

**WESTERN HIGHWAY DUPLICATION
SECTION 2
BEAUFORT TO ARARAT**

**Underestimation of Large Old Trees within
the Environment Effects Statement**

*Review of native vegetation accounting and
environmental planning to identify key learnings
and improvement opportunities*

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Summary

The duplication of the Western Highway between Beaufort and Ararat (Section 2 of the Western Highway Project) has been the subject of intense public scrutiny given the significant amount of native vegetation removal associated with the Project. It has become widely known that the removal of 221 Large Old Trees (LOTs) as stated in the Project's Environment Effects Statement (EES), was a severe underestimate and the actual number of LOTs removed is now known to be approximately 1350.

This report has been prepared to understand and explain what has occurred in relation to the underestimated number of LOTs.

VicRoads has previously publicly acknowledged the error, accepted responsibility and apologised for this significant miscalculation. In September 2015, VicRoads Chief Executive, Mr John Merritt made the following statement:

"In relation to sections beyond Buangor Bypass up to Ararat, VicRoads will not be proceeding with any tree clearing works until the issue of the tree discrepancy has been understood, made public and fully considered" John Merritt, Chief Executive, VicRoads, Sep 2015.

The primary purpose of this report is to document the sequence of events leading to the underestimation of LOTs, so VicRoads can properly understand what occurred, develop key learnings, and capitalise on improvement opportunities to avoid similar scenarios in the future.

VicRoads Senior Environmental and Heritage Advisor Matt Mooney has authored the report. Mr Mooney was not previously involved in the Project. This provided an opportunity for Mr Mooney to independently review the circumstances and the issues surrounding the underestimation of LOTs. Mr Mooney has had access to, and reviewed, documentation relating to the environmental planning phase of the Project as well as interviewing key staff who were involved in the planning phase of the Project.

Scope of report

This report specifically addresses matters relating to the underestimation of LOTs. It does not include a review of how Ecological Vegetation Classes were assessed or defined, nor does it include a review of how the potential impact on threatened species and communities was assessed and mapped in relation to each alignment Option.

Structure of this report

This report is presented in three sections as follows:

Section 1: Background

A brief overview of the Western Highway Project, the Environment Effects Statement, and the implications associated with the underestimation of LOTs.

Section 2: How did the LOT underestimation occur and what does it mean for the validity of the EES?

This section provides a detailed account of the sampling methodologies utilised to assess LOTs for the Project and how this led to an underestimate in the number of LOTs affected. The implications relating to the selection of the preferred alignment during the EES process is also discussed.

Section 3: Key learnings and improvement opportunities

The key learnings and improvement opportunities are discussed and a series of recommendations are provided. These recommendations are summarised as follows:

Recommendation 1: Undertake counts of individual LOTs at the appropriate stage of the planning process.

Recommendation 2: Be more proactive in informing the community about matters that are likely to be of significance to them.

Recommendation 3: Consider appointing dedicated Environmental Officers to VicRoads major Projects teams where there are significant environmental risks involved.

Recommendation 4: Exercise caution in reviewing sampling strategies that attempt to estimate LOT losses across large areas. VicRoads should ensure that it properly understands consultants' sampling strategies and is comfortable they are fit-for-purpose before supporting their adoption.

Recommendation 5: Ensure that technical experts are given adequate opportunity to review and provide feedback on the final draft of an EES before it is released for exhibition to ensure that technical information is presented and conveyed accurately.

Recommendation 6: In the case of future Environment Effects Statements, VicRoads, when responding to scoping requirements, should be mindful of capturing environmental criteria that are important to the community in addition to legislated biodiversity matters.

Recommendation 7: Assess the need to consult more broadly beyond those areas physically affected by alignment options and; harness technological advancements (e.g. 3D modelling and social media) more consistently.

Section 1: Background

1.1 Project Background

The Western Highway (A8) is currently being upgraded to a four-lane divided highway between Beaufort and Ararat (Section 2) as part of an overall strategy to upgrade the highway from Ballarat through to Stawell (noting that works between Ballarat and Beaufort are complete). Construction is progressing from Beaufort to Buangor and pre-construction planning is underway for Buangor to Ararat. There is no funding for construction beyond Ararat.

The Western Highway is the principal road link between Melbourne and Adelaide. It serves interstate trade between Victoria and South Australia and is a key transport corridor through Victoria's west. The highway supports farming, grain production, regional tourism and a range of manufacturing and service activities. More than 5500 vehicles each day currently travel the highway west of Ballarat, including 1500 trucks. This is expected to double by 2025. The highway duplication will significantly improve road safety, reduce travel costs and assist road freight efficiency.

1.2 Environment Effects Statement for Section 2 (Beaufort to Ararat)

On 27 October 2010 the then Victorian Minister for Planning determined that Section 2 required an Environment Effects Statement (EES) under the *Environment Effects Act 1978*. The scope of an EES is far reaching and addresses matters including (but not limited to) cultural heritage, social impacts, regional economy, noise, hydrology, biodiversity, geotechnical, and landscape and visual impact. With regard to biodiversity and habitat, the Minister determined that Section 2 required an EES because "*the project is likely to result in significant effects on biodiversity, including native vegetation, listed flora and fauna species and listed ecological communities*".

1.3 EES as accredited process under the federal Environment Protection and Biodiversity Conservation Act 1999.

On 17 December 2010 the delegate for the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities determined the Project to be a controlled action that required assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC). It was also determined that the EES was to be applied as an accredited process under the EPBC Act in accordance with the bilateral agreement between the Commonwealth and Victorian governments (administered under Sec 45 of the EPBC Act). This meant that the Victorian EES process was adopted in order to satisfy the federal government's EPBC legislation while simultaneously addressing Victorian statutory requirements.

1.4 Options presented for review under the EES

As described in detail within Chapter 5 of the EES, VicRoads undertook a comprehensive assessment process to select the preferred alignment options for consideration as part of the EES. VicRoads held a series of community and stakeholder workshops and information sessions. After these, VicRoads considered the feedback to refine the potential alignment options before presenting Option 1 and Option 2 for review under the EES (Figure 1).

Options 1 and 2 were the same from Beaufort to Andersons Road and from Langi Ghiran Picnic Ground Road to Ararat. Both Options 1 and 2 bypassed Buangor to the north and crossed Peacocks Road, before differing from Peacocks Road to Langi Ghiran Picnic Ground Road, and eventually returning on the same alignment for the remaining length to Ararat.

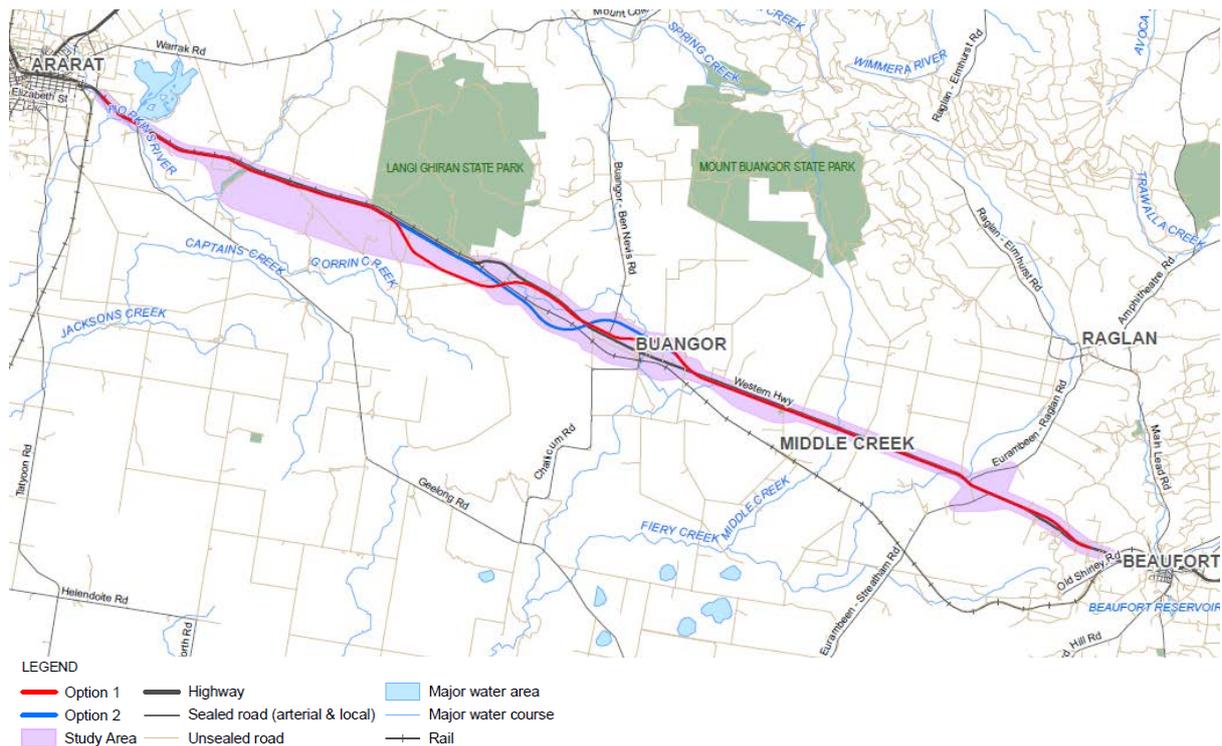


Figure 1: Options presented for review under the EES (Western Hwy Sec 2, Beaufort to Ararat).

1.5 EES conclusion

In May 2013, the Minister for Planning released his Assessment under the *Environment Effects Act 1978*, which completed the EES process (noting that the Minister’s assessment is not part of the EES process per se but a feature of the Act’s administration). In terms of biodiversity and habitat, the Minister concluded that Option 1 was the preferred alignment because overall, it had significantly less impact on native vegetation when compared with Option 2 (including less impact on vegetation of Very High and High Conservation Significance as assessed under Victoria’s *Native Vegetation Management - A Framework for Action*). The Minister’s Assessment was provided to statutory decision-makers to inform approval decisions on the Project (noting that statutory approval processes included amendments to the Ararat and Pyrenees Planning Schemes, permits under the *Flora and Fauna Guarantee Act 1988*, and Ministerial approval to clear native vegetation of Very High Conservation Significance under Victoria’s Native Vegetation Management Framework).

1.6 Underestimation of Large Old Trees within EES

The EES stated that the Project would require removal of up to 221 LOTS for Option 1. The EES further stated the following in regards to the 221 LOTS:

“...these numbers are a conservatively high estimate and include Scattered Trees and trees within patches of native vegetation” (Chapter 22, sec 22.1.2),

and;

“Mitigation measures including alignment refinements during detailed design should reduce the number of LOTS impacted by the Project, however it would not be possible to avoid all LOTS. With the application of management measures including micro-alignment and construction planning to minimise the number of LOTS impacted, it is

expected that the impact on LOTs would be minor. The number of LOTs is a conservative estimate and includes both Scattered Trees and those within patches of native vegetation. It is expected that the actual number of LOTs impacted would be less than these totals.” (Chapter 13, sec 13.8.1).

In May 2014, VicRoads final net gain analysis of Option 1 revealed that the 221 LOTs was a severe underestimation and that approximately 1350 LOTs would actually need to be removed (from within remnant patches of native vegetation) (Ecology and Heritage Partners Pty Ltd 2014). It was also appreciated at that time that the 221 LOTs was an estimate only, which should not have been presented in the EES as an absolute figure. Further still, it became apparent that the 221 LOTs only related to those occurring within remnant patches of native vegetation, and that further LOTs would be lost as Scattered Trees (a further 231 LOTs in addition to the 1350 LOTs from within patches). It was therefore incorrect for the EES to state that the 221 LOTs were inclusive of those within remnant patches *and* Scattered Trees.

In summary, the EES presented what turned out to be a significant underestimation of LOTs as an absolute maximum, and to further complicate matters, the context in which the figure was presented was not accurate.

1.7 Implications

The following outcomes have occurred as a direct result of, or at least have been exacerbated by VicRoads' underestimation of LOT losses:

1. Major reputational damage for VicRoads.
2. Community loss of faith in the EES process.
3. Community lack of confidence in VicRoads' environmental management processes.
4. Enormous media scrutiny with 64 media reports across newspapers, television and radio during the period of August - November 2015.
5. Public protests on site, including a 92-year-old woman chaining herself to a tree to prevent works from proceeding.
6. Considerably higher costs to purchase native vegetation offsets in comparison to what was initially budgeted.

Section 2: How did the LOT underestimation occur and what does it mean for the validity of the EES?

2.1 How were LOTs assessed?

In 2010, VicRoads engaged Ecology and Heritage Partners Pty Ltd to evaluate biodiversity values for several alignment options within multiple bands of interest (broad areas of land) along the Beaufort to Ararat corridor. VicRoads divided the study area into four zones, with multiple alignment options sitting within each zone (as described in Ecology and Heritage Partners Pty Ltd 2012, p.16). This meant that the ecological assessment covered a very large area with the investigation corridor being up to 1.6km wide in places. The assessment was commissioned to inform VicRoads high-level evaluation of potential alignment options in order to identify preferred options for further investigation. This report was finalised in 2011 (Ecology and Heritage Partners Pty Ltd 2011).

The scope of Ecology and Heritage Partners Pty Ltd investigation did not require a physical count of all LOTs potentially affected by the multiple alignments being considered at the time. The scope did however require an assessment of LOTs as a component of habitat quality in accordance with standard protocols administered under Victoria's Native Vegetation Management Framework (NRE 2002), in particular the Vegetation Quality Assessment Manual (VQAM), version 1.3 (DSE 2004).

This process involved estimating the density of LOTs within patches of vegetation and comparing this to a benchmark density for the particular Ecological Vegetation Class (EVC) being assessed. (Noting that all Victorian EVCs have been assigned a benchmark that represents the average characteristics of a mature and apparently long-undisturbed state for that vegetation type; e.g. the benchmark LOT density for Plains Grassy Woodland on the Victorian Volcanic Plain is 8 trees per hectare). LOTs for each EVC are defined by a minimum diameter (DBH) threshold as indicated in the EVC benchmark (e.g. the LOT threshold for Plains Grassy Woodland on the Victorian Volcanic Plain is 80cm for *Eucalyptus* species).

In order to assess LOT density, the VQAM (DSE 2004) suggests that assessors "*accurately measure a few 'large-looking' trees with a diameter tape to determine their DBH until this can confidently be determined by eye*" (DSE 2004, p. 19). Rather than relying solely on visual assessment, Ecology and Heritage Partners Pty Ltd ecologists physically measured and counted every individual LOT within a 1ha sample for each Habitat Zone (the base spatial unit for habitat hectare assessments, defined as a discrete area of native vegetation consisting of a single vegetation type (EVC) with an assumed similar averaged quality). Where a Habitat Zone was less than 1 ha, the entire zone was subjected to a physical count of all LOTs (e.g. if a habitat zone was 3.2ha then LOTs were individually measured and counted within a 1ha sample, whereas if the habitat zone was 0.48ha, then all LOTs within the entire 0.48ha were individually measured and counted). This approach is in keeping with what is prescribed by the VQAM and it was fit for the purpose of informing quality scoring.

Using this approach, each habitat zone was placed within the appropriate large tree density category and scored using the standard field recording sheet prescribed by the VQAM (refer to Figure 2 for a worked example). In addition to assessing LOT density, the health of LOTs was assessed by estimating the proportion of canopy cover that is present (i.e. not missing due to tree health, decline, insect attack or mistletoe infestation as per assessment charts provided in Appendix 4, p. 55 of the VQAM). Both LOT density and LOT canopy health contributed to the LOT score assigned to each habitat zone using the standard VQAM field recording sheet (as per Figure 2).

Note that LOTs were one of ten components assessed to make up the overall quality score for each habitat zone (Figure 3) as prescribed by the VQAM (DSE 2004). This method of assessing habitat

quality allows a maximum score of 10 for LOTs, or ten percent of the overall score (noting that the maximum possible habitat score is 100 as per Figure 3).

Large Trees	Score		
	5		
	% Canopy Health*		
Category & Description	> 70%	30-70%	< 30%
None present	0	0	0
> 0 to 20% of the benchmark number of large trees/ha	3	2	1
> 20% to 40% of the benchmark number of large trees/ha	4	3	2
> 40% to 70% of the benchmark number of large trees/ha	6	5	4
> 70% to 100% of the benchmark number of large trees/ha	8	7	6
≥ the benchmark number of large trees/ha	10	9	8

Large trees are defined by diameter at breast height (dbh)
- see EVC benchmark.
* Estimate proportion of an expected healthy canopy cover that is present (i.e. not missing due to tree death or decline, or mistletoe infestation).

Figure 2: Worked example of the large tree component of the VQAM field recording sheet.

	Component	Score
	Large Trees	10
	Tree Canopy Cover	5
'Site'	Understorey	25
'Condition'	Lack of weeds	15
	Recruitment	10
	Organic Litter	5
	Logs	5
'Landscape'	Patch Size *	10
'Context'	Neighbourhood *	10
	Distance to Core Area *	5
	Total	100

* these components can be derived on-site or with the assistance of maps and other information e.g. GIS)

Figure 3: Components and weightings of the habitat score as per VQAM (DSE 2004)

2.2 How were the LOT habitat quality scores used to estimate the total number of LOTs that would be removed?

The number of LOTs counted within the representative sample for each habitat zone (as described in section 2.1), was extrapolated to estimate the total number of LOTs that may occur across the remainder of the habitat zone. For example, if Habitat Zone 1 had a LOT per hectare estimate of 6, and there was a total of 7.78 hectares of Habitat Zone 1 to be removed within the alignment, then an estimate of 47 LOTs would be impacted within Habitat Zone 1 (with numbers rounded to the nearest whole number).

As previously discussed, Ecology and Heritage Partners Pty Ltd investigated several alignment options within multiple bands of interest, across a very large area. VicRoads divided the various alignment options into segments and these were used by Ecology and Heritage Partners Pty Ltd as a basis for reporting potential native vegetation losses for each alignment option. At this stage, Option 1 and Option 2 (as reviewed by the EES) had not been established, however the relevant segments that eventually comprised Option 1 were 1A, 2B, 3C1 and 4B (refer to Ecology and Heritage Partners Pty Ltd 2012 Figures 1, 2, 3A-3Y).

Using the extrapolation process for LOTs as described above, Ecology and Heritage Partners Pty Ltd estimated the number of LOTs to be removed within those segments that eventually made up Option 1, as 797 LOTs within patches and 196 LOTs occurring as Scattered Trees (Table 1). Note however that these estimates should be treated with caution when comparing with totals presented in the EES and subsequent field audits, as the segments initially assessed were to some extent different to the final Option 1 alignment. This difference is partly due to efforts made to reduce the final construction footprint and final corridor width, and partly due to ongoing alignment modifications made during the planning phase from 2010 - 2012.

Table 1: Native Vegetation Accounting Figures, Western Hwy, Sec 2.

	EHP final report to VicRoads 2011	EHP report EES tech document, 2012	EHP final Net Gain Assessment May 2014	Current status
Remnant patches <i>(hectares of native vegetation losses)</i>	166.29 (a)	110.77 (b)	91.84 (d)	69.3 (e)
LOTs <i>(losses of VLOTs and LOTs within patches)</i>	797 (a)	221 (b)	1350 (d)	710 (e)
Scattered Trees <i>(inc. ST, MOT, LOT and VLOT)</i>	247 (a)	249 (c)	295 (d)	175 (e)
Scattered trees <i>(VLOT and LOT only)</i>	196 (a)	132 (c)	231 (d)	124 (e)

- a) Figures taken from Ecology and Heritage Partners Pty Ltd Preliminary Net Gain Analysis, May 2011 (sum of totals for segments 1A, 2B, 3C1 and 4B which eventually comprised Option 1).
- b) Figures taken directly from Ecology and Heritage Partners Pty Ltd final report, August 2012, utilised as EES technical document.
- c) Figures calculated from Appendix 2.5 of Ecology and Heritage Partners Pty Ltd Aug 2012 and through manual interpretation of VicRoads drawings and Ecology and Heritage Partners Pty Ltd maps (Figures 3A to 3R).
- d) Figures taken directly from final Net Gain Analysis of Option 1 (Ecology and Heritage Partners Pty Ltd 2014).
- e) Figures taken directly from field audits commissioned by VicRoads in April 2015 (audits conducted by Ecology and Heritage Partners Pty Ltd).

2.3 Estimation of LOTs within EES technical document (Technical Appendix H - Biodiversity and Habitat Impact Assessment Report).

In mid 2011, VicRoads engaged GHD to prepare the Environment Effects Statement on behalf of VicRoads. In discussion with GHD, VicRoads re-engaged Ecology and Heritage Partners Pty Ltd to prepare the technical biodiversity and habitat reference document to inform the EES (which eventually became Technical Appendix H in the final EES). By this stage alignment Options 1 and 2 had begun to take form, and the appropriate spatial data was provided to Ecology and Heritage Partners Pty Ltd to overlay with the existing ecological mapping based on field data collected in 2010 (initially presented to VicRoads in a final report dated May 2011).

Adopting the same extrapolation process as described previously (Sec 2.2), estimates were established to gauge the potential extent of LOT removal by considering the proportion of each Habitat Zone affected by each alignment, and multiplying this area by the LOT per hectare estimate (initially derived from sampled areas during the 2010 fieldwork). Using this approach, the estimated number of LOTs within patches for Option 1 was reported as 221.

In presenting this estimate of 221 LOTs, Ecology and Heritage Partners Pty Ltd's report stated that LOTs had not been individually recorded within vegetation deemed to constitute a remnant patch, and that counts of individual trees within patches needed to be undertaken to determine the exact number of LOTs proposed to be lost. The Ecology and Heritage Partners Pty Ltd report also included advice that the estimated LOT losses were based on a sampling strategy that was indicative only, and that further assessment of LOTs was required to provide a more accurate estimate once the preferred alignment was chosen. These qualifications and limitations in regards to the data are presented in numerous places throughout the final report (Ecology and Heritage Partners Pty Ltd 2012, p. 23, 26, 34 and 182).

A further limitation of the LOT data was that ongoing alignment modifications were made throughout the planning phase, and these 'new' areas were not subjected to detailed field assessment with 'due diligence assessments' being undertaken instead (as directed by VicRoads). These due diligence assessments were undertaken on several broad areas adjacent to the original alignment options to identify EVCs, Scattered Trees, general habitat condition and determine presence of and/or potential habitat for significant flora and fauna species. LOTs within patches were not assessed as part of the due diligence assessments.

2.4 Why did the EES present the estimate of 221 LOTs as an absolute figure?

It was incorrect for the EES to state that 'up to' 221 LOTs would be removed for Option 1. The phrasing within Chapter 13 and 22 of the EES implied that the 221 LOTs were an absolute maximum. This error is attributed to a misinterpretation by VicRoads and GHD staff and a poor understanding of what the stated limitations of the data meant. The qualifications and limitations regarding the LOT data were either overlooked, or not properly understood and therefore dismissed without adequate further enquiry.

2.5 Why did the EES state that the estimated 221 LOTs were inclusive of those occurring as Scattered Trees and those within patches?

VicRoads and GHD incorrectly assumed that the estimated 221 LOTs was inclusive of both Scattered Trees and those within patches. To some extent, this can be attributed to a lack of understanding around how LOTs are defined and assessed in the field. It also appears that a contributing factor leading to this assumption was that in the final report (Ecology and Heritage Partners Pty Ltd 2012)

inadvertently omitted some of the Scattered Tree data (Ecology and Heritage Partners Pty Ltd has acknowledged this oversight noting that Table 11 as referenced in the body of the report is missing within section 7.2, p.84). It was therefore likely assumed (perhaps without adequate further enquiry) that the figure of 221 LOTs must have applied to both those occurring within patches and those occurring as Scattered Trees.

2.6 Why did the EES state that the figure of 221 LOTs was a conservatively high estimate?

In road construction planning it is common place for initial estimates of vegetation loss to be reduced as construction footprints are narrowed to minimise impacts. It is usually the case that the initial investigations are based on 'worst case scenarios' which incorporate very large footprints with buffer zones to cater for possible changes of alignment. As a result, initial estimates are often conservatively high, and as efforts are made to avoid and minimise vegetation removal, the area of proposed vegetation loss is reduced. To this end, the EES correctly outlined how the approximate 110 hectares of native vegetation proposed for removal for Option 1, would be reduced through detailed design and construction planning. As shown in Table 1 (p. 9 of this report), there has been a significant reduction from the initial estimated 110 hectares down to 69.3ha (based on recent field audits).

It appears however that through a lack of understanding in how the LOT estimate was established, VicRoads and GHD incorrectly assumed that the 'rule of thumb' relating to gradual reductions in proposed vegetation loss through detailed design and construction planning, applied to the LOT estimate (whereas this philosophy should only have applied to the estimated hectares of native vegetation).

The end result is that there is a significant disconnect between the Ecology and Heritage Partners Pty Ltd report and the EES. Ecology and Heritage Partners Pty Ltd initially presented the estimate and made it clear that if accurate counts were required, then physical counts of individual LOTs within patches would be needed (i.e. rather than relying on an estimate that had been established through a sampling strategy initially designed for habitat quality scoring purposes; not as a means for inferring the total number of LOTs potentially affected by the entire alignment). In short, the EES took what was an unqualified estimate with stated limitations and incorrectly presented it as a 'conservatively high' estimate.

2.7 Would the underestimation of LOTs have influenced the assessment of Options during the EES process and would the preferred alignment have been different if the actual impact on LOTs was known from the outset?

We have to accept that it is impossible to know whether the outcome of the EES would have been different if what we now know to be the correct number of LOTs had been included from the outset. What we can do however is examine the statements and documents tendered as part of the EES and draw assumptions from those as to whether the underestimation had an impact on the EES process.

The primary EES objective in relation to assessing Biodiversity impacts was as follows:

"To avoid or minimise effects on flora and fauna species and ecological communities listed under the Flora and Fauna Guarantee Act 1988 (FFG Act) or the Environment Protection and Biodiversity Conservation Act 1999 and as well as comply with requirements under Victoria's Native Vegetation Management - A Framework for Action".

This evaluation objective was repeatedly reinforced throughout the EES documentation including the EES scoping requirements (2011, p. 11), the EES itself (Chapter 13, Section 13.1) the panel report (2013, p.38) and Minister's Assessment (2013, p. 5).

As outlined in Chapter 13 of the EES, during the Options Assessment process, matters of National Environmental Significance (NES) and vegetation of Very High and High Conservation Significance were deemed to be of highest conservation value, and priority was given to avoiding and minimising impacts on matters of NES where possible.

The Minister's Assessment concluded the following:

"So the focus of determining which option should be implemented is the consideration of effects on biodiversity and habitat, largely native vegetation with VHCS or HCS which provides habitat for protected species. In doing so, this Assessment finds that Option 1 (the "alternative alignment" in the EES) would have a superior overall biodiversity outcome, due to clearly lower impacts on native vegetation (both total amounts and amounts of VHCS and HCS vegetation), as well as lower impacts on habitat areas adjacent to Langi Ghiran State Park. Option 1 would maintain better habitat connectivity between the State Park and large areas of bushland south of the existing highway in particular and result in less potential for road kill of native animals in this area of high biodiversity values. These ecological benefits in the areas adjacent and near the State Park, as well as the lower total amount of significant native vegetation to be cleared for Option 1, outweigh its marginally higher impact on Golden Sun Moth habitat and Grassy Eucalypt Woodland of the Victorian Volcanic Plain" (Minister's Assessment 2013, p. 25).

From this assessment it appears that the local significance of LOTs was not a priority consideration in selecting the preferred alignment. The primary focus was centred on State and Commonwealth threatened species and ecological communities, and vegetation assessed as Very High and High Conservation Significance. This is reflected in minutes from the EES Technical Reference Group (TRG), and the Department of Sustainability and Environment's (DSE, now part of DELWP) formal submission on the EES and Planning Scheme Amendments (tabled at the panel hearing). These submissions did not make any specific mention of LOTs but instead focussed on the overall amount of hectares of native vegetation, and the significant species and ecological communities potentially affected by each option. It is also relevant to note that Table 2 within the Minister's Assessment (p.9) presents a comparison of native vegetation losses between Option 1 and Option 2, and this excludes numbers of LOTs whilst emphasising the hectares of native vegetation lost and the corresponding 'habitat hectare' values.

It appears that the value of LOTs were only considered relevant in terms of confirming actual numbers prior to construction so that native vegetation offsets could be calculated appropriately (refer to potential strategies to achieve Net Gain in section 13.7.2 of the EES).

Given that the primary biodiversity focus appeared to be on matters other than LOTs, it is not unreasonable to speculate that even if the increased number of LOTs had been known, the options assessment would not have been greatly influenced and Option 1 would have likely remained as the favoured alignment.

2.8 Would the underestimation of LOTs have affected the quality scores and overall determination of Conservation Significance for each habitat zone?

As per Figure 4, the Native Vegetation Management Framework requires that Conservation Significance be determined for every Habitat Zone that is assessed. Conservation Significance is

determined by combining the habitat quality score with the EVC’s Conservation Status (noting that DSE has pre-assigned a Conservation Status for all EVCs within the State of Victoria).

As discussed in section 2.1, LOTs were one of ten components assessed to make up the overall quality score for each habitat zone as prescribed by the VQAM (DSE 2004). This method of assessing habitat quality allows a maximum score of 10 for LOTs, or ten percent of the overall score (noting that the maximum possible habitat score is 100 as per Figure 3).

It is therefore reasonable to question whether the underestimation of numbers of LOTs might have led to a corresponding lower habitat quality score that ultimately affected how Conservation Significance was determined. In particular, this may have led to different quantities of VHCS and HCS vegetation being presented in the EES, which then could have influenced which alignment was selected (noting that the amount of VHCS and HCS vegetation was a critical consideration in selecting the final alignment). In posing this question, it is important to remember that an individual count of all LOTs within an entire Habitat Zone is not required in order to assign a score of LOTs (as outlined in section 2.1). Notwithstanding this, it is still valid to question whether the overall proportion of VHCS and HCS vegetation would have changed (thereby influencing the options assessment process) if the actual number of LOTs was known at the time.

To explore this further, a review of habitat quality scores was undertaken for all habitat zones across Option 1 and Option 2 (review undertaken by M. Mooney, Nov 2015). A hypothetical 10/10 score was applied to all relevant habitat zones (excluding treeless vegetation such as Plains Grassland and Plains Grassy Wetland, Degraded Treeless Vegetation, and habitat zones that were initially given a LOT score of 0 to indicate that LOTs were absent from the patch). Figures 5-6 and Tables 2-3 show that whilst there was a change in the overall amount of VHCS and HCS vegetation for both options, Option 1 still had significantly less VHCS and HCS vegetation and therefore would have remained the preferred alignment. It is also relevant to note that when combining VHCS and HCS that Option 2 still had an additional 15ha in comparison with Option 1 when applying both the original quality scores and the hypothetical 10/10 for LOTs (i.e. no change).

CONSERVATION SIGNIFICANCE	VEGETATION TYPES		OR SPECIES
	Conservation Status ¹	Habitat Score ²	
VERY HIGH	Endangered	0.4 - 1	<ul style="list-style-type: none"> best 50% of habitat for each threatened species² in a Victorian bioregion
	Vulnerable	0.5 - 1	
	Rare	0.6 - 1	
HIGH	Endangered	< 0.4	<ul style="list-style-type: none"> the remaining 50% of habitat for threatened species² in a Victorian bioregion best 50% of habitat for rare species² in a Victorian bioregion
	Vulnerable	0.3 - 0.5	
	Rare	0.3 - 0.6	
	Depleted	0.6 - 1	
MEDIUM	Vulnerable	< 0.3	<ul style="list-style-type: none"> the remaining 50% of habitat for rare species² in a Victorian bioregion best 50% of habitat for regionally significant species²
	Rare	< 0.3	
	Depleted	0.3 - 0.6	
	Least Concern	0.6 - 1	
LOW	Depleted	< 0.3	
	Least Concern	< 0.6	

Figure 4: Determining Conservation Significance in accordance with Victoria’s Native Vegetation Management Framework - A Framework for Action (NRE 2002).

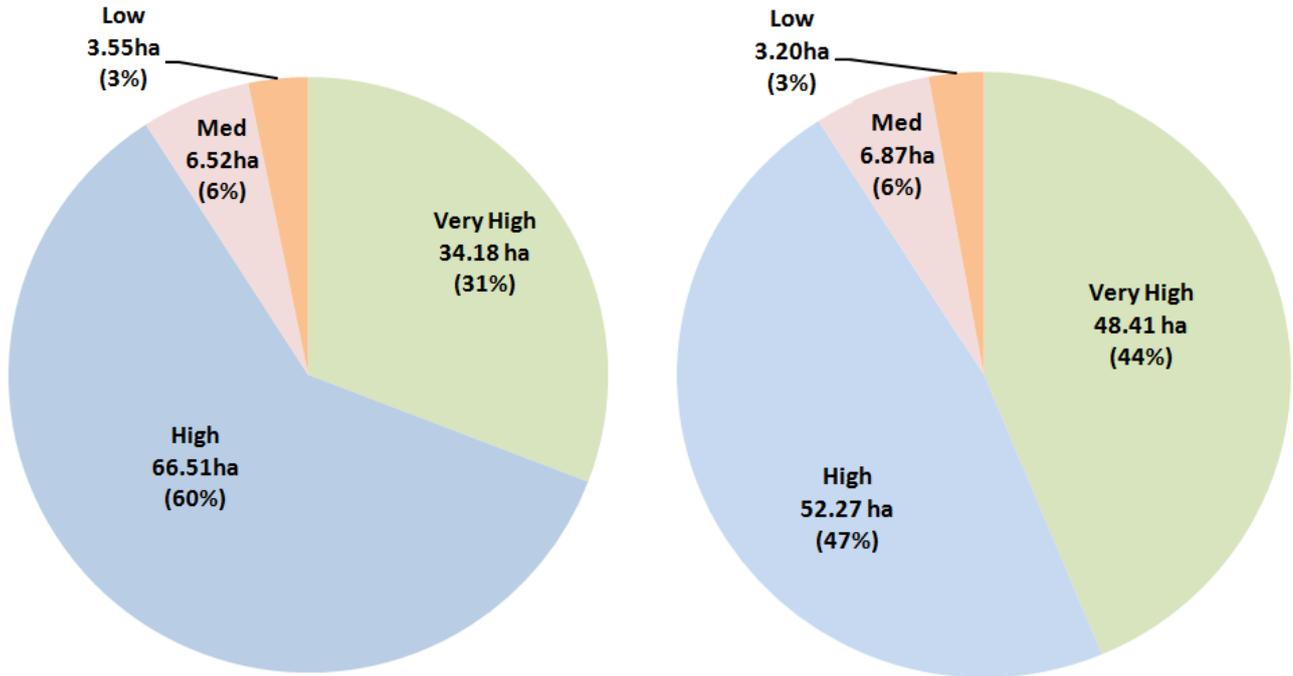


Figure 5: Option 1: overall proportions of Conservation Significance based on original quality scoring (left) and hypothetical maximum LOT score of 10/10 for all relevant habitat zones (right).

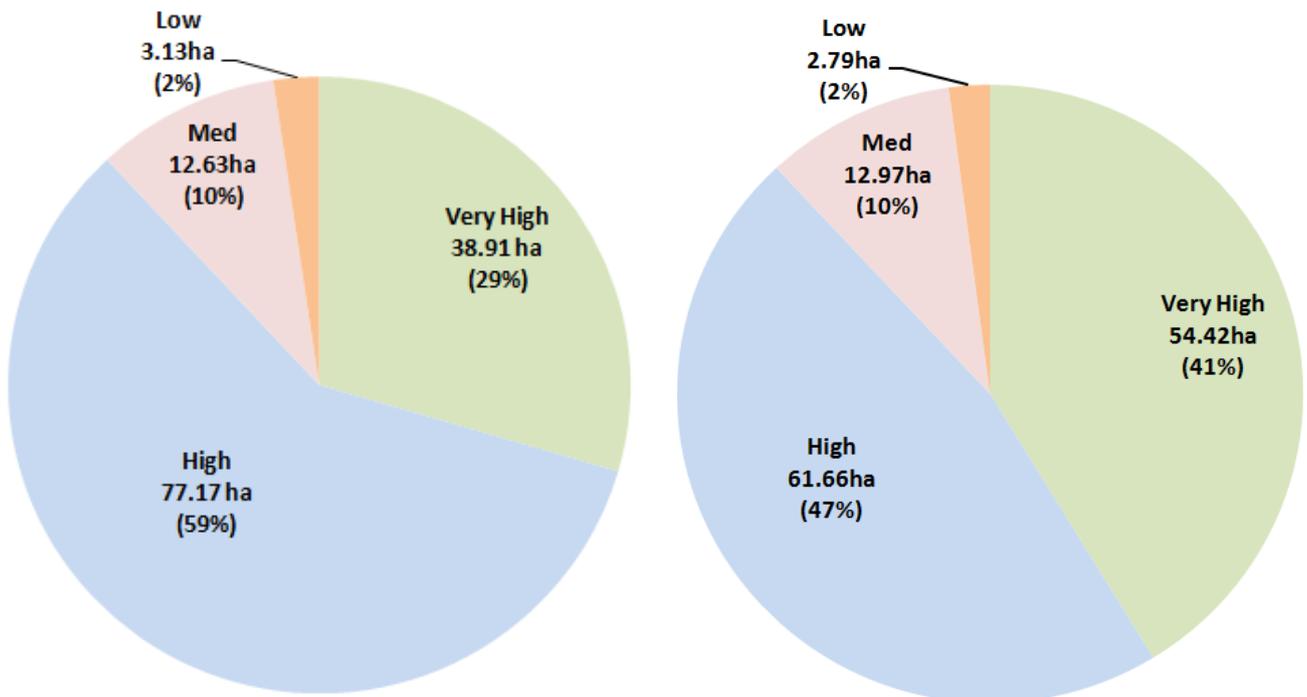


Figure 6: Option 2: overall proportions of Conservation Significance based on original quality scoring (left) and hypothetical maximum LOT score of 10/10 for all relevant habitat zones (right).

Table 2: Comparison of proportion of VHCS and HCS vegetation of Conservation Significance based on original quality scoring.

	HCS (ha)	VHCS (ha)	Tot (ha)
Option 1	66.51	34.18	100.7
Option 2	77.17	38.91	116.1
	*Option 2 had an additional 10.66ha of HCS in comparison to Option 1.	*Option 2 had an additional 4.73ha of VHCS in comparison to Option 1.	*Option 2 had a combined area of approx 15ha (both VHCS and HCS) in comparison to Option 1.

Table 3: Comparison of proportion of VHCS and HCS vegetation of Conservation Significance based on hypothetical maximum LOT score of 10/10 for all relevant habitat zones.

	HCS (ha)	VHCS (ha)	Tot (ha)
Option 1	52.27	48.41	100.7
Option 2	61.66	54.42	116.1
	*Option 2 had an additional 9.39ha of HCS in comparison to Option 1.	*Option 2 had an additional 6.01ha of VHCS in comparison to Option 1.	*Option 2 had a combined area of approx 15ha (both VHCS and HCS) in comparison to Option 1.

2.9 Why weren't LOTs individually counted for Option 1 and Option 2 prior to the EES?

As described in Section 2.1, the point in time at which the ecological fieldwork was initially undertaken in 2010 was in the very early planning stages when the investigation corridor was 38km in length and up to 1.6km wide in places. The ecological investigation at this stage was about identifying high-level matters such as the presence of threatened species and ecological communities and high-quality patches of native vegetation that should influence the positioning of alignment options. A physical count of individual LOTs across such a large area would have been extremely time-consuming and expensive, neither of which was justified at that time. A physical count at that time would also have, in many ways, provided superfluous detail that was not relevant at that particular time of the planning phase.

It is true however, that as Options 1 and 2 emerged as potentially the most feasible alignments, there was a window of opportunity during the later planning stages in late 2011 / early 2012 where a final Net Gain Assessment of both options (including a count of individual LOTs in patches of vegetation) could have been undertaken. The agreed alternative approach however was that a final Net Gain Assessment could be undertaken after the EES process, once the final alignment was adopted and a more detailed design was completed (as described in Section 13.7 of the EES). This

decision was influenced by the EES scoping requirements that placed emphasis on high-level matters such as threatened species and ecological communities and HCS and VHCS vegetation, rather than numbers of LOTs that might be affected.

As planning progressed and the EES was being drafted, the decision to hold off on a final Net Gain Assessment until after the final alignment was adopted would have likely been reinforced by VicRoads' understanding at the time, that the 221 LOTs was a conservatively high estimate that would be reduced through detailed design and construction planning. This decision also reflected a view that confirming numbers of LOTs to be removed was in some ways an administrative task that was important in the context of finalising offset requirements, but not a major factor in influencing which alignment option should be adopted.

2.10 Would the type of required statutory approvals and associated conditions have been any different if the actual LOT impact was known from the outset?

As previously stated, it is impossible to know with any certainty if the decision would have been different if the true number of LOTs were known at the relevant time. However, it is considered likely that the suite of required statutory approvals and associated conditions (as per the Incorporated Document for the final EES) would have been similar if the actual number of LOT losses was known at the time of the EES being assessed.

An Environment Effects Statement (EES) is the highest level of environmental assessment that a project can be subjected to under Victorian legislation. The EES does not provide formal approval for a project to proceed, rather it provides information to help the Minister for Planning set conditions that must be applied to relevant statutory approvals (if indeed the responsible authorities decide to grant the necessary approvals thereby allowing the project to proceed).

In May 2013, the then Minister for Planning wrote to VicRoads to advise that he had assessed the potential environmental effects of the Project and considered they could be adequately managed through the Environmental Management Framework (EMF) detailed in the Environment Effects Statement (Figure 7) and through the relevant statutory approval processes. These included amendments to the Ararat and Pyrenees Planning Schemes, permits under the *Flora and Fauna Guarantee Act 1988*, and Ministerial approval to clear native vegetation of Very High Conservation Significance under Victoria's *Native Vegetation Management - A Framework for Action*.

The EMF (Figure 7) was established to ensure that environmental measures (as detailed in the EES) were incorporated into project decisions and approvals. The Minister required that the EMF and core management plans be included as conditions of the Planning Scheme Amendment Incorporated Documents and be developed in consultation with and to the satisfaction of the appropriate agencies. The key elements of this relating to native vegetation removal included the following:

1. **Native Vegetation Management Plan** detailing additional measures to reduce the impacts on native vegetation and listed ecological communities, identified during the detailed design stage. This plan was prepared to the satisfaction of DSE and DSEWPC before construction commenced.
2. **Native Vegetation Offset Management Plan:** This was prepared in accordance with Victoria's *Native Vegetation Management - A Framework for Action* (2002) and the EPBC Act Environmental Offsets Policy (October 2012), in consultation with DSE and DSEWPC, and was submitted to and endorsed by the Secretary of the DSE (or delegate).

3. **Threatened Species Management Plans:** These be prepared for Spiny Rice-flower, Dwarf Galaxias and Golden Sun Moth in consultation with the DSE and DSEWPC and then be submitted to, and endorsed by the Secretary of the DSE (or delegate),

The most relevant of these approval processes and core management plans in relation to the LOT issue were the amendments to the Ararat and Pyrenees Planning Schemes, the Native Vegetation Management Plan, and the Native Vegetation Offset Management Plan. This same suite of mechanisms would have still applied regardless of the number of LOTs proposed for removal.

2.11 What about compliance with the Native Vegetation Management Framework?

Given that the underestimation of LOTs would not have significantly influenced the proportion of VHCS and HCS vegetation affected by either alignment (as outlined in Section 2.8), it is not unreasonable to suggest that the manner in which the 'Avoid' and 'Minimise' principles were applied to select the preferred alignment remains valid (with respect to avoiding and minimising impacts on those matters that were afforded priority in accordance with the primary EES evaluation objective for biodiversity and habitat). VicRoads implementation of the 'Avoid' and 'Minimise' principles is outlined in detail within Section 13.6 of the EES.

At the time of the EES, VicRoads Net Gain Assessment was only preliminary in nature (as described in Section 13.7 of the EES) and a final Net Gain Assessment was to be conducted once the final alignment was adopted and a more detailed design was completed. In order to achieve Net Gain, VicRoads committed to the following:

1. A final alignment would be adopted in order for all vegetation losses to be identified.
2. The vegetation offset requirements would be calculated.
3. Project timeframes and timing of vegetation removal would be estimated.
4. Offsets would then be secured.

In accordance with these steps, VicRoads completed its final Net Gain Assessment of Option 1 in May 2014 (Ecology and Heritage Partners Pty Ltd 2014). It was this assessment that first revealed that the initial estimate of 221 LOTs was inaccurate and that approximately 1350 LOTs would in fact require removal from within patches of native vegetation. At the time of this realisation, VicRoads considered that the main concern with the LOT underestimate was that the required offset costs would be substantially increased from what was initially estimated, and the increased offset may be difficult to immediately find.

The key question in terms of compliance with Victoria's *Native Vegetation Management Framework - A Framework for Action* (NRE 2002) is therefore whether the actual total number of LOTs has been accounted for in calculating the native vegetation offset for the project. As detailed within the approved Native Vegetation Offset Plan, the entire 1350 LOTs were included in the calculated losses and corresponding offset gains, thereby ensuring the project will comply with the Native Vegetation Management Framework. VicRoads has secured the required offsets for the LOTs removed. This offset equates to the protection (in perpetuity) of approximately 50ha of native vegetation.

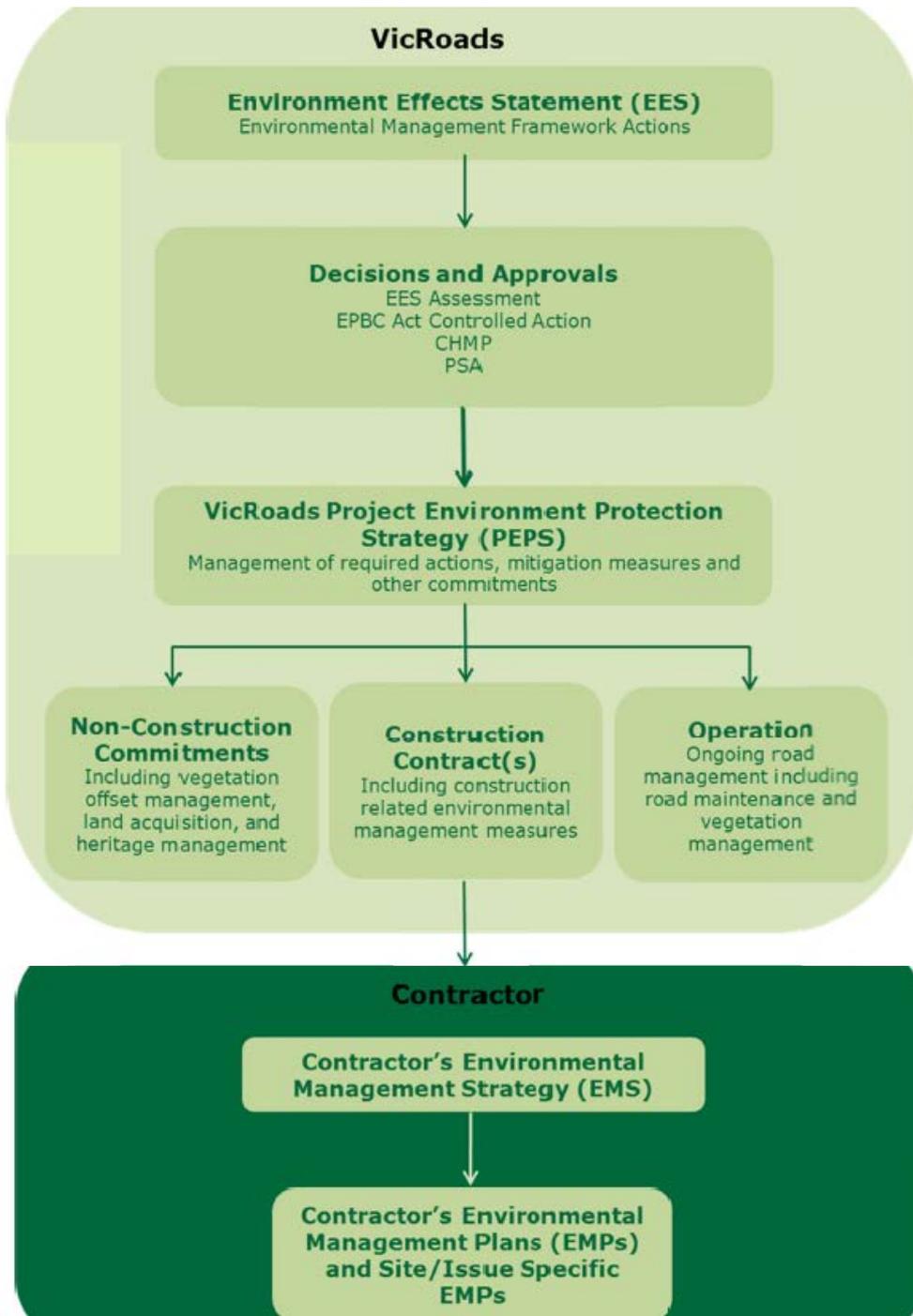


Figure 7: VicRoads' Project Environmental Management Structure (EES, Figure 21-1, page 21-4)

Section 3: Key Learnings and Improvement Opportunities

3.1 Deciding that a final count of LOTs in patches did not need to be completed prior to the EES.

It is understandable in all the circumstances that VicRoads made this decision. VicRoads was influenced by the fact that the EES evaluation objective focussed priorities elsewhere and that VicRoads believed that the 221 LOTs was a conservatively high estimate (inclusive of both Scattered Trees and those within patches) that would be reduced through detailed design and construction planning.

Aspects of this interpretation have proven to be problematic, and in some instances assumptions appear to have been made by VicRoads and GHD without seeking appropriate advice from Ecology and Heritage Partners Pty Ltd.

VicRoads staff acted on the above with little to no appreciation of what was defined as a LOT for each EVC, and therefore staff were in a poor position to make their own judgment on roughly how many LOTs would expect to be encountered within the landscapes being assessed. As a result, Ecology and Heritage Partners Pty Ltd's explanation of the LOT sampling method, and the limitations initially presented with the estimate of 221 LOTs, were not properly understood and therefore dismissed without adequate further enquiry (noting that this data was also accepted by the EES Technical Reference Group). The 221 LOTs was therefore misinterpreted as an absolute maximum, rather than an estimate, and the benefits of undertaking a count of individual LOTs (as part of a final Net Gain Assessment) prior to the EES were not appreciated. In hindsight, the benefits would have been three fold:

1. VicRoads would have been able to present absolute numbers of LOTs up front for consideration as part of the EES. The actual impact could have been presented as rigorous fact and with confidence.
2. VicRoads would have known the actual offset costs from the outset (noting that initial estimates for LOT offsets were \$850K based on removal of 221 LOTs, but this escalated to \$4.2M when the actual number of 1350 LOTs was realised).
3. VicRoads would have been in a much stronger position to facilitate avoiding and minimising impacts on LOTs through the detailed design and pre-construction planning phases, and then demonstrated this to the community and interested stakeholders.

A key improvement opportunity is therefore for VicRoads to ensure that counts of individual LOTs are undertaken prior to attempting to articulate the impacts of various alignment or construction options (regardless of whether that be through the EES process, a Planning Scheme Amendment, Planning Permit, or some alternative statutory approval process).

It is important to understand the point at which counting and measuring of every individual LOT for each alignment option or construction footprint should occur. As previously discussed in Section 2.9, Ecology and Heritage Partners Pty Ltd undertook the fieldwork in 2010 when the company was initially engaged to provide an ecological assessment across broad corridors up to 1.6km wide, and it would have been time and cost prohibitive to measure and count every LOT at this stage (and potentially superfluous for that particular point in time when the focus was to identify high-level matters, such as impacts on threatened species and ecological communities, that would influence the positioning of alignment options).

It is therefore considered more appropriate to generally measure and count individual LOTs after the initial planning phase has narrowed the field of alignment options (e.g. after some options may have

been eliminated due to potentially unacceptable impacts on high-level matters of ecological importance). This also ensures that the study area becomes a more realistic physical area to assess as alignment corridors will generally become more restrained as the planning process progresses.

Recommendation 1: Undertake counts of individual LOTs at the appropriate stage of the planning process.

3.2 Not informing the community when the underestimation of LOTs was realised.

As previously discussed, VicRoads became aware of the underestimation of LOTs in May 2014 when the final Net Gain Assessment was completed for the adopted alignment. VicRoads notified DSE, however the resulting informal discussions mainly revolved around the difficulty in immediately sourcing the required offsets and the subsequent increase in offset costs. The broader community was not informed of the increased number of LOTs until March 2015 when VicRoads notified the project's Environmental Consultation Group. By not informing the community sooner, it appeared that VicRoads was attempting to hide the issue from the public, and it created an air of conspiracy around the project and loss of community trust that VicRoads has been working extremely hard to regain.

Had VicRoads made a conscious decision to be more proactive and inform the community sooner, it would have been possible to articulate how the error was made and what it meant for the EES process, and in particular, that Option 1 would have remained as the preferred option from the biodiversity and habitat perspective.

Recommendation 2: Be more proactive in informing the community about matters that are likely to be of significance to them.

3.3 Staff resourcing - VicRoads Environmental Officers for Major Projects

Up until recently (when a short term secondment was arranged from October - December 2015), the Western Highway Project team has not included a dedicated environmental officer.

During the early planning phases, the VicRoads Project team acknowledged that preparation of the EES documentation was beyond the technical capability of the team. A decision was therefore made to appoint a suitably qualified and experienced consultant (GHD) to prepare the EES documents. Subsequent feedback from VicRoads staff involved in the planning phase suggests that staff with a limited technical environmental background, found it difficult to know at what point a consultant's advice or work should be interrogated and questioned, and when it should be accepted as the 'experts opinion'.

A common theme during recent interviews with key staff involved in the planning phase is that many of the environmental issues faced by the Project could have been avoided, or at least better addressed, if the VicRoads Project team included a suitably qualified and experienced environmental practitioner to provide guidance for engineering and Project management staff. Strong feedback in this regard has also been provided to VicRoads from the community (Western Highway Alternative Mindset, and the Environmental Consultation Group for the Project), and Ecology and Heritage Partners Pty Ltd which have expressed a view that better results and smoother efficiencies are generally achieved when the point of contact within VicRoads is a relatively informed purchaser (i.e. either a VicRoads Environmental Officer or an Engineer / Project Manager who is guided and assisted by an Environmental Officer).

Appointing appropriately-skilled and qualified environmental officers on VicRoads major projects would better reflect what VicRoads expects of its Contractors, as per Section 176 (177.A6) which states that:

The Contractor shall engage a suitably experienced and skilled environmental management professional to prepare the Environmental Management Plan and manage and monitor all environmental issues and environmental treatments implemented during construction. The individual shall be full-time on site.

Recommendation 3: Consider appointing dedicated Environmental Officers to VicRoads major projects teams where there are significant environmental risks involved.

3.4 LOT sampling methodology

As discussed in Section 2.1, the primary objective governing the design of the LOT sampling methodology was to inform habitat quality scoring (for which the method was fit for purpose). Given that such a large area was initially assessed in 2010, and only one single alignment would eventually be chosen, it was determined that the LOT sampling could *also* be used to infer numbers of LOTs that may be affected by the various alignment options being considered, rather than physically measuring and counting each individual LOT which would have been an extremely labour-intensive and costly exercise.

A recent analysis of the original datasets has shown that approximately 15% of the initial study area was subject to physical counts of individual LOTs within patches (36ha surveyed from a total of 246ha). Although 15% may seem like a relatively small sample size, it is understandable given the planning context of the time, that this would be used to make some level of inference about the total number of LOTs potentially affected. We now know however that this led to an underestimate of the LOTs.

The estimated figure of 221 LOTs occurring within the 110.6 ha of remnant vegetation associated with Option 1, inferred that LOTs within patches occurred at a density of two per hectare. When the actual LOT losses were calculated in the final Net Gain Assessment (Ecology and Heritage Partners Pty Ltd 2014), it was realised that approximately 1350 LOTs occurred within 91.84ha of remnant vegetation for Option 1, which equates to a density of 15 LOTs per ha.

Whilst the LOT sampling methodology was fit for the identification of alignment options with least ecological impact (defined as potential impact on threatened species and communities, and vegetation of HCS and VHCS), it is now clear (with the benefit of hindsight) that the methodology was not sufficiently robust to infer numbers of LOTs that would potentially be removed across a detailed alignment. This is most likely due to the uneven manner in which LOTs are distributed across landscapes due to factors such as soil type, soil moisture, topography and prior land use (meaning that the density of LOTs can increase and decrease markedly across very short distances).

The impact of this underestimation was exacerbated by the concluding statement in Chapter 22 of the EES which misleadingly stated that the LOT estimate included both Scattered Trees and those within patches, before going on to state that the estimate was “conservatively high”.

Ecology and Heritage Partners Pty Ltd has recently provided the following written acknowledgment to VicRoads:

Ecology and Heritage Partners acknowledge the limitations in using a sampling strategy to estimate the number of LOTs in remnant patches. We acknowledge the community's concerns with regard to the Project and moving forward will adopt the following strategies to ensure our work remains accurate and transparent:

- *Reconsider use of sampling strategies for very large assessment areas;*
- *Consider alternative methods for determining broad-scale impact;*
- *Where a sampling strategy may be deemed appropriate, the sampling area will be significantly increased and regularly cross-checked to ensure it remains accurate.*

We acknowledge that the LOT data was presented in technical documents in a manner that was easily misinterpreted, particularly for those readers without a technical background in vegetation assessment. The EES technical documents would have benefited from either:

- *More detailed cautionary advice on the use of the LOT estimation in determining tree losses;*
- *Using ranges to indicate the number of trees likely to be present in remnant patches rather than a specific number; or*
- *Remaining silent on the number of LOTs within patches (apart from stating that they would need to be counted in order to finalise offset targets).*

Recommendation 4: Exercise caution in reviewing sampling strategies that attempt to estimate LOT losses across large areas. VicRoads should ensure that it properly understands consultants' sampling strategies and is comfortable they are fit for purpose before supporting their adoption.

3.5 Preparation of the EES documentation

Some of the assumptions and interpretations made in regards to Ecology and Heritage Partners Pty Ltd data in drafting the EES have proven to be inaccurate and problematic. In particular, the concluding statement in Chapter 22 of the EES which presented the LOT estimate as "conservatively high" and inclusive of both Scattered Trees and those within patches, has been a source of major concern. Evidence suggests that Ecology and Heritage Partners Pty Ltd was not adequately involved in the drafting of some critical aspects of the EES (including Chapter 22).

Recommendation 5: Ensure that technical experts are given adequate opportunity to review and provide feedback on the final draft of an EES before it is released for exhibition to ensure that technical information is presented and conveyed accurately.

3.6 The EES scoping requirements and evaluation objectives

Section 2.7 of this report discusses the primary evaluation objective of the EES in regards to biodiversity and habitat and what ecological matters were given priority consideration during the options assessment process. State and federally listed threatened species and communities and vegetation of HCS and VHCS were clearly the driving forces in the alignment selection process.

It is however valid to question whether the local and regional value of LOTs should have featured more prominently in the EES scoping requirements and evaluation objectives. VicRoads recent experiences certainly suggest that people readily relate to old growth trees, probably because they are large visible entities that people connect with as part of their 'sense of place'. For the general community, large old trees are likely to be a more tangible or personally accessible element of nature than less conspicuous threatened species or communities that may not have a strong public profile. Various authors have published similar observations in this regard, including Blicharska and Mikusinski (2014):

With age, trees may attain dimensions (e.g. height or biomass) and complexity larger than virtually any other type of living organisms. As such, large old trees easily awaken emotions, appeal to aesthetic sentiments, and are often perceived as important landmarks. (Blicharska and Mikusinski 2014, p. 1559).

There is a sufficient body of literature that establishes the values of large old trees and demonstrates that a major decline in the number of large old trees within rural landscapes poses significant consequences for biodiversity and agricultural productivity (Gibbons et al. 2008, Manning et al. 2012, Lindenmayer et al. 2014).

It has been argued that policies aimed at sustaining large old trees must accommodate differences from the traditional conservation approaches that aim to prevent the extinction of threatened species or communities (Blicharska and Mikusinski 2014, Lindenmayer 2014). It has also been suggested that rather than a given tree species going extinct, its large old tree life stage may go extinct temporarily or permanently (Lindenmayer et al 2014). Lindenmayer et al. 2012 describes the potential for a "functional extinction" where the key ecological roles of large old trees may be lost from certain landscapes even though the particular tree species remains extant.

In terms of the Western Highway Duplication (Section 2), it may be considered that the EES scoping requirements and evaluation objectives automatically encompassed the value of LOTs by requiring the Project to achieve compliance with Victoria's *Native Vegetation Management Framework - A Framework for Action*. The Framework certainly recognises LOTs as "important environmental assets that are being progressively lost and are impossible to replace in the short term" (NRE 2002, p. 24), however this is more within the context of them needing to be accounted for within offsets, rather than them being a major determining factor in responses to clearing proposals (this aspect being driven more by Conservation Significance as per Table 6, p. 54 of the Framework).

It is important for VicRoads to note that the current Permitted Clearing Regulations (DEPI 2013) (which did not apply at the time of the Section 2 EES) do not require LOTs to be accounted for within proposals to clear native vegetation or as part of native vegetation offsets. As such, there is somewhat greater potential for the value of LOTs to be overlooked on projects assessed under the current regulations.

For these reasons, VicRoads needs to shift its thinking beyond a compliance-based statutory focus, and understand that in some instances, the focus may need to be broadened beyond threatened species and ecological communities to encompass important local values.

Recommendation 6: In the case of future Environment Effects Statements, VicRoads, when responding to scoping requirements, should be mindful of capturing environmental criteria that are important to the community in addition to legislated biodiversity matters.

3.7 Community consultation

It has been suggested that many of the environmental challenges faced by the Western Highway Project have been due to a lack of community consultation. At an Environmental Consultation Group meeting in November 2015, members of the community expressed a view that they did not understand the full extent of vegetation clearance and ground disturbance until machinery moved in and commenced works; and that relevant stakeholder groups were not adequately identified in the early planning stages.

As part of the EES, VicRoads prepared a Consultation Plan in accordance with the requirements of the *Environment Effects Act 1978*. This plan established a framework for community and stakeholder consultation and identified key interest groups that would be targeted for consultation activities. Interestingly the plan identified Landcare groups under the heading of Representative and Interest Groups, but according to recent feedback, it was not until concerns were raised by Ararat Landcare, after works had commenced, that detailed and productive consultation with local Landcare Groups really began to occur.

According to VicRoads staff involved in the planning phase of the Project, VicRoads placed a high value on effective community and stakeholder engagement and resourced this task appropriately with experienced Communications Officers. In addition, community and stakeholder consultation was embraced as an integral component of individual roles for staff involved from the planning, engineering and management perspectives. This commitment and positive attitude is reflected in the extensive correspondence that exists from community consultation sessions and engagement with affected landowners.

Key aspects of consultation included:

- Information bulletins, public displays and fortnightly updates on the VicRoads' website.
- Community consultation sessions on shortlisted alignment options took place in Buangor on 13 July 2011, Beaufort on 16 July 2011 and Ararat on 14 July 2011.
- Photomontages were prepared for the Eurambeen area and the northern side of Buangor to show the anticipated visual impact on the residents and the Buangor Primary School.
- In order to evaluate the potential landscape impacts from Mount Langi Ghiran, digital visualisations of views from a scenic lookout were prepared for both Options 1 and 2. These are shown in Figure 17-19 and 17-20 of the EES.
- Further consultation continued with affected landowners through 2011 and 2012, up to the date of the EES Inquiry Panel hearing.

In undertaking these activities, the majority of face-to-face consultation occurred in areas that were physically affected by the alignment options being considered.

Key learnings in relation to community consultation for this project relate to how environmental groups from broader areas (i.e. beyond those areas physically affected) can be engaged early in the process. To this end, peak environmental groups such as the Field Naturalists Club of Victoria, the Victorian National Parks Association, and Environment Victoria could be targeted for receiving information bulletins and updates (i.e. as a means of reaching interested individuals from across a wide area).

In addition, it appears that greater emphasis could have been placed on producing maps and plans at an appropriate scale that would allow people to visualise the actual likely impacts in a more

meaningful way (i.e. it has been suggested that the roll plots and engineering drawings used at consultation sessions made it difficult for members of the public to readily appreciate the extent of vegetation removal and ground disturbance). VicRoads should also endeavour to utilise available technology more consistently, particularly in terms of 3D modelling and 'virtual tours' that can be placed on digital social media outlets to communicate alignment options in a more effective manner.

Recommendation 7: Assess the need to consult more broadly beyond those areas physically affected by alignment options and; harness technological advancements (e.g. 3D modelling and social media) more consistently.

3.8 Summary of key learning recommendations

The key learning recommendations are summarised as follows:

Recommendation 1: Undertake counts of individual LOTs at the appropriate stage of the planning process.

Recommendation 2: Be more proactive in informing the community about matters that are likely to be of significance to them.

Recommendation 3: Consider appointing dedicated Environmental Officers to VicRoads major projects teams where there are significant environmental risks involved.

Recommendation 4: Exercise caution in reviewing sampling strategies that attempt to estimate LOT losses across large areas. VicRoads should ensure that it properly understands consultants' sampling strategies and is comfortable they are fit for purpose before supporting their adoption.

Recommendation 5: Ensure that technical experts are given adequate opportunity to review and provide feedback on the final draft of an EES before it is released for exhibition to ensure that technical information is presented and conveyed accurately.

Recommendation 6: In the case of future Environment Effects Statements, VicRoads, when responding to scoping requirements, should be mindful of capturing environmental criteria that are important to the community in addition to legislated biodiversity matters.

Recommendation 7: Assess the need to consult more broadly beyond those areas physically affected by alignment options and; harness technological advancements (e.g. 3D modelling and social media) more consistently.

References

Blicharska, M. and Mikusinski, G. 2014, Incorporating Social and Cultural Significance of Large Old Trees in Conservation Policy, *Conservation Biology*, Vol 28, No. 6, pp. 1558 – 1567.

DSE 2004, *Vegetation Quality Assessment Manual: Guidelines for Applying the Habitat Hectares Scoring Method*, Biodiversity and Natural Resources Division, Department of Sustainability and Environment, Victoria.

Ecology and Heritage Partners Pty Ltd 2011, *Detailed Flora and Fauna Assessment and Preliminary Net Gain Analysis - Western Highway Project, Beaufort to Ararat, Victoria*.

Ecology and Heritage Partners Pty Ltd 2012, *Western Highway Project, Section 2, Beaufort to Ararat, Victoria, Biodiversity and Habitat Impact Assessment Report - Flora, Fauna and Ecological Communities*.

Gibbons, P., Lindenmayer, D. B., Fischer, J., Manning, A. D., Weinberg, A., Seddon, J., and Barrett, G., The Future of Scattered Trees in Agricultural Landscapes, *Conservation Biology*, Vol 22, No. 5, pp. 1369-1319.

Lindenmayer, D.B, Banks, S.C. Laurance, W.F, Franklin, J. F., and Likens, G. F., Broad Decline of Populations of Large Old Trees, *Conservation Letters*, January / February 2014, 7 (1), pp. 72-73.

NRE 2002, *Victoria's Native Vegetation Management Framework - A Framework for Action*, Department of Natural Resources and Environment, Victoria.