) (the Act), cultural heritage significance includes "archaeological, anthropological, contemporary, historical, scientific, social or spiritual significance, and significance in accordance with Aboriginal tradition".

Scope of Desktop Study

Scope of Work for Desktop study of Hollow trees, Scarred trees and Hill in and near the VicRoads acquisition Zone for the widening of the Western Highway between Buangor and Ararat.

Client: KORS Inc. 22A Alexander St Wendouree, Vic 3377
Brief: Provide short scientific report on cultural and archaeological significance of the two hollow trees, the four Scarred trees, the hill south of Hillside Road and any significance they might have to the Traditional Owners (TOs) of the area, and any Regional or State significance to Victoria. Examine whether the trees and hill qualify for protection under the Aboriginal Heritage Act 2006 with Amendment 2016. Conduct field works as required and when feasible.

Reference Documents: Cultural Heritage Management Plan: CHMP 11812 and CHMP 12327

The Aboriginal Heritage Act, 2006 (AHA06) with Amendments 2016, with the Aboriginal Heritage Regulations 2007 (AHR07), provides more effective protection of Aboriginal cultural heritage than the previous Act, and broadens Aboriginal community involvement in decision making.

A CHMP is required under Section 47 of the Victorian *Aboriginal Heritage Act* (2006) if any high impact activity is planned in an identified area of cultural heritage sensitivity that has not been subject to significant ground disturbance, as defined in the Victorian *Aboriginal Heritage Regulations* (2007). Furthermore, under Section 49 of the Victorian *Aboriginal Heritage Act*

(2006), a CHMP must be prepared for any project for which an Environment Effects Statement (EES) is required (as is the case with these proposed works).

The proposed activity is high impact as it involves the construction of a road greater than 100 m long [S44(1)(e)], and the activity area passes through a number of areas of cultural heritage sensitivity (specifically named waterways, such as Fiery Creek, Middle Creek, Billy Billy Creek and Hopkins River [Regulations 23 (1)].

CHMP 11812 is a Desktop and Standard Assessment from 2012, followed by CHMP 12327 which is a Complex Assessment.

Under the AHA06 and the AHR07 the Regional Aboriginal Party (RAP) appointed by the Aboriginal Heritage Council was Martang Pty Ltd. Their representatives will have participated in the process of producing the CHMP 11812, March 2012 from ACHM, including assisting the Cultural Heritage Advisor in surveying for any cultural heritage, participate in decision-making for its management, if applicable, and to assess the CHMPs on behalf of the State Government.

Route Option 1 and Cultural Heritage Issues

The widening of a section of the Western Highway in Western Victoria, between Buangor and north-west to Ararat, is planned as a part of VicRoads' Western Highway Project (see Figure 1 below). The route chosen, includes a deviation to the south of the existing highway. It poses a threat to a number of previously unrecognised and yet significant archaeological features, being Culturally Modified Trees (CMTs). At least two of these six CMTs can be inferred to have functioned as an integral part of the *Djap wuurung* domestic ethno-architecture of this area (See Figures 2 and 3 below).

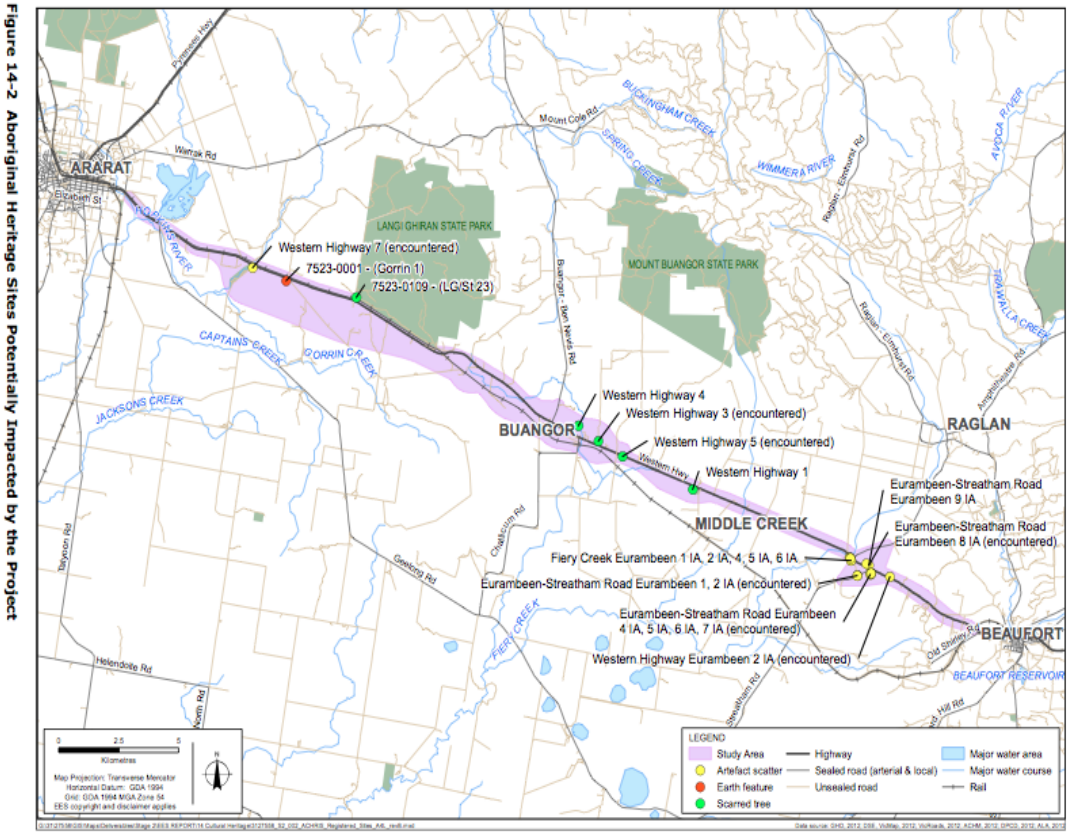

Fig. 1: Cultural Heritage identified in CHMP 11812 between Ararat and Beaufort

Travellers on this section of Western Highway highway readily observe the many trees of various species within the road reserve and some travellers recognised the distinctive large and old Red Gum trees (*Eucalyptus camaldulensis)* and within this category there is a further highly distinctive and altogether special class of Red Gum: these being the culturally modified individual Red Gums. They are distinctive by having been modified by hollowing out by the Traditional Owners of this region in the past so that they could be turned into a domestic space to serve a number of functions for these people.

The modifications and purpose of these trees have not been recognised, to date. Have their modifications and ethnohistorical importance been overlooked as being just naturally weathered, fire-prone, very old hollow gum trees?
This short report will provide some criteria by which these hollow trees and others may be properly assessed for their likelihood of having been culturally modified to be used as multi-functional spaces by the former Traditional Owners of this area. These criteria are based on observed and tested, statistically significant differences between culturally modified and naturally occurring hollow trees. The species which have been studied and referred to for this project are E. *viminalis* or Manna Gum and E. *camaldulensis* from South Australia and Victoria (Builth 2014; Carver 2001 and others).

Six CMTs Threatened by the Development

The red arrows in Figure 2 below point to the approximate locations of the four scarred trees that are discussed in this report. The two red circles show the locations of the largest hollowed CMTs being E6 in the west and E3 to the East. Figures 3 and 4 respectively show further details of these areas and the positions and photos of all of the remaining six trees discussed in this report.

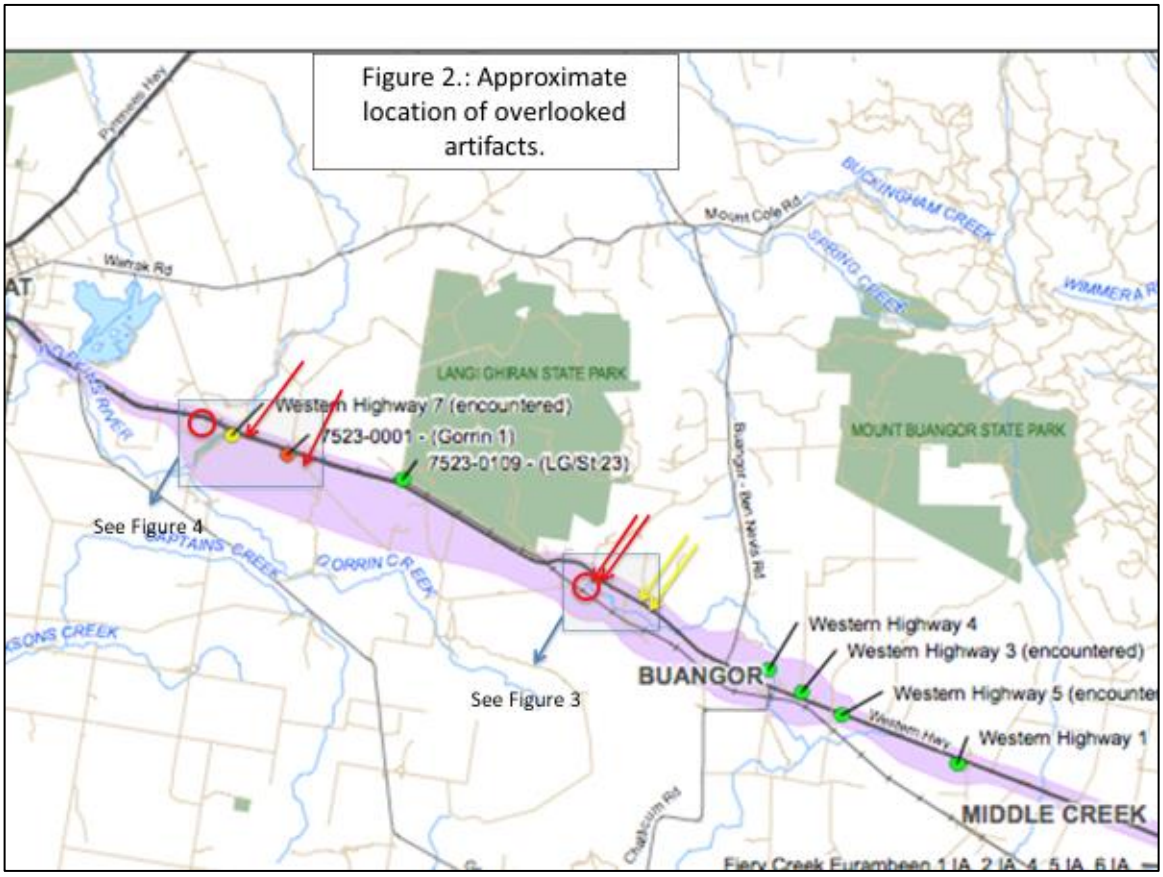

Fig. 2: Locations of threatened CMTs between Ararat and Buangor

Figure 3 below shows the location of the three most easterly of the six CMTs that have been identified as occurring along the Southern Option 1 Route. These have been renamed as E1, E2 and E3 to reflect their east-west geographic sequence starting from Buangor on their east.

Figure 4 below shows the location of the three most westerly of the six CMTs identified being E4, E5 and E6.

A culturally modified tree is defined as a tree bearing some form of modification directly related to Aboriginal activity. There are a variety of CMT purposes, other than canoe, shield or container scars, that can still be seen today. Bark and indeed the whole tree was used in a number of different ways by Aboriginal people and non-Indigenous alike. How to identify these scars is at times quite difficult as bark on trees can grow over scars over the years, decades and centuries

and result in a loss of integrity of the evidence, becoming invisible or causing confusion with natural scars (Gammage 2011: 29).

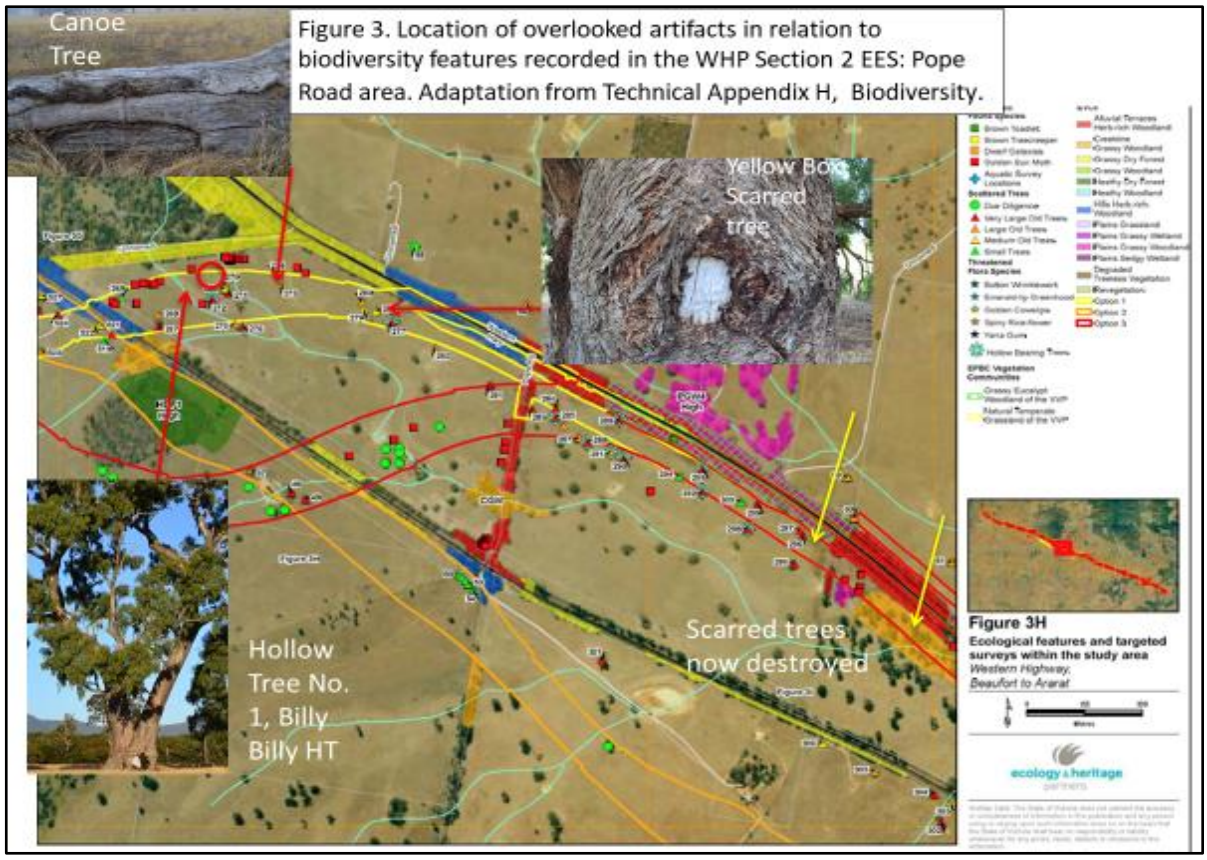

Fig. 3: Location of Trees E1, E2 and E3 (from east to west) along Southern Option 1 Route in Yellow

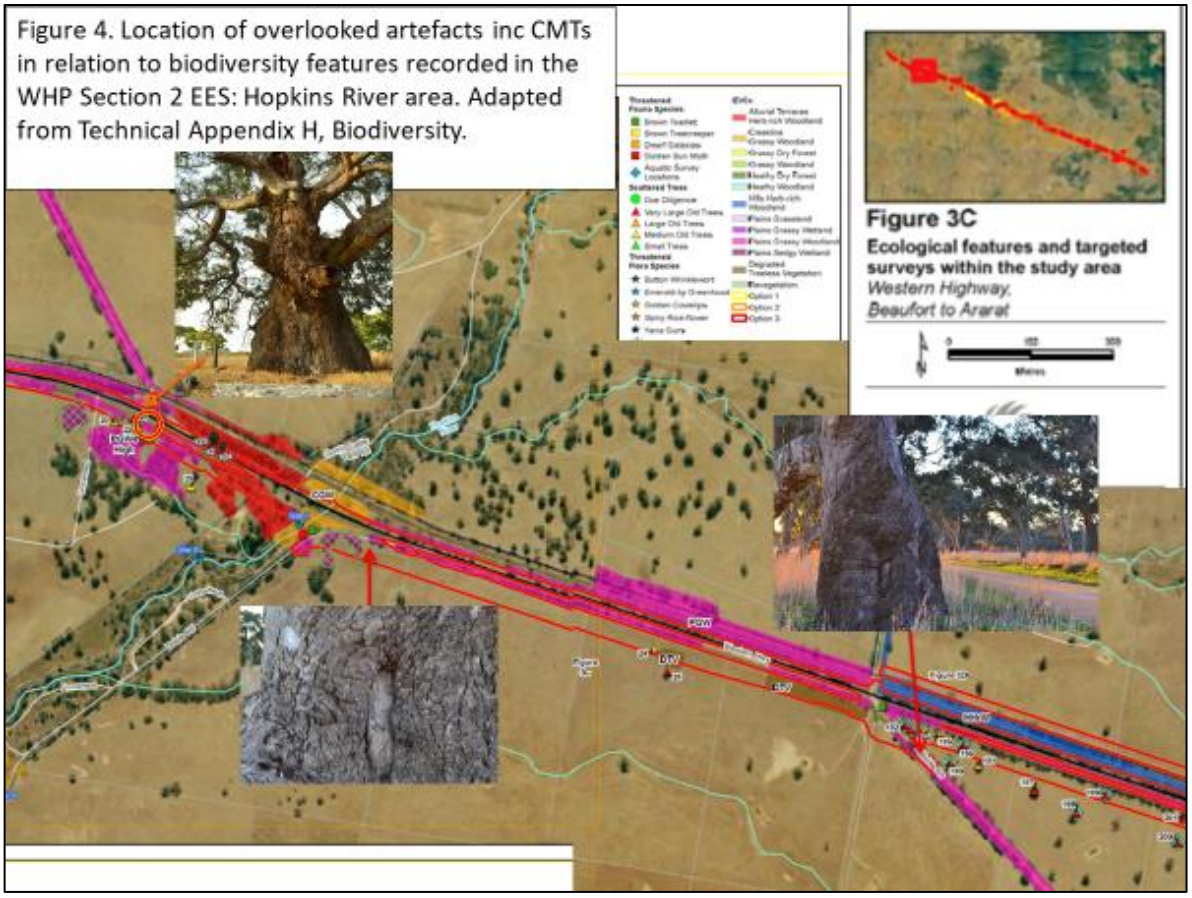

Fig. 4: Location of Trees E4, E5 and E6 (from east to west) along Southern Option 1 Route in Yellow

Local Government laws in South Australia as indeed in other States, have been changed to stop many ancient trees being destroyed but there is no specific emphasis on the protection of Aboriginal CMTs (Carver 2001). Across this continent numerous culturally significant trees are being destroyed due to ignorance resulting from a lack of research and documentation regarding their identification and heritage value. In relation to SA, Carver has noted:

> While numerous contract-based archaeological Surveys have been conducted, no standardised, definitive methodology or criteria has been developed for use in the field to enable the identification of CMTs in South Australia. This tends to make defining a CMT highly subjective. The subjectivity creates biases and instigates indecision in the field, therefore, some genuine CMTs are not counted while natural scars are confused with CMTs.
> Identification of CMTs requires a systematic approach using rigorous criteria. Uniformity of recording methods by all practitioners across Australia would alleviate the problems associated with identification of CMTs today (Carver 2001:9).

The extent of these types of cultural modification, and indeed ethno-architecture in the landscape, is no longer remembered nor understood. This is a direct consequence of the European occupation and settlement in the southern parts of Australia preventing the continuation of Aboriginal land management and resulting in a consequent inability to pursue a traditional economy and lifestyle.

Table 1 below shows the Tree IDs with their alternative name and location details. There are comments added from VAA and Martang on these trees during an inspection on 17 February 2017.

TREE ID	Alt name	Location	GDA 94 Coords	AAV & Martang views	
E1	Yellow Box Scarred Tree	Nth of Billy Billy Ck, 400m NW of Pope Rd	688430E 5864681N	Has been suggested as European scar as too small to have been useful to TOs	
E2	Canoe Tree (dead, prostrate)	350m NW of Tree E1 in same paddock	688126E 5864844N	Stated by AAV has no cultural scar and branch tear only plus insect damage	
E3	Hollow Tree BT1	150m W of Tree E2 on Billy Billy Ck	687991E 5864773N	No cultural values confirmed	
E4	Scarred Tree No 1	Hillside Rd West southern side	680435E 5868058N		
E5	Scarred Tree No 2	South at Start of Dobie Rd exit from Highway	678917E 5868624N		
E6	Hopkins River Hollow Tree BT2	Opposite Warrayatkin Rd	678320E 5868983N	No cultural values confirmed	

Table 1: Details of CMTs threatened by Option 1 Route

Note: Trees are numbered in order of their distance from Buangor travelling west along Western Highway

The following sections present both an ethnographic record of the existence of these trees as having a cultural purpose and providing details of the means by which they have been modified for this purpose; and also providing the results of recent archaeological and scientific studies into the existence of these trees as culturally modified.

The purpose of this is to be able to objectively assess the six trees named above in Table 1 as being CMTs or not, and then an informed decision can be made as to whether they are worthy of protection measures under the AHA 2006.

Historical, Ethnographic and Modern Observations of Hollow CMTs

Carver (2001:100-101) describes such a tree as shown in Figs. 4 & 5 below as a 'Habitation tree'. Such an artefact is an example of Aboriginal ethno-architecture. These hollow trees were either left in their natural state or most likely enlarged to accommodate more people (Roberts 2000). Fires enlarge the hollow. Cultural activities within the hollow did not kill the tree provided the surrounding sapwood and bark still exist to enable nutrients and moisture to move up and down the tree trunk.

Culturally modified hollow trees or habitation trees would have had a number of functions including as intermittent shelter for families passing through an area during inclement weather (Ellis & Ellis 1982:84, 95); used for prolonged periods of habitation; specific functions such as for birthing (which has been stated for one or more of the trees in this study area); and cooking in or being a sheltered location for constructing an in-ground oven for roasting tubers, yams or baking animals.

Fig 4: Ancient CMT or Habitation Tree which became the 'Herbig Family Tree', Eden Valley Rd, Springton, SA

Ethnohistorical accounts (Builth 2014:277)

Despite our present-day lack of knowledge of these trees and their functions, historic observations and accounts exist of the use of large Eucalypts "whose trunks were shaped by

Aboriginal burning into ovens and fire depots" (Pyne 1991:89). The following quotes are observations of the process of Aboriginal modification of large hollow Eucalypt trees in order that they became useable spaces for performing necessary domestic functions such as cooking or for shelter.

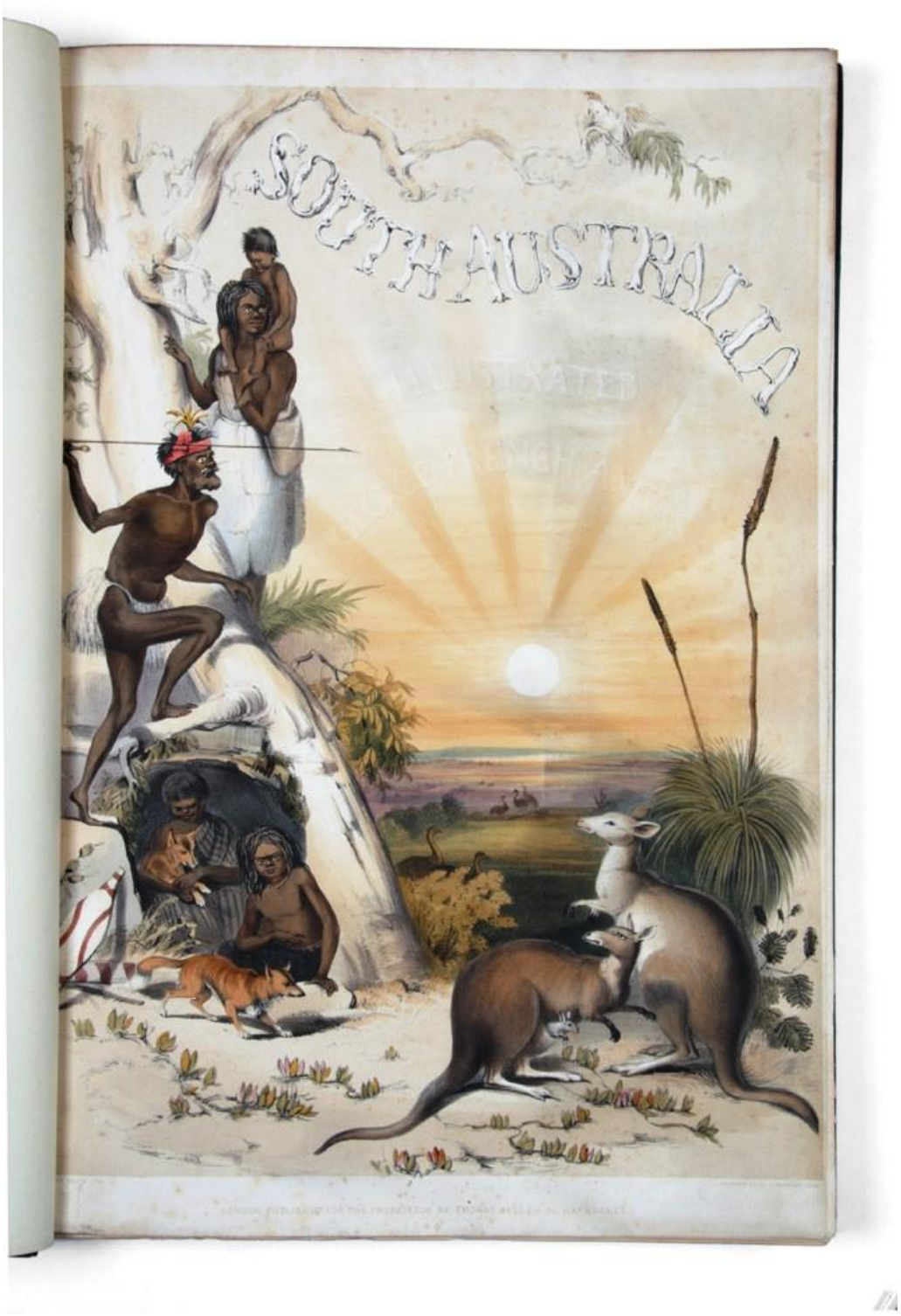

Fig. 5: 'Habitation tree' being a culturally modified Red Gum and an example of a tree modified as Aboriginal ethno-architecture (from G.F.Angus 1847)

- The process began by using large trunks as reflectors for campfires. The fire naturally ate into the green bole, and the more the site was revisited, the larger the fire-excavated cavity. In places, such hearths showed sign of digging, sometimes of lining by clay (Pyne 1991:90);

- If they cannot find a tree which decay has fitted for their purpose, they, by the use of fire, procure a cavity sufficiently large for the occasion (Holman cited in Roth, 1968:119);

- Cook and Anderson were both under the impression that the natives hollowed out, by means of fire, the lower part of tree trunks in order to make use of such openings for habitations (Cook's 3rd voyage, Book 1, in Roth 1968:107);

- Some huge trees such as the Red River Gum of New South Wales were carefully and deliberately burnt out on one side. While not killing the tree, a large area could then be "hollowed" out. A tree prepared in this manner provided a temporary, but secure shelter for a single person or in some cases, a whole family during a severe rain or wind storm (Ellis and Ellis 1984:84);

- Teichelmann and Schurmann (1841:27) in South Australia had observed that hollowed trees were utilised for homely activities for all seasons but summer. The reasons for not using hollowed trees as hearths during summer must primarily be based on the high possibility of setting fire to the tree. Tindale (n.d.b) notes that during summer there is a danger of tree explosion as a result of fire;

- The use of hollow trees for "firehearths" is also referred to by Tindale: "Abundance of firewood was essential as also the shelter of hollow red gum trees which could act as protection against rain for their highly vulnerable firehearths" (n.d.b.:155);

- Tindale has stated that a hearth or oven indicated permanence as a hearth tended to determine that the cooking area of each camp remained static or confined to a limited area, to which both firewood and food were transported. The requirement of oven baking for the staple food of tubers, rhizomes and corms means that it would have been necessary to find a suitable sheltered site or facility in winter. Utilising large hollow trees for baking would have sufficed for this purpose, and indeed, in the seasonal conditions of strong winds and inclement weather, would have provided a natural shelter for the oven; and

- Roberts (2000:21) has suggested that it may have been the women who hollowed the trees as part of their duties of preparing the family fire and ovens.

These large and well-used trees were observed in Tasmania, Victoria, the Australian Alps, in South Australia and in southern Western Australia, and an example from Tasmania can be observed in Fig. 6 below (See also Pyne 1991:90; Mortimer, and Rossel in Roth 1968:107).

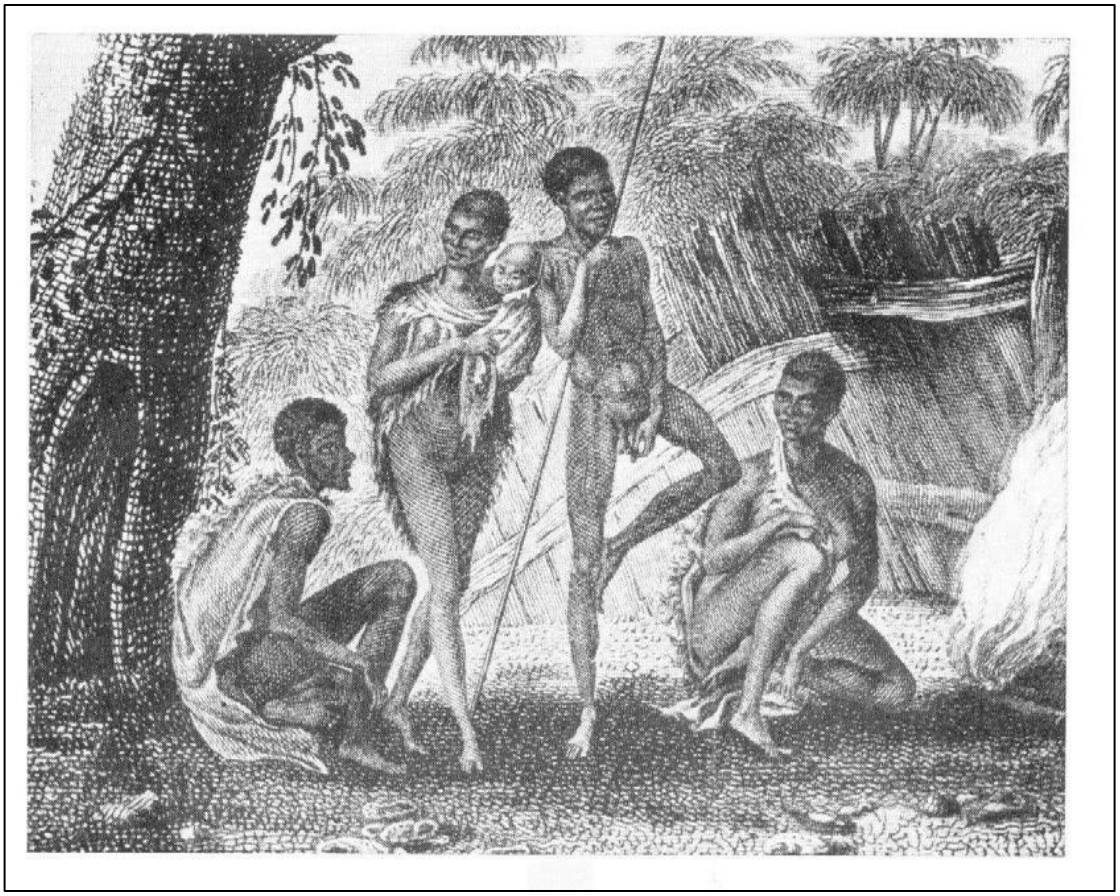

Fig 6: Culturally modified entrance to hollow tree in South-West Cape, Tasmania (Mountford 1963). (Note the distinctive raised collar scarring around the entrance to CMT which is the consequence of this particular activity.)

Carver suggests that nowadays identification of habitation trees is difficult. He writes that Hossfeld (1926:295) stated there were many possible habitation trees in the Eden Valley, SA, are facing east or north for maximum protection during inclement weather (see Figs. 4 & 5 above). Adequate head and sleeping room is another requisite for comfortable habitation (Roberts 2000). If stone tools, dendroglyphs or perhaps manuports are present it could be reasoned the tree was used for habitation. However, the presence of manuports is not definitive identification criteria because farmers often used these trees to deposit rocks and other general farm rubbish collected from paddocks. For this reason Builth suggests that only an in-tree excavation could identify integrity by revealing any stratigraphy associated with long-term use by previous Aboriginal occupation patterns in such a scenario.

Carver noted numerous CMTs located in his study area had axe marks present inside the tree and suggested they could also be from a natural hole having been enlarged.

Recent Research

Manna Gum Research on Mt Eccles lava flow

The following information is extracted from the results of research on 51 mature trees sampled from a survey area on the Mt Eccles lava flow (Builth 2014:254-273). Although not *Eucalyptus camaldulensis*, these trees, *Eucalyptus viminalis*, were the ubiquitous gum tree on this landform and certainly had attributes that led to their exploitation by people. It was important to the study that no bush fires had occurred in the area since European settlement.

After examination of trees observed to be in spatial association with archaeological features it was considered possible that a large number of hollow trees had been culturally modified. It was observed that this pattern continued outside of the study area on the remainder of the lava flow also. Attributes of these trees were collected in an attempt to quantify tree modification, and to ascertain the function of the trees. Of the trees with a diameter greater than 2m, 34 out of 39 (87%) were hollow; of those less than 2m in diameter only 4/10 (40%) were hollow. The hollowing of all trees for which data could be collected was due to termites.

Hollow trees with basal openings can be divided into two groups. One group is those with clearly natural openings defined by their often small size, jagged edges and interior filled with termite frass and splintered wood. The second group is trees hypothesised to have been modified and used by people and which were defined by their usually larger size, the smooth wood edge of opening and on several occasions, the obvious tool markings. It was observed that entrances had been made into hollow trees by cutting through the outer layer of bark, and/or burning through the remaining outer layers (see Figs. 7&8). Very often external burn scars were still visible from unsuccessful attempts at burning through to inner hollow as termite activity is localised within tree and often dictates the thickness of tree wood. There is the potential for the temperature regulated behaviour of termites to determine the likelihood of the thinnest walls of the tree having a particular orientation.

With all four variables that were collected in measuring natural versus culturally modified trees, the mean opening size remains smaller for natural rather than modified categories. This difference is significant for both internal width and depth. There do, therefore, appear to be significant differences in the size of natural and modified openings and the size of internal hollows.

VARIABLE Dia in cm	CATEGORY	No.	MEAN	STANDARD DEVIATION	T-DATA	PROBABILITY
Internal Width	Natural Modified	20 19	40.7 62.2	18.8 22.0	3.28	<0.01
Internal Depth	Natural Modified	18 18	36.7 62.5	20.3 26.1	3.31	<0.01
External Width	Natural Modified	18 18	41.4 53.3	15.9 20.4	1.96	<0.06
External Height	Natural Modified	18 17	61.1 98.5	46.3 58.0	2.11	< 0.05

Table 2: Size Comparisons of Natural and Modified Tree Openings

Results show that all measures of size were significantly greater for the modified openings except for external width which approaches significance.

Fig 7: Culturally modifed entrance by cutting outer layers and then burning into hollow tree (photo H.Builth).

Fig 8: A failed entrance by burning and a successful one in the same tree (photo H.Builth).

On many occasions hollow tree entrances were observed to have regrown over time, especially in a healthy tree near water (see Fig. 9). The landowner, remembers when the live trees shown below had much larger entrances and over time these have grown over to almost closing (personal communication, 1999).

Fig 9: A live healthy tree regrowing over previously modified entrance to hollow (photo H.Builth).

The detection of lipids or plant/animal sourced oil can often be detected in ancient materials given the right situations for its preservation. Their structures and compositions can provide direct evidence for their origin and past anthropogenic activity (Evershed 1993:74). In earlier research by Builth, the bio-molecular analysis of soil samples excavated from inside hollowed trees adjacent to eel traps in South-west Victoria, near Mt Eccles identified the distinctive marine lipids of the short-fin eel proving that these trees had been modified in order to smoke eels for their preservation by Gunditjmara. Excavation of other hollow CMTs within the same study area but in association with domestic ethno-architecture such as the remains of dwellings, revealed "heat stones" used during baking in ground ovens within the hollow trees. Two of these hollow culturally modified *E. viminalis* trees in close proximity to eel trapping features were excavated to collect sediment (see Figure 10). Investigation of the interior of the hollow trees in the south-west Victorian study site that were considered to have had a modified entrance, concluded that these trees were a necessary part of the domestic ethno-architecture within the landscape. Excavation of the interiors revealed the hollows had been used as either in-ground ovens to bake the staple root vegetables of yams and tubers which were spatially associated with dwellings remains; and see Figure 11 below showing broken basalt pieces that had been used for retaining heat during the baking process within the excavated tree hollow. Or else the trees in spatial association with eel traps had been used as smoking chambers for eels (See Figure 10). It was concluded from the separate findings that different culturally hollowed trees had a differentiated gender use within the shared cultural landscape: being either used as domestic ovens by women or for the processing of eels by men.

Fig 10: Two CMTs excavated and sediment analysed for lipids (photo H.Builth).

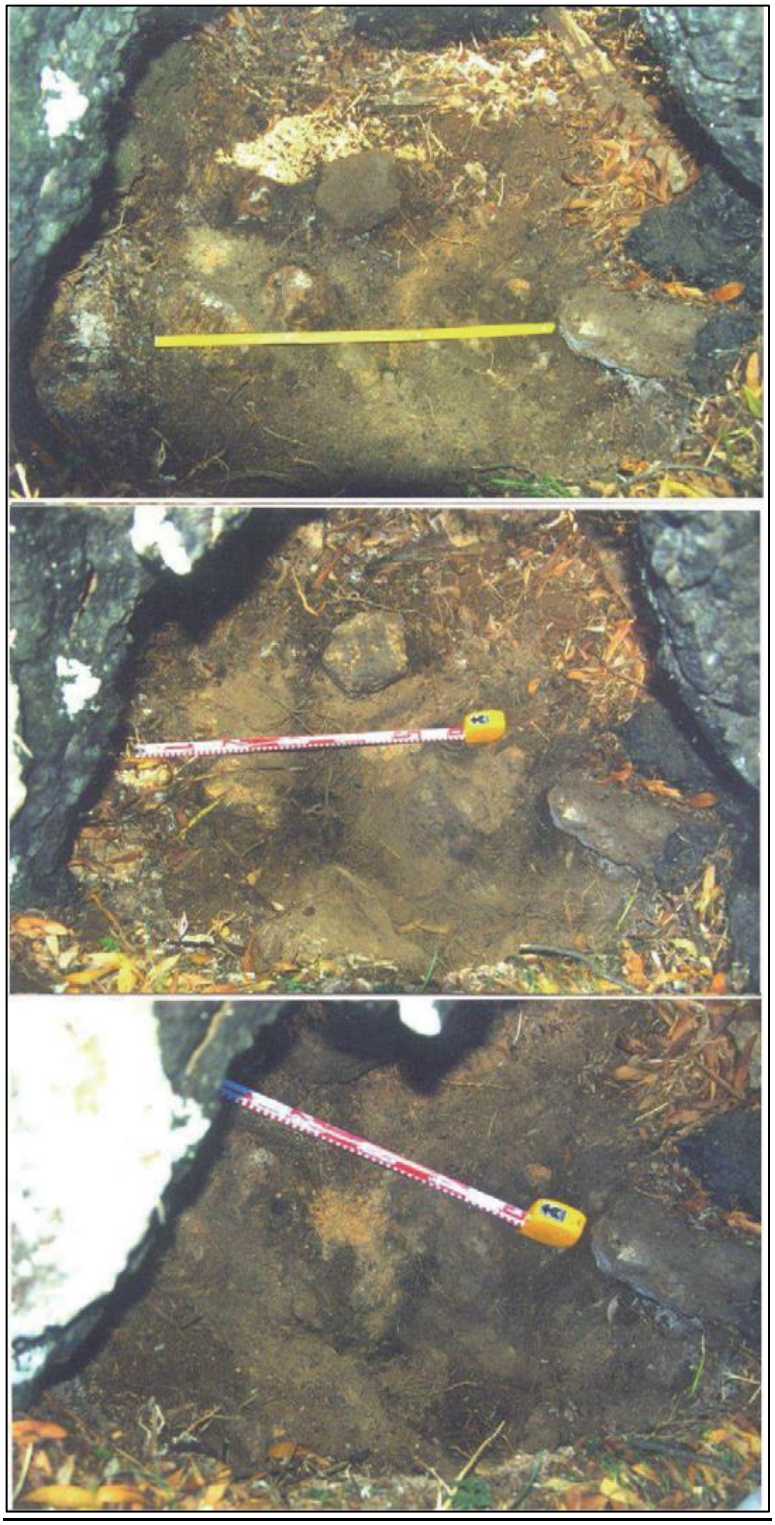

Fig. 11: Excavation of CMT hollow interior revealing evidence of oven and Broken pieces of basalt used as heat stones (photo Pam Smith).

Red Gum Survey on Christies Creek, SA. (from Builth 2014: 274 -276)
On June 2nd, 2000, N. Draper and H. Builth undertook an additional survey of trees in the south of Adelaide adjacent to the Christie's Creek, to compare what appeared to be culturally modified hollow trees to the CMTs on the Mt Eccles lava flow. These trees have not previously been recognised as being CMTs but were subsequently included in a cultural heritage study of Christie's Creek (Australian Cultural Heritage Management 1999).

The eight trees examined were hollow *Eucalyptus camaldulensis* or river red gums trees. They displayed burning of the inner trunk consistent with ethnographic and archaeological evidence that suggests these trees were hearth places for winter-time indigenous occupation. The purpose of this survey was to establish diagnostic criteria to judge whether the burnt out hollow trunks were the result of natural or cultural forces.

From this survey it was concluded there is strong evidence to support these trees having been used as hearths. Contributing factors to this conclusion are:

- A uniformity of burning and charcoal build up within the tree trunk hollow. On some trees there appears to be sequential layering of charcoal that effectively seals the trunk against further burning. This layering has, in certain trees, been helped along by axe use to expose fresh wood for combustion;
- A commonality of the angle and/or the direction of hollows exposed for use as hearth sites. Many burnt out hollows faced northeast to south-west. While this was not consistent for all trees surveyed (some of the examples showed opportunistic use of hollows and/or bark removal to help along the hollow), this was established as a diagnostic feature within the context of the site and the visible extent of the previous creek forest; and
- A selectivity of burning on similar sized and aged trees. Many of the trees surveyed (notably old red gums retained for a driveway to an old homestead) did not show burning out of the trunk or fire damage to the extent of those trees established as having been culturally modified. This differential burning suggests a focus of burning around particular trees for reasons other than size or age.

These criteria lend weight to an inference that river red gums along the Christies Creek were used for living spaces. They often used additional sheets of bark for shelter, and this could also have been a reason for bark removal. Kaurna people call these living huts *wodli* (Fitzpatrick 1989:17). Scarred and fire-scarred trees such as this have been recorded at Warriparinga, a traditional living area for Kaurna on the Sturt River at Marion (personal communication with Paul Dixon, 15/4/2000).

In the former territories of the Kaurna and Peramangk, from the Adelaide plains and hills areas respectively, Roberts (2000) study on hollow *E. camaldulensis* has referred to various descriptions of indigenous housing based around large burnt and hollow gum trees. He supports the view that particular trees were purposefully and "carefully burnt into and subsequently preserved" (Roberts 2000:15), rather than accepting that these hollow trees, including those burnt on one side, necessarily resulted from the effect of bush fires (Pyne 1991:27).

Roberts conclusions that a large number of hollow trees were indigenous artefacts, albeit modified from a natural feature, concur with those from this present study. He noted the thick

charcoal layer that lined the hollow trunk despite there having been no localised bush fires. It was considered a product of camp-fires, or internal rather than external burning (Tindale n.d.; Roberts 2000:81,142).

Carver's 2001 Research

Greg Carver inspected many CMTs during his research on the subject. He noted some common characteristics which are presented here as contributing to their identification.

Symmetry

After examining many hundreds of culturally modified trees it was found that the majority had a considerable amount of symmetry associated with their scarring and in most instances the scars had retained their original shape making them easily identifiable. Many had varying amounts of regrowth, however this usually followed the original outline of the initial incision. Occasionally one area had regrown at a different rate from another, creating an unusual shape but in most instances the original outline was obvious.

Heartwood

With CMTs the heartwood has remained intact and has a distinct flat surface. ln many natural scars this heartwood is undulating and uneven where the material has literally been torn from the tree. Unfortunately this heartwood rarely retains any axe marks.

Associated Artefacts

The presence of manuports, stone tools, dendroglyphs or axe marks could be indicators of habitation trees. The aspect of the openings and adequate headroom to stand erect are also indicators.

Position

At times a scar can be identified by the fact that there is no other possible means of its creation other than human application. If it is in the middle of an area away from a river, reasonably well protected from vehicular traffic, there are no large limbs evident to indicate the scar is from a dislodged branch, it has a recognisable shape, there is little else it can be.

Scar size

It is usually easier to identify a larger canoe than it is a smaller dish or shield. Regrowth on smaller scars appears to distort their appearance to a greater degree than scars related to removal of wood for larger canoes. Once again there are exceptions. At times scars inflicted on some trees have all but healed and it is nearly impossible to positively identify them. It is possible that the tree was very young and healthy at the time of the scar being cut thus instigating a quick healing.

Identification criteria (Carver 2001:120-22)

Symmetry: Reasonable degree of symmetry ie parallel sides, consistent upper or lower curve.
Shape: Recognisable shape (except where regrowth has obscured this)
Heartwood: If the exposed heartwood is smooth it is a CMT, if it is rough it often indicates it is a natural scar.
Beginning and end: Does the scar have a definite beginning and end? If the bottom is partially buried the top would need a recognisable shape.
Regrowth: Does the tree have regrowth?

Location of scar on the tree: Scars may be located in the fork of a tree or on a horizontal branch not just the trunk.
Location of a CMT on the landscape: CMTs are also, and often, found many kilometres away from watercourses.
Habitation trees: They exist and require specific elements to be recorded:
i. To be of a size that provides adequate headroom and sleeping room
ii Evidence of occupation ie stone tools, dendroglyphs, manuports, other scars
iii. Located in an area where it would not be susceptible to flooding
iv. The opening/s facing away from inclement weather ie facing east or north-east
v. The presence of axe marks
Other branches: Note whether other branches or fallen trees are in the vicinity that could have been responsible for the scar.
Location: could the tree have been scarred by a car, tractor, boat, etc?

Bark sheets used in drying of possum skins, for shelter construction or even burials have no define shape or size but when their context is taken into account a calculated judgement can be made and a CMT identified.

Figure 52. SIN 319a: Tree showing an access hole cut into side. Photo G. Carver.

Fig. 12: CMT showing an access hole cut into its hollow trunk (photo G.Carver 2001)

Results of Trees E1 – E6 Assessments

Please refer to Table 1 and either Fig. 3 or Fig 4 for location of all six trees.

Tree E1

Fig. 13: E1 Tree or yellow Box Scarred Tree

E1 is located closest to Buangor and situated north of Billy Billy Ck, 400m north-west of Pope Rd.

Although stated by VAA to be small and therefore not of Aboriginal origin, it is a smooth and very old scar with obvious vigorous regrowth having taken place and encroaching over this scar. It may be worth investigating under this bark to ascertain the extent of the scar beneath. Also an axe mark can be seen in the lower righthand side. It can also be seen that the bark to the left of this scar and above it is bark of a different consistency and it is suggested that is due to vigorous regrowth. It would be worth investigating also the growth rate of this species of gum tree. It is possible that scars are scarce in this species as they may not be observed as they have largely grown over since their initial cutting?
As Carver has claimed “At times scars inflicted on some trees have all but healed and it is nearly impossible to positively identify them. It is possible that the tree was very young and healthy at the time of the scar being cut thus instigating a quick healing.”

This scar is considered to be of sufficient likelihood to be the result of Aboriginal workmanship that it should be protected.

Tree E2

Fig. 14a & b: E2 Dead Canoe Tree

Tree E2 is located close to and to the north of Billy Billy Creek. It is long-dead and lies 350m north-west of Tree E1 in the same paddock. E2 is a tree with some unusual scarring. It should be possible to find out from the land-owner how long this tree has been dead and how long it has been laying in this position. During the 17 February 2017 visit it was stated by VAA that it has no cultural scar but a branch tear plus insect damage.

The tree has a well-defined canoe type scar which has had some regrowth immediately around where it was initially cut. Often the bark/wood cut from a tree for a canoe needs to be steamed and shaped by fire into that canoe. It can result subsequently in another layer of wood of the same shape either becoming separated from the heartwood or even causing a direct access to a hollow within the tree, usually depending on its age. It is not obvious whether one or two layers have already come off from this scar. It is certainly much smoother in the upper section of the scar than lower down the trunk (on the right and upper photo).

With this particular canoe scar the radiating parallel 'wrinkles' or 'crease lines' caused by cutting into a green and growing tree clearly can be seen. However, it is not clear why there is such a gap between the canoe scar and the edge of another outer layer of the tree that also bears the parallel wrinkles of having been cut, but which has also regrown toward the canoe scar. It is suggested that the first scar came from the removal of a much wider but shallower section of the tree, for hut building for example. And subsequently the tall straight tree was also exploited for the canoe shape.

It has been noted that a small branch has grown out of the top of the canoe scar. This does not discount there being a scar immediately lower down the trunk and adjoining it. Gum trees sprout new growth from their trunks quite often especially after big rain. This scar is much too well formed to possible be related to branch loss.

In addition, it appears as if there has also been a European layer to this palimpsest of scarring. It looks as if this tree was ring-barked which must have occurred while it was still alive and highly likely led to its death. I have marked the top photo outlining in red ellipses where the parallel wrinkles of an Aboriginal cultural scar can be seen and in blue where the marks from the ring-barking occur.

I believe the three types of scarring seen on this tree to have been the product of cultural modification, with the ring-barking the final mark of the European land-owners over the top of traditional Aboriginal resource procurement.

Tree E3

Tree E3 is located 150m west of Tree E2 on Billy Billy Ck 150m west of Tree E2. No cultural values have been confirmed for this tree by VAA and Martang representatives.

E3 is the perfect CMT as it fits the criteria presented in this report for a hollow red gum chosen by a family group to become a cultural activity place for them and which its interior space was then enhanced in size after having an entrance constructed. It was fire-proofed by flame as supported

by the uniformity of previous burning and charcoal build up within the tree trunk hollow. And resulted in a large, wide, smooth-surfaced basal hollow.

The wide collar around the entrance can clearly be seen to feature the parallel ‘crease’ lines emanating like rays from the entrance and which result from cutting into green wood when it is still growing. The entrance is smooth and well-used and the perfect size to enable entry but still provide protection from bad weather. It faces an easterly direction as often is the case.

There is aged, unburnt wood in the opening, with no obvious reason for it not to have burned at the same time as the interior of the hollow if a fire had entered from the outside to the inside. There is also no burning around the entrance or exterior of the tree.

Fig. 15: E3 or BT1 Entrance and hollow

The resulting space would have served many many generations to come in many different ways. It is a multi-functional space which would have included shelter and most likely the excavation within it for a ground oven to bake during winter in a protected place. It may have included birthing and /or post-natal shelter or a myriad of activities that included shelter.

E3 is one of the finest examples still in existence of a culturally modified habitation tree which is still living and deserves protection.

Figure 16 shows a side perspective of this tree with two trunks of the same width and presumed age can be observed separated at approximately 3m above a conjoined area which features the enhanced hollow.

It is definitely of regional significance and possible of State significance. It is recommended that this tree undergo excavation and soil testing both inside and outside the tree for comparison.

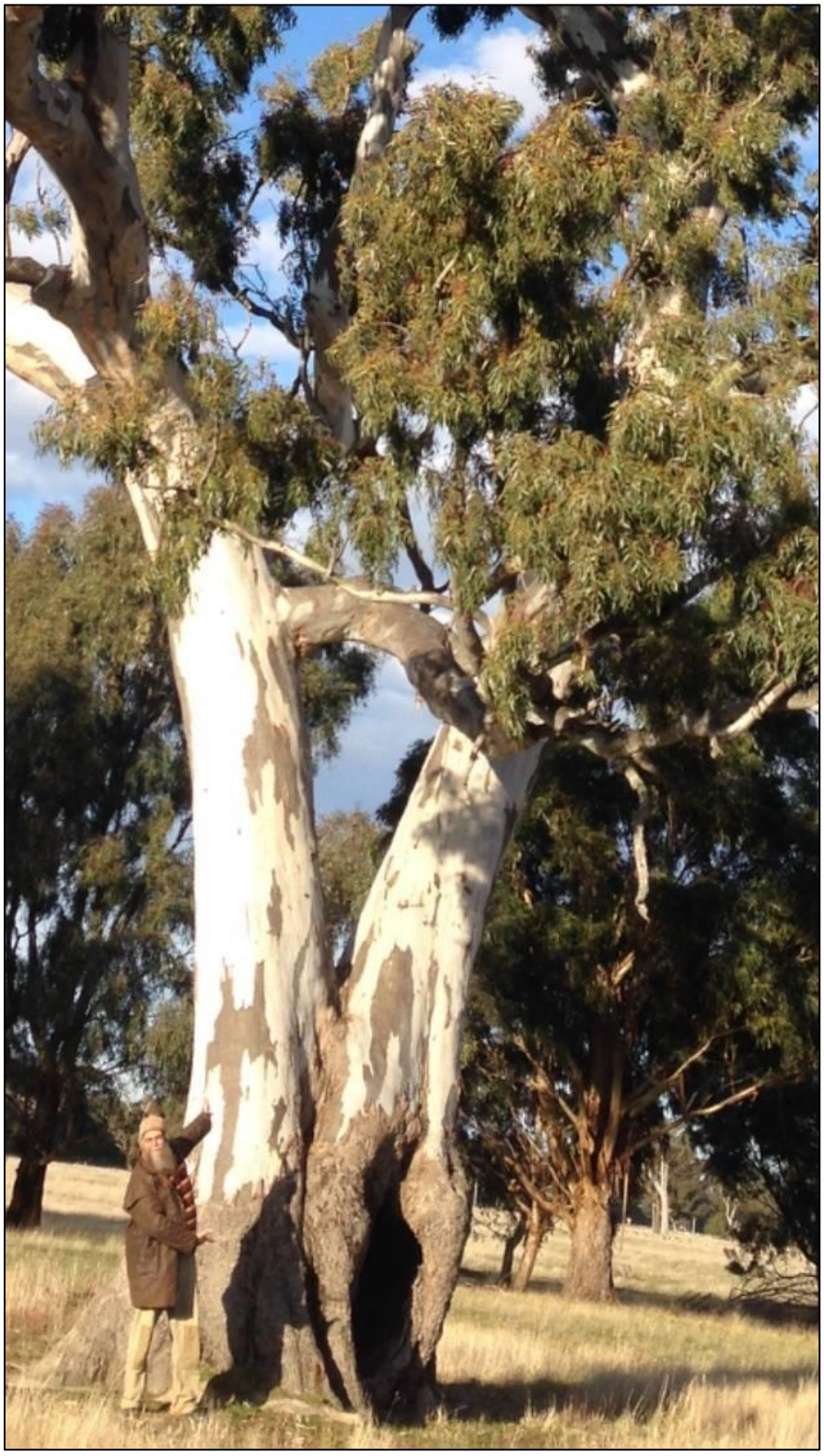

Fig. 16: E3 or BT1 Double trunk with feasible fusing

Location of two trunks join or fusion

Fig. 17: E3 and view of double trunk joining and hollow entrance

This is a very interesting scenario of a double trunk emanating from a single large charred hollow with all the criteria and features of a culturally modified interior and entrance. Obviously a single Red Gum tree takes a very long time to grow, mature and reach a size large enough to provide sufficient volume at the base to make the endeavour of gaining entry and preparing a cavity worthwhile and useful. In relation to the appearance of the conjoining of two red gums of equal age and size: given the criteria for differentiating natural versus cultural attributes for Habitation Trees, it is worth stating and investigating that in order for TOs to enable a larger living space, two conjoined red gums would produce such a possibility a great many decades earlier than a single tree growing to a girth that was necessary to enable internal cultural modification. However, if two trees grew together from a conjoined union, then the maturity needed from the trees to reach the volume required at their base, to create the same sized useful space, is theoretically halved. This double tree is also growing directly adjacent to the Billy Billy Creek meaning there is the availability of water to ensure optimal growth.

This scenario consists of many stages over a great length of time, each of which had to be successful, from two seedlings growing together by the creek to the final cultural charring of the enhanced hollow created from two trees which became conjoined. What is yet to be ascertained is how many of the steps along this long process were ensured success by intervention from the Traditional Owners, the Djap wurrung? In order to answer this and other questions related to this site, it is necessary that research be undertaken here. To this end it is recommended that this place featuring the Tree E3 be given a substantial buffer of protection, and research takes place

to enable a full understanding of the tree, its surrounds and spatial associations with other landscape features.

Tree E4

Fig. 16: E4 or Scarred Tree No 1

E4 is located on the southern side of Hillside Road's western end (see Fig. 4 for location).

As can be observed in the photo this scarred red gum tree features the thick and raised collar which includes the radiating 'crease lines' emanating from the scar which is produced by cutting through the growing green wood to extract the artefact material. This is a very wide collar which suggests that the tree has grown vigorously over an originally much larger scar than what remains today.

This overgrown scar should not be discounted and neither should the protection of this healthy and still growing red gum. It can be used for research on scarring on CMTs.

Tree E5

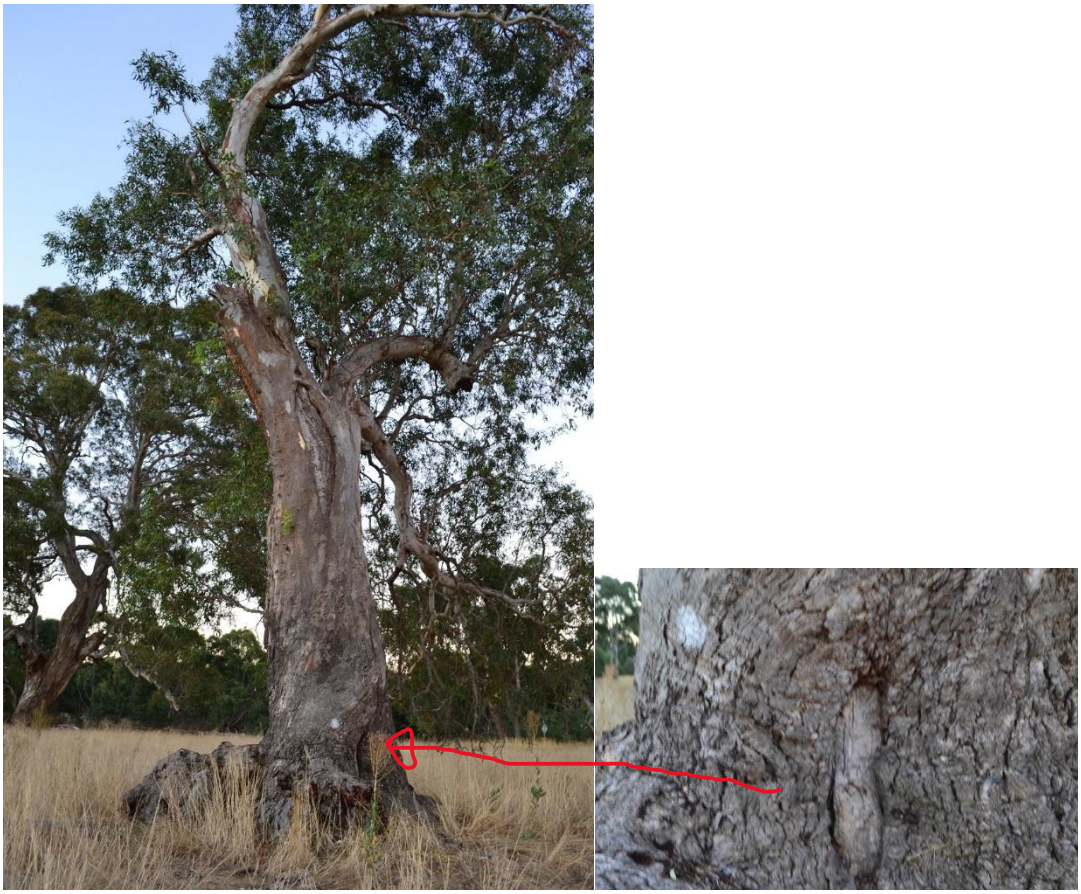

Fig. 17: E5 or Scarred Tree No 2

Tree E5 is located on the southern side at commencement of Dobie Rd exit from the Western Highway.

It is a tall tree with a scar near its base of the main trunk. This scar is old and appears to have been overgrown to a certain extent, which is not clear. It is however a cultural implement scar.

Tree E6

E6 is the most westerly of the six trees and is located just to the west of the Hopkins River crossing of the Western Highway.
As with E3, E6 is a culturally modified and enhanced hollow red gum which VAA and Martang have not confirmed has cultural values. As with E3, E6 is a wonderful example of the ethno-architecture of a Habitation tree. It has many of the criteria that prove it is of cultural construction in order that it fit the requirements of a living space for Djap wurrung. This which would have continued for countless generations.

Fig.17: E6 or BT2

E6 was chosen by a family group to become a cultural activity place initially for them and which its interior space was then enhanced in size after having an entrance constructed. It was fire-proofed by flame as supported by the uniformity of previous burning and charcoal build up within the tree trunk hollow. And resulted in a large, wide, smooth-surfaced basal hollow.

The collar around the entrance is not as clearly observable as E3 as the bark is much coarser, which is due to its slower growth, however the parallel radiating 'crease' lines can still be observed just within the outer entrance on an original section of tree wood which was cut through also. Once again this entrance wood would have expected to have burnt through if an external fire had entered the tree here during a bushfire and caused the interior burning. There is also no burning around the entrance or exterior of the tree. The entrance is smooth and well-used and the perfect size to enable entry but still provide protection from bad weather. It faces a northerly direction which is within the directional range of a Habitation Tree.

E6 is a fine example of a culturally modified habitation tree which is still living and deserves protection. As this tree is not in close proximity to water it is considered to have been slower growing than E3 to reach the size it has. It is dated at 800 years old.

It is definitely of regional significance and possible of State significance. It is recommended that this tree undergo excavation and soil testing both inside and outside the tree for comparison.

Hollow Habitation Tree Characteristics

The following are the criteria that have been identified in a culturally modified habitation tree. The more of these characteristics that are present in a hollow tree, the more likely it is to be a CMT. If more than 4 features are present, it is very unlikely to be a natural hollow.

- Size of hollows: larger than natural hollows by an average margin that has statistical significance.
- Proportions of hollow: relatively wider than natural hollows
- Smooth surface of hollow, compared with natural hollows which often have jagged edges and are filled with splintered wood.
- Selectivity of burns: nearby large old trees with unburnt, fire-prone, ground-level small hollows.
- Orientation: Hollow opening in Eastern half of tree, especially eastern quadrant of tree.
- Convex opening shape: an unnatural, non-A-frame shape, compared to a natural fire damage
- Aged, unburnt wood in opening, with no obvious reason for it not to have burned at the same time as the interior of the hollow
- Worn wood in entrances
- Proximity to water
- Proximity to rock art or other cultural heritage features

In summary, a tree within several hundred metres of water, and with a relatively large, wide, smooth-surfaced basal hollow (compared with natural hollows), with the entrance having a

convex shape, in the eastern quadrant of the trunk and with unburnt and worn wood in the entrance is extremely unlikely to form naturally.

Of relevance here is the comparison of the Japanese 'Shou Sugi Ban' process, which is an ancient technique that preserves wood by charring it with fire: burning the timber creates a protective layer, making the wood more resistant to fire, rot and insects, and preserving it for up to 80 years. This was for use externally, by charring internally in a sheltered position such as with the Red Gums, the charring technique would ensure protection of the wood for much longer.

	ENTRANCE	HOLLOW	NEARBY PROXIMITY CONTEXT	Why not bush-fire?
	Facing towards NE to SE direction	Larger than average for natural hollows	Neighbouring trees not burnt	aged, unburnt wood in the opening, with no obvious reason for it not to have burned
	Features worn unburnt wood	Smoother on the inside than average natural hollows	Artefacts/ cultural features located	no evidence of burning around the entrance or exterior of the tree
	Convex shape (not natural)	More squat than average natural hollows	Water located nearby	
		A uniformity of burning and charcoal build up within the tree trunk hollow.	A selectivity of burning on similar sized and aged trees	

Table 2: HOLLOW TREE Characteristics

TREE ID	Alt name	Location	GDA 94 Coords	AAV & Martang views	Builth's view
E1	Yellow Box Scarred Tree	Nth of Billy Billy Ck, 400m NW of Pope Rd	688430E 5864681N	Has been suggested as European scar as too small to have been useful to TOs	Most likely Aboriginal CMT

E2	Canoe Tree (dead, prostrate)	350m NW of Tree E1 in same paddock	688126E 5864844N	Stated by VAA it has no cultural scar and branch tear only plus insect damage	CMT with up to 3 periods of scarring including ring-barking
E3	Hollow Tree BT1	150m W of Tree E2 on Billy Billy Ck	687991E 5864773N	No cultural values confirmed	Highly significant Habitation tree with research required
E4	Scarred Tree No 1	Hillside Rd West southern side	680435E 5868058N		CMT overgrown
E5	Scarred Tree No 2	Left at Start of Dobie Rd exit from Highway	678917E 5868624N		CMT overgrown
E6	Hopkins River Hollow Tree BT2	Opposite Warrayatkin Rd	678320E 5868983N	No cultural values confirmed	Highly significant Habitation tree

Table 3: Details of CMTs threatened by Southern Option 1 Route

Conclusion of Study into the criteria for identification of CMTs

In this report Landscape Archaeologist, Dr. Heather Builth, has investigated and demonstrated that Habitation Trees, created and used by the Indigenous peoples of southern Australia, are well documented historically and ethnographically as widespread, important multi-functional features of their traditional ethno-architecture. However so thorough and rapid was the European process of obliterating the socio-economy and cultural landscape of the many language groups, especially so across Victoria, that many traditional owners themselves are unaware of the past practice of the innovative manipulation and consequent utilisation of these particular trees. This is the situation despite still-surviving examples of these culturally modified trees in existence today, albeit often locked up in privately-owned land.

Culturally Modified Trees or CMTs that have resulted in hollow trees becoming part of the landscape ethno- architecture, fulfil a number of functions as sheltered spaces. Nevertheless, It is surprising that despite numerous burnt out and hollow trees still being in existence throughout a wide area of southern and eastern Australia, neither the general public nor indeed, it appears, even archaeologists, have recognised or considered that they may be the product of long lost indigenous activity or even industry as in the case of the eel aquaculture of the Mt Eccles lava flow (see Builth 2014). Such a thorough job of obliterating evidence of past Aboriginal activities was

carried out in the rapidly settled south as part of the colonisation process, with the result that such a connection has largely escaped our collective consciousness, with few exceptions.

CMTs as culturally constructed spaces have largely remained invisible in the Australian landscape, including in this region since the Traditional Owners, the Djap Wurrung, were displaced as the land managers. This means that an archaeological methodology to identify trees as CMTs has to be identified and utilised so that they can be recognised and protected.
Carver (2002:128-9) believes that there are a number of factors that are needed to ensure future detailed research on these CMTs to assist in their preservation. He states that too many are being destroyed in Australia each year through ignorance or design, and studies must be undertaken to protect the remaining CMTs that are destroyed needlessly. They already have a finite existence as a highly significant component of Australian Indigenous cultural heritage and it is imperative that active recording programs are adopted in all States. He wants to see:

- acknowledgement of the existence of habitation trees is necessary in the first instance;
- greater explanation of where and how to measure regrowth
- detail criteria for identifying a habitation tree
- criteria to differentiate between metal, steel and stone axe cut marks

In relation to the process of producing a CHMP, if the cultural significance of a particular feature has not been flagged due to it not being recognised during the CHMP process, the feature will not be protected. Builth has provided evidence in this report for a case to re-examine a number of trees that fall into this category. These are CMTs that were an integral part of the domestic landscape, designed and used by Aboriginal families that inhabited this area in former times to perform the daily functions that are described in this report.

Within the proposed activity area of the Option 1 Route a number of trees that can be identified as CMTs have been overlooked by not only the archaeologists that produced the CHMP, but this has subsequently included the State Government employees of VAA along with the representatives of the RAP, Martang Pty Ltd. Of note and pertinent to the CHMPs that were produced for this development and omitted to recognise or further inspect these trees, Ellis (1976) in his study on the Adelaide region, writing on the past use of hollowed trees as shelters by the local indigenous people states: “it requires in most cases, an informed observer to trace the existence of these modified features” (in Builth 2014:278).

It was written in the CHMP 11812:4-5

> “Scarred trees are the most common (33%) of all archaeological places investigated for this CHMP within the St Arnaud geographic region. ..
> Based on our current knowledge of the activity area, and the known distribution of archaeological sites, both within the geographic region and within 5 km of the activity area, the following predictive statements can be made: Scarred trees are highly likely to occur anywhere within the activity area where remnant native trees of an appropriate age survive. There is a high possibility of these occurring on the hills, slopes, creekline terraces and alluvial plains...”

It is stated that all hollows in trees of suitable age were closely inspected (including those with hollows which required a climbing inspection) and no mortuary trees were recorded within the activity area. A total of thirteen climbing hollow bearing trees were also located during the survey.

Following a thorough inspection of each hollow, no human burials or mortuary goods were located within these trees (CHMP p93).
However, the practice of undertaking excavation test pits across the development area has not been extended to the largest category of cultural heritage feature in this landscape – being the CMTs.
It is posited in this report and illustrated by example, that due to a general lack of awareness of such functional trees having existed and indeed still existing, there remains a general ignorance of their presence and purpose. And ironically, due to the dwindling specimens that still exist, people that should know about these features have not had the opportunity to learn about them with the consequence that they are not recognised, protected nor preserved by archaeologists, governments and ultimately, the developers. In the past, private land-holdings that did feature such historic trees were not generally available to Traditional Owners, archaeology students, and the general public, with the consequence that the existence of these types of CMTs have been either forgotten or remain unknown.

It is recommended that excavation in the base of the two hollow habitation trees under threat will inform all parties as to the part these features have played in the daily lives of the previous occupants, the *Djap wurrung*. It is therefore recommended that excavations take place in Trees E3 and E6.

If it can be demonstrated that tree or trees at E3 have been culturally manipulated to by-pass the natural process of the time involved for a single tree to grow old and large enough for modification into a Habitation Tree, then E3 will be of national significance.

It is therefore recommended that a substantial buffer zone be placed around Tree E3 so that suitable research can take place to enable a full understanding of the tree, its surrounds and spatial associations with other landscape features, including the hill south of Hillside Road.

Qualifications and Experience

* Dr. Heather Builth is Operations Manager for Yinhawangka Aboriginal Corporation in WA. She has been previously registered as a Cultural Heritage Advisor by Aboriginal Affairs Victoria in accordance with Section 58 of the Aboriginal Heritage Act of 2006 and Schedule 2 Item 3 of the Aboriginal Heritage Regulations 2007.

Her professional training includes archaeology and anthropology, including a PhD in Archaeology from Flinders University of SA and Honours (First Class) in Aboriginal Studies from the University of South Australia. Publications include a book, nine academic refereed papers and several book chapters. With a cartographic and geographic background as well as post graduate GIS qualifications, Heather's expertise is interpreting past cultural and economic land use at a landscape level. Builth's research and interpretation of Indigenous landscapes has lead to the re-discovery and recognition of ancient eel aquaculture systems in SW Victoria, which culminated in Gunditjmara gaining National Heritage listing for the Budj Bim landscape in 2004 with the goal of future World Heritage Listing of this cultural landscape.

She has worked as a consultant archaeologist since 1998 when she was a founding Director of Australian Cultural Heritage Management (ACHM) in Adelaide. She established a cultural heritage management practice in the SW of Victoria in 2003 which included the role of Project Archaeologist for the Portland Wind Energy Project with Pacific Hydro Pty Ltd. 2004-2009; plus cultural heritage management of other localised projects. Builth undertook the cultural heritage management for the Crowlands wind energy project north of Ararat with Martang, and the subsequent CHMP production.

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