APPENDIX 6B: BURNS 2016

SCAR TREE ASSESSMENT REPORT

VICKERY EXTENSION PROJECT

Prepared for: **Whitehaven Coal Ltd – Vickery Extension Project**

Prepared by: *Global Soil Systems*

Date: May 2016

GLOBAL SOIL SYSTEMS
Land Rehabilitation and Revegetation
- Contractors and Consultants

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Dr Mark Burns
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1.0 BACKGROUND AND OBJECTIVES

Dr Mark Burns (Director - Global Soil Systems) was engaged to prepare this report for Whitehaven Coal Ltd. The relevant trees were inspected and measured, with the assistance of Rod Scholes from the Vickery Extension Project, in the period 22nd to 24th February 2016.

The principal objective of this assessment and report was to clarify whether observed scarring on previously recorded trees (identified in earlier archaeology surveys for the Vickery Extension Project) related to Aboriginal cultural activity, or whether scars could be attributed to natural or European causes.

The majority of trees assessed in this report (Assessment Trees 1 to 27) had been previously assessed by Kamminga and Lance (2016) for the same purpose. The remaining two assessment trees (Assessment Trees 28 and 29) had also been reported on and assessed in an earlier study by Whincop (2016 - UQ Culture and Heritage Unit - reference letter to Whitehaven Coal Limited dated 28 January 2016). Both Kamminga and Lance and the Whincop concluded that none of the assessed trees were of Aboriginal cultural origin and that observed scars could be attributed to natural and/or European causes.

It should be noted that one tree (with three separate scars) was noted twice in separate, earlier studies and given two descriptors (VS25a and VS33). For the sake of continuity of the numbering system, and in order to avoid questions, this tree was given two numbers (Tree # 19 and Tree # 20). The same details and comments apply.

This report includes comparative data derived from reference trees identified in similar, earlier studies located in the nearby Maule's Creek Mine area (see Burns 2014c). Data from several new reference trees, identified in this study and located on or near the Vickery Extension project, have also been included. Data from an additional reference tree (an Ironbark located near Muswellbrook in the upper Hunter Valley) has also been included.

The assessment methodology used in this report generally conforms to Long (2005). Methodology also generally conforms to that employed in the above referenced Kamminga and Lance (2016) and Whincop (2016) studies (who both also referenced Long) and also to that employed by the author in previous scar tree assessments for the Maul's Creek Mine.

As such, conclusions drawn in this report are based on both methodology and guidelines proposed by Long as well as on the extensive and practical experience of the author (Dr Mark Burns). This experience includes commercial forestry, nursery management, farm forestry projects, mine rehabilitation (reforestation), urban tree assessment (for Council's etc.) and other scar tree assessment in the upper Hunter Valley and tableland areas around Gunnedah and Boggabri. This experience has extended over a 40-year+ period and has included forestry involvement in inland areas in many areas of NSW such as Baradine, Glen Innes, Inverell, Gunnedah, Tamworth, upper and lower Hunter Valley and numerous other areas. This experience is relevant in that it provides practical insight into species identification, tree growth rates, common causes of tree scarring and how quickly scar tissue regrows following the initial wounding of a tree.

2.0 CAUSES OF TREE SCARRING

Scars can be attributed to a range of human related and natural causes (Long 2005). The main causes of scarring include the following.

Natural Scarred Trees

Some of the most common causes of tree scarring can be attributed to natural causes including lightning strikes, wind damage, branch and secondary stem tears, larval activity, termite activity, bird damage, fire damage, abrasion from falling limbs and numerous other initial and subsequent factors. These can create small or large scars on trees. There are numerous examples of large mature trees (both alive and dead) in the study and broader Gunnedah/Boggabri area exhibiting scar damage from natural factors such as wind, lightning and branch tear. ***Plate 1*** below shows an example of relatively recent lightning strike damage to a tree near Boggabri. While this is an extreme example, these damaging factors often significantly reduce the life of a tree below its maximum potential. Mature trees, nearing the end of their life, are more prone to damage from these primary and secondary causal factors. Single, isolated trees or trees located in small clumps in paddocks and open farmland, are also more likely to be affected by factors such as lightning and wind damage as well as mechanical damage from farm equipment.

Plate 1. *An example of recent lightning damage to a tree on an early mine lease. Other factors such as wind damage and secondary stem tear were also commonly observed in the study area.*

The exact cause of natural scarring is often difficult to identify as several factors often combine to produce a scar. Causal factors are often sequential. For example, branch tear because of wind damage can lead to secondary fungal, borer and termite damage over time. As a result, scars on living trees often consist of both living and dead wood. In older scars it is common for significant new cambial growth to have grown over part, or all

of, the original scar. This often results in the original scar being fully or partially covered with living wood over time. As an example, a wound, resulting from European survey markings in 1904 on a mature White Box in the Boggabri area (Reference Tree 1) had completely occluded (grown over) with living wood by 2013 (and probably well beforehand) and was no longer visible (Global Soil Systems 2013*)*. Consequently, due to a combination of secondary decay effects, over-growth, and the consequent expansion of the area of decay, the current location of the dead wood component of the scar is often not representative of where the original wound occurred (as was the case in the above reference tree). In other words, what you are looking at now is not necessarily the original location (or shape) of the scar and many scars are the result of several processes, the order of which is not always clear. In some cases, there may be no visible dead wood due to the initial wound having completely grown over with new tissue. Without some historical record such as survey notes and plans it is not possible to know that the tree had been intentionally marked.

It should be noted that the majority of scars that exist in the Australian landscape today are the result of natural and incidental causes (Long 2005). The cumulative effects of natural tree growth and decay, land clearance and forest management have removed most of the mature trees that held cultural scars in the pre-contact and even historical periods of Australia's past (Long 2005, Kamminga and Lance 2016). These have largely been replaced with younger trees bearing the impacts associated with the agricultural and forestry use of the landscape, which followed the earlier subsistence use of the landscape after c.1870 (Long 2005). As a result, this date (1870) has been used in this report as the date that Aboriginal cultural tree scarring largely ceased.

European Scarred Trees

A range of scars can also be related to early European activity and European bark removal. These types of scars are generally limited to rectangular panels, approximately 1 – 3 meters in length, which reflects their primary use for building cladding. European scars can also include survey and blaze marks and bark strip scars. Scars can also relate to past (and more recent) clearing activities and associated damage to tree trunks (Long 2005). Some scars may relate to stock fencing activities.

When reviewing comments in this report it is important to understand that remnant forest and woodland areas in the Boggabri and Gunnedah area have been extensively disturbed and modified over a long period (up to 180 years) following the arrival of Europeans. As mentioned by Long (2005) this general type of disturbance has effectively resulted in most tree scars evident today being the result of natural and European causes. This needs to be kept firmly in mind when assessing the probability of scars relating to Aboriginal activity.

In summary, remnant native trees in the Boggabri and Gunnedah area have been regularly subject to repeated damage from a long history of natural and European factors. These two are often related. For instance, tree clearing can result in single and more exposed remnant trees being more prone to factors such as wind damage. Adjacent, extensive and intensive agricultural activity and related farm machinery activity can also cause further damage to many remnant trees. The damaging activities of stock on trees in areas such as travelling stock reserves can also result in scars. These activities, combined with natural processes such as wind, fire, lightning and subsequent termite damage, have resulted in considerable non-Aboriginal scarring of tree trunks in this

region. Past scar tree assessments by the author in the upper Hunter Valley and Gunnedah/Boggabri area have demonstrated close links between many scars and historical large scale clearing and timber cutting events (as evidenced by remnant cut stumps and sawn timber debris). These activities, together with natural causes, largely explain the origin of most scars observed to date by the author and by others.

Aboriginal Scarred Trees

Aboriginal scars often have differing forms (Long 2005).

1. Curved (pre-form) bark removal scars. This category consists of circular, oval or elongated scars resulting from the removal of a pre-formed artifact, such as a canoe or container that took shape from a curved section of either the tree bole, a major limb or a large burl.

2. Bark slab (sheet) removal scars. Sheet and slab artifacts are produced from rectangular or square sheets of bark.

3. Toe holds. Toe holds are a series of small incisions into the bank designed to create a toe hold for climbing purposes.

4. Resource extraction holes such as smoke holes and access holes.

5. Other scar forms such as bark strip removal scars, grub procurement scars, marked and carved trees and wood removal scars.

3.0 CESSATION OF ABORIGINAL CULTURAL SCARRING

The cessation of Aboriginal related scarring is relevant to this study in the context of how long scars remain visible and how long a tree can survive. Long (2005) proposed that Aboriginal cultural scarring was generally not practiced in Australia after 1870. This date is consistent with comments from both archaeologists working in the local Boggabri/Gunnedah region and also a review of the history of European expansion into the Boggabri/Gunnedah area.

It has therefore been assumed in this report that cultural scarring of trees by Aboriginals would have occurred no later than 1870 (146 years ago).

1870 is considered a very conservative (late) date considering European settlement began in the Boggabri area in 1833 and the railway station opened in 1882 - by which time the town was well established. By this time, the long held tribal structures and practices of indigenous Australians would have been significantly impacted by European culture. The decline of cultural practices apparently occurred rapidly. William Ridley (referenced in Kamminga and Lance 2016) reported in the *Empire (12 December 1855, p.2* and then published in the *Sydney Morning Herald* two days later) that the number of Aborigines in the Namoi area was very much reduced since the occupation of this district by colonists sixteen years ago. He reported that, of those that remained, many were living on European stations at that time. In the process, many of the products resulting from bark removal would have been replaced with European equivalents (e.g. tarpaulins, sawn timber).

Similarly, European settlement in Gunnedah began in the mid to late 1830's and the railway arrived in 1879. As a result, most Aboriginal cultural practices had ceased well before 1880 and the arrival of the railway.

This is not to say that Aboriginal procurement of tree bark and wood ceased completely at that time, since Aboriginal people continued to live on pastoral leases, reserves and camps around settlements in rural areas, although admittedly their numbers were relatively small and traditional lifestyle had been severely disrupted (Kamminga and Lance 2016).

For a tree to now possess a significant Aboriginal related scar the tree would have had to have been of a significant size and age at the time of scarring (at least 146 years ago). Based on known growth rates a tree would therefore have had to have been at least 30 years old (and probably older) at the time of scarring. Combining these two (very conservative) figures a living scarred tree would now have to be at least 176 years old. As indicated above, it is unlikely that scars formed more than 146 years ago would still be visible.

In addition, the health of many trees after scarring can deteriorate relatively rapidly. As an example, the health of Reference Tree 3 has deteriorated relatively rapidly over the 87 year period following survey wounding. The tree in question is now close to death. This raises the question as to the maximum life span of trees in the Boggabri area?

There are varying opinions on maximum life span which can vary depending on species, geography, climate, soils, extent of disturbance, competition and many other biotic and abiotic stress factors. However, repeated observations and growth evidence by the author suggests that while the lower trunk (lignotuber) and root system of some trees can be quite old the current trunk of the tree may be much younger due to repeated death and reshooting (coppicing) of subsequent stems from the base of the stump. This is particularly prevalent in Box species (most of the trees in this report). This repeated cycle of stem emergence, death and re-emergence was evident in many trees in the study area.

4.0 WOUND REGROWTH CONSIDERATIONS

Past experience by the author in forestry and scar tree assessment in this and other areas of NSW has been drawn upon to determine the likely age of wound regrowth in assessed trees. More importantly, and as previously mentioned, the use of growth data from locally occurring reference trees has mainly been used to underpin conclusions made in this report.

Growth conclusions made using comparative reference trees in this report are consistent with many field observations by the author over many years of experience in forestry, mine rehabilitation and general tree related activities. While the ratio of growth rate (e.g. diameter) to tree age may vary slightly between species and sites, estimates in this report are considered fair and reasonable average approximations. A conservative approach has been adopted at all times in order to fairly consider the potential origin of scars.

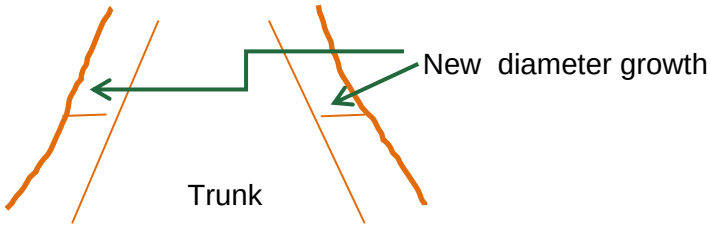
As hinted at above, and as a result of a lack of understanding of tree and wound growth rates, together with the many natural and European causes that can lead to wounding and scarring, tree and scar age are often frequently misinterpreted. As a result, both trees,

and scars present in live trees today, are most likely much younger than most people consider.

Despite the above generalizations, further definitive proof is needed to provide conclusive proof about scar date and origin. To do this we need to understand how a tree grows and how it repairs a wound (scar/wound regrowth).

Tree Growth Patterns

Despite common perception, a scar on the trunk of a tree does not move higher up the tree or get further off the ground over time. This is a result of the way in which a tree grows. A tree adds extra diameter by overlaying new (cambial) growth in a lateral manner as shown below.



As such, at a point on the trunk say 1.5 above ground level, new trunk growth is added laterally and not vertically. (Vertical tree growth occurs through a different mechanism involving shoot elongation higher up the tree). Hence, a scar one metre off the ground 50 years ago will still be the same height now - provided that erosion around the base of the trunk has not lowered the soil level. A second aspect of growth is that a tree grows faster in its early growth phase and slower as it ages and senesces. The diameter of an older tree is hence a composite of quick early growth and slower later growth. In an older tree the measured diameter is therefore an average of the different rates of growth over the life of the tree up to that point. The use of reference tree data generally reflects growth rates in the later stages of a tree's life (tree has to be large enough to facilitate marking). This effectively means that, if this data is used to estimate tree age in this slower growth period, the result is an over estimation of tree age.

In scar age assessment, the slowing of growth as a tree ages can be largely offset by comparing scar regrowth on assessment trees with scar regrowth on reference trees of similar size and species and which contain wounds of a known age. Where a tree has died prior to assessment additional calculations need to be made to allow for the time since death.

A second relevant aspect of tree growth, that has been touched on briefly above is coppicing. Many species form a new shoot when the existing shoot (stem/trunk) dies. This process is called coppicing and is a common survival mechanism found in many eucalypt species such as Box. When the main trunk is damaged (for whatever reason) the tree grows one or more new shoots from the stump close to ground level. These new stems often arise from lignotubers, which are round, bulbous organs at the base of the trunk. As a result, the remnant lignotuber and root system can often be much older than the current higher tree trunk. Over its life cycle a tree may have as many as five or six main trunks which can die and re-emerge due to a range of damaging factors. This effect has been observed by the author in this region and elsewhere (e.g. Burns 2014a) and is relevant when calculating the age of any scars on the trunk. In short, the scar can never

be any older than the trunk it is located on, which in turn can be much younger than the lower stump and root system.

Rate of Wound Regrowth

If a tree is wounded by taking a slab of bark off the trunk and, in the process damaging the cambial layer, the tree will repair itself by putting on adjacent new growth around the wound in order to close and seal off the wound. This is a protective measure by the tree to stop fungal and insect entry into the internal heartwood of the tree. If the wound is too large, the tree may not be able to completely seal the wound before decay enters the tree and the inner wood begins to die. As a result, scars often comprise both dead wood, which the tree continues to try and encapsulate overtime, as well as living tissue where live cambial tissue has grown over the wound in order to protect itself. Hence, and as mentioned above, visible scars are often a composite of both dead and living wood.

The relevance of the rate of wound regrowth is that it gives us a radial measurement of growth on one side of the tree. If we double this radial measurement we get a diameter increment. If we know the age of the scar (e.g. by comparison with a European marked survey (reference) tree containing a scar of known age) we can measure the depth of the regrowth and estimate the rate of new growth since wounding. If we double this radial figure we get a diameter growth rate. Hence, if a scar has surrounding wound regrowth with a depth of say 40 cm, and we know that the original wound occurred 40 years ago, we can assume that the tree grew radially at 1 cm per year in that time. Assuming that this radial growth is indicative of the overall growth of the tree (a reasonable assumption – see above discussion) we can assume that the diameter increment of the tree in that period was double that amount i.e. 2 cm per year. Hence, a tree with a diameter of 160 cm could be reasonably assumed to be up to 80 years old.

For a living tree in the Gunnedah/Boggabri area to now possess a significant Aboriginal related scar the tree trunk would have had to have been of significant size and age at the time of scarring (cut-off date 146 years ago). Based on known growth rates the tree trunk would therefore have had to have been at least 30 - 40 years old (and probably older) to have been of sufficient size to have been large enough to provide useful products. Combining these two (very conservative) figures a tree scar of Aboriginal origin would now have to be at least 176 to 186 years old. This is possible for some species and some locations. However, due to repeated growth, death and regrowth of stems over time (as discussed earlier) the probability of tree trunks being this old is significantly reduced.

How Long Do Tree Wounds Remain Visible?

As discussed above, trees will attempt to seal a surface wound as quickly as possible in order to prevent decay processes entering into deeper layers of the tree. This is a natural survival response. The rate and extent of this encapsulation process can vary considerably depending on a wide range of factors including the age and health of the tree.

Sometimes, and as mentioned above, a scar may completely grow over and be no longer visible. Such observations are very relevant to the probability of a scar being of likely Aboriginal cultural origin. If European survey scars have completely grown over and are not visible in a period less than 146 years (period since cessation of Aboriginal cultural scarring) then it is highly likely that the same applies to many older, Aboriginal related,

scars. In many cases, unless there is some historical record, no one will be aware that the tree was intentionally damaged. The only reason anyone knows that a completely healed European survey mark exists on many trees is because there is a written (e.g. survey notes/plans) record reporting its location and co-ordinates on a map.

In this context, the disappearance of the original survey mark on Reference tree 1, and the formation of a secondary scar lower down the trunk, was discussed earlier. By way of other relevant examples, a number of other survey markings on reference trees had completely grown over and were no longer visible at the time of this assessment.

As an example, a survey marked Bimble Box (Reference Tree 10), marked in 1886 is shown below in ***Plate 2***. The scar is now 130 years old and, except for a slight indentation (to left of hand) there is no other evidence of the original wound.

Plate 2. *Example of a 130 year old survey scar on a Bimble Box that has largely grown over (2016).*

A second example is shown below in ***Plate 3.*** This Box tree (Reference Tree 11) was survey marked in 1919 and the wound is now 97 years old. Little evidence of the wound remains in 2016.

Plate 3. *An Inland Grey Box survey marked 97 years ago now shows negligible evidence of the original wound.*

The above discussion related to scars on living trees. What additional considerations need to be taken into account where the scar is on a dead tree?

Dead Tree Considerations

Consideration of scar age on dead trees becomes more complicated as the time since the tree died needs to be factored into calculations.

Calculating the length of time since the tree died can be assisted by evidence such as whether the tree was felled/damaged by a chainsaw. As chainsaws only became widely used in NSW in the late 1950's/early 1960's this provides a means for dating trees containing chainsaw marks. As a result, evidence of chain saw activity can be used to assist dating of some scars. This period (estimated time since death) can then be added to the calculation for a living tree to provide an approximate total time span since initiation of the original wound.

Other factors can also be used to estimate the length of time elapsed since a tree died. As small branches fall off and decay progressively after death, the size of remnant branches can give some guidance. Similarly, bark falls off the dead tree at a generally known rate over time. Bark will persist for some time after the tree has died although most bark will have fallen off most standing trees within 10 years following tree death. The more remnant bark - the shorter the time since death. In addition, the extent of weathering of dead wood on a felled tree or piece of timber can also be used to help approximate the age of remnant stumps. This is a somewhat subjective assessment but again the extent and nature of weathering of dead wood on survey scars of known age can be used as a comparison.

If a tree has been felled and the remnant crown has disappeared in that time (timber cutters normally only take the main trunk) this means that remnant wood has either been eaten by termites, rotted away by other means, burnt by fire in that time or used for fire wood. Wildfire has been (and currently is) a frequent and relatively regular occurrence in many forest and rural areas and remnant timber on the forest floor is often (relatively) quickly consumed. These types of simple calculations can be used to help estimate tree, and hence scar age.

Despite this, there are still some dead trees where the time since death can only be estimated on the basis of observation and practical experience. In summary, it has been the author's experience that dead timber, lying on the forest floor, of even the most termite resistant tree species, normally disappears within a maximum of 70 years (and often much quicker) after death due to a combination of the above factors.

5.0 METHODOLOGY

The assessment methodology employed in this report is generally in accordance with "Scarred Trees, An Identification and Recording Manual" (Long 2005) and with the preamble in this report. For each scar tree, the following data was recorded:

- Tree number and archeology identifier -
- Tree species -
- Condition of tree -
- Girth of tree at 1.5m height (dbh) -
- Diameter of tree at dbh -
- Scar dimensions
  - Length -
  - Width -
  - Height of base of scar from ground -
- Average overgrowth measurement (depth of scar tissue) -
- General scar orientation -
- Shape of scar -
- Suspected origin of scar -
- Estimated scar age (years)
- Notes *e.g. Axe marks present (?) and type (Aboriginal/European)*
  -

Further comments on methodology have been discussed in Section 1.0 of this report.

6.0 RESULTS AND DISCUSSION

A total of 11 reference trees and 29 assessment trees have been included in this study.

6.1 Reference Trees

6.1.1 General

Reference trees are trees which contain survey marks of known ages. Where available, the depth of scar regrowth was measured and derived data was used to compare and assess scar growth (and hence scar age) on relevant assessment trees.

The location of the reference trees used in this study are shown in ***Figures 1 and 2***. Reference trees shown in ***Figure 1*** had been identified in earlier scar tree studies in the general area (Burns 2013, Burns 2014a, Burns 2014b and Burns 2014c). The location of additional reference trees, identified and measured in this study, are shown in ***Figure* 2**. GPS co-ordinates and other details for each reference tree (in both figures) are shown in ***Table 1.*** As mentioned, Reference Tree 6 was located near Muswellbrook and GPS co-ordinates are shown in ***Table 1.***

As discussed earlier, it should be noted that it was not possible to measure scar depth on all reference trees due to scars on some trees no longer being visible (see earlier discussion).

Results for Box reference trees (Reference Tree numbers 1,3,4 and 5) were averaged (where relevant) to provide average growth data for Box assessment trees. All assessment trees except Tree #9 (Callitris), Tree #16 (Narrow-leaf Ironbark) and Tree #26 (River Red Gum) were Box trees. Corresponding data from relevant reference trees for each of these species (see ***Table 2***) was used for assessment of scar age for corresponding trees.

Specific details and comments for each assessment tree and scar are shown later in Section 6.2.

Figure 1 Location of Reference Trees 1 to 5 near Leard State Forest and Maul's Creek Mine

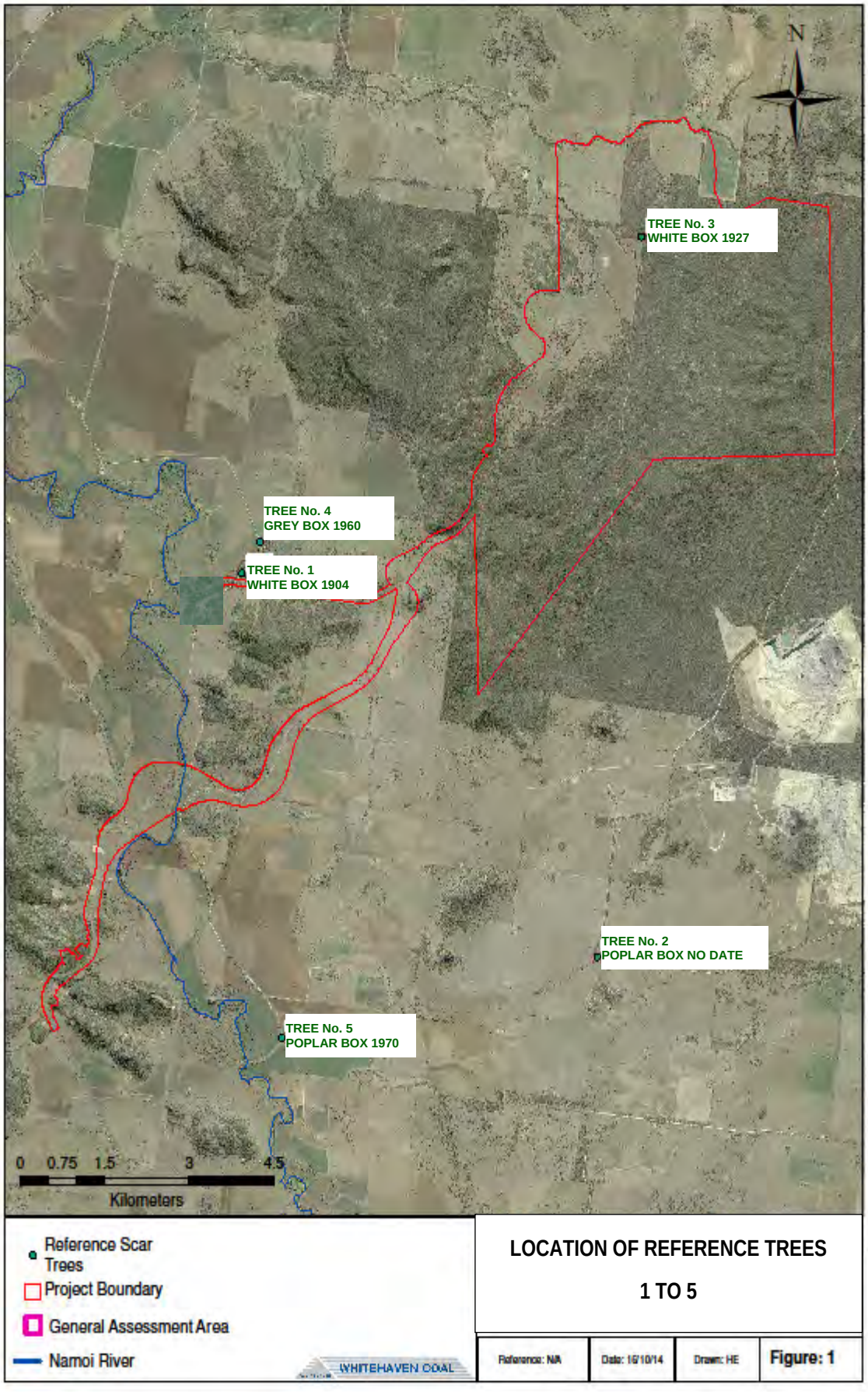
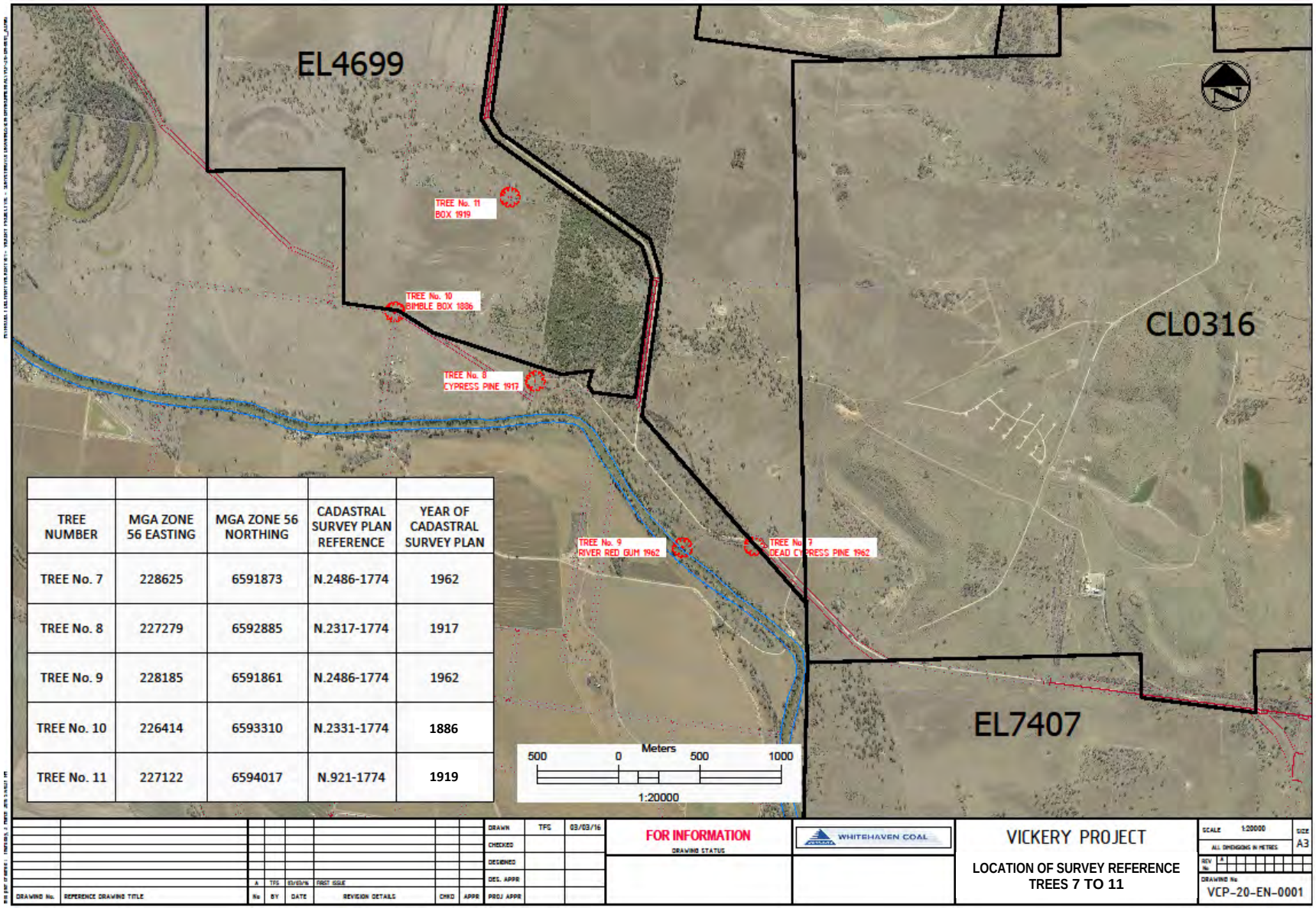


Figure 2 – Location of Reference Trees 7 to 11 on and Near Vickery Extension Project



TREE NUMBER	MGA ZONE 56 EASTING	MGA ZONE 56 NORTHING	CADASTRAL SURVEY PLAN REFERENCE	YEAR OF CADASTRAL SURVEY PLAN
TREE No. 7	228625	6591873	N.2486-1774	1962
TREE No. 8	227279	6592885	N.2317-1774	1917
TREE No. 9	228185	6591861	N.2486-1774	1962
TREE No. 10	226414	6593310	N.2331-1774	1886
TREE No. 11	227122	6594017	N.921-1774	1919

DRAWN TFS 03/03/16
CHECKED
DESIGNED
DES. APPR
PROJ APPR

FOR INFORMATION
DRAWING STATUS

WHITEHAVEN COAL

VICKERY PROJECT
LOCATION OF SURVEY REFERENCE TREES 7 TO 11

SCALE 1:20000 SIZE A3
ALL DIMENSIONS IN METRES
DRAWING No. VCP-20-EN-0001

Table 1 – Details of Reference Trees Referred to in this Report

Reference Tree #	Details	Co-Ordinates	
1 (White Box)	Plan 1632 – 1774 - marked in 1904.	217900E	6611407N
2 (Poplar Box)	Bench Mark Tree BM 04 on Corner of Leard Forest and Goonbri Roads. No date – general discussion.	224198E	6605223N
3 (White Box)	Lot 42 DP75494 - marked in 1927.	224981E	6616830N
4 (Pilliga Grey Box)	Crown Plan 26236–1603 Plan of Therribri Road alignment - marked in 1960.	218219E	6611917N
5 (Poplar Box)	Crown Plan 4314-1603 north of the junction of Therribri and Rangari Roads - marked in 1970.	218603E	6603922N
6 (Narrow-leaf Ironbark)	East Maitland Lands Office Survey marked D5057/2003	Corner of Common and Coal Roads Muswellbrook	
7 (Cypress pine)	Survey mark 41. Marked in 1962.	228625E	6591873N
8 (Cypress Pine)	Survey mark 36. Marked in 1917.	227279E	6592885N
9 (River Red Gum)	Survey mark 45 Marked in 1962.	228185E	6591861N
10 (Bimble Box)	Survey marked 1886	226414E	6593310N
11 (Inland Grey Box)	Survey marked 1919	227122E	6594017N

6.1.2 Reference Trees Details

The following details are provided for Reference Tree 1 to 9. Due to the wounds on Reference Trees 10 and 11 being completely grown over no regrowth data was available and no further details, other than that discussed in Section 4 above, have been shown.

Reference Tree 1 (*White Box – *Eucalyptus albens)

This tree was assessed in December 2013 (Burns 2013).

A photograph of the scar on Reference Tree 1 is shown below in ***Plate 4***.

Plate 4. *Photograph of scar on Reference Tree 1.*

Details of this tree and scar are shown below:

- Reference Tree 1
- Tree species - White Box (*Eucalyptus albens*)
- Condition of tree - Alive but mature tree near end of life - die back in crown
- Girth of tree at 1.5 - 373 cm
- Diameter of tree - 119 cm
- Scar dimensions
  - Length - 60 cm
  - Width - 12 cm
  - Height of base of scar - Ground level
- Overgrowth measurement (depth of scar tissue) - 39 cm
- General scar orientation - South East
- Shape of scar - Elliptical

- Axe marks present and type (Aboriginal/European) - No
- Estimated origin of scar - European survey mark

At the time of measurement the above data shows that this tree put on 39 cm (a radial measurement of scar tissue regrowth) in 110 years (since 1904). This equates to a radial growth rate of 0.35 cm per year (at the time of measurement) or a diameter increment of 0.7 cm per year over this period.

The following comments and conclusion were made:

The unhealed (dead wood) component of this scar is located just above ground level and well below where the original survey mark would have logically been placed. As such, the dead wood apparent in this photograph is a result of secondary and subsequent damage (decay) lower down the trunk and probably a consequence of initial wounding (the survey mark) higher up the trunk. As such, the current location of dead wood is not indicative of the location of the original wound (survey mark). Termite residue is evident at the base of the dead wood at ground level. Hence, initial wounding (the survey blaze) probably resulted in secondary insect (termites) and fungal attack which has spread downwards within the tree and below the perimeter of the original wound.

It was apparent that the site of the original wound has completely grown over with living tissue and whose approximate location can now only be seen as a thin vertical indentation above the dead wood at the approximate level of the tape measure (see top arrows in ***Plate 4***). This observation is very important to this assessment as it shows that scars, initiated approximately 110 years prior to the assessment (marked in year 1904), are often not now visible and are most likely evidenced by secondary decay damage (dead wood) above or below the original survey mark. If we accept that the latest Aboriginal cultural scaring occurred in 1870 (34 years before this tree was scarred) it is therefore highly unlikely that, in many trees, any Aboriginal tree scarring before 1870 will now be visible due to the wound being completely grown over. The exceptions being for trees that died soon after scarring and have not rotted away (unlikely to be still standing or not decomposed after over 144 years – see earlier discussion) or where minimal scar healing has occurred around the original wound due to abnormally slow growth rate. In the case of this tree, an observer with no knowledge of the history of this tree would not have known that this tree was marked for survey purposes. The same comment applies even more so to older Aboriginal scarring before 1870. In other words, if the tree was still alive, the wound would most likely have completely grown over.

Reference Tree 2 – (*Poplar Box – *Eucalyptus populnea) – Marked BM 04

This tree was assessed on 15th July 2014. A photograph of the scar on Reference Tree 2 is shown below in ***Plate 5***. It should be noted that the range of Box species assessed in this study have similar growth rates (if other factors are similar).

Plate 5. *Photograph of scar (survey mark) on Reference Tree 2.*

Details of this tree and scar are shown below:

●	Reference Tree	- 2	
●	Tree species	- Poplar box (*Eucalyptus populnea*)	
●	Condition of tree	- Alive–middle age – reasonably healthy and actively growing	
●	Girth of tree at 1.5		- 175 cm
●	Diameter of tree		- 56 cm
●	Scar dimensions	- Length	- 39 cm
		- Width	- 20 cm
		- Height of base of scar	- 56 cm
●	Overgrowth measurement (depth of scar tissue)		- 14 cm
●	General scar orientation		- South East
●	Shape of scar		- European(survey mark BM04)
●	Axe marks present and type (Aboriginal/European)		- Elliptical
●	Estimated origin of scar		- Survey marks

Despite extensive searching, it was not possible to establish the date on which this tree was initially marked. As a result, scar age, based on the depth of wound regrowth, could not be used to establish growth rate. Despite this, the nature of wound repair and the context of the scar provides useful general information on scar tissue regrowth.

A more distant view of the tree (***Plate 6***) shows that this is a relatively young to middle age tree with a healthy crown. As a result, the tree has continued to actively grow since the survey mark (wound) was established. Survey experience by the author has shown that trees of this size are commonly used by surveyors for marking.

Plate 6. *Reference Tree 2 is a relatively young and actively growing tree.*

It is interesting to note that dead wood in the centre of the scar had not yet significantly weathered over the period since wounding (see ***Plate 5***). This observation (the degree of weathering) can be used to approximately assess the age of dead wood on assessment trees where the age (and origin) of the scar is unknown. Based on the degree of weathering initial wounding was estimated to have occurred approximately 15 - 20 years ago (maximum). More recent cutting of surrounding live wood to re-expose the survey mark (BM 04) has resulted in new fresh scar wood that hasn't had sufficient time to form a thick bark cover (see fresh yellow/orange scar wood in top left hand corner of scar in ***Plate 5***). Based on extensive forestry experience the presence of this fresh wound regrowth indicates that the second round of wounding has most likely occurred in the last 2 to 4 years. All these results indicate that the initial wound, with a regrowth depth of 14 cm (a radial measurement), occurred no later than 20 years ago and probably more recently. If true, this suggests a diameter growth increment of 1.4 cm/year over this time interval. This is obviously much higher than the growth rate for Assessment Tree 1 in this report and provides insight into changes in growth rate as a tree ages.

In addition, the context of the scar tree at the junction of two bitumen-sealed roads indicates that the initial benchmark (BM 04) was most likely related to the survey, construction and/or upgrade of this intersection – possibly for nearby mining related purposes. The new fresh scar growth may be linked to a surveyor removing older scar regrowth in order to expose the underlying survey mark in conjunction with more recent road upgrade work. Evidence of fresh fill around the base of this tree together with relatively recent signage supports this conclusion. While not providing specific data or conclusive evidence this tree provides general guidance on the potential growth of young healthy Box trees in this vicinity. However, in the absence of a definite survey date this tree has not been considered in the evaluation of assessment trees and provides general guidance only.

Reference Tree 3 (*White Box – *Eucalyptus albens)

This tree was marked in 1927and assessed on the 15th July 2014. A photograph of the scar on Reference Tree 3 is shown below in ***Plate 7***.

Plate 7. *Photograph of scar on Reference Tree 3. A remnant survey mark can be seen to right of hand.*

Details of this tree and scar are shown below:

- Reference Tree - 3
- Tree species - White box (*Eucalyptus albens*)
- Condition of tree - Alive but unhealthy tree near end of life - minimal crown
- Girth of tree at 1.5 - 210 cm
- Diameter of tree - 67 cm
- Scar dimensions
  - Length - 80 cm
  - Width - 40 cm
  - Height of base of scar - 90 cm
- Overgrowth measurement (depth of scar tissue) - 13 cm
- General scar orientation - South
- Shape of scar - Elliptical
- Axe marks present and type (Aboriginal/European) - Survey marks
- Estimated origin of scar - European survey mark

The above data indicates that this tree put on 13 cm of scar growth since the survey wound occurred in 1927. This indicates that the radial growth of the tree since that time (87 years ago) was 0.15 cm/year. By doubling this number, we get an annual average diameter increment over this period of 0.30 cm/year.

It is apparent that the above diameter increment (0.30 cm/year) is lower than the estimated annual diameter increment for Reference Tree 1 (0.7 cm/year). Both are White box. This much slower growth rate is consistent with the old age and poor health of this tree (Reference Tree 3) and the fact that the tree is nearly at the end of its life (see ***Plate 8***). The inclusion of data from this tree, when determining average growth rate in this report, helps provide a fair and reasonable average growth rate that reflects the characteristics of both slow growing (older) and moderate growth rate (younger) trees.

Plate 8. *Reference Tree 3 was in poor health and near the end of its life. At this stage of a trees life diameter growth slows dramatically.*

As a guide to how rapidly a tree ages and declines it was apparent that the condition of this tree has declined significantly over the 87-year period since the initial survey wound occurred. Discussion with surveyors, together with the author's own survey experience, indicates that surveyors mainly select relatively healthy trees with a single trunk for survey marking as they want the markings to remain visible for as long as possible. Hence, it can be reasonably assumed that this tree would have been upright and relatively healthy at the time of marking. Since that time, the crown of the tree has largely disappeared (died), the base and central core of the tree has largely rotted out, and the tree trunk is now inclined at a steep angle. As a result, the tree is likely to soon fall over and die. These results highlight the dynamic nature of most trees in this area and provide some indication of the rate at which once healthy trees senesce.

Reference Tree 4 (*Pilliga Grey Box – *Eucalyptus pilligaensis)

This tree was survey marked in 1960 and assessed on 15th October 2014.

A photograph of the scar on Reference Tree 4 is shown below in ***Plate 9***.

Plate 9. *Photograph of scar on Reference Tree 4. Remnant survey marks are apparent at the top and bottom of the dead wood.*

Details of this tree and scar are shown below:

●	Reference Tree	-	4
●	Tree species	-	Pilliga Grey Box (*Eucalyptus pilligaensis*)
●	Location	-	Near junction of Road to Louenville property and Therribri Road (at Cattle Grid going into open farm land)
●	Condition of tree	-	Middle age - healthy
●	Girth of tree at 1.5	-	261 cm
●	Diameter of tree	-	83 cm
●	Scar dimensions - Length	-	50 cm
	- Width	-	18 cm
	- Height of base of scar	-	100 cm
●	Overgrowth measurement (depth of scar tissue)	-	20 cm
●	General scar orientation	-	West
●	Shape of scar	-	Elliptical
●	Axe marks present and type (Aboriginal/European)	-	Yes (European)
●	Estimated origin of scar	-	Survey mark (Triangular blaze, distinctive axe marks, distinctive R).

Reference Tree 4 was survey marked in 1960. At the time of assessment the scar was 54 years old. Remnants of the initial survey markings, made by a metal axe, can be seen at the top and bottom of the dead wood. The tree was considered to be of medium age and healthy at the time of assessment.

Based on the age (54 years) and depth of wound regrowth (20 cm) the radial rate of increase in that period is estimated at 0.37 cm/year giving a diameter increment of 0.74 cm/year.

This species (Pilliga Grey Box) grows in the same general vicinity as Poplar Box, Inland Grey Box and White Box in this area. Experience by the author indicates all four species have similar growth rates. This assumption is supported by comparing the growth data for this species (Pilliga Grey Box - Reference Tree 4) with known growth rates for White Box (Reference Tree 1) and Poplar Box (Reference Tree 5) – all growing in similar soil conditions.

In summary, the three different Box species had annual diameter increments of 0.74 cm/year (Reference Tree 4), 0.64 cm/year (Reference Tree 5) and 0.7 cm/year (Reference Tree 1). In other words, wound repair rates were similar. This supports comparison of relative growth data between Box species in this area.

Reference Tree 5 (*Poplar Box – *Eucalyptus populnea)

This tree was marked in 1970 and assessed on 15th October 2014

.A photograph of the scar on Reference Tree 5 is shown below in ***Plate 10***.

Plate 10. *Photograph of scar on Reference Tree 5. Remnant survey marks (arrow and letters RD) are apparent at the top of dead wood. European axe marks are apparent at the base of the dead wood.*

Details of this tree and scar are shown below:

- Reference Tree - 5
- Tree species - Poplar Box (*Eucalyptus populnea*)
- Location of tree - Corner Therribri Road and Rangari Road
- Condition of tree - Old – significant crown damage
- Girth of tree at 1.5 - 328 cm
- Diameter of tree - 104 cm
- Scar dimensions
  - Length - 113 cm
  - Width - 34 cm
  - Height of base of scar - 65 cm
- Overgrowth measurement (depth of scar tissue) - 14 cm
- General scar orientation - South
- Shape of scar - Survey mark
- Axe marks present and type (Aboriginal/European) - Yes -European axe mark
- Estimated origin of scar - European survey mark

Residual survey related markings can be seen in ***Plate 10*** above. An arrow and the letters RD can be seen in the top section of dead wood while European axe marks can be seen in the lower section. ***Plate 11*** below indicates that the tree has lost much of its crown and is in relatively poor health.

Plate 11. *Reference Tree 5 (Poplar Box) has suffered severe crown damage.*

Considering the age since wounding (44 years) and the depth of regrowth scar tissue (14 cm) this indicates that the tree put on 0.32 cm/year radial growth in that time or 0.64 cm/year diameter increment.

As mentioned in the discussion for Reference Tree 4 the scar regrowth rate for this species (Poplar Box - 0.64 cm/year) is similar to that for Reference Tree 1 (White Box – 0.7 cm/year) and Reference Tree 4 (Pilliga Grey Box – 0.74 cm/year). These trees are all of a similar age and growing under similar conditions.

Reference Tree 6 (Narrow-Leaf Ironbark – Eucalyptus crebra)

A suitable reference tree of the same species as Assessment Tree #16 (Narrow-Leaf Ironbark), and with a scar of known age, was found on the corner of Common and Coal Roads approximately two kilometres north east of Muswellbrook on similar soil to that in the study area. The marked tree is shown below in ***Plate 12***.

Plate 12: *Thirty year old scar on Narrow-leaf Ironbark near Muswellbrook (photo taken 2002).*

Inquiry revealed that this tree was initially marked for survey purposes on 10 February 1972 by John Dennis Hickey from the East Maitland Lands office and was identified as D5057/2003. Subsequent removal of regrowth around the top half of the wound has been undertaken at various times over the years (following initial marking) in order to keep the identifying survey number (228) visible. The depth of regrowth at the location of the white page provides the clearest guide to the extent of regrowth between wounding and the photograph.

While the tree had been lopped and had recently died six months prior to the photograph (May 2005), the relatively recent date of the tree's death (at that time) allowed an assessment of the rate of wound repair.

The scar revealed that the tree had put on 20 cm of scar tissue (depth of over-growth) over a 30-year period. This gives an overgrowth radial repair rate of 0.66 cm per annum. The diameter increment is double this (1.32 cm per annum). This rate of wound repair is very similar to the average for the reference Box trees in this report (0.6cm/year diameter increment) found in the Gunnedah/Boggabri area. Practical, field experience supports the similar rate of Box and Narrow-Leaf Ironbark species in many locations.

Reference Tree 7 (Cypress Pine – Callitris spp.)

This tree was survey marked in 1962 and assessed on 23rd February 2016. The scar was 54 years old at assessment (marked in 1962).

The current condition of the scar in 2016 is shown below in ***Plate 13***.

Plate 13. *Photograph of survey related scar on Reference Tree 7. The number 41 is evident below the top arrow. The scar is 54 years old (marked in 1962). The tree was estimated to have died approximately 12 years before this assessment.*

Details of this tree and scar are shown below:

- Reference Tree - 5
- Tree species - Cypress Pine – *Callitris spp*.
- Condition of tree - Dead (died in last 12 years)
- Girth of tree at 1.5 - 130 cm
- Diameter of tree - 41 cm
- Scar dimensions
  - Length - 69 cm
  - Width - 14 cm
  - Height at bottom of scar above ground - 80 cm
- Average overgrowth - 10 cm
- Scar orientation - 67 °
- Scar shape - Pyramidal

- Suspected origin
  - Survey mark 41 – established in 1962
- Scar age
  - 54 years (Note – tree estimated to have died 12 years ago. Hence, scar age at death was estimated at 42 years. This age has been used to calculate rate of wound regrowth.

The tree was dead at the time of assessment (see ***Plate 14*** below).

Plate 14. *Based on the extent of remnant small branches Reference Tree 7 was estimated to have died a maximum of 12 years ago.*

Based on the extent of small to medium branch retention this currently dead tree was estimated to have died a maximum of 12 years prior to this study. If we subtract time since tree death (12 years) from the time since the tree was survey marked (54 years) it is apparent that the tree put on 10cm of growth in 42 years at an approximate radial growth rate of 0.24 cm per year.

Reference Tree 8 (Cypress Pine – Callitris spp.)

This tree was survey marked in 1917 and assessed on 23rd February 2016. The tree was alive when assessed.

Plate 15. *Photograph of survey related scar on Reference Tree 8. The number 36 is evident below the top arrow. The scar is 99 years old (marked in 1917).*

Details of this tree and scar are shown below:

●	Reference Tree	- 8	
●	Tree species	- Cypress Pine – *Callitris spp*.	
●	Condition of tree	- Mature, healthy	
●	Girth of tree at 1.5		- 235 cm
●	Diameter of tree		- 75 cm
●	Scar dimensions	- Length	- 135 cm
		- Width	- 27 cm
		- Height at bottom of scar above ground	- 53 cm
●	Average overgrowth		- 16 cm
●	Scar orientation		- 125 °
●	Scar shape		- Trapezoid
●	Suspected origin		- Survey mark 36 – established in 1917
●	Scar age		- 99 years

Based on the age of the scar (99 years) and the depth of regrowth (16 cm) the average annual radial rate of growth over that period was 0.16 cm per year. This growth rate is lower than that for the other Cypress pine reference tree (Reference tree 7) which had a growth rate of 0.24 cm per year. This growth difference can be partly explained by the likely difference in age of the two trees at the time of scarring. That is, Reference tree 8 was older (and larger) at the time of scarring and hence subsequent growth was slower.

Reference Tree 9 (River Red Gum – Eucalyptus camaldulensis)

This tree was survey marked in 1962 and was still alive when assessed on 23rd February 2016.

Plate 16. *Photograph of the survey related scar on Reference Tree 9 located on a River Red Gum on the banks of the Namoi River. Puckered regrowth around the scar indicates significant growth in the 54 year period since wounding.*

Details of this tree and scar are shown below:

●	Reference Tree	- 9	
●	Tree species	- River Red Gum – *Eucalyptus camaldulensis*	
●	Condition of tree	- Middle age - healthy	
●	Girth of tree at 1.5		- 250 cm
●	Diameter of tree		- 80 cm
●	Scar dimensions	- Length	- 59 cm
		- Width	- 18 cm
		- Height at bottom of scar above ground	- 68 cm
●	Average overgrowth		- 14 cm
●	Scar orientation		- 154 °
●	Scar shape		- Elliptical
●	Suspected origin		- Survey mark - 1962
●	Scar age		- 54 years

Based on the age of the scar (54 years) and the depth of regrowth (14 cm) the average annual radial growth rate over that period was estimated at 0.26 cm per year.

Table 2 – Summary of Reference Tree Growth Data

Reference Tree #	Species	Radial Growth Rate (cm/yr)	Diameter Growth Rate (cm/yr)	
1	White Box	0.35	0.70	
2	Poplar Box	No date available for survey mark - for general guidance only		
3	White Box	0.15	0.30	
4	Pillaga Grey Box	0.37	0.74	
5	Poplar Box	0.32	0.64	
Average Box Trees		**0.3**	**0.6**	
6	Narrow Leaf Ironbark	0.66	1.32	
Average Ironbark		**0.66**	**1.32**	
7	Cypress Pine	0.24	0.48	
8	Cypress Pine	0.16	0.32	
Average Cypress Pine		**0.20**	**0.40**	
9	River Red Gum	0.26	0.52	
Average River Red Gum		**0.26**	**052**	
10	Bimble Box	Scar overgrown – no growth data		See discussion in Section 4.0
11	Grey Box	Scar overgrown - no growth data		See discussion in Section 4.0
Average for all species (where data available).		0.31	0.62	

Box Species

Results for Box reference Trees 1, 3, 4 and 5 were averaged and used for comparison with assessment Box trees growth rates. For this tree group (Box trees) this resulted in an average radial growth of 0.3 cm/year (rounded off) or 0.6 cm/year diameter increment. This average scar regrowth rate has been used to assist scar age determination in Box assessment tree discussion in the next section of this report. All but three of the 29 assessment trees were Box species.

While data from Reference Tree 2 was not used due to the inability to ascertain the date of wounding, it was apparent that this tree, being younger and healthier than Box Reference Trees 1, 3, 4 and 5, was growing quicker than the other Box trees. This was evidenced by the amount of fresh new wound regrowth surrounding recent opening-up of

the survey mark. As such, had likely data for this tree been included in the calculation of the average Box growth rate than the average growth rate of Box species in this report would probably have been higher. This would have resulted in younger estimated scar ages on Box trees. However, a conservative approach has been adopted and Reference Tree 2 has not been considered in any calculations.

It was evident for these trees at least that diameter increment was more affected by tree age, edaphic and health factors, than by species.

As mentioned the wounds on Box Reference Trees 10 and 11 had grown over and no scar growth data could be determined.

Narrow-Leaf Ironbark

The Ironbark reference tree (Reference Tree 6) was located near Muswellbrook in the upper Hunter Valley and used to estimate scar age on Assessment Tree 16 (Ironbark). No Ironbark reference trees could be found in the study area.

Cypress Pine

Two Cypress pine reference trees were identified. One tree was still alive (Reference Tree 8) and one was dead (Reference Tree 7). Scar age results from both were averaged and used to estimate scar age on Assessment Tree 9 (Cypress pine). The time since death for Reference Tree 7 was estimated based on the extent of branch-shed and wood weathering since death.

River Red Gum

One River Red Gum reference tree (Reference Tree 9) was identified and measured. The result from this tree was used to estimate the age of scarring on Assessment tree 26 (River Red Gum).

6.2 Assessment Tree Details

6.2.1 Assessment Trees - General

The following trees were assessed between 22nd and 24th February 2016. ***Figure 3*** below shows the location of assessment trees. ***Table 3*** below provides a summary of assessment tree number, site name, species, general location and co-ordinates (easting/northing).

Figure 3 – Location of Assessment Trees – Vickery Extension Project

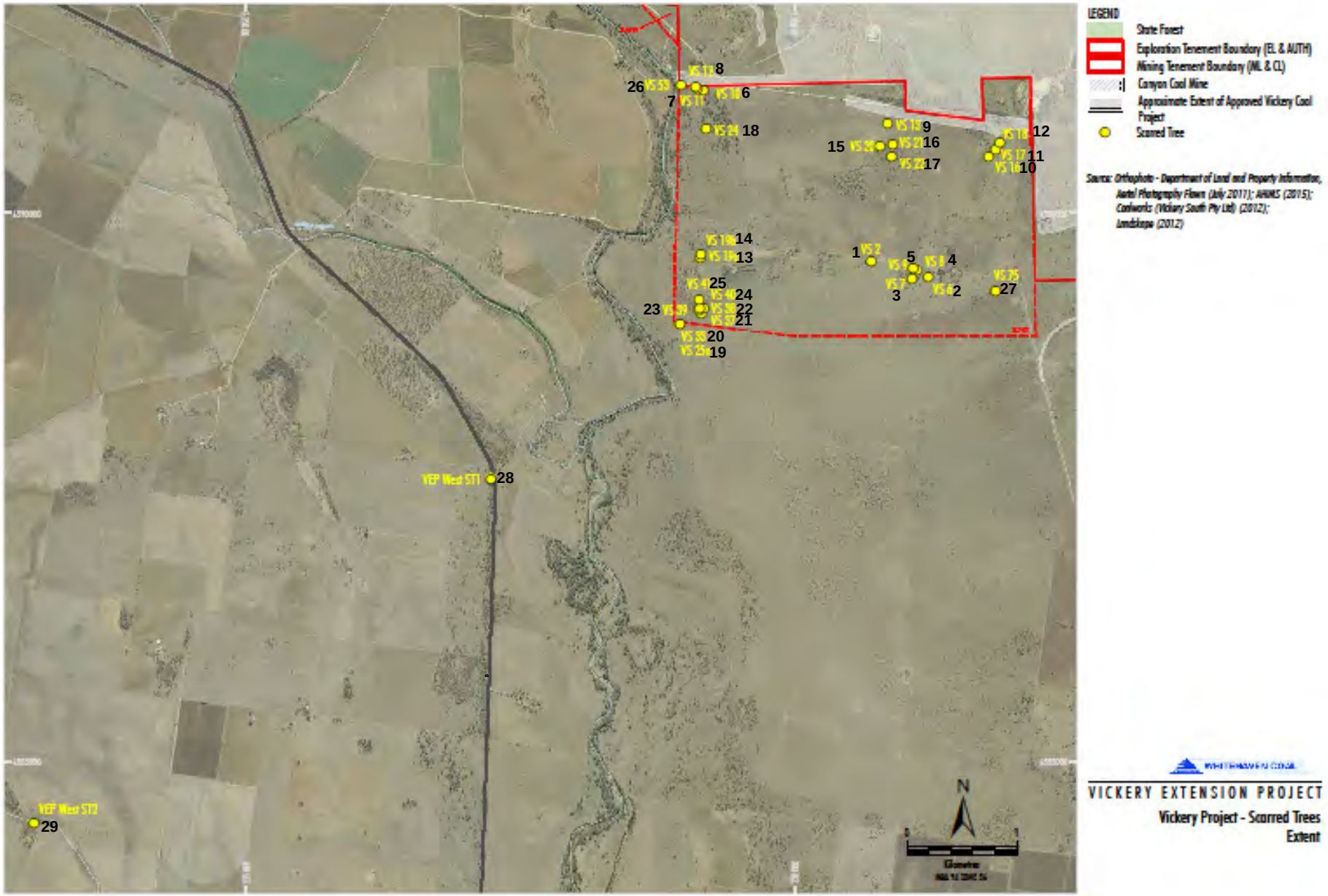


Table 3 – Summary of Assessment Tree Details

Tree Number	Tree Description	Species	Location	mE_GDA94 one 56	mN_GDA94Z one56
1	VS 2	Box	Redbank Paddock	230694	6589561
2	VS 6	Box	Redbank Paddock	231214	6589411
3	VS 7	Box	Redbank Paddock	231065	6589394
4	VS 8	Box	Redbank Paddock	231114	6589483
5	VS 9	Box	Redbank Paddock	231077	6589488
6	VS 10	Box	Polo Paddock	229168	6591109
7	VS 11	Box	Polo Paddock	229113	6591126
8	VS 12	Box	Polo Paddock	229097	6591151
9	VS 13	Cypress	Polo Paddock	230844	6590808
10	VS 16	Box	Polo Paddock	231767	6590518
11	VS 17	Box	Polo Paddock	231828	6590581
12	VS 18	Box	Polo Paddock	231865	6590633
13	VS 19a	Box	Polo Paddock	229138	6589594
14	VS 19b	Box	Polo Paddock	229146	6589629
15	VS 20	Box	Pine Paddock	230778	6590607
16	VS 21	Ironbark	Pine Paddock	230894	6590618
17	VS 22	Box	Pine Paddock	230880	6590511
18	VS 24	Box	Namoi River	229191	6590768
19	VS 25a	Box	Namoi River	228953	6588990
20	VS 33	Box	Namoi River	228953	6588990
21	VS 37	Box	Namoi River	229150	6589075
22	VS 38	Box	Namoi River	229171	6589130
23	VS 39	Box	Namoi River	229125	6589121
24	VS 40	Box	Namoi River	229136	6589136
25	VS 41	Box	Namoi River (Geological test pit 1)	229127	6589205
26	VS 53	River Red Gum	Namoi River (Geological test pit 47a)	228966	6591159
27	VS 75	Box	Redbank Paddock (Geological test pit)	231828	6589288
28	VEP West ST1	Box	WEP – Western Rail Corridor	227234	6587579
29	VEP West ST2	Box	WEP – Western Rail Corridor	223073	6584441

6.2.2 Assessment Tree Details

Assessment Tree 1 (VS 2 – Yellow Box)

A photograph of the three scars on Assessment Tree 1 is shown below in ***Plates 17, 18 & 19.***

Plate 17. *Scar 1 on Assessment Tree 1.*

Plate 18. *Scar 2 on Assessment Tree 1.*

Plate 19. *Scar 3 on Assessment Tree 1.*

Details of this tree and scar are shown below:

- Assessment Tree - 1 (VS 2)
- Tree species - Yellow Box (*Eucalyptus melliodora*)
- Condition of tree - Mature tree with some crown damage
- Tree girth at 1.5 - 425 cm
- Diameter of tree - 135 cm
- Scar dimensions - Scar 1 - 212 x 25 cm
  - Scar 2 - 176 cm x 24 cm
  - Scar 3 - 45 cm x 10 cm
  - Height above ground level - Scar 1 - 0 cm
    - Scar 2 – 36 cm
    - Scar 3 – 109 cm
- Average overgrowth - Scar 1 - 26 cm
  - Scar 2 – 25 cm
  - Scar 3 – 16 cm
- Approximate Scar orientation - Scar 1 - 240 °
  - Scar 2 – 180 °
  - Scar 3 – 40 °
- Scar shape - Scar 1 - Deltoid (triangular)
  - Scar 2 – Deltoid (triangular)
  - Scar 3 - Linear
- Suspected origin - Scar 1 -secondary stem tear
  - Scar 2 – secondary stem tear
  - Scar 3 – branch tear
- Notes - Termite damage to heartwood
- Scar age - Scar 1 - 86 years
  - Scar 2 – 83 years
  - Scar 3 – 53 years

Damage to all three scars appears to relate to secondary stem or lower branch tear which have not healed properly allowing decay to enter the tree.

The dead wood within Scar 2 represents the remnants of a dead secondary stem (remnants still visible) which the tree has tried to encapsulate.

In addition to these three scars, there are also numerous other burls on the trunk (e.g. adjacent to Scars 2 and 3) which support the loss of other stems and branches over the life of the trees. Many of these have completely grown over. The three noted scars represent natural wounds that the tree has tried (unsuccessfully) to encapsulate. Similarly, ***Plate 20*** below shows the remnants of a dead branch protruding from living scar tissue above Scar 1.

Plate 20.

The three scars were estimated to be 86 (Scar 1), 83 (Scar 2), and 57 (Scar 3) years old. Based on the above observations and measurements none of these scars were considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 2 (VS 6 – Grey Box)

A photograph of the tree scar on Assessment Tree 2 is shown below in ***Plate 21.***

Plate 21. *Scar on Assessment Tree 2.*

Details of this tree and scar are shown below:

- Assessment Tree - 1 (VS 6)
- Tree species - Grey Box (*Eucalyptus microcarpa*)
- Condition of tree - Mature with severe upper trunk (wind/damage)
- Girth of tree at 1.5 - 250 cm
- Diameter of tree - 80 cm
- Scar dimensions - 230 x 33 cm
  - Height above ground level - 0 cm
- Average overgrowth - 16 cm
- Approximate Scar orientation - 10 °
- Scar shape - Acuminate (triangular and tapering to a point)
- Suspected origin - Secondary stem tear
- Notes - Termite damage to core of tree, but little to scar surface
- Scar age - 53 years

This scar most likely occurred as a result of secondary stem or branch tear and remnants of the likely dead stem can still be seen on the ground adjacent to the scar in ***Plate 22*** below.

Plate 22. *Dead stem/branch probably related to scar on tree.*

The initial wound was estimated to have originated no earlier than 53 years ago. The extent of decay of the dead secondary stem (lying on the ground) suggests the scar may well be much younger. As a result of the above observations the scar is not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 3 (VS 7 – Grey Box)

A photograph of the tree scar on Assessment Tree 3 is shown below in ***Plate 23.***

Plate 23. *Scar on Assessment Tree 3.*

Details of this tree and scar are shown below:

- Assessment Tree - 3 (VS 7)
- Tree species - Grey Box (*Eucalyptus microcarpa*)
- Condition of tree - Living tree of moderate age with trunk damage but crown intact
- Girth of tree at - 299 cm
- Diameter of tree - 95 cm
- Scar dimensions - 153 x 40 cm
  - Height above ground level - 0 cm
- Average overgrowth - 24 cm
- Approximate Scar orientation - 95 °
- Scar shape - Elliptic
- Suspected origin - Natural scarring due to branch fall/fire/insect attack
- Notes - Termite damage to core of tree and weather scar surface
- Scar age - 80 years

This scar most likely originated from secondary stem tear at the base of the trunk. Decay then spread from this initial wound.

Evidence of young lignotuber shoots can be seen at the base of the trunk and adjacent to the scar. Cattle grazing is preventing these shoots from developing further and from re-establishing a new secondary stem. Growth of secondary stems, tearing and consequent wounding are common growth habits of Box species – particularly in open and exposed paddock environments. The location of trees such as this in open paddocks and exposed to damaging factors such as wind, lightning, stock damage, tractor damage etc. frequently results in regular damage and scarring.

Support for the scar being caused by secondary stem tear can be seen in ***Plate 24*** below where remnants of a fallen secondary stem can be seen laying on the ground next to the scar.

Plate 24. *The relationship between the scar and the dead secondary stem can be clearly seen.*

This scar was estimated to have occurred no earlier than 80 years ago. Based on the above observations and measurements the scar is not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 4 (VS 8 – White Box)

A photograph of the scar on Assessment Tree 4 is shown below in ***Plate 25.***

Plate 25. *Scar on Assessment Tree 4.*

Details of this tree and scar are shown below:

- Assessment Tree - 4 (VS 8)
- Tree species - White Box (*Eucalyptus albens*)
- Condition of tree - Mature tree with wind damage to crown
- Girth of tree at 1.5 - 380 cm
- Diameter of tree - 121 cm
- Scar dimensions - 150 x 30 cm
  - Height above ground level - 30 cm
- Average overgrowth - 30 cm
- Approximate Scar orientation - 50 °
- Scar shape - Ovate
- Suspected origin - Natural scarring due to branch fall/fire/insect attack
- Notes - Termite damage to core of tree and weathered scar surface
- Scar age - 100 years

This scar is located at the junction of two main stems and in a difficult to access inner section of the main trunk. However, this may not always have been the case and it is likely that the stem to the right may have established after initial wounding (lignotuber regrowth) and possibly in response to same.

This scar was estimated to be no older than 100 years. Based on the above observations and measurements the scar is not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 5 (VS 9 – Inland Grey Box)

A photograph of the scar on Assessment Tree 5 is shown below in ***Plate 26.***

Plate 26. *Scar on Assessment Tree 5.*

Details of this tree and scar are shown below:

- Assessment Tree - 5 (VS 9)
- Tree species - Grey Box (*Eucalyptus microcarpa*)
- Condition of tree - Middle age with some dieback of smaller branches
- Girth of tree at 1.5 - 275 cm
- Diameter of tree - 84 cm
- Scar dimensions - 174 x 20 cm
  - Height above ground level - 2 cm
- Overgrowth - 12 (top), 28 (mid left), 23 (mid right), 15 (bottom)
- Average overgrowth - 26 cm
- Approximate Scar orientation - 90 °
- Scar shape - Linear
- Suspected origin - Natural scarring due to branch tear
- Notes - Termite damage to core of tree and heavily weathered scar surface
- Scar age - 87 years

This scar most likely originated from an initial branch tear higher up the tree and probably somewhere near the top of the current, visible scar (see ***Plate 27*** below).

Plate 27. *Note wavy grain pattern in the scar indicating wound healing and partial encapsulation of the initial wound above the current visible scar.*

The wavy grain pattern above the scar also suggests the initial wound resulted from branch tear in this area. The zig-zag bark pattern indicates an altered growth pattern during the initial wound healing/encapsulation process. Wound regrowth was not quick enough to prevent the commencement of internal decay processes and the lower scar is the result over time.

This type of branch tear is common in Box species and evidence of dead branches from the same tree can be seen on the ground in front of the tree in ***Plate 26*** above.

This scar was estimated to have occurred no earlier than 87 years ago. Based on the above observations and measurements the scar is not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 6 (VS 10 – White Box)

Photographs of the five tree scars on Assessment Tree 6 are shown below in ***Plates 28, 29, 30, 31*** and ***32.***

Plate 28. *Scar 1 on Assessment Tree 6.*

Plate 29. *Scar 2 on Assessment Tree 6.*

Plate 30. *Scar 3 on Assessment Tree 6.*

Plate 31. *Scar 4 on Assessment Tree 6.*

Plate 32. *Scar 5 on Assessment Tree 6.*

Details of this tree and scars are shown below:

- Assessment Tree - 6 (VS 10)
- Tree species - White Box (*Eucalyptus albens*)
- Condition of tree - Dead lower trunk only survives
- Girth of tree at 1.5 - 335 cm
- Diameter of tree - 107 cm
- Scar dimensions
  - Scar 1 - 118 x 54 cm
  - Scar 2 - 310 x 56 cm
  - Scar 3 - 77 x 36 cm
  - Scar 4 - 84 x 32 cm
  - Scar 5 - 9 x 4 cm
  - Height above ground level
    - Scar 1 - 0 cm
    - Scar 2 – 0 cm
    - Scar 3 – 77 x 36 cm
    - Scar 4 – 84 x 32 cm
    - Scar 5 - 93 cm
- Average overgrowth
  - Scar 1 - 13 cm
  - Scar 2 - 25 cm
  - Scar 3 - 14 cm

		- Scar 4	- 12 cm		
		- Scar 5	- 9 cm		
●	Scar orientation	- Scar 1	- 220 °		
		- Scar 2	- 130 °		
		- Scar 3	- 350 °		
		- Scar 4	- 280 °		
		- Scar 5	- 250 °		
●	Scar shape	- Scar 1	- Spear shaped		
		- Scar 2	- Linear		
		- Scar 3	- Ovate		
		- Scar 4	- Aristate (rounded with a spine-like top)		
		- Scar 5	- Rectangular		
●	Suspected origin	- Scar 1	- Secondary stem tear on fine		
		- Scar 2	- Secondary stem/branch tear		
		- Scar 3	- Low branch tear		
		- Scar 4	- Branch tear		
		- Scar 5	- European cultural		
●	Notes		- Located 220 m from Namoi River - Tree estimated to have died 36 years ago		
●	Scar age			**At Tree Death**	**Now (2016)**
		- Scar 1	-	43 years	79 years
		- Scar 2	-	83 years	119 years
		- Scar 3	-	47 years	83 years
		- Scar 4	-	40 years	76 years
		- Scar 5	-	30 years	66 years

All scars, except Scar 5, were considered to have initially been caused by low branch or secondary stem tear. Scar 5 appeared to have been caused by European tools. The exact purpose of Scar 5 is unclear but may relate to a mortised hole created to insert a wooden railing for stockyard (permanent or temporary) purposes. The tree was estimated to have died 36 years ago.

The oldest scar (Scar 2) was estimated to be 119 years old. The youngest scar (Scar 5) was estimated to be 66 years old. All scars were considered to have occurred after the cessation of aboriginal scarring in 1870 (146 years ago). Based on the above observations and measurements none of the scars were considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 7 (VS 11 – White Box)

Photographs of the three tree scars on Assessment Tree 7 are shown below in ***Plates 33, 34 and 35.***

Plate 33. *Scar 1 on Assessment Tree 7.*

Plate 34. *Scar 2 on Assessment Tree 7.*

Plate 35. *Scar 3 on Assessment Tree 7.*

Details of this tree and scars are shown below:

- Reference Tree - 7 (VS 11)
- Tree species - White Box (*Eucalyptus albens*)
- Condition of tree - Mature tree with some crown damage
- Girth of tree at 1.5 - 404 cm
- Diameter of tree - 129 cm
- Scar dimensions
  - Scar 1 - 100 x 23 cm
  - Scar 2 - 126 x 8 cm
  - Scar 3 - 32 x 7 cm
  - Height above ground level
    - Scar 1 - 86 cm
    - Scar 2 – 94 cm
    - Scar 3 – 33 cm
- Average overgrowth
  - Scar 1 - 25 cm
  - Scar 2 - 19 cm
  - Scar 3 - 10 cm
- Scar orientation
  - Scar 1 - 200 °
  - Scar 2 - 295 °
  - Scar 3 - 5 °
- Scar shape - Scar 1 - Truncate)linear with a

		squared off apex)
	- Scar 2	- Ovate
	- Scar 3	- Linear
● Suspected origin	- Scar 1	- Branch tear
	- Scar 2	- Branch tear
	- Scar 3	- Secondary stem tear
● Estimated Scar age		
	- Scar 1	- 83 years
	- Scar 2	- 63 years
	- Scar 3	- 63 – Similar age to Scar 2 but wound overgrown and age unclear

These three scars all appear to have originated from low branch or secondary stem tear. An example of a surviving (living) low secondary stem can be seen next to (right of) Scar 1 in ***Plate 33***. Secondary steam and branch tear is considered the major cause of trunk scarring on Box trees in this region. Estimated scar ages ranged from 63 to 83 years. Based on the above observations and measurements the scars were not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 8 (VS 12 – White Box)

A photograph of the scar on Assessment Tree 8 is shown below in ***Plate 36.***

Plate 36. *Scar on Assessment Tree 8.*

Details of this tree and scar are shown below:

- Assessment Tree - 8 (VS 12)
- Tree species - White Box (*Eucalyptus albens*)
- Condition of tree - Mature tree with extensive branch fall from crown
- Girth of tree at 1.5 cm height - 323 cm
- Diameter of tree - 103 cm
- Scar dimensions - 148 x 22 cm
  - Height above ground level - 58 cm
- Average overgrowth - 23 cm
- Approximate Scar orientation - 195 °
- Scar shape - Lanceolate
- Suspected origin - Natural scarring due to branch fall and secondary stem tear.
- Notes - Termite damage to core of tree
- Scar age - 77 years

This scar has two components and may be the result of two separate wounding events. The smaller scar at the top appears to relate to branch death as a result of encroaching decay and remnant dead branch pieces can be seen within the scar. The lower and longer scar at the bottom appears to relate to secondary stem tear close to the ground. In addition to these two scars evidence of other secondary stem tear and consequent scarring can be seen below in ***Plate 37*** below. The tree appears to have had a long history of miscellaneous damage and observed scars may well be the result of multiple injuries over time.

Both scars were estimated to be approximately 77 years old and may have resulted from a similar wounding event(s). Based on the above observations and measurements the scar was not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Plate 37. *Additional evidence of scarring from another secondary stem tear on same tree.*

Assessment Tree 9 (VS 13 – Cypress Pine)

Photographs of the two tree scars on Assessment Tree 9 are shown below in ***Plates 38 and 39.***

Plate 38. *Scar 1 on Assessment Tree 9.*

Plate 39. *Scar 2 on Assessment Tree 9.*

Details of this tree and scars are shown below:

- Assessment Tree - 9 (VS 13)
- Tree species - Cypress Pine (Callitris sp.)
- Condition of tree - Dead tree with some remaining branches
- Girth of tree at 1.5 - 117 cm
- Diameter of tree - 37 cm
- Scar dimensions
  - Scar 1 - 49 x 11 cm
  - Scar 2 - 140 x 32 cm
  - Height above ground level - Scar 1 - 159 cm
  - Scar 2 – 0 cm
- Average overgrowth
  - Scar 1 - 5 cm
  - Scar 2 - 5 cm
- Scar orientation
  - Scar 1 - 210 °
  - Scar 2 - 350 °
- Scar shape
  - Scar 1 - Lanceolate
  - Scar 2 - Squat linear
- Suspected origin
  - Scar 1 - European
  - Scar 2 - Mechanical damage during clearing
- Notes - Steel axe marks across the heartwood of Scar 1
- Estimated Scar age
  - Scar 1 - 48 years (allows for time since tree death – 25 + 23)
  - Scar 2 - 48 years (allows for time since tree death)

Based on the average growth increment of the two Cypress reference trees (Reference Trees 7 and 8) in ***Table 2*** both scars were estimated to be approximately 25 years old at the time of tree death. This suggests that both scars may have been damaged at the same time - possibly in a widespread clearing event. Metal axe marks on dead wood on Scar 1 certainly place this scar within European history.

Although dead the tree still possessed medium size branches (***Plate 40*** below) although most of the smaller branches and twigs had disappeared. As a result, it was estimated that the tree had been dead for approximately 23 years. This estimate allows for the more durable and slower decay rate of Cypress pine compared to some other forest species (hence why termite resistant White cypress pine is commonly used for flooring). Combining these results with scar age at tree death indicates that both scars were initiated approximately 48 years ago. Based on the above observations and

measurements the scars were not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Plate 40. *Remnant, medium size branches on Assessment Tree 9.*

Assessment Tree 10 (VS 16 – Grey Box)

A photograph of the scar on Assessment Tree 10 is shown below in ***Plate 41.***

Plate 41. *Scar on Assessment Tree 10.*

Details of this tree and scar are shown below:

- Assessment Tree - 10 (VS 16)
- Tree species - Grey Box (*Eucalyptus microcarpa*)
- Condition of tree - Mature tree with some minor dieback and branch fall
- Girth of tree at 1.5 - 272 cm
- Diameter of tree - 87 cm
- Scar dimensions - 250 x 41 cm
  - Height above ground level - 15 cm
- Average overgrowth - 15 cm
- Approximate Scar orientation - 40 °
- Scar shape - Linear
- Suspected origin - Natural scarring due to branch fall
- Scar age - 50 years

This scar appears to have been caused by secondary stem tear near the base of the trunk. This wound has resulted in decay (dead wood) spreading up the tree. Expanding decay has resulted in the death of smaller branches higher up the trunk. Supporting evidence for this can be seen in ***Plate 42*** below which shows evidence of remnant dead

branch material extruding from decaying wood within a partially healed section at the top of the main scar scar.

Plate 42. *Remnant dead branch located within scar.*

There was also evidence of numerous large dead branches on the ground surrounding the tree (***Plate 43*** below) which indicates ongoing branch and secondary stem tear.

Plate 43. *Numerous large, dead branches were scattered around the main trunk supporting regular and ongoing stem/branch tear.*

This scar was estimated to be approximately 50 years old. Based on the above observations and measurements the scar was not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 11 (VS 17 – Grey Box)

A photograph of the scar on Assessment Tree 11 is shown below in ***Plate 44.***

Plate 44. *Scar on Assessment Tree 11.*

Details of this tree and scar are shown below:

- Assessment Tree - 11 (VS 17)
- Tree species - Grey Box (*Eucalyptus microcarpa*)
- Condition of tree - Mature tree with some minor dieback and branch fall
- Girth of tree at 1.5 - 215 cm
- Diameter of tree - 68 cm
- Scar dimensions - 75 x 6 cm
  - Height above ground level - 40 cm
- Average overgrowth - 14 cm
- Approximate Scar orientation - 80 °
- Scar shape - Linear
- Suspected origin - Natural scarring due to secondary stem tear.
- Notes - Bifurcated trunk growing from scar
- Scar age - 47 years

This scar appears to relate to secondary stem tear near the base of the trunk. A larger, surviving secondary stem can be seen to the left of the scarred trunk in the above plate. This surviving secondary stem may have grown in response to initial damage to the main trunk. As previously mentioned, Box trees are prone to secondary stem formation following damage to the main trunk.

This scar was estimated to be approximately 47 years old. Based on the above observations and measurements the scar was not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 12 (VS 18 – Grey Box)

A photograph of the scar on Assessment Tree 12 is shown below in ***Plate 45.***

Plate 45. *Scar on Assessment Tree 12.*

Details of this tree and scar are shown below:

- Assessment Tree - 12 (VS 18)
- Tree species - White Box (*Eucalyptus microcarpa*)
- Condition of tree - Live, healthy tree
- Girth of tree at 1.5 - 285 cm
- Diameter of tree - 91 cm
- Scar dimensions - 102 x 15 cm
  - Height above ground level - 106 cm
- Average overgrowth - 20 cm
- Approximate Scar orientation - 180 °
- Scar shape - Linear
- Suspected origin - Natural scarring due to branch fall/damage
- Scar age - 67 years

This scar is clearly related to decay caused by a branch/secondary stem dying. Evidence of a dead remnant branch/stem can be seen within the scar hollow in the above plate.

This scar was estimated to be a maximum of 67 years old. Based on the above observations and measurements the scar was not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 13 (VS 19a – Poplar Box)

Photographs of the two scars on Assessment Tree 13 are shown below in ***Plates 46 and Plate 47.***

Plate 46. *Scar 1 on Assessment Tree 13.*

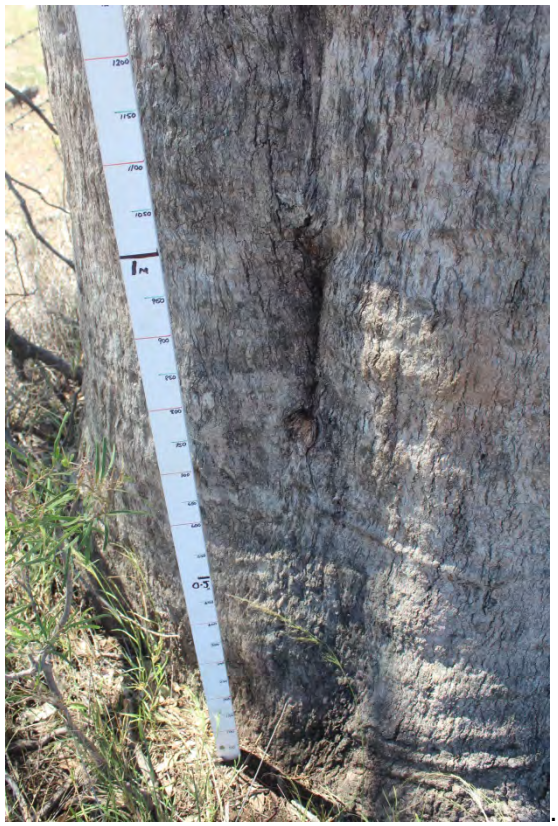


Plate 47. *Scar 2 on Assessment Tree 13.*

Details of this tree and scars are shown below:

- Assessment Tree - 13 (VS 19a)
- Tree species - Poplar Box (*Eucalyptus populnea*)
- Condition of tree - Mature tree with some minor dieback and branch fall
- Girth of tree at 1.5 - 320 cm
- Diameter of tree - 102 cm
- Scar dimensions
  - Scar 1 - 80 x 30 cm
  - Scar 2 58 x 2 cm
  - Height above ground level - Scar 1 - 40 cm
    - Scar 2 – 64 cm
- Average overgrowth
  - Scar 1 - 24 cm
  - Scar 2 - 4 cm (but difficult to determine due to wound healing)
- Approximate Scar orientation
  - Scar 1 - 90 °
  - Scar 2 - 200 °
- Scar shape
  - Scar 1 - Narrow Linear
  - Scar 2 - Narrow Linear
- Suspected origin
  - Scar 1 - Secondary stem tear
  - Scar 2 - Secondary stem tear
- Notes - Located near a fence line and other farm infrastructure
- Scar age
  - Scar 1 - 80 years
  - Scar 2 - 13 years plus. Could be similar age to scar but grown over

It appears that both scars initiated near the base of the trunk and both appear to relate to secondary stem tear. A small wound from a more recent (small) secondary stem tear can be seen at the bottom, right hand corner of Scar 1. A wound regrowth crease can be seen below Scar 2 and supports secondary stem tear close to the ground as being the cause in both cases. This tree is located near a farmhouse and sheds and secondary stem tear may have been a result of European farming activity.

The oldest scar is estimated to be approximately 80 years old. Based on the above observations and measurements neither scar is considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 14 (VS 19b – Grey Box)

A photograph of the scar on Assessment Tree 14 is shown below in ***Plate 48.***

Plate 48. *Scar on Assessment Tree 14.*

Details of this tree and scar are shown below:

- Assessment Tree - 14 (VS 19b)
- Tree species - Grey Box (*Eucalyptus microcarpa*)
- Condition of tree - Live, healthy tree
- Girth of tree at 1.5 - 305 cm
- Diameter of tree - 97 cm
- Scar dimensions - 84 x 8 cm
  - Height above ground level - 70 cm
- Average overgrowth - 16 cm
- Approximate Scar orientation - 330 °
- Scar shape - Linear
- Suspected origin - Natural scarring due to secondary stem tear or branch fall possible associated with tree clearing or other pastoral activities
- Notes - Located near homestead

and fence line

- Scar age - 53 years

This scar is located at the base of the trunk and is consistent with a wound caused by secondary stem tear. The initial wound most likely occurred lower down at the base of the trunk as evidenced by the wavy overgrowth crease below the current visible dead hollow. As this tree is located near a homestead the cause or factor resulting in the stem tear may relate to European farming activity.

The scar is estimated to be approximately 53 years old. Based on the above observations and measurements this scar was not considerd to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 15 (VS 20 – Grey Box)

A photograph of the scar on Assessment Tree 15 is shown below in ***Plate 49.***

Plate 49. *Scar on Assessment Tree 15.*

Details of this tree and scar are shown below:

- Assessment Tree - 15 (VS 20)
- Tree species - Grey Box (*Eucalyptus microcarpa)*
- Condition of tree - Live tree with some branch dieback
- Girth of tree at 1.5 - 310 cm
- Diameter of tree - 99 cm
- Scar dimensions - 10 x 10 cm
  - Height above ground level - 84 cm
- Average overgrowth - 8 cm
- Approximate Scar orientation - 80 °
- Scar shape - Orbicular (circular)
- Suspected origin - Natural scarring due to epicormic branch fall
- Notes - Large bole growing at site of secondary stem attachment point
- Scar age - 27 years

This scar almost certainly resulted from a largely encapsulated wound caused by secondary stem tear. A surviving secondary stem can be seen on the left hand side of the tree in the above photograph. Secondary stem formation and consequent tearing are common features on Box trees in this area.

The scar was estimated to be approximately 27 years old. Based on the above observations and measurements this scar was not considerd to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 16 (VS 21 – Narrow-leaf Ironbark)

A photograph of the scar on Assessment Tree 16 is shown below in ***Plate 50.***

Plate 50. *Scar on Assessment Tree 16.*

Details of this tree and scar are shown below:

- Assessment Tree - 16 (VS 21)
- Tree species - Narrow-leaf Ironbark (*Eucalyptus crebra*)
- Condition of tree - Live tree with some branch dieback
- Girth of tree at 1.5 - 246 cm
- Diameter of tree - 78 cm
- Scar dimensions - 201 x 30 cm
  - Height above ground level - 0 cm
- Average overgrowth - 17 cm
- Approximate Scar orientation - 160 °
- Scar shape - Linear
- Suspected origin - Branch tear
- Notes - A tree species not known as used for Indigenous bark removal
- Scar age - 57 years

This scar was most likely caused by branch or secondary stem tear near the base of the trunk. This is a common occurrence and evidence of fallen branches can be seen behind the tree in the above plate. Wind or mechanical damage (tree was close to farmhouse) to branches and stems is common in these single, open-paddock trees.

Using the average growth rate for Reference Tree 6 (Ironbark) in Table 4, this scar was estimated to be approximately 57 years old. Based on the above observations and measurements this scar was not considerd to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 17 (VS 22 – Grey Box)

A photograph of the scar on Assessment Tree 17 is shown below in ***Plate 51.***

Plate 51. *Scar on Assessment Tree 17.*

Details of this tree and scar are shown below:

- Assessment Tree - 17 (VS 22)
- Tree species - Grey Box (*Eucalyptus microcarpa*)
- Condition of tree - Live tree with some branch dieback
- Girth of tree at 1.5 - 215 cm
- Diameter of tree - 68 cm
- Scar dimensions - 56 x 20 cm
  - Height above ground level - 58 cm
- Average overgrowth - 20 cm
- Approximate Scar orientation - 170 °
- Scar shape - Linear
- Suspected origin - Natural scarring initially caused by branch tear
- Notes - Termite infestation with heartwood damage
- Scar age - 67 years

This scar was most likely caused by a low branch or stem tearing off the tree. A similar (intact) live branch can be seen in the top left hand corner of the above photograph. Numerous examples of fallen and dead branches can also be seen on the ground in the background of the above photograph. Evidence of metal axe marks can also be seen on dead wood within the scar (see ***Plate 52*** below) placing the scar in European context. This tree appears to have had a long history of multiple wounding from both natural and European causes.

Plate 52. *Evidence of metal axe marks within the scar on Assessment Tree 17.*

The scar was estimated to be approximately 67 years old and was not considerd to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 18 (VS 24 – Poplar Box)

A photograph of the scar on Assessment Tree 18 is shown below in ***Plate 53.***

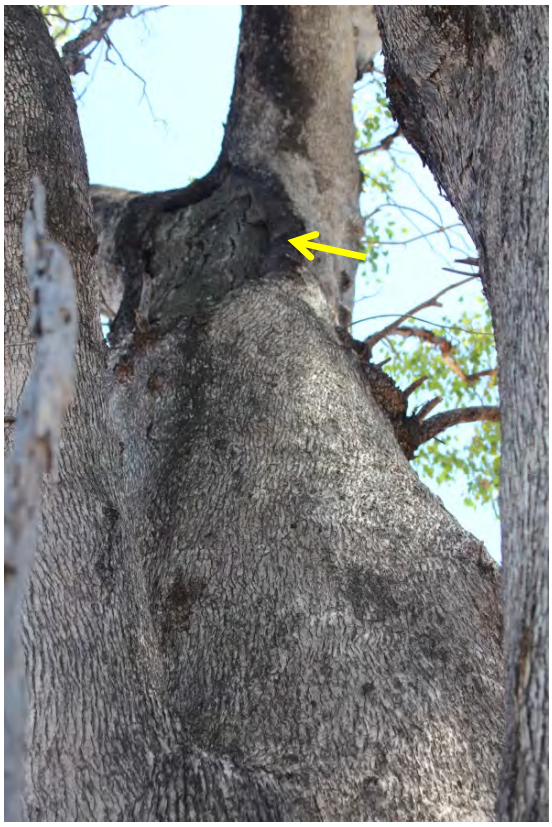


Plate 53. *Scar on Assessment Tree 18.*

Details of this tree and scar are shown below:

- Assessment Tree - 18 (VS 24)
- Tree species - Poplar Box (*Eucalyptus populnea*)
- Condition of tree - Live tree with extensive branch dieback
- Girth of tree at 1.5 - 190 cm
- Diameter of tree - 60 cm
- Scar dimensions - 158 x 32 cm
  - Height above ground level - 410 cm
- Average overgrowth - 6 cm
- Approximate Scar orientation - 125 °
- Scar shape - Irregular truncate
- Suspected origin - Abrasion from a falling branch higher in the tree
- Notes - Too high on trunk to have a cultural origin
- Scar age - 13 years

This scar was estimated to be approximately 20 years old. In addition to its relatively young age the scar was too high on the trunk (inaccesible without a ladder) to be considered of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 19 and 20 (VS 25a and VS 33 – Grey Box)

This tree was measured and recorded separately in two different (earlier) survey events. Tree 19 and 20 (VS 25a and VS 33) are one and the same tree.

A photograph of the three scars on Assessment Tree 19 (20) are shown below in ***Plates 54, 55 and 56.***

Plate 54. *Scar 1 on Assessment Tree 19 (20).*

Plate 55. *Scar 2 on Assessment Tree 19 (20)*

Plate 56. *Scar 3 on Assessment Tree 19 (20).*

Details of this tree and scars are shown below:

- Assessment Tree - 19 and 20 (VS 25a and VS 33)
- Tree species - Grey Box (*Eucalyptus microcarpa*)
- Condition of tree - Dying tree with extensive dieback and crown damage
- Girth of tree at 1.5 - 313 cm
- Diameter of tree - 100 cm
- Scar dimensions
  - Scar 1 - 210 x 44 cm
  - Scar 2 - 19 x 50 cm
  - Scar 3 - 243 x 27 cm
  - Height above ground level
    - Scar 1 - 10 cm
    - Scar 2 – 0 cm
    - Scar 3 – 0 cm
- Average overgrowth
  - Scar 1 - 17 cm
  - Scar 2 - 10 cm
  - Scar 3 - 3 cm
- Approximate Scar orientation
  - Scar 1 - 330 °
  - Scar 2 - 140 °
  - Scar 3 - 310 °
- Scar shape
  - Scar 1 - Oblong
  - Scar 2 - Acuminate
  - Scar 3 - Spear shaped
- Suspected origin
  - Scar 1 - Branch/secondary stem tear
  - Scar 2 - Branch/secondary stem tear
  - Scar 3 - Branch/secondary stem tear
- Notes - Hollow tree with termite damage
- Scar age
  - Scar 1 - 57 years
  - Scar 2 - 33 years
  - Scar 3 - 10 years

All three scars on this tree were considered to have originated from low branch or secondary stem tear. Low branches/secondary stems h in this area are prone to tearing - often from wind damage or contact with farm equipment or stock. An example of a remnant, living low branch can be seen on the right hand side of Scar 3 in ***Plate 56***. This open paddock-grown tree has suffered repeated damage, on numerous occasions, and

over many years. As a result, each current individual scar may well be a composite of more than one wounding event. There was also evidence of damage from wire fencing on the tree (see parallel ring marks on Scar 3).

The scars were estimated to be approximately 57, 33 and 10 years old respectively. Based on the above observations and measurements none of the scars were considerd to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 21 (VS 37 – Poplar Box)

A photograph of the scar on Assessment Tree 21 is shown below in ***Plate 57.***

Plate 57. *Scar on Assessment Tree 21.*

Details of this tree and scar are shown below:

- Assessment Tree - 21 (VS 37)
- Tree species - Poplar Box (Eucalyptus populnea)
- Condition of tree - Healthy tree with minor crown damage
- Girth of tree at 1.5 - 309 cm
- Diameter of tree - 98 cm
- Scar dimensions - 115 x 15 cm
  - Height above ground level - 63 cm
- Average overgrowth - 30 cm
- Approximate Scar orientation - 220 °
- Scar shape - Linear
- Suspected origin - Branch tear
- Notes - Hollow trunk with extensive regrowth pushing remaining heartwood inwards
- Scar age - 100 years

This scar most likely originated from a low branch tear. A similar living low branch can be seen below on the left hand side of the tree in ***Plate 58*** below.

Plate 58. *Note living low branch to left of scar. Low branches like this located on open paddock grown box trees are prone to tearing due to wind, mechanical farm machinery or stock damage.*

The scar was estimated to be a maximum of 100 years old (probably much younger) and was not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 22 (VS 38 – Poplar Box)

A photograph of the scar on Assessment Tree 22 is shown below in ***Plate 59.***

Plate 59. *Scar on Assessment Tree 22.*

Details of this tree and scar are shown below:

- Assessment Tree - 22 (VS 38)
- Tree species - Poplar Box (Eucalyptus populnea)
- Condition of tree - Dying tree with extensive crown damage
- Girth of tree at 1.5 - 151 cm
- Diameter of tree - 48 cm
- Scar dimensions - 172 x 22 cm
  - Height above ground level - 25 cm
- Average overgrowth - 10 cm
- Approximate Scar orientation - 135 °
- Scar shape - Linear
- Suspected origin - Branch tear
- Notes - Hollow trunk with chainsaw cut to timber at side, top and base of scar. Original scar older than chainsaw cuts
- Scar age - 30 years

This tree is small and relatively young. The scar is again consistent with low branch or secondary stem tear. There is also evidence of chainsaw damage on the edge of the scar (see ***Plate 60*** below) but this does not appear to relate to the initial wound.

Plate 60. *Showing chainsaw cut – most likely occurred well after initial wound.*

This scar was estimated to be approximately 30 years old and appears to have been initiated early in the life of this relatively young tree. Based on the above observations and measurements the scar is not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 23 (VS 39 – Poplar Box)

A photograph of the scar on Assessment Tree 23 is shown below in ***Plate 61.***

Plate 61. *Scar on Assessment Tree 23.*

Details of this tree and scar are shown below:

- Assessment Tree - 23 (VS 39)
- Tree species - Poplar Box (Eucalyptus populnea)
- Condition of tree - Small tree with some upper trunk damage from wind
- Girth of tree at 1.5 - 200 cm
- Diameter of tree - 64 cm
- Scar dimensions - 215 x 15 cm
  - Height above ground level - 0 cm
- Average overgrowth - 15 cm
- Approximate Scar orientation - 130 °
- Scar shape - Linear
- Suspected origin - Branch or secondary stem tear
- Notes - Hollow trunk - heartwood pushed out by regrowth
- Scar age - 50 years

This scar appears to relate to low branch or secondary stem tear early in the life of the tree. An example of a typical (surviving) low branch (epicormic branch formation after trauma to the main trunk) can be seen on the left hand side of the tree in the above photo.

This tree is small and relatively young. The scar on this tree is estimated to be approximately 50 years old but may well be much younger. For these reasons the scar was not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 24 (VS 40 – Poplar Box)

A photograph of the scar on Assessment Tree 24 is shown below in ***Plate 62.***

Plate 62. *Scar on Assessment Tree 24.*

Details of this tree and scar are shown below:

- Assessment Tree - 24 (VS 40)
- Tree species - Poplar Box (Eucalyptus populnea)
- Condition of tree - Mature tree with some upper branch dieback
- Girth of tree at 1.5 - 375 cm
- Diameter of tree - 119 cm
- Scar dimensions - 140 x 22 cm
  - Height above ground level - 59 cm
- Average overgrowth - 20 cm
- Approximate Scar orientation - 220 °
- Scar shape - Acuminate
- Suspected origin - Branch tear
- Notes - Hollow trunk with termite damage. Bifurcated trunk
- Scar age - 67 years

This scar is consistent with an early secondary stem tear that has led to further decay. Two remnant, living secondary stems can be seen in ***Plate 63*** below. These probably established following the initial wound to the main trunk (at that time).

Plate 63. *Multiple secondary stems on Scar Tree 24. When these break off (tear) scars can form during the healing process if the wound is not completely occluded before decay commences. Formation of secondary stems are also a common consequent response to early damage to the main trunk.*

This scar was estimated to be approximately 67 years old. Based on the above observations and measurements the scar was not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 25 (VS 41 – Poplar Box)

A photograph of the scar on Assessment Tree 25 is shown below in ***Plate 64.***

Plate 64. *Scar on Assessment Tree 25.*

Details of this tree and scar are shown below:

- Assessment Tree - 25 (VS 41)
- Tree species - Poplar Box (Eucalyptus populnea)
- Condition of tree - Healthy tree with some upper branch dieback
- Girth of tree at 1.5 - 150 cm
- Diameter of tree - 48 cm
- Scar dimensions - 63 x 14 cm
  - Height above ground level - 370 cm
- Average overgrowth - 5 cm
- Approximate Scar orientation - 20 °
- Scar shape - Elliptic
- Suspected origin - Natural branch tear
- Notes - Scar high up on trunk
- Scar age - 17 years

This scar was estimated to be approximately 17 years old noting that the tree is smaller and relatively younger than many other trees in this study. The base of this scar is 3.7m above ground level and appears to relate to branch tear. A remnant living branch can be seen next to the scar. The high nature of the scar, together with its relatively young age, precludes it from being of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 26 (VS 22 – River Red Gum)

A photograph of the scar on Assessment Tree 26 is shown below in ***Plate 65.***

Plate 65. *Scar on Assessment Tree 26.*

Details of this tree and scar are shown below:

- Assessment Tree - 26 (VS 22)
- Tree species - River Red Gum (*Eucalyptus camaldulensis*)
- Condition of tree - Mature tree with upper trunk wind damage and erosion around roots
- Girth of tree at 1.5 - 330 cm
- Diameter of tree - 105 cm
- Scar dimensions - 62 x 6 cm
  - Height above ground level - 117 cm
- Average overgrowth - 13 cm
- Approximate Scar orientation - 45 °
- Scar shape - Linear
- Suspected origin - European related scar (Tree is a corner post in fence)
- Notes - Recent damage from use as a fence corner post with fence wire and metal spikes driven into

trunk. Adjacent to Namoi River

- Scar age - 50 years

This scar was most likely caused by European activity linked to this tree's role as a major fencing/boundary corner post. Similar fencing related scars on other River Red Gums in this vicinity were noted.

Using the growth rate from the reference River Red Gum (Reference Tree 9) in ***Table 2*** approximates the age of this scar at 50 years. It was not considerd to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 27 (VS75 -Inland Grey Box)

A photograph of the scar on Assessment tree 27 is shown in ***Plate 66***.

Plate 66. *Photograph of survey related scar on Assessment Tree 27.*

Details of this tree and scar are shown below:

- Assessment Tree - 27 - VS75
- Tree species - Inland Grey Box (*Eucalyptus macrocarpa*)
- Condition of tree - Living tree with termite infestation
- Girth of tree at 1.5 - 243 cm
- Diameter of tree - 77 cm
- Scar dimensions - - 260 x 260 cm
  - Height above ground level - 0 cm
- Average overgrowth (cm) - 26 cm
- Scar orientation ° - 30 °
- Scar shape - Linear
- Axe marks - Not on scar but saw marks elsewhere
- Suspected origin - Natural – secondary stem tear
- Scar age (years) - 87 years

The initial cause of wounding was considered to be secondary stem tear. This species is prone to production of both secondary stems and lower branches in open-grown field conditions such as this (where low light is not a limiting factor). A small living secondary stem can be seen on the front left hand side of the tree and is typical of secondary stems that are prone to tearing because of wind damage or other factors. Once a wound occurs this often results in a permanent scar - unless the tree can quickly heal the wound. After looking at the damaged appearance of the main trunk it is considered highly likely that there have been numerous damage and wounding events over the life of the tree. These often result in the formation of further new stems or branches which in turn can tear and result in further scarring. It is most likely that a combination of repeated wounding events have caused the observed scar. In summary, scars can often be a composite of more than one injury event and decay processes such as termites and fungal attack than exacerbate damage to the tree over time.

The scar was estimated to be approximately 87 years old. Based on the above observations and measurements the scar is not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 28 (VEP West ST1 – Poplar Box)

This tree was located within the Kamilaroi Highway easement north of Gunnedah. A photograph of the scar on Assessment Tree 28 is shown below in ***Plate 67.***

Plate 67. *Scar on Assessment Tree 28.*

Details of this tree and scar are shown below:

- Assessment Tree - 28 (VEP West ST1)
- Tree species - Bimble Box
- Condition of tree - Mature declining crown
- Girth of tree at 1.5 - 326 cm
- Diameter of tree - 104 cm
- Scar dimensions - 150 x 43 cm
  - Height above ground level - 50 cm
- Average overgrowth - 26 cm
- Approximate Scar orientation - 150 °
- Scar shape - Elliptical
- Suspected origin - Next to main highway. Low branch on secondary stem tear
- Scar age - 87 years

In addition to the study scar this tree showed considerable evidence of other (repeated) secondary stem death and wound repair around ground level on the main trunk (see ***Plate 68*** below).

Plate 68. *Showing a partly healed wound following death of a secondary stem.*

This scar was estimated to be approximately 87 years old. Based on the above observations and measurements the scar was not considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

Assessment Tree 29 (VEP West ST2 – River Red Gum)

The dead stump on which the scar was located was situated in a remnant tree copse in open farming country. A photograph of the scar on Assessment Tree 29 is shown below in ***Plate 69.***

Plate 69. *Scar on Assessment Tree 29.*

Details of this tree and scar are shown below:

- Assessment Tree - 29 (VEPS 37)
- Tree species - River Red Gum (*Eucalyptus camaldulensis*) Most likely
- Condition of tree - Dead, scar on remnant stump
- Girth of tree at 1.5 - 240 cm
- Diameter of tree - 76 cm
- Scar dimensions - 34 x 14 cm
  - Height above ground level - 78 cm
- Average overgrowth - 12 cm
- Approximate Scar orientation - 254 °
- Scar shape - Elliptical
- Suspected origin - Trunk damage from past European activity
- Scar age - 46 years at tree death + 40 years since tree death = 86 years

This remnant stump was located in a remnant tree stand that has had an apparent long history of European timber extraction over many years. The trunk of this tree was felled for timber using a chainsaw approximately 40 years ago (late 1960s). There is considerably other evidence of extensive, similar chainsaw tree felling around the same time in the near vicinity of this stump.

Combining the age of scar at tree death (46 years) and the estimated time since death (40 years) suggests the scar is approximately 86 years old. Based on the above observations and measurements the scar is not considered to be of Aboriginal origin (Kamminga and Lance 2016).

6.2.3 Summary of Estimated Scar Ages

Estimated scar ages for each tree and for individual scars are summarized below in ***Table 4***.

Table 4 – Summary of Assessment Tree Scar Growth Data

Tree Number	Tree Description	Species	Estimated Scar Age (years)
1	VS2	Box	Scar 1 = 86 Scar 2 = 83 Scar 3 = 53
2	VS6	Box	53
3	VS7	Box	80
4	VS8	Box	100
5	VS9	Box	87
6	VS10	Box	Scar 1 = 79 Scar 2 = 119 Scar 3 = 83 Scar 4 = 76 Scar 5 = 66
7	VS11	Box	Scar 1 = 83 Scar 2 = 63 Scar 3 = 63
8	VS12	Box	77
9	VS13	Cypress (Callitris)	48
10	VS16	Box	50
11	VS17	Box	47
12	SV18	Box	67
13	VS19a	Box	Scar 1 = 80 Scar 2 = 13+
14	VS19b	Box	53
15	VS20	Box	27
16	VS21	Ironbark	57
17	VS22	Box	67
18	VS24	Box	13
19	VS25a VS33	Box	Scar 1 = 57 Scar 2 = 33 Scar 3 = 10
20	Same tree as 19	Box	Same scar as tree 19
21	VS37	Box	100
22	VS38	Box	30
23	VS39	Box	50
24	VS40	Box	67
25	VS41	Box	17
26	VS53	River Red Gum	50
27	VS75	Box	87
28	VEP West ST1	Box	87
29	VEP West ST2	Box	86

6.2.4 Conclusions

1. Based on estimated scar ages, and applying a cut-off date of 1870 (146 years ago), none of the study scars were considered to be of Aboriginal cultural origin (Kamminga and Lance 2016).

2. The above conclusion was strongly supported by the observation that the majority of the scars could be clearly linked to wounds resulting from branch or secondary stem tear. In some cases, the dead, torn branch/stem could still be seen lying on the ground adjacent to the scar. Lower stem/branch tear is a commonly observed characteristic of many trees (and particularly Box trees) in this region.

3. There was evidence of widespread scarring on trees generally in this region. There appeared little difference between the nature and age of study scars compared to numerous other similar scars, on similar remnant trees, in the area. The initial criteria for nomination of some trees were often unclear – particularly when the lower edges of some scars were well over reachable height.

4. A very conservative approach to scar age has been adopted and it is highly likely that many scars are considerably younger than the estimated age shown.

5. The above conclusions are consistent with the findings of Kamminga and Lance (2016) (trees 1 to 27) and Whincop (2016) (trees 28 and 29) who also considered that none of the trees related to Aboriginal cultural activity.

7.0 REFERENCES

Burns, M. 2013 *Appraisal of scar trees on the rail–infrastructure footprint for the Maules Creek Mine Project*. Report by Global Soil Systems to UQ Culture & Heritage Unit, School of Social Science, University of Queensland. December 2013.

Burns, M. 2014a *Scar tree report 2. Appraisal of 18 scar trees in Leard State Forest – Maules Creek Mine Project.* Report to UQ Culture & Heritage Unit, School of Social Science, University of Queensland. February 2014.

Burns, M. 2014b *Scar tree report 3. Appraisal of scar trees - Maules Creek Coal Project.Whitehaven Coal Limited – Maules Creek Coal Project.* Report to UQ Culture & Heritage Unit, School of Social Science, University of Queensland.

Burns, M. 2014c *Scar tree report 4. Appraisal of Namoi River scar trees - Maules Creek Coal Project. Whitehaven Coal Limited – Maules Creek Coal* Project. Report to UQ Culture & Heritage Unit, School of Social Science, University of Queensland.

Jacobs, M.R. 1955 *Growth habits of the eucalypts.* Published by Commonwealth of Australia, Forestry and Timber Bureau.

Kamminga, J.and Lance. A. 2016 *Vickery Extension Project – Scarred Tree Assessment.* A report to Whitehaven Coal Limited.

Long, A. 2005 *Aboriginal scarred trees in New South Wales: a field manual. Department of Environment and Conservation (NSW), Hurstville.*

Whincop,M. 2016 *Archaeological assessment of potential scarred trees.* A letter from UQ Culture and Heritage Unit to Whitehaven coal Limited 28 January 2016.

APPENDIX 7: AHIMS SEARCHES

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : AHIMS_Oct15_MRW

Client Service ID : 196317

UQCHU

Date: 23 October 2015

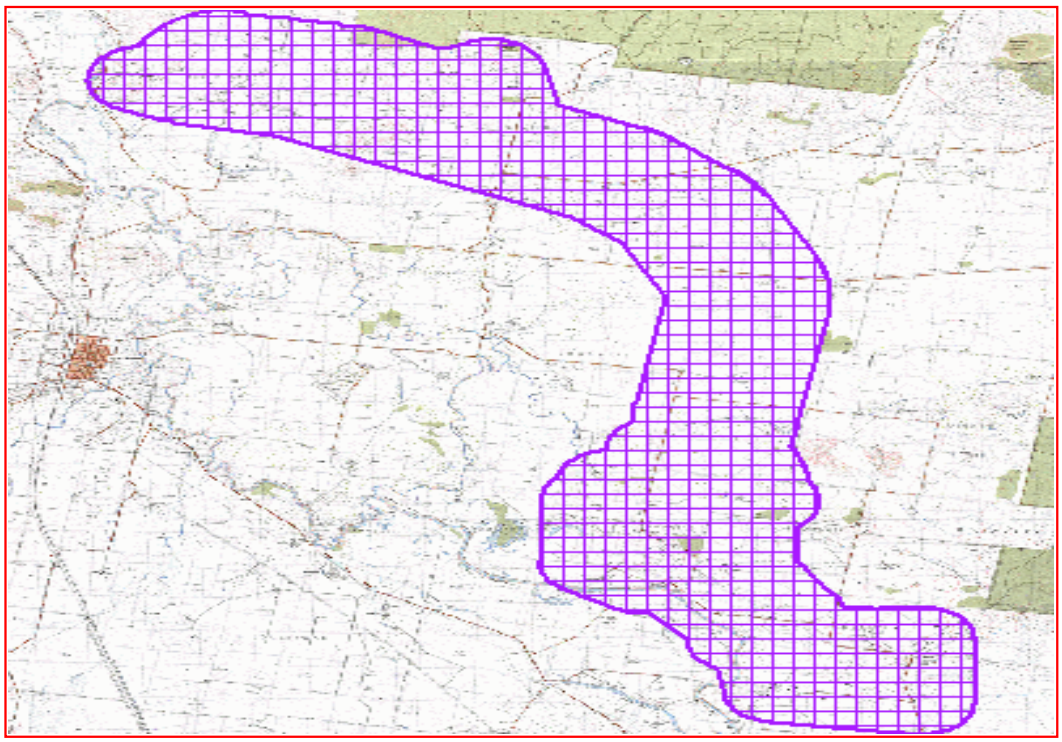
School of Social Science
University of Queensland Queensland 4072
Attention: Matthew Whincop

Email: m.whincop@uq.edu.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Search using shape-file AHIMSSearchArea 1km.SHP with a buffer of 0 meters. Additional Info : Archaeological cultural heritage assessment of the Vickery Coal Project area. - Desktop research for survey, conducted by Matthew Whincop on 23 October 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

73	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

AHIMS Web Services (AWS)

Extensive search - Site list report

Purchase Order/Reference : AHIMS_Oct15_MRW

Client Service ID : 196317

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0038	Mirrabinda;	AGD	56	228560	6590060	Open site	Valid	Artefact : -	Open Camp Site	1169
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**		
20-4-0042	Mirrabinda;	AGD	56	228560	6590060	Open site	Valid	Artefact : -	Open Camp Site	1169
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**		
20-4-0048	Mirrabinda;	AGD	56	228560	6590060	Open site	Valid	Artefact : -	Open Camp Site	1169
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**		
20-4-0008	Wilga;	AGD	56	227300	6592500	Open site	Valid	Artefact : -	Open Camp Site	812
	Contact	**Recorders**	Karen Flick					**Permits**		
20-4-0009	Wilga;	AGD	56	229000	6591000	Open site	Valid	Artefact : -, Grinding Groove : -	Axe Grinding Groove,Open Camp Site	812
	Contact	**Recorders**	Karen Flick					**Permits**		
20-4-0013	Whitehaven;Driggle Draggle Creek;	AGD	56	227800	6596200	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Karen Flick					**Permits**		
20-4-0024	Velyama; Manila; MC11	GDA	56	218966	6609869	Open site	Partially Destroyed	Artefact : -	Open Camp Site	
	Contact	**Recorders**	University of Queensland,University of Queensland,University of Queensland,Ms.La					**Permits**		
20-4-0390	BCS 1	GDA	56	219285	6608390	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Mrs.Angela Besant,Insite Heritage Pty Ltd					**Permits**		
20-4-0391	BCS 2	GDA	56	218010	6607841	Open site	Destroyed	Artefact : 1		
	Contact	**Recorders**	Mrs.Angela Besant,Insite Heritage Pty Ltd					**Permits**		
20-4-0074	BBS; Red Chief LALC; Daiseymead ST 1	AGD	56	216802	6607597	Open site	Valid	Modified Tree (Carved or Scarred) : 1		99031
	Contact	**Recorders**	Archaeological Surveys & Salvage ,Red Cheif LALC - BBS Survey Team					**Permits**		
20-4-0075	BBS; Red Chief LALC; Daiseymead ST 2	AGD	56	216782	6607044	Open site	Valid	Modified Tree (Carved or Scarred) : 1		99031
	Contact	**Recorders**	Archaeological Surveys & Salvage ,Red Cheif LALC - BBS Survey Team					**Permits**		
20-4-0091	Whitehaven 4	AGD	56	229250	6594910	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Mr.John Appleton					**Permits**	2051	
20-4-0150	BCHR3	GDA	56	224793	6608318	Open site	Valid	Artefact : 1		
	Contact Searle	**Recorders**	Mr.Giles Hamm					**Permits**		
20-4-0151	BCHR4	GDA	56	224630	6608316	Open site	Valid	Artefact : 1		
	Contact Searle	**Recorders**	Mr.Giles Hamm					**Permits**		
20-4-0152	BCHR5	GDA	56	224530	6608290	Open site	Valid	Artefact : 1		
	Contact Searle	**Recorders**	Mr.Giles Hamm					**Permits**		

Report generated by AHIMS Web Service on 23/10/2015 for Matthew Whincop for the following area at Search using shape-file AHIMSSearchArea_1km.SHP with a buffer of 0 meters.
Additional Info : Archaeological cultural heritage assessment of the Vickery Coal Project area. - Desktop research for survey.. Number of Aboriginal sites and Aboriginal objects found is 73

AHIMS Web Services (AWS)

Extensive search - Site list report

Purchase Order/Reference : AHIMS_Oct15_MRW

Client Service ID : 196317

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0153	BCHR7	GDA	56	219896	6608809	Open site	Valid	Artefact : 1		
	Contact Searle	**Recorders**	Mr.Giles Hamm					**Permits**		
20-4-0155	BCHR6	AGD	56	223161	6607947	Open site	Valid	Artefact : 1		
	Contact Searle	**Recorders**	Archaeological Risk Assessment Services (ARAS)					**Permits**		
20-4-0158	GGOS 2	AGD	56	228345	6604288	Open site	Valid	Artefact : 25		
	Contact	**Recorders**	Mr.John Appleton					**Permits**	2440	
20-4-0159	GGOS 3	AGD	56	228292	6604288	Open site	Valid	Artefact : 10		
	Contact	**Recorders**	Mr.John Appleton					**Permits**	2440	
20-4-0160	GGOS 4	AGD	56	228335	6604163	Open site	Valid	Artefact : 5		
	Contact	**Recorders**	Mr.John Appleton					**Permits**	2440	
20-4-0224	LF NV 24, 51-61 & 63	GDA	56	224946	6608068	Open site	Partially Destroyed	Artefact : 145		101940,103378
	Contact	**Recorders**	Mrs.Angela Besant,Mrs.Angela Besant					**Permits**		
20-4-0229	LFNV 77, 78	GDA	56	223825	6608155	Open site	Destroyed	Artefact : 10		101940,103378
	Contact	**Recorders**	Mrs.Angela Besant,Mrs.Angela Besant					**Permits**		
20-4-0199	BCD 2	GDA	56	225900	6606697	Open site	Valid	Artefact : 2		101906,103378
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
20-4-0200	BCD 3	GDA	56	226322	6606222	Open site	Valid	Artefact : 1		101906,103378
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
20-4-0201	HR NV64,66-70	GDA	56	221790	6608296	Open site	Destroyed	Artefact : 12		101940,103378
	Contact	**Recorders**	Mrs.Angela Besant,Mrs.Angela Besant					**Permits**		
20-4-0202	HRNV20 & 75	GDA	56	217277	6607988	Open site	Destroyed	Artefact : 2		101940,103378
	Contact	**Recorders**	Mrs.Angela Besant,Mrs.Angela Besant					**Permits**		
20-4-0203	HRNV21	GDA	56	218459	6608295	Open site	Destroyed	Artefact : 8		101940,103378
	Contact	**Recorders**	Mrs.Angela Besant,Mrs.Angela Besant					**Permits**		
20-4-0204	7HRNV22	GDA	56	217588	6607848	Open site	Destroyed	Artefact : 7		101940,103378
	Contact	**Recorders**	Mrs.Angela Besant,Mrs.Angela Besant					**Permits**		
20-4-0208	HR NV 65	GDA	56	221304	6608652	Open site	Destroyed	Artefact : 8		101940,103378
	Contact	**Recorders**	Mrs.Angela Besant,Mrs.Angela Besant					**Permits**		

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Additional Info : Archaeological cultural heritage assessment of the Vickery Coal Project area. - Desktop research for survey.. Number of Aboriginal sites and Aboriginal objects found is 73

AHIMS Web Services (AWS)

Extensive search - Site list report

Purchase Order/Reference : AHIMS_Oct15_MRW

Client Service ID : 196317

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0209	HR NV 71-74	GDA	56	219494	6608900	Open site	Destroyed	Artefact : 5		101940,103378
	Contact	**Recorders**	Mrs.Angela Besant,Mrs.Angela Besant					**Permits**		
20-4-0210	HRNV76	GDA	56	216773	6607827	Open site	Valid	Modified Tree (Carved or Scarred) : 2		101940,103378
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
20-4-0289	Broadwater 1	AGD	56	228834	6591040	Open site	Valid	Artefact : -		
	Contact Ms.Jane Bender	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0290	Broadwater 2	AGD	56	228997	6591013	Open site	Valid	Artefact : -		
	Contact Mr.Peter Beale	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0291	Broadwater ST1	AGD	56	228547	6591205	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Mr.Les J Draper	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0292	Broadwater Grinding Grooves	AGD	56	228716	6591128	Open site	Valid	Grinding Groove : 18		
	Contact Mr.Les J Draper	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0353	VCP-OS-007	GDA	56	232909	6589459	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0354	VCP-OS-001	GDA	56	229440	6594509	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0358	VCP-OS-021	GDA	56	233059	6589987	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0366	VCP-IF-010	GDA	56	232401	6589501	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0367	VCP-IF-014	GDA	56	232620	6589857	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0370	VCP-IF-034	GDA	56	232656	6590482	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0372	VCP-IF-055	GDA	56	230603	6591344	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0373	VCP-IF-060	GDA	56	230558	6591433	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0374	VCP-IF-070	GDA	56	232300	6591777	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0380	VCP-OS-069	GDA	56	229280	6594481	Open site	Valid	Artefact : 1		

Report generated by AHIMS Web Service on 23/10/2015 for Matthew Whincop for the following area at Search using shape-file AHIMSSearchArea_1km.SHP with a buffer of 0 meters.
Additional Info : Archaeological cultural heritage assessment of the Vickery Coal Project area. - Desktop research for survey.. Number of Aboriginal sites and Aboriginal objects found is 73

AHIMS Web Services (AWS)

Extensive search - Site list report

Purchase Order/Reference : AHIMS_Oct15_MRW

Client Service ID : 196317

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Kayandel Archaeological Services,Miss.Tristen Jones					**Permits**		
20-4-0386	VCP-IF-109	GDA	56	229771	6594288	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Miss.Tristen Jones					**Permits**		
20-4-0387	VCP-OS-008	GDA	56	233073	6589516	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0341	TCEP-OS-020	GDA	56	228527	6605098	Open site	Destroyed	Artefact : 2		
	Contact	**Recorders**	Kayandel Archaeological Services,RPS Australia East Pty Ltd -Hamilton,Mr.Warwic					**Permits**		
16-4-0009	Velyama AS1	GDA	56	220207	6609523	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Luke Kirkwood					**Permits**		
16-4-0010	Velyama AS2	GDA	56	220172	6609400	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Luke Kirkwood					**Permits**		
20-4-0394	Velyama IA1	GDA	56	220156	6609314	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	AECOM Australia Pty Ltd (previously HLA-Envirosciences),Mr.Luke Kirkwood					**Permits**		
16-4-0014	Velyama AS6	GDA	56	219812	6608891	Open site	Valid	Artefact : 1		103378
	Contact	**Recorders**	Mrs.Angela Besant,AECOM Australia Pty Ltd (previously HLA-Envirosciences),Mr.L					**Permits**		
20-4-0350	TCEP-ST-007	GDA	56	227834	6605044	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Ms.Caroline Hubschmann					**Permits**		
20-4-0458	Velyama IA2	GDA	56	220106	6609009	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	AECOM Australia Pty Ltd (previously HLA-Envirosciences),Mr.Luke Kirkwood					**Permits**		
20-4-0459	Velyama IA3	GDA	56	219344	6608973	Open site	Valid	Artefact : 1		103378
	Contact	**Recorders**	Mrs.Angela Besant,AECOM Australia Pty Ltd (previously HLA-Envirosciences),Mr.L					**Permits**		
20-4-0460	Velyama IA4	GDA	56	219264	6608993	Open site	Valid	Artefact : 1		103378
	Contact	**Recorders**	Mrs.Angela Besant,AECOM Australia Pty Ltd (previously HLA-Envirosciences),Mr.L					**Permits**		
20-4-0316	TCEP-IF-022	GDA	56	226939	6606170	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Ms.Melissa Dunk					**Permits**		
20-4-0320	TCEP-IF-026	GDA	56	228277	6604964	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Ms.Catherine Vermeltfoort					**Permits**		
20-4-0321	TCEP-IF-027	GDA	56	227652	6605232	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Ms.Melissa Dunk					**Permits**		
20-4-0305	TCEP-IF-004	GDA	56	227590	6605116	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Ms.Melissa Dunk					**Permits**		
20-4-0307	TCEP-IF-006	GDA	56	227063	6605159	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Ms.Caroline Hubschmann					**Permits**		

Report generated by AHIMS Web Service on 23/10/2015 for Matthew Whincop for the following area at Search using shape-file AHIMSSearchArea_1km.SHP with a buffer of 0 meters.
Additional Info : Archaeological cultural heritage assessment of the Vickery Coal Project area. - Desktop research for survey.. Number of Aboriginal sites and Aboriginal objects found is 73

AHIMS Web Services (AWS)

Extensive search - Site list report

Purchase Order/Reference : AHIMS_Oct15_MRW

Client Service ID : 196317

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
16-4-0011	Velyama AS3	GDA	56	220269	6609278	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Luke Kirkwood					**Permits**		
16-4-0012	Velyama AS4	GDA	56	220150	6609200	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Luke Kirkwood					**Permits**		
16-4-0013	Velyama AS5	GDA	56	220129	6609122	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mr.Luke Kirkwood					**Permits**		
20-4-0479	MC REG5 AS1	GDA	56	220675	6609533	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Doctor.Matthew Whincop					**Permits**		
20-4-0474	NV79	GDA	56	224486	6608228	Open site	Valid	Artefact : 1		103378
	Contact	**Recorders**	Mrs.Angela Besant,Insite Heritage Pty Ltd					**Permits**		
20-4-0529	PL 2/14	GDA	56	218880	6606632	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
20-4-0530	PL 3/14	GDA	56	218971	6606730	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
20-4-0531	PL 4/14	GDA	56	219160	6607098	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
20-4-0532	PL 5/14	GDA	56	219139	6606857	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
20-4-0533	PL 6/14	GDA	56	224937	6607555	Open site	Valid	Artefact : -		103378
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
20-4-0548	Broadwater-2	GDA	56	228997	6591010	Open site	Valid	Artefact : -		
	Contact Mr.Peter Beale	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0527	PL 1/14	GDA	56	220070	6607343	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		

Report generated by AHIMS Web Service on 23/10/2015 for Matthew Whincop for the following area at Search using shape-file AHIMSSearchArea_1km.SHP with a buffer of 0 meters.
Additional Info : Archaeological cultural heritage assessment of the Vickery Coal Project area. - Desktop research for survey.. Number of Aboriginal sites and Aboriginal objects found is 73

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : WHC-15-33

Client Service ID : 204284

Danielle Wallace

PO Box 1842
Milton Queensland 4064

Attention: Danielle Wallace

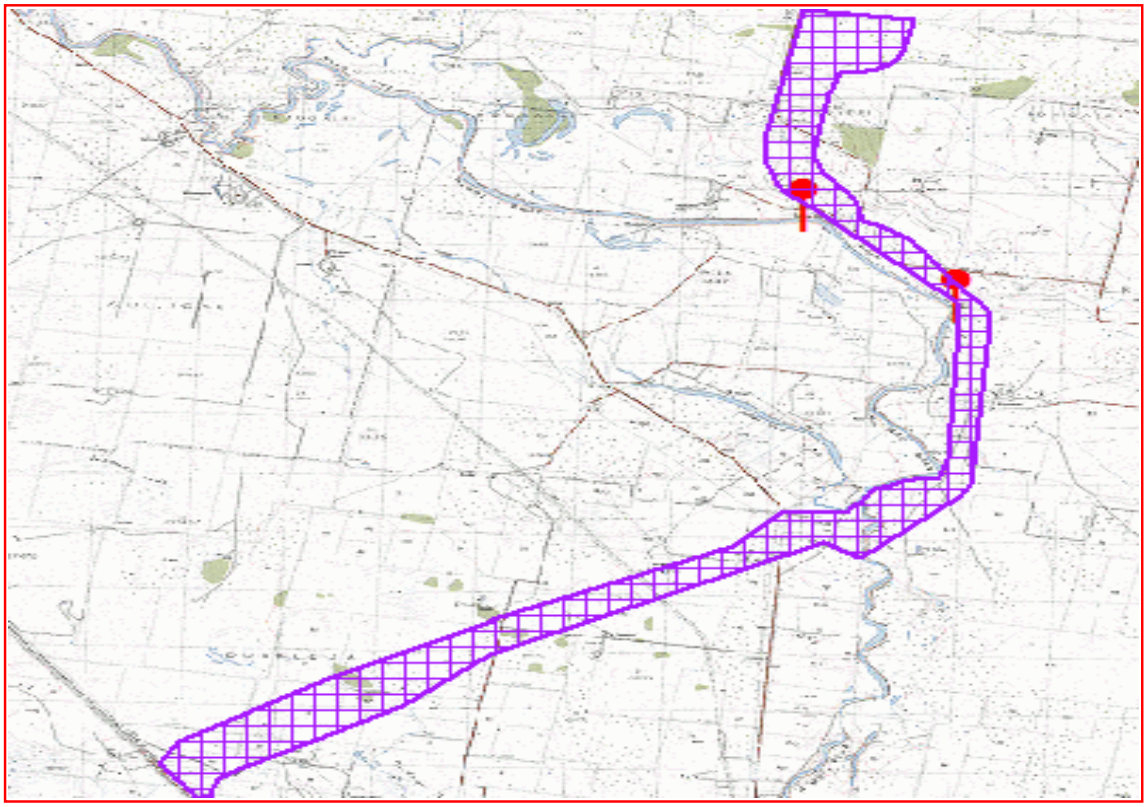
Email: dwallace@resourcestrategies.com.au

Date: 16 December 2015

Dear Sir or Madam:

AHIMS Web Service search for the following area at Search using shape-file WesternRail InvestigationCorridor.SHP with a buffer of 0 meters. Additional Info : Due Diligence, conducted by Danielle Wallace on 16 December 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

2	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : WHC-15-33

Client Service ID : 204284

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0009	Wilga;	AGD	56	229000	6591000	Open site	Valid	Artefact : -, Grinding Groove : -	Axe Grinding Groove,Open Camp Site	812
	Contact	**Recorders**	Karen Flick					**Permits**		
20-4-0290	Broadwater 2	AGD	56	228997	6591013	Open site	Valid	Artefact : -		
	Contact Mr.Peter Beale	**Recorders**	Mr.Patrick Gaynor					**Permits**		

Report generated by AHIMS Web Service on 16/12/2015 for Danielle Wallace for the following area at Search using shape-file WesternRail_InvestigationCorridor.SHP with a buffer of 0 meters. Additional Info : Due Diligence. Number of Aboriginal sites and Aboriginal objects found is 2

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : VEP_3

Client Service ID : 259263

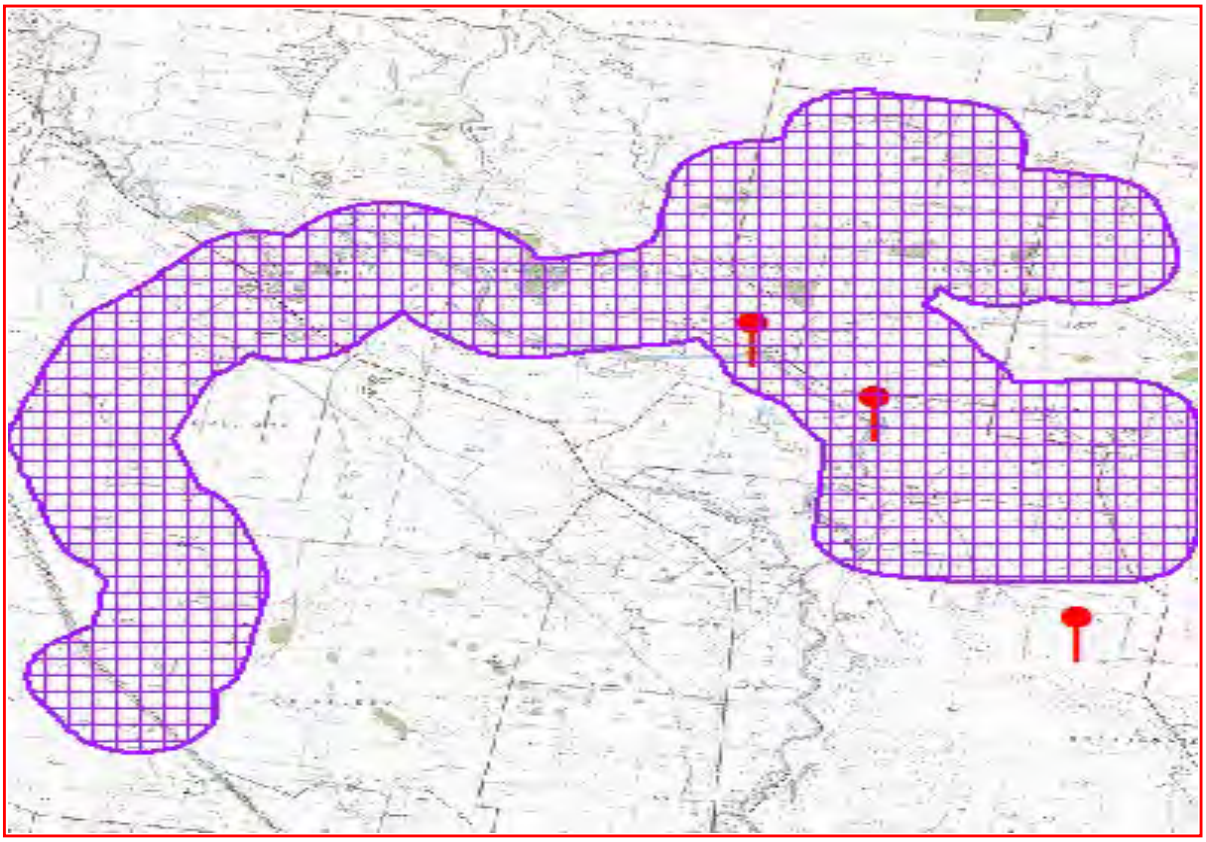
Whincop Archaeology Pty Ltd
11 Sowden Street
Tarragindi Queensland 4121
Attention: Matthew Whincop
Email: matt@whincoparchaeology.com.au

Date: 15 December 2016

Dear Sir or Madam:

AHIMS Web Service search for the following area at Search using shape-file VEP_StudyArea_AHIMS1km.SHP with a buffer of 0 meters. Additional Info : Vickery Mine ACHA, conducted by Matthew Whincop on 15 December 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

104	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

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Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : VEP_3

Client Service ID : 259263

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0038	Mirrabinda;	AGD	56	228560	6590060	Open site	Valid	Artefact : -	Open Camp Site	1169
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**		
20-4-0042	Mirrabinda;	AGD	56	228560	6590060	Open site	Valid	Artefact : -	Open Camp Site	1169
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**		
20-4-0048	Mirrabinda;	AGD	56	228560	6590060	Open site	Valid	Artefact : -	Open Camp Site	1169
	Contact	**Recorders**	Ms.Laila Haglund					**Permits**		
20-4-0008	Wilga;	AGD	56	227300	6592500	Open site	Valid	Artefact : -	Open Camp Site	812
	Contact	**Recorders**	Karen Flick					**Permits**		
20-4-0009	Wilga;	AGD	56	229000	6591000	Open site	Valid	Artefact : -, Grinding Groove : -	Axe Grinding Groove,Open Camp Site	812
	Contact	**Recorders**	Karen Flick					**Permits**		
20-4-0013	Whitehaven;Driggle Draggle Creek;	AGD	56	227800	6596200	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	**Recorders**	Karen Flick					**Permits**		
20-4-0014	Greenwood Creek;	AGD	56	230900	6593900	Open site	Valid	Artefact : -, Modified Tree (Carved or Scarred) : -	Open Camp Site,Scarred Tree	
	Contact	**Recorders**	Karen Flick					**Permits**		
16-4-0002	VM-OS-1	AGD	56	231950	6593800	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Central West Archaeological and Heritage Services Pty Ltd,Wayne Martin					**Permits**		
20-4-0091	Whitehaven 4	AGD	56	229250	6594910	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Mr.John Appleton					**Permits**	2051	
20-4-0289	Broadwater 1	AGD	56	228834	6591040	Open site	Valid	Artefact : -		
	Contact Ms.Jane Bender	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0290	Broadwater 2	AGD	56	228997	6591013	Open site	Valid	Artefact : -		
	Contact Mr.Peter Beale	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0291	Broadwater ST1	AGD	56	228547	6591205	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Mr.Les J Draper	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0292	Broadwater Grinding Grooves	AGD	56	228716	6591128	Open site	Valid	Grinding Groove : 18		
	Contact Mr.Les J Draper	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0353	VCP-OS-007	GDA	56	232909	6589459	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0354	VCP-OS-001	GDA	56	229440	6594509	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		

Report generated by AHIMS Web Service on 15/12/2016 for Matthew Whincop for the following area at Search using shape-file VEP_StudyArea_AHIMS1km.SHP with a buffer of 0 meters.
Additional Info : Vickery Mine ACHA. Number of Aboriginal sites and Aboriginal objects found is 104

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : VEP_3

Client Service ID : 259263

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0358	VCP-OS-021	GDA	56	233059	6589987	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0360	VCP-OS-046	GDA	56	233105	6591613	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0366	VCP-IF-010	GDA	56	232401	6589501	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0367	VCP-IF-014	GDA	56	232620	6589857	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0370	VCP-IF-034	GDA	56	232656	6590482	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0372	VCP-IF-055	GDA	56	230603	6591344	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0373	VCP-IF-060	GDA	56	230558	6591433	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0374	VCP-IF-070	GDA	56	232300	6591777	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0379	VCP-OS-067	GDA	56	231876	6594149	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Miss.Tristen Jones					**Permits**		
20-4-0380	VCP-OS-069	GDA	56	229280	6594481	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Miss.Tristen Jones					**Permits**		
20-4-0386	VCP-IF-109	GDA	56	229771	6594288	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services,Miss.Tristen Jones					**Permits**		
20-4-0387	VCP-OS-008	GDA	56	233073	6589516	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Kayandel Archaeological Services					**Permits**		
20-4-0548	Broadwater-2	GDA	56	228997	6591010	Open site	Valid	Artefact : -		
	Contact Mr.Peter Beale	**Recorders**	Mr.Patrick Gaynor					**Permits**		
20-4-0686	VEP AS28	GDA	56	229258	6588745	Open site	Valid	Artefact : -		
	Contact	**Recorders**	University of Queensland,Mr.Reiner Mantei					**Permits**		
20-4-0687	VEP AS35	GDA	56	229746	6589293	Open site	Valid	Artefact : -		
	Contact	**Recorders**	University of Queensland,Mr.Reiner Mantei					**Permits**		
20-4-0688	VEP AS34	GDA	56	228799	6588235	Open site	Valid	Artefact : -		
	Contact	**Recorders**	University of Queensland,Mr.Reiner Mantei					**Permits**		
20-4-0689	VEP AS33	GDA	56	228884	6588176	Open site	Valid	Artefact : -		
	Contact	**Recorders**	University of Queensland,Mr.Reiner Mantei					**Permits**		

Report generated by AHIMS Web Service on 15/12/2016 for Matthew Whincop for the following area at Search using shape-file VEP_StudyArea_AHIMS1km.SHP with a buffer of 0 meters.
Additional Info : Vickery Mine ACHA. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0690	VEP AS32	GDA	56	228977	6588424	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0691	VEP AS31	GDA	56	228990	6588570	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0692	VEP AS30	GDA	56	229103	6588637	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0693	VEP AS29	GDA	56	229225	6588668	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0694	VEP AS27	GDA	56	229189	6588765	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0695	VEP AS26	GDA	56	229137	6588841	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0696	VEP AS38	GDA	56	231912	6589723	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0697	VEP AS36	GDA	56	230141	6588953	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0698	VEP AS37	GDA	56	230133	6588895	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0704	VEP AS25	GDA	56	229029	6588968	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0705	VEP AS44	GDA	56	228616	6588765	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0706	VEP AS45	GDA	56	229032	6588765	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0589	VEP IA07	GDA	56	228844	6597371	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0590	VEP IA06	GDA	56	228987	6597267	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0591	VEP IA05	GDA	56	228379	6596441	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0592	VEP IA28	GDA	56	227217	6594000	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0593	VEP IA04	GDA	56	228499	6596552	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		

Report generated by AHIMS Web Service on 15/12/2016 for Matthew Whincop for the following area at Search using shape-file VEP_StudyArea_AHIMS1km.SHP with a buffer of 0 meters.
Additional Info : Vickery Mine ACHA. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0594	VEP IA27	GDA	56	227128	6594665	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0595	VEP IA29	GDA	56	227323	6593842	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0596	VEP IA30	GDA	56	227401	6593709	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0597	VEP IA31	GDA	56	227374	6593304	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0598	VEP IA32	GDA	56	227529	6592937	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0599	VEP IA33	GDA	56	227637	6592839	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0601	VEP IA35	GDA	56	228913	6591423	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0602	VEP IA65	GDA	56	220277	6584320	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0603	VEP IA36	GDA	56	229576	6591092	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0607	VEP IA03	GDA	56	228525	6596670	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0608	VEP IA37	GDA	56	229399	6591088	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0609	VEP IA26	GDA	56	227191	6594778	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0610	VEP IA24	GDA	56	227623	6595133	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0611	VEP IA23	GDA	56	227502	6595549	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0612	VEP IA46	GDA	56	229148	6588720	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0665	VEP AS 19	GDA	56	229113	6591168	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0666	VEP AS 18	GDA	56	228741	6591972	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		

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Additional Info : Vickery Mine ACHA. Number of Aboriginal sites and Aboriginal objects found is 104

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0667	VEP AS 17	GDA	56	227456	6592928	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0668	VEP AS 16	GDA	56	227005	6594185	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0672	VEP AS 15	GDA	56	227332	6594417	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0673	VEP AS 14	GDA	56	228153	6595458	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0674	VEP AS 22	GDA	56	229191	6589712	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0676	VEP AS 08	GDA	56	229641	6597141	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0677	VEP AS 06	GDA	56	228539	6597257	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0678	VEP AS 05	GDA	56	228150	6596856	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0679	VEP AS 04	GDA	56	228462	6596789	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0680	VEP AS 23	GDA	56	229158	6589162	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0681	VEP AS 24	GDA	56	229221	6589039	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0683	VEP AS 20	GDA	56	229153	6590949	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0684	VEP AS 21	GDA	56	229117	6589941	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0685	VEP AS 07	GDA	56	228343	6597396	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Ms.Jodie Crossman						Permits		
20-4-0615	VEP IA25	GDA	56	227548	6594992	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0618	VEP IA38	GDA	56	229399	6591088	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		
20-4-0619	VEP IA54	GDA	56	230956	6590077	Open site	Valid	Artefact : -		
Contact	Recorders	University of Queensland,Mr.Reiner Mantei						Permits		

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0620	VEP IA55	GDA	56	230970	6589998	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0623	VEP IA47	GDA	56	228950	6588305	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0625	VEP IA10	GDA	56	228290	6597281	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0626	VEP IA11	GDA	56	228218	6597298	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0627	VEP IA12	GDA	56	229703	6597200	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0628	VEP IA08	GDA	56	228437	6597270	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0630	VEP IA45	GDA	56	229001	6589165	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0631	VEP IA44	GDA	56	229122	6589237	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0632	VEP IA43	GDA	56	229122	6589409	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0633	VEP IA42	GDA	56	229120	6589620	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0634	VEP IA41	GDA	56	229087	6589748	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0635	VEP IA40	GDA	56	229280	6590100	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0636	VEP IA51	GDA	56	229567	6589281	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0637	VEP IA21	GDA	56	228467	6596340	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0639	VEP IA53	GDA	56	231040	6590227	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0641	VEP IA50	GDA	56	229684	6589486	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		
20-4-0643	VEP IA39	GDA	56	229250	6590298	Open site	Valid	Artefact : -		
	Contact	Recorders	University of Queensland,Mr.Reiner Mantei					Permits		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : VEP_3

Client Service ID : 259263

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
20-4-0645	VEP IA02	GDA	56	228607	6596988	Open site	Valid	Artefact : -		
	Contact	**Recorders**	University of Queensland,Mr.Reiner Mantei					**Permits**		
20-4-0646	VEP IA 52	GDA	56	230691	6590487	Open site	Valid	Artefact : -		
	Contact	**Recorders**	University of Queensland,Mr.Reiner Mantei					**Permits**		
20-4-0658	VEP IA34	GDA	56	228733	6592354	Open site	Valid	Artefact : -		
	Contact	**Recorders**	University of Queensland,Mr.Reiner Mantei					**Permits**		
20-4-0659	VEP IA01	GDA	56	228072	6597015	Open site	Valid	Artefact : -		
	Contact	**Recorders**	University of Queensland,Mr.Reiner Mantei					**Permits**		

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