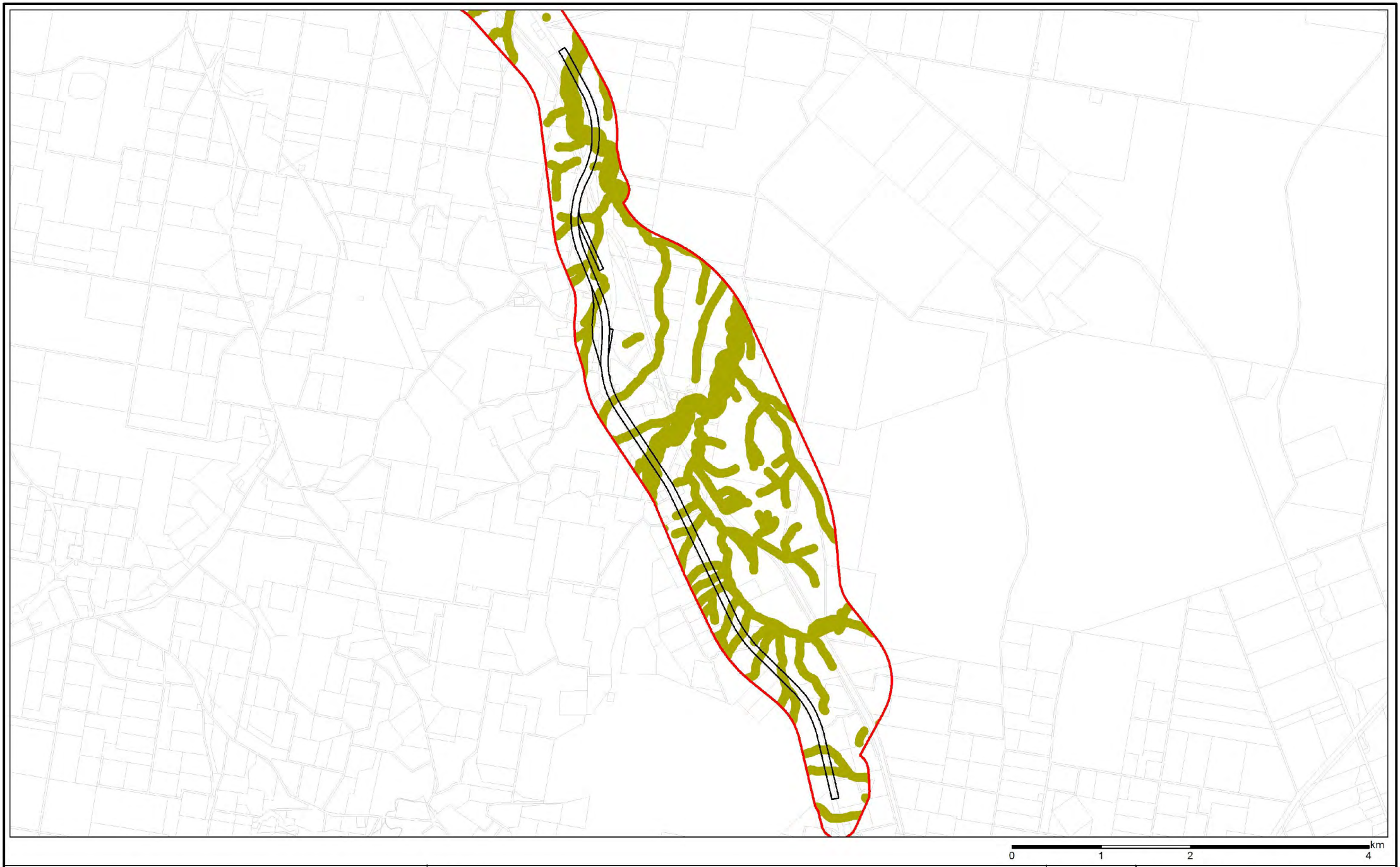
Appendix 4 Outputs for Cultural Values Map

Maps illustrating spatial distribution of cultural values across alignments



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 1A
Preliminary cultural values map

Legend

- Section 3 - Option 1A
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 21 September 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011

WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 1E
Preliminary cultural values map

Legend

- Section 3 - Option 1E
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES

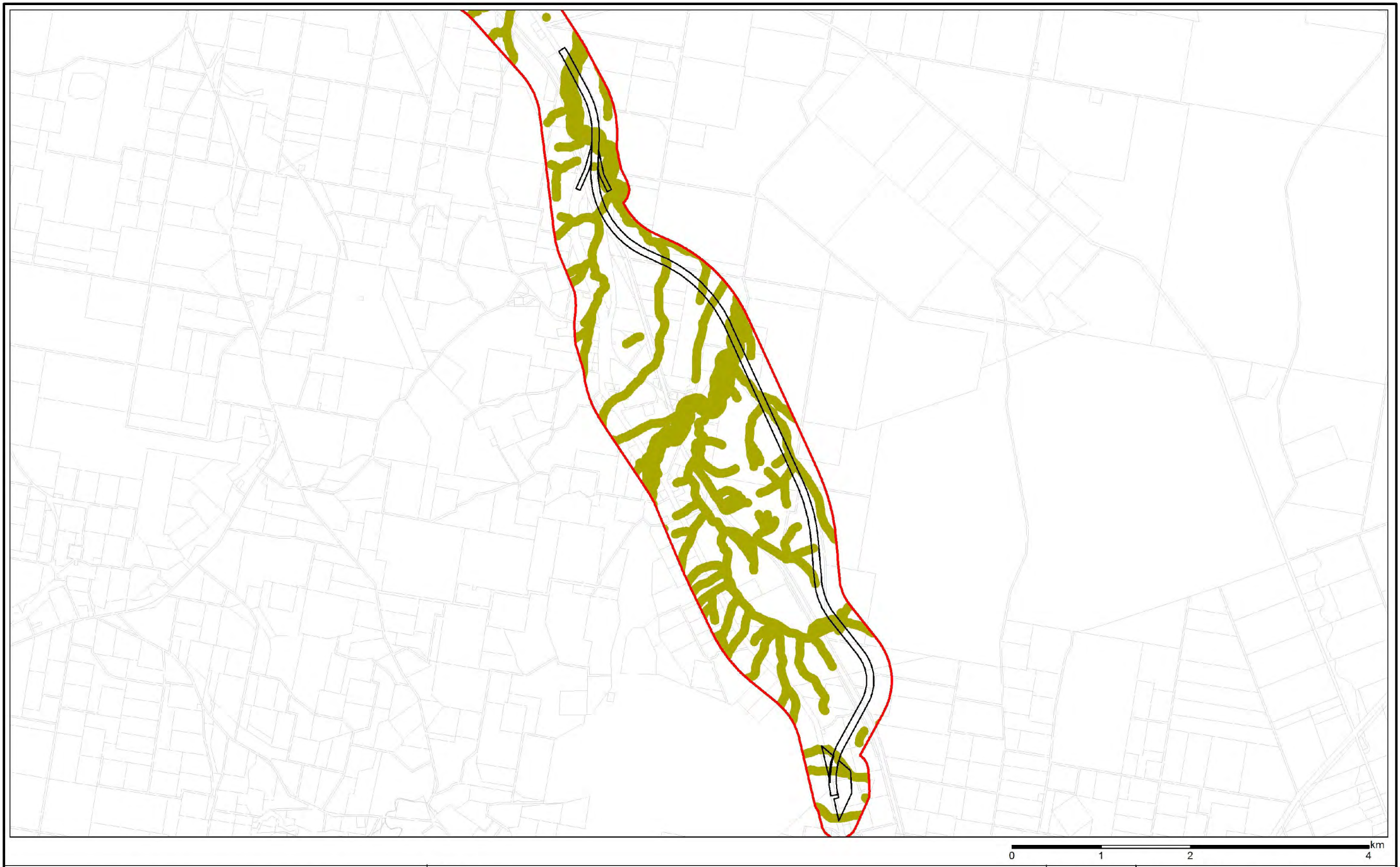
Drawn by: Josara de Lange

Date: 21 September 2011

GDA94
MGA Zone 54

ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 1C
Preliminary cultural values map

Legend

- Section 3 - Option 1C
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES

Drawn by: Josara de Lange

Date: 21 September 2011

GDA94
MGA Zone 54

ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011

WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3DC
Preliminary cultural values map

Legend

- Section 3 - Option 3DC
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES

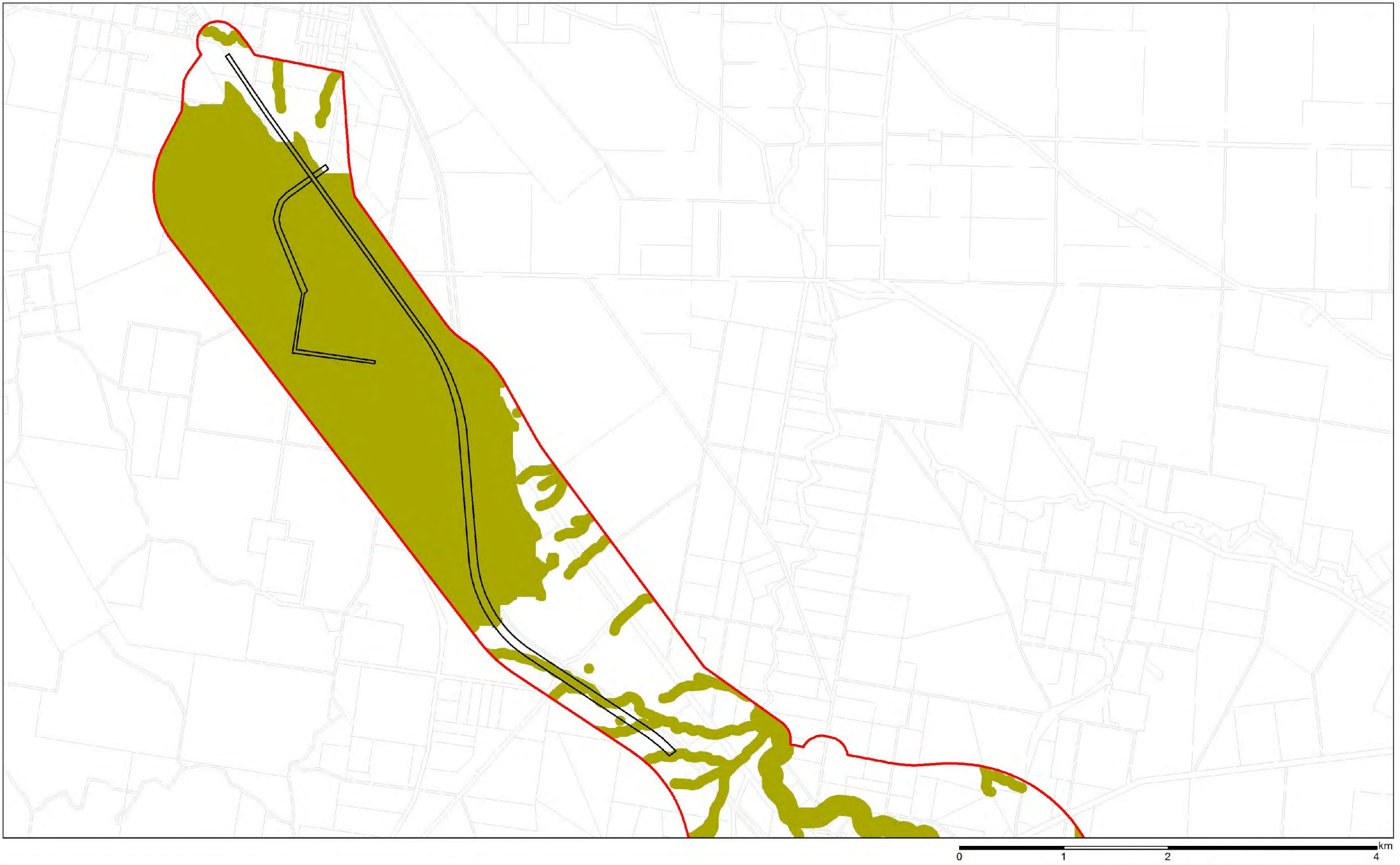
Drawn by: Josara de Lange

Date: 21 September 2011

GDA94
MGA Zone 54

ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3C
Preliminary cultural values map

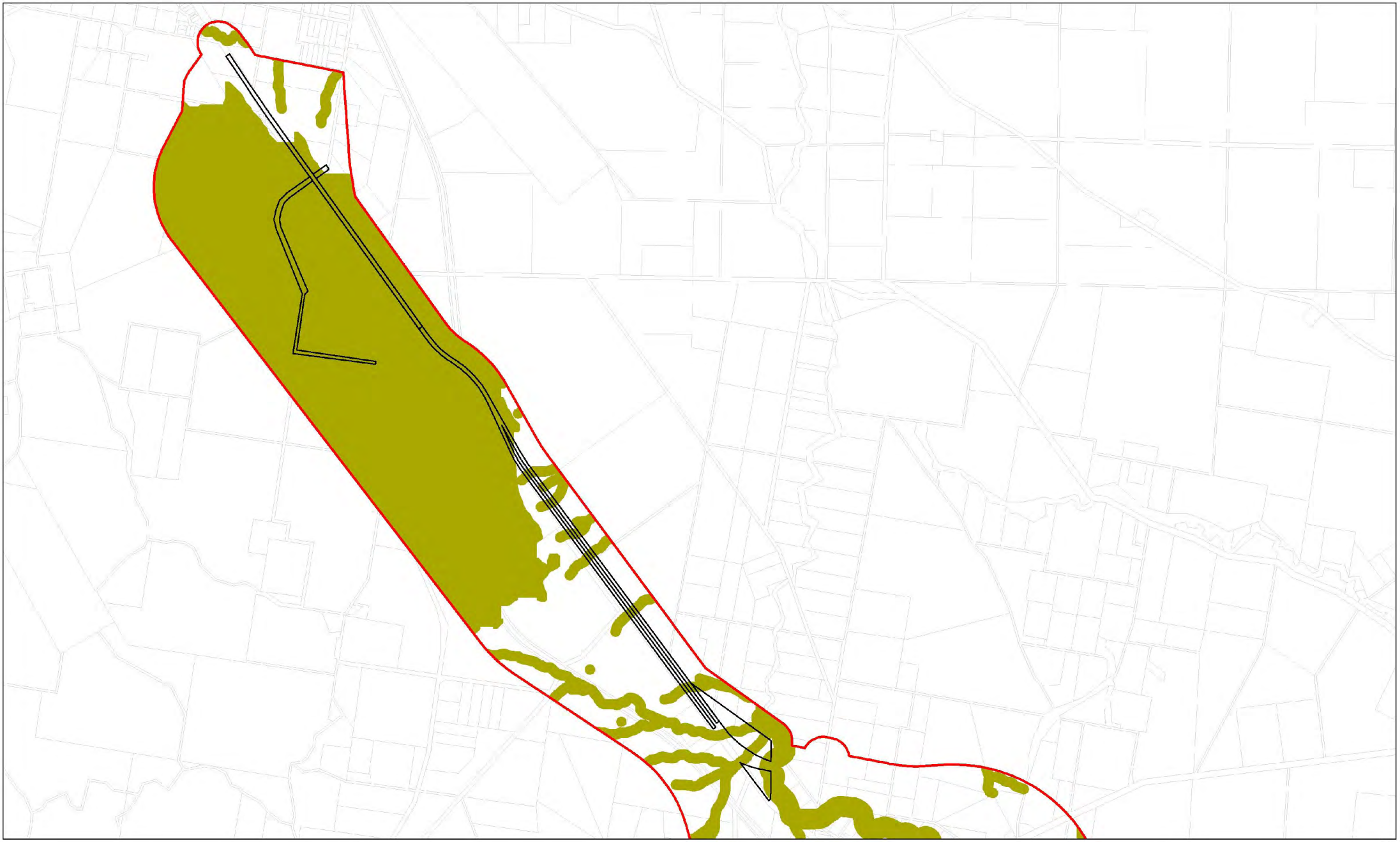
Legend

- Section 3 - Option 3C
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES	**Drawn by: Josara de Lange**
	Date: 21 September 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3B
Preliminary cultural values map

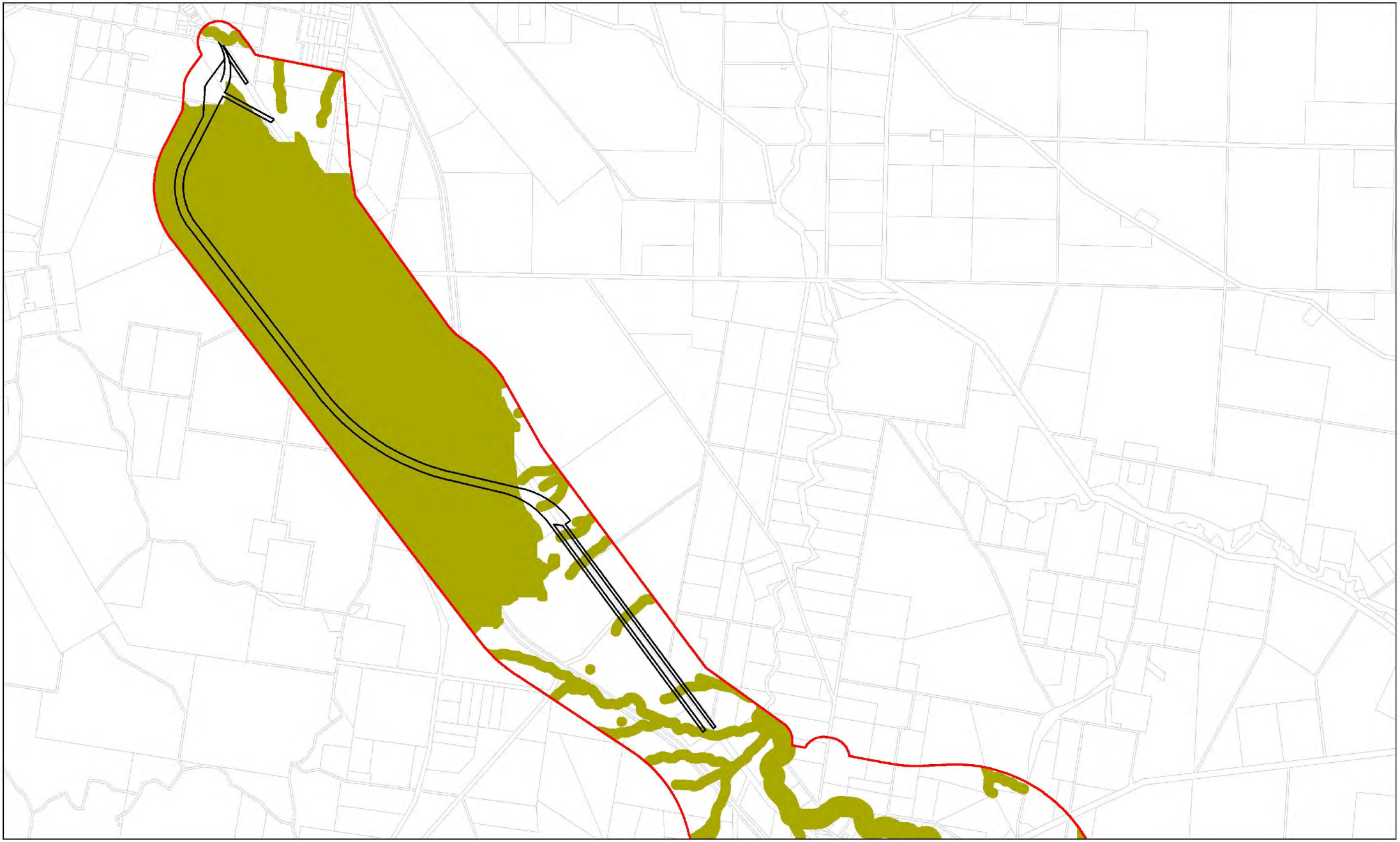
Legend

- Section 3 - Option 3B
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES	**Drawn by: Josara de Lange**
	Date: 21 September 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3AD
Preliminary cultural values map

Legend

- Section 3 - Option 3AD
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES

Drawn by: Josara de Lange

Date: 11 October 2011

GDA94
MGA Zone 54

ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011

WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3A
Preliminary cultural values map

Legend

- Section 3 - Option 3A
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES

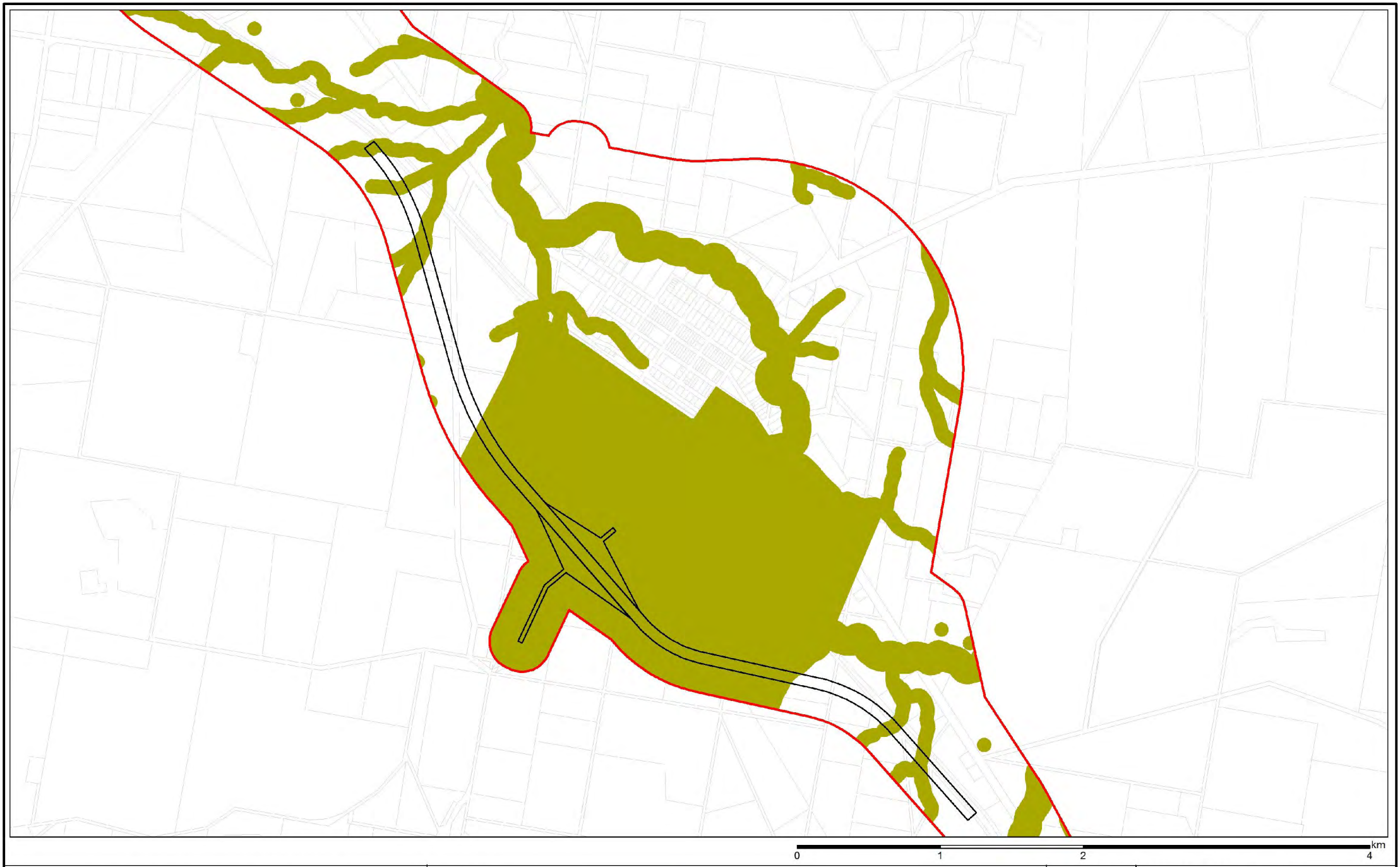
Drawn by: Josara de Lange

Date: 21 September 2011

GDA94
MGA Zone 54

ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 2E
Preliminary cultural values map

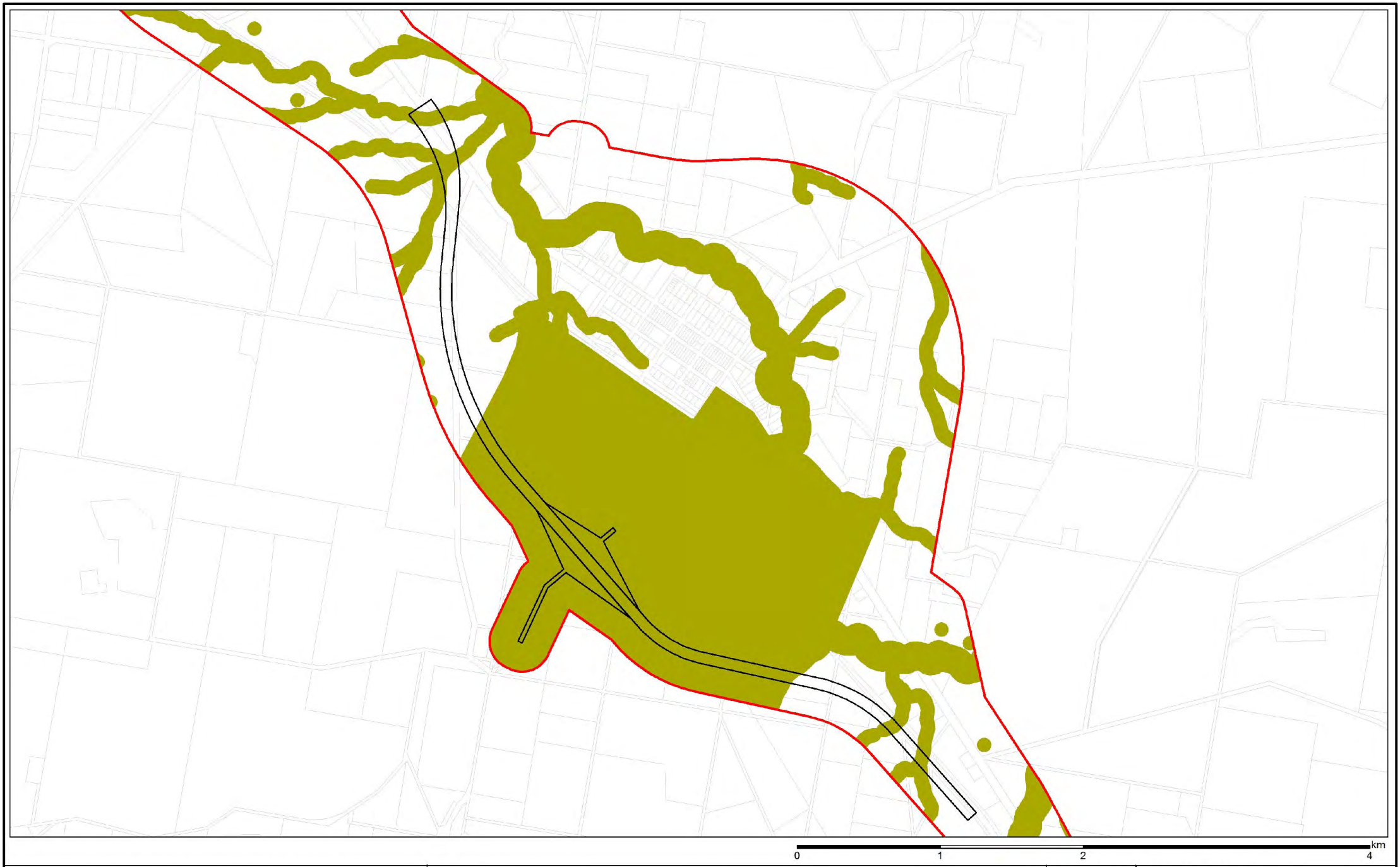
Legend

- Section 3 - Option 2E
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES	**Drawn by: Josara de Lange**
	Date: 21 September 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 2D
Preliminary cultural values map

Legend

- Section 3 - Option 2D
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES

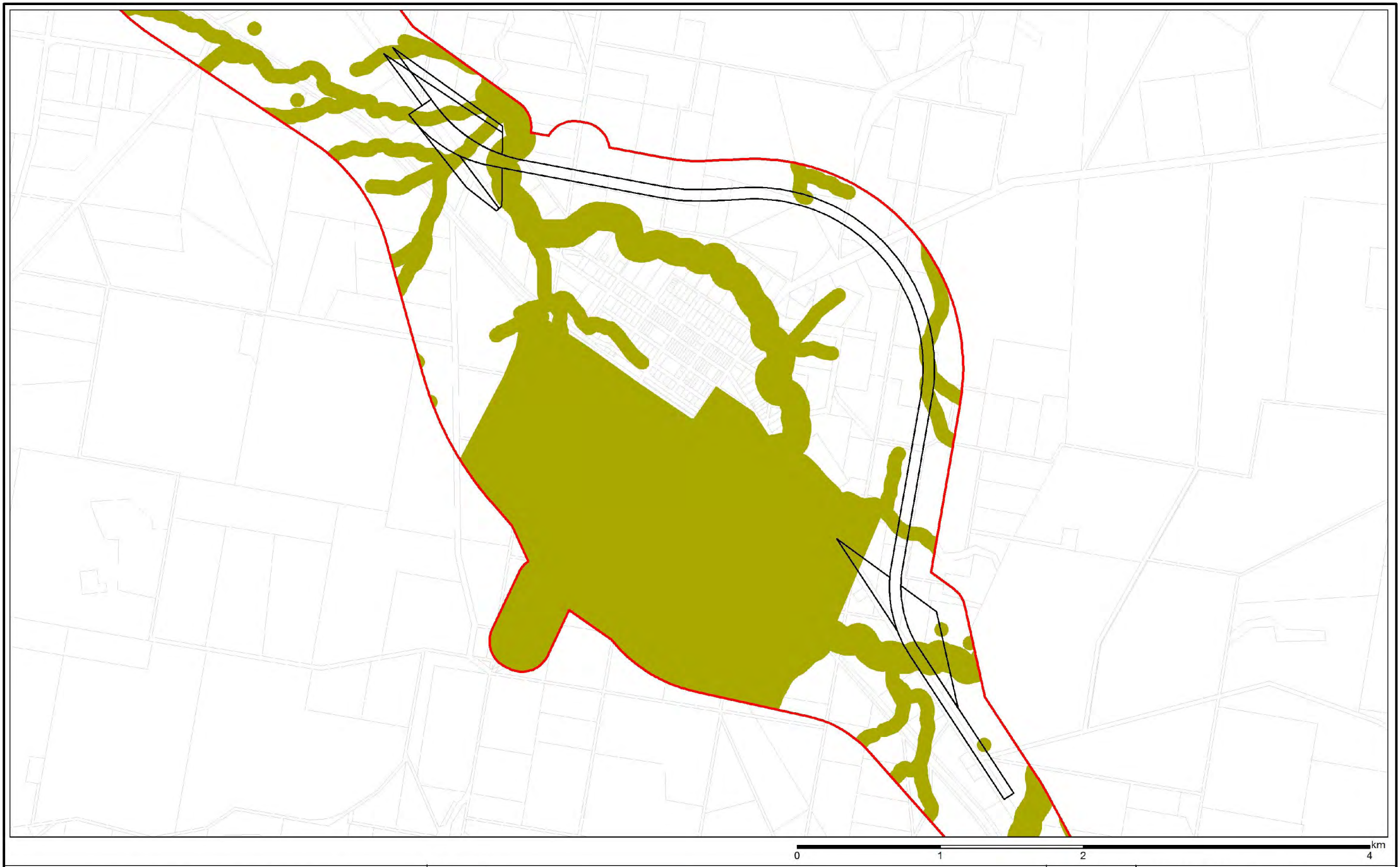
Drawn by: Josara de Lange

Date: 21 September 2011

GDA94
MGA Zone 54

ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 2C
Preliminary cultural values map

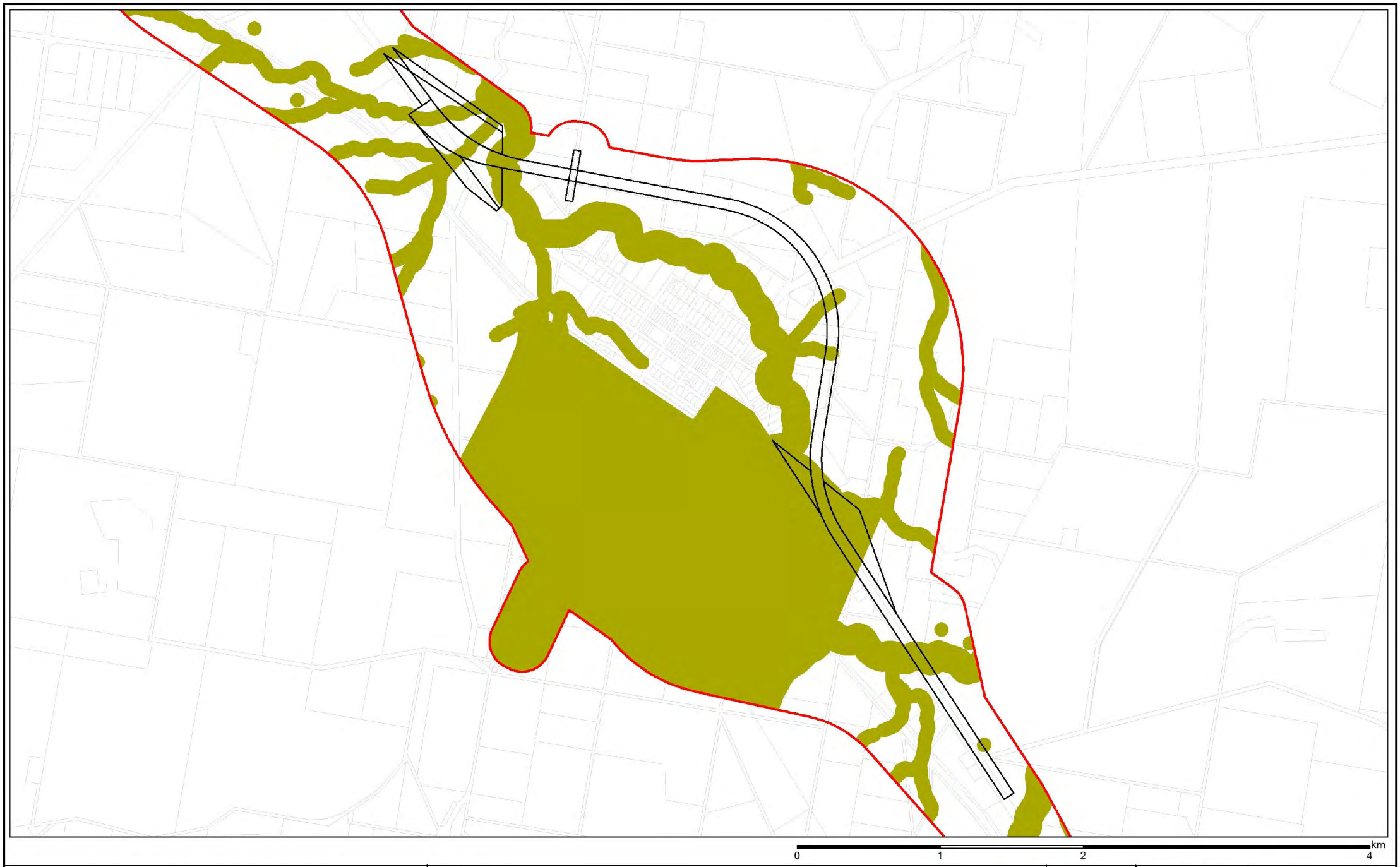
Legend

- Section 3 - Option 2C
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES	**Drawn by: Josara de Lange**
	Date: 21 September 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 2B
Preliminary cultural values map

Legend

- Section 3 - Option 2B
- Section 3 study area
- Nominated area of cultural value
- Property parcel

N

Project Code: WHEES

Drawn by: Josara de Lange

Date: 21 September 2011

GDA94
MGA Zone 54

ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Martang Pty Ltd and Barengi Gadjin Land Council Aboriginal Corporation: Cultural values layer, 2011

Appendix 5 Outputs for Specialist Input
Mortuary Tree Report and Burnt Mound Report
Andrew Long

Western Highway Project – Section 3 Duplication (Ararat to Stawell)

Mortuary Trees Desktop and Route Options Assessment

Specialist Report

By Andrew Long

27th Oct 2011

Introduction

This report presents a preliminary assessment of the risk of impact to Aboriginal mortuary trees undertaken as part of the Western Highway Project Environmental Effects Statement (WHPEES), Section 3 Duplication (Ararat to Stawell). The objective of the study is to inform the route alignment option selection process for the proposed duplication, which forms part of the broader cultural heritage studies undertaken for WHPEES.

The potential presence of mortuary trees has been identified as a key risk in the route selection process, given prior research into cultural traditions in the region, the occurrence of previously identified mortuary trees and the distribution of trees with comparable characteristics across the project area. The occurrence of a mortuary tree within the preferred option is considered a constraint to the construction of the duplicated road according to that option.

Data Sources

Victorian Aboriginal Heritage Register (VAHR)

Although there are several historical references to mortuary trees in the region, only one has been positively identified through archaeological investigation, the Moyston Aboriginal Mortuary Tree (7423-0751), which is located 15 km west of Ararat (Richards *et al*. 2004). In addition, another possible mortuary tree, known as the Gorrinn Mortuary Tree, is located ~ 10 km south east of Ararat (Richards *et al*. 2004, 29-30).

Both trees were mature river red gum trees (*E. Camaldulensis*) on land characterised by scattered trees and grazing. The Moyston Aboriginal Mortuary Tree consisted of a dead fallen tree section, in which skeletal remains were identified by chance in 2001. The Gorrinn Mortuary Tree is a living river red gum from which skeletal remains were allegedly removed during the 1870s,and subsequently re-identified through consultation with local informants in 2003 (Richards et al. 2004, 29-30).

Therefore there is recent evidence for the continued existence of mortuary trees close to the project area. Further evidence of the survival of culturally modified trees in the vicinity of the project area is attested by a number of registered scarred trees in the Langi Ghiran State Park, as well as at Armstrong, Great Western and Crowlands (Builth & Nicolson 2010).

It is important to note that these trees have not received specialist verification, however if at least some of them are confirmed as authentic Aboriginal bark removal scars, they constitute evidence that river red gum and potentially yellow box (*E. Melliodora*) trees of at least 100-150 years of age are still present in the local landscape today. Note that the age range of bark removal scars is

younger than that required for mortuary trees, as bark removal was a continuing practice throughout the 19th century, and the trees need not have been mature at the time of scarring.

Pre-1750 Ecological Vegetation Classes (EVCs)

Published information on pre-1750 Ecological Vegetation Classes (EVCs), which provide an overview of the vegetation structure of the landscape prior to the progressive clearance of the landscape on European settlement.

Although there is no known limitation on the types of tree used for mortuary purposes, both known examples are river red gum trees, which are a major component of three EVCs (Plains Grassy Woodland (EVC 55); Creekline Grassy Woodland (EVC 68) and Alluvial Terrace Herb Rich Woodland (EVC 67)).

Technical Environmental Reports (Ecology Partners 2010)

Although the coverage of these reports does not extend across the entirety of the project area, and the intended purpose is not entirely consistent with the aims of this study, this previous environmental assessment acts as verification of the EVC data, and also provides a characterisation of the relative quantity and distribution of very large old trees, large old trees, dead trees, trees with hollows, many of which have been mapped, and small scattered trees across parts of the project area. This information was collected for ecology management purposes, and does not as such form a secure framework for the evaluation of potential for mortuary trees, being based on different size and age criteria.

Given the inconsistencies between this and the current project, this data has only been used as an unqualified information source, rather than a quantifiable inherent in the development of the predictive model.

Field Observations

Field observations have been derived from a preliminary field inspection (24th June 2011), initial consultation with Aboriginal stakeholders undertaken in the field during August and September 2011, and further field inspections undertaken in September and October 2011. A map of locations inspected as part of this process is presented as Figure 1. Although no systematic field survey has been undertaken, as would be required as part of a standard assessment for a Cultural Heritage Management Plan (CHMP), inspections have been undertaken in order to verify and synthesise the various available desktop information so that a basic overview of the likely presence and distribution of mortuary trees within the project area can be developed.

The field observations cover two main aspects;

a. The relative distribution and presence of specific tree species surviving within a particular vegetation community (as per each option/EVC).

b. The characteristics of trees typical within each EVC, especially in relation to age potential, the preservation of the original structure of the trees, and their potential to contain hollows which may have been present in the period up to 1850.

What is a Mortuary Tree?

A mortuary tree is a significant type of Aboriginal cultural place, which is known to occur in the project area through contemporary accounts, as well as both historical and modern discoveries (Richards *et al*. 2004). The practice of placing disarticulated human remains and grave goods into hollows within trees is well attested in traditional Aboriginal practice in central west Victoria up to the mid 19th century, in particular within the domain of the *Djab Wurrung* language group, who occupied the plains and hills bordering the eastern edge of the Grampians from the vicinity of Stawell to Hamilton (Clark 1990).

This practice consisted of the secondary 'burial' or 'abandonment' of the remains of a deceased person, which had undergone one or more stages of treatment intended to deflesh and disarticulate the skeleton, either through burial or exposure on the ground, suspension in branches or on an elevated platform. There is documented evidence for various forms of this practice, involving the removal and distribution of specific bones to relatives, generally the feet and legs, and the bundling of the remainder into possum skins, basketry, netting or bark, occasionally with grave goods, before placing the remains into a prepared hollow in a selected tree. Sometimes, cranial bones were treated differently to the remainder of the skeleton. After bundling, the remains could have been carried by the family group for months or years, before final deposition. There is also evidence to suggest that trees or individual hollows were either used for multiple interments, either concurrently or consecutively (e.g. the one hollow of the Moyston Aboriginal Mortuary Tree contained three bundles of human remains, an adult male, an adult female and a child aged four to five years).

While it is possible that existing hollows have been enlarged to facilitate the placement, it is likely that the majority of mortuary trees are essentially unmarked, except for the caching of human remains.

Mortuary trees form part of a broader category of Aboriginal cultural places defined as 'culturally modified trees', which are also commonly known as scarred trees. These are living or dead trees that have been damaged through the removal of bark or timber, the collection of arboreal fauna (e.g. toe holds) or other natural resources that occur within trees (e.g. extraction holes for eggs, insects) and other forms of cultural marking (e.g. carving). This 'scarring' is generally recognisable by overgrowth tissue formed through the subsequent growth of the tree, or by indicators of human intervention, such as tool marks or incisions into the sapwood.

Although there are many different expressions of cultural modifications, they can be broadly defined into two groups:

1. Resource trees, where a material or resource has been removed from the tree for use or transportation elsewhere. As such, the specific tree and its location are less important than the scope and range of the activity to which the material relates. For example, a sheet of bark intended for use in the construction of a canoe may be transported some distance from the tree where the bark was stripped. As such, these trees are indicative of the distribution of the source materials, and the range within which traditional Aboriginal groups moved, rather than the actual places where cultural activities occurred (e.g. camping, food processing and ceremonies).

2. Marked trees on the other hand represent a place of intrinsic significance, associated with a particular activity or belief, rituals, social organisation or specific economic activities (e.g. eel smoking). As such, these trees are indicative of the tree as a place having a specific social value, such as for instance a boundary marker, a ceremonial or spiritual place, or in the case of mortuary trees, a funerary place associated with a deceased person or persons. Although these places do not necessarily have clear outward indicators of cultural intervention (such as tool marks), these places are invariably of *very high cultural significance* to the Aboriginal community.

In addition, mortuary trees are classified as 'burial' places, for which there are special provisions in the *Aboriginal Heritage Act* 2006, which requires the reporting of any knowledge of Aboriginal human remains (s17), and provides for enhanced protection of burials by prohibiting the granting of any cultural heritage permit (CHP) with respect to Aboriginal human remains (s37). Furthermore, a CHMP is unlikely to fulfil the matters to be considered in relation to a plan (s61) where there is an unmitigated impact to human remains, or where there is a risk that as yet unidentified human remains may be impacted.

As such, the effective identification of mortuary trees is both imperative and problematical, as there may be no clear external evidence that a tree may have been used for such a purpose. The only known discoveries of mortuary trees have been the result of chance finds, and to the best of our knowledge there has been no previous attempt to systematically identify these places as part of a major project planning study.

The recognition of such places is closely linked to the preservation of the tree as a physical object surviving in today's landscape, whether as a living tree, a dead or fallen section of a tree, though in theory skeletal remains may become dislodged and separated from the timber component of the place. In practice, however, the removal of bone from the relatively stable, sheltered environment of a tree hollow will significantly increase decomposition rates, and there will only be a limited opportunity to recognise these items before natural weathering and faunal activity impact on their preservation.

<u>The Known Attributes of Mortuary Trees</u>

There have been various studies of Aboriginal mortuary practice across southern eastern Australia (Meehan 1971; Russell 1990), however the most detailed and relevant study was undertaken on discovery of a mortuary tree at Moyston, 15 km west of Ararat in 2001 (Richards *et al*. 2004), which presents a useful summary of background information relevant to the project area.

The following key points of relevance to the current assessment are summarised below:

1. The only two recorded examples of mortuary trees, and the dominant tree species within the areas where they have been reported in *Djab wurrung* country (e.g. Mokepilly, Stawell and Ararat) and further afield (e.g. Charlton), have been river red gum (*E. Camaldulensis*). While the possibility of encountering mortuary remains in other species cannot be ruled out, neither can this association be ignored in assessing the relative likelihood of mortuary trees.

2. The mortuary use of these trees is likely to have occurred in the pre-and early post-contact (prior to c. 1850), and it is probable that the practice was discontinued from the 1850s onwards. The only contemporary observation of mortuary tree practice was documented by Philip Rose at his station at Mokepilly, 12 km west of Stawell in the 1840s (Bride 1983, 322). However, in 1858 the discovery of mortuary remains in another tree near Stawell was viewed by the authorities as a matter for police investigation, rather than evidence of an ongoing traditional practice (*Mount Ararat Advertiser*, 2 April 1858, cited in Richards *et al*. 2004, 25-27). Again, a later occurrence of the practice cannot be ruled out, though it is probable that these will be rare and unusual instances.

3. At the time at which it was selected for use for interment (up to c. 1850), the tree will be a mature specimen containing hollows suitable, in terms of size and position, for the placement of bundled human remains. In the case of the one scientifically investigated example, the Moyston Aboriginal Mortuary Tree (VAHR 7423-0751), the hollow consisted of a substantial cavity situated in one of the two primary limbs of the tree, immediately above its bifurcation.

   As such, the tree at the time of interment will be at least 100 years old, possibly older depending on the species, as it is unlikely that younger trees will have developed sufficient size or had sufficient length of exposure to natural processes, including a combination of limb loss, insect activity and biological decay, to allow the formation of suitable cavities. The predicted minimum age for suitable mortuary trees will thus be 250-300 years plus, which today are likely to be overmature, senescent, dead standing or fallen. Richards *et al*. (2004, 45), consider the likely age for a mortuary tree to be 300 years plus, though on the basis of my experience in tree dating I believe this to be a slight overestimation.

   An accurate age estimate is critical to the identification process, as it is fundamental to distinguish between trees surviving in the landscape today which have hollows pre-dating the 1850s, and those with hollows that have only formed after the 1850s. This will be particular challenge in moving forward with the ground truthing component of this project.

   Special consideration will need to be given to trees which have been killed in the historical period (e.g. by ringbarking), as they will not necessarily exhibit the growth characteristics to be expected in a tree of that age. For example, a tree established in 1800 and ringbarked in 1900 will still exhibit the characteristics of a 100 year old tree, albeit in a decayed form, rather than that of a living 250 year old tree.

   As there is no consistent recognised method for accurately dating mature red gum trees based on external appearance alone, it will be a particular challenge to apply a consistent non-invasive strategy to ranking trees by age during the field evaluation, with current estimates suggesting a lifespan up to about 1000 years for river red gum trees under optimal circumstances.

4. There is no specific evidence to suggest where mortuary trees occurred within a given landscape, and therefore we have to conclude that they may occur at any location, pending the distribution of suitable trees. As such, their distribution is likely to differ to established models of Aboriginal socio-economic activities, which tend to be driven by the availability of water and other key resources. There is no currently available cultural information regarding why a particular tree was selected for mortuary purposes over another.

5. The mortuary tree must survive to the present day and hold evidence clearly identifying it as a mortuary tree. While it is recognised that some trees used temporarily for mortuary purposes, such as trees with elevated exposure platforms, these are practically unfeasible to recognise without associated structure or skeletal remains.

   While woodland and forested areas may seemingly represent areas of potential for mortuary trees, if these areas have been subject to widespread clearance, logging and subsequent regeneration, they will not be fruitful places for further investigation.

6. If a mortuary tree has continued living to the present day, it is possible that the containing hollow may have been entirely sealed by overgrowth and thus be largely undetectable through external examination. This possibility must be carefully considered in detailed examination strategies and contingency arrangements.

<u>The Development of a Predictive Model and Map for Mortuary Trees</u>

The development of the model is based on applying our limited knowledge of known attributes predicted for mortuary trees, to a background framework of the 1750 EVCs, qualified by general observations of surviving trees by age and species, and the positions of the route alignment options under consideration, thus;

1. The highest rating was applied to Plains Grassy Woodland (EVC 55), Creekline Grassy Woodland (EVC 68) and Alluvial Terrace Herb Rich Woodland (EVC 67), which are dominated by River Red Gum (*E. Camaldulensis*). The lowest value was applied to open heath and dry forest (EVC 20 & 48), where trees either do not naturally occur in large numbers, or have limited capacity for age or size, by the nature of species or forest management practices.

2. These ratings were converted to two categories of land, where mortuary trees were considered to be most likely (highest rating, or Category 1) and less likely (moderate rating, or Category 2).

   - Category 1 land consists of 1750 EVC woodland dominated by river red gum and other suitable species.

   - Category 2 consists of 1750 EVC heathy woodland and dry forest with a lesser proportion of river red gum and other suitable species.

3. These categories were qualified by field observations regarding the overall age and survival of River Red Gum, and other species known to have been modified by Aboriginal people in the region, such Yellow Box (*E. Melliodora*) and stringybark spp., as well as any associations with known culturally modified trees.

   It is important to note that isolated examples of overmature or dead trees may be located across much of the project area, and as such there is at least a small risk of that trees suitable for mortuary use may be present in any option. Even in largely cleared land, commercial plantations or regenerated woodland, paddock isolates and dead standing or fallen trees are known to occur, and these cannot to completely discounted as potential mortuary trees at a desktop level. As a cautionary example, the Moyston Aboriginal Mortuary Tree (7423-0751) is essentially a dead fallen paddock isolate.

   Consequently, it is not possible to rule out the potential presence of mortuary trees in any of the alignments, though it is possible is provide an assessment of the relative risk of impact for each option.

Discussion and Rating of Options

On the balance of evidence, there is only a small risk that a mortuary tree is present within the project area. Ethnohistorical and archaeological evidence demonstrates the mortuary use of trees in the Stawell and Ararat region in the period up to 1850. The desktop model indicates the relative occurrence of suitable river red gum habitat (based on the distribution of 1750 EVCs), however this does not account for the condition of the landscape today. Nevertheless, field observations indicate that the preservation of surviving trees which could have been used for mortuary purposes is *very low*.

In general the landscape has been substantially cleared, with the exception of road reserves, creek corridors, a patchwork of small areas of bushland, mostly comprising heathy woodland on sandy eminences and a scatter of residual paddock trees. Significantly, the surviving river red gum population is dominated by relatively young, regenerated specimens, and the occurrence of suitably overmature or senescent trees is rare.

The individual zone options are briefly outlined as follows (see maps Appendix 3);

Zone 1:

Woodland sections of options 1A, 1C and 1E appear to be entirely dominated by post-1850 trees, either heathy woodland and dry forest (Figure 2), or regenerated red gum generally up to mature age (Figure 3).

On the basis of current evidence, all of these options appear to be suitable from the perspective of low mortuary tree potential.

Zone 2:

The Great Western bypass options can be divided into two groups; the north (2B and 2C) and south (2D and 2E) options.

Options 2B and 2C again appear to be dominated by post-1850 trees, either regenerated red gum generally up to mature age, or heathy woodland and dry forest (Figure 4), however there is some preservation of a few older red gum specimens within and adjacent to the existing Western Highway reserve, both at the east and west terminations. One suitable tree with a hollow was identified in Bests Lane in the centre alignment of these options (Figures 6 & 7).

Options 2D and 2E carry a slightly higher risk and appear to be less preferable to the northern options, given the apparently higher occurrence of mature and potentially older river red gums in the central and eastern sections (Figure 5). These options were not accessed for inspection to the same degree as Options 2B and 2C, so more detailed examination is required in order to confirm this perceived higher level of risk.

Zone 3:

Zone 3 consists of options based on the existing Western Highway corridor and various connections (Options 3A, 3AD and 3B). These options are generally low risk given the prevalence of cleared land and heathy woodland, though the eastern section of Options 3A and 3B do impact on an area of mature river red gum near Bests Lane (see Zone 2).

Options 3C and 3D bisect almost entirely cleared land, with only limited risk to mature trees other than heathy woodland species (Figures 9 & 10). There is very limited occurrence, if any, of mature age river red gums. These options are also of low risk, though again it should be noted that some parts were not accessed for inspection, and as such this is a tentative analysis.

It is important to note that occasional overmature, dead standing or fallen trees of suitable age may occur in any option (Figure 8), and as such the risk that a mortuary tree might be present cannot be entirely eliminated without detailed field checking of the preferred alignment.

Given the relatively low predicted estimate number of suitably aged trees across all options, there is a good chance that any risk could be managed with minimal impact through tactical avoidance and appropriate mitigation measures.

Although the risk of mortuary trees is not considered significant in comparison with Section 2 of the WHEES project area, more detailed examination as part of the field component will be required to eliminate any concerns that a significant cultural place may be at risk.

Given their extreme rarity and the very high scientific and cultural significance, the consequence of the loss of a mortuary tree through construction work on the project would be severe.

Irrespective of the low risk to mortuary trees based on the criteria described above, there is still a risk of impact to other forms of culturally modified trees which have not been assessed through this study.

<u>The Way Forward</u>

The process of systematically field checking alignment options will be relatively straightforward given the predicted small number of suitable trees at risk. As discussed above, the risk of impacting on a mortuary tree is generally low, though some areas of higher risk have been identified.

An initial priority of the field investigation will be to ground truth the preferred alignment / alignment options to individually identify all trees that fall into a high risk category (as per the known attributes of mortuary trees, above). It is intended that this will swiftly eliminate all trees that do not meet the basic criteria, namely;

1. The tree must be at least 250-300 years of age.
2. The tree must contain hollows which had developed and been usable prior to c. 1850.

Ultimately the key to the discovery of a mortuary tree will be the identification of skeletal remains within the body of the tree, which presents a unique set of methodological problems.

As there is no hard and fast rule in determining the age of an 'overmature' tree from outward appearance, attention must be given to the size, complexity and incidence of damage to the primary limb structure.

If time permits, consideration should be given to a pilot dating study, applying radiocarbon sampling techniques to suitable recently fallen timber or heartwood exposures to establish an 'age profile' for defined categories of tree within high risk areas. Although this would be rough and ready, it would also be cost-effective and convenient, and may assist in eliminating a significant number of trees from further enquiry on the basis that their profile is too young to meet the basic criteria.

For the remaining trees of concern that are at risk from the project, an investigation process similar to that proposed by Richards *et al*. (2004, 46) would need to be developed for use during the detailed assessment stage of the CHMP, involving the use of specialised access and recording equipment to assess the interior of hollows and cavities that meet the required age criteria.

References:

Bride, T. 1983. *Letters from Victorian Pioneers: A Series of Papers on the early Occupation of the Colony, the Aborigines, etc*. Second edition. William Heinemann, Melbourne.

Builth, H. and O. Nicolson. 2010. Crowlands Wind Farm. Crowlands near Ararat, Victoria, Djab Wurrung Country. Aboriginal Cultural heritage management Plan Number: 10020. Unpublished report to Energy Pacific (Vic) Pty Ltd.

Clark, I. 1990. *Aboriginal Languages and Clans: An Historical Atlas of Western and Central Victoria, 1800-1900. Monash Publications in Geography* 37. Monash University, Melbourne.

Ecology Partners. 2010. Detailed Flora and fauna Study – Western Highway Project –Ararat to Stawell, Victoria. Unpublished report to VicRoads.

Long, A., M. Brookhouse and A. Thorn. 2005. The Origin and Date of Three Scarred Trees at Minniedale Road, Loy Yang, Traralgon. Unpublished report to Loy Yang Power Management Pty Ltd.

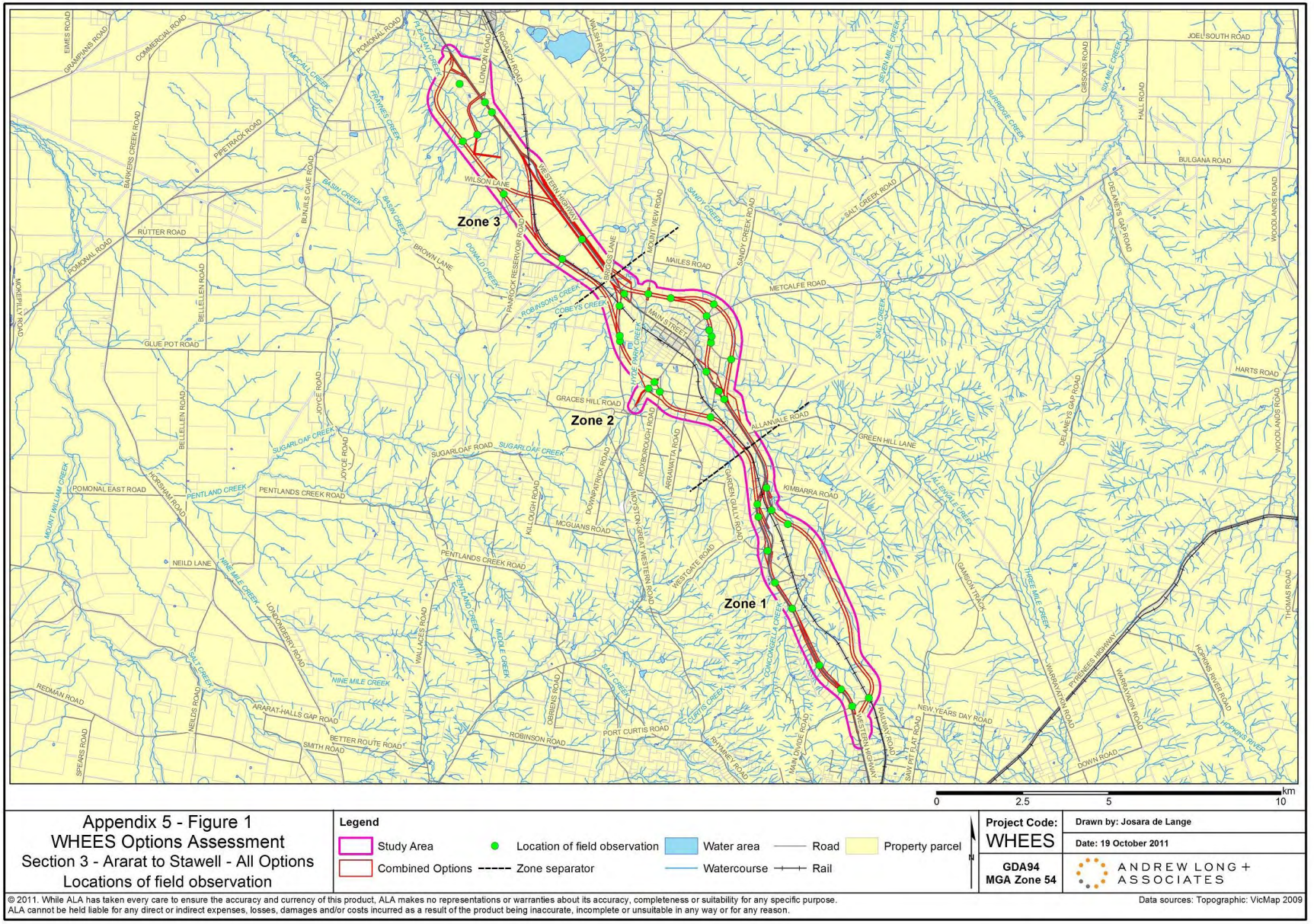
Long, A., A. Thorn and J. Banks. 2002. The Origin and Date of Two Scarred Trees at Horsham Saleyards, Horsham, Western Victoria. Unpublished report to Horsham Rural City Council and Goolum Goolum Aboriginal Co-operative.

Meehan, B. 1971. The Form, Distribution and Antiquity of Australian Aboriginal Mortuary Practices. Unpublished M.A. Thesis, University of Sydney.

Richards, T., H. Webber and C. Bennett. 2004. The Moyston Aboriginal Mortuary Tree. Aboriginal Affairs Victoria.

Russell, L. 1990. Funerals and Graves. A Study of Mortuary Practices in Southern East Australia. Unpublished Honours thesis, La Trobe University.

Figure 1: Locations inspected during the mortuary tree study



Appendix 5 - Figure 1
WHEES Options Assessment
Section 3 - Ararat to Stawell - All Options
Locations of field observation

Legend
Study Area
Combined Options
Location of field observation
Zone separator
Water area
Watercourse
Road
Rail
Property parcel

Project Code: WHEES
GDA94 MGA Zone 54
Drawn by: Josara de Lange
Date: 19 October 2011
ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009

Section	Location ID	Easting	Northing	Datum	Projection
Section 3	Ararat to Stawell 1	669675.87	5875978.91	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 2	670152.85	5876222.82	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 3	668719.88	5877169.13	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 4	667428.71	5879567.95	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 5	667210.69	5880490.82	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 6	667327.11	5881671.92	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 7	667181.06	5882323.86	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 8	666916.48	5881845.49	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 9	666948.23	5881479.31	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 10	665558.10	5884370.94	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 11	664085.69	5885113.10	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 12	663930.91	5885386.95	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 13	663756.29	5885204.38	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 14	665951.01	5884890.85	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 15	665800.20	5885125.01	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 16	665435.07	5885692.54	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 17	666157.39	5886049.73	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 18	665566.04	5886531.93	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 19	665589.85	5886718.46	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 20	665522.39	5886893.09	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 21	665443.01	5887309.81	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 22	665649.39	5887651.12	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 23	664399.23	5887829.72	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 24	663748.35	5887952.75	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 25	663053.82	5887948.78	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 26	662912.79	5887604.56	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 27	662925.49	5886580.09	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 28	662922.85	5886730.90	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 29	667800.72	5881267.11	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 30	667924.01	5878812.73	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 31	669345.80	5876469.58	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 32	661246.88	5888960.34	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 33	661821.87	5889531.50	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 34	659548.74	5890850.15	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 35	658364.25	5892375.79	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 36	658778.25	5892567.46	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 37	659211.41	5893226.78	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 38	659004.41	5893506.61	GDA94	MGA Zone 54
Section 3	Ararat to Stawell 39	658268.42	5894043.27	GDA94	MGA Zone 54

Figure 2: Heathy woodland of relatively young age adjacent to the existing Western Highway (Option 1A)

Figure 3: Remnant river red gum woodland at Armstrong (Options 1A & 1C), generally only young to early mature trees are present. This is typical of Section 2.

Figure 4: Heathy woodland to the north east of Great Western (Option 2C). Although this woodland may be of some age, the small size of the trees would prohibit their use for mortuary purposes.

Figure 5: A distant view of a section of Options 2D and 2E, showing some potential for mature river red gum trees (looking south east from Roxborough Road). The detailed checking of this section is a priority during field survey.

Figure 6: A relative large, mature river red gum on Bests Lane (Options 2B & 2C), displaying a hollow behind a large dead branch stub. The detailed inspection of trees such as this will be a priority during the field assessment.

Figure 7: A close up of the hollow on the tree depicted in Figure 5.

Figure 8: A dead standing mature river red gum (close to Option 2B), indicating that remnant trees of an older generation may occur in any suitable environment, assuming that the landscape has not been entirely cleared for agriculture.

Figure 9: An unusual stand of remnant mature age stringybarks close to Options 3A and 3AD to the west of Great Western. Although perhaps not suitable for mortuary trees given their relatively small stature and limited age potential, other forms of cultural modifications may be present.

Figure 10: Heathy woodland of young age adjacent to the existing Western Highway, typical of Zone 3.

Western Highway Project – Section 3 Duplication (Ararat to Stawell)

Burnt Mounds Desktop and Route Options Assessment

Specialist Report

By Andrew Long

27th Oct 2011

Introduction

This report presents a preliminary assessment of the risk of impact to Aboriginal burnt mounds undertaken as part of the Western Highway Project Environmental Effects Statement (WHPEES), Section 3 Duplication (Ararat to Stawell). The objective of the study is to inform the route alignment option selection process for the proposed duplication, which forms part of the broader cultural heritage studies undertaken for WHPEES.

The potential presence of burnt mounds has been identified as a risk in the route selection process, given prior research into cultural traditions in the region, the occurrence of previously identified burnt mounds and the distribution of landforms with comparable characteristics across the project area.

What is a Burnt Mound?

In broad terms a burnt mound is a cultural accumulation of burnt material, resulting in a raised heap of debris or 'mound'. On the basis of both historical and archaeological data, mounds are generally found to be circular or oval in shape, can vary considerably in size, and be composed of a mixture of varying amounts of soil, ash, charcoal and burnt clay or stone heat retainers. It is important to make the distinction between mounds and other cultural deposits by stating that a mound is an artificial construction formed through either a prolonged or intense period of use, as opposed to the low intensity use of a naturally elevated area.

Burnt mound features are known to occur throughout the world (e.g. Europe, North America and New Zealand), the origins of which have been ascribed to a variety of utilitarian and ceremonial practices (Buckley 1990; Hodder & Barfield 1991; Klaver 1987, 20). On available evidence it is apparent that regardless of similarities in basic characteristics, the form, age and perceived function of mounds throughout these areas can vary considerably.

In south eastern Australia, mounds have been variously interpreted as rake-out deposits from pit ovens, prolonged camping places or habitation bases, though some have also been used for secondary functions, such as burials. The artificial elevation of these features through the repeated accumulation of burnt deposits on low lying ground is seen as increasing the value of these places as bases for hunting and gathering during periods of flood.

There have been various attempts to define mounds in a physical sense, notably the work of Sullivan & Buchan (1980), who determined a set of criteria for distinguishing between Aboriginal and naturally-formed mounds on the Southern Riverina. It is recognised that a number of geomorphological and human processes (e.g. sedimentation and tree clearance burning), can result

in the formation of deposits that superficially mimic the characteristics of authentic mounds. The effective application of these criteria is greatly influenced by localised taphonomic processes, field survey conditions and familiarity with both the region and local land use practises; however, a better understanding of mounds means that cultural and natural sites can now be distinguished with a higher degree of certainty than was possible twenty years ago (cf. Buchan 1974, 40). The difficulty now lies in distinguishing in the field between artificially created mounds and cultural deposits on natural eminences, and interpreting how these types of features relate in the prehistoric landscape.

The definition of 'mounds' in a functional sense is more problematical (cf. Balme & Beck 1996). A brief survey of the primary ethnohistorical documentation indicates that there is considerable variation in both the terms used to describe mounds and their alleged function.

Early observers (e.g. Mitchell and Robinson) typically apply general descriptive terms, such as 'ash heaps' and 'mounds', while later 19th century commentators tend to employ more elaborate interpretive or ethno-specific tags (e.g. Beveridge 1869; MacPherson 1884). There is no conclusive evidence to state that they are all describing the same phenomena, and this is a problem that significantly influences our interpretation of the function of sites that are still variously termed in the archaeological literature, 'earth mounds', 'burnt mounds', 'Aboriginal mounds' and 'oven mounds'. In this report the use of the term 'burnt mound' is preferred since it adequately describes the evidence without introducing preconceived functional notions.

In reconciling the ethnohistorical and archaeological evidence it is important to realise that there are many unresolved issues regarding the interpretation between mound form and documented function. Is the function of a mound a reflection of its form or *vice versa*? (i.e. are mounds used for activities because they are raised features, or do they become raised features because of these activities? If the latter is true, do they need to be composed of burnt material, or can they be composed of artificial mounds of sediment which becomes burnt through secondary activity?). Is the form of a mound incidental to or dependent on its function? (i.e. are mounds deliberately shaped or do a combination of unrelated natural and human processes result in their characteristic form?). The emerging pattern indicates that there is considerable regional variation in mound form, content, physical characteristics and location in south eastern Australia. Existing interpretations are largely based on research concentrated on the floodplains in the Swan Hill area and swamps in south western Victoria, which do not necessarily apply to the project region.

It is currently difficult to answer detailed questions on mound origin and function with any degree of certainty; there is insufficient excavation data investigating the relationship between mound variables across a wider region. The ethnohistorical evidence presents an essentially incomplete picture of mound formation, function and location, as demonstrated by recent survey and excavation programmes, which tended to dominate archaeological interpretations of mounds into the 1980s. Only recently has detailed excavation data been collected from different types of mounds in a wider geographical area, though the results of these, and several earlier excavations, are not fully available.

The Known Attributes of Burnt Mounds in the Project Area

The project area is essentially a transitional zone between the uplands of central Victoria, with the Wimmera River draining onto the Murray basin plains to the north and tributaries of the Hopkins River draining from the eastern Grampians and Stawell granites (Black Range) onto the volcanic plains to the south.

No burnt mounds have been identified within the project area, however a number of known sites are scattered across the emerging Wimmera River plains to the north (ACS 1997, 47), and on the volcanic plains to the south west, such as (Coutts *et al*. 1976; 1977; Williams 1988). There has been very limited synthesis and analysis of mound data from the region, however the most recent regional study, the Wimmera River Cultural Heritage Study (ACS 1997), suggests that the few mounds identified at that time were closer in character to the Murray basin mounds, and were more likely to be the result of cooking activities, rather than camping, given the generally elevated nature of the surrounding landscape. Outwardly the mounds were composed entirely of dark charcoal rich soil with burnt clay heat retainers, and generally without other culturally derived material (e.g. artefacts, bone or shell).

In contrast to the uplands of central Victoria, all recorded burnt mounds are associated with waterways and wetlands, and alluvial corridors in general. No mounds have been identified away from river corridors, indicating a potentially different response to varying environmental and cultural background factors in this region, which appears to be more closely associated with the middle stretches of the Wimmera River in the Horsham area, a relatively discrete geographical area where mounds are a common cultural heritage expression. It is possible that this association is due to the diminishing number of minor creek, and large intervening distance between watercourses, in contrast to the adjacent uplands and volcanic plains of the Section 2 WHPEES duplication project area (Ararat to Beaufort).

Burnt mounds may also be associated with buried human remains, Antiquarian excavations (e.g. Soilleux 1891, 41-43; MacPherson 1884, 55 & 56), systematic field survey (e.g. Craib 1991, 141-142) and occasional modern excavation (Coutts *et al.* 1979, 68-69) have confirmed the occasional presence of human burials on mounds in the Murray valley, though to date no examples have been identified in the Wimmera basin.

Discussion and Rating of Options

Although there have been no discoveries of mounds within the project area, the type and distribution of these features in the adjacent landscape appear to be more closely associated with mounds located on the Wimmera river plains, rather than the mounds clustered around swamps in south western Victoria, or more widely distributed across the landscape of the central Victorian uplands. However, the project area does occur at the transition between these three regions, and as such some characteristics common to other regions, in terms of distribution or structure, may also be found in future discoveries.

A preliminary analysis of mounds found to the north and east of Stawell indicates a direct relationship to creeklines, wetlands, and alluvial corridors. Although the available information is limited, the known distribution of mounds in adjacent areas does support this hypothesis, and

provides a starting point for rating the options. The extent to which these options bisect drainage could thus be a measure to assess the likelihood of risk of impact to a mound or mound complex.

It is important to note that this discussion is based only on comparative desktop information and limited field observations only, and that to date no burnt mounds have been identified within the project area. As such, these ratings are precautionary and may be subject to revision following systematic ground truthing.

Burnt mounds are a significant Aboriginal cultural heritage place type, and in occasional instances have been known to contain buried human remains. As such, it would be considered a better outcome and lower risk to avoid or mitigate impacts from road construction.

The individual zone options are briefly outlined as follows (see maps Appendix 3);

Zone 1:

The options for Zone 1 can be classed into two groups, which have a similar low-moderate risk from slightly different reasons.

Options 1A and 1E follow the existing Western Highway corridor through a series of low hills and ridges with only occasional minor waterway crossings until the Concongella Creek at Armstrong. Although there is a risk of a mound being present in this area, this will probably be downgraded considering the existing disturbance to this corridor, including the recently constructed Armstrong deviation.

Option 1C deviates from the Western Highway, but mostly follows open plains and hills with only one minor waterway crossing until rejoining the highway at the Concongella Creek in Armstrong. Unlike Options 1A and 1E, this landscape has not been substantially disturbed.

As such, options 1A and 1E are marginally preferable to Option 1C, which involves a greater impact to a potentially less disturbed cultural landscape, should mounds be present.

Zone 2:

The options for Zone 2 can be classed into two groups, which bypass Great Western to the north east (Options 2B & 2C) and south west (Options 2D & 2E) respectively.

The main areas of risk are various floodplain crossings of Concongella Creek and various tributaries, including in particular extensive areas of confluence floodplain both to the east and west of the township, where extensive interchange works are proposed for the northern options (2B & 2C). There is a moderate risk of impact to burnt mounds in these areas, with the intervening elevated sections having only low risk.

The southern options (2D & 2E) have similar issues, but which result in a lower level of impact to the floodplain areas to the east and west, given that the interchange area is proposed for a relatively elevated area with low risk. There is, however, an additional creek floodplain crossing to be negotiated, though the overall rating is low to moderate.

As such, options 2D and 2E are preferable to Options 2B & 2C, which involves a greater impact to a more extensive landscape with potential for mounds.

Zone 3:

The options for Zone 3 can be classed into two groups, based on those that largely follow the existing Western Highway along an elevated ridgeline (Options 3A, 3B & 3C) and those that deviate across an extensive area of gently undulating land bisected by creeks (Options 3AD & 3DC).

The main area of risk for the Western Highway options (Options 3A, 3B & 3C) is the same area of confluence floodplain to the west of Great Western, where extensive interchange works are proposed (as discussed in Zone 2), however all three options also include some connecting roadworks works around the Stawell Golf Course which involve an additional two creek crossings. There is a moderate risk of impact to burnt mounds in these areas, however the majority intervening elevated sections have only low risk.

The other options to the west of the existing highway (3AD & 3DC) bisect several waterways and intervening plains which carry a moderate to high risk of impact to mounds, particularly Option 3DC which is almost exclusively located in this terrain. Option 3DC deviates from the highway 3 kilometres west of Great Western, before entering this landscape.

As such, options 3A, 3B and 3C are preferable to options 3AD and 3DC, which involves a greater impact to a more extensive landscape with potential for mounds.

References:

Archaeological Consulting Services. 1997. The Wimmera River Cultural Heritage Study. Stage 1: The Upper Wimmera Basin. Unpublished report to Goolum Goolum Aboriginal Co-operative.

Balme, J. and Beck, W. 1996. 'Earth Mounds in Southeastern Australia', *Australian Archaeology* 42, 39-51.

Beveridge, P. 1869. 'On Aboriginals Ovens', *Journal of the Anthropological Society of London* 1, 187-189.

Buchan, R. 1974. Report on an Archaeological Survey in the Murray Valley. Unpublished report to NSW National Parks and Wildlife Service.

Buckley, V. 1990. *Burnt Offerings; International Contributions to Burnt Mound Archaeology*. Wordwell Ltd, Dublin.

Coutts, P., Witter, D., McIlwraith, M. and Frank, R. 1976. *The Mound People of Victoria: a Preliminary Statement, Records of the Victoria Archaeological Survey* 1, Melbourne.

Coutts, P., Witter, D. and Parsons, D. 1977. 'The Impact of European Settlement on Aboriginal Society in Western Victoria'. *Records of the Victorian Archaeological Survey* 4, 17-58.

Coutts, P., Henderson, P., and Fullagar, R. 1979. *A Preliminary Investigation of Aboriginal Mounds in Northwestern Victoria*, Records of the Victoria Archaeological Survey 9, Melbourne.

Craib, R. 1991. Archaeological Survey in the Moira-Millewa State Forests. Unpublished report to NSW National Parks and Wildlife Service.

Hodder, M. and Barfield, L. (eds.) 1991. *Burnt Mounds and Hot Stone Technology*. Sandwell Metropolitan Council, Birmingham.

Klaver, J. 1987. Old Ovens are soon Hot; a Study of Function and Location of Aboriginal Mounds in the Upper Murrumbidgee Region. Unpublished Honours Thesis, Department of Prehistory and Anthropology, Australian National University, Canberra.

MacPherson, P. 1884. 'The Oven Mounds of the Aborigines of Victoria', *Journal and Proceedings of the Royal Society of New South Wales* 18.

Soilleux, G. 1891. 'Blackfellows' Mounds', in *Transactions of the Historical Society of Australasia* 1, 41-44.

Sullivan, M. and Buchan, R. 1980. 'Distinguishing between Aboriginal and Natural Mounds in the Murray Valley', *Records of the Victorian Archaeological Survey* 10, 87-97.

Williams, E. 1988. *Complex Hunter-Gatherers; a Late Holocene Example from Temperate Australia*, British Archaeological Reports S423, London.

Appendix 6 Spatial Dataset Meta Statements

Victorian Spatial Data Directory

Watercourse Network 1:25,000 - Vicmap Hydro (HY_WATERCOURSE/)

Unique Id	ANZVI0803002490
Title	Watercourse Network 1:25,000 - Vicmap Hydro (HY_WATERCOURSE/)
Custodian	Department of Sustainability and Environment
Jurisdiction	Victoria

Description

Abstract	This layer is part of Vicmap Hydro and contains line features delineating hydrological features. Includes; Watercourses (ie channels, rivers and streams) and Connectors. Attributed for name. Arcs run downstream.
Search Word(s)	AGRICULTURE Irrigation LAND Topography WATER Hydrology
Geographic Extent Name (s)	Victoria

Bounding Box

34.0 S

141.0 E 150.2 E

39.2 S

Dataset Currency

Beginning Date	01JAN1999
Ending Date	Current

Dataset Status

Progress	Complete
Maintenance and Update	Irregular

Dataset Access

Stored Data Format(s)	- SDE
Available Format Type(s)	Digital - - All major formats available
Access Constraints	Not Documented

Data Quality

Lineage

Data Set Source:
The line work and points were derived from the Vicmap Digital Topographic (VDT) map base coordinated by LIG. VDT evolved from Victoria's printed 1:25,000 Topographic Map Series program together with the need to supply a control framework for the creation of the rural Digital Cadastral Mapbase. The capture scale is 1:25,000 Statewide and the coverage, except for minor border issues is also statewide.
Collection Method:
Conversion of existing mapping, digital stereo capture
Processing Steps:
- Conversion of existing mapping - compilation conversion 30% and repromat conversion 50%
- digital stereo capture - 20%
-The majority of the conversion of existing mapping and approximately 30% of the digital stereo capture were outsourced to private contractors and the remainder was captured in house. Contractor's primarily scanned and vectorised existing repromat with a small amount of hand digitising done in some instances.

Positional Accuracy	The planimetric accuracy attainable will be the sum of errors from three sources:the positional accuracy of the source material, errors due to the conversion process, errors due to the manipulation process. For topographic base derived data this represents an error of 8.3m on the ground for 1:25,000 data. A conservative estimate of 10m for the standard deviation will be used in any data quality information. Alternate and equal ways of expressing this error are: not more than 10% of well-defined points will be in error by more than 16 m. The worst case error for the data is +/- 30 m. For vertical positional accuracy of points determined from contours there is an expectation that the elevation accuracy (standard deviation) will be half the value of the contour interval.
Attribute Accuracy	The allowable error in attribute accuracy ranges between a 1% allowable error to 5% error. For this product attribute accuracy ranges between a 1% to 5% error. For this product attribute accuracy is a measure of the degree to which features and attribute values of spatial objects agree with the information on the source material.
Logical Consistency	The allowable error in attribute accuracy ranges between 1% to 5% error. Logical consistency is a measure of the degree to which data complies with the technical specification. The test procedures are a mixture of scripts, microstation MGE program and on-screen visual checks.
Completeness	

Contact

Contact Organisation	Department of Sustainability and Environment
Contact Position	Custodian - Vicmap Hydro
Address	PO Box 500 East Melbourne VIC 3002 Australia
Phone	(03) 8636 2354
Facsimile	(03) 8636 2394
Email Address	darren.mckinty@dse.vic.gov.au

Other

Metadata Date 05JUL2006

Additional Metadata

---

last modified: 28/10/2010

Victorian Spatial Data Directory

Native Vegetation - Modelled 1750 Ecological Vegetation Classes (with Bioregional Conservation Status) (NV1750_EVCBCS/EVC1750)

Unique Id	ANZVI0803003496
Title	Native Vegetation - Modelled 1750 Ecological Vegetation Classes (with Bioregional Conservation Status) (NV1750_EVCBCS/EVC1750)
Custodian	Department of Sustainability and Environment
Jurisdiction	Victoria

Description

Abstract

This is a derived dataset that delineates the current Bioregional Conservation Status of EVCs within the modeled 1750 EVC dataset.

The dataset is derived from a combination of both Victorian bioregions (VBIOREG100) and the modeled 1750 EVC dataset (NV1750_EVC), with an assigned conservation status on the basis of unique Bioregion EVC units.
The dataset underpins the implementation of Victoria's Native Vegetation Management Framework, and the preparation of Regional Vegetation Plans in addition to other biodiversity planning.
The dataset requires upgrading when either of the two input datasets change.

Note erratum under Data Quality-Completeness-Classification

Search Word(s)	FLORA Native VEGETATION Biodiversity VEGETATION Classification VEGETATION Conservation VEGETATION Floristic VEGETATION Structural
Geographic Extent Name (s)	Victoria
Bounding Box	34.0 S 141.0 E 150.2 E 39.2 S

Dataset Currency

Beginning Date	01JAN1997
Ending Date	Current

Dataset Status

Progress	In Progress
Maintenance and Update	As required

Dataset Access

Stored Data Format(s)	Digital - Oracle/SDE DIGITAL Arc/Info Coverage DIGITAL Arc/Info Grid
Available Format Type(s)	Digital - - All major formats available
Access Constraints	This is a landscape scale dataset, site verification is required for site based projects Planning or investment decisions at the site-scale should use some form of ground-truthing.

Data Quality

Lineage

Data Set Source:
This is a derived dataset see source datasets for history. When either of the source datasets change this dataset is rederived.

The dataset is derived from a combination of Victorian bioregions (VBIOREGION100), and Pre 1750 EVCS (NV1750_EVC). Bioregional conservation status and geographic occurrence is applied to unique Bioregion EVC units. The boundaries and key attributes from the source datasets are found in this derived dataset.

The key attributes, Bioregional Conservation Status (EVC_BCS) and Geographic Occurrence (EVC_GO) of EVCs, have been assigned to Bioregion/EVC combinations on the basis of an expert interpretation of statistical and spatial information by Alison Oates and David Parkes, Biodiversity and Ecosystem Services, DSE with the support of other DSE staff. The source information for these two attributes is maintained in a separate database that is linked to the NV1750_EVC/NV2005_EXTANT/VBIOREG100 combination dataset to create NV2005_EVCBCS. The source table is maintained by Biodiversity and Ecosystem Services

The approach to assessing bioregional conservation status and geographic occurrence of vegetation types (Ecological Vegetation Classes) is described in Appendix 2 of DSE's, 'Victorias Native Vegetation Management - A Framework for Action', 2002.

Collection Method:

API
Flora and Fauna Branch Two-way Analysis Tables to determine species groupings.
Existing CGDL EVC100 dataset.

Processing Steps:
NV1750_EVC is intersected with VBIOREGION100 and Bioregional Conservation and Geographic Occurrence attributes are populated for each Bioregion-EVC combination

Positional Accuracy

Refer to Metadata for NV1750_EVC and VBIOREGION100

Attribute Accuracy	Refer to Metadata for NV1750_EVC and VBIOREGION100
Logical Consistency	Not Known
Completeness	As of March 1998 the dataset covers EVC mapping for the Central Highlands RFA area, East Gippsland RFA area and North-East RFA area.

Contact

Contact Organisation	Department of Sustainability and Environment
Contact Position	Biodiversity Info
Address	PO Box 500 East Melbourne Vic 3002 Australia
Phone	(03) 9637 8393
Facsimile	(03) 9637 8312
Email Address	biodiversity.info@dse.vic.gov.au

Other

Metadata Date	26MAR2010
Additional Metadata	Metadata for NV1750_EVC and VBIOREG100 EVC Benchmark descriptions on the DSE external website (dse.vic.gov.au)

last modified: 17/8/2011

Victorian Spatial Data Directory

Geological polygons and lines (1:250,000) (GEOL250/)

Unique Id	ANZVI0803002488
Title	Geological polygons and lines (1:250,000) (GEOL250/)
Custodian	Department of Primary Industries
Jurisdiction	Victoria

Description

Abstract

This dataset contains primary geological data, namely outcropping/sub-cropping geological rock units and boundary types separating rock units. Other geological features (e.g. fault or dyke) are included where the feature forms a boundary to rock units.

The data have been collected by the Geological Survey of Victoria. The dataset is accompanied by other datasets representing structural lines, miscellaneous lines, miscellaneous polygons, metamorphism, and placer deposits.

Search Word(s)	GEOSCIENCES Geology Mapping
Geographic Extent Name (s)	Victoria

Bounding Box

34.0 S

141.0 E 150.2 E

39.2 S

Dataset Currency

Beginning Date	01JAN1970
Ending Date	01NOV2003

Dataset Status

Progress	Complete
Maintenance and Update	Irregular

Dataset Access

Stored Data Format(s)	- Format: ArcInfo Master Location: Unix eureka:/arc/p_gsv/master Backup: ITT Backup Format: ArcInfo CGDL Location: Unix eureka:/cdb_mpv/l100-gmpv Backup: ITT Backup Format: MapInfo Location: j:/f-maps/geology Backup: ITT Backup Format: MapInfo CDs Location: CD Backup: GSV Irregular
Available Format Type(s)	Digital - - ArcInfo, ArcView, MapInfo Non digital - printed maps
Access Constraints	Subject to licence conditions

Data Quality

Lineage	Data Set Source: Data captured prior to April 2000 is derived from previous Genamap data; Data captured after April 2000 is primary ArcInfo data. Collection Method: Processing Steps:
Positional Accuracy	Generally accurate to 1:250,000
Attribute Accuracy	Attributes are mostly qualitative data obtained from field mapping by GSV geologists. Validated for quality in 2003 in order to meet GSV standards.
Logical Consistency	Good
Completeness	

Contact

Contact Organisation	Department of Primary Industries
Contact Position	Manager of Geoscience Information and Geophysics
Address	GPO Box 4440 Melbourne Vic 3001 Australia
Phone	(03) 9658 4511
Facsimile	(03) 9658 4555
Email Address	linda.bibby@dpi.vic.gov.au

Other

Metadata Date	31MAY2007
Additional Metadata	

last modified: 17/8/2011

Victorian Spatial Data Directory

Vicmap Elevation DTM 20m (VICMAP_ELEV_DTM_20M/)

Unique Id	ANZVI0803003584
Title	Vicmap Elevation DTM 20m (VICMAP_ELEV_DTM_20M/)
Custodian	Department of Sustainability and Environment
Jurisdiction	Victoria

Description

Abstract	Vicmap Elevation DTM 20m is a product which is a raster representation of Victoria's elevation. DTM 10m has a spatial resolution of 20m. The DTM is constructed from source data of various resolutions, accuracies and ages to produce an improved DTM containing increased detail in localised areas. The DTMs are hydrologically enforced and correctly defines the natural surface drainage and hydrological flow. (DEM)
Search Word(s)	LAND Topography Models
Geographic Extent Name (s)	Victoria

Bounding Box

34.0 S

141.0 E 150.2 E

39.2 S

Dataset Currency

Beginning Date	30JUN2008
Ending Date	Current

Dataset Status

Progress	Complete
Maintenance and Update	Not Planned

Dataset Access

Stored Data Format(s)	- Native Format: ESRI Grid
Available Format Type(s)	Digital - - All major formats available
Access Constraints	Not Documented

Data Quality

Lineage

Data Set Source:
Content had been supplemented and/or verified with information supplied by:
Local Government
Water Authorities
Catchment Management Authorities
Private Industry
Department of Sustainability and Environment

Collection Method:

Processing Steps:
The methodology utilizes a combination of ArcInfo TIN and ANUDEM processes to ensure that stream enforcement is achieved while maintaining a DTM which closely conforms to the original input data. More information on the methodology can be found in the product description (www.land.vic.gov.au/vicmap).

Positional Accuracy

The spatial accuracy for Vicmap Elevation DTM 20m is inherited from the spatial accuracies of its many source datasets. The most consistently used and therefore the base for positional accuracy is the Vicmap Elevation 10-20 Contours and Relief, therefore the positional accuracy for Vicmap Elevation DTM 20m is 12.5m horizontally and 5m vertically or better.

Attribute Accuracy	The vertical accuracy associated with the DTMs is +/-5m or better. Reprojecting, changing format or resampling causes changes to the height values in the DTM.
Logical Consistency	The DTM values across initial basin tiles have been constructed to ensure smooth consistent elevation values is achieved.
Completeness	

Contact

Contact Organisation	Department of Sustainability and Environment
Contact Position	Custodian - Vicmap Elevation
Address	PO Box 500 East Melbourne Vic 3002 Australia
Phone	(03) 8636 2353
Facsimile	(03) 8636 2813
Email Address	christina.ratcliff@dse.vic.gov.au

Other

Metadata Date	25MAR2010
Additional Metadata	Please see Vicmap Elevation - DTM 20m and DTM 10m product description for more detailed information on this product. This can be found on the Vicmap Elevation Webpage.

last modified: 17/8/2011

Appendix 7 Historical Cultural Heritage Site Assessment Table

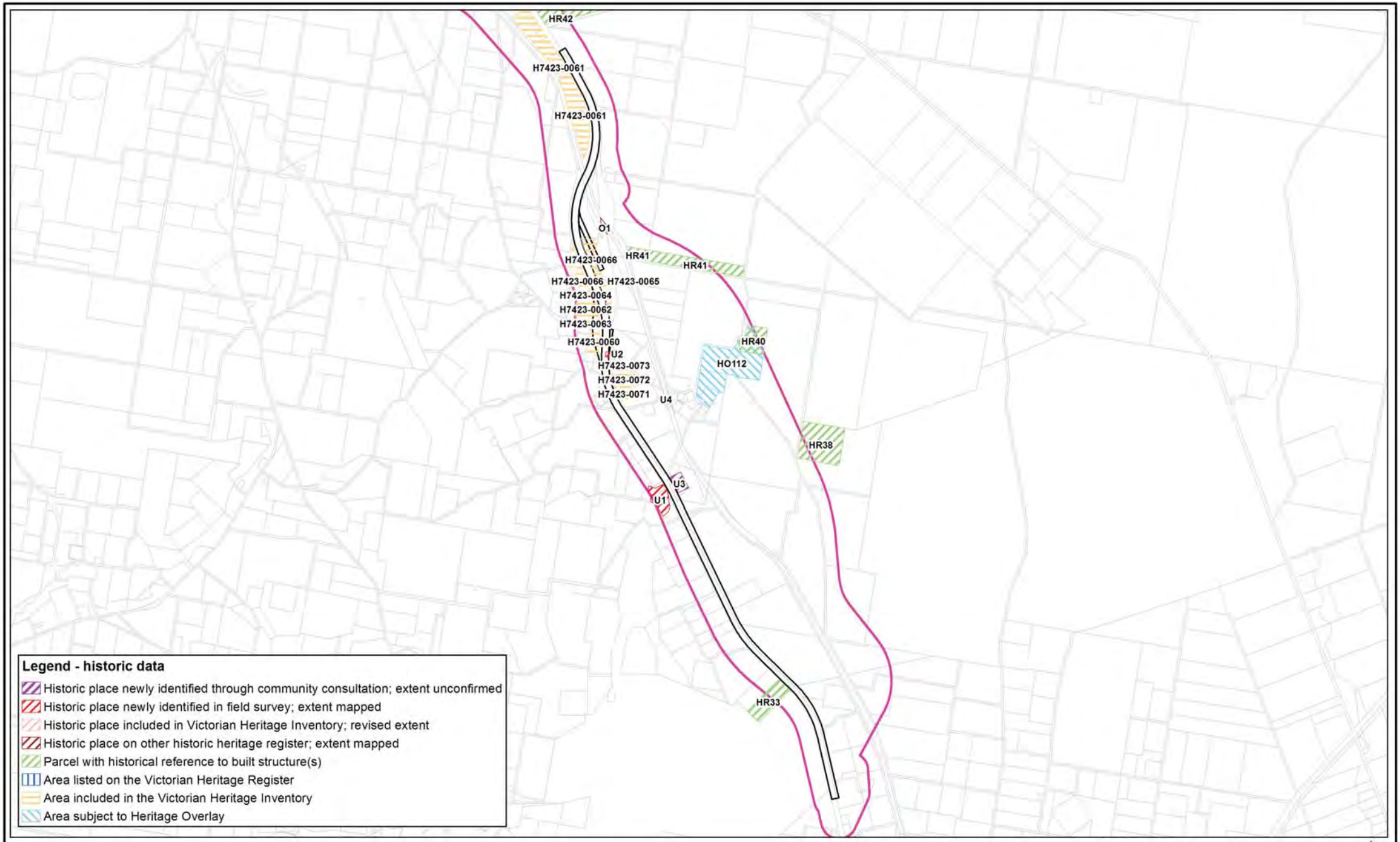
Western Highway Project Section 3 - European Heritage Conditions Assessment

Register	Site Number	Site Name	Existing Significance Assessment	Confirm/Change Significance Assessment (Recommended)	Description	Impacted by Alignment	Recommendations
VHR	HO1	SEPPELTS CHAMPAGNE CELLARS (included in HO and DSE registers)	State significance	Confirmed	Numerous intact winery buildings, ~ 3km of underground cellars and drives and mature garden areas	no	no further investigation required
VHI	H7423-0027	GREAT WESTERN LEAD (included in DSE register)	Local/Regional significance	Confirmed	Narrow band of intensive sinkings (shafts and small mounds) along an old cement lead. Very scrubby but workings are undisturbed and do provide an appreciation of the nature of this type of gold mining.	Zone 2, 2B	Confirmation of extent desirable
	H7423-0060	ARMSTRONG NO.1	of local historical and potential archaeological significance	Confirmed	Ruins comprising a ruined structure, marked by stone wall foundations and a possible stone hearth with a possible outbuilding and a raised circular structure with a central depression.	Potentially by Zone 1, C_INT 1A/1E	Inspection by VicRoads and HV and consultation with landowner to confirm presence/absence of remains
	H7423-0061	ARMSTRONG NO 2	of local historical and potential archaeological significance	Confirmed	House ruins with remnant garden and circular cistern	no	no further investigation required
	H7423-0062	GARDEN GULLY ROAD RUIN	of local historical and potential archaeological significance	No access/Not inspected	site consists of a ruinous structure, marked by the remains of a stone fireplace with stones set in mud mortar. There a few scattered hand made bricks	Potentially by Zone 1, C_INT 1A/1E	Site survey recommended upon resolution of access issues - confirmation of extent desirable
	H7423-0063	GARDEN GULLY ROAD HOUSE SITE NO.1	local historical significance	No access/Not inspected	A ruinous, four roomed timber house, with a lean-to kitchen at the rear and a verandah at the front and side. A cellar has been excavated under the east side. There is a shearing shed to the west and brick shed foundations nearby, a small dam and a brick cistern. Artefacts and equipment are scattered over the site and there is a remnant orchard, mature pines and other exotic trees	Potentially by Zone 1, C_INT 1A/1E	Site survey recommended upon resolution of access issues - confirmation of extent desirable
	H7423-0064	GARDEN GULLY ROAD HOUSE SITE NO. 2	of local historical and potential archaeological significance	No access/Not inspected	stone and brick foundations, low mounds and scattered historical artefacts. There is also a brick cistern and a remnant garden.	Potentially by Zone 1, C_INT 1A/1E	Site survey recommended upon resolution of access issues - confirmation of extent desirable
	H7423-0065	ARMSTRONG ALLUVIAL GOLD MINING AREA No. 1	local historical significance	Confirmed	An extensive area of shallow alluvial gold workings along a tributary of Concongella Creek. The area is marked by shallow pits, low mounds of spoil and scattered historical artefacts.	Zone 1, 1A_1E	Confirmation of extent by HV desirable
	H7423-0066	ARMSTRONG ALLUVIAL GOLD MINING AREA No. 2	of local historical and potential archaeological significance	Confirmed	Shallow alluvial gold workings along the banks of Concongella Creek, for approximately 250 metres. The site is marked by shallow pits, low mounds, one partially filled tunnel and scattered historical artefacts.	Zone 1, 1A_1E	Confirmation of extent by HV recommended
	H7423-0071	ARMSTRONG BRICK STRUCTURE RUINS	of local historical and potential archaeological significance	Confirmed	Brick and stone footings covered by long grass. Handmade bricks, granite and lime mortar. Some wall lines are apparent in an area about 10x10 m. Low mounds 50-60 cm above ground level may mark further ruins.	no	Confirmation of extent by HV recommended
	H7423-0072	ARMSTRONG HOTEL RUINS	of local historical and potential archaeological significance	Change	Ruined stone structure, with some well-preserved sections of wall (up to 1.5m high). Walls are of mudstone and mud mortar. Appears to be large and multi-roomed but difficult to assess as it is covered by dense scrub, may be garden remains on S side of structure	Zone 1, 1A_1E	Confirmation of extent by HV recommended
	H7423-0073	ARMSTRONG GRAVES	May have high historical, social and scientific value if these are graves.	Change	A group of 8-9 low oval mounds edged by field stones. Appear to be graves. Most are small (ie. children's?) but 3 are larger. One is shaped like a cross. There are a number of larger, rectangular areas that are also raised and edged by stones.	Zone 1, 1A_1E	Further investigation into the nature of the mounds recommended. Confirmation of location and extent by VicRoads and HV recommended
	H7423-0075	ST PETER'S VINEYARD	No statement of significance	Local Significance	The vineyards, orchards, winery and the gracious old homestead of St Peter's are all long gone. Two English trees shade an old iron gate which once lead to the homestead.	no	Recommended that the registration at HV be updated
HO	HO1	SEPPELTS CHAMPAGNE CELLARS (included in VHR and DSE registers)	State significance	Confirmed	Numerous intact winery buildings, ~ 3km of underground cellars and drives and mature garden areas	no	no further investigation required
	HO112	FOUNTAIN HEAD BREWERY RESIDENCE	Local significance	Change - Regional	Overlay on Entire property. Property includes 1872 managers residence, brewery cellar, stables and formal gardens	Zone 1, 1C (grounds only)	recommend site visit by VicRoads and HV to reassess the significance of additional features and grounds
incl. DSE, Register of th	O1	RAILWAY BRIDGE, BETWEEN ARARAT AND GREAT WESTERN	Not assessed	Change - Local	Previously described as a bluestone single span bridge - Concrete and redbrick structure observed	no	Administered by VicTrack. Bridge appears to be modern - Confirmation of location and extent by VicRoads and HV recommended
	O2	BOILER SETTING	Not assessed	Not identified	Remains of a stone boiler setting, approximately 4 metres long and 1.5 metres wide. Around the setting is evidence of shallow alluvial mining	no	Confirmation of location and extent by HV recommended. Likely part of township (see below)
	O3	GREAT WESTERN LEAD MINE (included in VHI register)	Local significance	Change	Narrow band of intesive sinkings (shafts and small mounds), pits, wooded setting	Zone 2, 2B	Confirmation of location and extent by
	O4	RAILWAY BRIDGE, GREAT WESTERN	Local significance	Confirmed	Timber 'humpbacked' road bridge over railway line adjacent to Seppelts	no	Administered by VicRoads/ Local council. Significance assessment by HV
	O5	SISTERS ROCK GRAFFITI SITE	Local significance	Confirmed	Reserve NE of western hghway containing rockformations extensively covered with graffiti	Zone 3, 1C	no further investigation required
	O6	SEPPELTS CHAMPAGNE CELLARS (included in VHR and HO registers)	Historical and social (state level) significance	Confirmed	Series of underground 'drives' ~ 3km long	no	no further investigation required
	O7	SAPPELTS WINERY SHAFT HOUSE	Historical and social (state level) significance	Confirmed	House with entrance to underground drives	no	no further investigation required
	O8	PRIMARY SCHOOL #860	Local significance	Confirmed	1870's brick structure (disused) and 1880's weatherboard structure. Associated early 1900's church and mature exotic trees	no	Recommended that the registration at HV be updated
	O9	BRANDT'S PLOUGH MEMORIAL, GREAT WESTERN	Local significance	Confirmed	In memorial park Great Western. Cement/stone/memorial surmounted by a plough	no	no further investigation required
	O10	GREAT WESTERN CEMETARY	Local significance	Confirmed	Town cemetery with headstones dating back to 1859	no	no further investigation required. Update of registration desirable

Western Highway Project Section 3 - European Heritage Conditions Assessment

Register	Site Number	Site Name	Existing Significance Assessment	Confirm/Change Significance Assessment (Recommended)	Description	Impacted by Alignment	Recommendations
	O11	WEIGHBRIDGE, GREAT WESTERN	Local significance	Confirmed	Small (~2m x 1.5m) weatherboard building with associated concrete weighbridge.	no	no further investigation required. Update of registration
	O12	LOCK-UP (FORMER), GREAT WESTERN	Local significance	Confirmed	Slab hut lock up with'wired' walls roof and floor to prevent escape. Relocated from original setting to Memorial Park, Great Western	no	no further investigation required.
UNREGISTERED Cited locations from community consultation	U1	TOWNSHIP - JUNCTION HOTEL, POST OFFICE, BAKERY, DIGGINGS, MINE SHAFTS, BATTERY, SMALL STRUCTURES		Regional. High archaeological potential	extensive diggings, shafts associated with quartz and alluvial mining. Extant structures include battery, 2 small buildings, pub, possible post office, stables and bakery in a largley wooded setting. Powerlines and Western Highway have previously impacted site	no (~10m from Zone 1, 1A_1E)	VicRoads and HV to visit and assess. Further site survey on NE side of Western Highway recommended with the aim of identifiying any additional features. Further background research
	U2	FORMER ARMSTONG PRIMARY SCHOOL		Local - Low archaeological potential	Location of former Armstrong School. Exotic trees, no extant structural remains	Zone 1, 1A_1E	Further background research and assessment by VicRoads and HV recommended
	U3	GRAVES	none	Local	Located between creek and railway line on eastern side of the highway, opposite hill with gold diggings ('Junction' township)	no	Confirmation of location and extent by VicRoads and HV
	U4	FORMER ARMSTRONG RAILWAY STATION	none	Local	Location of formaer Armstrong railway station. Platform eathworks intact, brick remnant visible at edge.	no	Further background research recommended
	U5	BESTS WINERY	none	Regional/State	Largely intact and functional 1860's winery with original vineyards, slab hut, stables, infrastructure and cellars.	no	further consultation with owner desirable. registration of site highly recommended. Assessment by HV recommended
	U6	Railway Overpass	none	to be advised by Heritage Victoria	1876ish bluestone. Located at the point where the Western High way meets Military Bypass Road near Concongella Creek.	no	Confirmation of location and extent by VicRoads and HV recommended
	U7	Mud brick outbuilding	none	to be advised by Heritage Victoria	Mud brick outbuilding part of home built around 1900. Located near intersection of Garden Gully Road and Grellet Road.	no	Assessment by VicRoads and HV recommended
	U8	St. Ethel's Winery	none	to be advised by Heritage Victoria	Located east of Great Western on the Western Highway	Zone 2, C_INT2B, C_INT2C, C-2B	Assessment, confirmation of location and extent by VicRoads and HV recommended
	U9	Mud brick building	none	to be advised by Heritage Victoria	Located in the township of Great Western on what was Crown Allotment 51, initially owned by J.Patching. Allotment borders on the Concongella Creek.	no	Assessment by VicRoads and HV recommended
	U10	Mud brick building	none	to be advised by Heritage Victoria	Located in the township of Great Western on what was Crown Allotment 114, initially owned by I Barrant. Allotment bounded by the Western Highway and Locke Street	no	Assessment by VicRoads and HV recommended. Further background research required
	U11	St. George's Winery	none	to be advised by Heritage Victoria	Stone remanants located beyond intersection of Patterson Road and Western Highway.	Zone 2, C_INT 2B to 3A, 2B to 3B, 2C to 3A, 2C to 3B	Assessment by VicRoads and HV recommended. Further background research required
	U12	Eucalyptus Distillery	none	to be advised by Heritage Victoria	Remains of eucalyptus boiler located west of Great Western, near Churchill Crossing Road.	Zone 3, 3DC	Assessment by VicRoads and HV recommended. Further background research required
	U13	Churchill Gate Crossing	none	to be advised by Heritage Victoria	1875/6 Gate Keeper's house located on Churchill Crossing Road.	Zone 3, C-3DC, C-3C	Assessment by VicRoads and HV recommended. Further background research required

Appendix 8 Historical Cultural Heritage Site Maps



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 1A
Historic heritage

Legend

- Section 3 - Option 1A
- Property parcel
- Study area

N

Project Code: WHEES

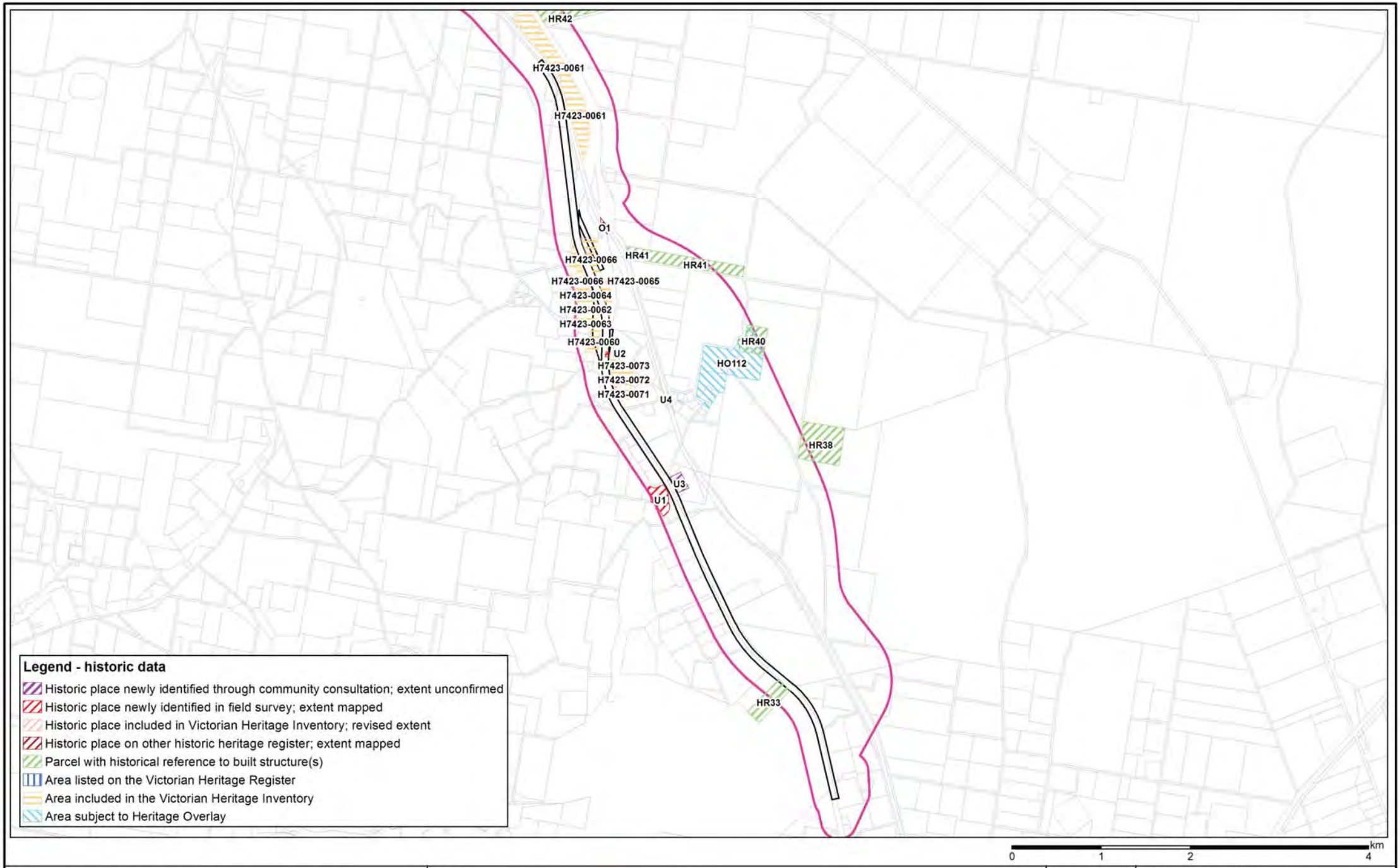
Drawn by: Josara de Lange

Date: 18 October 2011

GDA94 MGA Zone 54

ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 1E
Historic heritage

Legend

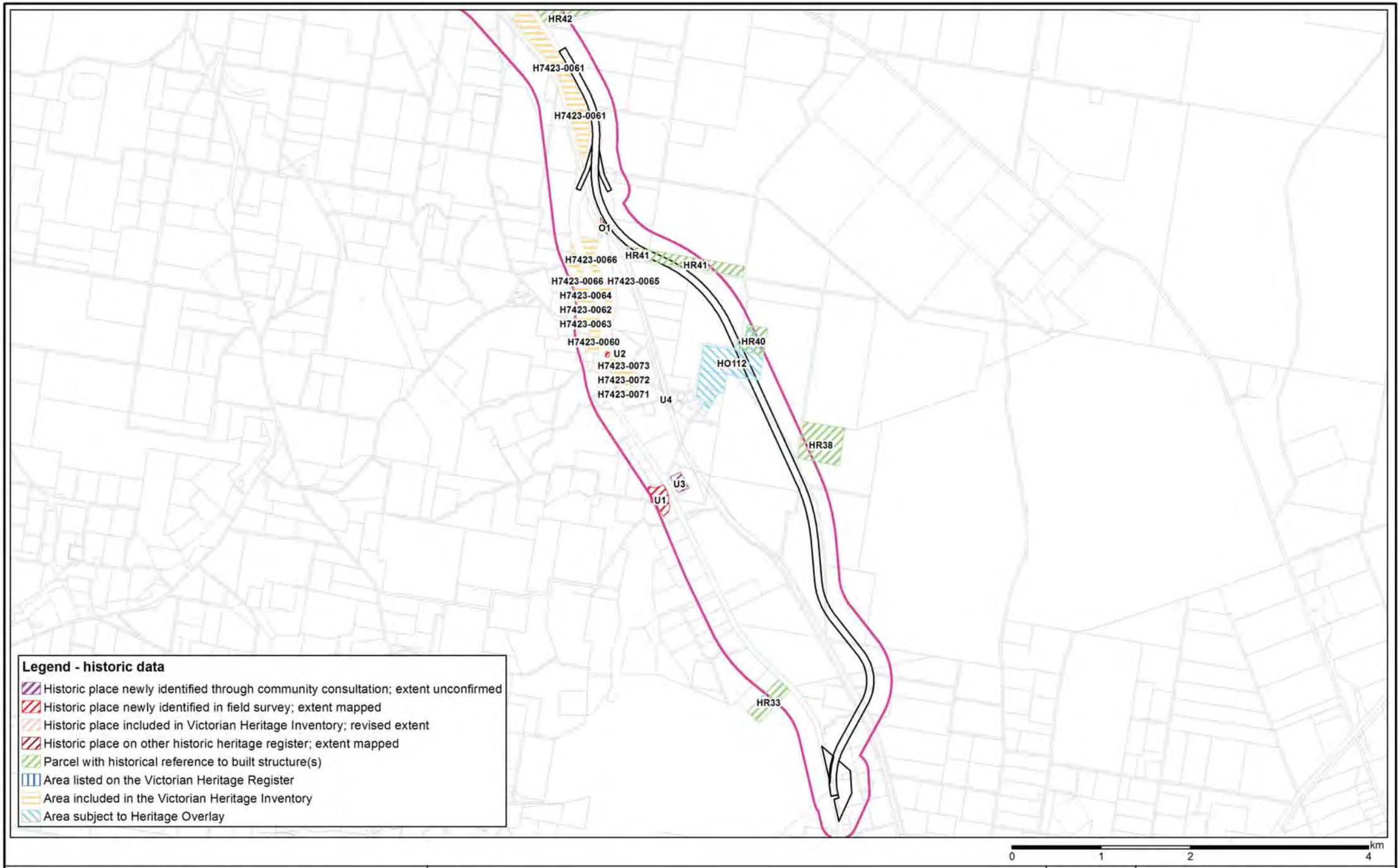
Section 3 - Option 1E Study area

Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 1C
Historic heritage

Legend

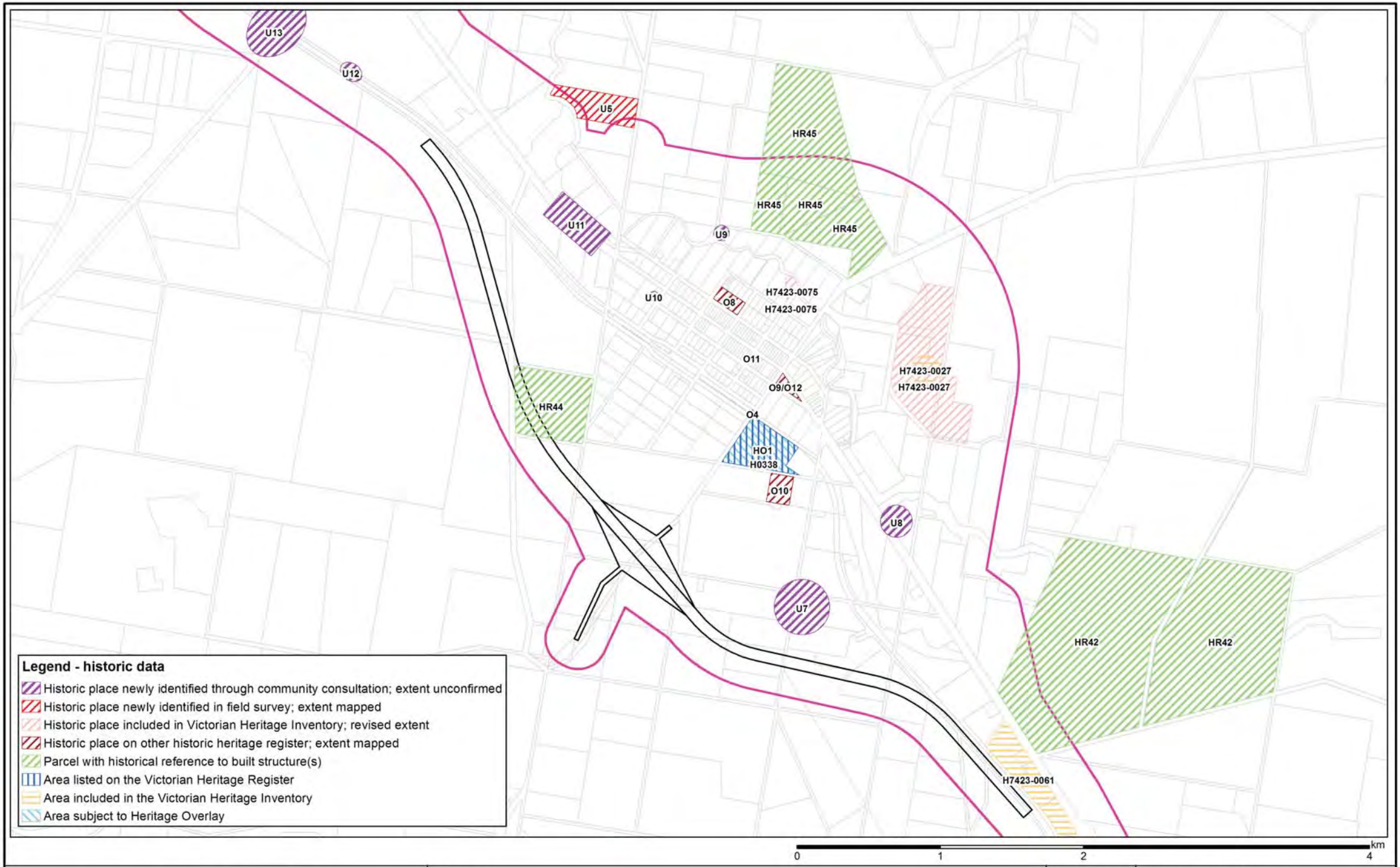
Section 3 - Option 1C Study area

Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 2E
Historic heritage

Legend

Section 3 - Option 2E
Study area
Property parcel

N

Project Code: WHEES

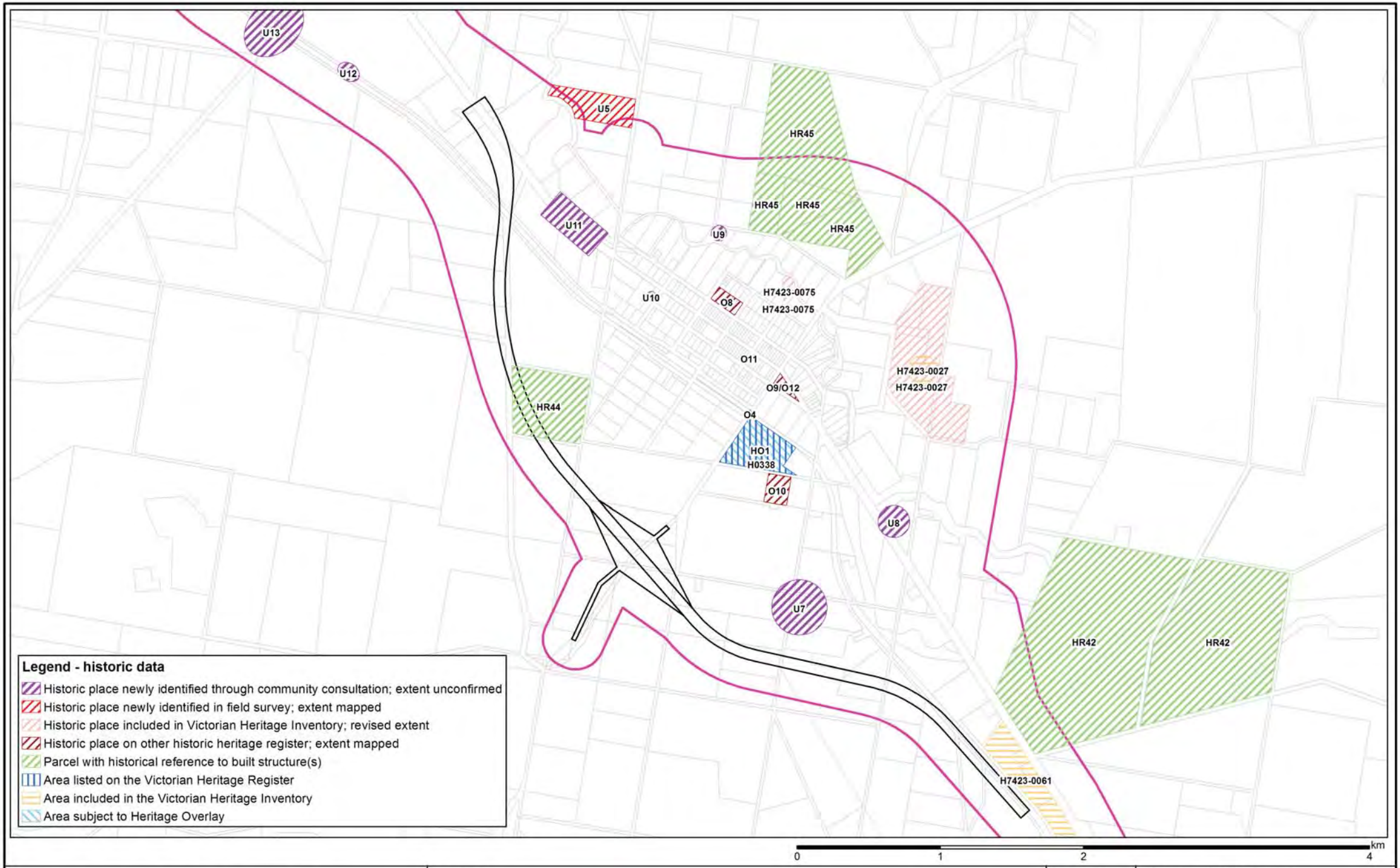
Drawn by: Josara de Lange

Date: 18 October 2011

GDA94 MGA Zone 54

ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 2D
Historic heritage

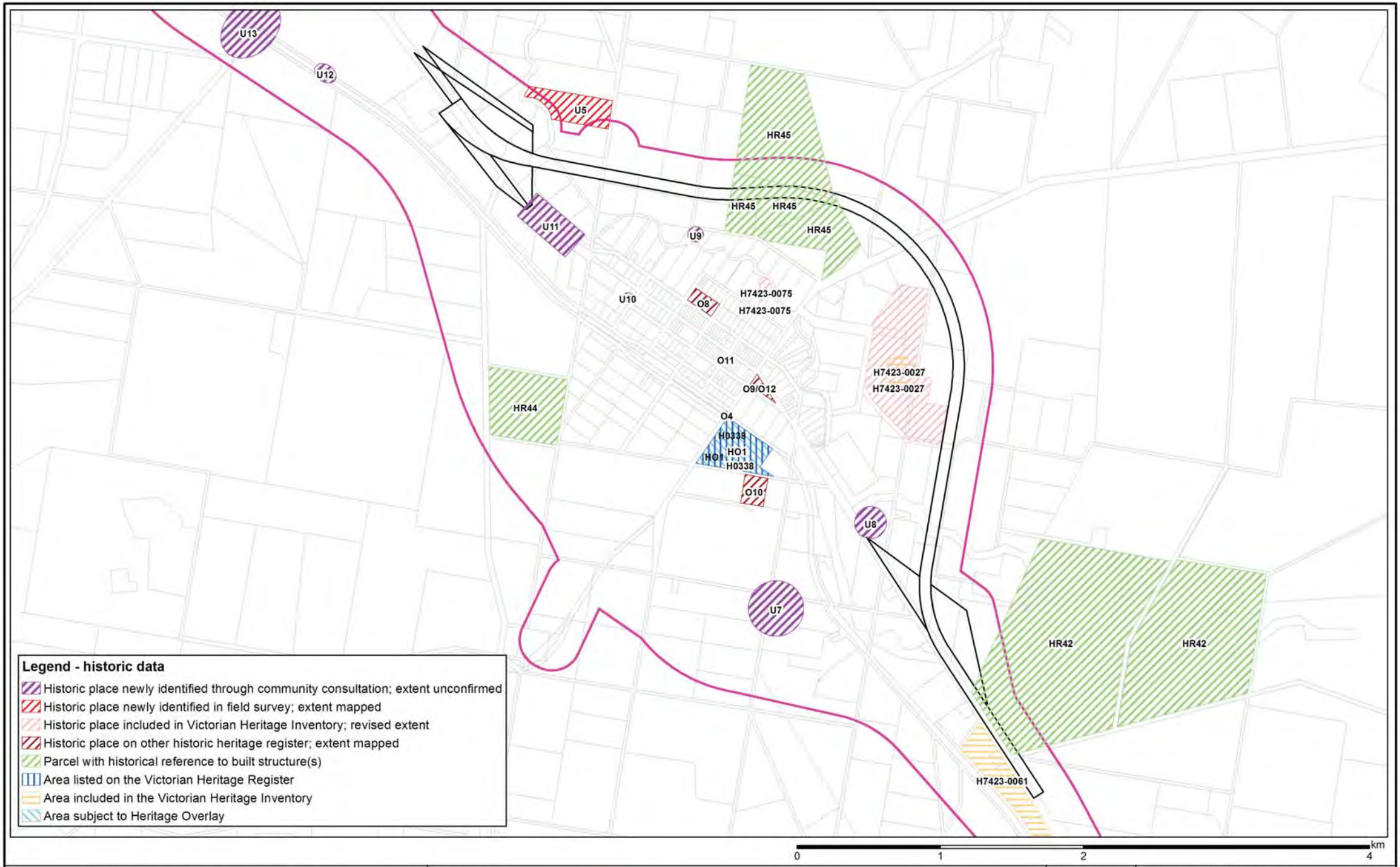
Legend

Section 3 - Option 2D
Study area
Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009;
Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



Legend - historic data

- Historic place newly identified through community consultation; extent unconfirmed
- Historic place newly identified in field survey; extent mapped
- Historic place included in Victorian Heritage Inventory; revised extent
- Historic place on other historic heritage register; extent mapped
- Parcel with historical reference to built structure(s)
- Area listed on the Victorian Heritage Register
- Area included in the Victorian Heritage Inventory
- Area subject to Heritage Overlay

WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 2C
Historic heritage

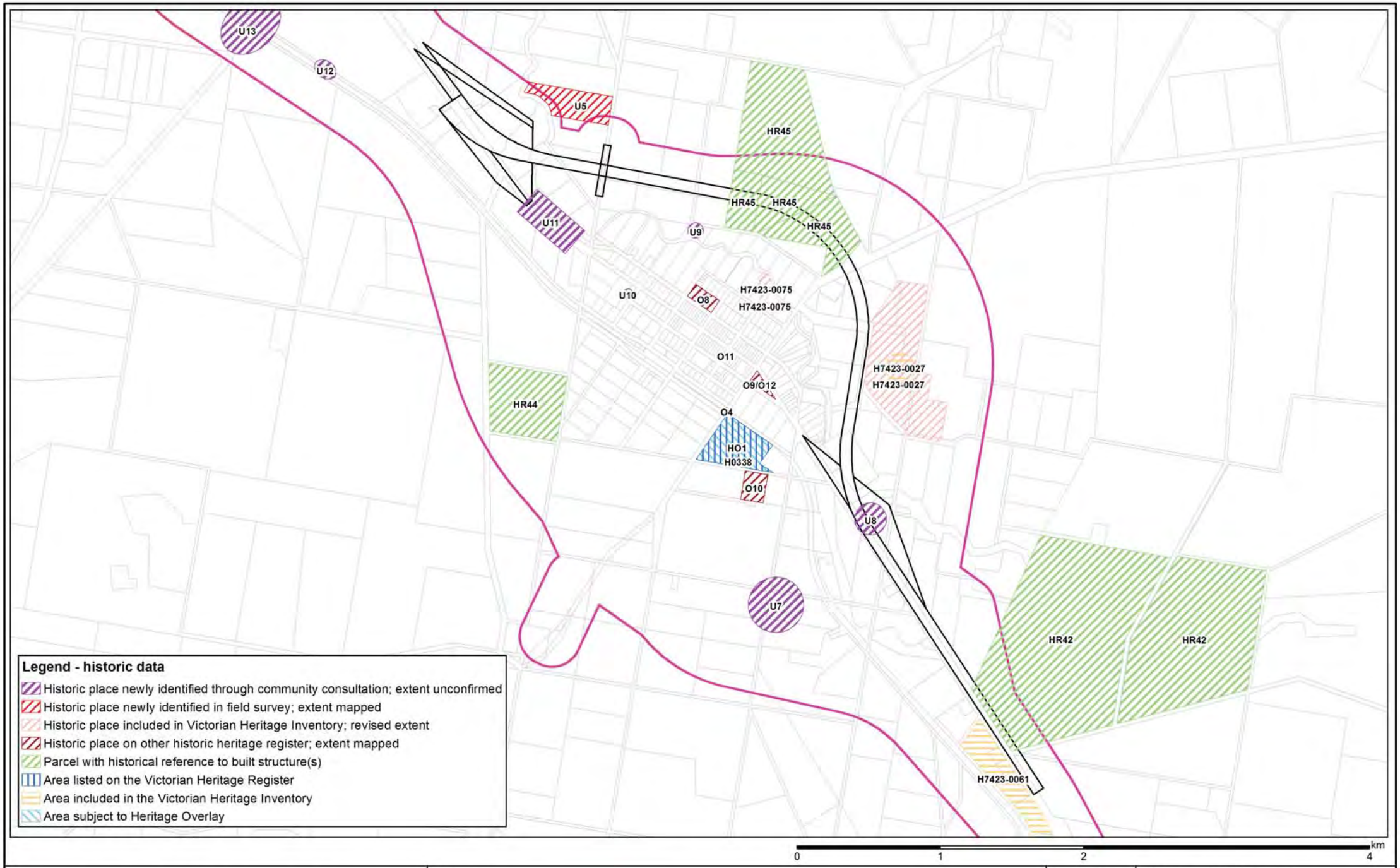
Legend

- Section 3 - Option 2C
- Study area
- Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 2B
Historic heritage

Legend

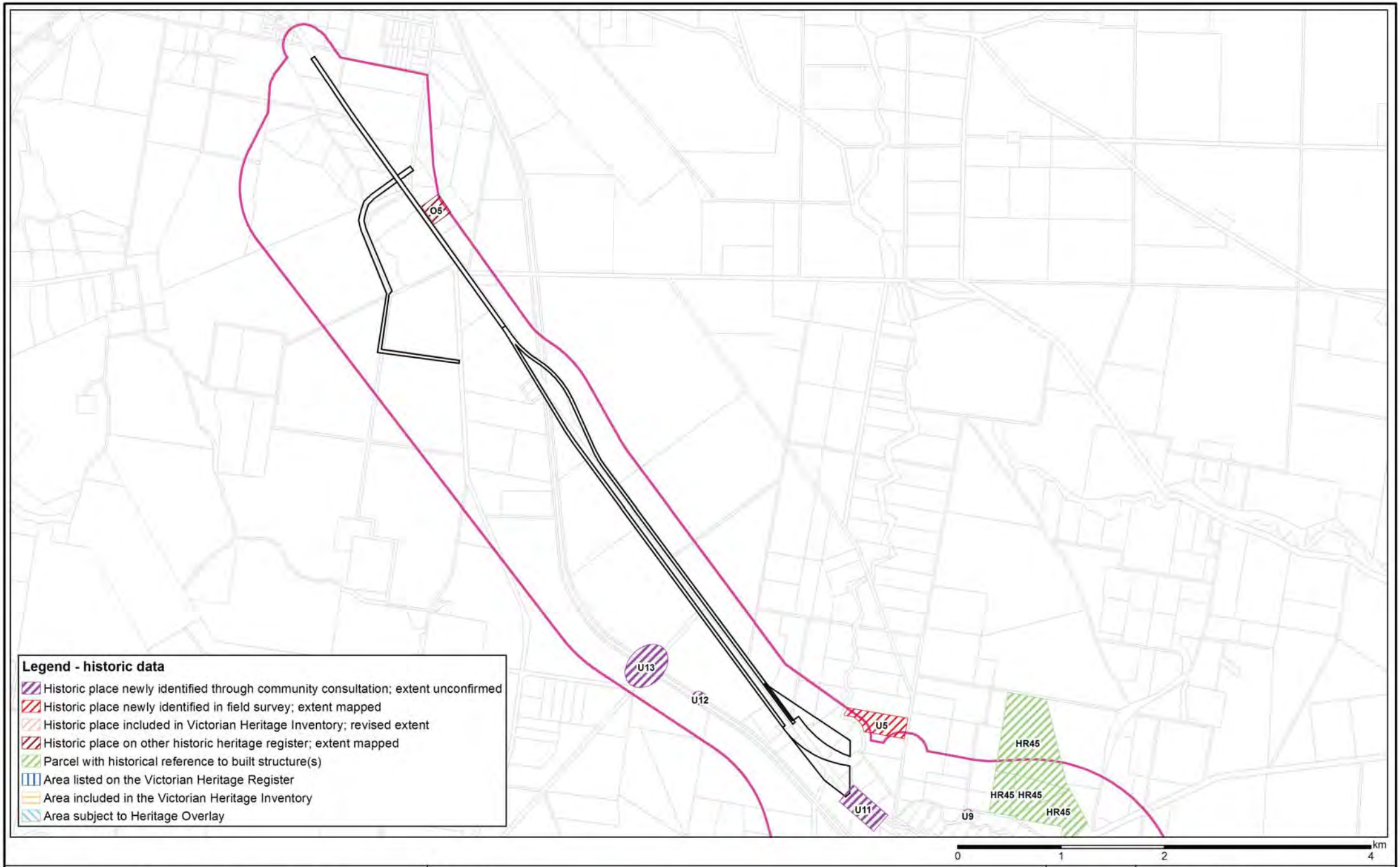
Section 3 - Option 2B | Study area

Property parcel

N

Project Code: WHEES	**Drawn by:** Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3A
Historic heritage

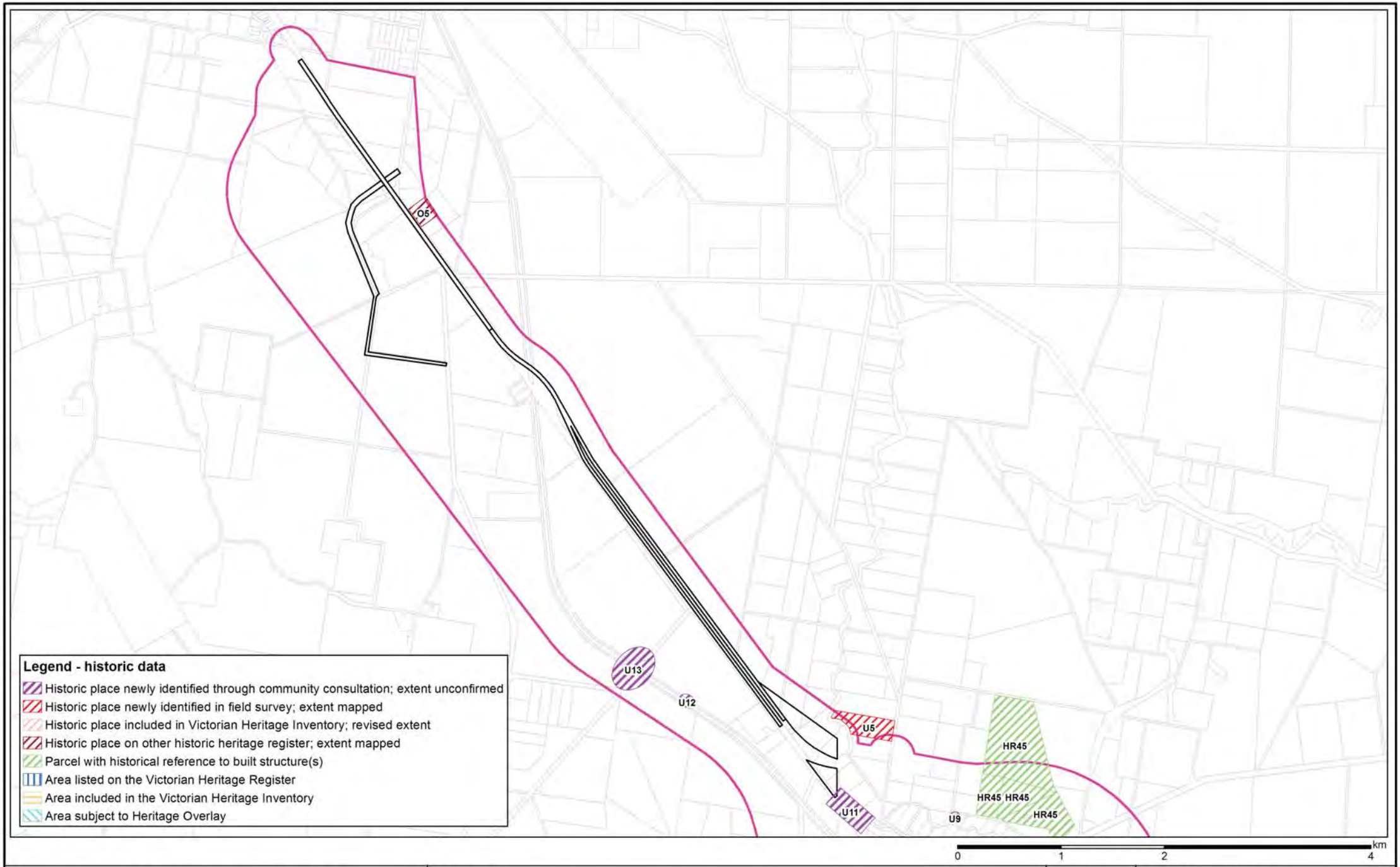
Legend

Section 3 - Option 3A
Study area
Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009;
Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3B
Historic heritage

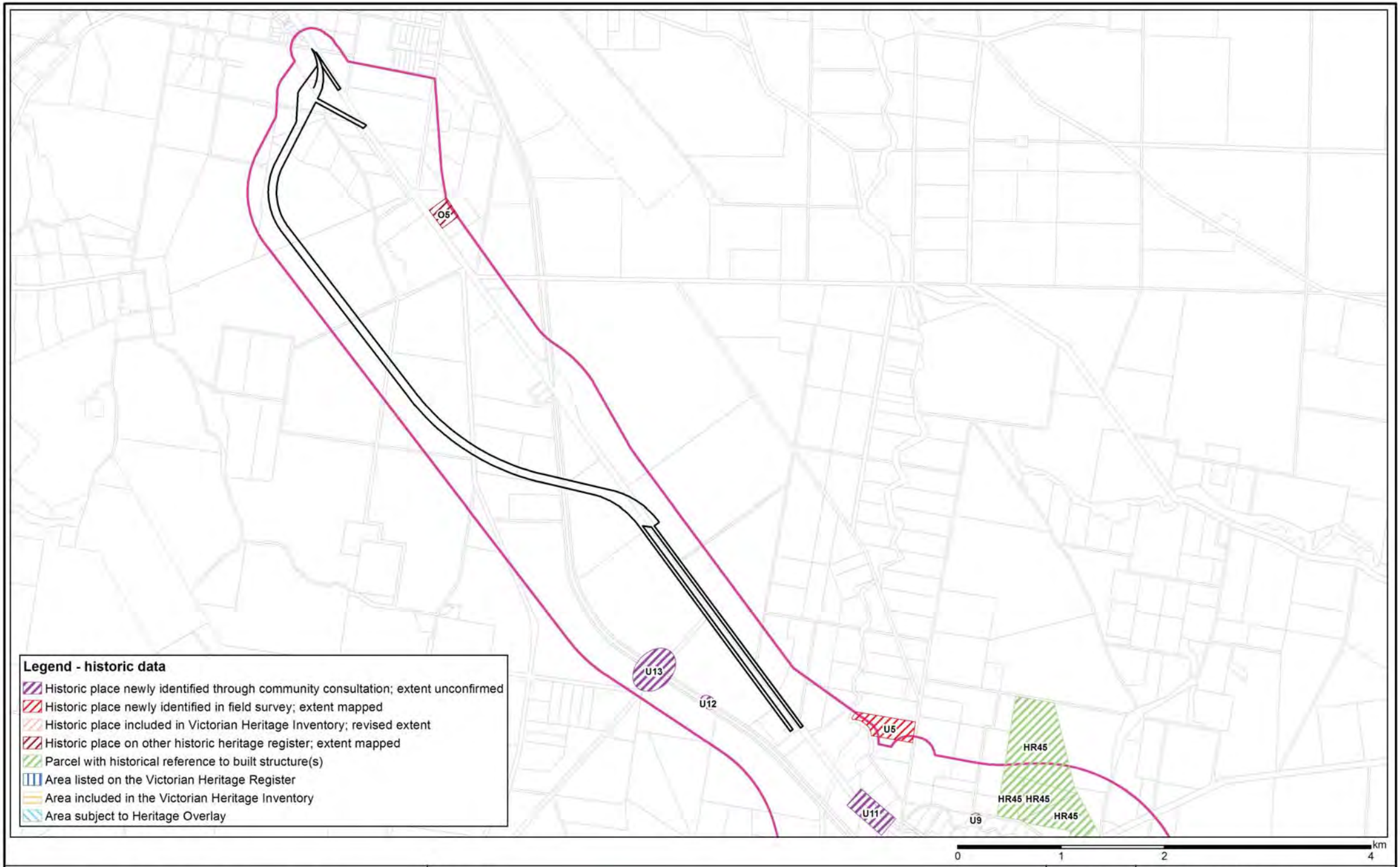
Legend

Section 3 - Option 3B
Study area
Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3AD
Historic heritage

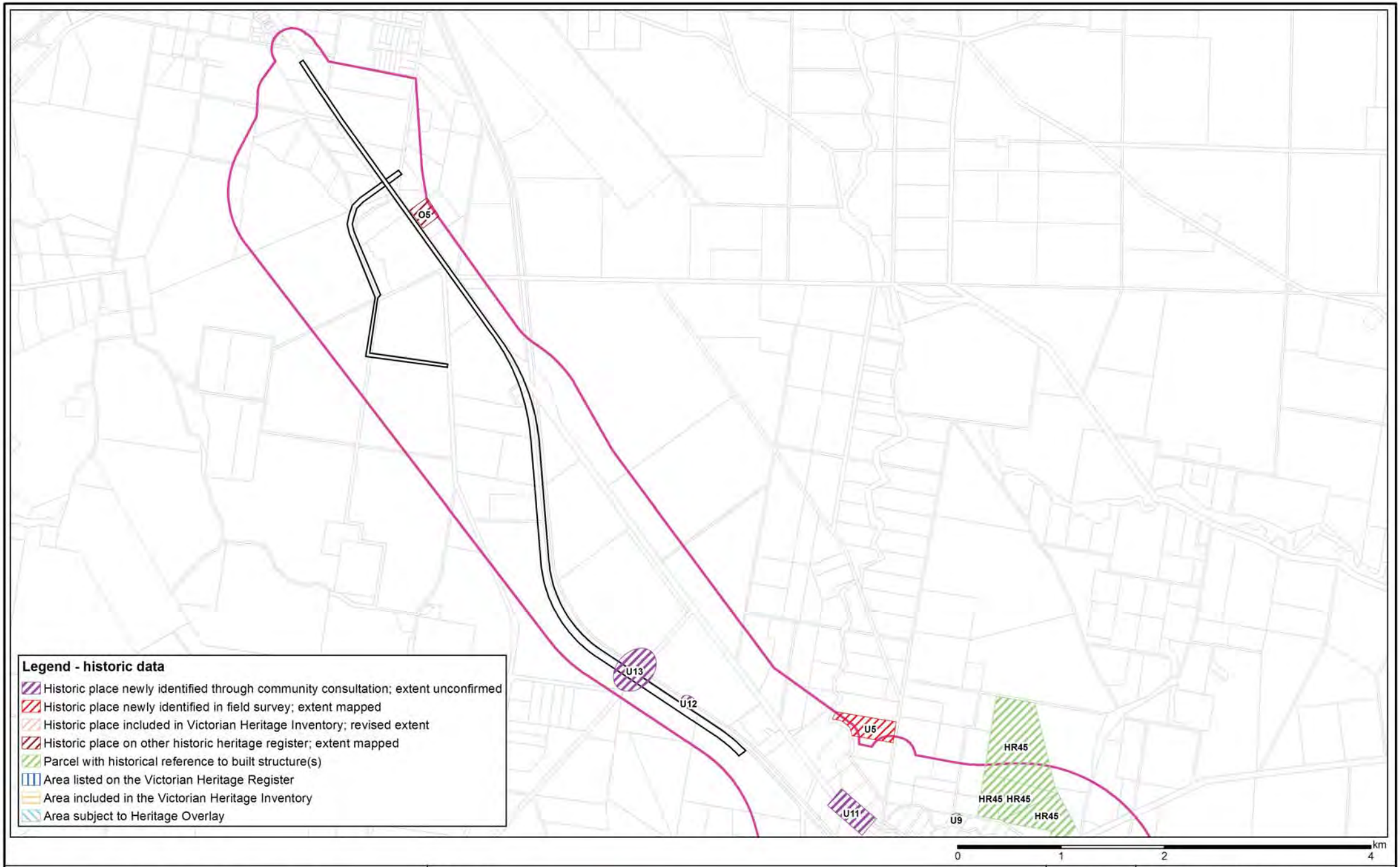
Legend

Section 3 - Option 3AD
Study area
Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3C
Historic heritage

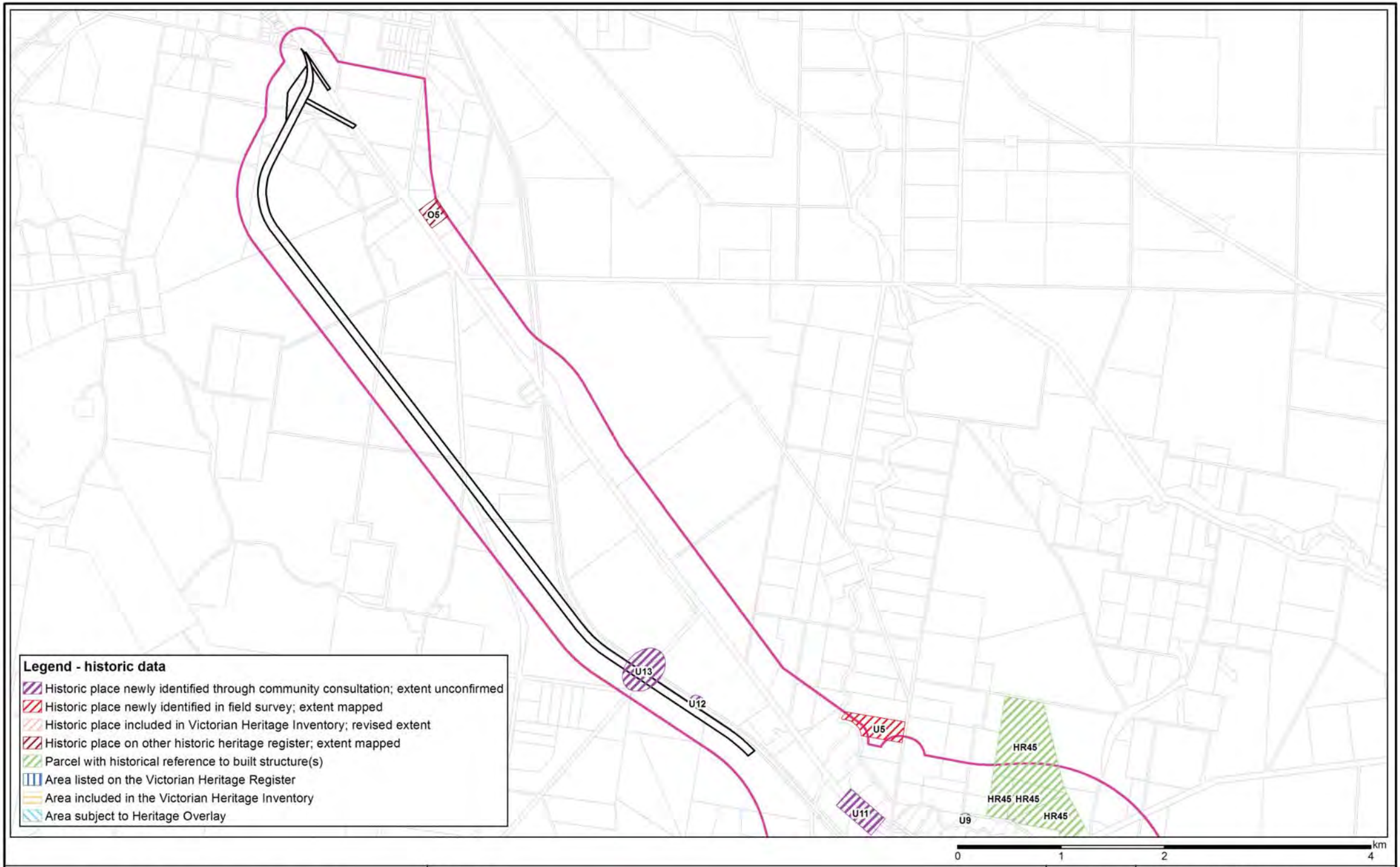
Legend

Section 3 - Option 3C
Study area
Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009;
Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011



WHEES Matrix Development
Section 3 - Ararat to Stawell - Option 3DC
Historic heritage

Legend

Section 3 - Option 3DC
Study area
Property parcel

N

Project Code: WHEES	Drawn by: Josara de Lange
	Date: 18 October 2011
GDA94 MGA Zone 54	ANDREW LONG + ASSOCIATES

Data sources: Topographic: VicMap 2009; Historic heritage data: Heritage Victoria, 2010/2011; Way Back When 2011; ALA 2011

Appendix 9 Land Use History Report

Western Highway Project Section 3 – Ararat to Stawell

EES and PSA

Land Use History Report

Authors: Sarah Rood and Fiona Poulton

Way Back When, Consultant Historians

Date of Completion: 1 November 2011

Introduction

The study area consists of the course of a proposed realignment of the Western Highway between the towns of Beaufort and Ararat (Section 2), and between Ararat and Stawell (Section 3). The alignments closely follow the current route of the Western Highway, passing through the smaller towns of Buangor, Dobie, Armstrong and Great Western. The study area traverses land located within the City of Ballarat, the Pyrenees Shire, the Ararat Rural City and the Northern Grampians Shire Council.

This report includes a broad historical background of general land use and settlement patterns in Section 3, as well as a more detailed examination of the use of some of the specific allotments that are in the course of the proposed alignments. As the proposed alignments cover such a large area, it has not been feasible to conduct title searches of individual allotments within the study area. While some detail regarding ownership of specific allotments within the study area has been revealed in the course of research, the focus of this study is on the history of land use. Where possible, built structures and use of the land for agriculture are discussed.

Background History

Major Thomas Mitchell, surveyor-general of New South Wales, and his party were the first European explorers to travel through this region in 1836, while on an expedition to chart tributaries along the Murray River. Impressed by the rich fertile soil and grassy plains irrigated by numerous waterways, Mitchell described the region as 'Australia Felix' and encouraged pastoralists to settle there.

European settlement began in the region soon after in the 1840s, with vast expanses of pastoral land taken up by squatters who used the land for agricultural purposes, bringing with them thousands of livestock. The proposed alignments pass directly through, or nearby to, three major pastoral runs: Eurambeen, or Mt Cole, occupied by brothers Alexander and Colin Campbell from 1840; Buanger, or Buangor, subdivided from the Eurambeen run in 1949 and taken over by Colin Campbell; and Allanvale, or Sinclair's, occupied by John Sinclair from 1841. Eurambeen and Buangor were all located in Section 2 of the proposed alignments and Allanvale was located in Section 3. All of these land owners constructed houses and used their land primarily for grazing purposes. The Allanvale pastoral run is discussed in further detail in the 'Land use within Section 3 of the Study Area' section below.

The main road linking the towns of Ballarat and Stawell was first constructed during the gold rushes of the 1850s, which attracted a huge influx of miners into western Victoria. This Main Road eventually became known as the Western Highway. A comparison of present day maps and parish maps dating from the 19th century demonstrates that the road followed much the same route as it does today.

The gold rushes led to the foundation of settlements near the major diggings in this area. Beaufort, Buangor, Colvinsby, Dobie, Ararat, all in Section 2 of the proposed alignments, and Armstrong, Great Western and Stawell, all in Section 3, were all established along the Western Highway as a direct result of the existence of major goldfields. The rich gold diggings at Fiery Creek led to the development of the township of Beaufort, which was originally called Fiery Creek. The first gold to be found in the Ararat area was in 1854. Gold diggers flocked to the region in their thousands after Chinese diggers discovered the rich Canton Lead at Ararat a few years later in 1857.

The earliest discovery of gold in the Armstrong area, in Section 3, was in 1855 and by 1857 four diggings were in operation: the Garden Gully, Eaglehawk, Dutton's Gully and Long Gully Leads. The township of Great Western began as a roadside stop-over point between Ararat and Stawell and developed into a gold-mining centre when gold was discovered at Concongella Creek in 1858. This site became the Great Western Lead. The Pleasant Creek goldfields, where the township of Stawell was established, had a population of over 20,000 by 1858.

Each of the goldfields experienced alternative periods of rush and decline. At times they were booming and at others it would appear that the supply of gold had been exhausted and the populations of the settlements would rapidly dissipate, before another lucky strike would see them suddenly revive once again. The settlements that survived this period did so because they developed important infrastructure and services, such as schools, hotels and businesses, building up a large enough permanent residential population to keep them alive.

The introduction of the North Western Railway in the mid-1870s was another major factor in the development of towns in the study area, ferrying both people and goods, including machinery, produce, livestock and building materials to and from Melbourne. The line to Beaufort in Section 2 was officially opened on 11 August 1874 and the extension to Ararat on 5 April 1875, with stations at Buangor and Dobie.[1] The following October the railway line was extended through Section 3 of the alignments to Great Western and was then officially opened in Stawell on 25 May 1876.

Heritage studies of the Pyrenees Shire and the Northern Grampians Shire, conducted in 2001 and 2005 respectively, contain detailed descriptions of historically significant built structures that still remain in these regions. Many of these sites are also listed on the Victorian Heritage Register.[2]

[1] Tim Allender and Des Brennan, *Coaches Called Here: a history of Buangor and surrounding districts*. Ararat: T. Allender and D. Brennan, 1996, page 51.
[2] Dr David Rowe, *Pyrenees Shire Heritage Precinct Study*, 2001; Wendy Jacobs, Vicki Johnson, David Rowe & Phil Taylor, *The Northern Grampians Shire Heritage Study, Stage 2*, 2005.

Land use within Section 3 of the Study Area

Section 3 of the proposed alignments runs between Ararat and Stawell and extends through the parishes of Ararat, Concongella South, Concongella, Mokepilly and Stawell in the County of Borung.

Using parish maps, Land Selection Files, Closer [and Soldier] Settlement files, pastoral run papers and consultation with local communities, it has been possible to piece together the following information about the use of several allotments in Section 3 of the study area. Historical references to built structures (HR33-HR44) and unregistered historic places identified through community consultation (U1-U13) are tabulated in Appendix 7 and depicted in relation to proposed alignment maps in Appendix 8.

Northwest of Ararat, Section 3 breaks into two separate pathways. The western pathway follows the route of the Western Highway, travelling past Allotment 43 of Section 9 in the parish of Ararat (HR33 Appendix 9 Map Options 1A, 1C and 1E), which was purchased by Michael Grace in 1871. Grace applied for a license to occupy the 20 acres of land in 1870 and a plan is included with his application, showing old gold diggings at the western end of the allotment known as Corkscrew Gully. The plan also indicates that there was a house and garden situated close to the main road. No additional land files could be found relating to allotments in this section of the alignments. Community consultation also did not reveal any possible significant sites in this area.

The eastern pathway of the alignments in this section travel through Allotment 66 of 15B (also referred to as Allotment 135N).[3] This allotment of almost 100 acres was reserved for mining purposes until it was leased to Ararat butcher John Pritchard Evans in 1891. Evans owned 'J.P. Evans, Retail and Family Butcher' in Barkly Street, Ararat. His lease application reveals that the land was unfit for cultivation, being very scrubby, and contained no buildings. Evans planned to cut back the scrub and run sheep on the allotment, but when he died in 1903 and his son was unable to pay out the mortgage and arrears owning on the land, it was sold to Henry More, a farmer from Armstrong in 1904.

North of More's allotment was Allotment 67, or 135M, which was also reserved for mining purposes before being leased by George Stephen Nason, a teacher from Armstrong, in 1891. Nason's lease application reveals that the land contained no buildings and was unfit for cultivation, being completed covered in vegetation. In a letter dated 30 June 1899, Nason requested that the asking price for his allotment be reduced under the New Land Act, as 'it is very inferior land and very scrubby certainly not worth the 1 pound per acre'. He eventually purchased it for 100 pounds in 1905. Directly across from Nason and More's properties, on the western side of Railway Road, was Allotment 65, also referred to as Allotment 135L. David Morris, an Ararat draper, leased this allotment in 1891. His lease

[3] This allotment does not appear on the Appendix 8 maps. Nor do the subsequent allotments discussed here: Allotments 67, 65 and 68. These correspond to the following HR numbers in the Historical Research Table: Allotment 66 = HR34, Allotment 67 = HR36, Allotment 65 = HR35 and Allotment 68 = HR37.

application reveals that this land was also covered with vegetation and considered unfit for cultivation. It contained a dam but no built structures.

John Cannon leased the allotment directly north of Nason and Morris' land, Allotment 68 or 135K in the parish of Ararat, from 1891. This allotment had previously been reserved for mining purposes and was unfit for cultivation, being too steep and rocky. Cannon, who was a News Agent in Ararat, lived in the town rather than on this allotment. When Cannon died in 1904, the Crown Grant to the land was sold to the executors of his estate. The adjoining allotment, 69 or 135J (HR38 Appendix 8 Map Options 1A, 1C and 1E), was applied for by William A. Wright in 1884, having previously been reserved for mining. It was leased to Susan Fox nee Wright in 1891. When she inspected it a year later, it had not been cultivated apart from a fruit garden and it contained a 2-room dwelling house made of slab and bark, as well as a dam. The allotment was transferred to Donald McKay, a station manager from Great Western, in 1893.

This pathway of the proposed alignments continues north-west along the southern border of another allotment owned by Donald McKay. West of McKay's 200 acres were two more allotments owned by Henry More. He applied for a license to occupy Allotment 29 in 1867 (HR40 Appendix 8 Map Options 1A, 1C and 1E). That same year, he erected a weatherboard dwelling house with a shingle roof, created a vegetable garden and cultivated three acres with oats. By 1876 the house had become a wood and brick dwelling with three rooms plus a kitchen. More obtained a licence to occupy the adjoining Allotment 31 (HO112 Appendix 8 Map Options 1A, 1C and 1E) in 1872, which was unfit for cultivation but used for grazing purposes.

West of these allotments, between the two diverging pathways of the alignment, is the township of Armstrong, which is a highly significant area, particularly given its gold mining history with several important leads in the area. Site work around Armstrong has also identified significant archaeological ruins in the area.

As the Western Highway, railway line and the proposed alignment converge, the proposed highway extension moves from Ararat into the parish of Concongella South travelling through allotments owned by Jens Christian Thorsen Kofoed and Jorgen Thorsen Kofoed on the border of the two parishes. A land file relating to Jens Kofoed's land directly corresponds to Allotment 25 of over 192 acres in the parish of Ararat. However, it also mentions allotments 181, 182, 183, 184, 185, 186, 186A, 187, 188, 189, 190, 8A and 15. These are likely to refer to later subdivisions of Allotment 25. Kofoed was a brewer from Armstrong and leased this land from 1877, though he resided on an adjoining allotment.

The file includes lengthy correspondence about the auriferous nature of the land in this area, which was very close to the gold diggings at Armstrong, and whether leasing it to pastoralists would affect the miners. One of the authorities reported that men had recently been working on the land, which had 'the only permanent water near the Concongella,

locally known as the Brewery Creek, and contains the best timber for mining purposes in that part of the district.' He concluded that the allotment should not be occupied, despite the Mining Board finding that it was not particularly auriferous. John Kofoed (Jens must have Anglicised his Danish name) wrote in response to this decision that it was unfair that he should 'be deprived of making a home for myself and family after living on the spot for over 17 years'. Kofoed's 1877 lease application reveals that he had in fact been living on the adjoining allotment, in a 2 room weatherboard house. Although Allotment 25 was not fit for cultivation, he had cultivated 31 acres of adjoining land (HR41 Appendix 8 Map Options 1A, 1C and 1E) with oats and English grass, which he also used for grazing purposes. It is likely that in the end, the allotment was granted to Kofoed with the boundaries slightly modified to 'exclude the edge of the auriferous drift which may hereafter be worked upon'.[4]

Continuing north following the route of the Western Highway and the railway line, the alignment travels along the western border of the Allanvale pastoral run (HR42 Appendix 8 Map Options 1A, 1C and 1E and 2B, 2C, 2D and 2E). Allanvale or Sinclair's consisted of 80,000 acres with the capacity for 15,000 sheep and was taken up by John Sinclair in 1841. It came to be known as Allanvale soon after when it was taken over by John Allan. The first homestead on the property was destroyed by fire in 1919 and the current house dates from 1921. The proposed alignments are unlikely to impact the homestead or the surrounding sites, including a private cemetery, that were identified through consultation with the local community.

Continuing on to the town of Great Western, the alignments again split into two different pathways skirting the outer edges of the town. North of the Western Highway was the Parish of Concongella, while the Parish of Concongella South was to the south of the Highway. Before diverging from the Western Highway south of Great Western, the northern pathway travels past St Ethel's winery (U8 Appendix 8 Map Options 2B, 2C, 2D and 2E). Following the decline of the gold rush, Great Western became known as an important wine-making centre. St Ethel's winery was identified in the course of local community consultation as a significant site that will be impacted by the alignment. It is listed on the Victorian Heritage Database as a site of local significance.[5] Members of the Stawell Historical Society have conducted a site visit and reported an extant underground cellar as well as the original winery building and three underground paraffin lined concrete wine tanks. It is recommended that further research be conducted on this site.

[4] Public Record Office Victoria, Land Selection File, VPRS 625, Unit 395.
[5] Victorian Heritage Database: http://vhd.heritage.vic.gov.au/places/result_detail/105101?print=true

Plate 1: Access point to underground storage tank, St Ethel's Winery. Courtesy of Gary Withers, Stawell Historical Society.

Plate 2: Beams in underground cellar, St Ethel's Winery. Courtesy of Gary Withers, Stawell Historical Society.

Plate 3: Beams in underground cellar, St Ethel's Winery. Courtesy of Gary Withers, Stawell Historical Society.

In the north-western corner of Great Western, this northern pathway of the proposed alignments travels through land that, according to community consultation, contains two significant mud brick buildings. These have been situated by local residents on Allotments 51 and 114 (U9 and U10 Appendix 8 Map Options 2B, 2C, 2D and 2E) on the parish map of the township of Great Western. Further research into these mud brick dwellings is recommended.

The pathway of the proposed alignment that bypasses Great Western to the south, through the Parish of Concongella South, travels through a property that is believed to contain a mud brick outbuilding which was part of a home constructed around 1900. This outbuilding was identified through consultation with the local community, who located the site near the intersection of Garden Gully Road and Grellet Road (U7 Appendix 8 Map Options 2B, 2C, 2D and 2E).

This southern pathway of the proposed alignments continues through land that was owned by Joseph Best. Best purchased Allotments 3, 4, 9, 10 and 15B in the parish of Concongella

South in 1886, which he had originally obtained a license for in 1879.[6] Best was a vigneron and owned another 290 acres of which he had 50 acres under vines and 30 acres of other cultivation, including hay, rye and barley. He resided on adjoining land in Great Western, where he had a nine-roomed building including cellars with a capacity for 60,000 gallons. This was the beginning of Best's winery, which may be impacted by the proposed alignments (U5 Appendix 8 Map Options 2B, 2C, 2D and 2E).

On the western edge of Great Western, the alignments travel through Allotment 8, Section 3 in the parish of Concongella South (HR44 Appendix 8 Map Options 2B, 2C, 2D and 2E), which was owned by Great Western school teacher James Raymond. Raymond applied for a lease on this allotment in 1889 and his application reveals that he had cultivated eight acres of the allotment with vines and one acre with fruit trees. The property also contained a five-room house, with two rooms made of brick and three of wood, as well as a dam. Raymond had been residing on the land with his family since 1883.

North of Great Western, the proposed alignments travel nearby to an allotment that was owned by Jean-Pierre Trouette. Trouette was also a wine-maker, leasing Allotment 10, Section 6 in the parish of Concongella (HR45 Appendix 8 Map Options 2B, 2C, 2D and 2E) in 1880, after having obtained a license to occupy it in 1876. He was granted this license on condition that he use the land for grazing purposes only, given the possible auriferous nature of the land. A survey plan shows old gold diggings to the east were abandoned and the mining objections were soon withdrawn. Trouette's lease application reveals that he had planted 10 acres of vines on the land and owned 90 acres of vineyards on a nearby selection, where he lived with his family.

Community consultation revealed that there are stone remnants of St George's Winery west of Great Western where Patterson Road meets the Western Highway (U11 Appendix 8 Map Options 2B, 2C, 2D and 2E). Further research could be conducted into this site. From here, one pathway of the proposed alignments heads west of the Western Highway, following the route of the railway line through the parishes of Concongella and Mokepilly. Before crossing Churchill Crossing Road, the alignments travel through land owned by George Humphrey (U12 Appendix 8 Map Options 2B, 2C, 2D and 2E and 3A, 3AD, 3B, 3C and 3DC) that may contain the remains of a boiler from a eucalyptus distillery dating to 1900. Further north, where the alignments cross Churchill Crossing Road (U13 Appendix8 Map Options 2B, 2C, 2D and 2E and 3A, 3AD, 3B, 3C and 3DC), there are believed to be the remains of a gatekeeper's house dating to around 1875, used by gatekeeper Phoebe Churchill. It is recommended that further research on both of these sites be carried out.

Section 3 of the proposed alignments continues west of the Western Highway before terminating south of the town of Stawell.

[6] These allotments are not marked on the maps in Appendix 8.

Recommendations

It is recommended that further research be conducted into sites that were identified by the local communities in the course of the consultation phase. In Section 3 of the proposed alignments, these sites include:

- the mud brick outbuilding at Garden Gully Road (U7 Appendix 8 Map Options 2B, 2C, 2D and 2E),
- the remains of St. Ethel's and St. George's wineries (U8 and U11 Appendix 8 Map Options 2B, 2C, 2D and 2E),
- the mud brick buildings in Great Western (U9 and U10 Appendix 8 Map Options 2B, 2C, 2D and 2E),
- the eucalyptus distillery (U12 Appendix 8 Map Options 2B, 2C, 2D and 2E and 3A, 3AD, 3B, 3C and 3DC),
- the gatekeeper's house at Churchill Crossing Road (U13 Appendix8 Map Options 2B, 2C, 2D and 2E and 3A, 3AD, 3B, 3C and 3DC).

Should there be more research carried out, the following additional Allotments may have corresponding Land Selection files that may be of use:

Mud brick buildings in Great Western township:

J. Patching, Allotment 51
I. Farrant, Allotment 114

Eucalyptus distillery, Parish of Concongella South:

E.G. Humphrey, Allotment 6A: 2415/50.51

Gatekeeper's house, Churchill Crossing Road, Parish of Mokepilly:

H. Best, Allotment 58: 2118/19.20
E.G. Humphrey, Allotment 66: 49/54.56

Further research is required to identify additional allotments that may be significant as identified in community consultation.

References

Primary sources

Public Record Office Victoria

Parish maps of Beaufort, Eurambeen, Woodnaggerak, Buangor, Colvinsby, Gorrinn, Langi Ghiran and Ararat in the County of Ripon and of Ararat, Concongella South, Concongella, Mokepilly and Stawell in the County of Borung.

VPRS 625 Selection Files, Sections 19 and 20, Land Act 1869
VPRS 626 District Selection Files, Sections 19 and 20, Land Act 1869
VPRS 627 Land Selection Files, Section 31, Land Act 1869
VPRS 629 Land Selection Files, Section 33, Land Act 1869
VPRS 5920 Pastoral Run Files

Secondary Sources

Websites

Australian National University, *Australian Dictionary of Biography [online edition]*, http://adbonline.anu.edu.au/adbonline.htm

The National Trust of Australia (Victoria): http://www.nattrust.com.au/

Victorian Heritage Database: http://vhd.heritage.vic.gov.au/

Books

Allender, T. and Brennan, D. *Coaches Called Here: a history of Buangor and surrounding districts*. Ararat: T. Allender and D. Brennan, 1996.

Barry, J. *The Dobie Tragedy*. Ararat: J.Barry, 1995.

Billis, R.V. and Kenyon, A.S. *Pastoral Pioneers of Port Phillip*. Melbourne: MacMillan, 1932.

Blake, L.J. (ed.), *Vision and Realisation: a centenary history of state education in Victoria.* Melbourne: Education Department of Victoria, 1973.

Heritage Studies

Dr David Rowe, *Pyrenees Shire Heritage Precinct Study*, 2001.

Wendy Jacobs, Vicki Johnson, David Rowe & Phil Taylor, *The Northern Grampians Shire Heritage Study, Stage 2*, 2005.

Appendix J

Planning & Land Use Options Assessment

Western Highway Project

Appendix J – Planning & Land Use Options Assessment

To complete the options assessment the following tasks were undertaken:

- Review of relevant Planning Schemes (Pyrenees, Ararat and Northern Grampians)
- Discussions with Council Planners
- Obtaining copies of current Planning Permit Applications lodged with Council (Ararat)
- Review of information collated as part of the existing conditions report
- Inspection of aerial photography (ArcReader spatial data).
- Site inspection.

1.1 Reference Information

- Planning and Environment Act 1987 (accessed online 22 June 2011) http://www.austlii.edu.au/au/legis/vic/consol_act/paea1987254/
- Pyrenees Planning Scheme, Department of Planning and Community Development (accessed online 8 July 2011) http://www.dpi.vic.gov.au/planningschemes/pyrenees/home.html
- Ararat Planning Scheme, Department of Planning and Community Development (accessed online 8 July 2011) http://www.dpi.vic.gov.au/planningschemes/ararat/home.html
- Northern Grampians Planning Scheme, Department of Planning and Community Development (accessed online 8 July 2011). http://www.dpi.vic.gov.au/planningschemes/northerngrampians/home.html
- Spatial information from ArcReader Database
- Existing Conditions Report (Planning and Land Use).

Table 1 Potential Benefits

	Major Utility Services	Existing Land Use	Future Land Use	Potential Benefits
VERY WELL	Facilitating opportunity for improved service to the state	Consistent with legislation and will have a National benefit	Consistent with legislation and will have a National benefit	Significant benefit to the State Superior benefit to the region Policy consistency with Superior positive impact
WELL	Facilitating opportunity for improved service to Western victoria	Consistent with SPPF & regional policies	Consistent with SPPF & regional policies	Moderate benefit to the State Significant benefit to the region Superior benefit to the locality Policy consistency with significant positive impact
MODERATELY WELL	Facilitating opportunity for improved service to the region / locality	Consistent with the LPPF & local policies	Consistent with the LPPF & local policies	Moderate benefits to the region Significant benefit to the locality Policy consistency with moderate positive impact
PARTIAL	Facilitating opportunity for improved service to a property (specific level)	Consistent with the Zones and Overlays	Consistent with the Zones and Overlays	Minor benefits at a local level or significant benefits for a small number of individuals
NEGLIGIBLE	No long term impacts but will have a temporary disruption during construction	Consistent with land uses	Consistent with land uses	Minimal benefit at any level

Table 2 Potential Disbenefits

	Future Land Use	Existing Land Use	Major Utility Services	
NEGLIGIBLE	Consistent with land uses with no change	Consistent with land uses with no change	No long term impacts but will have a temporary disruption during construction	Minimal disbenefit at any level
LOW	Inconsistent with the Zones and Overlays	Inconsistent with the Zones and Overlays	Improved opportunity for service at a property (specific) level	Low level of impact for some local areas or high impact for a small number of individuals
MODERATELY POOR	Inconsistent with the LPPF & local policies	Inconsistent with the LPPF & local policies	Improved opportunity for services to the region / locality	Significant disbenefit to the locality Moderate disbenefit to the region Policy inconsistency with moderate negative impact
POOR	Inconsistent with SPPF & regional policies	Inconsistent with SPPF & regional policies	Improved opportunity for services on Western Victoria	Severe disbenefit to the locality Significant disbenefit to the region Moderate disbenefit to the State Policy inconsistency with significant negative impact
VERY POOR	Inconsistent with legislation and will have negative National benefits	Inconsistent with legislation and will have negative National benefits	Improved opportunity for services to the State	Severe disbenefit to the region Significant disbenefit to the State Policy inconsistency with severe negative impact

Western Highway Project

Planning and Landuse Options Assessment

SECTION 3

Evaluation objectives:	To avoid or minimise disruption and other adverse effects on infrastructure, land use (including agriculture and residential) and households, as well as road users during construction and/or resulting from the highway alignment. To avoid or minimise noise, landscape, visual and other adverse amenity effects on the environment and local residents during the construction and operation of the proposed duplicated highway to the maximum extent practicable.				
Evaluation Criteria	**Methodology**	**Zone**	**Option**	**Rating**	**Reason for Ratings**
Extent of Impact on Major utility services	Desktop assessment of Planning Schemes. Analysis of GIS maps. Review of GIS Mapping , Aerial photographs, some MOCs information and site inspection of alignment	1	1A*	NEGLIGIBLE	Requires minor realignment of existing power along the roadside which will require temporary disconnection for local residents whilst power being relocated along the new roadway. Will also require the relocation of a recycled water pipeline on the southern side of the highway, extending into Armstrong from Ararat.
			1C *	NEGLIGIBLE	Will require relocation of existing services.
			1E *	NEGLIGIBLE	Requires minor realignment of existing power along the roadside which will require temporary disconnection for local residents whilst power being relocated along the new roadway. Will also require the relocation of a recycled water pipeline on the southern side of the highway, extending into Armstrong from Ararat.
		2	2B*	NEGLIGIBLE	Will require relocation of existing services.
			2C*	NEGLIGIBLE	Will require relocation of existing services.
			2D*	NEGLIGIBLE	Will require relocation of existing services.
			2E*	NEGLIGIBLE	Will require relocation of existing services.
		3	3A*	NEGLIGIBLE	Will require relocation of existing services.
			3B*	NEGLIGIBLE	Will require relocation of existing services.
			3C*	NEGLIGIBLE	Will require relocation of existing services.
			3AD	NEGLIGIBLE	Will require relocation of existing services.
			3DC	NEGLIGIBLE	Will require relocation of existing services.
Extent and impact of change to existing land use (consistency with applicable planning policies)	Desktop assessment of relevant Planning Schemes, SPPF, LPPF, Zones and Overlays. Analysis of GIS maps	1	1A*	NEGLIGIBLE	Minimal encroachment on agricultural and residential properties (FZ) which will not prohibit the ongoing use of land for farming purposes. Alignment is an extension of the current width of the existing Western Highway.
			1C *	LOW	Directly impacts two residential properties and 8 properties (FZ) currently used for agricultural purposes, including 2 dams. Will affect agricultural land zoned (FZ).
			1E *	NEGLIGIBLE	Minimal encroachment on agricultural properties (FZ) which will not impact upon the use of land for farming purposes.
		2	2B*	LOW	Dissects 14 landowners properties (FZ) used for agriculture purposes and the old gravel pits and adjacent to the former landfill site.
			2C*	LOW	Dissects approximately 15 properties (FZ) used for agriculture purposes. The alignment extends cross the middle of more properties than 2B and therefore will have a greater impact upon existing land uses without mitigation measures in place. This will also result in less than preferable lot sizes in a farming zone.
			2D*	MODERATELY POOR	Dissects 9 properties and directly impacts 3 residential properties. All zoned (RL). The minimal lot size is 32ha in this location and the acquisition will have a detrimental impact upon approximately 13 properties to satisfy the minimum lot size requirements. The alignment will also have a detimental impact upon Beringer Blass Estate landholdings.
			2E*	MODERATELY POOR	Dissects 9 properties and directly impacts 3 residential properties. All zoned (RL). The minimal lot size is 32ha in this location and the acquisition will have a detrimental impact upon approximately 13 properties to satisfy the minimum lot size requirements. The alignment will also have a detimental impact upon Beringer Blass Estate landholdings.
		3	3A*	NEGLIGIBLE	Minimal encroachment on 4 landowners rural living properties (RLZ). Alignment is an extension of the current width of the existing Western Highway and will not preclude the ongoing existing uses of the land
			3B*	NEGLIGIBLE	Minimal encroachment on 6 landowners agricultural and residential properties (FZ) along the existing hwy. Alignment is an extension of the current width of the existing Western Highway and will not preclude the ongoing use of land. The Panrock Res. Road extension will have a very localised impact on 2 landowners, whilst the balance of the realigned road will not preclude the ongoing use of land for rural purposes.
			3C*	NEGLIGIBLE	Follows the alignment of the Melbourne - Adelaide railway line. Therefore, there is minimal encroachment of properties. The alignment will not precluded the existing land uses from continuing
			3AD	MODERATELY POOR	This alignment will result in the severance of 12 landowners rural and rural residential and farming properties that will impact upon how the land is used and result in inappropriate subdivision sizes.
			3DC	MODERATELY POOR	This alignment will result in the severance of 7 landowners rural and rural residential properties that will impact upon how the land is used and result in inappropriate lot sizes in the locality.

Western Highway Project

Planning and Landuse Options Assessment

SECTION 3

Evaluation objectives:	To avoid or minimise disruption and other adverse effects on infrastructure, land use (including agriculture and residential) and households, as well as road users during construction and/or resulting from the highway alignment. To avoid or minimise noise, landscape, visual and other adverse amenity effects on the environment and local residents during the construction and operation of the proposed duplicated highway to the maximum extent practicable.				
Evaluation Criteria	**Methodology**	**Zone**	**Option**	**Rating**	**Reason for Ratings**
Extent and impact of change to future land use (consistency with applicable planning policies)	Desktop assessment of relevant Planning Schemes, SPPF, LPPF, Zones and Overlays. Analysis of GIS maps	1	1A*	NEGLIGIBLE	Minimal impact to adjacent properties along the existing highway. Therefore, not likely to impact future land use.
			1C *	LOW	Future land use of the land affected is potentially limited. The extent depending on where the alignment dissects the property. However, the impact will only be of low disbenefit to the property owners.
			1E *	NEGLIGIBLE	Minimal impact to adjacent properties along the existing highway.Therefore, not likely to impact future land use.
		2	2B*	NEGLIGIBLE	Future land use of the land affected is potentially limited. The extent depending on where the alignment dissects the property. However, the impact will only be of low disbenefit to the property owners. The realignment of the highway provides some potential benefits for local landowners and the locality in that residents of Great Western will have heavy vehicles removed the streets and will allow for the development of the town as envisaged by Council to the south (once the new reticulated sewerage system has been installed).
			2C*	NEGLIGIBLE	Future land use of the land affected is potentially limited. The extent depending on where the alignment dissects the property. However, the impact will only be of low disbenefit to the property owners. The realignment of the highway provides some potential benefits for local landowners and the locality in that residents of Great Western will have heavy vehicles removed the streets and will allow for the development of the town as envisaged by Council to the south (once the new reticulated sewerage system has been installed).
			2D*	LOW	Future land use of the land affected is potentially limited. The extent depending on where the alignment dissects the property. Council has a strategy that identifies potential future growth of Great Western to the South consistent with the reticulated sewerage provision to the township. As the proposed alignment is beyond the township zone, it might provide addedd pressure for further development beyond the TZ boundaries.
			2E*	LOW	Future land use of the land affected is potentially limited. The extent depending on where the alignment dissects the property. Council has a strategy that identifies potential future growth of Great Western to the South consistent with the reticulated sewerage provision to the township. As the proposed alignment is beyond the township zone, it might provide addedd pressure for further development beyond the TZ boundaries.
		3	3A*	NEGLIGIBLE	The new freeway alignment will sencroach upon the front of existing properties but with access arrangements in place, it is not expected to preclude the ongoing use of land for its existing purposes.
			3B*	NEGLIGIBLE	The new freeway alignment will sencroach upon the front of existing properties but with access arrangements in place, it is not expected to preclude the ongoing use of land for its existing purposes.
			3C*	NEGLIGIBLE	Minimal impact to adjacent properties along the Melbourne - Adelaide railway line. Therefore, not likely to impact future land use. However, a Permit Application for the subdivision of 3 lots is proposed and will be significantly impacted by this alignment. It is noted that the disbenefit will only be on disbenefit to the applicant.
			3AD	MODERATELY POOR	This alignment will result in the severance of rural and rural residential properties that will impact upon how the land can be used over the longer term and may encourage inappropriate development to occur on the substandard lot sizes resultant from the acquisition by VicRoads
			3DC	MODERATELY POOR	This alignment will result in the severance of rural and rural residential properties that will impact upon how the land can be used over the longer term and may encourage inappropriate development to occur on the substandard lot sizes resultant from the acquisition by VicRoads

Appendix K

Social Options Assessment

Western Highway Project

Appendix K – Social Impacts Options Assessment

The methodology for the social impact options assessment is also discussed in Section 3 of the report.

A qualitative assessment of the potential social impacts of the alignment options was undertaken. Key to the assessment of the alignment options was developing a sound understanding of the current conditions and social factors that apply to the existing Western Highway and local roads. To develop this understanding, the following tasks were undertaken:

- Three site visits to the area, including two visits to attend community information sessions and Council meetings, and a third to meet with an affected landowner and to inspect the options around Great Western;
- Review of the community feedback collected informally at the public information displays and provided later through feedback forms and records of VicRoads contacts with affected landowners, as well as feedback provided through stakeholder interviews;
- Review of the information collected on the location of community services and facilities;
- Review of the social policy data collected during for the existing conditions report; and
- Consideration of the number of properties potentially severed by each option and the number houses potentially affected, either by acquisition or amenity impacts.

1.1 Reference Information

The assessment used a combination of qualitative and qualitative information, including:

- A count of the number of properties potentially severed by each option;
- A count of the houses potentially affected, either by acquisition or amenity impacts;
- Review of the information collected on the location of community services and facilities;
- Review of the social policy data collected during for the existing conditions report;
- Review of the community feedback collected informally at the public information displays and provided later through feedback forms and records of VicRoads contacts with affected landowners, as well as feedback provided through stakeholder interviews;
- A briefing provided by VicRoads staff on the project and their contacts with landowners (this briefing covered many of the in-depth issues and impacts for individual landowners); and
- Three site visits to the area, including two visits to attend community information sessions, and one site visit to meet with an affected landowner and take a tour around Great Western.

Western Highway Project

Social Impact Options Assessment

SECTION 3

Evaluation objectives:	To avoid or minimise disruption and other adverse effects on infrastructure, land use (including agriculture and residential) and households, as well as road users during construction and/or resulting from the highway alignment. To avoid or minimise noise, landscape, visual and other adverse amenity effects on the environment and local residents during the construction and operation of the proposed duplicated highway to the maximum extent practicable.

Evaluation Criteria	Methodology	Zone	Option	Rating	Reason for Ratings
Impact on Access, mobility and social severance	This criterion assesses the impact of the option on accessibility and mobility. This includes accessibility to and between towns, and to key community sites. Mobility includes consideration of how the option might affect people's ability to get around their property, as well as impacts on individual mobility. Severance considers whether any options cut people off from places they need or want to go to (not land severance).	1	1A*	NEGLIGIBLE	This option stays closest to the current alignment and hence would have the least access impact. May affect access for adjacent landowners, however this could also be a benefit if the opportunity is taken to make safer property entrances.
			1C *	LOW	Six new road crossings: The Majors Road, McDonald's Park Road, three unnamed roads on Map 1, Mckays Woolshed Road, - potential severance or access impact.
			1E *	NEGLIGIBLE	May affect access for adjacent landowners
		2	2B*	LOW	Four new road crossings - potential severance or access impact - access needs to be maintained on most of these roads. This option takes heavy traffic out of Great Western and it would improve internal connectivity.
			2C*	LOW	Five new road crossings - potential severance or access impact. This option takes heavy traffic out of Great Western and it would improve internal connectivity.
			2D*	MODERATELY POOR	Four new road crossings - potential severance or access impact. This option would take some heavy traffic out of Great Western. It would lead to improved internal connectivity. However, this option takes the highway entrance well away from the town and would potentially increase travel times to other locations, affecting access.
			2E*	MODERATELY POOR	Four new road crossings - potential severance or access impact. This option would take some heavy traffic out of Great Western. It would lead to improved internal connectivity. However, this option takes the highway entrance well away from the town and would potentially increase travel times to other locations, affecting access.
		3	3A*	NEGLIGIBLE	May affect access for adjacent landowners, however this could also be a benefit if the opportunity is taken to make safer property entrances. This option has the best social outcome in this section.
			3B*	NEGLIGIBLE	May affect access for adjacent landowners, however this could also be a benefit if the opportunity is taken to make safer property entrances.
			3C*	LOW	One new road crossing - potential severance or access impact. May increase travel times slightly.
			3AD	LOW	One new road crossing - potential severance or access impact. Need for new access road. May increase travel times slightly.
			3DC	LOW	One new road crossing - potential severance or access impact. Need for new access road. May increase travel times slightly.
Impact of the full or partial acquisition of properties	This criterion calculates the number of properties affected by land acquisition and the severity of that impact in terms of land severance which affects people's enjoyment of their land or their ability to continue working the land. The criterion also calculates the number of dwellings which may be acquired under each option.	1	1A*	NEGLIGIBLE	Low impact on land acquisition.
			1C *	LOW	Approximately nine landowners affected by acquisition (the line goes into white in one place).
			1E *	LOW	Four landowners affected by acquisition
		2	2B*	LOW	Approximately 12 landowners affected by acquisition. This option appears to have the lowest impact in terms of land alienation.
			2C*	MODERATELY POOR	Approximately 12 landowners affected by acquisition
			2D*	MODERATELY POOR	Approximately 12 landowners affected by acquisition
			2E*	MODERATELY POOR	Approximately 12 landowners affected by acquisition
		3	3A*	NEGLIGIBLE	Three landowners affected by land acquisition - elsewhere the duplication is within the existing reservation.
			3B*	LOW	Six landowners affected by land acquisition - elsewhere the duplication is within the existing reservation.
			3C*	LOW	Eight landowners affected by acquisition
			3AD	LOW	Three landowners affected by land acquisition. (only Section AD)
			3DC	MODERATELY POOR	Approximately 11 landowners affected by acquisition (only Section DC). Several rural living properties would be unviable.
Experiences of the local environment • Impacts from dislocation effects	Based on how big a change the option will make in the local environment, including on-property changes and changes to the experience of driving through the area.	1	1A*	NEGLIGIBLE	This option stays closest to the current alignment and hence would have the lowest dislocation effects.
			1C *	MODERATELY POOR	This option would have a big impact on community perceptions of Armstrong as a rural area. It is likely that it would lead to increased conversion from farming to rural lifestyle.
			1E *	NEGLIGIBLE	This option stays close to the current alignment and hence would have a relatively low dislocation effect.
		2	2B*	LOW	Potential acquisition of one dwelling.
			2C*	LOW	This option will impact on more properties ore severely than 2B.
			2D*	MODERATELY POOR	Potential acquisition of one dwelling. Several properties affected by high land severance. This option would be perceived as creating more change in the local environment than the other two options.
			2E*	MODERATELY POOR	Potential acquisition of one dwelling. Several properties affected by high land severance. This option would be perceived as creating more change in the local environment than the other two options.
		3	3A*	PARTIAL	No dwellings would be acquired, and minimal impact on settlement patterns.
			3B*	NEGLIGIBLE	No dwellings would be acquired, and minimal impact on settlement patterns. More land severance than Option 3A.
			3C*	LOW	No dwellings would be acquired, but this option would have a high land severance impact, and it is more likely to lead to land ownership changes than Options 3A and 3B.
			3AD	LOW	No dwellings would be acquired, but this option would have a high land severance impact, and it is more likely to lead to land ownership changes than Options 3A and 3B.
			3DC	LOW	No dwellings would be acquired, but this option would have a high land severance impact, and it is more likely to lead to land ownership changes than Options 3A and 3B.
Experiences of the local environment - Impacts from amenity changes	Mostly based on impacts to nearby dwellings. Amenity changes include changes to noise environment, air quality, traffic lights at night and the pleasantness of the local environment.	1	1A*	NEGLIGIBLE	Minimal change to existing alignment means that amenity impacts would be low. This option has the best social outcome.
			1C *	LOW	Brings a new road closer to four houses. Introduces considerable change to the Armstrong environment, which would impact on amenity.
			1E *	NEGLIGIBLE	Low level of change to existing alignment means that amenity impacts would be low.
		2	2B*	LOW	Changes amenity and environment for ten dwellings, but significantly enhances amenity through Great Western.
			2C*	NEGLIGIBLE	Changes amenity and environment for a small number of dwellings, but significantly enhances amenity through Great Western.
			2D*	MODERATELY POOR	Changes amenity and environment for fourteen dwellings, but enhances amenity through Great Western.
			2E*	MODERATELY POOR	Changes amenity and environment for fourteen dwellings, but enhances amenity through Great Western.
		3	3A*	NEGLIGIBLE	Minimal change to existing alignment means that amenity impacts would be low. This option has the best social outcome.
			3B*	LOW	Brings a new road closer to four houses.
			3C*	LOW	Brings a new road closer to three houses. Creates a significant landscape change and hence has an amenity impact at a local level, not just at a residential level.
			3AD	LOW	Brings a new road closer to three houses. Creates a significant landscape change and hence has an amenity impact at a local level, not just at a residential level.
			3DC	LOW	Brings a new road closer to four houses. Creates a significant landscape change and hence has an amenity impact at a local level, not just at a residential level.

Western Highway Project

Social Impact Options Assessment

SECTION 3

Evaluation objectives:	To avoid or minimise disruption and other adverse effects on infrastructure, land use (including agriculture and residential) and households, as well as road users during construction and/or resulting from the highway alignment. To avoid or minimise noise, landscape, visual and other adverse amenity effects on the environment and local residents during the construction and operation of the proposed duplicated highway to the maximum extent practicable.

Evaluation Criteria	Methodology	Zone	Option	Rating	Reason for Ratings
Experiences of the local environment - • Impacts on community facilities	Considers changes in access (travel times and ease of access) to public places and townships	1	1A*	NEGLIGIBLE	All options improve access to community facilities in Ararat and Great Western due to reduced through traffic in town.
			1C *	NEGLIGIBLE	All options improve access to community facilities in Ararat and Great Western due to reduced through traffic in town.
			1E *	NEGLIGIBLE	All options improve access to community facilities in Ararat and Great Western due to reduced through traffic in town.
		2	2B*	NEGLIGIBLE	All options improve access to community facilities in Great Western due to reduced through traffic in town. All options improve accessibility to Ararat and Stawell. This option increases travel times the least.
			2C*	NEGLIGIBLE	All options improve access to community facilities in Great Western due to reduced through traffic in town. All options improve accessibility to Ararat and Stawell.
			2D*	LOW	All options improve access to community facilities in Great Western due to reduced through traffic in town. All options improve accessibility to Ararat and Stawell. This option increases travel times the most.
			2E*	LOW	All options improve access to community facilities in Great Western due to reduced through traffic in town. All options improve accessibility to Ararat and Stawell. This option increases travel times the most.
		3	3A*	PARTIAL	All options improve access to community facilities in Stawell due to reduced travel times. This option changes travel patterns the least.
			3B*	PARTIAL	All options improve access to community facilities in Stawell due to reduced travel times. This option has a low effect on travel patterns.
			3C*	LOW	All options improve access to community facilities in Stawell due to reduced travel times. This option leads to changed access to the caravan park and the golf course.
			3AD	LOW	All options improve access to community facilities in Stawell due to reduced travel times. This option leads to changed access to the caravan park and the golf course.
			3DC	LOW	All options improve access to community facilities in Stawell due to reduced travel times. This option leads to changed access to the caravan park and the golf course.
Community Context • The expressed preferences and concerns of local people	Based on feedback from community in letters, feedback forms and at community information sessions.	1	1A*	NEGLIGIBLE	This option is accepted by the community.
			1C *	LOW	This option has low community support.
			1E *	NEGLIGIBLE	This option has limited community support.
		2	2B*	NEGLIGIBLE	This option had the highest level of community support of the three options through this area.
			2C*	NEGLIGIBLE	This option had medium community support - main issues were access to Bests and quarry impacts.
			2D*	MODERATELY POOR	This option had low support. It was seen as going through low-lying and flood prone land, and is too far away from town.
			2E*	MODERATELY POOR	This option had low support. It was seen as going through low-lying and flood prone land, and is too far away from town.
		3	3A*	LOW	This option had the highest level of community support of the options through this area. The key issue is to avoid impacts on dwellings as much as possible.
			3B*	LOW	This option has limited community support.
			3C*	LOW	This option has low community support.
			3AD	LOW	This option has low community support.
			3DC	MODERATELY POOR	This option has low community support. Seen as too big a change.

Appendix L

Economic Options Assessment

Western Highway Project

Appendix L – Economic Impacts Options Assessment

The economic assessment was informed by existing information, aerial imagery and outcomes from community consultation, discussions with Council officers, and some affected landowners.

The following criteria and associated reference information were used to assess the potential economic impacts of each option.

1.1 Evaluation Criterion: Number and significance of businesses (including agricultural) affected by full or partial acquisition

Reference Information

- Aerial images – developed by the GHD project team; and
- Economic Existing Conditions Report (July 2011).

1.2 Evaluation Criterion: Impact on accessibility for industry and tourism opportunities.

Reference Information

This options assessment draws on information from a range of documents and sources, including but not limited to:

1. Economic Existing Conditions Report, GHD
2. Ararat Rural City (2009), Economic Development Strategy 2009-2012, available at http://www.ararat.vic.gov.au/
3. Ararat Rural City, Ararat Renewable Energy Park (information sheet), available at http://www.ararat.vic.gov.au/
4. Ararat Planning Scheme, http://planningschemes.dpcd.vic.gov.au/index.html
5. Northern Grampians Planning Scheme, http://planningschemes.dpcd.vic.gov.au/index.html
6. Northern Grampians Shire, Great Western Community Plan 2009-2013, , http://www.ngshire.vic.gov.au/
7. Network Planning Consultants Pty Ltd and Essential Economics Pty Ltd for Pyrenees Shire (2005), Beaufort and Avoca Industrial Land Strategy, Supplementary Review, available at http://www.pyrenees.vic.gov.au/Your_Council/Publications/Strategic_Plans
8. Northern Grampians Shire, Industry Snapshots – Manufacturing, Tourism (2008), available at www.grampiansforgrowth.com.au
9. Pyrenees Planning Scheme online, http://planningschemes.dpcd.vic.gov.au/index.html
10. Pyrenees Shire, Pyrenees Shire Growth and Development Strategy 2010-14, available at http://www.pyrenees.vic.gov.au/Your_Council/Publications/Strategic_Plans
11. Tourism Victoria (2008), Victoria's Nature-Based Tourism Strategy 2008-2012, available at http://www.tourism.vic.gov.au/
12. Tourism Victoria (2008), Regional Tourism Action Plan 2008-2011, available at http://www.tourism.vic.gov.au/
13. Tourism Victoria (2006), 10 Year Tourism and Events Industry Strategy available at http://www.tourism.vic.gov.au/

14. Tourism Victoria (2010), 10 Year Tourism and Events Industry Strategy: Progress report, available at http://www.tourism.vic.gov.au/
15. Tourism Victoria (2011), Tourism Victoria's Regional Marketing and Development Plan 2011-2012, available at http://www.tourism.vic.gov.au/
16. Maps issued by GHD

1.3 Evaluation Criterion: Impact on rail operations during construction

Reference Information

The following is a list of the sources that were used in arriving at the evaluation of the economic impact on rail operations as a result of the highway alignment options during construction.

1. Aerial images – developed by the GHD project team;
2. Economic Existing Conditions Report (July 2011);
3. Internal engineering advice on grade separation impacts;
4. Railway Map Victorian Lines (March 1999);
5. Auslink Melbourne – Adelaide Corridor Strategy (2007);
6. VLine – timetable and service information;
7. Great Southern Rail, timetable and service information;
8. Freight Future, Victorian Network Freight Strategy (2008).

Western Highway Project

Economic Impact Options Assessment

SECTION 3

Evaluation objectives:	To avoid or minimise disruption and other adverse effects on infrastructure, land use (including agriculture and residential) and households, as well as road users during construction and/or resulting from the highway alignment. To avoid or minimise noise, landscape, visual and other adverse amenity effects on the environment and local residents during the construction and operation of the proposed duplicated highway to the maximum extent practicable.

Evaluation Criteria	Methodology	Zone	Option	Rating	Reason for Ratings
Number and significance of businesses (including agricultrual) affected by full or partial acquisition.	Evaluation criteria included direct land loss, severance, relationship to allotment & tenement boundaries and impact on infrastructure	1	1A*	LOW	Follows existing rail alignment incurring some direct land loss and limited severace on western allotments, Tourism Econ: Possibly a wineyard at Garden Gully Road Intersection
			1C *	MODERATELY POOR	Significant severance throughout route, severe on eastern section because of diagonal, improves subsequently, Tourism Econ: No commercial or tourism business acquisition
			1E *	LOW	Similar to 1A except greater number of allotments affected, Tourism Econ: No commercial or tourism business acquisition
		2	2B*	LOW	Eastern section imposes high severance on small lots to north of township but ag quality only fair, Tourism Econ: A large swathe of land of Bests Winery will be acquired. Severance issues & higher business costs. Location of deer farm uncertain. 2D≥2B≥2C
			2C*	MODERATELY POOR	imposes significant severance and direct land loss on eastern section while western section less intrusive because of poorer quality land, Tourism Econ: A large swathe of land of Bests Winery will be acquired. Will compromise the business. Location of deer farm uncertain.
			2D*	MODERATELY POOR	Cumulative severance similar to 2B plus 2C but land quality better. Tourism Econ: Grampians Estate is currently a cellar door with highway trade; 2D removes highwaytraffic completely from this business. A corner of Beringer Blass land will be acquired.
			2E*	MODERATELY POOR	Similar to 2D but with increased severence western section; however allows ready alignmnet with railway line. A corner of Beringer Blass land will be acquired.
		3	3A*	LOW	Greater direct land loss relative to 3B due to strip. Tourism Econ: Depends how tight the land take is near golf course, caravan park- no difference between apparent options
			3B*	LOW	Direct land loss only, no severance. Tourism Econ: Depends how tight the land take is near golf course, caravan park- no difference between apparent options
			3C*	LOW	Some severance on eastern section but then aligns southern railway boundary to limit direct land loss impact. Tourism Econ: Depends how tight the land take is near golf course, caravan park- no difference between apparent options
			3AD	MODERATELY POOR	Increased severance at commencement and througout alignment until return to highway. No acquisition of land from Grange Golf Course or Stawell Park Caravan Park.
			3DC	MODERATELY POOR	Increased severance at commencement and througout alignment until return to highway. No acquisition of land from Grange Golf Course or Stawell Park Caravan Park.
Impact on accessibility for industry and tourism opportunities.	The options for the duplication route were assessed using the methodology described in the Alignment Options Assessment Methodology memo provided by GHD. The following tasks were undertaken: The short listed options were reviewed using sets of maps provided by GHD. The maps showed: • The boundaries of the Duplication Zones for Section 2 and Section 3; • The Study Area boundaries containing the route options; • The ownership patterns of allotments within the Study Area; • Townships within the study area or that are currently on the Western Highway and would be bypassed as a result of duplication project; • Indications of location of intersections on Section 2 and on Section 3. At some locations, municipal planning schemes were cross referenced to identify the zone of land in or near the study area near towns and townships. Impacts on land zoned industrial or business rated with consideration of local economic and tourism development plans and strategies and the importance of the land, site, or tourist destination as identified in these strategies and plans. The verbal descriptions of each option within the Duplication Zones (e.g. Zone 1, Option 1AB, 1A and AB) were cross referenced with the information presented in the maps, to obtain additional information about which side of the current alignment the duplication could potentially be sited. This was particularly useful in Duplication Zones were the alignments options were quite similar and the maps did not provide sufficient information to distinguish between one option and another. The options (by Duplication Zone) were assessed against agreed criteria - Impact on accessibility for industry and tourism opportunities. The maps did not contain detailed information about the fate of roads that currently link into the Western Highway. It has therefore been assumed, that all roads will remain open to the Highway unless the study team is informed otherwise. When the road design has been progressed further it will be necessary to revisit this assumption. It is unlikely that all roads will remain open with the road designed to 110km/h standard. With respect to the 'impact on accessibility' assessment criteria, we also included consideration of highway visibility – this is a particularly important aspect for industry and for some tourism businesses that rely on highway trade for a large share of their business. If their highway visibility is reduced – through realignment – it is likely to affect the impetus or impulse to access as well as accessibility itself. The outcome for industry, businesses and tourism operators was assessed for each option, and the impact rated according to the Potential Project Benefits and Potential Project Disbenefits described in the Options Assessment Methodology memo. Where the impact of the options were identical in terms of the magnitude, the three or four options were compared to each other to establish which of them was preferable in terms of minimising potential project disbenefits.	1	1A*	NEGLIGIBLE	Intersection at Garden Gully Road allows for access to Westgate Country House
			1C *	LOW	Deviation north of Armstrong makes directions to Westgate Country House (in Westgate Road nr Armstrong) more complicated for tourists
			1E *	NEGLIGIBLE	Intersection at Garden Gully Road allows for access to Westgate Country House
		2	2B*	MODERATELY POOR	Grampians Estate Winery has cellar door w highway trade; 2B is duplication past the cellar door w off ramps to town opposite the cellar door (access and amenity issues). Town centre businesses impacted, e.g. petrol station, trailer sales, wineries, general store.2E=2D≥2C≥2B
			2C*	MODERATELY POOR	Grampians Estate Winery has cellar door w highway trade; 2C removes highwaytraffic, but cellar door still visible at deviation (partial loss of exposure). Off ramp to town where cellar door has frontage to Western Highway (access issues). Town centre businesses impacted, e.g. petrol station, trailer sales, wineries, general store.
			2D*	MODERATELY POOR	Grampians Estate Winery has a cellar door with highway trade; 2D removes highway traffic completely from this business. Town centre businesses impacted, e.g. petrol station, trailer sales, wineries, general store. Western bypass alignment is preferred by the township. Better visibility of town along western bypass route for passing trade.
			2E*	MODERATELY POOR	Grampians Estate Winery has a cellar door with highway trade; 2D removes highway traffic completely from this business. Town centre businesses impacted, e.g. petrol station, trailer sales, wineries, general store. Western bypass alignment is preferred by the township. Better visibility of town along western bypass route for passing trade.
		3	3A*	MODERATELY POOR	Access to the caravan park and golf course via Carlsens Road and Monaghan Road is less direct than in options 3ad and 3dc. This will result in a relatively high impact for operators of the Caravan Park and Grange Golf Course due to reduced access with no amenity improvements
			3B*	MODERATELY POOR	Access to the caravan park and golf course via Carlsens Road and Monaghan Road is less direct than in options 3ad and 3dc. This will result in a relatively high impact for operators of the Caravan Park and Grange Golf Course due to reduced access with no amenity improvements
			3C*	MODERATELY POOR	Access to the caravan park and golf course via Carlsens Road and Monaghan Road is less direct than in options 3ad and 3dc. This will result in a relatively high impact for operators of the Caravan Park and Grange Golf Course due to reduced access with no amenity improvements
			3AD	LOW	Access to the caravan park and golf course via new intersection at Robsons Road is more direct than access via Carlsens Road and Monaghan Road as in options 3A, 3B, & 3C. Access is good for eastbound traffic (from Stawell) and also good for westbound traffic (from Ararat). Converting the current western highway alignment into a local access route with reduced traffic improves opportunities for connections between facilities south of the road (in particularly caravan park and golf course) and bushland reserve north of the Old Highway, which can improve recreation opportunities in the area. Reduced traffic on the existing routes would also improve amenity for caravan park visitors and residents. However, reduced highway exposure has potential to limit knowledge of caravan park and golf course for travellers on this corridor, with possible impacts on future visitation by these travellers or their circle of family/friends. due to access issues and loss of highway exposure & visibility.
			3DC	LOW	Access to the caravan park and golf course via new intersection at Robsons Road is more direct than access via Carlsens Road and Monaghan Road as in options 3A, 3B, & 3C. Access is good for eastbound traffic (from Stawell) and also good for westbound traffic (from Ararat). Converting the current western highway alignment into a local access route with reduced traffic improves opportunities for connections between facilities south of the road (in particularly caravan park and golf course) and bushland reserve north of the Old Highway, which can improve recreation opportunities in the area. Reduced traffic on the existing routes would also improve amenity for caravan park visitors and residents. However, reduced highway exposure has potential to limit knowledge of caravan park and golf course for travellers on this corridor, with possible impacts on future visitation by these travellers or their circle of family/friends. due to access issues and loss of highway exposure & visibility.

Western Highway Project

Economic Impact Options Assessment

SECTION 3

Evaluation objectives:	To avoid or minimise disruption and other adverse effects on infrastructure, land use (including agriculture and residential) and households, as well as road users during construction and/or resulting from the highway alignment. To avoid or minimise noise, landscape, visual and other adverse amenity effects on the environment and local residents during the construction and operation of the proposed duplicated highway to the maximum extent practicable.

Evaluation Criteria	Methodology	Zone	Option	Rating	Reason for Ratings
Impact on rail operations during construction.	A series of aerial images showing Section 3 (Ararat to Stawell) were reviewed. Each image illustrated the existing highway alignment and the alternative alignment options for a duplicated route of the Western Highway. An evaluation was made to ascertain the impact on rail operations during the construction phase of the potential new alignments. Research was undertaken to gather information about the profile of each section in terms of its passenger and freight movements and to gain an understanding of how these movements were important on a local, regional or state level. A number of zones were considered. For each zone, the existing highway alignment and the proposed alternative highway duplication alignments were evaluated for their impact on rail operations. This involved identifying the alignment of the rail line and identifying points within the zone where either the rail line was observed to run parallel to the new alignment options or, more importantly, where physical crossings of the road and rail would occur with one of the new alignment options. In the event of a new rail crossing occurred, an assessment was made as to the likely impact (where applicable) to the locality, region and the State. In each case, a rating was assigned to the road/rail interaction to describe the type of impact that would occur. Advice provided to this assessment indicated that the likely level of disruption to rail traffic that would result from construction works (a grade separation of the new road alignment over the railway) would be in the order of 1-2 days. Section 3 is situated on the Australian Rail Track Corporation's (ARTC) interstate rail network and experiences both freight movements and interstate passenger movements Inter-state passenger and freight services use the same track network. Therefore the impact of the new alignment crossings over the railway line in this section would affect interstate freight and passenger movements. These impacts were initially scored as 'poor', due to the potential for the impact on the state. These impacts were downgraded to 'low' due to the likely short period of disruption from construction of the new highway alignment options.	1	1A*	LOW	One intersection between the railway and proposed new highway alignment, which will cause some disruption to services.
			1C *	LOW	One intersection between the railway and proposed new highway alignment, which will cause some disruption to services.
			1E *	NEGLIGIBLE	No interaction between the railway line and the proposed new highway alignment
		2	2B*	NEGLIGIBLE	No interaction between the railway line and the proposed new highway alignment
			2C*	NEGLIGIBLE	No interaction between the railway line and the proposed new highway alignment
			2D*	LOW	One interaction between the railway line and the proposed new highway alignment, which will cause some disruption to services.
			2E*	NEGLIGIBLE	No interaction between the railway line and the proposed new highway alignment
		3	3A*	LOW	Two interactions between the railway line and the proposed new highway alignment, which will cause some disruption to services.
			3B*	LOW	One interaction between the railway line and the proposed new highway alignment, which will cause some disruption to services.
			3C*	NEGLIGIBLE	No interaction between the railway line and the proposed new highway alignment, which runs parallel with the railway line for a large proportion of the route.
			3AD	LOW	One interaction between the railway line and the proposed new highway alignment, which will cause some disruption to services.
			3DC	NEGLIGIBLE	No interaction between the railway line and the proposed new highway alignment

Appendix M

Visual & Landscape Options Assessment

Memo

Western Highway Duplication
Section 3 Ararat to Stawell

Appendix M – Visual and Landscape Options Assessment Memo

Methodology

For the purpose of this project stage and options assessment study we have prepared a desktop methodology to determine the impacts of the Western Highway duplication options. This methodology provides a reasonable tool to undertake a comparative assessment of the multiple duplication options.

The impact ratings assigned to the duplication options is based upon Table 1 Impact Ratings provided within the Alignment Options Assessment Methodology prepared by GHD.

Objective: ***To minimise the impact upon the amenity of adjacent residents.***
Criteria: To assess the number and level of visual impact of households affected by the project.

Households located within 500m proximity of an alignment option have been considered within the assessment. This proximity is a typical benchmark for VicRoads and other studies to identify households that may receive a visual impact from proposed developments. Outside of this 500m proximity, typical visual impact significantly reduces.

Households within 150m proximity of the duplication options are assumed to receive a greater visual impact given their increased proximity.

The visual impact upon households has also been considered based upon whether the options propose the duplication of the existing Western Highway alignment or an entirely new alignment for the highway. Households that are affected by the duplication of the highway are considered to receive a lower visual impact than those households that are affected by a new highway alignment.

Households that are affected by the duplication of the highway are considered to receive a lower visual impact because the existing highway is already part of the visual outlook. Their visual impact will be based upon an existing infrastructure element, the highway becoming larger in scale or width. Those households affected by a new alignment receive a higher visual impact because they are impacted upon by a new infrastructure element within their visual outlook.

In order to provide a comparison between the options, points have been assigned to affected houses dependent upon their proximity to the alignment option and whether they are affected by a duplicated alignment or a new alignment. The following point values were assigned:

Houses within proximity to duplicated highway options

ASPECT Studios Pty Ltd
ABN 11 120 219 561
Melbourne
www.aspect.net.au

Melbourne
30–32 Easey Street
Collingwood 3066 VIC Australia
T 03 9417 6844
F 03 9417 6855
aspectmelbourne@aspect.net.au

Sydney
Studio 61, 61 Marlborough Street
Surry Hills 2010 NSW Australia
T 02 9699 7182
F 02 9699 7192
aspectsydney@aspect.net.au

Shanghai
Room B302-303 Building 2
Park2Space 169 Mengzi Road
Luwan District 200023 P.R.C.
T +86 21 5302 8555
office@aspectstudios.com.cn

- Houses within 500-150m proximity 1 point
- Houses within 150m proximity 2 points

Houses within proximity to new highway alignments

- Houses within 500-150m proximity 5 points
- Houses within 150m proximity 10 points

The houses and corresponding point values are then quantified to provide an overall numerical value to each highway option. This then corresponds to the categories provided in the 'Impact Ratings Table.'

- 0-34 points, ranked as a low impact, providing a low level impact upon households
- 35 points or more, ranked as a moderately poor impact, providing a significant disbenefit to households within the locality.

Objective: ***To minimise the impact upon townships and places of cultural and natural value.***
Criteria: To assess the project's impact of visual change to the landscape from townships, vistas and places of cultural and natural value.

Within this study, townships and places of cultural and natural value were individually assessed to determine the proposed visual impact of the multiple duplication options. This is based upon the following attributes:

- Level of significance of the place of natural or cultural value;
- Size of township;
- Distance of duplication alignment option from a township or place of natural or cultural value.
- Estimated visual prominence of the alignment option from a township or place of natural or cultural value.

Objective: ***To minimise detrimental impact upon existing landscape character.***
Criteria: To assess the capacity of the landscape character types to absorb the visual change from the project.

The duplication options have been assessed to calculate the proportion that each alignment affects different visually sensitive landscape character types.

In order to provide a comparison between the options, numerical values have been assigned to the landscape character types, based upon their visual sensitivity. The level of sensitivity and their corresponding numerical values are as follows:

Landscape Character Types, across both Sections:

• Bushland	High landscape sensitivity
• Mountain Bushland	High landscape sensitivity
• Great Western Township	High landscape sensitivity
• Rural with Scattered Canopy Vegetation	Medium to high landscape sensitivity
• Township Fringe	Medium landscape sensitivity
• Rural	Medium landscape sensitivity
• Highway with Roadside Vegetation	Low landscape sensitivity
• Highway	Very low landscape sensitivity
• Vegetated Plantation	Very low landscape sensitivity
• Cleared Plantation	Very low landscape sensitivity

Associated numerical value:

• High landscape sensitivity	4
• Medium to high landscape sensitivity	3
• Medium landscape sensitivity	2
• Low landscape sensitivity	1
• Very low landscape sensitivity	0

Each option is then assessed to determine the landscape character types and percentage along it's alignment that traverses through these character types. These percentages are then multiplied by the associated numerical value assigned to the landscape character type's level of sensitivity. These are then added providing an overall score for each option.

Score categories have been determined based upon the 'Impact Ratings Table' and are as follows:

- 0.04 to 0.49, negligible, providing minimal disbenefit
- 0.50 to 1.99, low, providing a low impact upon areas
- 2.00 to 3.99, moderately Poor, providing a significant disbenefit to the locality or moderate disbenefit to the region
- 4.00 and above, poor, providing a severe disbenefit to the locality or significant disbenefit to the region

Memo

Criteria Ranking

An equal rating has been applied to the three landscape and visual impact criteria. Criteria ratings (if deemed a suitable assessment method) is typically based upon the following three attributes:

- Further data for the alignment options, including refined concepts for each;
- Extensive community consultation to ascertain their visual and landscape values; and
- Relevant State Legislation, including Significant Landscape Overlays.

As none of these three attributes are available or applicable to the alignment options at this stage, evaluation criteria ratings cannot be suitably applied.

Experience in past projects and recent conversations with the VicRoads Landscape Department reiterate the difficulty in applying ratings to the criteria.

Reference Information

The following reference information was used in the preparation of the Options Assessment:

- Ararat to Stawell Design Options, August 2011. These plans identify the alignment options within Section 3.
- EES Design Options, SK2001-SK2005, June 2011 prepared by GHD. These plans identify the estimated cut and fill required for each alignment option.
- Beaufort to Ararat, Houses, 27 June 2011 prepared by GHD.
- Beaufort to Ararat, Elevation, 23 June 2011 prepared by GHD.
- Draft Landscape and Visual Impact Assessment Existing Conditions Report, Section 3 Ararat to Stawell, prepared by ASPECT Studios.

Key Issues

This Options Assessment is limited to a desktop study utilising our findings from our site investigations, using available reference information and our professional judgement. As such, the investigation has been primarily undertaken through assumptions based upon distances of alignment options from elements including townships, residents and other valued attributes.

This methodology is an appropriate tool to undertake a comparative assessment of the duplication alignment options to assess landscape and visual impact of the preferred duplication alignment.

The options assessment does not take into account any of the following which can be considered as important elements within landscape and visual impact assessment. These will be used in preparing the landscape and visual assessment of the preferred duplication alignment.

- Design of the duplication, including earthworks and bridges;
- Any mitigation interventions;
- Existing on site elements and infrastructure including trees;

- Detailed cross sections;
- Access to private residences; and
- Photomontages.

Regards

Nelson Gomes
Senior Landscape Architect
nelsong@aspect.net.au

Western Highway Project

Visual and Landscpe Options Assessment

SECTION 3

EES Evaluation objectives:	To avoid or minimise disruption and other adverse effects on infrastructure, land use (including agriculture and residential) and households, as well as road users during construction and/or resulting from the highway alignment. To avoid or minimise noise, landscape, visual and other adverse amenity effects on the environment and local residents during the construction and operation of the proposed duplicated highway to the maximum extent practicable.

Evaluation Criteria	Methodology	Zone	Option	Rating	Reason for Ratings	Measurement
To minimise the impact upon the amenity of adjacent residents. - assess the number and level of visual impact of households affected by the project.	Quantify number of households within 500m proximity to the duplication option, including those within 150m proximity.	1	1A*	LOW	Score: 34	Total 26 households. Duplicated highway. 18 households within a 500-150m proximity, 8 households within 150m proximity.
			1C *	MODERATELY POOR	Score: 60	Total 9 households. New highway. 6 households within a 500-150m proximity, 3 households within 150m proximity.
			1E *	LOW	Score: 34	Total 26 households. Duplicated highway. 18 households within a 500-150m proximity, 8 households within 150m proximity.
		2	2B*	MODERATELY POOR	Score: 90	Total 25 households. New highway. 20 households within a 500-150m proximity, 5 households within 150m proximity.
			2C*	MODERATELY POOR	Score: 44	Total 14 households. New highway. 12 households within a 500-150m proximity, 2 households within 150m proximity.
			2D*	MODERATELY POOR	Score: 130	Total 16 households. New highway. 6 households within a 500-150m proximity, 10 households within 150m proximity.
			2E*	MODERATELY POOR	Score: 145	Total 18 households. New highway. 7 households within a 500-150m proximity, 11 households within 150m proximity.
		3	3A*	LOW	Score: 25	Total 20 households. Duplicated highway. 15 households within a 500-150m proximity, 5 households within 150m proximity.
			3B*	LOW	Score: 27	Total 20 households. Duplicated highway. 13 households within a 500-150m proximity, 7 households within 150m proximity.
			3C*	MODERATELY POOR	Score: 64	Total 18 households. Duplicated highway. 12 households within a 500-150m proximity, 1 households within 150m proximity. New highway. 5 households within a 500-150m proximity.
			3AD	MODERATELY POOR	Score: 39	Total 6 households. Duplicated highway. 2 households within 150m proximity. New highway. 1 household within a 500-150m proximity, 3 households within 150m proximity.
			3DC	MODERATELY POOR	Score: 40	Total 6 households. New highway. 4 household within a 500-150m proximity, 2 households within 150m proximity.
To minimise the impact upon townships and places of cultural and natural value - assess the project's impact of visual change to the landscape from townships, vistas and places of cultural and natural value.	Assess proximity and estimated impact of duplication options upon townships, views and natural and cultural values.	1	1A*	LOW	Option has high level impact upon Ararat Hills Regional Park. Option has low level impact upon Concongella Creek	Cuts into Ararat Hills Regional Park. Widens existing Concongella Creek bridge.
			1C *	NEGLIGIBLE	Option has minimal disbenefit to the 'Hole in the Wall.'	Within 100m proximity of 'Hole in the Wall.' Widens existing Concongella Creek bridge.
			1E *	LOW	Option has high level impact upon Ararat Hills Regional Park.	Cuts into Ararat Hills Regional Park
		2	2B*	MODERATELY POOR	Option on elevated land and within 1km proximity to Great Western and has moderate impact upon town centre. Option has low level impact upon Concongella Creek and Alanvale Creek. Option has moderate impact upon Grampians Estate Winery. Bests Winery and Seppelt Winery.	Within 1km of Great Western town centre. On elevated land to town centre. Located in front of ridge line, however is expected to be be cut into existing topography. Adjacent to Grampians Estate Winery. Widens existing Concongella Creek bridge. New bridge over Concongella Creek. New crossing over Alanvale Creek. 300m from Bests Winery. 500m from Seppelt Winery. Goes through landfill and quarry.
			2C*	LOW	Option on elevated land behind ridge and within 1.2km proximity to Great Western and has low impact upon town centre. Option has low level impact upon Concongella Creek and Alanvale Creek. Option has moderate impact upon Grampians Estate Winery. Bests	Within 1.2km of Great Western town centre. On elevated land to town centre, behind ridge line. Adjacent to Grampians Estate Winery. Widens existing Concongella Creek bridge. New bridge over Concongella Creek. New crossing over Alanvale Creek. 300m from Bests Winery. 500m from Seppelt Winery.
			2D*	LOW	Option within 1.5km proximity to Great Western and has low impact upon town centre. Option has low impact upon Great Western Racecourse. Option has low level	500m from Great Western Racecourse. New crossing Hyde Park Creek.
			2E*	LOW	Option within 1.5km proximity to Great Western and has low impact upon town centre. Option has low impact upon Great Western Racecourse. Option has low level	500m from Great Western Racecourse. New crossing Hyde Park Creek.
		3	3A*	LOW	Option has moderate level impact upon Sister's Rocks. Option has low level impact upon Golf Club and Caravan Park.	Adjacent to Sister's Rocks. Adjacent to Stawell Resort Caravan Park. Adjacent to Grange Golf Club.
			3B*	LOW	Option has moderate level impact upon Sister's Rocks. Option has low level impact upon Golf Club and Caravan Park.	Adjacent to Sister's Rocks. Adjacent to Stawell Resort Caravan Park. Adjacent to Grange Golf Club.
			3C*	LOW	Option has moderate level impact upon Sister's Rocks. Option has low level impact upon Golf Club and Caravan Park. Option has high impact upon Pleasant Creek.	Adjacent to Sister's Rocks. Adjacent to Stawell Resort Caravan Park. Adjacent to Grange Golf Club. Crosses over Pleasant Creek for 400m.
			3AD	LOW	Option has low level impact upon Golf Club. Option has moderate impact upon Pleasant Creek.	Adjacent to Grange Golf Club. 2 crossing points over Pleasant Creek
			3DC	LOW	Option has low level impact upon Golf Club. Option has moderate impact upon Pleasant Creek.	Adjacent to Grange Golf Club. 2 crossing points over Pleasant Creek
To minimise detrimental impact upon existing landscape character - assess the capacity of the landscape character types to absorb the visual change from the project.	Quantify percentage of landscape character type that aligment option travels through.	1	1A*	LOW	Score: 1.00	100% Highway Vegetation (1.0x1)
			1C *	MODERATELY POOR	Score: 2.70	15% Highway Vegetation (0.15x1), 85% Rural with Scattered Vegetation (0.85x3)
			1E *	LOW	Score: 1.30	85% Highway Vegetation (0.85x1), 15% Rural with Scattered Vegetation (0.15x3)
		2	2B*	MODERATELY POOR	Score: 2.65	35% Highway Vegetation (0.35x1), 35% Bushland (0.35x4), 30% Rural with Scattered Vegetation (0.30x3)
			2C*	MODERATELY POOR	Score: 2.75	25% Highway Vegetation (0.25x1), 25% Bushland (0.25x4), 50% Rural with Scattered Vegetation (0.50x3)
			2D*	MODERATELY POOR	Score: 3.00	100% Rural with Scattered Vegetation (1.0x2)
			2E*	MODERATELY POOR	Score: 3.00	100% Rural with Scattered Vegetation (1.0x2)
		3	3A*	LOW	Score: 1.30	70% Highway Vegetation (0.70x1), 30% Rural (0.30x2)
			3B*	LOW	Score: 1.25	75% Highway Vegetation (0.75x1), 25% Rural (0.25x2)
			3C*	LOW	Score: 1.55	45% Highway Vegetation (0.45x1), 55% Rural (0.55x2)
			3AD	LOW	Score: 1.90	10% Highway Vegetation (0.10x1), 90% Rural (0.90x2)
			3DC	LOW	Score: 2.00	100% Rural (1.00x2)

Appendix N

Air Quality Options Assessment

Western Highway Project

Appendix N – Air Quality Options Assessment

The methodology for the Air Quality options assessment is also discussed in Section 3 of the report.

For each of the three zones between Ararat and Stawell, two operational emission criteria and one construction dust criterion were considered for each of the proposed options, and also, the option of "no build". These criteria and associated methodologies were:

- Sensitive receptors within close proximity to the road will have some construction dust impact. **Methodology:** Determine number of sensitive receptors within 0-15 m; 15-80 m, 80-100 m and 100-200 m of the road. Weight the closest band six times and the next band four times, the third band three times and the outermost band once. (Viz weightings 6, 4, 3 and 1 times). A summation of the above allows differentiation of the options with the higher number giving worsening impacts. The range of this metric was 1 through 16. Can only be worsening impact from existing (no build) conditions.
- No sensitive receptors within a minimum distance as evaluated by AUSROADS and SEPP(AQM) Schedule B using expected, indicative traffic emissions. **Methodology:** Use AUSROADS to define distance from road where SEPP(AQM) objectives are not met. Any identified sensitive receptor within this distance is rated 'Very Poor'. Otherwise, negligible rating as compliant to policy - as is the existing road and traffic conditions.
- Emissions into the atmosphere as a measure of potential contribution to regional load of air pollutants. **Methodology:** All options will be an improvement on existing conditions due to better traffic flow with dual carriageways. Vehicle Kilometres Travelled (VKT) is a direct measure of total pollutants released for freely mixing into the regional 'airshed'. Shortest distance scores an improving impact. When all options are same length, all score neutral.

The operational criteria were selected in order to determine compliance with the SEPP (AQM) intervention levels described in Schedule B of the policy and the objectives and goals outlined in SEPP (AAQ) schedule 2. The construction dust criterion was selected in order to determine the number of sensitive receptors within close proximity to the Project in order to assess the relative dust impacts of each of the different options within each zone.

These three air quality criteria were then weighted equally between construction and operational impacts with the two operational criteria each taking an even share of the overall operational weighting and the single construction criteria utilising the entire construction weighting, as shown in the table below:

Criteria	Criteria Weighting	Reason For Weighting
No sensitive receptors within a minimum distance as evaluated by AUSROADS and SEPP(AQM) Schedule B using expected, indicative traffic emissions.	0.250	Weighting equally split between construction and operation impacts. Operational impacts then equally split between two criteria.
Sensitive receptors within close proximity to the road will have some construction dust impact.	0.500	Construction impacts are the likely to be the greatest difference between Build and No/Build
Emissions into the atmosphere as a measure of potential contribution to regional load of air pollutants.	0.250	Weighting equally split between construction and operation impacts. Operational impacts then equally split between two criteria.
Total Weighting	**1**	

Each option was then given a rating (see options assessment section 3) and this rating was then scored and the weightings above used to determine a ranking for each option.

1.1 Construction

In the construction phase, dust impacts are to be controlled by a Dust Management Plan during the (relatively) short duration of the construction period. The risk of impacts decreases with increasing distance from the construction activity. Therefore, the number of sensitive receptors within close proximity to the Project provides a metric by which to assess the relative impact of each option. A nominal reference distance of 200 m, based on experience for other linear construction projects, was used in this assessment. Since the number of receptors and associated distances within 200 m (in bands 0-15 m, 15-80 m, 80-100 m and 100-200 m) were provided, a weighting factor was applied to rank the closer receptors as having higher risk of exposure to either construction dust or operational vehicle emissions.

1.2 Operational

Operational impacts from vehicle emissions decrease with distance from the running lanes. Modelling of near-road concentrations requires information on numbers of vehicles and the percentage of trucks. For this assessment, traffic volumes were assumed at 5,300 vehicles per day with peak volumes of 533 vehicles per hour. The percentage of heavy vehicle volumes can be up to 29% of total daily volumes (CPG, August 2009).

An AUSROADS simulation of the near road dispersion was undertaken using appropriately sourced meteorological data for this section of the roadway. The following assumptions were applied:

- Proportion of heavy vehicles was 29%
- Vehicle speeds were 110 km/h
- Road gradient was flat
- Roads were all modelled as “At-Grade”
- Emission factors were based on the year 2016 using EPA Victoria supplied data, with linear interpolation between the years of 2011 and 2021
- NO_2 to NOx ratio was assumed to be 30 per cent.

The AUSROADS modelling provides estimates of concentration as a function of perpendicular distance from the road, both sides of the road, with meteorology accounted for by site-representative data. These estimates were used with the emissions factor detailed above to make predictions of the peak concentrations at the road edge as shown in the table below. Note that even with adding in background pollutants levels, compliance to SEPP (AQM) is always achieved.

Constituent	Concentration (µg/m^3)			Compliance factor
	Concentration (at road edge)	Background	Intervention level	
Nitrogen dioxide (NO_2)	189	0.18	270	70%
Carbon monoxide (CO)	826	2000	38400	7%
PM_{10}	4.9	20	60	42%
$PM_{2.5}$	3.7	10	36	38%
Benzene	2.1	5	75	9%
Toluene	2.9	50	1880	3%
Formeldehyde	0.6	0.1	16	5%
PAHs	0.0007	0.002	0.5	1%
1,3 butadiene	0.23	1	110	1%
Xylenes	1.9	40	2080	2%

The total amount of pollutants released into the atmosphere is a measure of the potential impact on a regional basis. This is simply due to the ability of the atmosphere to mix the pollutants and distribute these widely as they become mixed with the rest of the pollutants from the region. If we assume the same vehicle numbers, heavy vehicle mix and travel speed across each option segment, the metric used is simply the Vehicle Kilometres Travelled (VKT). This is, in turn, a direct measure of the total length of each option segment. A difference of as little as 100 m between options was considered significant enough to afford the shorter option an improved impact over other options.

In the case of the Project bypass of Great Western in Section 3, traffic will no longer need to slow down to a town speed limit, with possibly breaking and even stopping due to traffic congestion/turning vehicles, and then accelerate back up to open highway speeds. A difference of as little as 100 m between options was considered significant enough to afford the shorter option an improved impact over other options. Where the option was found to be the shortest and also bypassed large areas of housing, further improved impacts were noted (e.g. option 2D).

1.3 Reference Information

The various options assessed were provided on the alignment options maps:

- 3127558_S3_002_House_Locations_A3L_MB.pdf

GIS mapping was used to identify the number of sensitive receptors (housing) within 15 m, 80 m, 100 m and 200 m for each option.

Traffic counts were provided inclusive of percentage of heavy vehicles (see Table 3.2.2 Western Highway Growth Traffic Growth Rate Predictions (1999 – 2025) in CPG Report 10430 – Western Highway Traffic Analysis Report (12 August 2009).

Vehicle emission factors were supplied, interpolated to year 2016, by EPA Victoria for PeninsulaLink and WestLink air quality assessments.

Appendix O

Noise & Vibration Options Assessment

Western Highway Project

Appendix O - Noise Options Assessment Methodology

The methodology for the Noise options assessment is also discussed in Section 3 of the report.

For each of the three zones between Ararat and Stawell, an operational criterion was considered for each of the proposed options, and also, the option of "no build". This criterion and its associated methodology was:

- **Criterion:** Distances from dwellings and other sensitive receptors (e.g. schools) to road corridor for each option with regard to operational noise. Construction noise has not been assessed as all works are expected to be carried out during the daytime and there is currently no noise policy available for daytime construction works**.**
- **Methodology:** Determine the number of sensitive receptors (eg. dwellings or schools) within 0-15 m; 15-50 m, 50-120 m and 120-200 m of the road. Weight the closest band 9 times and the next band 6 times, the third band 3 times and the outermost band once (giving weightings of 9, 6, 3 and 1 times). Carry out the same weighting process to the existing highway (no build situation) and compare to each of the options at each zone. A summation of the above allows a differentiation of the options with the higher number giving worsening impacts. Relative ratings of each option were based on a comparison to the existing highway (no build) scenario. Weighting sensitivity testing found no change to the relative rankings for each zone.

This was the only evaluation criterion used during this early phase of the Project. It is expected that once a preferred option and further cut and fill and design work has been carried out an assessment of noise levels using topography as an evaluation criterion will be carried out.

Criterion	Criterion Weighting	Reason For Weighting
Distances from dwellings and other sensitive receptors (e.g. schools) to road corridor for each option with regard to operational noise. Construction noise has not been assessed all works are expected to be carried out during the daytime and there is currently no noise policy available for daytime construction works.	1.0	This is the only criterion assessed.
Total Weighting	**1**	

Each option of the Project was then given a rating and this rating was then scored and the weighting above used to determine a ranking for each option.

A secondary "rating" was also carried out to acknowledge options where the VicRoads Road Traffic Policy 2005 would apply. Where the policy would not apply the rating given was "Negligible", indicating a minimal disbenefit. However, where the policy would apply the rating given was "Low", as it is expected some form of noise mitigation would be required in these areas.

1.1 Construction

In the construction phase, noise impacts are to be controlled by the site contractor through the use of time management and silencing techniques, while in the operational phase noise impacts can be minimised at the road design stage and through vehicle engine and tyre technologies. Generally, for both

the construction and operational phases the risk of a noise impact decreases with increasing distance from the source. For this options assessment, construction noise will not be considered as construction is expected to be carried out during the daytime and there is currently no policy that applies to daytime construction noise.

1.2 Operation

For operational noise the number of sensitive receptors (eg. dwellings or schools) within close proximity to the Project provides an indicator (metric) by which to assess the relative impact of each option compared to the existing highway. An outer most reference distance of 200 m was used in this assessment as at this distance noise effects would be relatively minor. Dwelling distances were separated into zones and a weighting factor was applied to rank the dwellings that were closer to the road with a higher risk of exposure to operational road traffic noise.

The weighting of the closest band (inside 15 m) was 9 times the 200 m band and the next band 6 times, the third band 3 times and the outermost band one times (giving weightings of 9, 6, 3 and 1 times). The same process was carried out to the existing highway (no build situation) and then this was compared to each of the options within each zone. A summation of the above allows a differentiation of the options with the higher number giving worsening impacts.

Fieldwork to enable measurement of existing noise levels along the relevant section of the highway and also at amenity sites was carried out in order to calibrate the sound model for the selected options impact assessment and also as a guide to existing noise levels relative to the VicRoads Road Traffic Policy 2005, please refer to the GHD reports "Report for Western Highway Duplication EES - Section 2 (Beaufort to Ararat) Existing Conditions Assessment - Noise, 2011" and "Report for Western Highway Duplication EES - Section 3 (Ararat to Stawell) Existing Conditions Assessment - Noise, 2011" for more detail.

1.3 Reference Information

- Environment Protection Authority (EPA). (1996, February). *Environmental Guidelines For Major Construction Sites.* Retrieved July 29, 2011, from EPA Victoria: https://epanote2.epa.vic.gov.au/EPA/Publications.nsf/PubDocsLU/480?OpenDocument
- Environmental Protection Authority (EPA). (2008). *Noise Control Guidelines - Publication 1254.* Melbourne: Environmental Protection Authority (EPA).
- VicRoads. (2005). *Interpretation and Application of VicRoads Traffic Noise Reduction Policy.* Melbourne: VicRoads.
- VicRoads. (2005, January 04). *Traffic Noise Measurment Requirements For Acoustic Consultants.* VicRoads.
- VicRoads. (2005, January 04). *Vic Roads - Traffic Noise Reduction Policy.* VicRoads.
- VicRoads. (2007, January 04). *VicRoads Technical Guidelines - Noise Guidelines – Construction and Maintenance Works.* VicRoads.

- GIS mapping was used to identify the number of sensitive receptors (housing) within 15 m, 50 m, 120 m and 200 m for each option.
- Weightings of the various options based on distances

Western Highway Project

Noise Options Assessment

SECTION 3

Evaluation objectives:	To avoid or minimise disruption and other adverse effects on infrastructure, land use (including agriculture and residential) and households, as well as road users during construction and/or resulting from the highway alignment. To avoid or minimise noise, landscape, visual and other adverse amenity effects on the environment and local residents during the construction and operation of the proposed duplicated highway to the maximum extent practicable.

Evaluation Criteria	Methodology	Zone	Option	Rating	Reason for Ratings	Rating based on Policy
Distances from dwellings and other sensitive receptors (e.g. schools) to road corridor for each option with regard to operational noise. Construction noise has not been assessed all works are expected to be carried out during the daytime and there is currently no noise policy available for daytime construction works.	Determine the number of sensitive receptors (dwellings) within 0-15 m; 15-50 m, 50-120 m and 120-200 m of the road. Weight the closest band 9 times and the next band 6 times, the third band 3 times and the outermost band once. (giving weightings of 9, 6, 3 and 1 times). Carry out the same weighting process to the existing highway (no build situation) and compare to each of the options at each zone. A summation of the above allows a differentiation of the options with the higher number giving worsening impacts. The median value was 26. Relative ratings of each option were based on a comparison to the existing highway (no build) scenario. Weighting sensitivity testing found no change to the relative rankings for each zone. Fieldwork to enable measurement of existing noise levels along the relevant section of the highway and also at amenity sites were carried out in order to calibrate the sound model for the selected options impact assessment and also as a guide to existing noise levels relative to the VicRoads Road Traffic Policy 2005, please refer to the GHD report "Report for Western Highway Duplication EES - Section 3 (Ararat to Stawell) Existing Conditions Assessment - Noise, 2011" for more detail.	1	1A*	LOW	Option metric equals 41 and the existing highway metric equals 23. Two residences inside 50 m, eight residences inside 120 m and five residences inside 200 m from option. This option will move traffic closer to some houses bringing two inside 50 m compared to the existing which has five residences inside 120 m and eight inside 200 m but none inside 50 m. POLICY DOES NOT APPLY (Current understanding is that if the option lies within the road corridor or only has one out of two lanes lying outside the existing road corridor then the VicRoads policy does not apply. However if both lanes are outside the existing corridor then the duplication is classified as a new alignment and hence the policy applies).	NEGLIGIBLE
			1C *	PARTIAL	Option metric equals 14 and the existing highway metric equals 23. Three residences inside 120 m and five residences inside 200 m from option. This option will move all the traffic further east compared to the existing reducing traffic noise for the majority of dwellings. Policy Applies (62 @ <50 dB(A) L10 (18hr), 63 @ 50-63 dB(A) L10 (18hr), 65@>63 dB(A) L10 (18hr). High impact on small number of individuals at dwellings 91 and 92	LOW
			1E *	LOW	Option metric equals 39 and the existing highway metric equals 23. One residence inside 50 m, nine residences inside 120 m and six residences inside 200 m from option. This option will move traffic closer to some houses bringing one inside 50 m compared to the existing which has five residences inside 120 m and eight inside 200 m but none inside 50 m. Policy Applies (62 @ <50 dB(A) L10 (18hr), 63 @ 50-63 dB(A) L10 (18hr), 65@>63 dB(A) L10 (18hr). High impact on small number of individuals at dwellings 91 and 92	LOW
		2	2B*	PARTIAL	Option metric equals 25 and the existing highway metric equals 331. Two residences inside 50 m, two residences inside 120 m and seven residences inside 200 m from option. Dwelling ID 108 will need to be acquired for the alignment and so has been disregarded in the assessment. This option will move all the traffic further east compared to the existing highway reducing traffic noise for the majority of dwellings but causing an amenity issue at the group of dwellings adjacent dwelling ID 122. Policy Applies (62 @ <50 dB(A) L10 (18hr), 63 @ 50-63 dB(A) L10 (18hr), 65@>63 dB(A) L10 (18hr).	LOW
			2C*	PARTIAL	Option metric equals 21 and the existing highway metric equals 331. One residence inside 50 m, three residences inside 120 m and six residences inside 200 m from option. Dwelling ID 108 will need to be acquired for the alignment and so has been disregarded in the assessment. This option will move all the traffic further east compared to the existing highway reducing traffic noise for the majority of dwellings but causing an amenity issue at the group of dwellings adjacent dwelling ID 122. Policy Applies (62 @ <50 dB(A) L10 (18hr), 63 @ 50-63 dB(A) L10 (18hr), 65@>63 dB(A) L10 (18hr).	LOW
			2D*	PARTIAL	Option metric equals 32 and the existing highway metric equals 331. Two residences inside 50 m, five residences inside 120 m and five residences inside 200 m from option. Dwelling ID 148 will need to be acquired for the alignment and so has been disregarded in the assessment (also it looks like a farm yard). This option will move all the traffic further west compared to the existing highway reducing traffic noise for the majority of dwellings but causing an amenity issue at the group of dwellings in the southern section. Policy Applies (62 @ <50 dB(A) L10 (18hr), 63 @ 50-63 dB(A) L10 (18hr), 65@>63 dB(A) L10 (18hr).	LOW
			2E*	PARTIAL	Option metric equals 26 and the existing highway metric equals 331. One residence inside 50 m, five residences inside 120 m and five residences inside 200 m from option. Dwelling ID 148 will need to be acquired for the alignment and so has been disregarded in the assessment (also it looks like a farm yard). This option will move all the traffic further west compared to the existing highway reducing traffic noise for the majority of dwellings but causing an amenity issue at the group of dwellings in the southern section. Policy Applies (62 @ <50 dB(A) L10 (18hr), 63 @ 50-63 dB(A) L10 (18hr), 65@>63 dB(A) L10 (18hr).	LOW
		3	3A*	LOW	Option metric equals 36 and the existing highway metric equals 18. Nine residences inside 120 m and nine residences inside 200 m from option. The southern half of this option will move half the traffic southwest compared to the existing highway increasing the number of houses inside 120 m from three along the existing highway to nine for this option. POLICY DOES NOT APPLY (Current understanding is that if the option lies within the road corridor or only has one out of two lanes lying outside the existing road corridor then the VicRoads policy does not apply. However if both lanes are outside the existing corridor then the duplication is classified as a new alignment and hence the policy applies).	NEGLIGIBLE
			3B*	LOW	Option metric equals 38 and the existing highway metric equals 18. Nine residences inside 120 m and eleven residences inside 200 m from option. The southern half of this option will move half the traffic east compared to the existing highway increasing the number of houses inside 120 m from three along the existing highway to nine for this option and the number of residence inside 200 m from nine along the existing highway to 11 for this option. POLICY DOES NOT APPLY (Current understanding is that if the option lies within the road corridor or only has one out of two lanes lying outside the existing road corridor then the VicRoads policy does not apply. However if both lanes are outside the existing corridor then the duplication is classified as a new alignment and hence the policy applies).	NEGLIGIBLE
			3C*	LOW	Option metric equals 27 and the existing highway metric equals 18. Six residences inside 120 m and nine residences inside 200 m from option. The southern half of this option will move all the traffic southwest compared to the existing highway increasing the number of houses inside 120 m from three along the existing highway to six for this option. Policy Applies (62 @ <50 dB(A) L10 (18hr), 63 @ 50-63 dB(A) L10 (18hr), 65@>63 dB(A) L10 (18hr).	LOW
			3AD	PARTIAL	Option metric equals 15 and the existing highway metric equals 18. One residence inside 50 m, two residences inside 120 m and three residences inside 200 m from option. This option will move all the traffic further west compared to the existing reducing traffic noise for the majority of dwellings. Policy Applies (62 @ <50 dB(A) L10 (18hr), 63 @ 50-63 dB(A) L10 (18hr), 65@>63 dB(A) L10 (18hr).	LOW
			3DC	PARTIAL	Option metric equals 11 and the existing highway metric equals 18. One residence inside 50 m, one residence inside 120 m and two residences inside 200 m from option. This option will move all the traffic further west compared to the existing reducing traffic noise for the majority of dwellings. Policy Applies (62 @ <50 dB(A) L10 (18hr), 63 @ 50-63 dB(A) L10 (18hr), 65@>63 dB(A) L10 (18hr).	LOW

	Overall weighting	Notes:
S3_Z1	23	Option 2B house ID 108 has been removed due to its probable acquisition.
1A	41	Option 2C house ID 108 has been removed due to its probable acquisition.
1C	14	Option 2D house ID 148 has been removed due to its probable acquisition (and looks like a farm shed).
1E	39	Option 2E house ID 148 has been removed due to its probable acquisition (and looks like a farm shed).
S3_Z2	331	
2B	25	
2C	21	
2D	32	
2E	26	
S3_Z3	18	
3A	36	
3B	38	
3C	27	
3DC	11	
3AD	15	
min	11	
max	331	
mean	46	
median	26	
mode	#N/A	
	ALL DIFFERENT	

lower than existing = Partial
Same than existing = Negligible
Higher than existing = Low

	Overall weighting
S3_Z1	23
1A	41
1C	14
1E	39
S3_Z2	331
2B	25
2C	21
2D	32
2E	26
S3_Z3	18
3A	36
3B	38
3C	27
3DC	11
3AD	15
min	11
max	331
mean	46
median	26
mode	All Different

Appendix P

Surface Water Options Assessment

Western Highway Project

Appendix P – Surface Water Options Assessment

All of the alignment options involved the crossing of waterways as they are located in the upstream end of waterway catchments. The key assumptions for this assessment include:

- The highway will include some form of waterway crossing at each identified waterway (ie. culvert, pipe, bridge). The nature of the crossing is not yet identified but is expected to be similar to existing highway crossings.
- The potential for impact was assessed, not taking into account some likely waterway protection measures that are expected for a project of this nature. Some of the identified impacts could be reduced with appropriate mitigation.
- Due to limited details of flood modelling methodology, there is still some uncertainty whether water courses not identified as flooding in the 100 year event can be ruled out of having flood impact.
- Detailed assessment of flora and fauna impacts associated with waterways has not been undertaken for the surface water options assessment. However, knowledge of the presence of protected species in waterways, as well as the fauna abundance and diversity, have been taken into account along with information about vegetation extent and diversity of stream form, purely as in indication of the habitat value of waterways. Impacts on waterways with good habitat quality as judged from this information were more likely to be considered significant, compared with impacts on similar waterways with low habitat quality.

A desktop assessment was undertaken using information from the ecological surveys undertaken by Ecology and Heritage Partners and flood mapping prepared by Bonacci Water.

1.1 Reference Information

Legislation, Policies and Guidelines referred to in understanding waterway significance and River Health:

- *Environmental Protection Act 1970;*
- State Environment Protection Policy (Waters of Victoria);
- *Catchment and Land Protection Act 1994;*
- *Water Act 1989;*
- Local Planning Policy (Pyrenees Shire Council, Greater Ararat Shire Council, Shire of Northern Grampians); and
- Wimmera and Glenelg Hopkins River Health Strategies.

Specific information used in the impact assessment:

- VicMap Planning Zones and Water Course maps;
- Aerial image;
- The proposed alignments; and
- Bonacci 2011, VicRoads Western Highway Duplication, Projects 320 1203 and 320 1204: Phase A – Preliminary Data analysis and requirements for additional data.

Western Highway Project

Surface Water Options Assessment

SECTION 3

Evaluation objectives:	To protect catchment values, surface water and groundwater quality, stream flows and floodway capacity, as well as to avoid impacts on protected beneficial uses.				
Evaluation Criteria	**Methodology**	**Zone**	**Option**	**Rating**	**Reason for Ratings**
• Potential impact to waterway value taking into account the following: – Beneficial uses of the waterway , - No. of waterway crossings and effective footprint area of waterway affected – Status of river health of the catchment system (including downstream receiving waterway) – Status of river health (local scale eg. Bank condition, instream features)	Count the number of crossings and measure the existing width of the river crossing at the proposed location using ArcGIS aerial image Assess using aeria image from ArcGIS and any available imae from Google street view - looking for bank vegetation, pools, other features	1	1A*	NEGLIGIBLE	4 moderate crossings of Concongella Creek (low-medium habitat quality) and tributaries, 15 minor drainage line crossings
			1C *	LOW	1 moderate crossing of skewed confluence of 3 tributaries, 2 skewed and 1 straight moderate crossings of Concongella Creek (low-medium habitat quality), 9 minor drainage line crossings.
			1E *	NEGLIGIBLE	2 moderate crossings of Concongella Creek (low-medium habitat quality) and tributaries, 15 minor drainage line crossings
		2	2B*	MODERATELY POOR	4 moderate crossings of Concongella Creek (2) (low-medium habitat quality), Donald Creek (low habitat quality) and Cobey's Creek (low habitat quality). 2 minor drainage line crossings, 1 skewed crossing of Allenvale Creek with potential waterway health impacts. Interchange over two moderate crossings (low habitat quality) causing significant disbenefit.
			2C*	MODERATELY POOR	5 moderate crossings of Concongella Creek (2) (low-medium habitat quality), Donald Creek (low habitat quality), Robinson's Creek and Allenvale Creek. 1 skewed moderate crossing of drainage line. Possible diversions needed to Concongella Creek, Robinson's Creek and Donald Creek. Interchange over two moderate crossings (low habitat quality) causing significant disbenefit.
			2D*	MODERATELY POOR	3 moderate crossings of Donald Creek (low habitat quality), confluence of Robinson and Cobeys Creeks (may need diversion), and Hyde Park Creek (under road interchange, may need diversion). 5 minor drainage line crossings.
			2E*	NEGLIGIBLE	2 moderate crossings of Robinsons Creek and Cobey's Creek, 5 minor drainage line crossings
		3	3A*	MODERATELY POOR	6 moderate crossings including Pleasant Creek (low habitat quality), and Cobey's Creek, Robinson Creek and Donald Creek (all low habitat quality) are beneath an interchange resulting in significant disbenefit. Also 7 minor crossings.
			3B*	MODERATELY POOR	5 moderate crossings including Pleasant Creek (low habitat quality), and Robinson Creek and Donald Creek (both low habitat quality) are beneath an interchange resulting in significant disbenefit. 9 minor crossings.
			3C*	MODERATELY POOR	1 Moderate Crossing of Pleasant Creek (low habitat quality), 6 minor crossings, runs along course of minor drainage line for 1650 m and Donald Creek for 700 m - may need diversions.
			3AD	MODERATELY POOR	1 moderate crossing of Pleasant Creek (low habitat quality), 10 minor crossings, Cobey's Creek, Robinson Creek and Donald Creek (all low habitat quality) are beneath an interchange resulting in significant disbenefit.
			3DC	MODERATELY POOR	1 moderate crossing of Pleasant Creek (low habitat quality), 11 minor crossings, runs along Donald Creek for 700 m - may need diversion
• Potential to increase flooding risk taking into account the following: – No. of waterway crossings – Effective width of floodplain (measured by 100 year flood extent) – Complexity of floodplain interactions	Measure the ~~Bonacci~~ existing flood extent where it crosses the proposed alignment from the Bonacci Water Modelling results	1	1A*	LOW	only 50 m of flood extent crossed, potential local impacts from 19 crossings, possible impacts to small number of houses
			1C *	LOW	only 50 m of flood extent crossed, potential local impacts from 13 crossings, possible impacts to small number of houses
			1E *	LOW	no modelled flood impacts, potential local impacts from 15 crossings, possible impacts to small number of houses
		2	2B*	NEGLIGIBLE	crosses 2200 m of flood extent, including substantial area under road interchanges
			2C*	NEGLIGIBLE	crosses 1500 m of flood extent including substantial area under 2 road interchanges
			2D*	LOW	crosss 1050 m of flood extent, possible local impacts from 4 crossings, 2 houses at risk
			2E*	LOW	crosss 630 m of flood extent, possible local impacts from 4 crossings, 2 houses at risk
		3	3A*	NEGLIGIBLE	Crosses 700 m of flood extent, negligible local impacts
			3B*	NEGLIGIBLE	Crosses 600 m of flood extent, negligible local impacts
			3C*	LOW	crosses 1900 m of flood extent, small number of houses at risk.
			3AD	NEGLIGIBLE	crosses 1300 m of flood extent, possible additional local impacts
			3DC	NEGLIGIBLE	crosses 1300 m of flood extent, possible additional local impacts

Appendix Q

Groundwater Options Assessment

Western Highway Project

Appendix Q – Groundwater Options Assessment

The methodology for the Groundwater options assessment is also discussed in Section 3 of the report.

To complete the options assessment the following tasks were undertaken:

- Review option grade-lines;
- Review of data collected and collated as part of the existing conditions report; and
- Inspection of geoQogy, aerial photography (arcview spatial data).

Focus was placed on those areas which were below grade and therefore had potential to interact with the groundwater system. Whilst areas above grade can result in impacts to groundwater, these can generally be mitigated using a number of engineering design and construction techniques and are therefore considered a lower risk. Areas above grade, or shallow cuts (generally less than 4 m) were considered to have negligible impacts.

1.1 Reference Information

- Design option grade lines (cut and fill areas);
- Road cross section design plants (footprint);
- Existing conditions report (Groundwater);
- Victorian Groundwater Beneficial Use map Series: South Western Victoria Water Table Aquifers; and,
- Spatial information from ArcReader Database developed by GHD for the project.

Western Highway Project

Groundwater Options Assessment

SECTION 3

Evaluation objectives:	To protect catchment values, surface water and groundwater quality, stream flows and floodway capacity, as well as to avoid impacts on protected beneficial uses.				
Evaluation Criteria	**Methodology**	**Zone**	**Option**	**Rating**	**Reason for Ratings**
• Extent of potential impacts (decline/deterioration) to groundwater quality and implications for beneficial uses.	Local groundwater depth information is poorly understood. Site specific groundwater information (e.g. from geotechnical investigations) may shift risk rating from LOW to NEGLIGIBLE.	1	1A*	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap
			1C *	LOW	Cuts to 6m, potential to interact with water table. Estimated more areas of cut than Option 1A. Water level information acknowledged data gap
			1E *	LOW	Cuts to 6m, potential to interact with water table. Estimated more areas of cut and deeper cuts than Option 1A. From this perspective it possibly makes this the least favourable option of the three in terms of likelihood of impacts to groundwaterWater level information acknowledged data gap
		2	2B*	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap
			2C*	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap. Marginally worse than Option 2B given slightly longer area requiring cut. Noted granitic geology (generally low groundwater flows)
			2D*	NEGLIGIBLE	Shallow areas of cut - low risk of groundwater interaction.
			2E*	NEGLIGIBLE	Shallow areas of cut - low risk of groundwater interaction.
		3	3A*	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap
			3B*	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap
			3C*	LOW	Shallow areas of cut - low risk of groundwater interaction
			3AD	LOW	Cuts to 8m, potential to interact with water table. Deepest cut of the alignment options in this zone which therefore makes it potentially the least favourable owing to the higher likelihood of groundwater interaction. Water level information acknowledged data gap
			3DC	LOW	Shallow areas of cut - low risk of groundwater interaction
• Extent of disruption of groundwater flow (recharge, discharge) i.e. flow paths, availability (for users, environment). Potential for alteration of groundwater levels.	Local groundwater depth information is poorly understood. Site specific groundwater information (e.g. from geotechnical investigations) may shift risk rating from LOW to NEGLIGIBLE.	1	1A*	LOW	Shallow areas of cut - low risk of groundwater interaction
			1C *	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap
			1E *	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap
		2	2B*	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap
			2C*	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap. Marginally worse than Option 2B given slightly longer area requiring cut. Noted granitic geology (generally low groundwater flows)
			2D*	NEGLIGIBLE	Shallow areas of cut - low risk of groundwater interaction
			2E*	NEGLIGIBLE	Shallow areas of cut - low risk of groundwater interaction.
		3	3A*	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap
			3B*	LOW	Cuts to 6m, potential to interact with water table. Water level information acknowledged data gap
			3C*	LOW	Shallow areas of cut - low risk of groundwater interaction
			3AD	LOW	Cuts to 8m, potential to interact with water table. Deepest cut of the alignment options in this zone which therefore makes it potentially the least favourable owing to the higher likelihood of groundwater interaction. Water level information acknowledged data gap
			3DC	LOW	Shallow areas of cut - low risk of groundwater interaction

Appendix R

Soils & Geology Options Assessment

Western Highway Project

Appendix R – Soils and Geology Options Assessment

The methodology for the Soils and Geology options assessment is also discussed in Section 3 of the report.

A desktop review was undertaken to assess the existing soil and geological conditions within the study area for Section 3 of the Western Highway Project (Ararat to Stawell).

The scope of work for the assessment of the existing conditions in relation to soils and geology included a review of available information to assess the scoping requirements, which comprised the following tasks:

- A review of historical aerial photographs of the study area, where available, to assist in establishing the physical patterns of development over time;
- A review of publicly available literature and geotechnical information relevant to the study area;
- Sourcing and collating relevant available borehole, test pit and other geotechnical data;
- Interpretation of the available information;
- Development of a preliminary geological and geotechnical model of the study area; and
- A preliminary coastal acid sulfate soil (CASS) hazard assessment.

A review of historic title deeds was planned to look at the history of ownership and historical land users of properties within the study area, however due to the lack of potential areas of concern identified in the historical aerial photograph review, this was not undertaken.

The existing information was used to assess the alignment options against the following criteria:

- Extent of impact of gross contamination from historic land use (including historic landfills), and potential cost of works
- Extent of exposure to watercourse embankments and river beds (potential triggers for erosion/instability criteria)
- Extent of potential impact of poor soils and / or topographic location on road construction or operation activities (unstable, low strength subgrades, wet or poor draining areas)

1.1 Reference Information

Sources of available geological and geotechnical information used as the basis for the assessment of the soils and geological environment included the following:

- Birch (eds.) (2003) Geology of Victoria, Geological Society of Australia;
- Department of Primary Industries (DPI), Minerals and Petroleum Division, Explore Victoria Online – GeoVic web mapping application;
- Department of Sustainability and Environment (DSE), Aerial Photography Register;
- Douglas, Ferguson (eds.) (1988) Geology of Victoria, Geological Society of Australia;

- Geological Exploration & Development Information System (GEDIS) database;
- Geological Survey of Victoria; Geological Map Series Ballarat, 1:250 000;
- Golder Associates Former Great Western Landfill – Management of Environmental Risks Related to Road Construction (Western Highway Duplication (2011) (report);
- King (1986) Ballarat 1:250 000 Geological Map Explanatory Notes;
- VicRoads Western Highway Project Bypass of Great Western Geotechnical Assessment of Sand/Gravel Pits (2010) (report);
- CSIRO Australian Soil Resource Information (ASRIS); and
- Department of Primary Industries (DPI) Map 1, Far South West Coast.

Western Highway Project

Soils and Geology Options Assessment

SECTION 3

Evaluation objectives:	To protect catchment values, surface water and groundwater quality, stream flows and floodway capacity, as well as to avoid impacts on protected beneficial uses.				
Evaluation Criteria	Methodology	Zone	Option	Rating	Reason for Ratings
Impact of gross contamination from historic land use, and potential cost of works.	Review of historic aerial photographs	1	1A*	LOW	Alignment intersects with rail line approximately 800m south of the intersection of Kimburra road and the Western Hwy which may initiate contamination concerns.
			1C *	LOW	Alignment intersects with rail line approximately 3km north of the township of Ararat and again approximately 800m south of the intersection of Kimburra road and the Western Hwy which may initiate contamination concerns.
			1E *	LOW	Alignment intersects and runs parrallel (in close proximity) with rail line which may initiate contamination concerns.
		2	2B*	LOW	Alignment intersects the edge of the old Great Western landfill located on the eastern side of the junction of Sandy Creek Road and Great Western-Bulgana Road which will likely initiate contamination concerns. Alignment also intersects potential sheep shearing shed approximately 200m north west of Delahoys Road which may initiate contamination concerns.
			2C*	LOW	Alignment intersects potential sheep shearing shed approximately 700m south east of Delahoys Road which may initiate contamination concerns. Route also intersects farm shed with potential above ground storage tanks approximately 200m west of Sandy Creek Road may initiate contamination concerns.
			2D*	LOW	Route intersects farm shed with potential above ground storage tanks approximately 250m east of Garden Gully Road and potential sheep shearing shed at the intersection of St Ethels Rd and Roxborough Rd which may initiate contamination concerns. Route also intersects farm shed with potential above ground storage tanks approximately 250m east of Garden Gully Road and the runs parrallel (in close proximity) with rail line which may initiate contamination concerns.
			2E*	LOW	Route intersects potential sheep shearing sheds approximately 100m west of St George Rd and and at the intersection of St Ethels Rd and Roxborough Rd which may initiate contamination concerns. Alignment intersects and also runs parrallel (in close proximity) with rail line which may initiate contamination concerns.
		3	3A*	LOW	Alignment intersects rail line at Harvey Lane which may initiate contamination concerns. Route also intersects farm shed with potential above ground storage tanks at Monaghan Road.
			3B*	LOW	Alignment intersects rail line at Harvey Lane which may initiate contamination concerns. Route also intersects farm shed with potential above ground storage tanks at Monaghan Road.
			3C*	LOW	Alignment intersects and runs parrallel (in close proximity) with rail line which may initiate contamination concerns. Route also intersects farm shed with potential above ground storage tanks at Monaghan Road.
			3AD	LOW	Alignment intersects rail line at Harvey Lane which may initiate contamination concerns.
			3DC	LOW	Alignment intersects potential sheep shearing shed approximately 400m south west of Robson Road which may initiate contamination concerns.
Avoid or minimise exposure to watercourse embankments and river beds (potential triggers for erosion/instability criteria).	Review of regional and site-specific geology and aerial photography	1	1A*	LOW	Alignment crosses drainage lines in 19 instances predominantly at an inclined angle.
			1C *	MODERATELY POOR	Alignment crosses drainage lines in 12 instances, and is coincident with one drainage line for a length of about 400m. Alignment also intersect two significant farm dams.
			1E *	NEGLIGIBLE	Alignment crosses drainage lines in 3 instances predominantly at a right angle.
		2	2B*	LOW	Alignment crosses Allenvale Creek at near right angle, and is coincident with a drainage line for a length of 450m.
			2C*	NEGLIGIBLE	Alignment crosses drainage lines in 5 instances predominantly at a near right angle (alignment crosses one drainage line at inclined angle).
			2D*	LOW	Alignment crosses drainage lines in 6 instances predominantly at a near right angle. Alignment crosses Hyde Park creek at an inclined angle.
			2E*	LOW	Alignment crosses drainage lines in 5 instances predominantly at a near right angle. Alignment crosses Hyde Park creek at an inclined angle.
		3	3A*	LOW	Alignment crosses drainage lines in 4 instances as well as one minor farm dam.
			3B*	NEGLIGIBLE	Alignment crosses drainage lines in 5 instances predominantly at a near right angle (alignment crosses one drainage line at inclined angle).
			3C*	MODERATELY POOR	Alignment crosses drainage lines in 6 instances, a large number of which are coincident with alignment over a length of some 800m. Alignment intersect one significant farm dam.
			3AD	MODERATELY POOR	Alignment intersects 10 drainage lines, including Pleasant Creek, at right to highly inclined angles. Alignment traverses 3 small farm dams.
			3DC	MODERATELY POOR	Alignment intersects 8 drainage lines, including Pleasant Creek, at right to highly inclined angles. Alignment traverses 3 small farm dams.
Potential impact of poor soils and / or topographic location on road construction or operation activities (unstable, low strength subgrades, wet or poor draining areas).	Review of regional and site-specific geology and aerial photography, complimented with drive through field mapping	1	1A*	LOW	Minor slumping is noted in cut exposures. Rill erosion evident within the length of this alignment. Potentially dispersive materials.
			1C *	MODERATELY POOR	Alignment intersects railway crossing at relatively flat terrain requiring significant earthworks to achieve grade separation. Intersects two significant farm dams requiring rehabilitation works.
			1E *	LOW	Minor slumping is note in cut exposures. Rill erosion evident within the length of this alignment. Potentially dispersive materials.
		2	2B*	LOW	Alignment intersects the edge of the old landfill and goes through the quarry. Expect good quality subgrade over quarry and conversely poor subgrade conditions across landfill site.
			2C*	NEGLIGIBLE	Anticipate a mix of alluvials over granite.
			2D*	LOW	Anticiapte marshy conditions in instances. Presence of minor granitic boulders as obstruction to construction. Evidence of piping within fill embankments.
			2E*	LOW	Anticiapte marshy conditions in instances. Presence of minor granitic boulders as obstruction to construction. Evidence of piping within fill embankments.
		3	3A*	NEGLIGIBLE	Expect poor traffficability under wet conditions. Relatively flat terrain.
			3B*	NEGLIGIBLE	Relatively flat terrain and limited impact on construction or operation activities.
			3C*	MODERATELY POOR	Alignment is coincident with drainage line for significant portion and anticipate poor / wet subgrade conditions. Large granitic boulders at surface as significant obstruciton to construction. Evidence of piping channels and materials of significant erosion potential. Poor drainage conditions at times (instances of surface water ponding). Intersects farm dam.
			3AD	MODERATELY POOR	Alignment extensively intersects sequences of Tertiary and Quaternary age alluvial deposits which may impact on ground stability and strength. A high number of drainage line crossings exposes the alignment to more potential stability and construction issues. Alignment intersects rail line which may require additional earthworks and embankment construction.
			3DC	MODERATELY POOR	Alignment extensively intersects sequences of Tertiary and Quaternary age alluvial deposits which may impact on ground stability and strength. A high number of drainage line crossings exposes the alignment to more potential stability and construction issues.

Appendix S

TRG Comments and Responses

Comments from DPCD on the Western Highway Duplication EES and PSA Working Papers on Generation and Selection of Shortlisted Options for Sections 2 and 3
June 2011

Section	DPCD Comments	GHD response
Both Sections 2 & 3:		
General Comments	• It was apparent during the EES team presentation at the TRG meeting that there are inconsistencies between this report and the content of the PowerPoint document. The report should be revised to reflect the discussion at the TRG meeting, including the more detailed evaluation criteria discussed at the meeting.	Agreed. Working papers for each of Sections 2 and 3 have been revised (refer Working Paper on Generation and Selection of Shortlisted Options, July 2011). We did develop more detailed evaluation criteria relating to each objective and use them in the workshop. However, we did not include them in the draft working paper to avoid confusion in having a large number of evaluation criteria for a large number of options.
	• There seems to be an assumption in the document that one option will be clearly superior to all others and there is no need to put forward two or more that could satisfactorily meet the project objectives, albeit with slightly different benefits/impacts. There is some risk in making this assumption and taking this approach through the entire EES process.	No such assumption has been made. To avoid any presumption that this is the case and to provide an alternative alignment option for every part of the project, two alignment options have been re-introduced as shortlisted options in parts of each of Sections 2 and 3 where only one alignment previously existed (option 4D entering Ararat for Section 2 and option 3D3C entering Stawell for Section 3).
	• The project objectives are different (in number and some in content) from those in the draft scoping requirements and the study scope and methodologies report – it is not clear why this is this case…	VicRoads issued revised project objectives at the TRG meeting on 12th July 2011.
	• Further to this, the project related evaluation objectives used in the report (1 to 6 and 13 to 15 in tables 1 to 10) (i.e. those non-environmental objectives) should be reviewed, with the view to reducing the duplication. This will also be necessary to avoid	Project objectives have been revised, as recommended by DPCD and DSE, in the amended working papers for Sections 2 and 3 respectively. We have assessed the options using the revised objectives as a 'sensitivity test' of the shortlisting carried out at the workshop. Whilst the numerical scores for

potential 'double-counting' in the calculations within table 12, potentially affecting the exclusion/inclusion of options. For example – all safety related objectives (2, 3, 4) could be combined into a single objective. Should also consider combining engineering cost related objectives (13, 14, 15). This would result in 5 project related objectives (rather than 9): *1. travel time, 2. safety aspects, 3. high productivity vehicles, 4. complement bypasses, 5. costs* (engineering, construction, environmental offsets/externalities, use of existing assets to minimise costs).	most options changed as a result of this revised assessment, there was no change to the relative ranking of options for either Section 2 or 3 from that emanating from the rapid assessment workshop. The lowest ranked options which are designated for exclusion from more detailed assessment are still the same for each of Sections 2 and 3.
• Should also consider re-instating the 2nd biodiversity related objective or another suitable objective. It is appropriate to have separate consideration of: i) the total areas of native vegetation (EVCs) to be cleared, and ii) the potential impacts on any listed/ protected species and communities (these may sometimes overlap or correlate, but they are different considerations for assessment of environmental impacts).	A second biodiversity objective has been added in the 'sensitivity test' in the revised working papers, as suggested.
• Also, note that numbering for objectives differs from tables 7 -10 to those used in table 12.	The numbering of objectives 16, 17 & 18 in Table 12 of the draft working paper for Section 2 and Table 8 for the draft working paper on Section 3 was an error. These objectives should have been numbered 13, 14 & 15. The objective numbers have been amended in the revised working papers.
• The way in which project-related objectives are addressed for each option is sometimes a little too cursory, and may need to be qualified some more.	Some additional explanation and information on the assessment process has been added in the revised working papers.
• The report would benefit from having a clearer description of the evaluation process used to consider the options (scoring/ratings, specific qualitative criteria, calculations and thresholds used for exclusion).	A clearer description of the evaluation process has been provided in the revised working papers.

	• The report /process also needs an explicit treatment of relevant uncertainties and 'gaps in understanding' – i.e. where and how were these accounted for and/or influence the evaluation process. Given there is limited information about the existing conditions (and therefore impacts) within sections of the project area (particularly for some key aspects, such as aboriginal cultural heritage) it is important that uncertainties stemming from the use of limited data/ desk-top assessments is acknowledged and addressed.	A description of the treatment of uncertainties using the precautionary principle has been provided in the revised working papers.
	• For example, the recent Detailed Flora and Fauna Assessment and Preliminary Net Gain Analysis Report, May 2011 for Section 2 does not seem to have been used to short-listed options. Therefore, you could question the accuracy of the evaluation with regard to the extent of native vegetation loss and impact on native flora and fauna – how have related uncertainties been considered?	Ecology & Heritage Partners participated in the rapid assessment workshop and utilised all information on flora and fauna obtained to that date, which included results of the detailed flora and fauna assessment and preliminary net gain assessment.
	• The report also needs a clearer description of how the key agencies and other stakeholders are involved/ related to the process - the flow-chart in the original GHD presentation at the first TRG meeting indicated a relationship or interface between the TRG agencies (& wider stakeholders) and the GHD options evaluation process, but it is not clear how this has worked/s in practice – need to appropriately document this in the report. Also, clarify when the options were presented to the stakeholders and whether they were in any way different from those in this report.	A description of the role of the TRG in reviewing shortlisted options has been added in the revised working papers.
	• Need to consider how potential native vegetation offset 'costs' should be considered in the assessment of options for the project cost related objective (14).	Consideration will be given to inclusion of potential native vegetation offset costs in the evaluation criteria to be used in the assessment of shortlisted options.

	• It is not clear why there are limited options to the south of Buangor.	There is only one option to the south of Buangor because of the number of large old trees which would be impacted and the steepening slope further to the west.
Executive Summary	• On page 3, specific dates should be provided for the steps in the options assessment process.	Specific dates have been provided for the steps carried out to date. Specific dates cannot be provided, at this time, for future tasks. .
	• The membership of the "EES project management team" should be identified.	The membership of the EES project management team has been provided in the revised working papers.
Chapter 1	• Section 1.2.1: Need to explain the meaning and relevance of various standards eg HS20 Standard	The meaning and relevance of quoted standards has been provided.
	• Section 1.4: This section should outline the community feedback received and how it influenced the generation or modification of options. There should also be some comment on how the current options compare with the ones previously presented to the community.	Community feedback received on the previous VicRoads' options and how this feedback influenced the selection of shortlisted options has been summarised in the revised working papers.
	• Section 1.5: This section should refer to the Minister's decision to appoint an Inquiry under the EE Act.	The Minister's decision to appoint an Inquiry Panel has been noted in the revised working papers.
	Figure 2: Note that there is an EPBC approval but not a separate assessment. Other key approvals should be acknowledged.	Figure 2 has been amended to refer to the EPBC approval rather than assessment. Other key approvals have also been noted.
Chapter 2	• It is not clear if or how community feedback was considered during the brainstorming workshop.	As stated above, community feedback received on the previous VicRoads' options and how this feedback influenced the development of options and selection of shortlisted options has been summarised in the revised working papers.

	• The term technical specialists should be explained. Does this term apply to road designers or environmental consultants in the context of the options assessment workshop?	The term 'technical specialists' has been defined in the revised working papers.
	• It is not clear how TRG or community feedback is considered in the options assessment process.	How TRG and community feedback has been used in the shortlisting of options and is to be used in the detailed options assessment process has been described in the revised working papers.
	As discussed, the more detailed evaluation criteria should be provided in the report.	The more detailed evaluation criteria utilised in the shortlisting of options have been provided in the revised working papers.
Section 2:	**Tables 7-10** • Clarify or qualify terms like "no known impacts" (e.g. for cultural heritage was this informed by the due diligence report for all options, if not, explain basis).	The term 'no known impacts' has been clarified in the revised working papers.
	• Clarify how "Issues unlikely" for geotechnical objective has been determined, if no preliminary assessment exists, perhaps state so and if not qualify the term.	The term 'issues unlikely' has been clarified in the revised working papers.
	• Objective 9 - There is a lack of clarity around the use of phrases like "negligible impacts. No buildings require acquisition", as there may be potentially significant impacts on properties/land-use, even households, perhaps due to very close proximity or changed conditions, without them necessarily needing to be acquired. Need some qualifications/clarity for some cells - review wording used for these cells in the tables.	The term 'negligible impacts' has been clarified in the revised working papers.
	• Native vegetation is not addressed with sufficient clarity. Should be clearer where it is a key constraint. Also, need to be explicit about the degree of native vegetation requiring removal (and what portion is	Greater clarity has been provided in the revised working papers in relation to potential impacts on native vegetation.

	significant), as you know these figures. E.g. options 1A and 1B need 23.59ha (13.1ha very high) and 33.01ha (16.79ha very high) to be removed respectively, which aids the comparative assessment in these tables.	
	• Clarify "negligible impact" for noise in relation to 2A and 2B – isn't there 9 dwellings within 200m of options 2A and 2B, yet both options have been rated as negligible impacts.	The term 'negligible impact' for noise in relation to options 2A and 2B has been clarified in the revised working papers. 'Negligible impact' is in relation to the noise from the existing highway.
	• Option 3C has a number of ratings under community and social that meets objective well and very well. However, this option is very close to the Buangor Primary School perhaps should now be rated the same as option 3D, which is well south of any community facilities.	Option C comes to within around 120 metres of Buangor Primary School and Option 3D comes within a similar distance of several houses. Both of these options are considered to have considerable disbenefit to the local community for both impacts on land use and amenity and have been rated accordingly.
	• There are additional non-Aboriginal cultural heritage places within Buangor other than the Cobb and Co place like the avenue of honour and the old hotel – how have these been considered in this evaluation?	There are other potential cultural heritage places in Buangor but only the currently registered places (ie. on Victorian Heritage Register or Inventory or within a Heritage Overlay in the Planning Scheme) have been noted in the working papers.
	• It is also not clear how significant views to Mt Buangor/Mt Cole have been recognised and considered in relation to northern options in this zone.	It is merely noted that there are views from Buangor to Mt Cole to the north and the potential impacts of the highway options on this view have been considered.
Section 3:		
Chapter 3	• In the second sentence, Sisters Rocks Park should also be identified as an area that has been excluded from the consideration of options.	Sisters Rocks Park was excluded from consideration for highway alignments and this fact has been noted in the revised working papers.
	• In the third sentence, a short description of the high impacts from E, K	A short description of the high impacts of former options E, K

	and N would be helpful.	& N has been added in the revised working papers.
	• In the fifth paragraph, more detail should be provided on the membership and structure of the "brainstorming workshop".	The membership and structure of the brainstorming workshop has been added to the revised working papers.
	• In the third last paragraph on p10, some explanation should be given for the generation of additional options to those previously prepared by VicRoads.	Explanation has been on additional options to those previously generated by VicRoads.
	• There is inconsistent numbering of the objectives in Tables 4/5 and Table 8, which could cause confusion.	As stated under response to general comments above, the numbering of objectives 16, 17 & 18 in Table 8 is an error. These objectives should have been numbered 13, 14 & 15. The objective numbers have been amended in the revised working papers.
Chapter 4	• As discussed at the TRG meeting, the use of all the objectives derived from the project objectives, draft scoping requirements and project review committee in their current form involves a significant risk of "double counting" in the scoring in Table 8. This is particularly evident for safety and the PRC objectives. Note that the PRC objectives are particularly influential in eliminating 3d/3c.	The description of the objectives used and the assessment process have been revised in the amended working papers to negate suggestion of double counting.
	• There needs to be some explanation of why the scores for each objective were simply added rather than weighted.	The numerical scores shown in the draft working papers were merely used for working purposes to more readily distinguish between the ratings, as described in the revised working papers.
	• There needs to be some explanation of why one option with an overall score of -2 is eliminated and why the others are kept in the short list.	The shortlisted options have changed as a result of feedback from the TRG, as discussed in the revised working papers.
	• As discussed at the TRG meeting, option 3d/3c warrants further detailed evaluation since it is the only option in zone 3 which avoids the significant roadside native vegetation in this zone. In doing so, it will be	VicRoads has decided, in response to concerns raised at the TRG meeting on 12th July 2011, to add option 3d/3c to the shortlist of options for more detailed assessment

	important to consider the merits of modifying the 3d/3c alignment to achieve a useful connection with London Road.	
	• While there is a new option for the northern bypass of Great Western, there should be some discussion on why there is no suitable alternative to 2D for the southern bypass of Great Western.	There are no southern bypasses of Great Western other than 2D because much of the land to the south of the town is poorly drained and for this reason, the highway would need to be elevated with consequent visual impacts from the town. Further, there is little room within the study area of 1.5 kilometres from the current highway which avoids significant impacts on either the town or nearby vineyards.
Chapter 5	• In paragraph 2, the "EES project management team" needs to be explained in the context of referring separately to "VicRoads, design engineers and technical specialists".	As stated in responses above, the GHD project management team has been described defined in the revised working papers.

Comments from DSE and Parks Victoria on the Western Highway Duplication EES and PSA Working Papers on Generation and Selection of Shortlisted Options for Sections 2 and 3
June 2011

Section	DSE/ Parks Vic Comment	GHD response
Both Sections 2 & 3:		
	General Comments from DSE 1. The Draft Scoping Requirements for each of Sections 2 and 3 have 11 evaluation objectives. In respect to biodiversity there are two objectives. These are: • To avoid or minimise effects on species and ecological communities listed under the Flora and Fauna Guarantee Act 1988 (Vic) or the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth); and to comply with the requirements under Victoria's Native Vegetation Management – A Framework for Action. • To provide for the sustainable, long-term management of retained native vegetation and habitat areas within and adjacent to the road reservation along the duplicated highway. 2. The Working Paper: Generation and Selection of shortlisted options June 2011 Section 3 and The Working Paper: Generation and Selection of shortlisted options June 2011 Section 2 have only one evaluation objective directly related to biodiversity. 3. Having only one evaluation objective directly related to biodiversity in the Working Papers has undervalued the importance of biodiversity issues in the selection of route options. It is the view of DSE that two objectives relating to biodiversity should have been included; with one requiring consideration of Victoria's Native Vegetation Management – A Framework for Action and the other about threatened species and communities. The wording of the evaluation objective in the Working Paper is: Avoid or minimise effects on species and ecological communities. The wording of this objective is not considered appropriate by DSE, as it only addresses half of the original evaluation objective, and even then it remains ambiguous. The requirement to meet Victoria's Native Vegetation Framework has also been omitted.	Two evaluation objectives have been used for biodiversity in the 'sensitivity test' evaluation following the July TRG meeting, as described in the revised working papers for each of Sections 2 and 3.

Section	DSE/ Parks Vic Comment	GHD response
	In conclusion, DSE would have preferred if the following two objectives were utilised in the generation and selection of shortlisted options (and will recommend that they be used for the evaluation criteria for selection of the preferred route): • To avoid or minimise effects on species and ecological communities listed under the Flora and Fauna Guarantee Act 1988 (Vic) or the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth). • To comply with the requirements, and best meet the objectives, of Victoria's Native Vegetation Management – A Framework for Action, and to minimise impacts on wildlife corridors.	
Section 2:		
	Comments from DSE on Chapter 4 • DSE does not support the elimination of any options because it has been provided with inadequate information on flora and fauna for consideration on the relative impacts of each option. DSE requires targeted flora and fauna survey information for all options and general and targeted flora and fauna information for options 2E, 2G, 3A, 3B, 3G, 3H and 4C before it can agree to the elimination of any options. • DSE does not support the elimination of Option 4D as, on the basis of available information, Option 4D has the lowest biodiversity impacts of any option in Zone 4.	• Flora, fauna and net gain assessments and targeted fauna surveys have been completed for all options in Section 2 apart from 2C, 2D, 3A, 3B and 3C. This information will be made available to DSE. Targeted flora surveys for Section 2 will be carried out over Spring of 2011. In the absence of this information, it has been assumed that threatened species which could be present are present within an alignment option (ie use of the precautionary principle). • In response to concerns raised by DSE and DPCD at the TRG meeting on 12th July 2011, Option 4D has been included as a shortlisted option for more detailed assessment along with Option 4A.
	Comment from Parks Victoria re Chapter 4 • If the proposed road reservation associated with Route 4A and 4A2 is to 'take' part of the existing Dobie Highway Park reservation (copy attached) then Table 10 (page 8) Objective 8 (Avoid or minimise effects on species and ecological communities) should include reference to Dobie Highway Park under Route 4A and 4BA (4A2?).	There should be no need to 'take' land from the Dobie Highway Park. There should be sufficient land within the existing road reserve to duplicate the highway at this point.

Section	DSE/ Parks Vic Comment	GHD response
Section 3:		
	Comments from DSE re Chapter 4 • DSE does not support the elimination of any options because it has not been provided with adequate information on flora and fauna for consideration on the relative impacts of each option. DSE requires targeted flora and fauna survey information for all options before it can agree to the elimination of any options. • An alternative entry to Stawell other than Option 3ABC has not been presented in the working paper and DSE is opposed to this. Zone 3 of Section 3 is of high concern to DSE in relation to potential biological impacts. DSE is opposed to the shortlisting of only one possible route entering Stawell as the Avoid and Minimise principles of Victoria's Native Vegetation Framework have not been demonstrated. • DSE requires the native vegetation assessments for Stage 3 to be presented per individual route option per zone, as was done for Section 2. Without having the date in this format, DSE is unable to support the elimination of any route options.	• Flora, fauna and net gain assessments and targeted flora and fauna surveys have been completed for all options in Section 3 apart from 3ABC. This information will be made available to DSE. • In response to concerns raised by DSE and DPCD at the TRG meeting on 12th July 2011, an alternative to Option 3ABC (former VicRoads' Option N) has been included as a shortlisted option for more detailed assessment along with Option 3ABC. • Native vegetation assessments are being prepared for each option by zone in the same manner as for Section 2.
	Comment from Parks Victoria re Chapter 4 • Table 4 (page 15) Objective 8 (Avoid or minimise effects on species and ecological communities) under Route 1A makes reference to 'the reserve opposite Ararat Regional Park'. Parks Victoria manages this area as part of the Ararat Regional Park. • If the proposed road reservation associated with Route 3A is to 'take' part of existing Sisters Rock Bushland Reserve reservation (copy attached) managed by Parks Victoria and /or Western Highway Stawell H8A Bushland Reserve reservation (copy attached) managed by the Department of Sustainability and Environment then Table 6 (page 17) Objective 8 (Avoid or minimise effects on species and ecological communities) should include reference to Sisters Rock Bushland Reserve and /or Western Highway Stawell H8A Bushland Reserve under Route 3A.	• No land will be 'taken' from the Ararat Regional Park and there should be no need to 'take' Crown land from opposite the Ararat Regional Park as there should be sufficient land within the existing road reserve to duplicate the highway at this point. • No land will be 'taken' from the Sisters Rock Bushland Reserve. • If any land is required to be 'taken' from the Western Highway Stawell H8A Bushland Reserve the area taken and the impact on vegetation will be minimised.

Western Highway Sections 2 and 3 EESs

TRG Review and Comment Table for

Section 3 Short-Listed Options Assessment Reports (20 October 2011, GHD for VicRoads),
Comments Prepared by DPCD (Valerie Dripps, Fiona Murray, Gabby Perkins & Geoff Ralphs), November 2011

General Comments/ Advice from DPCD regarding both Draft Short-listed Options Assessment Reports - technical, policy, presentation related	*GHD RESPONSE*
• The justification and key decision-making factors for selection of VicRoads preferred option for each zone for each section needs to be more clearly documented – need more transparent and consistent consideration of the relevant criteria and discussion of how the *key competing/ differentiating factors/impacts bore upon each selection*. This is particularly important where the selection of a clearly superior option was not possible and/or the option(s) selected was inferior with respect to key factors such as social or biodiversity related impacts (e.g. 1B and 4B in Section 2). This further discussion of VicRoads' selection and analysis of competing factors could be included at the end of each chapter for each zone or in the Options Assessment Outcomes chapter.	• Further discussion about the justification and key decision making factors has been added to the flora and fauna sections of Chapters 5, 6 and 7, and to Chapter 8 which discusses the outcomes of the options assessment.
• As discussed at our meeting on 02.11.11 and again at the TRG meeting, the current drafts of the Short-listed Options Assessment Reports require some additional quantitative details (potentially sourced from the appendices) to assist with the weighing up of key factors that justify the selection of the preferred option/s and elimination of other options not progressing to the next stage of the EES investigations. This could be assisted by including more information in *quantitative summary tables* comparing options for each zone (see Princes Hwy Options Report) – such a table should focus on the key impacts and differentiating factors (e.g. hectares of sig vegetation to be cleared, no. of houses/ properties affected etc.).	• Quantitative summary tables have been created for each alignment option in each zone.
• Further to this, it is recommended that additional information and discussion be required for all the flora and fauna sections of the document, including estimated amounts of native vegetation removal, the conservation significance of the vegetation to be removed and a discussion about where the vegetation is to be removed from the remnant patches, i.e. whether on the edge or middle etc, and is this significant from a habitat or connectivity perspective, presence of endangered/protected species etc.	• Additional discussion has been added for all flora and fauna sections in Chapters 5, 6, 7 and 8. • The area of native vegetation to be removed, its significance & where the veg is removed from for each option has been added to the report.

General Comments/ Advice from DPCD regarding both Draft Short-listed Options Assessment Reports - technical, policy, presentation related	*GHD RESPONSE*
• There is a question whether the traffic factors should be assessed equally (i.e. have same weighting) with all other factors – it is a starting assumption (now that only shortlisted options are being assessed) that all shortlisted options would meet general road engineering standards and the objective of improving traffic safety, travel times etc. Further, the traffic discipline/factors are all likely to represent an improvement/ benefit from base case, as opposed to the other disciplines (esp. biodiversity and social) where the impacts are very much likely to be a negative. Should the traffic/project objectives /factors be considered in this assessment of short-listed options, and if so why? If they need to be, the weighting should be revisited.	• The EES scoping requirements include an Objective that addresses traffic factors. All Objectives of the EES Scoping Requirements are being considered equally in the options assessment. • Also, the EES is to consider both impacts and benefits therefore it is acceptable to consider benefits as well as impacts in the options assessment.
• There is still some potential double counting of impacts (as advised in the context of the previous options assessment report) – some of the criteria seem to have very close relationships (especially the 'experience' criteria in the social impact) – does this lead to danger of 'double counting' impacts when tabulating/calculating the overall scoring?	• The criteria were broken down to allow for more detailed consideration of impacts and benefits for each option. • Due to the nature of the study areas /disciplines, there is overlap in most criteria between disciplines. It is not considered that any minor overlaps in criteria provides double counting to the benefit of any discipline. • In regard to social impacts, air and noise are just one of many considerations of social impacts.
• In this context, it is also suggested that a reasonableness or common sense check be undertaken for the preferred option/s, rather than potentially over-relying on numbers/ total scores –when looking carefully at the key differentiating factors that largely influence the selection, does the outcome make sense and is there a need for some sensitive analysis to address this?	• Further discussion has been added to the Options Assessment Outcomes in Chapter 8 to outline how the numbers of the options assessment matrix were reviewed and used to inform selection of a

General Comments/ Advice from DPCD regarding both Draft Short-listed Options Assessment Reports - technical, policy, presentation related	*GHD RESPONSE*
	recommended alignment
• The inputs and influence of the risk ratings for cultural heritage need to be carefully considered in the context of the related uncertainties. There are some areas where the risk has a very high likelihood associated with the adverse consequence (such as those examples of sensitive/significant sites/ areas described by ALA that have been witnessed or confirmed), whereas others are merely potential areas of significant impact (with less certain likelihood and perhaps consequence). For this reason a sensitivity analysis is needed (and should be described in the reports) of the comparative evaluation and selection of options in terms of cultural heritage risks, particularly where the level of risk has been more significantly influencing the selection (e.g. 2B v 2E for section 3).	• Ground truthing of historical heritage values has been undertaken and ratings have been reconsidered. • The revised options assessment matrix is provided in Section 8.

Specific Comments on *Section 3 Short-Listed Options Assessment Report*		GHD RESPONSE
Section & Page No	Agency Comments & Advice:	
General Comments on this draft report for Section 3		
	• *Great Western Quarry* – Given option through the quarry is preferred, what is the effect of the loss of this resource (has this been quantified in local and regional economic and resource supply terms – DPI should be consulted). There is potential for impact on the quarry product market in the broader western region given the extent of significant development (Windfarms, PowerStations, Gas Pipelines etc) happening in Western Victoria.	• A search of the Extractive Industry Tenements DPI database indicates there a number of other tenements in the area to access the same type of geology. • This will be addressed in the Impact Assessment.
	• What is the status of the Quarry operations? Given the preferred alignment is straight through the quarry this will influence the need for the permit application for extending the quarry to proceed – undertaking a new permit application and MRSD Act approval would involve considerable expense.	• The quarry is still operational. • The requirement for a permit to extend the quarry for the purposes of building the freeway through it will be considered in the impact assessment.
	• Where is all the material for this project coming from? Consider this in the context of impacts/demands from other regional projects and the viability of supply from available market sources verses having to source material from new quarries or borrow pits directly stemming from this project alone.	• Sourcing material for the construction of the project is difficult to estimate at this stage and will be determined by the

Specific Comments on *Section 3 Short-Listed Options Assessment Report*		GHD RESPONSE
Section & Page No	Agency Comments & Advice:	
		contractor. It is outside the scope of the EES and will not be considered further.
• Bushfire Overlay? - Has the Bushfire Management Strategy been considered? Is there a proposed Bushfire overlay in this area? Is there a designated location and/or shelter site been identified in either Section 2 or Section 3?		• At the time of the options assessment the Bushfire Overlay had not been published. However, there was the wildfire management overlay and this was considered. • Requirements for access in and out of areas within the Bushfire Overlay will be addressed during impact assessment. • Input from the emergency services who are members of the Professional and Local Services Group are important to address this.
Chapter 1		
Section 1.1		
p iii p4 p9 Evaluation Criteria p12	a) Map should include Ararat Regional Park and Big Sisters Bush Reserve b) 2D text indicates that t it starts at Allanvale Road but map indicates it starts at th3 end of 1AE and appears to be on the western side of the rail line c) "Effective width of floodplain (measured by 100year flood extent)." *What about 1:300 year flood event of January 2011?*	a) Maps will include these land marks in the EES b) Text describing 2D in Table 1 Section 1.4 has been updated. c) The January 2011 event was unprecedented. No data was collected during the event so it has not informed the modelling. However the areas of impact have been provided and will be considered in

Specific Comments on *Section 3 Short-Listed Options Assessment Report*		GHD RESPONSE
Section & Page No	Agency Comments & Advice:	
	d) " The groundwater, soil and geology, air and noise specialists were not included in the (Options Assessment) workshop as the outcomes of their assessments were not considered to be key drivers in the selection of alignments" *One presumes that their input to the options assessment is still able to be demonstrated and does not pose any risk to the process?*	the Impact Assessment, particularly where the duplication involves the existing highway in an area which may have contributed to flooding in January 2011. d) The input to the options assessment is demonstrated for each of these disciplines in: 1. The discussions provided for each option 2. The options assessment matrix in Section 8 3. Details of each assessment also provided in appendices.
Chapter 2		
Section 2.1	N/A	
Chapter 3		
Section 3.2 p 15	a) "traffic and transport options are provided in Appendix C." - this is very small print	a) noted and addressed
Section 3.3	b) It would be good to include how many hectares of native vegetation (and the significance of the native vegetation) that will be removed from Section 3. Also it would assist understanding if you could discuss the impact of the native vegetation removal (Is it through the middle of properties, or a slice down the side of the properties?)	b) Summary tables of information about each alignment have been added to each Section.
	c) We will need DSE's expert analysis of Table 7 Flora and Fauna Options Assessment Method Summary and the weightings that have been applied. Maybe include in discussion on Thursday 10 Nov.	c) Responses to DSE comments provided later
	d) We will need Harry Webber's input on the intricacies of the methodology for Cultural Heritage. At a recent meeting he was satisfied with the verbal report of the methodology but will need to review all the written work.	d) Response to AAV comments provided later
Section 3.8 p		

Specific Comments on *Section 3 Short-Listed Options Assessment Report*		GHD RESPONSE
Section & Page No	Agency Comments & Advice:	
31 Visual and Landscape Character Assessment	e) "Households that are affected by the duplication of the existing highway are considered to receive a lower visual impact than those households that are affected by a new highway alignment." What is the weighting? In Table 12 all criteria are weighted equally. This needs to be clearer.	e) All criteria for the visual and landscape options assessment are weighted equally (ie: 0.333) as stated in Table 12. The numerical value of the weighting has been added.
	f) In Appendix I page4, "Experience in past projects and recent conversations with the VicRoads Landscape Department reiterate the difficulty in applying ratings to criteria." yet the consultants are able to do it for the proponent and use it in the assessment of options. This will be a risk that the proponent is willing to take.	f) This statement in Appendix I is in a section called Criteria Ranking. This section discusses what would need to be considered to apply weighting to the criteria. The terminology used here may have caused confusion as the statement relates to weightings rather than ratings.
Section 3.10 p33 Noise Assessment	g) TRG members do not have access to the Reference Information – dot point 2 – EES Design Options, SK2001-SK2005, June 2011 prepared by GHD. These plans identify the estimated cut and fill required for each alignment option.	g) The plans are preliminary and indicative only. The plans were based on categories of depth of cut and fill that were used to get a general indication of requirements for each option. WE don't consider they should be an appendix to the options assessment but refined estimates will be provided with the EES.
Section 3.11	h) Leaving out Topography as a criterion for Noise Assessment until a preferred option is selected and detailed design is undertaken is a very big risk for VicRoads. Has a risk assessment been undertaken? This may have significant implications for the need for noise barriers in noise sensitive areas.	h) VicRoads understands this risk and acknowledges that noise mitigation may be required in some locations. A risk assessment has not been undertaken for options assessment but will be done for the

Specific Comments on *Section 3 Short-Listed Options Assessment Report*		GHD RESPONSE
Section & Page No	Agency Comments & Advice:	
p34 Surface Water Assessment	i) Table 14 indicates that only one criterion has been used and it is assigned a criteria weighting of 1, therefore this, in effect, has limited usefulness to this study.	Impact Assessment. i) As stated in Section 3.10, there are 2 sources of noise impacts – operation and construction. Construction impacts were not used as a criterion as it has been assumed construction will occur in the day and there is no noise policy for daytime construction.
Section 3.13 p.38 Soils and Geology	j) Dot point 2 "The potential for impact was assessed, not taking into account some likely water protection measures that are expected for a project of this nature." What are the measures and why were they not considered? k) Dot point 3 "Due to limited details of flood modelling at this stage. There is still some uncertainty whether water courses not identified as flooding in the 100 year event can be ruled out of having flood impact." When will the flood modelling be updates? What is the risk for VicRoads if only limited details are included in assessing for their preferred route? l) *We will look to the CMSAs for their input as to the adequacy of the information and the Assessment Methodology and Criteria Weighting.* m) "Note that none of the criteria have been rated above 'moderately poor' because common engineering solutions and environmental management measures have been assumed to mitigate impacts." It is presumed that VicRoads will be prepared to take this risk. n) Soil erosion is noted. Are there any faults in the region that need to be considered?	j) As stated in Section 3.3 of the report, no mitigation has been assumed for options assessment. k) Flood modelling of recommend options is being carried out to inform the Impact Assessment of the EES. l) Responses to CMA comments provided later m) VicRoads understand and accepts this risk. n) Yes there are faults in the region and will be considered in the impact assessment.
Chapter 4		

Specific Comments on *Section 3 Short-Listed Options Assessment Report*		GHD RESPONSE
Section & Page No	Agency Comments & Advice:	
Section 4. p 41 Community Consultation	In the Consultation Plan it states "Preparation of EES Mid 2011 to late 2011 Consider - Any possible refinements within technical and financial constraints of the project" This dot point does not seem to be addressed in the Community Consultation section.	The timeframe in the Consultation Plan is now out of date and will be revised. The EES will consider refinements to the recommended alignment within the technical and financial constraints of the project. How this is done, based on community consultation, will be documented in the EES.
Chapter 5		
5.3.1 Flora & Fauna 5.3.5 p 47 Noise Assessment 5.3.10 p 47 – 48 Social Impact Assessment	a) The minimisation or avoidance of impacts on native veg of VH cons significance is an important factor given the native veg framework (NVMF) does not permit the clearing of VHCS native veg unless there are exceptional circumstances. (see NVMF, Appendix 4, Table 6). If it can be avoided there may be a case for considering such options given they are still feasible (short-listed options are ostensibly feasible alternatives). ... therefore option 1C would be preferable because of its minimisation of impacts on native flora and fauna, *as well as* it avoiding much more VHCS native vegetation. b) It is unclear which is the preferred option with respect to Noise Assessment in zone 1. c) It is unclear which is the preferred option for Social Impact Assessment in zone 1.	a) Further discussion about the flora and fauna issues has been added to the report for each option in Chapters 5, 6 and 7 and to the discussion for the outcome of the assessments in Chapter 8. b) Section 5.3.5 states that 1C has minor benefit due to moving away from more dwellings where as 1A and 1E have minor impacts. This infers that Option 1C is preferred and the report has been updated to state this. , However it should also be noted that 1C brings the freeway near properties that currently do not experience highway traffic noise. c) Section 5.3.10 last paragraph states that Option 1A is preferred for the Social Impact Assessment.

Specific Comments on *Section 3 Short-Listed Options Assessment Report*		GHD RESPONSE
Section & Page No	Agency Comments & Advice:	
Chapter 6		
6.3.11 p 53 Social Impact Assessment 6.3.4 & 6.3.12	a) It is unclear what is the overall preferred option for Social Impact. In zone 2. b) Neither of these sections addresses the impact on the existing use of the quarry area... the selected option is both a significant impact on this existing land-use and quite potentially an impact of significance on its role in the local economics and regional quarry product market.	a) Section 6.3.11 last paragraph states that '*Option 2B is considered to have the least impact*…..', which infers this is the preferred option. b) Sourcing material for the construction of the project is difficult to estimate at this stage and will be determined by the contractor. It is outside the scope of the EES and will not be considered further. A search of the Extractive Industry Tenements DPI database indicates there a number of other tenements in the area to access the same type of geology.
Chapter 8		
8.2 8.3	a) As discussed at TRG, need some further explanation of why the preferred options were selected and how competing factors were considered, especially where there appears to be 'outliers' in terms of the negative impacts e.g. FF often worse for selected option (this may be more transparent and defensible if the issues and quantifiable aspects are addressed, as mentioned above). b) It is not clear why 1C is not considered further in this discussion of options give it is the most preferred from both the biodiversity and cultural heritage perspectives. The most significant "Very Poor" ratings are mostly for the selected combination of 1A and 1E...the option(s) selected seems counter intuitive without much clearer explanation of these factors and how they were weighed up against the social /land-use factors.	a) Further discussion about the justification and key decision making factors has been added to Chapter 8 Options Assessment Outcomes. b) Further discussion about the selection of recommended options is provided in Chapter 8. Additionally, following the options assessment, a field visit was held with Heritage Victoria to Options 1A and 1E where there were potentially high risks to historical sites. After site inspection with Heritage Victoria the assessment has been revised. Excavation is required to

Specific Comments on *Section 3 Short-Listed Options Assessment Report*		GHD RESPONSE
Section & Page No	Agency Comments & Advice:	
	c) This discussion seems to be more robust and considered than the other two subsections here.	confirm if they are graves or flower beds. Heritage Victoria have advised the risk to registered sites is manageable. This further supports the recommendation of Option 1E. The report has been updated to reflect this – Sections 5.3.3, 6.3.3 and 7.3.3. c) Noted and more discussion has been added to Chapter 8.

Section & Page No	EPA Comments & Advice:	GHD RESPONSE
	• Generally comfortable with selected options.	
	• In relation to the potential intersect with the landfill site - EPA provided comments on the Golders report previously in approximately April and those comments still stand. If there was to be an intersect this would trigger a number of statutory requirements (e.g. environmental risk assessment, pollution abatement, post closure PAN)	• The issues associated with intersecting the landfill will be explored in detail in the Impact Assessment. This will include outlining what site assessments, approvals, management plans and relocation requirements that could apply.
	• The proponent would be required for comply with EP Act requirement etc at the relevant point in time regardless of the option selected	Noted.

Section & Page No	AAV Comments & Advice:	GHD RESPONSE
	Tya and I have, between the two of us, somehow managed to wade through the following reports: VicRoads Western Highway Project - Section 2 (Beaufort to Ararat) - EES 'Shortlisted Options Assessment - October 2011' VicRoads Western Highway Project - Section 3 (Beaufort to Ararat) - EES 'Shortlisted Options Assessment - October 2011' Appendix 3 Compiled - Section 2 Appendix 4 Combined- Section 2 Appendix 5 Burnt Mounds Desktop Section 2 Appendix 5 Mortuary Trees Desktop Section 2 Appendix 6 Section 2 combined Appendix 8 Combined Section 2 Cultural Heritage Report_Section 2 with appendices 1 and 2 Appendix 3_section 3- combined and reduced Appendix 4_Section 3 Combined Appendix 5 Burnt Mounds Desktop Section 3 Appendix 5 Mortuary Trees Desktop Section 3 Appendix 6_section 3 combined Appendix 8_Section 3 combined Cultural Heritage Report_Section 3 with Appendices 1 and 2 • They may not be terribly user friendly at present, but they do seem to do a good job of identifying the issues that matter, and of giving the project a thorough method of identifying and managing the cultural heritage risks involved. Well done. Unless we've missed something, I can now say with some confidence that we have no comment!	
	• As an aside, we remain concerned about the following: - The standard assessment needs to be concluded prior to the EES (yes, we understand that the written report may not be...) - Given the nature of the standard assessment, it is essential that Tya and myself are involved in the standard assessment so that we have a thorough understanding of how this assessment has worked, specifically the examination of possible mortuary trees. We would like some notice about when field investigations will commence.	VicRoads understands the Standard Assessment needs to be completed before the EES is completed and is working towards this. As the next stage of the Standard Assessment progresses (field work), AAV will be consulted and involved

Section & Page No	AAV Comments & Advice:	GHD RESPONSE
		as necessary.
	• - As with all large activities, please continue to discuss the proposed assessments (as would normally happen under section 60 if a RAP were evaluating a management plan) with AAV. AAV believes that commencing with a shared understanding of the community consultation required and consulting with AAV in relation to the assessment methodology should provide more certainty to all parties, and avoid unexpected delays or further assessment being required on evaluation of the CHMP. Please engage AAV in discussions about any complex assessment prior to commencement.	VicRoads and GHD will continue to work closely with AAV on aboriginal cultural heritage assessments for the EES.

Section & Page No	Heritage Victoria Comments & Advice:	GHD RESPONSE
	Alarm Bells H7423-0073, Armstrong Graves — potentially by 1A and 1E HO112, Fountain Head brewery residence — 1C (grounds only)	Site visit was undertaken with Heritage Victoria to these sites. Meeting held 8/12/2011 to discuss the way forward. The only area that needs further work is the potential graves. Excavation is required to confirm if they are graves or flower beds. Heritage Victoria has advised the risk to registered sites is manageable.
	Some concerns • H7423-0027, Great Western Lead alluvial diggings — 2B	Site visit was undertaken with Heritage Victoria to these sites. Meeting held 8/12/2011 to discuss the way forward. The alignment travels along the edge of the registered site. Field work will be undertaken to confirm locations of the site of the registered features. Heritage Victoria has advised the risk to registered sites is manageable.

Section & Page No	Northern Grampians Shire Comments & Advice:	GHD RESPONSE
	While Jim was planning to send some comments in writing he said that if we had not seen anything by the end of Friday he was happy for me to send his verbal comments through. This may be a bit pre-emptive as it not quite the end of the day however here is a summary of his verbal comments:	
	a) Would like to see the local heritage advisor involved in discussions about heritage impacts b) In relation to Concongella River said that, perhaps contrary to views of the WCMA, siltation was a concern for the community. From the community perspective silt build up is a potential contributing factor to flood risk, and if an option could be selected that reduced silting the community would see this as beneficial. c)They are generally supportive of the option that goes around the north of Great Western - sees that it would enable good access to the town, good views and would have potential economic benefits. d) When it comes to the more detailed design the Council would like to discuss the interchange treatments	a) Appendix E, Table 12 lists the consultation undertaken with various Historical Heritage organisations. This included the Heritage Advisors for Pyrenees, Ararat and Northern Grampians councils. b) Silt build up in Concongella River will not be considered in the EES unless it is a direct result of the proposed freeway. c) Noted d) Noted
	Just a point of clarification regarding the Concongella creek, Council and the community is seeking an option which does not increase the impact of flood, and preferably which may assist in addressing the current flow restriction (whether silt, vegetation or the existing highway – on the eastern edge of GW) to better mitigate the impact of flood. Consideration should be given to the high level of upstream erosion in the catchment, and the extent of silt and vegetation build up in the stream around Great Western.	The design of the bridge structure crossing Concongella Creek will be designed to accommodate flooding events and not cause restrictions. The design standards required to achieve this will be investigated and defined during the Impact Assessment.

Section & Page No	WCMA Comments & Advice	GHD RESPONSE
General Comments (technical, policy, presentation related) on the Report's content and its key findings/issues		
	• a) Assumptions and assessments in surface water assessments are reasonable and identify some uncertainty in the 100 year event as lack of flood intelligence; however aerial images and community consultation would give better understanding about nature, duration, extent and intensity of flooding especially around the Great Western area. The short listed option selection on the northern side of Great Western (Section 3, Zone 2) 2B crosses major floodplains (see attached aerial images January 2011 flooding). Other options like 2C and 2D for this reason could be consider for further study. If 2B is the only option available adequate engineering solution and community consultation should be made to ensure it will have no adverse impact to the community and the adjacent environment. • b) It is worth noting that WCMA believe that whilst the modelling to date is of question with respect to being able to adequately assess the various alignment impacts with respect to the floodplain for the VicRoads preferred alignment to this point, we have met with the contractor and feel suitably assured that they will be able to model with sufficient certainty to ensure our confidence with the impact of the final alignment solution. Again, this process is not what we would recommend in terms of sequence as we feel that some options are potentially being eliminated based upon limited modelling or understanding at this point. • Email communications clarifying comments: Hi Grant, Further to your email below and also our related chat I thought it best to document our position at this point. Our comments during the meeting on the 17th with respect to the modelling to date were that it was not sufficiently advanced or detailed to allow for the level of determination that you suggest is the case. It is for this reason that we stated, "this process is not what we would recommend in terms of sequence as we feel that some options are potentially being eliminated based upon limited modelling or understanding at this point". Having said this, we also provided comment that we had met with the consultant post this meeting separately and now have confidence that they have the ability to adequately model the impact of any future alignment option chosen so that engineering solutions with any preferred option can be thoroughly worked through. So to reiterate, We do not feel that the current level of modelling is sufficient to determine a preferred option, and We do have sufficient confidence in the ability of the consultant to develop an engineering solution for any proposed alignment. I trust that this will be sufficient to ensure that nothing additional has been inferred or is wanted to be inferred from our comments.	a) Noted that Option 2B crosses a floodplain and adequate engineering solution will be required to prevent adverse flooding impacts from occurring. b) Noted. Modelling will be used to inform the impact assessment. Flood modelling is not typically used to inform options assessment and there are engineering solutions available to address flooding issues created by road crossings.
Chapter 3	Surface Water Assessment	
Section 3.11 (key assumptions)	• Due to limited details of flood modelling methodology at this stage, there is still some uncertainty whether water courses not identified as flooding in the 100 year event can be ruled out of having flood impact.	

Section & Page No	WCMA Comments & Advice	GHD RESPONSE
Comment	Due to lack of understanding of modelling flooding near Great Western township, aerial images could be analysed to get improved understanding of some uncertainty of water courses and their potential for flood impact.	Noted. Photos have been provided and will be used to inform impact assessment.
Chapter 3		
Section 3.11 Potential to flooding risk	• Effective width of the 100 year flood extent (Bonacci Water, May 2011)	
Comment	This study does not consider September 2010 and January 2011 flooding in Great Western so getting extent from this report would not be reasonable. Instead flood extent may be identified from aerial images of the event which would be understandable at this stage.	Noted. Photos have been provided and will be used to inform impact assessment.
Chapter 3		
Section 3.11 Potential to flooding risk	• Level of complexity in the interaction of the modelled flood extents within the alignment options (e.g. significant length of road alignment within the flood extent associated with stream confluences) • Complex interaction of the flood extents with alignment options where properties may be impacted is considered to be of significant disbenefit at a regional scale.	
Comment	The preferred option Section 3, zone 2, 2B crosses major floodplains and its impact would much more complex than 2C and 2D options from flooding prospective around Great Western township. We recommend considering other options (2C and 2D) at this stage. However if consulted only consider 2B option for future assessment they have to satisfy that the highway will have no impact to the community and adjacent environment.	Noted that Option 2B crosses a floodplain and adequate engineering solution will be required to prevent adverse flooding impacts from occurring.
Chapter 3	Surface Water Options Assessment Method Summary	
Table 16	• Criteria Weighting	
Comment	Weighting criteria could be redefined after community consultation. As there is more concern about potential adverse impact of flooding than the waterway value.	The EES Scoping Requirements specify consideration of both waterway beneficial uses and floodplains. Based on the assessment of our waterway specialists, the criteria for options assessment have been weighted equally. Community comments about flooding concerns will be addressed through the impact assessment for the EES.

Western Highway Section 3 EES

TRG Review and Comment Table for

Section 3 (Ararat to Stawell) Environmental Effects Statement – Shortlisted Options Assessment, October 2011 (GHD Pty Ltd), completed by Department of Sustainability and Environment (Nick Jaschenko and Stewart Dekker)

VERSION 2

TRG Agencies should also give consideration to the following when reviewing the draft reports:

- *Does the report identify or take account of any relevant legislative and/or policy requirements?*
- *Is the assessment and/or/ method(s) applied appropriate and technically sound?*
- *Are there any gaps and key uncertainties in the report or data that need to be considered?*
- *Does the report present its findings / information with sufficient clarity for its readers / audience?*
- *Has the existing conditions been correctly and adequately documented? [for relevant reports]*
- *Have all the likely impacts been identified and assessed to a reasonable extent? [for relevant reports]*
- *Are proposed environmental management/ mitigation/ design measures appropriate or need to be explored? [for relevant reports]*
- *Are there any key linkages to other reports, studies, documents or issues that need further consideration /attention?*

Section & Page No	Agency / Organisation Comments & Advice	Response
General Comments (technical, policy, presentation related) on the Report's content and its key findings/issues		
	• DSE still has concerns regarding the evaluation objectives and criteria used in the Options Assessment Matrix; these concerns have previously been raised in comments made on the *Evaluation Criteria for Selection of Preferred Alignment* and *Generation and Selection of shortlisted options (Section 2 & 3)* documents/ reports. • DSE believe the manner in which environmental impacts are presented/ assessed (i.e. combined consideration of threatened species and native vegetation) in the Options Assessment Matrix prejudices the consideration of remnant native vegetation. DSE consider native vegetation and threatened species to be very different matters, each with their own Act, and as such they should be considered separately.	DSE suggestions to revise evaluation objectives and criteria have been adopted and assessment was revised.
	• As per previous recommendations/ comments (more specifically comments in relation to the *Evaluation Criteria for Selection of Preferred Alignment*), DSE recommends the following evaluation objectives and criteria be used in the Options Assessment Matrix. Each objective should be individually represented carry its own weighting (i.e. totalling one). ***To avoid or minimise effects on species and ecological communities listed under the Flora and Fauna Guarantee Act 1988 (Vic) and/ or the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*** • Impacts to matters of National Environmental significance. (Recommended example weighting - 0.6) • Avoid impacts to species, communities and processes listed under the FFG Act. (Recommended example weighting - 0.4) ***To comply with the requirements and best meet the objectives, of Victorias's Native Vegetation Management — A Framework for Action, and to minimise impacts on wildlife corridors.*** • Quantity and quality of remnant vegetation to be removed shown in different categories (Recommended example weighting, V/High = 0.3, High 0.3, Medium 0.2 and Low 0.1) • Impact on wildlife corridors (considering extent, connectivity and known species records) (Recommended example weighting - 0.1)	The evaluation objective and criteria were revised to adopt this comment.
	• As mentioned earlier, each of the above objectives should be individually represented carry its own weighting (i.e. totalling one). DSE considers the current combined consideration/ evaluation objective for threatened species and native vegetation to undervalue environmental considerations. A full 1 point value/ weighting should be considered for native vegetation and threatened species, rather than the current value/ weighting where both are being considered together under the 1 point.	Each evaluation objective for F&F was assigned a weighting of 1.
	• DSE notes that the evaluation criteria used in the preferred Options Assessment Matrix only considers 'very high' conservation significance native vegetation, and as such, prejudices the consideration of remnant native vegetation. DSE has provided a weighting system (see above which could be used to consider quality/ conservation significance native vegetation).	Adopted.
	• DSE wishes to advise that as this proposal will likely involve the removal of 'very high' conservation significance, under *Victoria's Native Vegetation Management – A Framework for Action* (the Framework) approval from the Minister for Environment and Climate Change will be required. With respect to 'very high' conservation significance Appendix 4 of the Framework states that '*Clearing not permitted unless exceptional circumstances apply (i.e. impacts are an unavoidable part of a development project, with the approval of the Minister for Environment and Conservation (or delegate) based on considerations of environmental, social and economic values from a state-wide perspective*'.	This has been understood and will be considered in the Impact Assessment.
	• DSE recommend that a column be provided showing the loss of native vegetation in terms of physical area within the preferred Options Assessment reports and existing conditions reports for each alignment option within both stages.	This has been added to reports.
	• In the absence of targeted survey data/ results for Stage 2, DSE recommend that a precautionary approach is taken and the presence of threatened species is assumed.	Agree

Section & Page No	Agency / Organisation Comments & Advice	Response

- DSE offers the following comments on the preferred alignments being proposed (as per the Western Highway – Shortlisted Options Assessment, TRG Meeting 5 power-point presentation and preferred Options Assessment reports), noting that receipt of further targeted survey work for Stage 2 and recommended/ requested changes to the Options Assessment Matrix may alter these positions.

ARARAT TO STAWELL — SECTION 3

	ZONE 1	Conservation Significance	Habitat hectare score	Total net gain target	Large old tree losses
1A	VicRoads preferred option	Very High	11.72	23.44	165
		High	3.6	5.4	64
		Medium	1.01	1.01	17
				29.85	**246**
1C	Lowest Environmental Impact Route	Very High	0.19	0.38	3
		High	1.74	2.61	33
		Medium	0.35	0.35	7
				3.34	**43**
1AE		Very High	3.91	7.82	53
		High	0.25	0.37	9
		Medium		**8.19**	**62**
1E		Very High	5.28	10.56	76
		High	1.16	2.4	20
				13.00	**96**

- Option 1C clearly has the lowest impact on native vegetation, and best demonstrates the avoid principle.
- Option 1AE (which is a combination of 1A & 1E) is considered to have the next best outcome for native vegetation.
- The area between Thomas Road and the Armstrong deviation should be investigated for an area of least impact on remnant native vegetation.
- DSE consider the impacts associated with options 1C or 1AE to be acceptable, and is supportive of these alignments going to the next stage of the EES process.

More information demonstrating the avoid and minimise principles for options 1A or 1E would be required before DSE could provide support.

ARARAT TO STAWELL — SECTION 3

	ZONE 2	Conservation Significance	Habitat hectare score	Total net gain target	Large old tree losses
2B	VicRoads preferred option	Very High	1.33	2.66	34
		High	6.43	9.64	106
		Medium	1.64	1.64	**0**
				13.94	**140**
2C	Lowest Environmental Impact Route	Very High	0		
		High	3.71	5.56	58
				5.56	**58**
2D		Very High	2.34	4.68	56
		High	4.28	6.42	77

DSE's detailed comments on the Options Assessment have been considered and additional discussion has been added throughout the Options Assessment reports for Section 2 and 3.

Section & Page No	Agency / Organisation Comments & Advice					Response
				11.1	**133**	

- Option 2C has the lowest impact on native vegetation, and best demonstrates the avoid principle.
- Option 2B could be considered (even though native vegetation losses are greater than Option 2C) due to losses already provided for under the expansion of the existing quarry operation.
- Option 2E (deleted in the previous short-listings) has least environmental impact, and should still remain an option for consideration.
- DSE consider the impacts associated with options 2B or 2C to be acceptable, and is supportive of these alignments going to the next stage of the EES process.

ARARAT TO STAWELL — SECTION 3

	ZONE 3	Conservation Significance	Habitat hectare score	Total net gain target	Large old tree losses
3A	Lowest Environmental Impact Route	Very High	0.31	0.62	8
		High	0.46	0.69	4
		Medium	2.06	2.06	24
				3.37	**36**
3B	VicRoads preferred option	Very High	1.49	2.98	41
		High	0.46	0.69	4
		Medium	7.13	7.13	62
				10.8	**107**
3C		Very High	0.9	1.8	14
		High	3.01	4.51	53
		Medium	0.97	0.97	11
				7.28	**78**
3ABC		Very High	1.08	2.16	10
		High	1.44	2.16	12
		Medium	1.19	1.19	12
				5.51	**34**

- Option 3DC connecting with 2E has the lowest impact on native vegetation, and best demonstrates the avoid principle.
- Option 3DC is considered the best option to accommodate a possible bypass of Stawell in the future, and should be considered as a genuine option to demonstrate the avoid principle.
- DSE consider the impacts associated with options 3A or 3B to be acceptable, and is supportive of these alignments going to the next stage of the EES process.
- DSE understand that the detailed design phase for 3ABC (between Sisters Rocks and the Stawell Caravan Park) will further demonstrate the avoid and minimise principles.

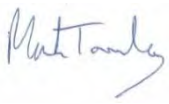
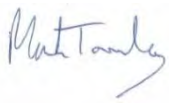
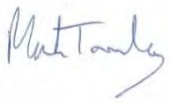
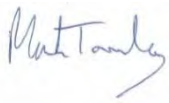
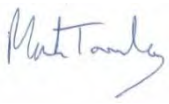
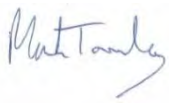
Chapter 1		
Section 1.1	N/A	
etc..		
Chapter 2		
Section 2.1	N/A	
etc..		
Chapter 3		

Section & Page No	Agency / Organisation Comments & Advice	Response
Section 3.3	N/A	
Chapter 4		
Section 4.1	N/A	
etc..		

GHD

180 Lonsdale Street
Melbourne, Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com.au

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	Katie Watt Lisa Driscoll	M Tansley		M Tansley		20/10/2011
1	Katie Watt Lisa Driscoll	M. Tansley		M. Tansley		16/12/2011
2	Katie Watt	M. Tansley		M. Tansley		24/02/2012