

Smith's Beach Project, Yallingup - Coastal Tourism Village: potential impacts to Western Ringtail Possum

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1 Introduction

Smiths 2014 Pty Ltd is proposing to develop a coastal tourism village at Smith's Beach in Yallingup. The development envelope is approximately 40 ha in size, and it is proposed that almost half (c. 17 ha) of this be protected in perpetuity for the purpose of conservation and adjoin the Leeuwin-Naturaliste National Park, located immediately to the south of the project area and < 500 m to the north-east. The remaining c. 23 ha will be subject to a variety of developments to create a sensitively designed tourist village. The proposal includes features such as hotel accommodation, a campground, holiday homes, a community hub and Cape to Cape Welcome Centre, the latter of which may provide an educational opportunity to showcase the significant fauna which inhabits the project area. This includes the following species:

- Western Ringtail Possum, *Pseudocheirus occidentalis*, Critically Endangered (EPBC Act/BC Act)
- Wambenger Brush-tailed Phascogale, *Phascogale tapoatafa*, Conservation Dependent (BC Act)
- Quenda, *Isoodon fusciventer*, Priority 4 DBCA
- Western Brush Wallaby, *Notamacropus irma*, Priority 4 DBCA
- Carnaby's Black-Cockatoo, *Zanda latirostris*, Endangered (EPBC Act/BC Act)
- Baudin's Black-Cockatoo, *Zanda baudinii*, Endangered (EPBC Act/BC Act)
- Forest Red-tailed Black-Cockatoo, *Calyptorhynchus banksii naso*, Vulnerable (EPBC Act/BC Act)
- Barking Owl, *Ninox connivens connivens*, Priority 3 DBCA
- Coastal Plains Skink, *Ctenotus ora*, Priority 3 DBCA

1.1 Background and scope

At an earlier stage of planning, an environment impact assessment was conducted (Bamford Consulting Ecologists, 2024) which identified several potential impacts to Western Ringtail Possum (WRP) and provided recommendations to mitigate these impacts. More detailed planning regarding the clearing and modification of Western Ringtail Possum habitat (within other constraints of the development), as well as mitigation measures to reduce direct impacts, and plans to provide supplementary resources (revegetation, water sources, artificial dreys) and possum bridges to enable connectivity has now been prepared. This allows for more certainty around potential impacts to Western Ringtail Possum. On behalf of the proponent, JBS&G have therefore commissioned Bamford Consulting Ecologists to provide expert advice regarding the potential impacts of the proposed development on Western Ringtail Possum, taking into account the more detailed information now available.

Partial modification of the vegetation is proposed, involving selective retention of trees and shrubs depending on bushfire management categories. Calculations have been provided by JBS&G and are presented in Appendix 1.

2 Providing connectivity for Western Ringtail Possum using bridges

2.1 Background and proposed configuration of possum bridges in the development envelope

Fauna crossing structures have been successfully used to help mitigate the negative impacts of fragmentation due to barriers such as roads, for a variety of fauna. Some examples for arboreal fauna are summarised in Table 1.

Table 1. Some examples of the use of fauna crossing structures by arboreal mammals in Australia.

Reference	Summary
(Mitchell et al., 2022)	Bridges allowed Leadbeater’s Possum to cross roads; they were not detected crossing these roads prior to bridge installation. Leadbeater’s Possum preferred ladder bridges to single-rope design bridges.
(Yokochi & Bencini, 2015)	First full crossing by a WRP was 36 days after installation. Usage increased during the 270 days of monitoring.
(Goldingay et al., 2012)	Several native arboreal mammal species used fauna crossings (five bridges of three different designs) to cross a major highway in eastern Australia
(City of Cockburn, 2023)	A possum bridge has been shown to be regularly used by Common Brushtail Possum to cross Beeliar Drive in the City of Cockburn. The first proven crossing was approximately one year after installation.
Bamford et al (unpublished report)	Single sisal rope bridges have been shown to be effective and used by both adult and juvenile WRP along the Vasse Diversion Drain in Busselton.

Some examples of fauna bridges that have been successfully constructed elsewhere in Australia are provided as Appendix 2, based on information available from Fauna Crossings Australia (2022). For the proposed Smith’s Beach Tourist Village development, Human-Urban have proposed a network of bridges as per Figure 2. The design of the bridges is yet to be determined.



Figure 1. Proposed possum bridge network superimposed on proposed development details and indicative retained trees under the partial-modification scenario.

3 Potential ecological impacts of partial modification of Western Ringtail Possum habitat within the development envelope

Partial modification of the vegetation within the Development Area (DE) will result in a lesser impact to WRP compared with total clearing. The partial modification proposed (selective retention of trees and shrubs, combined with revegetation in particular areas) may result in a scenario where the existing WRP population can coexist with the proposed development, if WRP requirements can be made a priority during planning and development. The case for such *in situ* management of WRP during development (as opposed to translocating WRP to another location) has been made by Thompson and Thompson (2009), who noted that WRP in Dunsborough readily utilised highly disturbed environments such as residential areas and roadside verges; dreys were found in these areas, along with sightings of individuals. Buschotts *et al.* (2021) reported that WRP readily utilised residential areas within the City of Albany, even if those areas were not close to remnant vegetation. Van Helden *et al.* (2020) reported that WRP resided exclusively in residential gardens for at least several months of the year. These studies indicate that WRP can (and will) coexist with human disturbance, given the right conditions. The primary requirement for WRP will be connectivity to allow animals to move through the DE and access habitat resources (such as retained trees, retained clumps of shrubs, revegetation areas) without having to come to ground. It is proposed that connectivity be provided by way of possum bridges.

The expected ecological impacts to WRP are discussed below, and are based on the following assumptions:

Assumptions regarding WRP population and behaviour

1. Area is currently not at carrying capacity for Western Ringtail Possum (due to lack of predator control and fragmentation of habitat by large east-west firebreaks – it appears that southern parts of DE are either unoccupied, or used at a very low level);
2. Individual WRP currently occupying DE can safely be actively displaced (temporarily) away from clearing activities,
3. WRP currently using DE for part or all of home range will return in the long-term (although may be displaced during clearing);
4. Additional individuals will move into DE if connectivity is provided (within DE and between DE and other remnant vegetation) and sufficient resources are available.

Assumptions regarding clearing and modification plan

1. References to “baseline” mean the existing vegetation currently present on the site.
2. Locations of all WRP will be determined prior to the beginning of clearing, in order to effectively manage individual animals.
3. Artificial dreys and possum bridges will be constructed prior to the beginning of clearing activities (to allow WRP time to acclimatise to their presence and be willing to use them)
4. Clearing will be conducted in a sensitive manner, allowing individual WRP to be shepherded to nearby vegetation without needing to capture individuals (to avoid undue stress to the animals)
5. Revegetation will be commenced as soon as possible, ideally before clearing in areas to be retained and enhanced, to maximise the food resources available to the animals.

3.1 Proposed modification of vegetation

The proposed modification of habitat involves retention of trees and shrubs at certain densities in certain areas as defined by bushfire regulations. Based on these regulations, JBS&G have prepared mapping showing indicative vegetation remaining across the DE, along with calculations regarding how much of the tree layer and shrub layer will be retained compared to baseline, including how much of the retained vegetation will be connected and therefore accessible to WRP. This document is provided as Appendix 1. Based on these calculations, the following numbers have been used throughout, to provide a rough quantification of the impact of vegetation modification on WRP habitat (primary and secondary combined):

Vegetation layer	Baseline area (ha)	Accessible habitat retained (ha) under partial modification	% habitat lost/inaccessible under partial modification scenario
Trees	7.49*	1.46*	80.5 %
Shrubs	7.44*	0.58*	92 %

* Note: These figures are based on the sums of the habitat categories Open Peppermint Forest, Open Banksia Forest and Closed Low Marri Forest in the calculations provided by JBS&G (Appendix 1), not the row titled “All veg types combined”.

3.2 Functional connectivity within the development envelope

The removal of trees that currently form a connected canopy will result in a loss of functional connectivity (for WRP) within the DE. In simple terms, any canopy tree, cluster of trees, or cluster of shrubs that is isolated from other trees/shrubs/cluster is effectively habitat lost to WRP as they are not able to safely access it. If this is the only habitat available, WRP in the DE will be forced to go to ground in order to access these habitat resources, which greatly increases the risk of direct mortality due to vehicle strike or predation by foxes/cats/pet dogs.

Therefore, the more above-ground connectivity available throughout the DE, the better the outcome for WRP. This connectivity could be in the form of connected tree canopies, possum bridges, or other built structures such as fences, gazebos and roof structures. Increased connectivity will result in increased resource availability, and a lower likelihood of WRP coming to ground in order to access resources.

Possum bridges have been shown to be readily used by WRP in other studies (Yokochi & Bencini, 2015) and it is likely that possum bridges built to appropriate specifications (see Bamford Consulting Ecologists, 2024) could be used to supplement functional canopy connectivity within the DE. Other structures could be designed to provide connectivity for WRP without being an obvious “possum bridge” (discussed further in Section 4). The current proposal is for a network of possum bridges to be constructed as per Figure 1 (above).

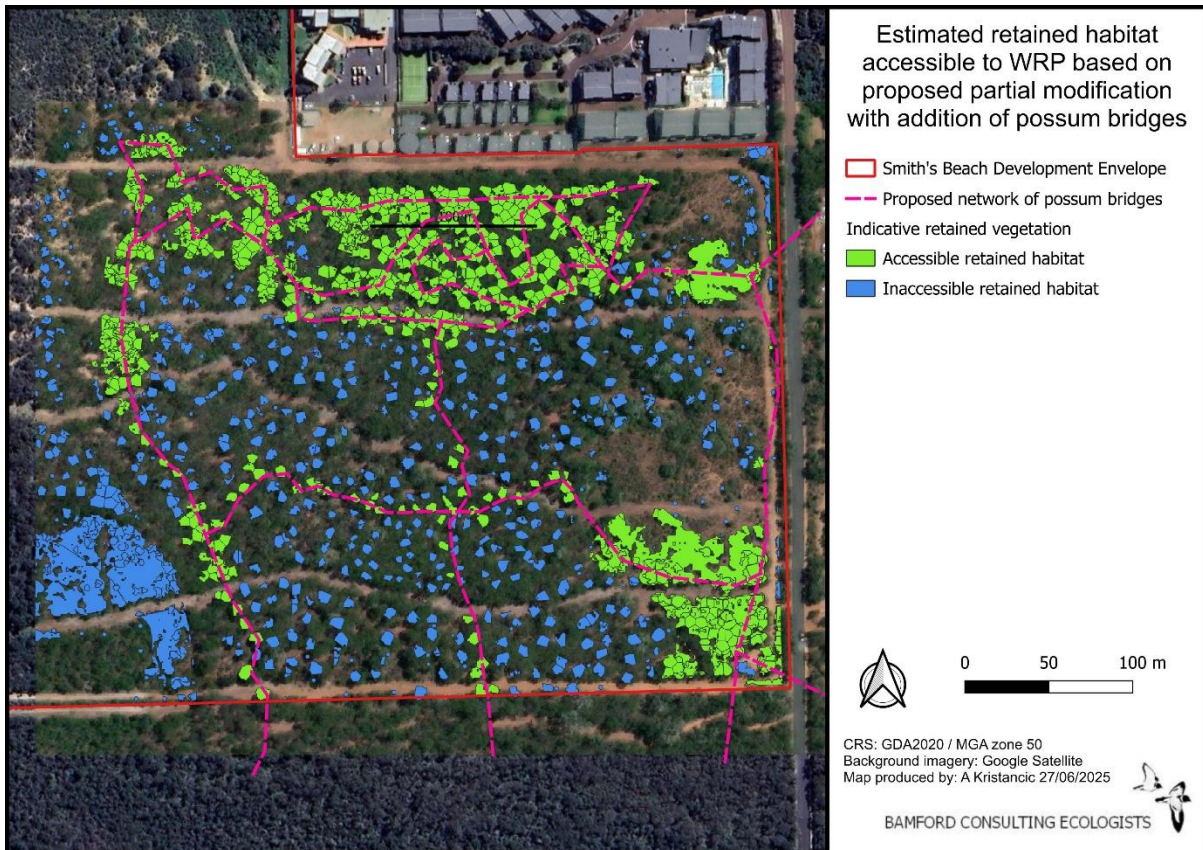


Figure 2. Proposed possum bridge network (in pink) and estimated area of vegetation accessible to WRP (pale green) based on proposed partial modification of vegetation combined with provision of possum bridges. Proposed bridge network and area accessible are overlaid on proposed development details and indicative retained trees under the partial-modification scenario.

If possum bridges are to be used to supplement connectivity within the DE, placement of the bridges will be very important to provide functional connectivity between retained canopy trees. The proposed scenario documented in Figure 1 and Figure 2 proposes one long possum bridge around the boundary of the development, with an extended web through the campground, and two central links - one running north-south and one running east-west. The proposed arrangement of possum bridges would provide connectivity around the periphery of the development as well as safe access to some of the retained trees within the middle of the development. It also provides connectivity through to the NP to the south and across Smith's Beach Rd to the east. Figure 2 shows the predicted habitat available to possums based on the network of bridges proposed combined with the partial modification (retention of some trees). Within the campground, more trees and more canopy area is able to be retained, resulting in the majority of this area likely being interconnected and accessible to WRP. Throughout the remainder of the development, the retained habitat is predominantly isolated trees (and very isolated clumps of shrubs). The possum bridge network provides connectivity between mostly isolated trees, with some areas where it appears that retained vegetation provides connectivity (via connected canopies). Based on this (see Figure 2) there is an estimated 2 ha of retained habitat (trees and shrubs) accessible to WRP. Currently, it is assumed that all retained vegetation is connected and accessible to WRP; this is an area of c. 14 ha (primary and second habitat combined, trees and

shrubs not considered separately). Therefore, compared to baseline, the proposed partial modification of vegetation combined with the addition of a network of possum bridges would result in a decrease in available habitat of c. 85 %.

The proposed scenario of partial modification and provision of possum bridges provides significantly more functional connectivity within the DE and between the DE and adjacent native vegetation compared to a scenario of full clearing.

3.3 Habitat quality

Habitat quality for WRP is considered to mean the presence of resources required for survival, therefore consists of the following:

- Palatable and nutrient-rich plant species to provide food resources
- Large trees (at least 3 m high) for shelter, escape from predators, and building of dreys
- Sufficient ground cover to provide protection in the event that individuals must come to ground (e.g. during high ambient temperatures).

For the purpose of this report, connectivity is treated separately (and discussed above); but it should be noted that the habitat quality of an area is of little relevance to WRP if the area cannot be safely accessed by WRP (via above-ground connectivity).

Habitat quality (e.g. the presence and quality of food and shelter resources) within the DE will be (at least temporarily) significantly reduced (compared to baseline) post-modification due to the loss of c. 90 % of the existing shrubs 2-5m and c. 80 % of the existing trees (more than 5m). It is understood that most of the ground cover will be removed, and clumps of retained shrubs will be isolated (and therefore effectively lost to WRP). Based on the quantity of resources remaining, partial modification is preferable to complete clearing, as some value will be retained - mostly via the retention of some existing trees which are able to be made accessible via structures such as possum bridges (discussed above), providing about 2 ha of accessible habitat (compared to zero under a scenario of full clearing).

Habitat quality for WRP could be improved to some extent by providing artificial dreys, sheltered, self-flushing aboveground water sources, and over time, revegetation with nitrogen-rich species (that grow tall enough to provide safe food resources and are accessible via above-ground connectivity), and revegetation of ground cover to provide safe refuge from predators if individuals come to ground. It is possible that revegetation will be restricted due to fire regulations, and it will not be possible to use revegetation to significantly improve the habitat quality post-clearing.

3.4 Resource availability

Resource availability relates to habitat quality but depends on the quantity of resources available and the accessibility of those resources. Areas of high-quality habitat/vegetation are of little use for WRP if they are not readily accessible via functional connectivity at the canopy level (high enough that they are safe from predators and other ground-based threats such as cars).

Resource availability for WRP post-development will depend on the habitat quality (discussed above) and the functional connectivity (discussed above).

Resource availability for WRP will be decreased (compared to baseline) under the following scenarios

- Removal of trees and shrubs that provide nest sites (for building dreys) and food resources
- Fragmentation of retained habitat into patches or isolated trees that are not safely accessible to WRP (e.g. that do not have functional canopy connectivity – provided by connected canopy trees and/or artificial structures).

Under the current proposed scenario, resource availability for WRP will be heavily reduced compared to baseline, as 80-90% of habitat (trees over 5m and shrubs between 2-5m) is proposed to be removed, and connectivity is proposed to be provided (via a network of possum bridges) to an area of c. 2 ha of connected habitat (see discussion above of functional connectivity within the DE). For the purposes of attempting to quantify this, there is currently 7.5 ha of tree cover and 7.4 ha shrub cover within WRP habitat within the DE (JBS&G calculations, Appendix 1, table 3.2, 3.4). Under the proposed scenario of a combination of full clearing and partial modification, with the addition of a network of possum bridges, approximately 1.5 ha of connected tree (>5m) cover and 0.6 ha of connected shrub (2-5m) cover within WRP habitat categories will be retained. This equates to c. 6 ha (80 %) of tree habitat and c. 6.8 ha (90 %) of shrub habitat being lost (either directly by clearing or by being made inaccessible to WRP). This is a significant reduction in resource availability (due to the combined effects of loss of resources due to clearing, and isolation/fragmentation of remaining resources).

Resource availability for WRP could be increased by the following:

- Provision of resources (revegetation with high-quality vegetation to provide shelter at ground level and food resources at ‘canopy’ level, artificial dreys in retained canopy trees, shaded, self-cleaning above-ground water resources) *AND*
- Retention of natural connectivity and/or provision of artificial structures to provide functional connectivity so that WRP can access resources (for example covered walkways or pergola structures in addition to purpose-built possum bridges).

****Note that resource availability depends on both factors (resources being present and resources being accessible). Revegetation will not increase resource availability if the revegetation is not accessible.**

Given that c. 80 % of tree cover and c. 90 % of shrub cover is proposed to be removed/made inaccessible to WRP, it would be difficult to provide sufficient revegetation and provide enough supplementary resources to return resource availability to pre-development levels. Due to this high level of habitat loss and fragmentation, it is expected that there will be a significant and long-term reduction in resource availability for WRP under the proposed partial modification scenario, even if connectivity could be created between all remaining habitat resources. However, the reduction in resource availability under the proposed partial modification would be less than the reduction in resource availability under a scenario of full clearing.

3.5 Carrying capacity

The proposed modification of WRP habitat will result in less of a reduction in carrying capacity of the DE compared to complete clearing and is preferable compared to the complete loss of habitat that would occur if all habitat was removed. However, the carrying capacity of the DE will still be reduced compared to baseline (e.g. the current carrying capacity based on relatively intact native vegetation and current levels of disturbance). This is due to the proposed removal/isolation of c. 80 % of canopy trees (used for foraging, nesting and connectivity) and proposed removal/isolation of c. 90 % of shrubs (used for foraging). Loss of 80-90 % of WRP habitat will mean fewer individuals can be supported by the remaining vegetation. This may be mitigated to some extent by revegetation (to provide additional foraging resources, if this is possible given the constraints of fire regulations), provision of artificial dreys (for nesting), provision of possum bridges to replace lost canopy connectivity and provision of artificial water sources. Some of these measures have been found to be effective in other studies (Bamford et al., 2023; Yokochi & Bencini, 2015).

Density estimates, from a large-scale study by Biota (2020), for the nearby northern part of the Leeuwin-Naturalise National Park were used to provide a 'best-case scenario' estimate for how many possums could potentially be supported by the DE pre- and post-development. In the site just south of the DE, Biota estimated a density of 2.55 possums per hectare (equivalent to 45.71 possums in an area of 17.9 ha). Within the DE there is currently 14 ha of possum habitat (primary and secondary habitat). Assuming a density of 2.55 possums per hectare, and based purely on area of habitat (not considering factors such as connectivity and presence/abundance of predators) the DE could perhaps support up to about 35-36 mature individual WRP (within primary and secondary habitat). It is expected that there are currently fewer possums than this in the DE, partly because the large firebreaks prevent connectivity between all patches of vegetation. Based on BCE surveys in 2023 (Bamford Consulting Ecologists, 2024) it was estimated that 15-20 individuals may currently be present in the DE (and they appear to be concentrated in the northern portion – this apparent concentration in the north is expected to be at least partly because of lack of connectivity through to the more southern parts of the DE).

Under the post-development scenario, where trees and shrubs would be selectively retained in partially modified areas, and possum bridges installed around the periphery and through the centre of the development, the number of possums that could be supported is estimated to be about 5 individuals. This is based on an area of accessible habitat of c. 2 ha (see Figure 2 and Section 3.2). This is a decrease in carrying capacity of more than 85 %. As it is likely that the area is not currently at carrying capacity (due to fragmentation by firebreaks and lack of predator control), the reduction in *baseline* population size may be estimated to be c. 75 % (5 individuals compared to the 15-20 individuals estimated to be currently supported by the DE).

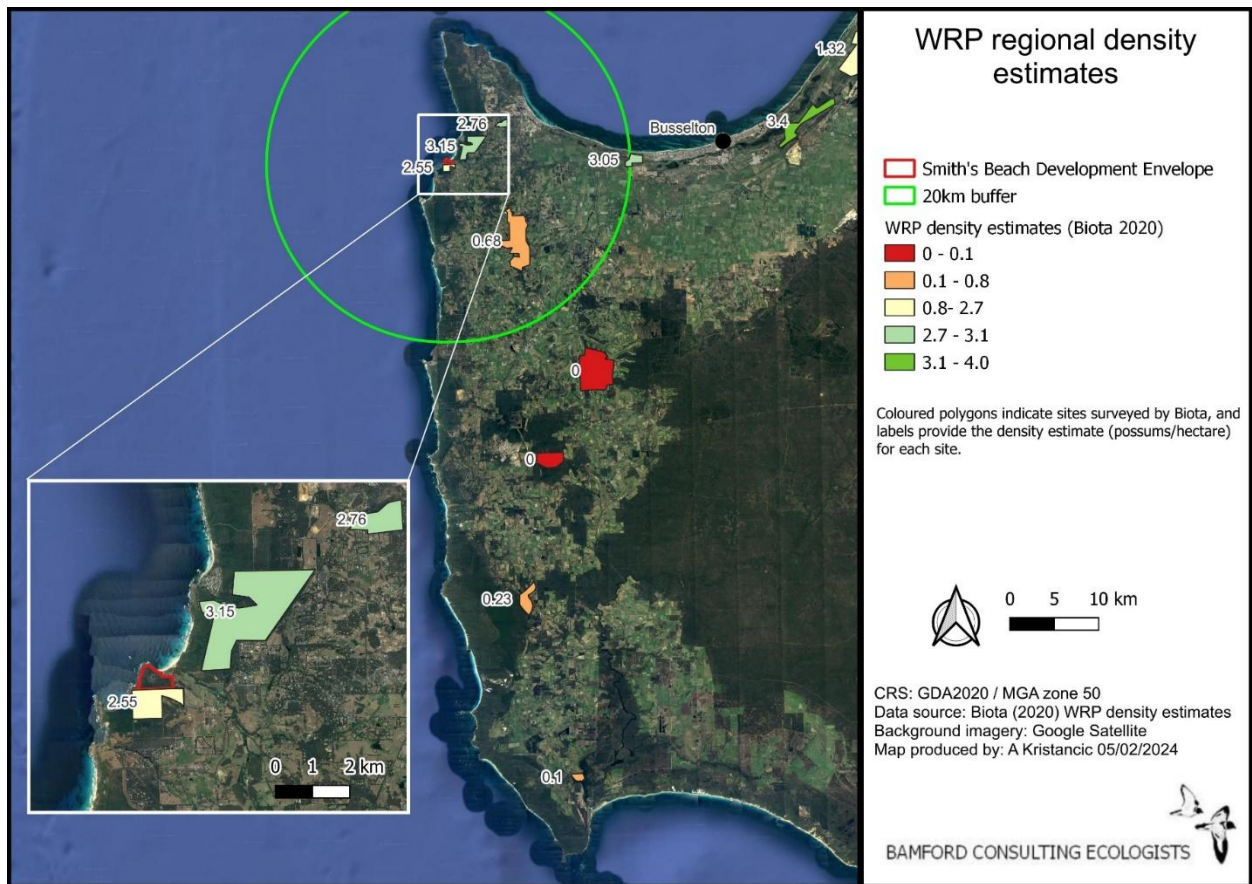


Figure 3-2. Western Ringtail Possum regional density estimates in Cape to Cape area (and some sites near Busselton), based on distance sampling surveys undertaken by Biota (2020).

3.6 Home ranges

The concept of home range describes the area used by an individual to obtain the resources necessary for survival. Home range can be (statistically) calculated in a range of different ways which all aim to quantify the amount of space used by individuals. In a scenario where resource availability was decreased, it would be expected that the home range of individuals would increase, to compensate for the lower density of resources. In other words, individuals would be expected to require a larger area in order to obtain sufficient resources, if resource availability is decreased. Note that an increase in home range for WRP is only sustainable when connectivity is provided to allow possums to use larger areas without a high risk of predation. Conversely, if resource availability is increased, it may be expected that individuals would require a smaller home range in order to obtain sufficient resources. The latter has been observed in studies of WRP in suburban areas such as residential gardens.

Van Helden *et al.* (2020) radio-tracked 20 individual WRP in residential areas around Albany, WA, and found that some possums resided exclusively within gardens, even when remnant vegetation was nearby. Furthermore, tracked possums in urban areas used artificial resources for foraging and rest sites (such as non-indigenous plants and man-made structures) more frequently than natural resources. This exemplifies how valuable novel environments can be for WRP, and provides evidence that WRP can coexist with human development under the right conditions.

Home range estimates for possums using residential gardens were calculated by Van Helden *et al.* (2020), and reported to be on average 0.51 ha (0.26 ha for females and 0.88 ha for males). In remnant vegetation within the same broad location, Van Helden (2018) reported an average home range size of 0.88 ha. These authors proposed that the smaller home ranges in residential areas, coupled with their finding that individuals were residing exclusively in gardens for at least several months, suggested that residential landscapes were able to provide sufficient resources to support residency by WRP. It was concluded that this may indicate that gardens provide higher quality and/or quantity of resources and are therefore preferentially utilised, or that nearby remnant vegetation was saturated with WRP and thus some individuals were forced to reside in gardens. The type of environments studied in Van Helden *et al.* (2020) are similar to what would be present in the DE post-development; assuming that resources such as dreys, trees and shrubs for foraging, and above ground water are available throughout the development and possums are not prevented from accessing large parts of the development. It would therefore be reasonable to expect similar home ranges post-development as those recorded in the Van Helden *et al.* (2020) study. However, it should be noted that this is difficult to predict with certainty. It is also not known what the home ranges of WRP are currently in the DE, or in nearby native vegetation, and so it is unclear how home range would be influenced (increased or decreased) by the development.

3.7 Likelihood and implications of increased movement of Western Ringtail Possum at ground level

Based on the level of habitat loss under the current scenario, there is likely to be a significant increase in movement of WRP at ground level as the majority of their primary and secondary habitat will be fragmented into individual trees that are separated by a distance of at least 5m (as per bushfire planning constraints). Provision of the proposed network of possum bridges and / or other fireproof artificial structures will mean some proportion of habitat will be safely accessible by WRP. Areas of retained vegetation that remain isolated (not connected by possum bridges) are not safely accessible to WRP and individuals will need to come to ground if they want to access these resources.

In the presence of feral predators (foxes and feral cats) and pet cats and dogs, WRP that are forced to come to ground to access resources will be highly susceptible to attack by these predators, leading to injury or death of individual WRP. Individuals moving at ground level will also be prone to vehicle strike, further contributing to mortality.

Injury and mortality to WRP moving at ground level could be reduced by measures that decrease the number of predators present in the area; such as control of feral predators, and either banning pets or strictly controlling pet dogs and cats. The latter would entail containing pet dogs and cats to private properties, and keeping them indoors at night or other times when WRP are active.

The more functional connectivity that can be provided within the DE, the lower the likelihood of WRP coming to ground in order to access resources. However, WRP also come to ground during hot weather; even with high levels of functional connectivity WRP will at some point come to ground and be susceptible to predation. Therefore, predator control and strict rules around pets will still be of high importance even if a high level of functional connectivity is provided. Revegetation of ground

cover will also be an important consideration to provide safe areas for WRP to shelter when they come to ground and the provision of shaded, above-ground water sources will minimise their need to do so

4 Recommendations to reduce impacts to Western Ringtail Possum within the constraints of the project

The largest impact to WRP comes from the requirement to remove a substantial amount of habitat to comply with bushfire regulations. There are limits to what can be recommended to reduce impacts to WRP under the constraints posed by bushfire regulations. However, the following recommendations can be made:

- Maximise revegetation with nutrient-rich local plant species in any part of the development permitted by fire regulations and ensure that connectivity to these areas is provided using possum bridges or other structures.
- Maintain ongoing predator control (cats and foxes) and strict conditions on pets within the development
- Utilise novel approaches to enhance connectivity throughout the DE. This could be achieved by encouraging WRP to use dwellings, shelters, fences and so on to move around – e.g. build these things with the *intention* of WRP using them to move around the DE (e.g. Plate 1 and Plate 2).
- Implement conditions on what type of gardens can be created by home-owners (e.g. encourage/mandate possum-friendly gardens to supplement resource availability within the DE).
- Provide raised, sheltered water points to provide alternative cool places for WRP on hot summer days to replace lost ground vegetation and reduce the risk of predation. Water is likely to be particularly important during hot weather and when WRP are raising young (due to increased water requirements during lactation) (Wicke & Wicke, n.d.).



Plate 1. Covered walkways such as this structure, designed to provide shelter from the weather for humans, could double as aesthetically-pleasing, fire-proof structures that enhance connectivity for WRP.



Plate 2. A photo of a WRP travelling along the top of a boundary fence (from Nature Conservation Margaret River Region, n.d.). Fences within the development could potentially be used to further enhance connectivity for WRP.

5 Conclusion

The level of modification of vegetation required for bushfire safety regulations for human habitation appears incompatible with the aim of avoiding a significant impact on WRP. However, partial modification of vegetation (as proposed) is preferable to complete clearing and is expected to result in a lesser overall impact on WRP. This is because WRP will be able to occupy the DE to some degree, and the retention of trees and provision of possum bridges will provide connectivity between remnant vegetation to the south, to the north and south-east and within patches of retained vegetation within the DE. It is strongly recommended that revegetation with local native plant species takes place in all areas allowable by fire regulations to maximise the carrying capacity of the area following development. The provision of raised, sheltered water points will also help to support the animals in hot weather, particularly if large areas of groundcover need to be removed to comply with fire regulations.

6 References

- Bamford, A., Bamford, J., & Bamford, J. (2023). Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton. Year Two. January 2022 – February 2023. Unpublished report prepared for Water Corporation.
- Bamford Consulting Ecologists. (2024). Smith's Beach Coastal Tourism Village Western Ringtail Possum Assessment. Unpublished report prepared for JBS&G Pty Ltd.
- Biota. (2020). Western Ringtail Possum, *Pseudocheirus occidentalis*, Regional Surveys. Unpublished report prepared for Main Roads Western Australia.
- Busschots, M. B., Close, P., Van Helden, B. E., & Speldewinde, P. C. (2021). Is the presence of a threatened arboreal mammal in residential areas related to remnant habitats? *Austral Ecology*, 46, 181–185.
- City of Cockburn. (2023). New possum bridge a recipe for Success! <https://www.cockburn.wa.gov.au/City-and-Council/Events-and-News/News-From-The-City/New-possum-bridge-a-recipe-for-Success!>
- Fauna Crossings Australia. (2022). Fauna Crossings Australia Company Profile 2022. <https://faunacrossings.com.au/wp-content/uploads/2025/05/Company-Profile-2022-Fauna-Crossing.pdf>
- Goldingay, R. L., Rohweder, D., & Taylor, B. D. (2012). Will arboreal mammals use rope-bridges across a highway in eastern Australia? *Australian Mammalogy*, 35(1), 30–38. <https://doi.org/10.1071/AM12006>
- Mitchell, B., Harrison, L., Ainley, J., Ree, R. van der, & Soanes, K. (2022). Mitigating the effect of linear infrastructure on arboreal mammals in dense forest: A canopy bridge trial. *Ecological Management & Restoration*, 23(3), 228–236.
- Nature Conservation Margaret River Region. (n.d.). Western Ringtail Possums and your property, a guide to conserve and encourage them on your patch. <https://natureconservation.org.au/wp-content/uploads/2018/05/WRP-and-your-property-A5-booklet.pdf>

- Thompson, S. A., & Thompson, G. G. (2009). A case for in situ management of Western Ringtail Possums, *Pseudocheirus occidentalis*, in development areas. *Journal of the Royal Society of Western Australia*, 92, 269–276.
- Van Helden, B. E., Close, P., Stewart, B. A., Speldewinde, P. C., & Comer, S. J. (2020). Critically Endangered marsupial calls residential gardens home. *Animal Conservation*, 24, 445–456.
- Van Helden, B., Speldewinde, P., Close, P., & Comer, S. (2018). Use of urban bushland remnants by the western ringtail possum (*Pseudocheirus occidentalis*): Short-term home-range size and habitat use in Albany, Western Australia. *Australian Mammalogy*, 40(2), 173–180.
<https://doi.org/10.1071/AM17026>
- Wicke, H., & Wicke, U. (n.d.). Water equals life.
https://westernringtailpossum.online/B_practical_apps/water_equals_life.html
- Yokochi, K., & Bencini, R. (2015). A remarkably quick habituation and high use of a rope bridge by an endangered marsupial, the western ringtail possum. *Nature Conservation*, 11, 79–94.

7 Appendices

Appendix 1

Draft calculations provided by JBS&G

Western Ringtail Possum habitat modification calculations

Documentation of spatial analyses and calculations.

Smith's Beach Project, Lot 4131 Smiths Beach Road, Yallingup.

Dr Keren Raiter 25/06/2025 (revised version of original analysis from 15/11/2024).

1. Purpose

The purpose of this workflow is to create spatial data layers that allow for the visualisation and quantification of vegetation most critical for Western Ringtail Possum (WRP) habitat, based on the:

- A. pre-development status (baseline)
- B. post-development tree canopy
- C. post-development tree canopy connected by canopy bridges;

within the development envelope of the proposed development, taking into account:

- A. Suitable habitat types (primary (Peppermint forest) and secondary habitat (Banksia and Marri forests) values;
- B. Relevant vegetation strata within the suitable habitat types: using Bushfire APZ classifications, these have been determined to be the 'trees' layer - >5 m2 in height, and the taller part of the 'shrubs' layer, 2-5 m2 in height.
- C. Proposal elements: full clearing, partial modification, conservation, and public open space areas;
- D. Bushfire risk management modifications to vegetation (Asset protection zones requiring different levels of modification: high, medium and low)

Note: This exercise focuses on WRP habitat with an emphasis on trees and tall shrubs, with the latter including important foraging species such as Basketbush, Nuytsia, Acacia. The strata categorizations used are based on those implemented in the fire risk management rules, and for which LiDAR data is available: trees >5 m in height and vegetation 2-5 m in height. It has more recently been advised that within some areas, vegetation above 4 m can be classified as a tree and while we do not have data for vegetation specifically between 4-5 m tall, an assumption has been made that out of the vegetation 2-5 m high, some of it will be over 4 m and therefore able to be included in the 'tree' classification.

Connectivity at the shrub and groundcover layers at the base of trees is also important for when WRPs need to go to ground to shelter in cool vegetation at ground level and/or travel to locations where canopy connectivity is lacking. This is not captured in the current spatial analysis due to the lack of spatial data for groundcover as LiDAR doesn't readily detect vegetation under tree canopies, but descriptions of the groundcover allowed in each risk management zone are provided.

This revised version of the original analysis from 15/11/2024 contains the following updates:

1. In the 'low' bushfire mitigation zone: no 'shrubs patches' between the heights of 2-5 m to be retained (it had previously been assumed that some could be retained)
2. In the medium and low bushfire mitigation zones: trees are considered to be any vegetation greater than 4 m in height (it was previously understood >5 m height for all zones). As available LiDAR is only for broader categories of 0.2 – 1 m, 1-2 m, 2-5 m, and above 5 m; specific 4-5 m height trees could not be located, but an assumption that some of the 2-5 m layer contains trees above 4 m tall and that these could be included during pre-development ground surveys was made.

3. In the medium bushfire mitigation zone: a larger separation is required between shrubs, which varies with the height of the shrub. For the sake of this analysis it is assumed that the shrubs are over 3.5 m tall and that a 10 m separation is required.

2. Methodology

2.1 Datasets utilised

1. Development proposal elements (Plate 1)
2. Fauna habitat types (Plate 2)
3. Proposed Bushfire Risk Mitigation asset protection zones and guidelines for their implementation, including further clarifications from JBS&G bushfire team, Linden Wears and Louisa Robertson (Plate 4, Table 1)
4. Lidar-derived vegetation layers (likely from 2021 capture;)
 - a. Above5m_SmithsStratification_APZ.shp
 - b. 2m-5m_SmithsStratification_APZ.shp
 - c. 1m-2m_SmithsStratification_APZ.shp
 - d. 0.2m-1m_SmithsStratification_APZ.shp

Note that this LiDAR imagery only shows the tallest strata height in any given area and does not show lower strata underneath tree canopies. As a result, the two lower levels were not useful for this analysis, which focuses on possum habitat which is largely covered by tree canopy and tall shrubs.

All layers were reprojected to GDA 2020 MGA z50 (EPSG:7850).



Plate 1 Proposal elements (simplified): green = conservation and public open space; grey = full clearing; orange = partial vegetation modification

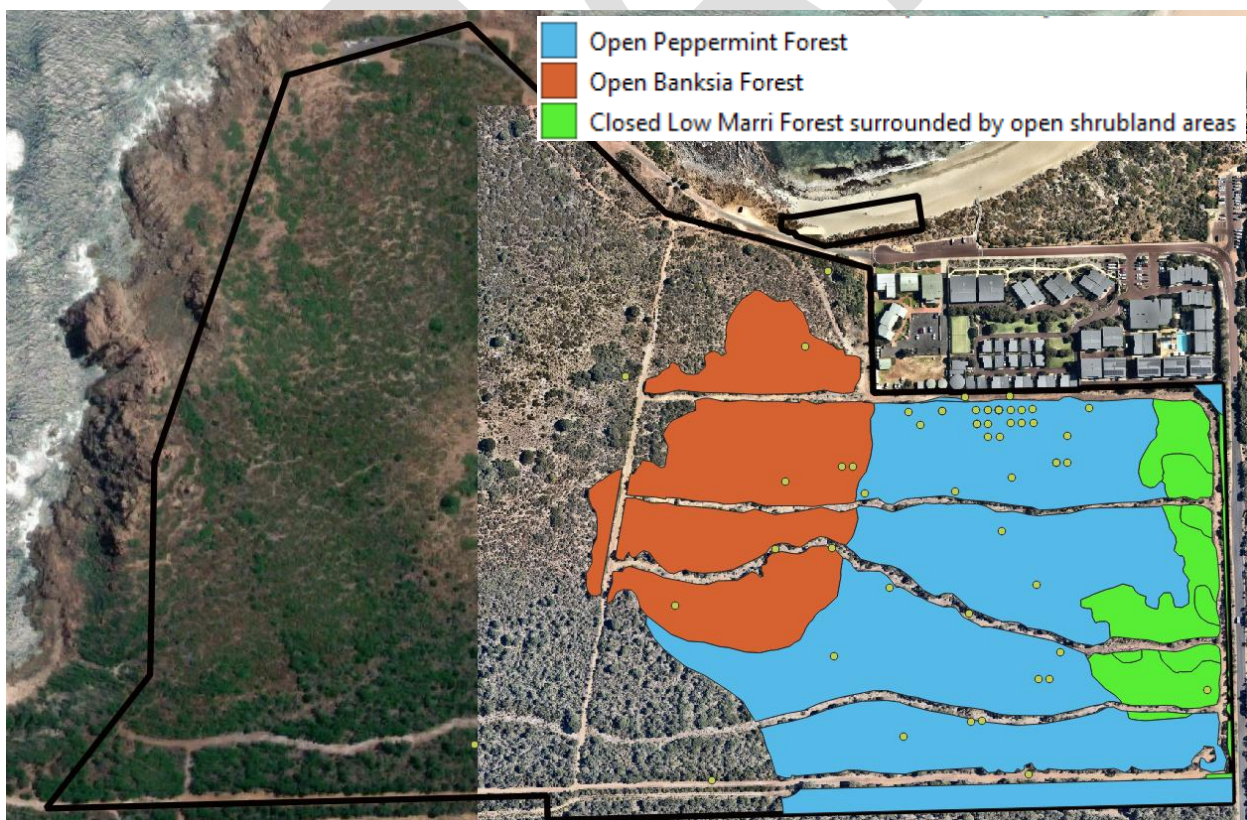


Plate 2 Western ringtail possum habitat. Blue – open Peppermint forest; orange = open Banksia forest; green = closed low Marri forest surrounded by open shrubland areas.

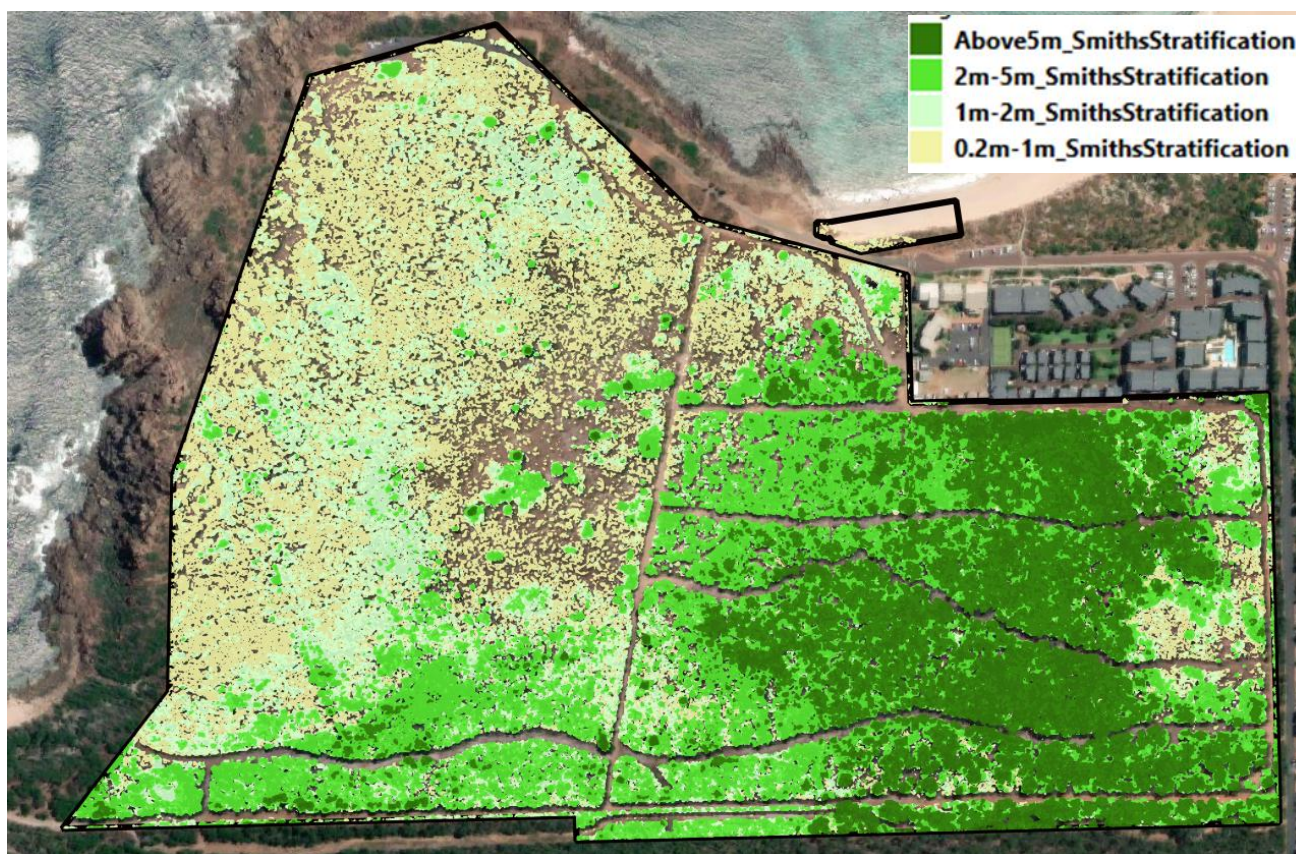


Plate 3 LiDAR-derived vegetation stratification within the development envelope.

2.2 Software utilised

Analyses were carried out in;

- R software environment for statistical computing and graphics version 4.4.3 accessed with RStudio 2024.12.1 for Windows, primarily using ‘terra’ package for spatial data manipulation, analysis and creation of random spatial samples.
- QGIS version, version 3.40, including with a series of native tools and processing functionalities, as well as external plugins (‘Group Stats’ and ‘Select Within’); and

2.3 Fire hazard management constraints

Table 1 summarises the constraints placed on the retention of vegetation where the asset protection zones overlapped either partially modified vegetation areas or public open space. The zones are shown in Figure 1. It is assumed that all vegetation is removed in ‘fully cleared’ areas and that all vegetation is retained outside of any proposal elements requiring clearing or vegetation modification and outside of fire risk management zones.

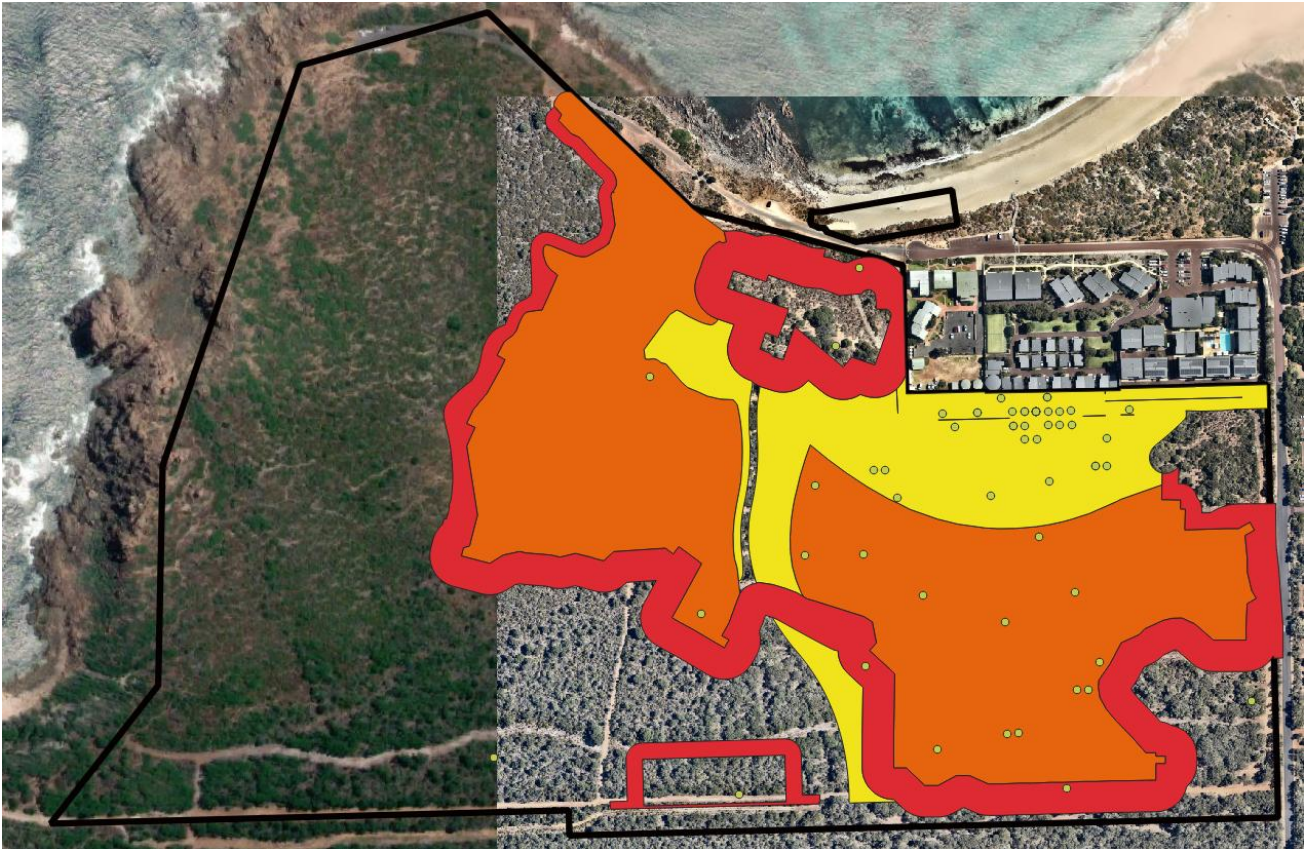


Plate 4 Bushfire risk management zones. Red = high risk management zone ('APZ'); orange = medium risk management zone ('APZ – modified'); yellow = low risk management zone ('low threat vegetation').

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Table 1 Fire risk management constraints

APZ category	Sub - category	Trees	Trees max canopy cover/area allowed	Shrubs (0.5m – 5m height – note: the focus here is on ‘tall shrubs’, 2-5 m in height)	Other constraints	Groundcover (vegetation <0.5m in height)
3 - High level of modification required (aka ‘APZ’)		>5 m height. Individual trees with >5m canopy separation.	15%	<5m ² clumps with 10 m canopy separation. It is assumed that heights and species relevant to WRP will be prioritized within the WRP habitat.	Shrubs not located beneath trees. >3m from building; >10m from exposed window or door	Can be planted beneath trees but must be maintained to remove dead vegetation <ul style="list-style-type: none"> o Groundcovers >100mm must be: >2m of building and >3m from windows or doors o Very low groundcovers and grasses (<100mm) permitted adjacent to buildings. Fine Fuel Loads: combustible dead vegetation matter less than 6 mm in thickness: to be maintained at up to an average of 2 t/ha.
2 - Medium level of modification required	Hotel/Eco-suites	(Not in possum habitat)				
	Holiday homes	>4 m height. Individual trees with >5m canopy separation.	20%	<5m ² clumps with 10 m canopy separation. It is assumed that heights and species relevant to WRP will be prioritized within the WRP habitat.	Not beneath trees. Cover is to be <10% of overall vegetated area.	Can be planted beneath trees but must be maintained to remove dead vegetation. Groundcovers >100mm must be: >2m of building & >3m from windows or doors <ul style="list-style-type: none"> o Very low groundcovers (<100mm) permitted adjacent to the building Nominated areas of increased tree retention <ul style="list-style-type: none"> • Following deviations to above specifications apply to areas of nominated tree retention only <ul style="list-style-type: none"> o Underplanting by low groundcovers (<0.3m high), high moisture content vegetation, mulch or non-combustible material. No shrub underplanting
1 - Low level of modification required	Campground, park spine, road verge, entry statement	>4 m height. Patches of trees (no max size), with >5m canopy separation.	40%	No tall shrubs 2-4 m allowed.		<ul style="list-style-type: none"> • Low groundcovers (<300mm) required beneath areas of trees with canopy cover >15%. Very low groundcovers (<100 mm) can be within 1.5m of shrub island. Other rules as above.

2.4 Trees: creation of baseline layer

2.4.1 Trees 5 m tall and above

1. Within the bounds of the Lidar-derived >5 m canopy extent, a ‘tree centroid’ point layer was manually created to approximately represent individual trees, to be used to partition the existing canopy into segments. Centroids were placed roughly where it was estimated that a tree trunk may be located based on visual inspection of aerial and satellite imagery.
2. Tree centroids were buffered by 5 m with non-overlapping (Voronoi) buffers using the "Non_overlapping_buffer_from_points_tSVLfmI.model3" macro model in QGIS.
3. The output of the above step was clipped by the existing canopy layer; any parts from the canopy layer that lay outside of the centroid buffer layer were extracted using st_difference() tool and merged with the buffer layer to make the baseline tree canopy layer.
4. Multi-part polygons were converted to single part for efficiency and accuracy of analyses. Small sliver polygons were dissolved with the adjacent polygon with the largest shared boundary.
5. The following attributes were calculated based on greatest proportion overlay and/or centroid location of each polygon relative to each definition layer (centroid overlay determined using the ‘Select Within’ QGIS plugin; majority overlay determined using the ‘overlay intersects’ field calculator tool with sorting by intersection size):
 - a. Proposal element (“Proposal”): ‘Clearing’, ‘Conservation / POS’ or ‘Vegetation modification’.
 - b. Bushfire threat mitigation zone (Asset protection zones) (“APZ”): ‘0 - No fire risk modification required’, ‘1 - Low level of modification required’, ‘2 - Medium level of modification required’, ‘3 - High level of modification required’.
 - c. FaunaHabitat type (“FaunaHab”): ‘Open Peppermint Forest’ (Primary habitat), ‘Open Banksia Forest’ (secondary habitat), ‘Closed Low Marri Forest surrounded by open shrubland areas’ (secondary habitat) or ‘other – not WRP habitat’.

shows the > 5 m tree polygons classified by Bushfire threat mitigation zone.

2.4.2 Trees 4-5 m tall

As spatial data for vegetation specifically between the heights of 4 and 5 m height was not available, this analysis used then entire 2-5 m height vegetation layer, with the assumption that within that layer, *some* of the 2-5 m layer contains trees above 4 m tall and that these could be included during pre-development ground surveys was made. The estimations of vegetation retained based on this analysis may be overestimates if sufficient >4m vegetation cannot be found within the appropriate areas.

The creation of the baseline dataset for this is similar to the one for the >5 m trees above, but was run entirely in R as follows:

1. The LiDAR-derived 2 - 5 m vegetation layer was cropped to the extent of the ‘low’ and ‘medium’ risk zones and the ‘vegetation modification’ proposal element. This was shrunk by 0.5 m on all edges to avoid placing ‘tree centroids’ on the edge of the areas.
2. Within these cropped extents, a ‘tree centroid’ point layer was created using the ‘terra’ package ‘spatSample’ to approximately represent individual tree trunks, by first randomly creating 100,000 points and then iteratively thinning them one by one until there are no points remaining that are within an arbitrary distance of 4 m apart (estimated as twice an estimated radius of 2). Voroni diagrams were then drawn around the ‘tree centroids’ and these were intersected with a 5 m buffer of the tree centroids to give the smaller of the two. This layer was then cropped by the original shrub baseline.

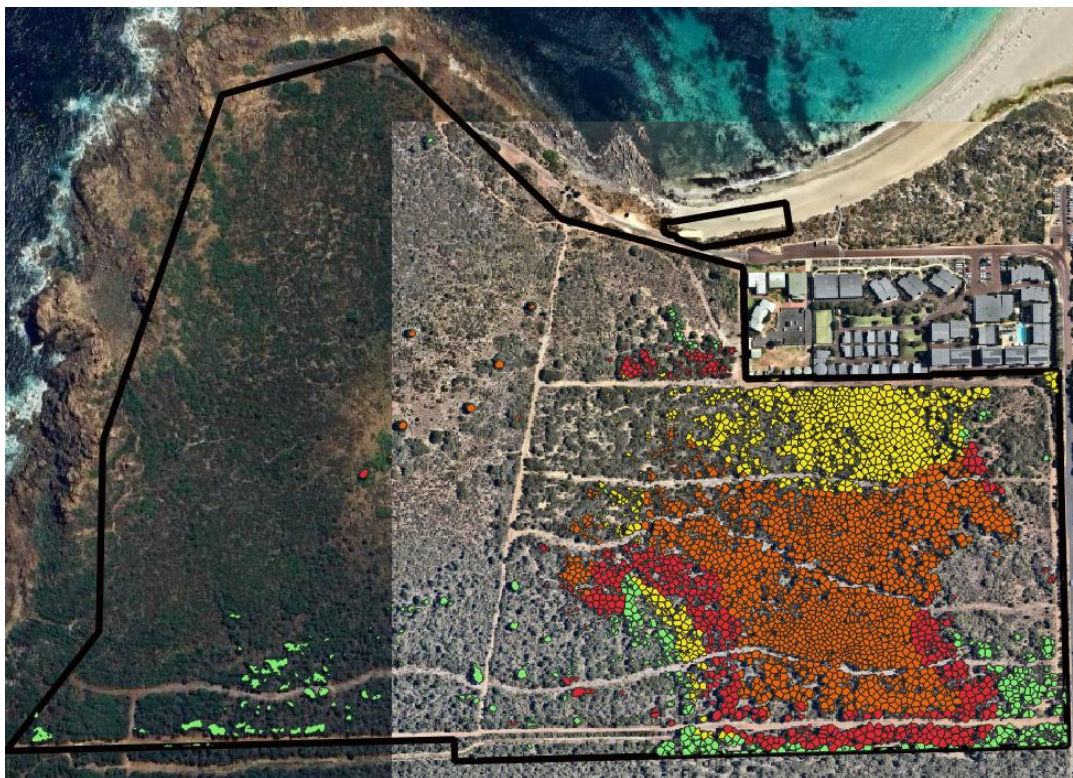


Plate 5 Tree >5 m polygons classified by Bushfire threat mitigation zones (Asset protection zones) (“APZ”) for the entire Development Envelope: Green = ‘0 - No fire risk modification required’, yellow = ‘1 - Low level of modification required’, orange = ‘2 - Medium level of modification required’, red = ‘3 - High level of modification required’.

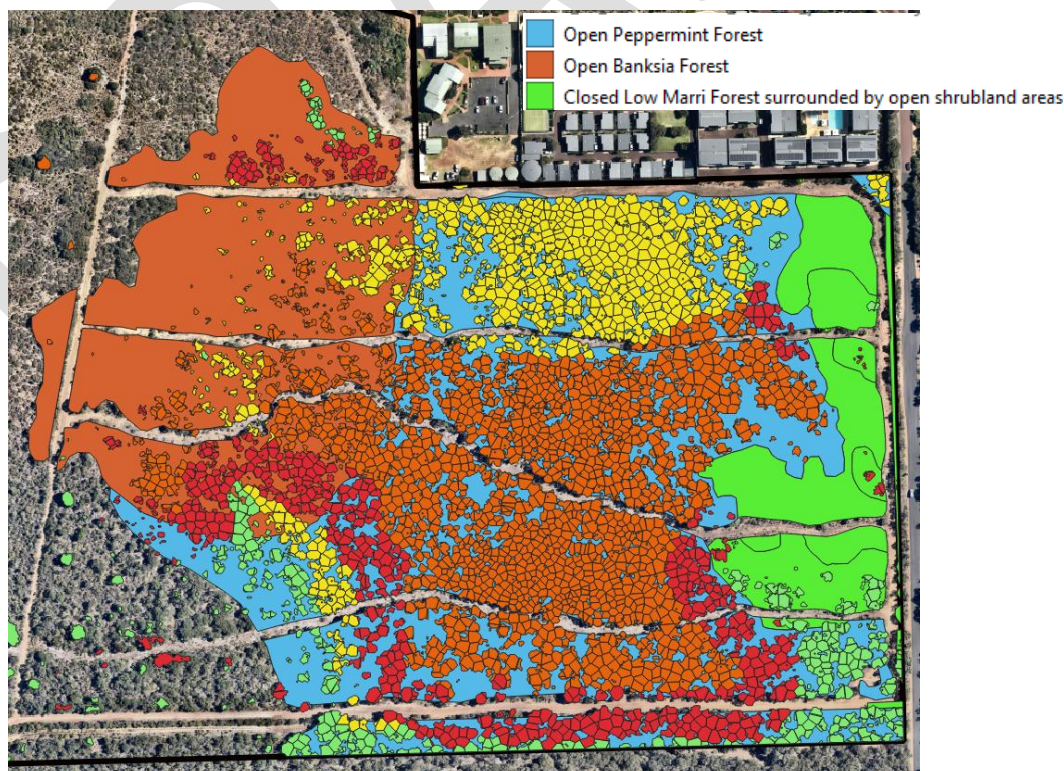


Plate 6 Tree polygons classified by Bushfire threat mitigation zones (Asset protection zones) (“APZ”) for the possum habitat: Green = ‘0 - No fire risk modification required’, yellow = ‘1 - Low level of modification required’, orange = ‘2 - Medium level of modification required’, red = ‘3 - High level of modification required’.

2.5 Creation of modified tree scenario

3. To calculate the area of various landscape parts, to inform the selection of tree polygons for retention versus removal, a multi-attribute area layer was first created by dissolving and merging: a) Bushfire threat mitigation zones layer by APZ zone; b) Proposal elements layer by element; and c) fauna habitat layer by fauna habitat. A multiple union process was then run for all of the above layers and the attribute table was populated with the relevant attributes for each polygon, as well as polygon areas.
4. Tree polygons were then 'marked' for removal or retention based on a combination of proposal element, bushfire management zone, and habitat type.
 - For the 'cleared' proposal element, all tree polygons are considered 'removed'.
 - For the 'conservation / POS' elements, all tree polygons are considered 'retained' unless there is overlap with a low, medium or high asset protection zone; in which case the requirements of that zone take precedence.
 - For the 'modified vegetation' element, tree polygons were selectively retained versus being removed according to bushfire mitigation classifications, i.e. individual trees separated by > 5 m gaps in the medium and high modification zones, with a maximum of 20% and 15% tree canopy cover allowed for the medium and high modification zones, respectively.

For the 'low modification' bushfire threat mitigation zone, groupings of trees were allowed, separated by > 5 m gaps and with a maximum of 40% tree canopy cover allowed.

- Total areas for the different APZ categories were calculated for the for the whole development envelope and total allowed canopy was calculated for each APZ category based on the percentage foliage cover allowed in each zone
- Trees were marked for retention based on the rules of each APZ (i.e. >5m gap between trees/patches of trees required; individual trees in 'high-risk' and 'moderate risk' zones and intermittent groupings of trees in the 'low risk' zones.
- Total canopy retained for each APZ within the modified area were calculated using the 'group stats' QGIS plug-in.
- The two steps above were repeated in an iterative manner for each APZ with trees included and/or removed until the 'total allowed canopy' was reached and not exceeded. This process was done first for trees above 5 m height, and following this for the 2-5 m layer from which it is assumed that 4-5 m trees will be found, where possible to extend and/or complement the > 5 m tree layer.

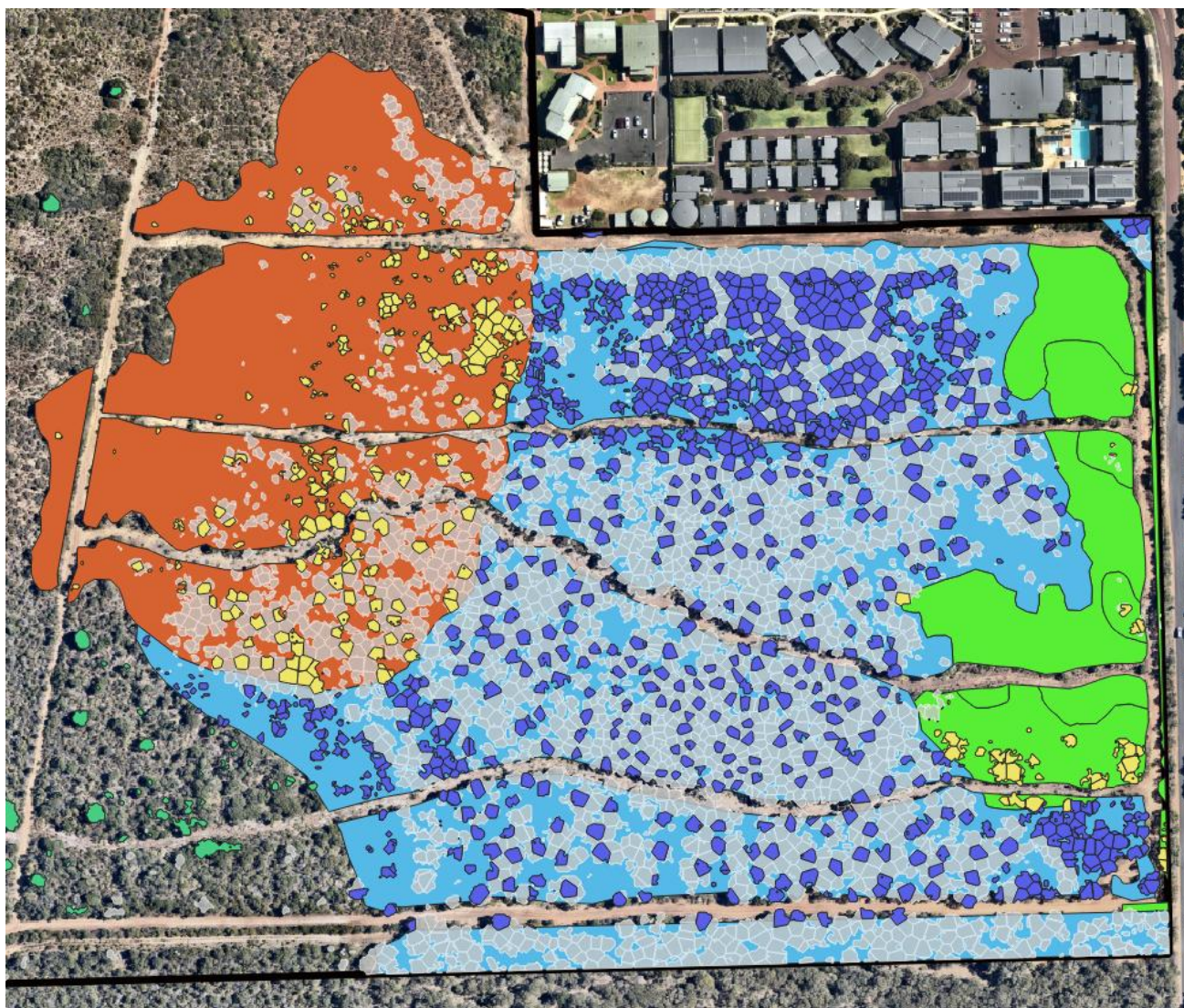


Plate 4 Trees to be retained and removed, by habitat classification.

<input checked="" type="checkbox"/> Trees_above5m retained by habitat category	JBSG 2F FaunaHabitat 240627 possums only
<input checked="" type="checkbox"/> Primary	Open Peppermint Forest
<input checked="" type="checkbox"/> Secondary	Open Banksia Forest
<input checked="" type="checkbox"/> N/A	Closed Low Marri Forest surrounded by open shrubland
<input checked="" type="checkbox"/> Remove	

2.6 Tall shrubs (i.e. vegetation with maximum height of 2-5 m height) baseline

The tall shrubs layer was derived from the Lidar-derived 2-5 m vegetation height layer and only represents areas where the maximum vegetation height is 2-5 m; any shrubs or lower trees under tall trees are not considered. Some overlaps did exist between the >5 m layer and the 2-5 m layer and these were removed. Plate 3 shows the resulting layer.

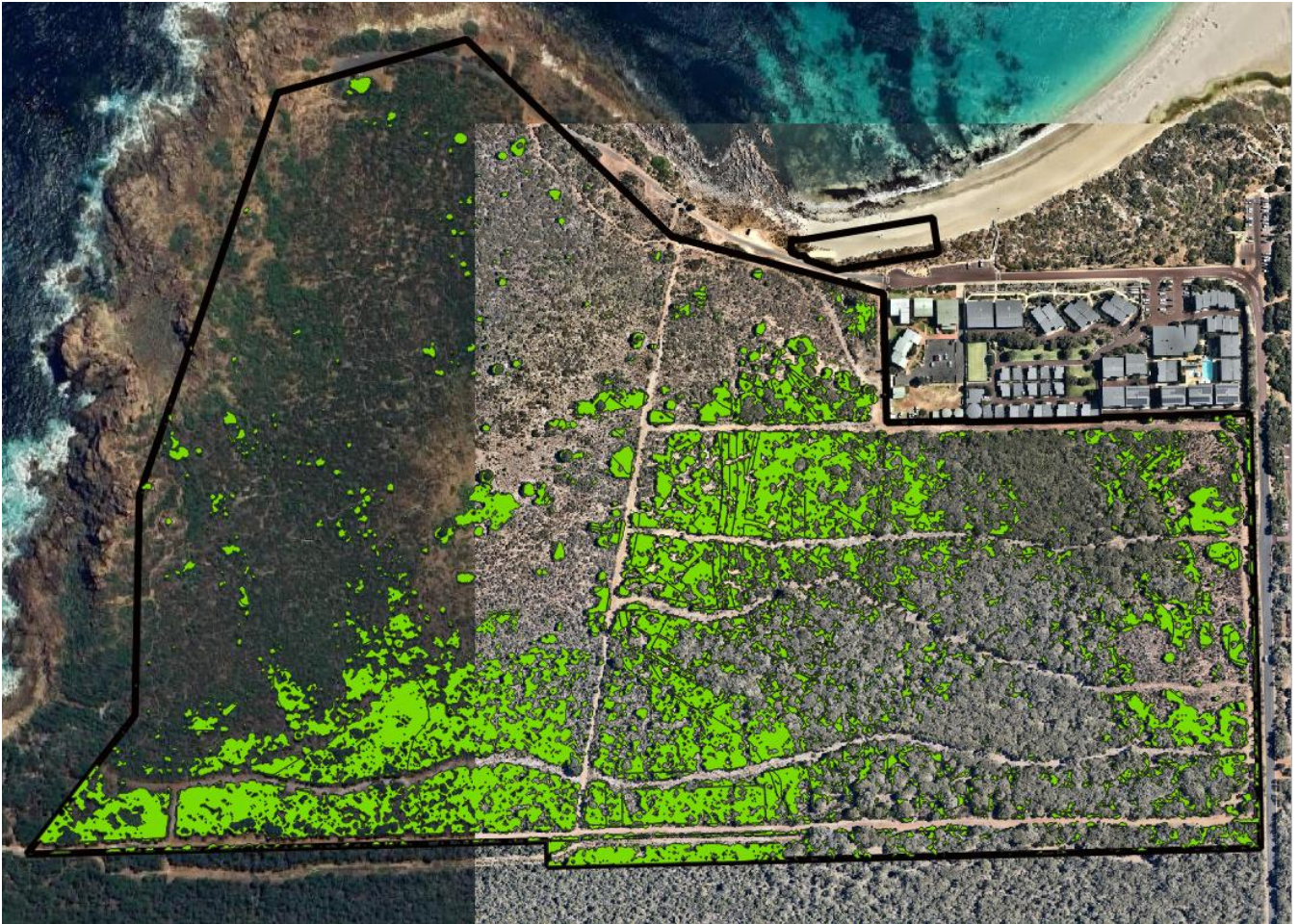


Plate 5: Tall shrubs baseline

2.7 Tall shrubs (i.e. vegetation with maximum height of 2-5 m height) modification

'Shrub patches' were created within the vegetation modification areas of the 'high' and 'medium' bushfire risk zones. No shrub patches are allowed in the 'low' risk zone. To do this, random points were generated throughout the relevant areas shrunk by the shrub patch radius and then thinned such that none are within 12.523 m of each other, to provide a separation of 10 m gaps in between the patches, after considering the 1.26 m radius of a circle with the area of 5 m², the maximum allowable shrub patch area. Initially a higher number of candidate points was generated and then an iterative process was employed to filter the points with a maximum distance constraint. A total of 203 shrub patches were created at this 10 m spacing throughout both the 'high' and 'medium' risk zones, within the modified vegetation proposal element. Each point was then buffered by the shrub patch radius to create a patch of 5m².

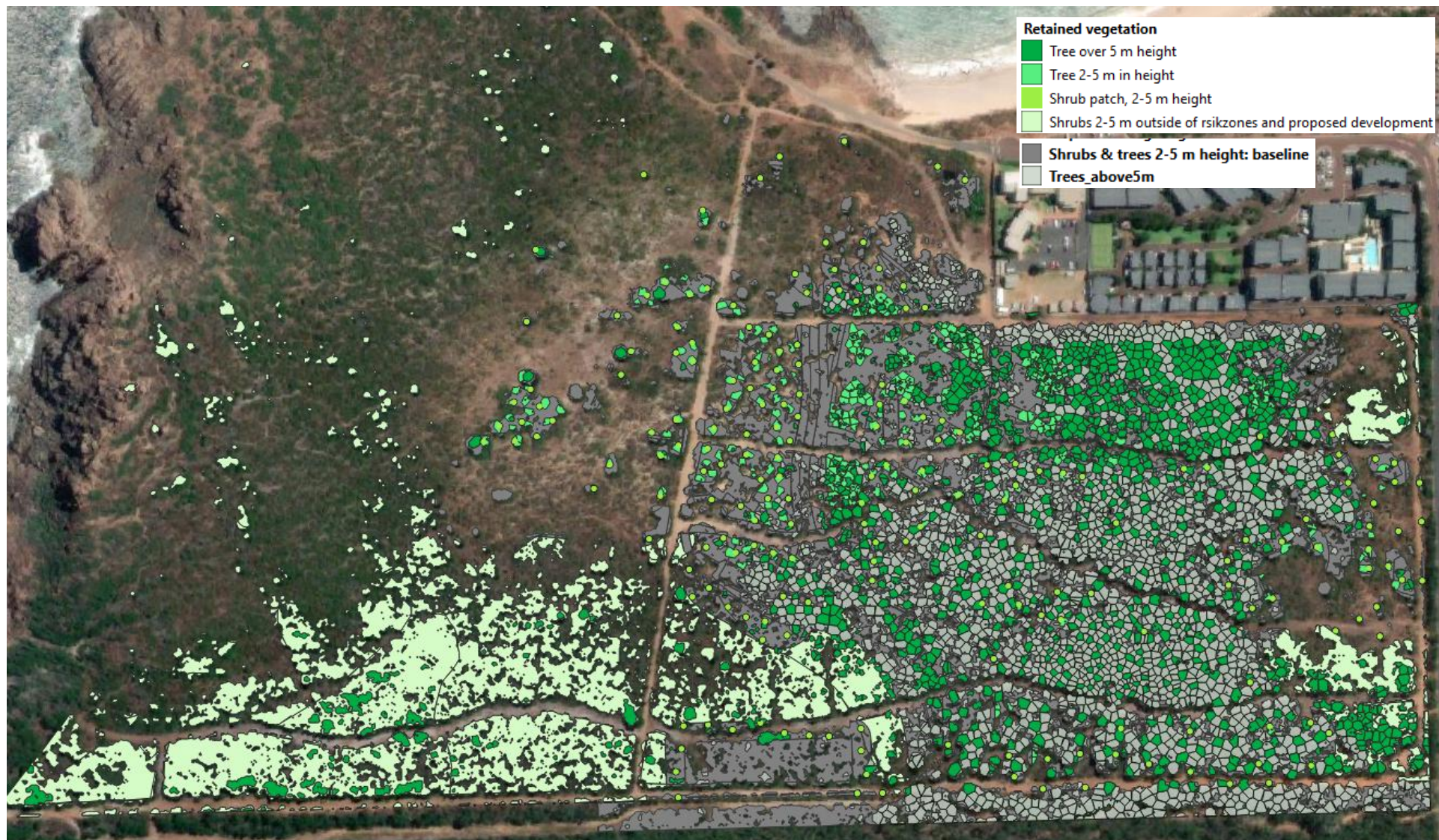


Plate 7 Retained vegetation relative to original baseline vegetation, for 2-5 m and >5 m vegetation strata



Plate 8 Indicative retained vegetation in development scenario, by WRP habitat, with proposed development elements in the background.

2.8 Creation of mitigation features (possum bridges)

Line features drawn between key parts of the possum habitat to provide connectivity within these parts and between these and the national park to the south. The current rendition reflects a compromise between a) more bridges that provide connectivity between more individual trees, particularly within the high and moderate APZs where only individual trees are retained (not patches of trees), and b) feasibility and cost considerations combined with the presumed lower likelihood of individual trees representing critical habitat resources.

Two scenarios of possum bridges are presented below to aid discussion of options and outcomes.



Plate 9 Minimal possum bridge option



Plate 10 Alternative possum bridge option which connects more of the retained vegetation. Green = retained primary habitat; olive green = retained secondary habitat; pale green = retained vegetation that is not considered to be key WRP habitat.

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3. Calculation of retained habitat compared to baseline

Table 2: Indicative baseline and retained habitat by vegetation height category and type. Note that a rough approximation has been included that there is 30% canopy cover of the Trees/Shrubs 2-5 m layer under the >5 m tall trees; cover for vegetation that sits under other vegetation could not be extracted from Lidar imagery as lidar imagery only captures the top of the vegetation height. Total retained habitat as a percentage is calculated relative to the 'total with overlap' baseline figure, which takes into account the simplification of vegetation structure within areas of habitat relative to the original multi-layered habitat. Connection is considered to be 'connected to the campground area' via either adjacent vegetation or possum bridge.





Fauna Habitat areas	Arrangement	Area of habitat - baseline (ha)				Area of habitat - retained (ha) (parentheses show percent of baseline with overlap)		
		Trees >5 m	Trees/Shrubs 2-5 m	Total (no overlap)	Total (with overlap)	Trees >5 m	Trees/Shrubs 2-5 m	Total (no overlap permitted)
Open Peppermint Forest	Total	6.255	3.844	8.222	10.099	2.105 (34%)	0.538 (14%)	2.644 (26%)
	'Connected'	It is assumed that at baseline all are connected; see 'total' row above				1.183 (19%)	0.344 (9%)	1.527 (15%)
Open Banksia Forest	Total	1.138	2.751	3.547	3.889	0.418 (37%)	0.446 (16%)	0.863 (22%)
	'Connected'	It is assumed that at baseline all are connected; see 'total' row above				0.184 (18%)	0.205 (7%)	0.413 (11%)
Closed Low Marri Forest surrounded by open shrubland areas	Total	0.103	0.84	0.911	0.943	0.099 (96%)	0.089 (11%)	0.188 (20%)
	'Connected'	It is assumed that at baseline all are connected; see 'total' row above				0.093 (90%)	0.034 (4%)	0.127 (13%)
All veg types combined	Total	7.828	16.179	21.658	24.007	2.622 (33%)	1.073 (7%)	3.695 (15%)
	'Connected'	It is assumed that at baseline all are connected; see 'total' row above				1.484 (19%)	0.583 (4%)	2.067 (9%)

Appendix 2

Fauna Crossings Australia brochure

FAUNA CROSSINGS

COMPANY PROFILE 2022

-  Culverts
-  Rope Bridges
-  Glider Poles
-  Aluminium Bridges



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COMPANY PROFILE

Our company (FaunaCrossings.com.au) is committed to designing, manufacturing and installing the most effective fauna crossings to achieve the best possible outcomes, by identifying a number of options to address a broad suite of fauna and its environment. We have had over 15 years experience in design, consultation and more recently, research of the various types of fauna furniture to ensure safe passages for our wildlife.

For many years, ecologists and conservationists have documented the adverse relationship between roads and wildlife. They have identified four ways that roads and traffic detrimentally impact wildlife populations:

- 1. They decrease habitat amount and quality**
- 2. They increase mortality due to wildlife - vehicle collision (road kill)**
- 3. They prevent access to resources on the other side of the road; and**
- 4. They subdivide wildlife populations into smaller and more vulnerable sub-populations (fragmentation). Habitat fragmentation can lead to extinction or extirpation if a population's gene pool is restricted enough**

Numerous studies have shown that the construction and use of roads is a direct source of habitat fragmentation. As mentioned above, populations surrounded by roads are less likely to receive immigrants from other habitats and as a result, they suffer from a lack of genetic diversity. The relationship between roads and habitat fragmentation is well documented. After years of research, biologists agree that roads and traffic lead to habitat fragmentation, isolation and road kill, all of which combine to significantly compromise the viability of wildlife populations throughout the world.

COMPANY PROFILE (CONTINUED)

We are passionate about our wildlife environment and to ensure the native fauna of Australia can remain in their environment and move across roads without the risk of being killed, we deliver high quality products designed to meet our client's specifications at very competitive prices. We work closely with our clients and stakeholders to provide products that are quality assured, environmentally sustainable and fauna friendly.

I am proud to have participated in the success of many companies who have placed their confidence in our team and inviting those companies who are committed to quality, to count on us for their forthcoming projects.

I am convinced that faunacrossing.com.au will make you and your company a fully satisfied customer.

DAVID SULLIVAN
Managing Director





PROJECTS

SOME OF OUR PROJECTS SUCH AS;

Abigroup - Cardwell Range, Hunter Expressway Projects

John Holland Group - Devils Pulpit Project

CMC Construction - Wiggins Island Project

Boulderstone - Buladelah Project

Thiess / Queensland Rail - Opossum and Sandy Creeks

Veolia Water - Mt Petrie

MacMahon - Glenugie Upgrade

Fulton Hogan - Berry Bypass

K2K - OHL and McDonall Dowell Joint Venture

Warna Hall Contractor - Old North Road Warna

Fulton Hogan - Race Course Road Caloundra

Bielby Holdings - Telegraph Road

Moreton Bay Regional Council - Collins Road, Everton Hills

and MBRC 18 - 19 Package

Roads and Maritime Services (RMS) - Karuah Bypass Project

Mcllwain - Bunya Road, Draper

CPB Contractors - Logan Enhancement Project (Valued at \$1,498,000)

Brisbane City Council - Koala Log Bridge (World First Design)

Robson Civil - Weir Road, Barnsley

Richard Crookes Construction - Porters Creek Public School, Warnervale

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PROJECTS

(CONTINUED)

EXISTING GEOTECHNICAL INFORMATION

- No geotechnical report is provided at time of pricing
- Allowance has been made for drilling in dry stable soil strata conditions that can be removed by standard rotary soil auger tooling

SCOPE OF WORKS

- Mobilisation/demobilisation of plant, equipment and labour to project site
- Drill holes as directed
- Supply of all plant labour required to carry out the agreed scope
- Supervision of works by client
- Mutually agreeable terms and conditions



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TERMS AND CONDITIONS

1. Site Location

The Client will be deemed to have ascertained the conditions at the site, and will have ensured that all underground and overhead services have been located and clearly marked. The Client shall ensure that all services located in the vicinity of the field work are protected from damage in compliance with the requirements of the relevant Statutory Authority for the duration of the contract. Any underground services are to be clearly shown on drawings, and nominated prior to excavation.

The Client must mark the locations where the holes are to be bored, with the hole centers clearly marked. All set out details and survey drawings are to be made available at no cost to us, and that the setting-out and the checking of all measurements are to be carried out by the Client's builder/engineer/architect prior to pouring of the concrete at no cost to us. We have presumed that the client or builder will provide adequate water, electricity, toilet and lunchroom facilities available free of charge to us, and are maintained in a clean and trouble free manner as required by relevant authority.

No allowance has been made for removal of spoil from site, hoarding, bunting, safety rails, flags, traffic controllers, scaffolding, safety screens and bins for waste materials. Faunacrossings.com.au will be exempt from any liability in the case of any damage that may result to underground or overhead services, or adjoining property when boring or excavating in locations specified by the Client Site Representative. No responsibility or costs will be accepted by our company due to damage to crossovers, footpath, paving or the like while carrying out our scope of work.

The Client shall carry out such site preparation and provide such access to all working areas as may be necessary to permit faunacrossings.com.au to conduct its drilling operations without hindrance or delay our scope of works or burden us with costs associated with non production. Any delays beyond our control will be claimed by us.

Any trenches excavated by other trades, including plumbers and electrical, to be compacted by them to engineer's specifications. No responsibility is taken for uncompact trenches or subsequent subsidence.



TERMS AND CONDITIONS

1. Site Location *(continued)*

We require an area for our site office and storage container, with adequate power supply adjacent all free of costs if required.
No drilling shall be permitted without the Site Representative from the Client being on site to confirm the location of each hole.

2. Licenses, Approvals & Contributions

The Client shall be responsible for obtaining all necessary licenses and approvals required for undertaking the works and shall adhere to any requirements imposed in the issuing of such a license/approval by the appropriate Authority.

Our price has not included levy of 0.25% payable by the principle or owner builder to the Construction Industry Training Fund.

No allowance has been made for any site allowance, or BIRST contributions as they are not required under our award or mentioned in the specifications.

3. Traffic Control

All traffic measurements, traffic control and associated planning / consultation with relevant parties to be performed by the Client, and must comply with the Australian Standard for Traffic Control (AS1742.3- 1996), the Police Traffic Branch and the requirements of Department of Transport and relevant local Councils. All associated costs incurred to be paid by the client.

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RESTING
POLES

DP LOG
FAUNA
CROSSING



ROPE
CROSSING

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BOX ROPE
AND WIRES



ROPE
FAUNA
CROSSING



INSTALL AT
WIGGINS
ISLAND



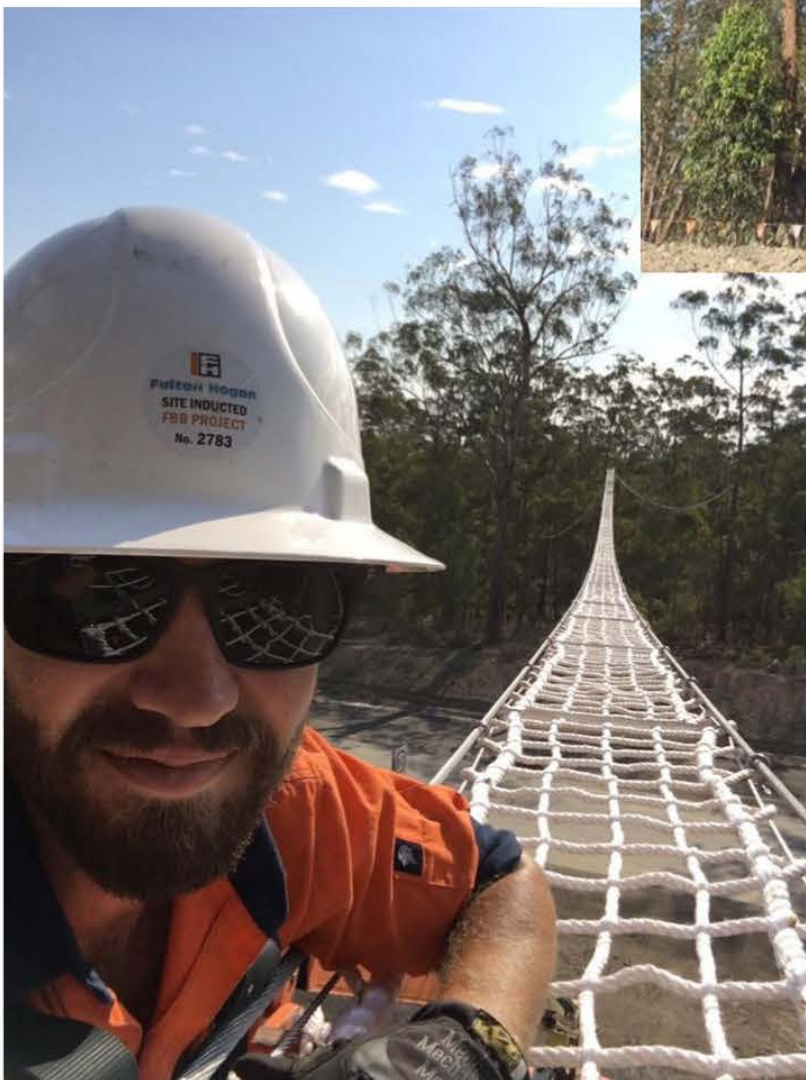
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COMPLETED PROJECTS

**K2K PROJECT:
2016**



These pictures are of a 60 meter fauna crossing across the new upgrade from Kempsey to Cooperbung in NSW. These fauna crossing are to help possums/gliders to cross the road into their habitat.

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COMPLETED PROJECTS

TELEGRAPH ROAD BRACKEN RIDGE PROJECT: 2014



For this project (awarded to Bielby Hull Joint Venture) we supplied and erected a 60 meter box rope fauna crossing for the Brisbane City Council. The fauna crossing was constructed for glider squirrels and this went across the full width of the carriageway for the Telegraph Road, Open Level Crossing Replacement Project at Bracken Ridge. Completion of this project was Thursday 24th July, 2014.

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COMPLETED PROJECTS

WIGGINS ISLAND GLADSTONE PROJECT: 2014



In April 2014 we finished the biggest fauna crossing in the Southern Hemisphere. We manufactured and installed these two fauna crossings for the protection of the endangered squirrels and sugar gliders who are breeding in the bushland where a conveyor belt was then constructed. Within the first day of one of the fauna crossings being installed, we noticed that there had already been activity on the crossing by seeing glider droppings. These two fauna crossings span over 80 meters long. They were designed to go across a large conveyor belt which delivers coal out into the Port of Gladstone. The main contractors that we were subcontracting for were CMC and Worley Parsons.

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COMPLETED PROJECTS

CALOUNDRA PROJECT: 2012



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COMPLETED PROJECTS

CALOUNDRA PROJECT: 2012 (CONTINUED)



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COMPLETED PROJECTS

LOGAN ENHANCEMENT PROJECT: 2019



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COMPLETED PROJECTS

KOALA LOG BRIDGE PROJECT: 2022



The World First "Koala Log Bridge" spanning over 27 meters was manufactured and installed for the Brisbane City Council. This specific bridge design includes an overhead log bridge and fauna fencing allowing koalas to safely cross between habitat areas. Locally sourced materials such as Ironbark Short Leaf was used to create a crossing that replicated a koalas natural habitat.



CONTACT US

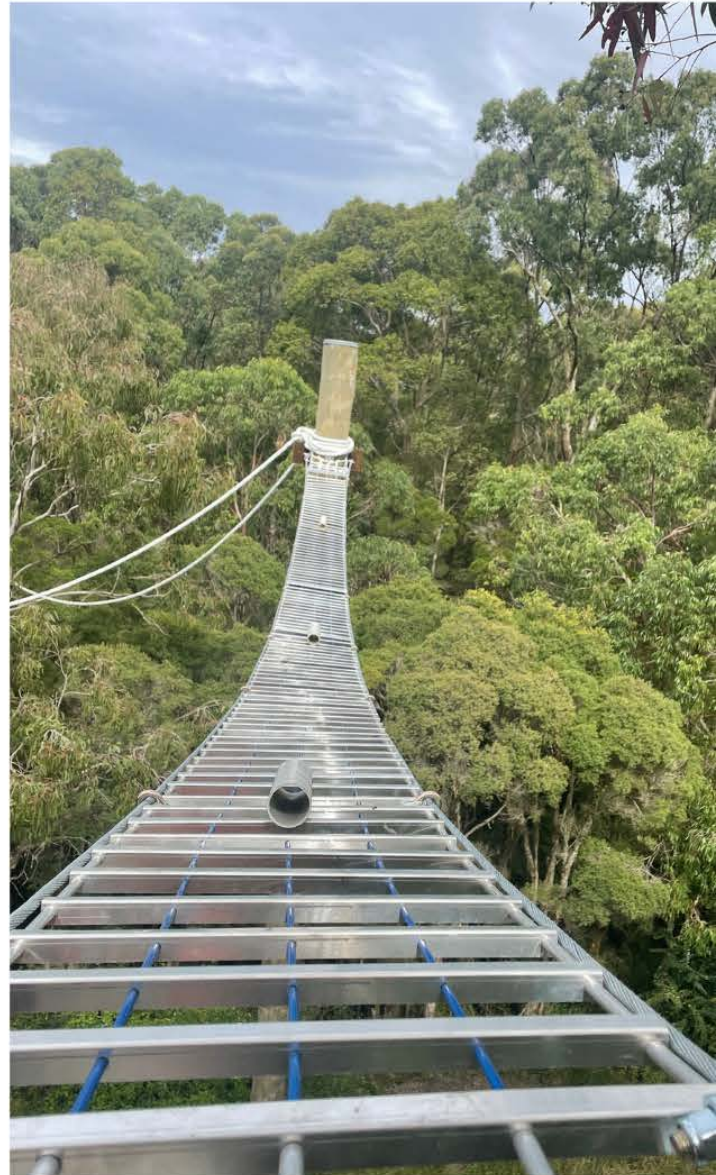
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COMPLETED PROJECTS

BARNSLEY WEIR ROAD PROJECT: 2022

For this project we used a light-weight aluminum crossing instead the standard rope. This newly design crossing weighs 1/3 of a conventional weighted ladder and is more durable. These are ideal for locations were stay wires aren't possible to be installed (i.e. near private property).



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COMPLETED PROJECTS

WARNERVALE NSW PROJECT: 2022

These pictures are of an aluminum fauna crossing we recently installed for Porters Creek State School, on behalf of Richard Crookes Construction.

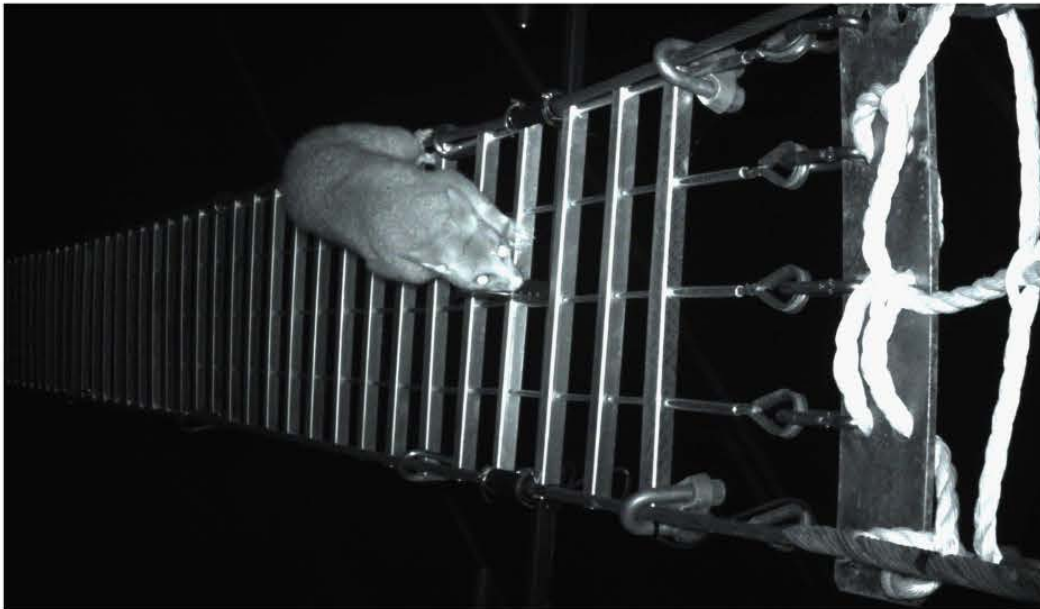


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CCTV FOOTAGE



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