

IN THE MATTER OF THE RESOURCE MANAGEMENT ACT 1991

**AND IN THE MATTER OF AN APPLICATION FOR SUBDIVISION AND
LAND USE CONSENT FOR THE AMBERFIELD
DEVELOPMENT**

BETWEEN WESTON LEA LIMITED

Applicant

AND HAMILTON CITY COUNCIL

Consent Authority

STATEMENT OF EVIDENCE OF DR REBECCA LIV STIRNEMANN

Dated: 23rd April 2019

STATEMENT OF EVIDENCE OF DR REBECCA LIV STIRNEMANN

1. Witness introduction

1.1 My full name is Dr Rebecca Liv Stirnemann I work as an independent ecological consultant and as a regional manager for Forest and Bird.

1.2 I hold the following qualifications and experience:

- a) My qualifications include a PhD in Biological Sciences from the University of Massey (2016). I have an MSc from Trinity college Dublin on climate change and a second MSc from the University of Pretoria. My MSc research in Pretoria focused on the ecology of micro-bats.
- b) I am a member of the Australasian bat society, the International conservation Society, the Raptor society and the American ornithology society and the freshwater science society,
- c) I have published 15 peer-reviewed scientific papers and book chapters; 2 of my scientific publications focus on microbats. In total I have over 15 years' experience in ecological management and research. That work experience also includes involvement with a wide variety of ecological projects including invasive predator impacts, seabirds and windfarms and endangered species declines and threats. I have also been involved with the development of new techniques for bird and bat monitoring.
- d) I have considerable experience working in New Zealand on native bats and hold a level 4 bat qualification from the Department of Conservation's Bat Recovery Group. This means that I am considered highly competent at locating bat roosts, capturing and handling bats using a variety of techniques, and undertaking monitoring and surveys.
- e) I have been involved in the oversight and interpretation of bat monitoring surveys at various sites in the North and South Islands. I have also developed methods for bat surveys to be undertaken more widely in the Pacific Islands and in South Africa. My work experience also includes providing technical input and advice into the design of mitigation packages, development and implementation of management, mitigation, restoration, and monitoring plans that focus on bats and birds. I have also led the development of endangered species monitoring and conservation management projects.
- f) In 2007, I undertook research with Andrea Dekrout which involved the capture and radio-tracking of long-tailed bats and we monitored their activity in Hamilton. Many of the captures of long-tailed bats were in Hammond bush. I was involved in radio tracking them on the farm land surrounding and directly across the river.

- g) The work I have undertaken has been for a number of organisations including DOC, CSIRO, UNDP, the Asian development bank, SPREP, non-profit conservation organisations, infrastructure companies and various governments.

2. Expert witness

- 2.1 My evidence contains opinion evidence based on my expert qualifications and experience. I believe that I am able to present this opinion evidence because of my qualifications and experience in the field of ecology and expertise on microchiroptera.
- 2.2 I have read the code of conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2014 prior to preparing my evidence. I have complied with that code of conduct in preparing this evidence and I will comply with that code of conduct in presenting this evidence and in the course of the hearing.
- 2.3 I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.
- 2.4 I have participated in an expert witness conference and have signed an agreed witness statement that has been produced as result of that conference.
- 2.5 The evidence that I give in these proceedings is within my area of expertise, except when I rely on the evidence of another witness or other evidence, in which case I have explained that reliance.

3.0 Scope of evidence

- 3.1 My evidence is given on behalf of the Riverlea Environment Society Inc.

3.2 My evidence addresses the following issues:

- (a) Introduction
- (b) Response to Hamilton City Council s42A report
- (c) Response to the s42A suggested conditions
- (d) Response to the Applicant's evidence

4.0 Introduction

4.1 The North Island population of long-tailed bats (*Chalinolobus tuberculatus*) is a threatened species classified as threatened, nationally critical (O'Donnell et al. 2017), which is the highest-possible risk of extinction in New Zealand. The species is endemic to New Zealand i.e. found nowhere else in the world.

4.2 The value of the Peacocke site for long tailed bats has been demonstrated in multiple studies (Le Roux & Le Roux 2012, Crewther & Parson 2017, Mueller et al. 2017, Dekrout et al. 2014 and Dekrout 2009).

4.3 Ecological compensation, and biodiversity offsets and thus mitigation, is a mechanism to achieve 'no net loss or preferably net gain' of biodiversity (Kate et al. 2004). This generally requires that what is lost in development is counterbalanced by conservation gains that are at least equivalent and preferably greater in value.

5.0 Hamilton City Council S 42A report

5.1 The Hamilton City Council report reviewed the applicant's AEAA. I agree with the assessment of the critical habitats and the importance of the site in linking bat habitat together. However, I disagree with the adequacy of the proposed mitigation measures to address the adverse effects on long-tailed bats. Like the HCC ecologist, I have extensive reservations in regard to the time lag of the buffer planting along the river. I consider the effects of this time lag to be so substantive that it will create long term impacts which may not only lead to "the loss of habitat and a reduction in the long-

tailed bat population in Hamilton,” as specified by the HCC ecologist, but could lead to long term permanent loss of the long tailed bat population in Hamilton.

- 5.2 The HCC ecologist suggests that offset mitigation or compensation measures can be applied instead of appropriate buffering. However, can pest management and enhancement of bat habitat compensate for the local extirpation of a species? Offsetting can be applied to mitigate for additional effects other than the buffer which are not likely to lead to the loss of the species.
- 5.3 I also disagree with the HCC ecologist in regards to the compensation period of 10 years suggested as appropriate for such a high magnitude of effect. Even should an appropriate buffer be in place, it will take at least 20-25+ years to reduce the effects of the proposed development and for native habitat to be fully functional. Any offset period should at the very least cover this period.
- 5.4 I agree with the HCC ecologist that adverse effects of development should be avoided as directed in the Operative District Plan, that the ecological function of the Mangakotukutuku Gully and Waikato River margins should be maintained as per Operative District Plan), and that habitat for threatened indigenous species, including airspace and ecological corridors, should be classified as ecologically significant (WRPS). Under section 6(1)(c) of the RMA, the protection of areas of significant habitats of indigenous fauna is a matter of national importance that must be recognized and must be provided for in this consent application process. It is not one of a number of equally weighted factors to be considered in a general balancing exercise. I also agree with the outline of ecological effects provided by the HCC ecologist (48-59).
- 5.5 I also agree with the outline of ecological effects provided by the HCC ecologist (48-59).
- 5.6 I also agree with the HCC ecologist that without the appropriate buffering, the high-value habitat of the bats is likely to be impacted in terms of feeding, commuting and roosting. With the loss of key feeding and roosting areas, I would expect a significant decline in the population.

5.7 Like the HCC ecologist, I have significant concerns in regards to the buffer and the time lag in development suggested by the applicant. I discuss this further below. I also agree with the statement that the effects on long-tailed bats and their habitat begins with clearance, construction and the erection of buildings and the associated infrastructure. I agree that no matter how large or widespread the planting, the effect of habitat loss cannot be fully mitigated until many years have passed. Time is needed to grow a buffer. Unlike the HCC consultant ecologist, I do not believe that offsetting is appropriate. Instead I believe that development should be avoided until an appropriate buffer is in place (as discussed below).

6 Response to the s42A suggested conditions

- 6.1 I note that it appears that the bats are not subject to a future management plan. It is critical that there is a management plan that demonstrates how conditions are to be complied with for bats. A functioning buffer is critical for ensuring the population remains and the methods for achieving this must be stated clearly in the consent conditions.
- 6.2 The monitoring conditions for bats outlined in conditions 92 and 93 are not in sufficient detail given the high potential likelihood of an adverse effect. The monitoring conditions also cover an extremely short period of time given that the effects of the proposed development will continue to occur for at least 30 years. The additional funding for offsetting or within a bond should not cover this cost as suggested in condition 97a.
- 6.3 A high level of certainty should be given as to the effectiveness of the conditions for maintaining the bats flyways and for the effectiveness of the buffer; if not, additional conditions should “kick in” as part of the consent.
- 6.4 It is also critical that compliance with conditions like 79, that applies to planting, occurs (although as Bruce Clarkson notes in his evidence, five years is an inadequate length of time to maintain planting restoration). Because the integrity of the planting is critical for maintaining bats, strict conditions should be included in the consent conditions.
- 6.5 Conditions of buffer height (15-20 m) and density prior to development should be closely monitored and included in the consent. The restoration plan should specify

the requirements of the buffer maintenance including pest control for wasps and mammalian pests.

- 6.6 There should be a bond to ensure adequate monitoring and mitigation/offsetting occurs. The likelihood of compliance for mitigation and offsetting requirements has been shown to drop substantially without a bond (see Professor Clarkson's evidence). In situations like this, when a species is at a critical risk of extinction, I recommend the precautionary principle is adopted.
- 6.7 Where offsetting is appropriate, the monetary sum involved should be separate to the bond, and both the amount and action required should be predetermined prior to consent being given and not left for nomination by Hamilton City Council, following discussions with the consent holder, DOC and WRC, as suggested in 97b.
- 6.8 Additional consent recommendations are at the end of this document.

7 Response to Applicant's evidence: Level of adverse effects on bats after application of mitigation

- 7.1 I agree with the applicant's conclusion that the magnitude of effect combined with an ecological value means that without mitigation the ecological effect is very high and that this represents a high level of effect which either warrants avoidance or high intensity mitigation and remediation actions.
- 7.2 The applicant has stated that the site as a whole and the northern extent of the site in particular is used by long tailed bats for commuting, periodic foraging and potential opportunistic roosting. The applicant's field methods using automatic sound recorders identified that bats were utilising the entire area of the Peacocke site. There was, however, not sufficient research to allow the degree of foraging or roosting occurring within the site to be quantified, let alone limited to "periodic foraging" and "opportunistic roosting". I would redefine the entire area as used for commuting, foraging and roosting, and as an important migrational pathway site.

7.3 The applicant has provided an assessment of the likely effects of the proposed development and identified a number of opportunities to avoid, remedy and mitigate potential effects on the terrestrial ecology. I reviewed the major effects of the development including the changes suggested in regards to mitigation and offsetting of effects on long-tailed bats (Table 1). I have adopted a conservative approach because of the high likelihood of high magnitude and the minor level of uncertainty. In my expert opinion, given the proposed mitigation/offsetting information provided by the applicant, the magnitude of impact is still High-Very high and therefore the level of effect remains Very high (Table 1). This reflects the time lag impact, which is mentioned but not seriously considered in the proposal, and which is likely to result in the permanent loss of ecological value through the loss of the long tailed bats. For this reason I do not consider that the main effects of this development have been avoided or mitigated.

Table 1. Description of the magnitude of effect on long tailed bats and changes with the proposed mitigation by the applicant.

| Effect on bats | Magnitude of impact by the proposed development | Applicant's proposed suggestion of mitigation/offsetting | Magnitude of impact given the applicant's suggested mitigation | Key issues with proposed mitigation |
|--|--|---|---|--|
| Loss of buffering and fragmentation and loss of extent of key habitat - Across the river, including Hammond park | Very High | The applicant has suggested: <ol style="list-style-type: none"> 1) Specific lighting in street lamps 2) Vegetative planting along the river 3) Low planting (e.g. Meadow area) | High | The time lag between buffering vegetation growth and development of the site has not been addressed. The vegetation along the river will not be of sufficient height and width to protect critical bat habitat prior to development occurring. |
| Fragmentation and loss of extent of key habitat - Connectivity and barrier to movement down river and through lower gully | Very high | The applicant has suggested: <ul style="list-style-type: none"> • Specific lighting in street lamps • Vegetative buffer planting along the river. | Very high | The time lag between buffering vegetation growth and development of the site has not been addressed. The vegetation along the river will not be of sufficient height and |

| | | | | |
|--|-----------|--|--------|---|
| | | <ul style="list-style-type: none"> Low trees (for views) are planted beside what is referred to as the minor gully (which B. Clarkson terms the N-S gully). | | width to protect critical bat habitat. |
| Fragmentation and loss of extent of key habitat: Across the site/ loss of migratory pathway | Very high | The applicant has designed an area with 10 m of shelterbelt to be retained and an additional 10 m buffer to be planted next to it. In between there is an approximately 2 m-wide "meadow". | High | The approach is considered experimental and it is likely that the bats will not continue to use this crossing once the development has occurred. |
| Reduction in habitat and feeding area on site | Very high | The applicant has suggested replacing the pasture with a small area of meadow which will also include a cycle path, a storm water pump station, a storm water pond and regenerating bush. | Medium | The increase in feeding habitat is considered experimental. The applicant has not considered that until closed canopy is reached (+15 years) they will be creating optimal habitat for <i>Polistes</i> , paper wasps, thereby reducing insect abundance and thus food availability. |
| Increase in threats from pest species | medium | Not addressed by applicant | medium | Predation on bats not considered |
| Loss of habitat that has a key life cycle function for bats - Impact on roosts on site | high | Not addressed by applicant | medium | Time lag not addressed |
| Reduction in access to roosts offsite | High | Time lag not addressed | High | Time lag not addressed |
| Loss of habitat - Airspace | High | Compensation offset not specified | High | Compensation offset not specified |
| Loss of vegetation on site | Medium | 2.6 ha of vegetation is removed during construction phases | Low | Additional planting of 18.5 ha of mainly indigenous trees will eventually mitigate the vegetation loss |

8. Response to Applicant's evidence: Loss of buffering, fragmentation and loss of extent of key habitat.

8.1 Ecological buffers are protected zones established around sensitive or critical areas and may be used to reduce or minimize the risks of land use disturbance, proximity of infrastructure and other anthropogenic effects. The following areas have been highlighted as critical areas for the long tailed bat in Hamilton: the margins of the Waikato River (particularly around the Narrows, Hammond Park, Stanford Park, Hamilton Gardens, the Mangakotukutuku gully complex, the Mangaharakeke gully system). Hammond Park is particularly important. The loss of connectivity and/or buffering to these sites is likely to result in the loss of the bat population. To avoid adverse anthropogenic effects a buffer must be wide, thick and high so that key behaviours are not disrupted.

8.2 To protect the key habitat, the applicant has suggested a native planting buffer area between the areas currently used by the bats and the proposed development. To form an adequate buffer, the vegetative cover must form a barrier to disturbance. To achieve buffering the vegetation must be wide enough to remove the anthropogenic impacts such as noise, visual and physical disturbance which will prevent bats utilising the site or have other adverse behavioural impacts. Impacts may be from lighting (e.g. residential housing, car lights) and other general activities of any housing development.

8.3 To be effective, the design of the buffer area must consider the elevation change where houses are to be developed against the elevation of the area which needs buffering, such as the river area and adjacent bat habitat. The Peacocke site is not level and this must be considered in terms of the placement and height of the required buffer (Fig. 1). For instance, the critical bat habitat at Hammond Park is at 27-55 m elevation (See Fig. 1). To effectively buffer this area, trees would need to be planted at least at 24 m asl and be at least 15-20 m high (assuming that houses are restricted to being single storey; see Fig. 1). Because of these factors, I recommend a further vegetative setback which should form part of any conditions of consent. I recommend that no urban area along the river should be closer than 140 m from the river bed to ensure appropriate buffering of all disturbances. Any additional activity within the

area, e.g. bike paths, should result in compensatory increases in the width of the buffer. Areas like the proposed “bat habitat meadow” should not cut into the buffer zone since this will reduce the buffer’s integrity.

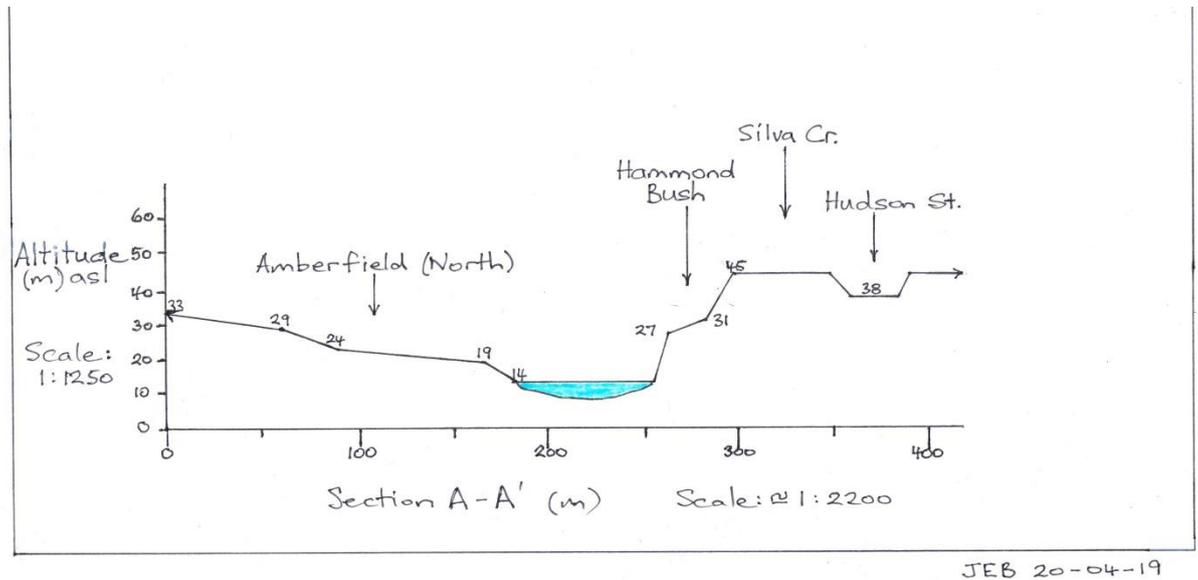


Figure. 1. Profile from the northern end of the proposed Amberfield subdivision across the Waikato River to Hammond Bush and Hudson Street.

- 8.4 The size of the buffer is also critical for maximising insect abundance as the habitat matures into an ecosystem that produces food for the bats. Research has shown that the responses of canopy invertebrates are similar to vegetation in regards to edge effects, although the effect on predator abundance extended into the forest for at least 100 m (Denyer et al. 2006). Therefore, to counter this edge effect on insect abundance and to ensure availability of the insects that the long-tailed bats feed upon, a further width of 25 meters is recommended to be added to the buffer. This should be in addition to any additional mitigation required since in itself it will not provide additional habitat. I recommend a total buffer width of 125 metres.
- 8.5 Bat presence has been found to be negatively correlated with housing and streetlight density (Dekrout 2009). Despite this, the current design proposes that houses are to be built within 50 m of the river edge. The buffer area must be applied along the full

length of the river corridor to maintain this last flyway, since bats are unlikely to migrate across the Peacocke site once houses are built.

9 **Time required for the buffer to become operational**

- 9.1 To be functional, the buffer vegetation must be at least 15-20m high and thick enough that the risk of anthropogenic disturbance to the bat species is reduced. This is not addressed in the AEAA, which underestimates the number of years required until the buffer is of sufficient height (see Professor Clarkson's evidence). This is a significant underestimate of the time needed for vegetation to reach sufficient size to adequately buffer the area (see evidence by Bruce Clarkson which suggest 15-20 years of growth will be needed to reach 15-20m of height). I also supply a photo of 4-year-old native vegetation in front of a housing area (Figure 2a) as an example of how buffering is not achieved at this age of growth, and a photo of 5-year-old vegetation (Figure 2b) to show a height of 1 to 1.5 metres at this age.



Figure 2a. Photo of 4 year old vegetation and housing development to show lack of buffering capacity. Photo taken at Waiwhakareke, Hamilton, 2019.



Figure 2b. Photo of 5-year-old vegetation to show a height of approximately 1–1.5 metres. Photo taken at Waiwhakareke, Hamilton, 2019.

- 9.2 For the long tailed bat, the time lag between impact and compensation action (i.e. planting reaching an adequate height to act as a buffer) should be a critical factor in decision-making to avoid the high likelihood of net loss of the species in Hamilton (see evidence by Professor Clarkson). The AEAA suggests that a 7x multiplier in terms of greater planted area will substitute for the time lag required to establish an effective canopy height. I do not agree with this approach, which could result in the loss of the species.
- 9.3 The AEAA purports that the additional creation of habitat will both buffer the effects of the site and provide connectivity. I do not accept the conclusion in the AEAA section 3.3.2 that the magnitude of effects will be low because the buffer has been widened and indeed that the effect of the planting will result in a positive effect in the

long term (20+ years). I disagree because of the prolonged time lag period required for growth, during which the vegetation will not buffer the effects.

- 9.4 The information provided does not allow timing of the proposed development to be properly assessed because full information has not been provided that relates the stage of development to the number of years. However, if the development has to occur prior to the native trees reaching 15-20 m (which will take 15-25 years), consent should only be given if an additional buffer is provided which will provide the recommended height. One option is the addition of a sufficiently large (10 m thick), fast-growing deciduous non-native (e.g. pine) area buffer section above the native buffer. Consent for any building should not occur until these faster growing trees are 15-20 m tall and form a thick (10m) buffer. Appropriate maintenance by the applicant would be needed for the lifetime of any non-native planting to ensure seedlings do not spread. If this was adopted as part of the consent conditions, I would recommend that once the native plantings reach full buffering height (15-20 years) the non-native area could be removed and replanted with natives providing additional bat habitat. This should all be stipulated in the consent.
- 9.5 I note that the applicant has employed a lighting specialist to minimise lighting spill. I support this since it may make the area more bat friendly, although details of the lighting design have not been provided. However I consider a buffer of sufficient height and density along all critical flyways and a setback in housing a critical method for minimise the anthropogenic effects of the development.
- 10 Roost site protection.** Though the applicant did not undertake any radio tracking work, which would have enabled bat roosts to be discovered, at least one bat roost was found in the site by AECOM during their radio tracking. Buffers around bat roost sites range from 500 feet (152 m) to more than 1,000 feet (304.8) in other countries, they and should be based on wind direction, adjacent land use and surrounding vegetation. I recommend that this approach to restoration occurs in the gully where at least one bat roost has been found. Radio tracking should occur to determine any additional roost sites and appropriate buffers should be developed to protect this habitat.

- 11. Loss of spatial movement (airspace) across the site.** I have radio tracked bats captured in Hammond Park that utilised space over Peacocke subdivision. The proposed development will result in a net loss of long tailed bat migratory pathways and airspace across the Peacocke site, thus constraining their movement. The applicant has suggested maintaining the row of trees along the site to enable bats to have an additional escape route. I consider this row of trees beneficial in providing a potential escape route for the bats early on in the development. However, in my expert opinion, as soon as houses are added within 200 m from this route, the bats will no longer use it and ultimately this habitat will be lost. The positive impacts and effects of any offsetting compensation proposals should be rigorously assessed against any potential loss. This includes loss of access to roost sites across from the Peacocke site. The applicant has not specified how the long-term migration airspace loss (criterion 11, WRPS) and potential fragmentation impacts due to the development are to be mitigated or offset. Given the high level of effect, all offsetting activities should have been specified prior to the hearing, and I propose that it is not possible to assess whether consent should be granted until all detail is specified.
- 12. Reduction in habitat and feeding area on site.** The applicant has not undertaken research looking at the importance of this site as a feeding site for long tailed bats. Despite a lack of actual data, they specified that the area was of only “periodic” value for bat feeding. Pasture is a productive area for insects (e.g. Smith et al. 2002, Collier et al. 1997). This productive area will be lost as feeding habitat as soon as development begins. The applicant has suggested replacing this habitat with an experimentally designed habitat of an unspecified area (in terms of dimensions) of specially designed meadow (although other than “meadow grass”, we have no detail of which plant species it will contain or its maintenance requirements) and has also proposed a native buffer area. Given that bat habitat has never previously been deliberately designed, I have concern about this experimental approach. I also have considerable concern about this area being located within the critical buffer area directly across from Hammond Park, thereby reducing the effective width of buffering.

13. **Wasp problem.** Newly regenerating vegetative areas are optimal habitat for *Polistes* (paper wasps) which result in consequential severe reductions in insect availability (Schmark, in press). If this area was to be used to replace lost habitat, then I would recommend that the consent specifies that for at least the first 20 years wasps are controlled in the area to ensure that native insect abundance is enhanced. After 20 years the closed canopy will be less attractive to this invasive species and it is expected to be of reduced concern.
14. **Introduced mammalian predators** are a known threat to bat populations from studies in the South Island. A 10-year study at Fiordland beech forest demonstrated that in years with low predator numbers, long-tailed bat populations increased, while in years with high predator numbers, bat populations declined (Pryde et al., 2005). In urban areas cats are a particular concern for long tailed bats. To enhance long tailed bats on site I recommend that one of the consent conditions is that all cats in the proposed development are contained inside. I also suggest that pest control, both onsite and offsite, targeting roosts and in particular maternity roosts, may be one appropriate mitigation tool which may positively impact the long tailed bat population. A known bat roost in a stand of oak trees to the north-west of the existing Narrows Bridge is considered to be a possible maternity roost.
15. **Additional consent recommendations.** To reduce development effects, all the following conditions should be met. Because this development will reduce the flight path of bat movement across the entire site, limiting movement to primarily along the river and the gully, it should be considered critical that this entire escape route is protected and treated equally in terms of buffering width. Full corridor and gully restoration planting of natives needs to occur along the entire area of the 'escape route' and provide effective buffer for bats prior to any development occurring. Vegetation should attain 15-20 m of height prior to any development occurring or, if not, extra fast-growing buffer vegetation which is of this height should be established at the buffer-urban boundary prior to activities beginning. A setback of the first two rows of housing should occur (200 m) until the buffer is 20 m in height, and minimum house heights (one storey only) be permanently imposed for the first three rows of houses to reduce lighting effects.

- 16. Conclusion.** Given the importance of this site to long tailed bats, implementation of the currently-proposed strategy to reduce adverse effects may lead to the permanent loss of this threatened species, not only from the Peacocke site but also from Hamilton in general. If the appropriate buffer cannot be developed prior to the commencement of development, at least for the entire river frontage, in my expert opinion the entire project should be avoided to prevent long-term significant adverse effects such as the localised loss of this species.

References:

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Dated: 4/23/2019



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