

BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Proposed Plan Change 5 to the Operative Hamilton
City District Plan

**STATEMENT OF EVIDENCE OF GERARDUS HENRICUS ANTHONIUS KESSELS
(ECOLOGY)**

Dated 2 September 2022

LACHLAN MULDOWNY
BARRISTER

P +64 7 834 4336 **M** +64 21 471 490

Office Panama Square, 14 Garden Place, Hamilton

Postal PO Box 9169, Waikato Mail Centre, Hamilton 3240

www.lachlanmuldowney.co.nz

INTRODUCTION

1. My full name is Gerardus (**Gerry**) Henricus Anthonius Kessels.
2. I hold a Bachelor of Science degree majoring in zoology (completed in 1988) and a Master of Resource and Environmental Planning (1st class honours, on wetland ecology - completed in 1999), both from Massey University. I am an accredited Independent Hearings Commissioner certified by the Ministry for the Environment and Local Government New Zealand.
3. I have 32 years' experience in the fields of ecology and resource management planning. I have been the managing director and principal ecologist of Kessels & Associates Limited since 1999 (trading as Kessels Ecology until 2018, and now trading as Bluewattle Ecology 2019-2022).
4. Prior to this, I held the following roles:
 - a) My initial role was with the Department of Conservation (**DOC**) as a Conservation Officer at Mount Bruce Wildlife Reserve and then as a Conservation Officer – Protected Species with the Waikato Conservancy.
 - b) From the end of 1994 until the end of 1999 I worked for the Hamilton and Napier offices of Works Consultancy Services/Opus International Consultants as an ecologist.
 - c) I was employed as a Principal Ecologist for Tonkin and Taylor Limited for 16 months in 2018/2019.
5. I am a member of the New Zealand Ecological Society, the Ornithological Society of New Zealand, the Waikato Botanical Society, and an affiliate member of the New Zealand Planning Institute. I am certified with 'Bat Competency' by DOC as being suitably qualified to undertake and analyse

data for bioacoustic surveys (using acoustic bat monitors (**ABM**)), identify long-tailed bat roosts and capture and handle long-tailed bats.

6. I am a generalist ecologist with experience in assessing the conservation significance of natural habitats, assessing the ecological effects associated with infrastructure, policy development relating to the potential ecological implications of land use and biodiversity offsetting. I have a broad background of relevant experience in threatened species management, ecosystem monitoring/evaluation and conservation management.
7. I have been surveying, assessing and managing indigenous flora and fauna and their habitats since 1990, including:
 - a) Undertaking threatened species captive breeding management and research;
 - b) Assisting with onshore and offshore island pest control programmes;
 - c) Assisting with the monitoring and active management of a number of threatened species, such as kakapo, North Island kokako, kiwi and long-tailed bats; and
 - d) Ecological impact assessments, and restoration and management plans.
8. I have also undertaken ecological impact assessments and assisted with policy development pertaining to indigenous flora and fauna and their habitats and biodiversity under the Resource Management Act 1991 (**RMA**) for a wide variety of development and biodiversity enhancement projects. I have undertaken this work for various organisations including Waka Kotahi, DOC, territorial authorities, rural landowners, rural and residential subdivision companies, non-profit conservation organisations and infrastructure companies.

9. I have been involved in assessing significant natural areas (**SNAs**) and assisting in biodiversity policy and regulation analysis/development for territorial authorities, primarily under the provisions of section 6(c) and sections 30 and 31 of the RMA. Local and regional authorities that I have assisted in this process since 1993 include: Hauraki District Council; Franklin District Council; Papakura District Council; Ruapehu District Council; Waikato Regional Council (**WRC**); Auckland Regional Council; Auckland City Council; Auckland Council; Kapiti Coast District Council; Waipa District Council; Waitomo District Council; Waikato District Council; Central Hawkes Bay District Council; Thames-Coromandel District Council and Hamilton City Council (**HCC** or **Council**).

10. More recently I have provided independent advice and been involved in specialist workshops to the Ministry of the Environment and DOC on the development of the National Policy Statement for Indigenous Biodiversity (**NPS-IB**) at the request of the Associate Minister for the Environment (Hon. James Shaw). I have authored several reports for WRC, district councils and central government with regard to section 6(c) matters of the RMA, including peer review of the 2002 and 2019 WRC guidelines for determining ecological significance and the Local Government NZ “Action Bio-Community” initiative¹.

11. I have been involved in the development and application of ecological offsetting and compensation measures for private developers, large energy generation providers, district councils and Local Government NZ. In 2010 I was part of the specialist team which provided input into the development of the DOC biodiversity offsetting guidelines². I am a co-author of the NZ

¹ Kessels, G. (2004). Action Bio—Community Common Ground Local In Search Of The Right Mix An investigation of tools for biodiversity management. Kessels & Associates Ltd for Local Government NZ

² “Guidance on biodiversity offsetting in New Zealand”; <https://www.doc.govt.nz/about-us/our-policies-and-plans/guidance-on-biodiversity-offsetting/>

Local Government report: 'Biodiversity Offsetting in New Zealand – Guidance for Local Government Decision Makers.'³

MY INVOLVEMENT IN THIS PROJECT

12. I have undertaken many ecological surveys, assessments and provided technical advice and reviews for HCC throughout my professional career, including the following examples:
 - a) I was principal review ecologist retained by HCC for the HCC designation and WRC consenting phase for Southern Links arterial roading project. I presented evidence and assisted Council in the preparation of recommended consent conditions as part of staff's section 42A report;
 - b) I have undertaken ecological assessments, mitigation and monitoring of several large and small residential subdivisions in Hamilton, including Somerset and St James Park;
 - c) I have reviewed the ecological aspects of the Ruakura Development Plan on behalf of HCC during the consenting phase;
 - d) I was retained by HCC to assist with ecology aspects of policy and rule development and responses to submitters for the Operative Hamilton District Plan;
 - e) I have project managed, peer reviewed, and been involved in numerous bat surveys throughout Hamilton (and the North Island

³ Maseyk, F., G. Ussher, G. Kessels, M. Christensen, M. Brown (nee Doole). (2018). Local government guidance for Biodiversity Offsetting under the Resource Management Act. Prepared for the Biodiversity Working Group on behalf of the BioManagers Group.; <https://www.lgnz.co.nz/assets/Uploads/7215efb76d/Biodiversity-offsetting-under-the-resource-management-act-full-document-....pdf>

generally), as well as project managing two city-wide bat surveys on behalf of Project Echo, DOC, HCC, and WRC⁴; and

- f) I was part of the HCC team of ecologists providing recommendations and evidence for the 'Amberfield' subdivision consent application within the Peacocke Structure Plan area (**PSPA**)⁵, and subsequently peer reviewed the various ecological management plans related to this subdivision on behalf of HCC.
13. I originally provided ecological advice to HCC for the Peacocke Structure Plan in 2009. More recently (2018-2022) in conjunction with Dr Baber, Dr Mueller and Dr Davidson-Watts, I have provided technical reports to HCC presenting methods, analysis and recommendations for long-tailed bats and their habitats, ecological effects management guidelines, and a process to assess and protect SNAs for proposed Plan Change 5 (**PC5**).
 14. During this period I have working closely with the Council team to provide advice on ecological and section 6(c) matters. I have attended a number of meetings and workshops with key stakeholders, including expert ecologists and planners from DOC and WRC where we presented and discussed, in some detail, the methodologies and outcomes of the technical ecology reports, such as mapping of SNAs, and biodiversity offsetting and compensation approaches.

CODE OF CONDUCT

15. I have read the Environment Court Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2014 and agree to comply with it. I confirm that the opinions expressed in this statement are

⁴ For example Le Roux D.S. and Le Roux N.S. 2012: Hamilton City Bat Survey 2011-2012. Report prepared by Kessels & Associates Ltd for Project Echo (project partners: Waikato Regional Council, The University of Waikato, Hamilton City Council, Department of Conservation, Waikato Tree Trust). 22 pp.

⁵ *Weston Lea Limited v Hamilton City Council* NZEnvC 189.

within my area of expertise except where I state that I have relied on the evidence of other persons. I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

SCOPE OF EVIDENCE

16. My evidence, presented on behalf of HCC as proponent of PC5, summarises the key aspects of the following technical ecological report:
 - a) PSPA Long-tailed Bat report - Appendix J to the PC5 Assessment of Environmental Effects (**AEE**) (**LTBR**)⁶;
 - b) PSPA Preliminary Assessment of Ecological Effects report – Appendix K to the PC5 AEE (**PAEER**)⁷;
 - c) PSPA Assessment of Ecological Significance report – Appendix L to the PC5 AEE (**AESR**)⁸; and
 - d) Plan Change 5 Technical Ecology Report (**TER**) dated 31 August 2022 which is appended to my evidence as **Attachment 1**.
17. In addition, I expand on matters pertaining to the process leading to the development of the core aspects of the ecological recommendations in these reports, particularly section 6(c), and to a lesser extent sections 6(a) and 7(d), of the RMA, as they relate to the updated PC5 provisions.

⁶ Peacocke Structure Plan Assessment of Environmental Effects - Appendix J, Peacocke Structure Area Plan Change Long-tailed bat report, 4Sight 4 June 2021.

⁷ Peacocke Structure Plan Assessment of Environmental Effects - Appendix K, Preliminary Assessment of Ecological Effects, Tonkin+Taylor, July 2021.

⁸ Peacocke Structure Plan Assessment of Environmental Effects - Appendix L, Peacocke Structure Plan Area: Ecological Significance Assessment, Tonkin+Taylor, July 2021

18. While I am conversant, and suitably qualified and experienced on the other ecological aspects of PC5 and ecological matters raised by submitters, I rely on the detailed analysis in the technical reports listed above and the evidence of Dr Mueller and Dr Baber to address these matters. I am in agreement with their evidence in this regard.

EXECUTIVE SUMMARY

19. The natural values of the PSPA were assessed using best practice guidelines to assess ecological significance using the Waikato Regional Policy Statement (**WRPS**) criteria for determining significance of indigenous biodiversity set out in Table 11-1 of the WRPS. If an area meets one or more of these eleven criteria it is considered to be ecologically significant. These identified areas now collectively include habitats of significant indigenous fauna, as well as significant indigenous vegetation and significant wetlands. These areas have been mapped as SNAs in PC5.
20. The Significant Bat Habitat Areas (**SBHAs**) mapped in PC5, given effect by the Natural Open Space Zone (**NOSZ**) and the relevant provisions of PC5 are central to achieving a linking network between the identified SNAs, particularly of the Mangakōtukutuku Gully, its tributaries, the Waikato River, other significant indigenous fauna habitats within HCC, and in the surrounding districts of Waipa and Waikato.
21. While parts of the SBHAs and the overarching area may not exhibit any obvious ecological values at present, they are essential to protecting the SNAs by providing space for restoration and recreation of habitats required to maintain and enhance biodiversity values in the PSPA as the area is urbanised. Criterion 11 of Table 11-1 the WRPS criteria⁹ provides a

⁹ "It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from

pathway to recognise and incorporate the SBHAs, the Bat Habitat Buffers and the 5 m development setback as described in the LTBR.

22. These areas have been applied in PC5 for protecting indigenous fauna habitats and corridors, particularly (but not exclusively) for long-tailed bats.
23. Subject to the updated proposed provisions being amended in line with the recommended changes set out in the TER, and further elaborated in my evidence below and that of Dr Mueller and Dr Baber, I am supportive of PC5 as it relates to ecological matters.

TECHNICAL REPORTS

24. The focus of my evidence is on how PC5 gives effect to section 6(c) of the RMA. The LTBR, the AESR and the TER detail the methodology, analysis and recommendations pertaining to SNAs and other mechanisms, which when combined, provide protection of significant indigenous vegetation and significant habitats of indigenous fauna with the PSPA.
25. The ecological significance assessment methodology and outcomes are detailed more fully in the AESR, and summarised in the TER. The analysis has identified a large increase in extent and area of ecologically significant habitats compared to those identified as SNAs in the Operative District Plan. The natural values of the PSPA were assessed using best practice guidelines to assess ecological significance using the WRPS criteria for determining significance of indigenous biodiversity set out in Table 11-1 of the WRPS, including application of best practice guidelines and qualifying threshold criteria as detailed in the AESR. If an area meets one or more of these eleven criteria it is considered to be ecologically significant. These identified areas now collectively include habitats of significant indigenous

fauna, as well as significant indigenous vegetation and significant wetlands. These areas have been mapped as SNAs in PC5¹⁰.

26. The SBHAs mapped in PC5, given effect to by the NOSZ and the relevant provisions of PC5 are central to achieving a linking network between the identified SNAs, particularly of the Mangakōtukutuku Gully, its tributaries, the Waikato River, other significant indigenous fauna habitats within Hamilton City, and in the surrounding districts of Waipa¹¹ and Waikato¹².
27. While parts of the SBHAs may not exhibit any obvious ecological values at present they are essential to protecting the SNAs by providing space for restoration and recreation of habitats required to maintain and enhance biodiversity values in the PSPA as the area is urbanised. Criterion 11 of Table 11-1 the WRPS criteria¹³ provides a pathway to recognise and incorporate the SBHAs, the Bat Habitat Buffers and the 5 m development setback as described in the LTBR and AESR. These areas have been applied in PC5 for protecting indigenous fauna habitats and corridors, particularly (but not exclusively) for long-tailed bats in our recommendations to HCC. The scientific justification of these areas, their widths and locations is discussed in more detail in the LTBR and the AESR.
28. In particular, Section 4.2 of the LTBR provides rationale for the SBHAs (bat corridors) and the Bat Habitat Buffers (buffers to high value bat habitats). In summary high value bat buffers and bat corridors will retain connectivity

¹⁰ Note that ground truthing has not been undertaken as part of the AESR, however, best available data and literature has been used to determine these areas.

¹¹ Deichmann, B., & Kessels, G. 2013. Significant Natural Areas of the Waipa district: Terrestrial and wetland ecosystems (Waikato Regional Council Technical Report TR 2013/16). Prepared by Kessels & Associates Ltd for Waikato Regional Council.

¹² Van der Zwan, W., Kessels, G., Deichmann, B., Purcell, A. 2017. Significant natural areas of the Waikato District: terrestrial and wetland ecosystems. Waikato Regional Council Technical Report 2017/36, Kessels Ecology for Waikato Regional Council, Hamilton.

¹³ "It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects." Operative Waikato Regional Policy Statement - Te Tauaki Kaupapahere Te-Rohe O Waikato.

and over time create core habitat for bats in the PSPA. In terms of buffer and corridor habitat, for both enhancement of existing or recreation of new habitat areas, the most important general principle is that wide swathes of land are required to be set aside as bat habitat in order to retain a permeable and functioning landscape for long-tailed bats. Dark buffer zones may be used for hard and soft amenity use and landscaping, provided that this use does not compromise the functioning and maintenance of the high value bat habitat it protects.

29. In terms of determining buffer and corridor widths for long-tailed bats, studies in Hamilton show that without any bespoke design measures a minimum width of 100 m appears to be an optimum width to retain use of gully systems in Hamilton by long-tailed bats (Le Roux and Le Roux 2012). Nonetheless, in Sandford Park and Hammond Park (both adjacent to the PSPA, bats continue to use the vegetation in these areas for roosting and foraging, even when only 20-50 m from the nearest houses. The structural characteristics of the vegetation in these areas are important for the bat's ability to use them. Ideally, the vegetation within these areas is mature and dense (and comprise of either exotic or native trees and shrubs), and there is an inter-laced network of mature corridors of trees, with open grass parkland, wetlands or low shrubland 'glades' interspersed between. With bespoke planting design and artificial lighting control measures (as discussed in section 4.2.2 of the LTBR), a corridor width of 50 m is considered to be adequate (shown to be 50 m with 5 m building setback on either side, in Figures 7 and 8 of the LTBR).
30. Buffer widths are dependent on the adjacent land use, including lighting controls and topography. A minimum width of 20 m from the edge of high value habitats, including buffer planting devoid of large infrastructure, such as buildings and roads would likely be effective at maturity. A further set back of 5 m from the edge of this buffer to buildings is also recommended, giving a total effective buffer width of 25 m. For communal bat roosts a

minimum buffer of 50 m is appropriate and reflects the current situation at Sandford Park. A buffer of 25 m is likely to be appropriate for non-communal bat roosts (section 4.2.1 LTBR).

31. While ecologists do not completely understand how long-tailed bats are able to persist in highly modified and largely exotic landscapes of southern Hamilton, my view is that we cannot miss facilitating opportunities to allow long-tailed bats to remain in this locality, as well as protect and restore other biodiversity values, as urbanisation expands into the PSPA (e.g. Wallace and Clarkson 2019; Norton et al., 2016; Clarkson et al 2007)¹⁴. The evidence shows that the mapped SNAs and SBHAs of PC5, while often currently dominated by exotic vegetation, are nonetheless important habitats for a range of native fauna species, as well as supporting remnant wetlands and indigenous forests (see the LTBR and AESR for example).
32. As outlined in the LTBR and AESR, where we have not assigned areas as high value habitat for bats, essentially the remaining areas of the PSPA (aside from human-made structures such as building and roads), are likely to provide 'low' or 'moderate' value habitats for bats. Protecting and providing provisions for the restoration and recreation of higher quality habitats in the SBHAs and Bat Habitats Buffers (incorporated within the NOSZ of PC5), gives effect to criterion 11 of the WRPS.
33. International literature is supportive of this approach. Urban environments are subject to extensive modification of environmental gradients, which has led to novel urban ecosystems requiring unique

¹⁴ Wallace, K. J., & Clarkson, B. D. (2019). Urban forest restoration ecology: a review from Hamilton, New Zealand. *Journal of the Royal Society of New Zealand*. doi:10.1080/03036758.2019.1637352;

Norton, D. A., Young, L. M., Byrom, A. E., Clarkson, B. D., O', P., Lyver, B., Mcglone, M. S., & Waipara, N. W. (2016). How do we restore New Zealand's biological heritage by 2050? *Ecological Management & Restoration*, 17(3), 170–179.

Clarkson, B. D., Wehi, P. M., & Brabyn, L. K. (2007). A spatial analysis of indigenous cover patterns and implications for ecological restoration in urban centres, New Zealand. *Urban Ecosystems*, 10(4), 441-457. doi:10.1007/s11252-007-0035-6

approaches to protection and restoration of them (Klaus & Kiehl, 2021)¹⁵. Cities have historically been the terrestrial environments most drastically altered from their natural states (Kellert, 2016; Richardson & Butler, 2022)¹⁶. Although cities cover approximately 3% of the Earth's land surface, they are often centred around biodiversity hotspots, leading to exacerbated biodiversity losses (Kowarik, 2011)¹⁷.

34. Hamilton City is no different. Within Hamilton City, 99.9% of land environments are referred to as 'Threatened Environments' at a national level¹⁸, with the majority (84.7%) identified as "Less than 10% of indigenous cover remaining with no legal protection" (Montemazzani, 2022)¹⁹.
35. Despite these losses, cities are a vital avenue to ameliorate ecological resilience and restoration goals because of the collective efforts and ambitions of highly populated societies (Ahern, 2016)²⁰.
36. Providing opportunities for ecological restoration will maintain and bring back native fauna species (see section 4.1 of the LTBR). Successful and ongoing restoration initiatives by a number of private landowners and community groups within the PSPA, and by others (including HCC and developers) in Hamilton City generally, exponentially increase the rate of biodiversity gains both spatially and temporally. In my experience community engagement is central to achieving biodiversity gains, and

¹⁵ Klaus, V. H., & Kiehl, K. (2021). A conceptual framework for urban ecological restoration and rehabilitation. *Basic and Applied Ecology*, 52, 82–94.

¹⁶ Kellert, S. (2016). Biophilic urbanism: the potential to transform. *Smart and Sustainable Built Environment*, 5(1).; Richardson, M., & Butler, C. W. (2021). Nature connectedness and biophilic design. *Building Research & Information*, 50(1-2), 36-42.

¹⁷ Kowarik, I. (2011). Novel urban ecosystems, biodiversity, and conservation. *Environmental Pollution*, 159(8–9), 1974–1983.

¹⁸ The Threatened Environment Classification 2012 combines Land Environments of New Zealand (LENZ; Leathwick et al., 2002), the land cover classes of the fourth Land Cover Database (LCDBv4.0) and the protected areas network, identifying legally protected areas for the purpose of natural heritage protection.

¹⁹ Montemazzani, W. (2022). Significant Natural Areas of Hamilton City District: Terrestrial and Wetland Ecosystems. 4Sight Consulting for Hamilton City Council.

²⁰ Ahern, J. (2016). Novel urban ecosystems: Concepts, definitions and a strategy to support urban sustainability and resilience. *Landscape Architecture Frontiers*, 4(1).

while suitable plan provisions are a vital part of the mix in our tool-box, these can only best be achieved by supporting and incentivising the community by means outside of the RMA framework.

37. Wallace and Clarkson (2019) state that: “restoring to a minimum of 10% indigenous ecosystem cover in a city is a necessary target for maintaining a healthy level of native biodiversity. Secondly, forming a step-wise restoration plan with well-timed and comprehensive steps is important for efficient, sustainable project progression. Finally, we emphasised why creating and maintaining partner engagement is more important than ever when working in urban settings achieving at least 10-% biodiversity”. These are the core principles determining urban restoration success.
38. The approach taken in PC5 to protect and restore natural areas, combined with a range of biodiversity restoration initiatives by HCC and WRC outside of the district plan framework, are striving to meet these core principles. The wider strategies, funding and other initiatives for biodiversity protection and restoration being implemented by HCC are discussed in the evidence of Mr Sirl.

RESPONSE TO SUBMISSIONS

39. A full summary of the collective review and responses of Dr Mueller, Dr Baber and myself of the submissions to PC5 relating to ecological matters are contained within section 6 and Appendix 1 of the TER. In this section I expand my response to what I consider to be critical submission points pertaining to section 6(c) RMA matters. Further responses are provided in the TER and in the evidence of Dr Mueller and Dr Baber.
40. At the time of preparing this evidence I have not concluded addressing the outcomes of my site visits to several properties undertaken in August 2022. I will provide short supplementary evidence in relation to several specific

submissions requesting alterations of the SNAs, SBHAs, the NOSZ and Bat Habitat Buffers at the hearing.

41. There have been a number of submissions relating to the application and location of the SNAs, SBHAs and the NOSZ²¹. As discussed in paragraphs 24-38 above, I consider that these areas have sound scientific basis to be applied and are suitably located. Notwithstanding this, as agreed to in conferencing, I am open to consideration of minor alterations and amendments provided the original spatial extent and functional attributes of the areas are maintained in doing so. My supplementary evidence will address several of these specific submissions in this regard.
42. The Director-General of Conservation has made a number of specific submission points to which the combined response of Dr Mueller, Dr Baber and myself are contained in section 6 and Appendix 1 of the TER. Mapping of low and moderate significant habitats for bats in PC5 is not the best approach to dealing with these habitats for long-tailed bats in my opinion. We have suggested a different approach which is detailed in the TER and summarised in the evidence of Dr Baber. In my view, this approach achieves the same objective of protecting significant habitat of indigenous fauna, is consistent with the provisions of the draft NPS-IB and addresses the issue of how to deal with incomplete and emerging scientific knowledge within the constraints of the RMA framework.
43. WRC's submission requests a new policy as part of the Natural Environment policies to "Preserve the natural character of the Mangakōtūkutu Gully and Waikato River margins and protect it from inappropriate development. Where natural character has been compromised utilise opportunities to restore and enhance it."

²¹ For example (Jones Lands – Sub 13, Northview – Sub 14, Tilehurst Living-, Findlay – Sub 17, Williams Ltd – Sub 21), Broadwater-Sub 23, Transpower-Sub 21, Glenview Club – Sub 1).

44. The PSPA contains a multitude of inter-related significant indigenous vegetation communities and significant habitats of indigenous fauna with intrinsic ecological values²². In the TER we have recommended that this amendment from WRC be adopted, as the use of natural character provisions in the RMA is a good policy tool to identify and address potential effects of urbanisation on the Waikato River, its margins and connected gully systems with multiple, inter-linking abiotic and biotic values, as well as amenity and landscape values. The proposed amendment also reinforces the approach of PC5 in relation to section 7(d) RMA in having particular regard to the intrinsic values of ecosystems.
45. I note that Mr Graham, in his Landscape Architectural Technical Report dated 31 August 2022, also supports inclusion of a new policy to cover natural character.

UPDATED PC5 PROVISIONS

46. I am generally supportive of the changes to notified plan change provisions in the updated set of PC5 provisions relating to ecology. The critical recommendations relating to protecting significant indigenous vegetation and habitats of indigenous fauna in the LTBR and AESR have been adopted.
47. Further amendments are suggested by Dr Baber, Dr Mueller and myself as detailed in the TER and in their statements of evidence. I am supportive of these recommendations and recognise that a multiple agency approach is necessary, and that not all solutions sit within the district plan framework.
48. As signalled, based on my recent site visits there may be some further minor amendments to the location and boundaries of SNAs, SBHAs and the NOSZ, which will be addressed at the hearing.

²²"intrinsic values, in relation to ecosystems, means those aspects of ecosystems and their constituent parts which have value in their own right, including— (a) their biological and genetic diversity; and (b) the essential characteristics that determine an ecosystem's integrity, form, functioning, and resilience." Part 1, RMA.

CONCLUSION

49. Subject to the updated proposed provisions being amended in line with the recommended changes set out in the TER, and further elaborated in my evidence above, I am supportive of PC5 as it relates to ecological matters.

GHA (Gerry) Kessels

2 September 2022

ATTACHMENT 1

Hamilton City Council

Plan Change 5 Technical Ecology Report



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Prepared by: Gerry Kessels, Dr Hannah Mueller & Dr Matt Baber

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Front Photo – Hannah Mueller



EXECUTIVE SUMMARY

This report has been prepared to assist in the preparation of any changes to the proposed plan provisions and the Independent Hearing Panel in making its decisions on Plan Change 5 (PC5). To this end, this report:

- Summarises the known or likely biodiversity values within the PC5 area and immediate surrounds;
- Summarises the assessment of ecological effects associated with the proposed land use change;
- Updates our conclusions (presented in earlier technical reports) on the likely residual adverse effects management measures needed to generate No Net Loss (NNL) and preferably Net Gain (NG) biodiversity outcomes for ecological values after consideration of measures to avoid, remedy or mitigate for adverse effects;
- Assesses the appropriateness and adequacy of the updated PC5 provisions presented at expert witness conferencing on 24 August 2022 (updated PC5 provisions) for addressing potential effects on terrestrial ecology that are associated with land use change;
- Responds to submitters' comments in respect of ecology; and
- Presents recommendations for further amendments to the updated PC5 provisions and maps in relation to ecological matters.

It is recommended that the three previous technical ecological reports associated with PC5 are read in conjunction with this report, since these provide more in-depth analysis of the ecological values and assessment of ecological effects associated with the plan change. These are the Peacocke Structure Plan Area (PSPA) Long-tailed Bat report - Appendix J; the PSPA Preliminary Assessment of Ecological Effects report – Appendix K and the PSPA Assessment of Ecological Significance report – Appendix L.

The PSPA is dominated by farms, peri-urban residential areas and semi-rural residential areas. It is located adjacent to the Waikato River, and also features a major gully and stream system: the Mangakōtutuku Gully. Smaller streams, wetlands and gully systems are also present across the area. These habitats provide habitat for a range of native plants and animals, including fish, birds, invertebrates, lizards and long-tailed bats. A number of these areas are significant in terms of section 6(c) of the Resource Management Act 1991 (RMA) and these have been identified, mapped and protected from land use change by the updated PC5 provisions and mapping.

The identification and preservation of Significant Bat Habitat Areas (SBHA) in addition to Significant Natural Areas (SNA) is an important step in trying to preserve habitat values in this area for long-tailed bats. The creation of bat corridors in predominantly open pastureland means the restoration planting of large areas across the PSPA will, over time, create additional habitat and maintain habitat linkages through the landscape.

Of key importance, the change from rural to residential land use within the PSPA will likely result in a 'Very High' level of residual effects on the local population of bats after measures to avoid, remedy or mitigate for adverse effects are implemented. This is attributed primarily to the large-scale change in land use (ca 500 ha) of low- and moderate-value bat habitats in the form of pasture and exotic vegetation, as well as the loss of 3.15 ha of high value bat habitat to urbanisation.



Since PC5 was notified, various amendments have been made to the proposed plan provisions to further support ecological protection and restoration. These amendments include¹ the adoption of Department of Conservation (DOC) Bat Roost Protocols for managing removal of potential bat roost trees; further information requirements for Bat Management Plans; the broadening of management plans to cover other biodiversity values in addition to bats such as aquatic species, aquatic corridors and fish passage, and terrestrial fauna; more detailed information requirements for ecological effects assessments; and further refinements to the artificial lighting performance standards.

We generally support the updated PC5 provisions and mapped areas of high value habitat as they relate to ecological values. They provide a landscape-scale approach to safeguarding the ecological values, habitats and biodiversity in a currently rural landscape with unusually high ecological values, whilst enabling development required to cater for a growing population. We recommend that these provisions are strengthened further to give effect to our recommendation regarding pursuit of the NNL/NG outcomes we have identified in our report.

In this regard further mechanisms are required to address the adverse residual effects of urbanisation on the low- and medium-value long-tailed bat habitats. This report summarises a biodiversity compensation model process to assess the type and quantum of habitat restoration and enhancement measures that would likely be required to address these residual adverse effects on low to medium value bat habitats to a NNL or NG standard after consideration of measures to avoid, remedy or mitigate for adverse ecological effects. We consider that these residual ecological effects can be appropriately addressed through habitat restoration and enhancement, with a focus on native revegetation and the control of introduced predatory mammals within suitable protected areas.

The application of a biodiversity compensation model indicates that the following measures are required in addition to the mapping of the Natural Open Space Areas, SNAs, Significant Bat Areas and other related provisions of the plan change:

- a) Habitat restoration within PSPA public open space areas (native revegetation, weed management and mammalian pest control within riparian pasture) of some 66 ha;
- b) Habitat enhancement within PSPA public open space areas (native enrichment planting, weed management and mammalian pest control within existing forested habitats – exotic and indigenous) equating to about 62 ha; and
- c) Habitat restoration outside of the PSPA within high value bat habitat known to support bat roosts. This comprises:
 - native revegetation, weed management and mammalian pest control within riparian pasture (equating to some 190 ha of habitat restoration); and/or
 - mammalian pest control in perpetuity (equating to 700 ha of habitat enhancement); OR
 - a lesser combination of both.

Additionally, several recommendations from the technical ecology reports and made by submitters have not yet been implemented in the updated PC5 provisions. These include:

¹ As documented in the Hamilton City Council Plan Change 5: Peacocke Structure Plan – Expert Conferencing Session #3 ‘Bats and related updated provisions’ - Wednesday 24 August 2022 Topic



- a) The adoption in the updated PC5 provisions of monitoring guidelines to standardise all bat monitoring.
- b) Addressing current uncertainty regarding the nature and location of any compensation sites that are required to enable pest control and/or restoration planting to address residual adverse effects on ecological values. These sites are likely to be located at least partially outside the PSPA.
- c) Reference is made to a landscape-scale approach to management in some of the PC5 objectives. However, in contrast, the rules around subdivisions and other matters take an individualised (property-based) approach which does not link back to the stated approach in the objectives. This could mean that adverse effects on ecological values—and in particular cumulative effects on bats— are not adequately addressed. A landscape-scale approach is important in the PSPA because of the ‘very high’ level of adverse effect on the local population of a threatened (nationally critical), highly mobile species.
- d) Similarly, we recommend the centralisation of bat monitoring as sought by several submitters.
- e) An amendment to the Natural Environment policy to include natural character is a matter that requires further consideration. The use of a natural character approach to identify and address potential effects on the ecological values of the Waikato River margin and gully systems within or adjacent to the PSPA — all with multiple, inter-linking abiotic and biotic values as well as amenity and landscape values for people — will allow for a more holistic approach to protection and restoration of the intrinsic ecological values of these natural features.
- f) The updated PC5 provisions require an ecological management and restoration plan prepared by a suitably qualified ecologist for subdivisions greater than 2 ha. We recommend that from an ecological perspective, this area threshold triggering a subdivision consent requirement in relation to ecological matters needs to be set to encompass as many subdivision consent applications within the PSPA as practical to ensure the majority of potential ecological impacts of land use change on the ecological values of the PSPA (and significant habitats of bats in particular) are captured by this approach. In this regard we would prefer a threshold of 0.5 ha rather than 2 ha.



1 INTRODUCTION

1.1 SCOPE

Hamilton City Council (HCC) has requested Dr Hannah Mueller, Dr Matt Baber and Gerry Kessels to prepare this additional technical ecology report in relation to PC5 as it relates to ecological matters with the PSPA. This report has been prepared to assist in the preparation of any changes to the updated PC5 provisions and the Independent Hearing Panel in making its decisions on PC5. To this end, this report:

- Summarises the known or likely biodiversity values within the PSPA and immediate surrounds;
- Summarises the assessment of ecological effects associated with the proposed land use change;
- Updates our conclusions on the likely residual adverse effects management measures needed to generate NNL and preferably NG outcomes for ecological values after consideration of measures to avoid, remedy or mitigate for adverse effects;
- Assesses the appropriateness and adequacy of the updated PC5 provisions for addressing potential effects on terrestrial ecology that are associated with land use change;
- Responds to submitters' comments in respect of ecology; and
- Recommends further amendments of the updated PC5 provisions and maps in relation to ecological matters.

We recommend that the following three technical ecological reports for PC5 are read in conjunction with this report, as they provide more in-depth analysis of the ecological values and assessment of ecological effects associated with the plan change:

- PSPA Long-tailed Bat report - Appendix J (LTBR)²
- PSPA Preliminary Assessment of Ecological Effects report – Appendix K (PAEER)³
- PSPA Assessment of Ecological Significance report – Appendix L (AESR)⁴

Collectively, the LTBR and AESR contribute to the PSPA Biodiversity Effects Management Framework assessment, for which an overall objective to assist in policy development is to achieve NNL outcomes for indigenous biodiversity values across the PSPA and adjacent ecological features (such as the Waikato River). As the current report is a summary and updated technical ecology review, we have not included all scientific supporting information, full scientific names or a complete set of references. These are contained in the three detailed technical ecology reports listed above.

In forming our recommendations in this technical ecology report, we have read and considered all the relevant submissions to PC5 (section 7). We also participated in expert conferencing leading into the hearing, and assisted with recommended revisions to the PC5 planning provisions (Hearing Version 1)

² Peacocke Structure Plan Assessment of Environmental Effects - Appendix J, Peacocke Structure Area Plan Change Long-tailed bat report, 4Sight 4 June 2021.

³ Peacocke Structure Plan Assessment of Environmental Effects - Appendix K, Preliminary Assessment of Ecological Effects, Tonkin+Taylor, July 2021.

⁴ Peacocke Structure Plan Assessment of Environmental Effects - Appendix L, Peacocke Structure Plan Area: Ecological Significance Assessment, Tonkin+Taylor, July 2021.



as they relate to ecological matters. This included the plan provisions pre-circulated and considered in the ecology and planning expert conferencing convened on 24 August 2022.

1.2 BACKGROUND & STATUTORY CONTEXT

PC5 is proposed to create a new policy framework and zoning mix for the area enabling high density development to meet Hamilton's growth targets and to satisfy the City's obligations under the Housing Infrastructure Fund.

Peacocke comprises approximately 750 hectares of mostly rural land zoned Peacocke Special Character Area with gully, hill and terrace overlays. The PSPA includes a proposed development footprint of around 500 ha where land use change is proposed to allow for urban and high density residential development. The Urban Design Report prepared for PC5 (Appendix H to the AEE) sets the framework for a sustainable and walkable community. High density development will be encouraged around the suburban and neighbourhood centres and along the key transport routes to support a high frequency public transport service.

The remaining area includes the Southern Links road designation (ca 132 ha) with the balance of ca 128 ha including public open space areas that are to be protected.

In regard to ecological matters, PC5 has considered policy and rules to protect significant indigenous vegetation and significant habitats of indigenous fauna consistent with the RMA, with policy direction from a range of documents. These include the Waikato Regional Policy Statement (WRPS), the Draft National Policy Statement - Indigenous Biodiversity (NPS-IB), the National Policy Statement on Freshwater Management 2020 (NPS-FM) and the National Environmental Standards – Freshwater (NES-F, Sept 2020) in particular.

2 SUMMARY OF THE ECOLOGICAL CHARACTERISTICS OF THE PSPA

2.1 RIVER, STREAMS & GULLIES

While dominated by open pasture, the PSPA is located adjacent to the Waikato River, and also features a major gully and stream system; the Mangakōtukutuku Gully. Smaller streams and gully systems are also present across the area.

There are numerous records for fish within the PSPA, including in the Waikato River and Mangakōtukutuku Gully, as well as in smaller gullies near the PSPA. Longfin eel have been recorded in this locality, as have lamprey, inanga, giant kōkopu, shortjaw kōkopu, torrentfish, redfin bully, koaro and black mudfish. All of these species are classified as 'At Risk' or 'Threatened'. Freshwater invertebrates recorded near the PSPA include the 'At Risk – Declining' freshwater mussel, kākahi and the native freshwater snail *Austropelea tomentosa*.

2.2 NATIVE VEGETATION

The PSPA largely consists of farms with some 'lifestyle block' development, and remains predominantly in rural land use. The farming activities in the area have been in place for over a hundred years and the dominant vegetation outside of pasture includes exotic trees and shelterbelts. Historic clearance has removed almost all of the original indigenous vegetation. Very little remnant or regenerating indigenous vegetation now exists and is primarily located as small, fragmented patches within the Waikato River corridor and the Mangakōtukutuku Gully, consisting of secondary growth scrub and



forest, such as kānuka, treefern species and regenerating broadleaved species. Many landowners and volunteers have replanted areas of gully habitat with native trees and shrubs over the last twenty years or so. These replanted areas are now regenerating naturally and supporting habitat for various native fauna species as well as for aquatic biota where they provide riparian margin cover.

2.3 WETLANDS

Wetlands in the PSPA include riverine and palustrine wetlands (approximately 5.6 ha) and ephemeral seep or spring wetlands (cf 1.7 ha)⁵. These wetland areas comprise a mixture of exotic and native rushes and sedges, sometimes with a canopy of exotic deciduous trees (e.g. crack willow), and native tree ferns. Some of these wetlands are located within pasture areas. Again, some landowners and volunteer groups have protected wetlands from stock, undertaken weed control and replanted with native wetland species. These areas now contain native fish and provide habitats for native animals.

2.4 TERRESTRIAL FAUNA EXCLUDING BATS

2.4.1 BIRDS

The PSPA features a bird assemblage dominated by naturalised introduced species, which are common in the agricultural landscape surrounding Hamilton, including both terrestrial species, and species associated with wetland/water habitats. This species assemblage reflects its location directly adjacent to the Waikato River.

Tūi are now very commonly seen and heard in the PSPA, as are other ubiquitous native birds such as fantail, pukeko, grey warbler and morepork. Nationally 'Threatened' or 'At Risk' bird species that have been detected, or are potentially present, include the kārearea/bush falcon and the New Zealand dabchick, both 'Threatened – nationally increasing'⁶; the long-tailed cuckoo, koekoeko ('Threatened, nationally vulnerable'); North Island kākā, and the pied shag, both classified as 'At Risk – recovering'; the 'At Risk – Naturally Uncommon' little black shag; the 'At Risk – Relict' black shag the 'Threatened – nationally critical Australasian bittern and the 'At Risk – declining' pipit. The riparian margin vegetation along the river may be utilised by the shag species for roosting and/or nesting, but there is no suitable habitat for New Zealand dabchick onsite. Like other rural and urban parts of the Hamilton area, kākā may visit the site when dispersing during winter, or as a short visit, but are unlikely to inhabit the area for long periods (Fitzgerald and Innes, 2013)⁷. Long-tailed cuckoo is migratory and expected to be only an occasional visitor.

⁵ There is insufficient information to assess the full ecological value of wetlands within the PSPA as this will first require an assessment of presence and extent based on field investigations and application of the Wetland Delineation Protocol (MfE 2020).

⁶ Threat classifications are in accordance with Robertson (2021) and have therefore been updated since publication of the ASER and PAEER assessment in 2021: Robertson, H.A., Baird, K.A., Elliott, G.P., Hitchmough, R.A., McArthur, N.J., Makan, T.D., Miskelly, C.M., O'Donnell, C.F.J., Sagar, P.M., Scofield, R.P., Taylor, G.A., Michel, P. 2021. Conservation status of birds in Aotearoa New Zealand, 2021. New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 p. Singers, N.J.D., Rogers, G.M. 2014. A classification of New Zealand's terrestrial ecosystems. Science for Conservation publication No. 325. Department of Conservation, Wellington.

⁷ Fitzgerald N & Innes J. 2013. Hamilton City biennial bird counts: 2004-2012. Prepared for Hamilton City Council. Hamilton, New Zealand



2.4.2 LIZARDS

Three lizard species have been recorded in the locality. Of these, the 'At Risk – declining' copper skink is known to be present onsite⁸. Faecal material attributed to forest gecko has been reported in the Hakarimata Ranges, some 30 km to the north. DOC also has a record of the threatened Auckland green gecko from Hakarimata. Other native species which could be present include ornate skink and Pacific gecko. However, despite these records it is quite likely that the only native lizard species remaining in the PSPA at present is copper skink (At Risk – declining). The introduced plague skink, which is present within the PSPA, is considered an ecological pest species as it competes for habitat with native lizards.

2.5 BATS

Research shows that a population of long-tailed bats is regularly using many areas of the PSPA throughout the year for foraging, commuting and roosting habitat as key components of their complex lifecycles and wide-ranging habitat usage requirements⁹. The presence of long-tailed bats, a threatened species (see section 3 below), is a major ecological feature in the PSPA. These bats utilise a wide range of habitats in this rural landscape, comprising both exotic and indigenous vegetation which varies on a seasonal basis.

The primary habitat features that allow long-tailed bats to persist within the southern peri-urban/rural residential landscape of Hamilton are the relatively deep and connected swathes of well-vegetated riparian margins of the Waikato River and gullies feeding into the river, which bats use as roosting and foraging habitat. This habitat usage is consolidated by a network of exotic and indigenous stands of trees and mature shelterbelts, wetlands, mature gardens, and ponds scattered through this largely pastoral environment. These lines of shelterbelts and patchily distributed stands of mature trees likely enable bats to move around this landscape, as they use these features as navigational cues to orient their movement to and from the key habitats.

Figure 1 displays the current network of existing natural features within the PSPA which provide habitat for bats. The values of these features as bat habitat have been qualitatively assessed in this figure based on known and likely use of the features by bats as habitat, from 'high value' habitats (primarily the margins of the Waikato River, Mangakōtukutuku Gully and known roost sites), 'moderate value' habitats (areas containing vegetation, edge pasture habitat in topographical gradients near high value habitat which may be utilised by bats as commuting corridors, foraging habitats or contain potential bat roost trees), and 'low value' habitats (such as areas of open pasture which likely provide occasional foraging or commuting habitat for bats). Human-made structures, such as buildings and roads, are unlikely to provide habitat for bats, but trees in private gardens, parks and around infrastructure, as well as ornamental ponds, are regularly used as habitat by bats.

⁸ Copper skink have had their threat status changes since publication of the AESR and PAEER assessments in 2021 in accordance with Hitchmough, R.A., Barr, B., Knox, C., Lettink, M., Monks, J.M., Patterson, G.B., Reardon, J.T., van Winkel, D., Rolfe, J., Michel, P. 2021. Conservation status of New Zealand reptiles, 2021. New Zealand Threat Classification Series 35. Department of Conservation, Wellington. 15 p.

⁹ (Dekrout et al. 2014)



2.6 ECOLOGICAL SIGNIFICANCE ASSESSMENT

This section summarises the methodology and results for determination of ecological significance in respect to section 6(c) of the RMA. The ecological significance assessment methodology and outcomes are detailed more fully in the AESR and the ecological values assessment in the PAEER, and further summarised and updated in sections 4 and 5 below.

No specific site-based fieldwork was conducted to inform this assessment. It is therefore expected that more comprehensive assessments and ground truthing may be needed in relation to specific submissions and further evidence from the PC5 hearing process and/or through future resource consent applications in instances where there is potential for adverse effects on ecological values. Nonetheless, we consider that at a landscape-wide level, the best available evidence has been used to validate the SNAs at a level suitable to support PC5 policy framework.

2.7 DETERMINATION OF ECOLOGICAL SIGNIFICANCE

In 2012 HCC identified several SNA within the PSPA based primarily on the presence of significant indigenous vegetation¹⁰. However, we understand that the 2012 study did not fully assess these areas against the criteria for determining significance of indigenous biodiversity set out in the WRPS, and consequently, many significant habitats for indigenous fauna and wetlands were not identified. Therefore, the PSPA was re-assessed using best practice guidelines to assess ecological significance using the WRPS ecological significance set out in Table 11-1 of the WRPS (see Table 1 below), including ‘qualifying threshold criteria’ as set out in the AESR.

The analysis has identified an increase in extent of ecologically significant habitats compared to those identified as SNAs in the Operative District Plan. These areas now collectively include habitats of significant indigenous fauna, as well as significant indigenous vegetation and wetlands (refer to Figures 4.1, 4.2, 4.3, and 4.4 in the AESR report).

The AESR also found that a number of animals listed as nationally ‘At Risk’ or ‘Threatened’, notably the ‘Nationally Critical’ long-tailed bat, use a range of habitats in the PSPA as part of their habitat requirements. This habitat can include exotic vegetation such as willows or exotic pine species in gully, wetland, stream or river edge habitat. Indigenous animals, particularly long-tailed bats, can rely on such exotic habitats as essential components of their life cycles, for breeding or migration, or buffering waterways because it is the only available habitat since indigenous vegetation is so depleted within this landscape. It will therefore be used even if it is of marginal quality. It is important to note that the WRPS ecological significance criteria do not differentiate between indigenous and exotic plants as habitat for these native animals.

In addition, criterion 11 of the WRPS (Table 11A) allows for the identification of potential ecological buffers and corridors to protect habitats of key native mobile fauna species: *“It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.”*

¹⁰ Cornes TS, Thomson RE, Clarkson BD. 2012a & 2012b. Key Ecological Sites of Hamilton City: Volume I & II. CBER Contract Report 121 prepared for Hamilton City Council. Hamilton, New Zealand.



Criterion 11 was applied in the AESR to protect values for native fauna, particularly long-tailed bats, by adopting the recommendations of the LTBR and by protecting and applying suitable buffers to high value bat habitats and identifying 'bat corridors' through moderate and low value bat habitat. These areas may currently not exhibit any obvious habitat features, but by protecting this land from urban development, as land use change occurs, they can be restored to create suitable buffer and corridor habitats, as well as providing areas for compensating or offsetting any residual adverse effect of urbanisation within the PSPA (see sections 4 and 5 below).

Areas identified as ecologically significant include those that currently provide significant indigenous vegetation and habitat for indigenous fauna, and areas considered critical to the long-term persistence of these significant habitats through buffering and/or the maintenance of ecological connectivity in the landscape (particularly for long-tailed bats).

However, ecological knowledge of the PSPA is incomplete. Planning mechanisms need to acknowledge and account for incomplete scientific knowledge and incorporation of new information which may alter the results of the ecological significance analysis presented in this report and the supporting technical ecology reports.

In addition, the technical studies for identification of SNAs in the rest of Hamilton City (through Plan Change 9) have developed an updated methodology for categorising ecological significance slightly differently. It is recommended that the ecological significance categorisation for PC5 SNAs be updated to reflect this later methodology. No changes to the spatial extent or ranking of SNA significance will occur as a consequence of this recommended update; however, the terminology will require change.

The NPS-IB, which is still in exposure draft form, is expected to be finalised in the near future. The AESR analysis for PC5 tested the ecological significance assessment methodology against the draft NPS-IB criteria. The spatial extent of the SNAs, and approach to protection of ecological buffer and corridors (for mobile species habitats in particular), will be able to be supported under the new NPS-IB direction and criteria assuming no major changes are made to this NPS when it is finalised.



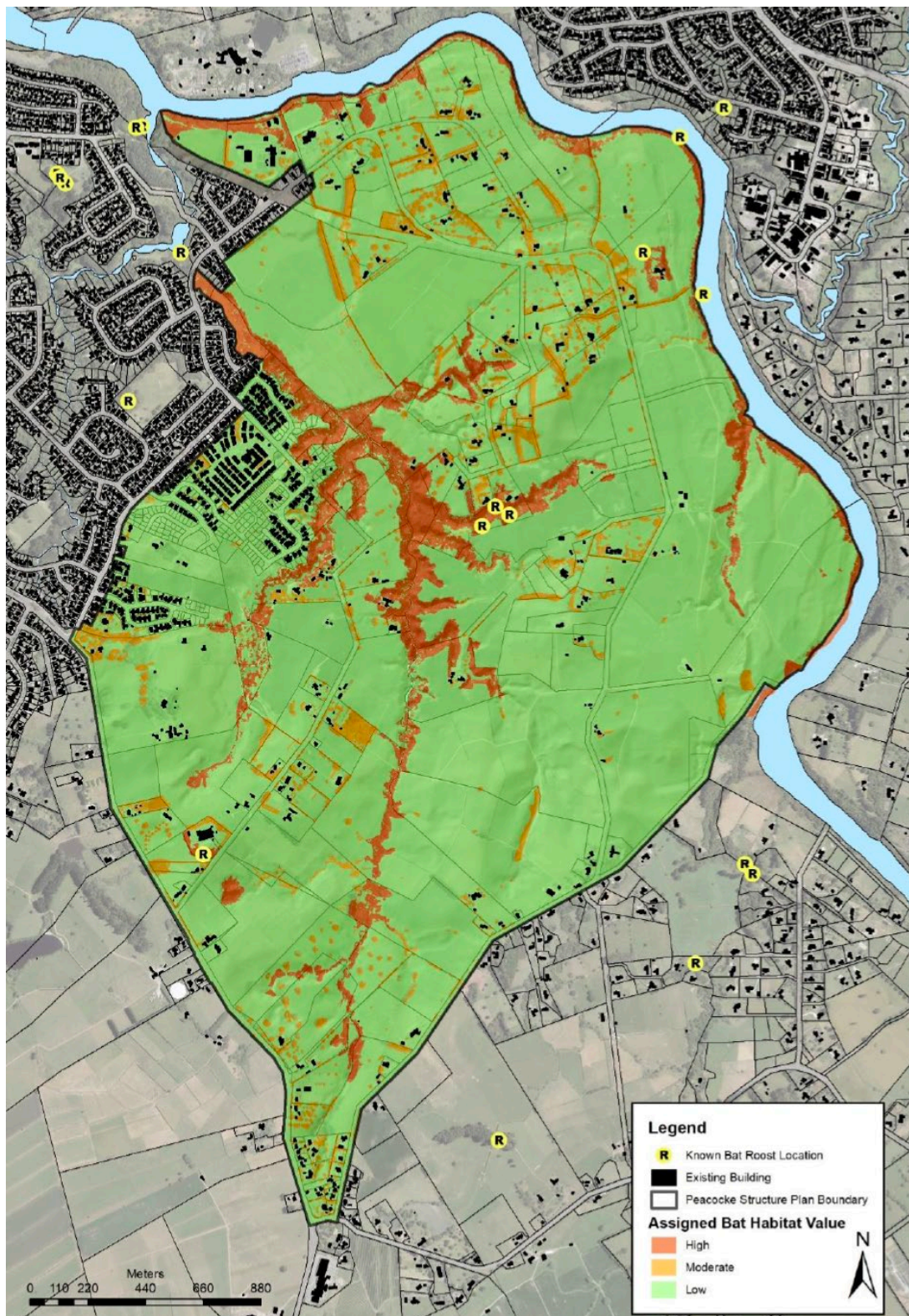


Figure 1: Qualitative assessment of the value of existing natural and landscape features within the PSPA for long-tailed bats.¹¹

¹¹ High' value bat habitats were determined by available presence data and known roost locations, and professional judgement of bat habitat usage. Professional judgment of bat behaviour and Southern Links radio tracking estimators were used to assign 'Moderate' and 'Low' value habitats where habitat was determined by spatial analysis using 2019 four band Aerial Photography and ArcGIS. Normalised Difference Vegetation Index raster generation was used to obtain vegetation mapping.



Table 1: Criteria for determining significance of indigenous biodiversity Waikato Regional Policy Statement: 11A (Table 11-1)

Criteria	
1	It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngā Whenua Rāhui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11.
2	In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened.
3	It is vegetation or habitat for indigenous species or associations of indigenous species that are: <ul style="list-style-type: none"> • classed as threatened or at risk, or • endemic to the Waikato region, or • at the limit of their natural range.
4	It is indigenous vegetation, habitat or ecosystem type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally.
5	It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, chenier plain, or karst ecosystems, hydrothermal vents or cold seeps.
6	It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with: <ul style="list-style-type: none"> • Waste treatment; • Wastewater renovation; • Hydro-electric power lakes (excluding Lake Taupō); • Water storage for irrigation; or • Water supply storage; unless in those instances they meet the criteria in Whaley et al. (1995).
7	It is an area of indigenous vegetation or naturally occurring habitat that is large relative to other examples in the Waikato region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. Note this criterion is not intended to select the largest example only in the Waikato region of any habitat type.
8	It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self-sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context “critical” means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.
9	It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because: <ul style="list-style-type: none"> • its structure, composition, and ecological processes are largely intact; and • if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time.
10	It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato region or an ecological district, or is an exceptional, representative example of its type.
11	It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.



3 ASSESSMENT OF ECOLOGICAL EFFECTS

An assessment of ecological effects arising from the proposed land use change to medium and high density housing, associated infrastructure, and business centres under PC5 was set out in the PAEER. An overview of the methods and results from this report are provided below. Values for certain bird and lizard species have been updated to reflect the most recent (2021) threat status classifications.

3.1 METHODS

The assessment of ecological effects was undertaken in general accordance with the Ecological Impact Assessment (EclAG) (Roper-Lindsay et al., 2018)¹². These guidelines are now common practice in New Zealand and provide a systematic, consistent and transparent framework for undertaking assessments of effects, while also providing for professional judgement and flexibility where appropriate.

As outlined in the following sections, the EclAG have been used to determine:

- Step 1: ‘Ecological value’ (refer to Tables 4-6, EclAG, 2018) of the PSPA.
- Step 2: The ‘Magnitude of Effect’ on the environment (refer to Tables 8-9, EclAG, 2018).
- Step 3: The overall ‘Level of Effect’ after recommended measures have been taken to further avoid, remedy or mitigate for effects (refer to Table 10, EclAG, 2018).

3.1.1 STEP ONE: ASSIGNING ECOLOGICAL VALUE

‘Ecological values’ were assigned on a scale of ‘Negligible’ to ‘Very High’ based on species and habitat values, using criteria in the EclAG (Roper-Lindsay et al., 2018) (refer to Tables 4-6, EclAG, 2018). The ecological value assigned to habitat types is based on an assessment against four sub-criteria including ‘representativeness’, ‘rarity and distinctiveness’, ‘diversity and pattern’ and ‘ecological context’. The ecological values assigned to species that are known or likely to be present is based on the New Zealand Threat Classification Status (NZTCS; Townsend et al 2007) and corresponding threat classifications for each taxon (e.g., wetland birds, invertebrates and plants).

3.1.2 STEP TWO: ASSESSING THE MAGNITUDE OF EFFECTS

The ‘Magnitude of Effect’ is a measure of the extent or scale of the effect of an activity and the degree of change that it will cause after measures to avoid, remedy or mitigate for effects have been applied.

The ‘Magnitude of Effect’ after measures to avoid, remedy or mitigate for effects, was scored on a scale of ‘Negligible’ to ‘Very High’ (refer to Tables 8-9, EclAG, 2018) and was generally assessed in terms of:

- Spatial scale of the effect.
- The relative permanence of the effect.
- The intensity of the effect within the impact footprint.
- Timing of the effect in respect of key ecological factors.
- Level of confidence in understanding the expected effect.

¹² Environment Institute of Australia and New Zealand Inc. (2018). Ecological Impact Assessment (EclAG). EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd Edition.



In terms of the magnitude of effect, our assessment focuses on the magnitude of effect at landscape-scale (for habitats) or local population scale (for species). This is a conservative approach that best aligns with Te Mana o te Taiao - Aotearoa New Zealand Biodiversity Strategy (NZBS) 2020, which guides local as well as regional and national biodiversity actions.

Neither the term 'landscape' or 'local population' is defined in the RMA, the NZBS 2020 or the NPS-IB exposure draft. However, for the purposes of this assessment framework:

- 'Landscape scale' relates to the surrounding landscape in which physical and ecological characteristics are similar and include an inter-dependent and ecologically connected mosaic of habitats or ecosystems and associated biodiversity.
- 'Local population' equates to a population of breeding individuals that are ecologically and geographically connected and that would be expected to have distinct genetic or physical characteristics. A local population is not known or likely to be isolated from other local populations in the landscape, ecological district or region.

3.1.3 STEP THREE: ASSESSING THE LEVEL OF EFFECTS

An overall 'Level of Effect' on each value (after measures to avoid, remedy or mitigate for effects) was identified for each activity or habitat/fauna type using a matrix approach. This approach combines the ecological values (described in Section 4.1.1 above) with the magnitude of effects (Section 4.1.2 above) resulting from the activity (refer to Table 10, EclAG, 2018, which is also set out below at Table 2).

The matrix describes an overall 'Level of Effect', after measures to avoid, remedy or mitigate effects, on a scale from 'Very Low' to 'Very High'. The 'Level of Effect' is then used to guide the extent and nature of measures to demonstrably offset and/or compensate for these residual effects.

It is considered necessary to address any 'Level of Effect' assessed as being 'Moderate' or higher through offsetting or compensation measures. However, any 'Level of effect' deemed to be 'Very High' (if applicable) may not comply with the 'Limits to offsetting' principle and therefore cannot be offset.

Table 2: Criteria for describing overall levels of ecological effects (Step 3) based on Table 10, EclAG. If the overall level of effect is assessed as being 'Moderate' or greater (blue shade), after measures to avoid, remedy or mitigate effects this warrants measures to undertake residual effects management.

Magnitude of effect	Ecological Value				
	Very high	High	Moderate	Low	Negligible
Very high	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very Low
Moderate	High	High	Moderate	Low	Very Low
Low	Moderate	Low	Low	Very low	Very Low
Negligible	Low	Very low	Very low	Very low	Very Low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain



3.1.4 DETERMINING RESIDUAL EFFECTS MANAGEMENT REQUIREMENTS

Determining the type and magnitude of terrestrial habitat and enhancement measures to address residual effects associated with PC5 that cannot be avoided or minimised will be guided by the application of a Biodiversity Compensation Model (BCM).^{13, 14} These models provide additional objective transparency, process and justification for the overall compensation package where biodiversity offsets cannot be demonstrated at the plan change or resource consenting application stage, which is the case in almost all instances. In summary, BCMs:

- Provide guidance on addressing all residual adverse effects associated with a project for which impacts or gains cannot feasibly be measured or quantified with adequate precision and for which residual effects management is deemed appropriate when assessed against the ‘limits to offsetting’ principle.
- Serve as a ‘sense check’ that provides additional transparency and rigour to the process of addressing residual adverse effects on biodiversity through compensation measures at proposed habitat restoration/enhancement site(s).
- Provide guidance on whether Net Gain (NG) outcomes are likely to be achieved for specified biodiversity values. Expected NG outcomes are sought, rather than NNL outcomes, to provide more confidence that NNL will actually be achieved.
- Operate at the ‘as close to offset as possible’ end of the compensation continuum. This is termed ‘biodiversity compensation’ in the NPS-IB exposure draft.

3.2 STEP 1: ASSESSMENT OF ECOLOGICAL VALUES

The results of this values assessment are summarised in Table 3 below.

Table 3: Summary of biodiversity values within the PSPA based on Ecological Impact Assessment Guidelines (EciAG) most of these values are present outside the development footprint.

Key biodiversity features (incl. estimated spatial extent of area in hectares)	Biodiversity characteristics and values	Biodiversity Value
Significant indigenous terrestrial and freshwater fauna habitat: Riparian margins and associated waterways (58.74 ha)	<ul style="list-style-type: none"> • Moderate value for representativeness. • High value for rarity and distinctiveness. • Moderate value for diversity and pattern. • High value for ecological context 	High
Significant indigenous terrestrial and freshwater fauna habitat: non-riparian linear features (ecological corridors) (20.49 ha)	<ul style="list-style-type: none"> • Low value for representativeness. • High value for rarity and distinctiveness. • Low value for diversity and pattern. • High value for ecological context, 	High

¹³ Baber, M, Christensen, M, Quinn, J, Markham, J, Ussher, G and Signal-Ross, R. 2021: The use of modelling for terrestrial biodiversity offsets and compensation: a suggested way forward. Resource Management Journal, Resource Management Law Association (April 2021). Baber, M, Dickson, J, Quinn, J, Markham, J, Ussher, G, Heggie-Gracie, S, and Jackson, S. 2021. A Biodiversity Compensation Model for New Zealand – A User Guide (Version 1). Prepared by Tonkin & Taylor Limited. Project number 1017287.0000P. Baber, M, Dickson, J, Quinn, J, Markham, J, Ussher, G, Heggie-Gracie, S, and Jackson, S. 2021. Biodiversity Compensation Model for New Zealand– Excel Calculator Tool (Version 1). Prepared by Tonkin & Taylor Limited. Project number 1017287.0000P.

¹⁴ Termed Qualitative Biodiversity Models (QBM) in the BEMF report



Key biodiversity features (incl. estimated spatial extent of area in hectares)	Biodiversity characteristics and values	Biodiversity Value
Significant indigenous bat habitat: non-riparian habitat ecological buffers (56.59 ha)	<ul style="list-style-type: none"> Moderate value for representativeness. High value for rarity and distinctiveness. Moderate value for diversity and pattern. Moderate value for ecological context, 	High
Significant Indigenous vegetation remnants (4.5 ha)	<ul style="list-style-type: none"> Moderate value for representativeness. High value for rarity and distinctiveness. Moderate value for diversity and pattern. Moderate value for ecological context, 	High
Wetlands (7.3 ha) including Riverine & Palustrine wetlands (5.6 ha*) and Ephemeral Seep or Spring wetlands (1.7 ha).	<i>Wetlands have been assessed as a desktop analysis as detailed in the AESR. There is currently insufficient information to assess the ecological value of wetlands within the PSPA in accordance with NES-FW¹⁵</i>	Likely to range from Moderate to Very High
Non-significant exotic vegetation (excluding pasture) (47.58 ha)	<ul style="list-style-type: none"> Very Low value for representativeness. High value for rarity and distinctiveness. Low value for diversity and pattern. Moderate value for ecological context 	Moderate
Non-significant exotic vegetation (pasture) (500.33 ha)	<ul style="list-style-type: none"> Very low value for representativeness. High value for rarity and distinctiveness Very low value for diversity and pattern. Moderate value for ecological context. 	Moderate
Flora species		
Kānukā ¹	Threatened – Nationally Vulnerable	Very High
Mānuka ^{1w}	Threatened – Nationally Vulnerable	Very High
Poroporo	Threatened – Nationally Vulnerable	Very high
Fauna species		
Long-tailed bats	Nationally threatened species (Nationally Critical) with the PSPA constituting a high use area for roost sites, foraging habitat and flyways	Very High
Copper skink	At Risk (declining) expected to be present within the development area	High
Forest gecko, moko-piri-rākau	At Risk (declining) possibly present but not in development area	High
Auckland green gecko, elegant gecko, kākārīki	At Risk (declining) possibly present but not in development area	High
Ornate skink	At Risk (declining) possibly present but not in development area	High

¹⁵ To determine extent and values of wetlands within the PSPA will first require an assessment of presence and extent based on field investigations and assessment using the Wetland Delineation Protocol (MfE 2020). It is also key to note that the areal extent of wetlands provided in column one is likely to be an underestimate as this only includes wetlands that can be readily detected through analysis of aerial imagery.



Key biodiversity features (incl. estimated spatial extent of area in hectares)	Biodiversity characteristics and values	Biodiversity Value
Pacific gecko	Not Threatened. Possibly present but not in development area	Low
Grey duck, pārerā	Threatened – Nationally Vulnerable	Very High
New Zealand pipit, pīhoihoi	At Risk – Declining	High
White heron, kōtuku	Threatened – Nationally Critical	Very high
Australasian bittern, matuku hūrepo	Threatened – Nationally Critical	Very high
North Island fernbird, māātātā	At Risk – Declining	High
Long-tailed cuckoo, koekoea	Threatened – Nationally Vulnerable	Very High
Bush falcon, karearea	Threatened – Nationally Increasing	High
Banded rail, moho pererū	At Risk – Declining	High
New Zealand pied oystercatcher, tōrea	At Risk – Declining	High
Black billed gull, tarāpuka	At Risk – Declining	High
Red billed gull, tarāpunga	At Risk – Declining	High
North Island kākā, kākā	At Risk – Recovering	Moderate
Black shag, kawau	At Risk – Relict	Moderate
Little black shag, kawau tūi	At Risk – Naturally Uncommon	Moderate
Pied shag, karuhiruhi	At Risk – Recovering	Moderate
Royal spoonbill, kōtuku ngutupapa	At Risk – Naturally Uncommon	Moderate
New Zealand dabchick, waiwea	At Risk – Nationally Increasing	Moderate
Marsh crake, koitareke	At Risk – Declining	High
Spotless crake, pūweto	At Risk – Declining	High
Auckland tree wētā	Regionally uncommon	Low
Longfin eel, tuna	At Risk – Declining; may be present in river and gully waterways	High
Torrentfish, piripiripohatu	At Risk – Declining; may be present in river and gully waterways	High
Giant kōkopu, taiwharu	At Risk – Declining; may be present in river and gully waterways	High
Koaro	At Risk – Declining; may be present in river and gully waterways	High
Īnanga, inaka	At Risk – Declining; may be present in river and gully waterways	High
Shortjaw kōkopu	Threatened – Nationally Vulnerable; may be present in river and gully waterways	Very high
Lamprey, kanakana	Threatened – Nationally Vulnerable; may be present in river and gully waterways	Very high



Key biodiversity features (incl. estimated spatial extent of area in hectares)	Biodiversity characteristics and values	Biodiversity Value
Redfin bully	At Risk – Declining; may be present in river and gully waterways	High
Black mudfish	At Risk – Declining; may be present in river and gully waterways	High
Freshwater mussel, kākahi	At Risk – Declining	High
Freshwater snail	Data Deficient	Moderate

Notes: ¹ Level of threat status for Myrtaceae species is primarily associated with a precautionary approach due to disease risk.

3.3 STEP 2: MAGNITUDE OF EFFECTS ASSESSMENT

3.3.1 OVERVIEW OF POTENTIAL EFFECTS ASSOCIATED WITH LAND USE CHANGE

The proposed change in land use associated with PC5 has the potential to result in a range of adverse effects on ecological values.

These include construction-related effects such as:

- Vegetation and habitat loss through vegetation clearance and earthworks;
- Direct mortality or injury to species, for example all plants and most of the smaller less mobile species (e.g. lizards and invertebrates) may be harmed during vegetation clearance or earthworks activities. Likewise, roosting bats could potentially be harmed during vegetation clearance activities;
- Outside of bird breeding season, bird mortality would be low, however during breeding season vegetation removal has the potential to result in the destruction of nests, eggs and fledglings;
- The creation of habitat edge effects, altering the composition and health of adjacent vegetation (i.e. habitat degradation), which may affect habitat suitability for flora and fauna;
- Habitat fragmentation and isolation due to the loss and reduction of available habitat types and by reducing the ability for plants and animals to disperse across the landscape for food, shelter, and breeding purposes, i.e. severing or partially severing access to habitats that would otherwise be suitable; and
- Construction and operations-related noise, vibrations, dust, or lighting effects.

Potential long-term ongoing adverse effects associated with the change in land use may include:

- Ongoing habitat degradation associated with habitat loss, edge effects and fragmentation, which permanently affect movement of some species, with possible effects on meta-population dynamics and increased vulnerability to local extinction;
- Ongoing disturbance effects, particularly on habitat margins/edges, through noise, dust and lighting associated with infrastructure and housing;
- Mortality or injury on roads through strike or road kill for some species;
- The increased presence of people and introduced species in previously less accessible areas; and
- Lost opportunities for creating wildlife corridors.

3.3.2 SUMMARY OF MEASURES TO AVOID OR MINIMISE POTENTIAL EFFECTS



Proposed measures to reduce the severity of potential effects through effects avoidance (in the first instance) and effects minimisation where effects cannot feasibly be avoided.

3.3.2.1 EFFECTS AVOIDANCE MEASURES

As a first principle, every effort should be undertaken to avoid adverse effects on ecological values. To this end the most significant adverse effects will be avoided through:

- Protection of the most ecologically significant habitat which includes riparian margins of the Waikato River, major gullies and known bat roost sites through the mapping of these areas as public open space (127.86 ha). However, we note that 3.15 ha of significant habitat is still present within the PC5 development footprint and as recommended in our preliminary assessment of effects report, we consider this habitat should also be included in the public open space network if feasible.
- Protection of significant bat habitat in the form of ecological corridors to avoid or minimise severance or partial severance in the landscape.
- Protection of significant bat habitat in the form of ecological buffers around important ecological habitat to avoid or minimise potential effects associated with lighting and general disturbance resulting from land use change activities.

3.3.2.2 EFFECTS MINIMISATION MEASURES

Potential adverse effects on terrestrial and wetland values associated with construction and operation should be avoided, remedied or mitigated to the extent possible, through:

- Seasonal constraints on vegetation clearance. Vegetation clearance is expected to be affected by specific timing restrictions to avoid or minimise effects on fauna that are legally protected under the Wildlife Act 1953. This should include avoidance of vegetation clearance:
 - Outside of earthworks season (i.e., should not be undertaken from 1 May – 1 October) due to the need for erosion and sediment controls to be in place in accordance with the relevant management plan;
 - During colder months when bats are less active and when roosting bats are less likely to be detected through standard bat tree felling protocol methods;
 - During peak bird breeding season to reduce harm to eggs or chicks (August to December inclusive); and
 - In accordance with seasonal constraints for salvaging and relocating lizards and invertebrates.
- Vegetation clearance protocols should include:
 - Physical delineation of vegetation to be cleared to avoid inadvertent clearance and to minimise potential damage to branches and roots; and
 - Directional felling to prevent damage to vegetation immediately adjacent to the footprint.
- Sediment control measures should be undertaken to avoid or minimise effects on the wider aquatic receiving environment, i.e., wetlands, streams and the Waikato River.
- Vegetation/habitat clearance, salvage and relocation operations for nationally 'Threatened', 'At Risk', Regionally uncommon or legally protected species present or potentially present onsite. This should include:
 - Best practice bat tree felling protocols to reduce the risk of harming roosting bats;
 - Lizard salvage and relocation; and



- Redeployment of dead standing wood or fallen logs into native revegetation sites, to mitigate for potential effects on regionally uncommon invertebrates that may be present, e.g., tree weta and peripatus.
- Mitigation plantings to buffer against light, noise, dust or general disturbance of ecologically significant habitats. These plantings are ideally undertaken before construction starts, to reduce the time lag needed for planted habitat to become ecologically functional.

These measures to avoid or minimise effects should be detailed in the respective ecological management plans, as mandated through the updated PC5 provisions.

3.3.3 MAGNITUDE OF EFFECTS (AFTER EFFECTS AVOIDANCE AND MINIMISATION)

The results of the magnitude of effects assessment is summarised in Table 4 below. We note that these are conservative assessments and undertaken in the context of the wider landscape (habitats) and local populations (species).

Table 4: Magnitude of effects assessment after measures to avoid or minimise effects.

Biodiversity value	Direct and indirect effects within the PSPA	Magnitude of effects after effects avoidance and minimisation
Habitat complexes		
Significant indigenous terrestrial and freshwater fauna habitat: Riparian margins and associated waterways (58.74 ha)	It is assumed that there will be no permanent loss of riparian margins and associated waterways within PSPA. It is assumed that there will be potential effects on these habitat types due to light, noise or general disturbance associated with housing developments or degradation of the associated waterways through stormwater pollutants and potential sedimentation. It is expected that most of these effects will be avoided or minimised through the significant bat habitat buffers, though residual effects are still expected.	Moderate
Significant indigenous terrestrial fauna habitat: non-riparian linear features (ecological corridors) (20.49 ha)	Permanent loss of 3.15 ha of non-riparian linear features (shelterbelts), which equates to 15 % of the 20.49 ha of available habitat within the PSPA, and a small proportion of what is available in the landscape. It is assumed that there will be potential effects on these habitat types due to light, noise or general disturbance associated with housing developments. It is expected that these effects will be appropriately mitigated for though residual effects are expected.	High
Significant indigenous bat habitat: non-riparian habitat ecological buffers (56.59 ha)	It is assumed that there will be no permanent loss of this habitat type. It is assumed that there will be potential effects on these habitat types due to light, noise or general disturbance associated with housing developments, and that these effects will be appropriately mitigated for, though residual effects are expected.	Low
Significant indigenous	It is assumed that there will be no permanent loss of this habitat type. It is assumed that there will be potential effects on these	Low



Biodiversity value	Direct and indirect effects within the PSPA	Magnitude of effects after effects avoidance and minimisation
vegetation remnants (4.5 ha*)	habitat types due to light, noise or general disturbance associated with housing developments, and that these effects will be appropriately mitigated for, though residual effects are possible.	
Wetlands (7.3 ha) including Riverine & Palustrine wetlands (5.6 ha*) and Ephemeral Seep or Spring wetlands (1.7 ha).	It is assumed that there would be no permanent loss of natural freshwater wetlands due to activity status rules for natural freshwater wetlands set out in the NES-F, but some constructed wetlands (ponds) may be lost, and most wetland areas identified as significant in the AESR have been protected within the natural Open Space Zone. Potential effects on these habitat types will result from light, noise or general disturbance associated with housing developments (terrestrial) or degradation of water quality through stormwater pollutants and potential sedimentation. It is expected that these effects will be appropriately mitigated for, though residual effects are expected.	Moderate
Non-significant exotic vegetation (excluding pasture) (47.58 ha)	Permanent loss of 34.36 ha which equates to 72.2% of the available habitat within the PSPA, and which constitutes a moderate proportion of the habitat available in the surrounding landscape.	High
Non-significant exotic vegetation (pasture) (535.73 ha)	Permanent loss of 462.88 ha which equates to 86.4% of the available habitat within the PSPA, and which constitutes a moderate proportion of the habitat available in the surrounding landscape.	High
Taxa		
Nationally Threatened Long tailed bat	Permanent loss of 3.15 ha of high-quality bat habitat, 34.36 ha of moderate-quality bat habitat and 500.33 ha of low-quality bat habitat, which equates to 78.7% of what remains available in the PSPA (excluding the Southern Links footprint), and a large proportion of the habitat available to the local bat population (albeit only a small proportion of this is high quality bat habitat). In addition to direct effects, landscape and habitat ecological connectivity may be severed or partially severed. It is assumed that there will be potential effects on these habitat types due to light, noise or general disturbance associated with housing developments. It is expected that these effects will be appropriately mitigated for, though residual effects are expected.	High
Nationally Threatened Kānuka and Mānuka	Permanent loss of all kānuka and mānuka within the development footprint, for which the magnitude of effect is expected to be negligible	Negligible



Biodiversity value	Direct and indirect effects within the PSPA	Magnitude of effects after effects avoidance and minimisation
Nationally threatened poroporo	It is assumed that no Poroporo are present within the development footprint	Negligible
Nationally threatened or 'At Risk' birds	The magnitude of effects on 'At Risk' or nationally 'Threatened' birds will be variable with the highest magnitude of effects expected for pipit due to the loss of pasture/grassland habitat	Likely low except for pipit Moderate
'At Risk' fish and freshwater invertebrate species	It is assumed there will be no permanent loss of natural streams. Potential indirect effects on fish and freshwater invertebrates may occur through degradation in water quality associated with stormwater runoff, however there will be corresponding potential positive effects through a reduction in sedimentation and nutrient enrichment associated with farming activities (particularly the presence of livestock in riparian margins).	Low
Nationally 'At Risk' lizard species	It is assumed that copper skink are present within the PSPA footprint.	Likely negligible for all species except for copper skink (Low)

These measures to avoid, remedy or mitigate potential adverse effects should be detailed in the respective ecological management plans, as mandated through proposed consent conditions set out in the AEE.



3.4 STEP 3: LEVEL OF EFFECTS ASSESSMENT

Table 5 below summaries our view on the residual effects remaining after suitable avoidance and remediation measures have been taken into account as a consequence of land use change within PSPA associated with the updated PC5 provisions. As the table shows, residual adverse effects are expected to remain after feasible measures to avoid or minimise potential adverse effects are undertaken.

Table 5: Level of residual effects on biodiversity values after effects avoidance and minimisation measures have been considered

Biodiversity value	Biodiversity value category	Magnitude of effects category after mitigation	Level of effects category (after mitigation)
Habitat/vegetation type			
Significant indigenous terrestrial and freshwater fauna habitat: Riparian margins and associated waterways (58.74 ha)	High	Moderate	High
Significant indigenous terrestrial fauna habitat: non-riparian linear features (ecological corridors) (20.49 ha)	High	High	Very High
Significant indigenous bat habitat: non-riparian habitat ecological buffers (56.59 ha)	High	Low	Low
Significant indigenous vegetation remnants (4.5 ha)	High	Low	Low
Wetlands (7.3 ha) including Riverine & Palustrine wetlands (5.6 ha) and Ephemeral Seep or Spring wetlands (1.7 ha).	<i>Moderate to High</i>	<i>Likely Moderate</i>	<i>Potentially high¹⁶</i>
Non-significant exotic vegetation (excluding pasture) (47.58 ha)	Moderate	High	Moderate
Non-significant exotic vegetation (pasture) (535.73 ha)	Moderate	High	Moderate
Nationally Threatened or 'At Risk' Flora Species			
Nationally threatened (vulnerable) kānuka	Very high	Negligible	Low
Nationally threatened (vulnerable) mānuka	Very high	Negligible	Low
Nationally threatened (vulnerable) poroporo	Very high	Negligible	Low
Nationally Threatened or 'At Risk' Fauna Species			
Nationally threatened (critical) Long-tailed bat	Very high	High	Very high
At Risk (declining) Copper skink	High	Low	Low
At Risk (declining) Forest gecko, moko-piri-rā kau	High	Low	Low

¹⁶ It is key to note that prohibited activity status applies to a number of activities that may affect natural freshwater wetlands as defined by the National Policy Statement – Freshwater Management 2020 and as set out in National Environmental Standards for Freshwater 2020. Furthermore determining the presence and extent of natural wetlands typically requires field investigations and an assessment against the Wetland Delineation Protocol (MfE, 2020). Correspondingly it is difficult to determine the potential level of effects on wetlands.



Biodiversity value	Biodiversity value category	Magnitude of effects category after mitigation	Level of effects category (after mitigation)
At Risk (declining) Auckland green gecko, elegant gecko, kākārīki	High	Low	Low
At Risk (declining) Ornate skink	High	Low	Low
Nationally threatened (vulnerable) Grey duck, pārerā	Very high	Low	Moderate
At Risk (declining) New Zealand pipit, pīhoihoi	High	Moderate	High
Nationally threatened (critical) White heron, kōtuku	Very high	Negligible	Low
Nationally threatened (critical) Australasian bittern, matuku hūrepo	Very high	Low	Moderate
At Risk (declining) North Island fernbird, mātātā	High	Low	Low
Nationally threatened (vulnerable) Long-tailed cuckoo, koekoea	Very high	Low	Moderate
Nationally threatened (increasing) Bush falcon, karearea	Very high	Low	Moderate
At Risk (declining) Banded rail, moho pererū	High	Negligible	Low
At Risk (declining) New Zealand pied oystercatcher, tōrea	High	Negligible	Low
At Risk (declining) Black billed gull, tarāpuka	High	Negligible	Low
At Risk (declining) Red billed gull, tarāpunga	High	Negligible	Low
At Risk (recovering) North Island kākā	Moderate	Low	Low
At Risk (relict) Black shag, kawau	Moderate	Low	Low
At Risk (naturally uncommon) Little black shag, kawau tūi	Moderate	Low	Low
At Risk (recovering) Pied shag, karuhiruhi	Moderate	Low	Low
At Risk (naturally uncommon) Royal spoonbill, kōtuku ngutupapa	Moderate	Low	Low
Nationally threatened (increasing) New Zealand dabchick, waiwea	Very high	Low	Moderate
At Risk (declining) Marsh crake, koitāreke	High	Negligible	Low
At Risk (declining) Spotless crake, pūweto	High	Low	Low
At Risk (declining) Longfin eel, tuna	High	Low	Low
At Risk (declining) Torrentfish, piripiripohatu	High	Low	Low
At Risk (declining) Giant kōkopu, taiwharu	High	Low	Low
At Risk (declining) Koaro	High	Low	Low
At Risk (declining) Īnanga, inaka	High	Low	Low
Nationally threatened (vulnerable) Shortjaw kōkopu	Very High	Low	Moderate



Biodiversity value	Biodiversity value category	Magnitude of effects category after mitigation	Level of effects category (after mitigation)
Nationally threatened (vulnerable) Lamprey, kanakana	Very High	Low	Moderate
At Risk (declining) Redfin bully	High	Low	Low
At Risk (declining) Black mudfish	High	Low	Low
At Risk (declining) Freshwater mussel, kākahi	High	Low	Low
Freshwater snail (Data deficient)	Moderate	Low	Low

4 RECOMMENDED MEASURES TO ADDRESS RESIDUAL ADVERSE EFFECTS THAT CANNOT BE AVOIDED OR MINIMISED

4.1 RESIDUAL ADVERSE EFFECTS OVERVIEW

Table 6 below summaries our view on the residual effects remaining after suitable avoidance and remediation measures have been taken into account as a consequence of land use change within PSPA associated with the updated PC5 provisions. As the table shows, residual adverse effects at the landscape or local population scale are expected to remain after feasible measures to avoid or minimise potential adverse effects are undertaken.

Table 6: Biodiversity values for which the level of residual effects has been assessed as moderate or higher (after effects avoidance and minimisation measures have been considered).

Biodiversity value	Habitat within the project footprint	Level of residual effects category (after avoidance and minimisation measures)
Significant indigenous terrestrial and freshwater fauna habitat: Riparian margins and associated waterways (58.74 ha available within the PSPA)	0 ha¹⁷ within the PSPA development footprint	High ¹⁸
Significant indigenous terrestrial fauna habitat: non-riparian linear features (ecological corridors) (20.49 ha available within the PSPA)	3.15 ha within the PSPA development footprint	Very High

¹⁷ Conservatively assessed as 'High' due to the potential for indirect effects e.g. general disturbance associated with land use change

¹⁸ Indirect effects are conservatively assessed to be 'high' due to edge effects, although this habitat is outside the PSPA development footprint



Biodiversity value	Habitat within the project footprint	Level of residual effects category (after avoidance and minimisation measures)
Wetlands (7.3 ha) including Riverine & Palustrine wetlands (5.6 ha*) and Ephemeral Seep or Spring wetlands (1.7 ha).	0 ha¹⁹ within the PSPA development footprint	<i>Potentially high²⁰</i>
Non-significant exotic vegetation (excluding pasture) (47.58 ha)	34.36 ha within the PSPA development footprint	Moderate
Non-significant exotic vegetation (pasture) (535.73 ha)	462.88 ha within the PSPA development footprint	Moderate
Nationally threatened (critical) Long-tailed bat	500.33 ha within the PSPA development footprint	Very high
Nationally threatened (vulnerable) Grey duck, pārerā	Assumed to be several hectares	Moderate
At Risk (declining) New Zealand pipit, pīhoihoi	462.88 ha within the PSPA development footprint	High
Nationally threatened (critical) Australasian bittern, matuku hūrepo	Assumed to be several hectares including all wetland habitat and farm drains.	Moderate
Nationally threatened (vulnerable) Long-tailed cuckoo, koekoea		Moderate
Nationally threatened (increasing) Bush falcon, karearea		Moderate
Nationally threatened (increasing) New Zealand dabchick, waiwea	Assumed to be several hectares	Moderate
At risk (declining) Black-billed gull		Moderate

4.2 BIODIVERSITY OFFSETTING VERSUS COMPENSATION

4.2.1 AN OVERVIEW

Management of residual effects that cannot be avoided or minimised falls to offsetting (where feasible) or compensation if offsets cannot demonstrably be achieved.

Various definitions of offsetting have been proffered and in New Zealand the most recent definition of offsetting is in the NPS-IB exposure draft as follows:

¹⁹ Conservatively assessed as 'High' due to the potential for indirect effects e.g. general disturbance associated with land use change

²⁰ It is key to note that prohibited activity status applies to a number of activities that may affect natural freshwater wetlands as defined by the National Policy Statement – Freshwater Management 2020 and as set out in National Environmental Standards for Freshwater 2020. Furthermore determining the presence and extent of natural wetlands typically requires field investigations and an assessment against the Wetland Delineation Protocol (MfE, 2020). Correspondingly it is difficult to determine the potential level of effects on wetlands however we have assumed no natural wetlands will be lost or adversely affected.



Biodiversity offset means a measurable conservation outcome that complies with the principles in Appendix 3 and results from actions that:

- (a) redress any more than minor residual adverse effects on indigenous biodiversity after all appropriate avoidance, minimisation, and remediation measures have been sequentially applied; and*
- (b) achieve a measurable net gain in type, amount, and condition (structure and quality) of indigenous biodiversity compared to that lost.*

Net gain is defined in the NPS-IB exposure draft as:

The biodiversity values to be lost through the activity to which the offset applies are counterbalanced and exceeded by the proposed offsetting activity, so that the result is a net gain when compared to that lost. Net gain is demonstrated by a like-for-like quantitative loss/gain calculation of the following, and is achieved when the ecological values at the offset site exceed those being lost at the impact site across indigenous biodiversity:

- (a) types of indigenous biodiversity, including when indigenous species depend on introduced species for their persistence; and*
- (b) amount; and*
- (c) condition.*

Key biodiversity offsetting principles from the NPS-IB exposure draft are set out in Table 7 below. Similarly, the biodiversity compensation principles are also outlined in the draft NPS-IB. These biodiversity compensation principles generally follow the offsetting principles, with the most notable difference relating to the scale of biodiversity compensation. Instead of NG outcomes required by offsetting, compensation requires the indigenous biodiversity values lost through the activity to be addressed by positive effects to indigenous biodiversity that are proportionate to the adverse effects.

In respect of biodiversity offsetting, the WRPS includes Objective 3.11.4: Maintenance of Biodiversity: *Biodiversity within the Region maintained or enhanced*. This objective is notably broad and we interpret it to mean that to maintain or enhance biodiversity there must be>NNL (and preferably NG) of geographic extent, health (quality) or variety of living organisms in the region.

4.2.2 BIODIVERSITY OFFSETTING

The proposed residual effects measures are all defined as forms of compensation and do not meet the definition of biodiversity offsetting as presented above. While offsetting was considered in the first instance, offsetting was ruled out on the grounds that neither the biodiversity values within the PSPA, nor the nature of residual effect effects on those values or the proposed residual effects management measures, lend themselves to quantitative accounting for gains and losses with the necessary degree of confidence to constitute an offset. This is particularly so under the definition of biodiversity offset and NG as written in the draft NPS-IB. In our view, no residual effects could possibly be offset under the NPS-IB definition due to:

- Fundamental challenges in collecting and interpreting data and/or;
- The nature of effects on key ecological values (e.g. bats), which for the most part are inexplicit due to confounding impacts from surrounding land use activities and/or;



- The proposed effects management which is not necessarily ecologically equivalent, e.g. measures to address effects on bats associated with the loss of exotic vegetation will be addressed through native revegetation (which would largely be considered a ‘trade-up’).

We note that accordance with the draft NPS-IB definitions means that, with very few exceptions, all habitat restoration and enhancement activities will default to compensation (rather than offsetting) for this and other projects. This is because quantification of losses, and particularly quantification of predicted gains, cannot be determined with sufficient certainty to meet this ‘bright line’ test or yardstick to support offsetting. As such, current definitions in the draft NPS-IB cannot be used to verify that net gain outcomes are likely to be achieved.

4.2.3 BIODIVERSITY COMPENSATION

All available and commonly used options for assisting with the determination of compensation requirements were considered. These options include:

- a sole reliance on professional opinion;
- the use of arbitrarily assigned multipliers/ compensation ratios;
- negotiated exchanges; and
- Application of BCMs²¹ coupled with professional opinion.

Of these options, the BCM approach was favoured because it is the most transparent and likely to generate the best ecological outcomes based on our collective experience.

In summary BCMs are used to ‘sense check’ and test the likelihood that NG outcomes will be achieved through the type and quantum of compensation that is proposed to address residual adverse effects. We emphasise that the BCM is not used to claim or demonstrate an offset has occurred or that a particular outcome (e.g NNL or NG) is guaranteed - which is why it is termed a compensation model rather than an offset model. In summary, BCMs:

- Include quantitative and qualitative metrics with the qualitative metrics being directly aligned with the preliminary assessment of ecological effects, which in turn, is based on professional opinion underpinned by desktop and field investigations.
- Are based on measurements of biodiversity loss at the impact site(s) and gains at the proposed compensation site, i.e.:
 - Assessment of the quantum and value/quality of habitat within the impact footprint before and after project activities (biodiversity loss)
 - Assessment of the quantum and value/quality of habitat before and after proposed compensation measures (biodiversity gain)
- Account for time lag between adverse effects at impact sites and gains at compensation sites
- Include multiple contingencies to minimise the risk of false positives, i.e. predicting likely NG when the converse is true. Specifically the BCMs include:
 - Contingency to account for biodiversity risk, which is based on ecological value/threat status per se
 - Contingency to account for impact uncertainties

²¹ Termed Qualitative Biodiversity Models (QBM) in the BEMF report.



- Contingency to account for the degree of confidence that stated NG outcomes through restoration or habitat enhancement measures will be achieved in the stated time frame
- A predicted NG target of 20%.

We chose to use a single long-tailed bat BCM to assist with determining compensation requirements for all adversely affected biodiversity values because:

- Long-tailed bats are an 'umbrella species' and efforts to address effects on bats also serve to benefit the full suite of biodiversity values that are potentially affected by the PSPA; and
- Residual adverse effects on bats were considered the most significant potential effect.

Ideally, the process of sense checking and finalising the model would be undertaken in collaboration with submitter ecologists, to manually test the sensitivity of the model based on different inputs, and to crystallise and resolve potential areas of disagreement in respect of data inputs. However, the effectiveness of this process is dependent on constructive engagement by parties.

Although biodiversity compensation does not require the same numerical rigour as offsetting, it is generally recognised that ecological outcomes are improved where biodiversity compensation principles are applied as a guideline. Table 7 below sets out our assessment of the proposed biodiversity compensation package against the biodiversity compensation principles provided in Appendix 4 of the exposure draft NPS-IB.

Table 7: Assessment of the PC5 proposed residual effects management measures against biodiversity compensation principles (NPS-IB Appendix 4)

Biodiversity compensation principle	Explanation (taken from NPS-IB exposure draft)	Assessment
Adherence to the effects management hierarchy	<i>Biodiversity compensation is a commitment to redress more than minor residual adverse impacts, and should be contemplated only after steps to avoid, minimise, remedy, and offset adverse effects are demonstrated to have been sequentially exhausted.</i>	<p>We consider this principle to be met and exceeded because:</p> <ul style="list-style-type: none"> • Considerable effort has been first placed in avoidance measures through the protection of high value and potentially high value habitat within designated conservation areas and significant bat habitat areas (buffers and ecological corridors) which total approximately 128 ha • Considerable effort has been placed in effects minimisation measures including through lighting standards, setbacks, good practice tree felling protocol for bats and hopovers • Offsetting has been considered but ruled out due to difficulties in the collection and interpretation of quantitative data and challenges in quantitatively predicting future gains. • Compensation has been considered as a last resort and the design of the proposed compensation package has been undertaken



Biodiversity compensation principle	Explanation (taken from NPS-IB exposure draft)	Assessment
		in accordance with biodiversity offset principles to the extent possible. As such, we consider the proposed compensation package to be as close to an offset as feasibly possible and likely to generate net gain outcomes for all biodiversity values adversely affected by the proposed land use change.
When biodiversity compensation is not appropriate	<p><i>Biodiversity compensation is not appropriate where indigenous biodiversity values are not able to be compensated for, for example because:</i></p> <p><i>(a) the indigenous biodiversity affected is irreplaceable or vulnerable; or</i></p> <p><i>(b) effects on indigenous biodiversity are uncertain, unknown, or little understood, but potential effects are significantly adverse; or</i></p> <p><i>(c) there are no technically feasible options by which to secure proposed gains within acceptable timeframes.</i></p>	We consider this principle will be met because adverse effects on all ecological values will be addressed through avoidance, minimisation, offsetting or compensation. Importantly, while the potential for residual adverse effects on the local long-tailed bat population is deemed to be 'Very high' the type and quantum of habitat restoration and enhancement is expected to ensure that there is unlikely to be a net loss in the local bat population associated with the land use change.
Scale of biodiversity compensation	<p><i>The values to be lost through the activity to which the biodiversity compensation applies are addressed by positive effects to indigenous biodiversity,</i></p>	As set out above, offsets have been considered but ruled out due to difficulties with calculating quantitative data on impacts and expected gains with adequate precision. However, we consider this principle will be met to the degree possible because a BCM has been applied as a transparent 'sense check' to provide additional confidence that the proposed type and quantum of ecological restoration and enhancement is likely to achieve NG outcomes. The proposed restoration and habitat enhancement activities will improve the ecological integrity and ecological connectivity of high and potentially high value habitat across the landscape through the increase in both quantum and quality.
Additionality	<p><i>Biodiversity compensation achieves gains in indigenous biodiversity that are above and beyond gains that would have occurred in the absence of the compensation, such as gains that are additional to any minimisation and remediation undertaken in relation to the adverse effects of the activity.</i></p>	We consider this principle will be met because the proposed restoration and enhancement activities would not otherwise occur. However, to adhere to this principle it is imperative to separate out compensation sites allocated for PC5 versus those allocated for addressment of residual adverse effects associated with Southern Links.



Biodiversity compensation principle	Explanation (taken from NPS-IB exposure draft)	Assessment
Leakage	<i>The design and implementation avoid displacing activities or environmental factors that are harmful to indigenous biodiversity in other locations.</i>	We consider this principle to be met for all biodiversity values with the notable exception of pipit. As this species prefer low stature vegetation/habitat there is expected to be a potential loss of habitat for this species with restoration of this habitat type to forest. However, we expect this to be offset at least in part through a reduction in predation pressure through pest management.
Landscape context	<i>Biodiversity compensation actions are undertaken where this will result in the best ecological outcome, preferably close to the impact site or within the same ecological district. The actions consider the landscape context of both the impact site and the compensation site, taking into account interactions between species, habitats and ecosystems, spatial connections, and ecosystem function.</i>	We consider this principle will be met because the proposed restoration and habitat enhancement activities will improve the ecological integrity and ecological connectivity of high and potentially high value habitat across the landscape through the increase in both quantum and quality.
Long-term outcomes	<i>Biodiversity compensation is managed to secure outcomes of the activity that last as least as long as the impacts, and preferably in perpetuity.</i>	We consider this principle will be met because the benefits associated with habitat restoration and enhancement activities are proposed in perpetuity where this is possible.
Time lag	<i>The delay between loss of indigenous biodiversity at the impact site and gain or maturity of indigenous biodiversity at the compensation site is minimised</i>	This has been addressed to the extent possible through recommendations included in the updated PC5 provisions and has also been accounted for through the biodiversity model by penalising for the lag between the occurrence of impacts and expected gains at the proposed compensation site(s).
Trading up	<i>When trading up forms part of biodiversity compensation, the proposal demonstrates that the indigenous biodiversity values gained are demonstrably of higher indigenous biodiversity value than those lost. The proposal also shows the values lost are not to Threatened or At Risk species or to species considered vulnerable or irreplaceable.</i>	This forms the essence of the proposed compensation package in that the loss of low value habitat for long-tailed bats and other species is 'traded up' for restoration and enhancement of higher value indigenous habitat types.



Biodiversity compensation principle	Explanation (taken from NPS-IB exposure draft)	Assessment
Financial contributions	<i>Financial contributions are only considered when there is no effective option available for delivering indigenous biodiversity gains on the ground. Any contributions related to the indigenous biodiversity impacts must be directly linked to an intended indigenous biodiversity gain or benefit.</i>	Financial contributions or some other similar access to funding may be required to ensure delivery of tangible biodiversity gains and this principle is addressed because financial contributions (or other financial mechanisms) will be structured to directly link impacts and gains.
Science and mātauranga Māori	<i>The design and implementation of a biodiversity offset should be a documented process informed by science, including an appropriate consideration of mātauranga Māori.</i>	We consider this principle to be met <u>in part</u> . The assessment and effects management has been informed by professional expert opinion and underpinned by desktop and field investigations. However, inputs from expert(s) in mātauranga Māori have not yet been included in the design and implementation of a biodiversity offset and this is considered a gap that will need to be addressed.
Stakeholder participation	<i>The effective participation of stakeholders should be ensured in decision making about biodiversity offsets, including their evaluation, selection, design, implementation, and monitoring. Stakeholders are best engaged early in the process.</i>	We consider this principle likely to be met because there has and will continue to be opportunities for stakeholders to input into the process.
Transparency	<i>The design and implementation of biodiversity compensation, and communication of its results to the public, is undertaken in a transparent and timely manner.</i>	We consider this principle to be met through the assessment of effects and the application of a biodiversity model to provide transparency on the design and implementation of the compensation package for addressment of residual effects.

Taken together, we consider our approach to residual effects management — i.e., the use of a biodiversity compensation model and alignment with biodiversity compensation principles —to operate at the ‘as close to offset as possible’ end of the compensation continuum.

4.3 PROPOSED COMPENSATION PACKAGE

Of key importance, even with the application of effects avoidance and minimisation measures, urbanisation within the PSPA development footprint, as currently proposed, will likely result in a ‘Very High’ level of residual adverse effect on the local long-tailed bat population.

To address residual effects on bats and other values, we recommend a focus on native revegetation or native enrichment plantings, weed control and the control of introduced mammalian pests (browsers and predators) within suitable protected areas, and that these measures follow best practice guidelines to optimise ecological outcomes.



In summary, we expect habitat restoration, or enhancement activities within all available open public space zones that are present within the PSPA but outside of the development footprint, will go a considerable way towards addressing residual effects. However, the BCM indicates that it is unlikely to achieve a NG outcome for long-tailed bats. As such we consider that further bat habitat restoration and enhancement measures in areas outside of the PSPA would be required to generate a NG outcome for long-tailed bats with the model. The type and quantum of proposed habitat restoration and enhancement activities is set out in Table 8 below. This proposed compensation package has been ‘sense checked’ against a revised BCM to reflect the slight increase in available public open space based on revised calculations. All other data inputs and the rationale behind them are as described in Section 5 of the PAER.

Table 8 Long-tailed bat impact summary and proposed compensation package

Impacts	
Bat habitat impacts	Areal extent of impacted habitat (ha)
High value bat habitat (significant riparian margins and associated waterways and linear habitat features)	3.15
Moderate value bat habitat (non-pasture exotic vegetation)	34.36
Low value bat habitat (pasture)	462.88
Proposed compensation package	
Habitat restoration within PSPA public open space areas (native revegetation, weed management and mammalian pest control within riparian pasture)	65.27
Habitat enhancement within PSPA public open space areas (native enrichment planting, weed management and long-term mammalian pest control within existing forested habitat).	62.17
Habitat restoration outside of PSPA (native revegetation, weed management and long-term mammalian pest control within riparian pasture /or approx. 700 ha of long-term mammalian pest control in perpetuity within high value bat habitat known to support bat roosts (or a lesser combination of both).	190 ha restoration OR 700 ha enhancement

5 CONTEXT OF RELEVANT NATIONAL POLICY DIRECTION

5.1 ECOLOGICAL IMPLICATIONS OF CENTRAL GOVERNMENT DIRECTION ON HOUSING DENSITY

The RMA requires Medium Density Residential Standards (MDRS) to be incorporated into district plans to enable greater residential intensification than previously possible. PC5 has identified greenfield areas (the Peacocke Medium Density Residential Zone) that will provide for higher density housing in accordance with the MDRS. The intent is to enable more efficient land use and infrastructure development and the creation of walkable communities, amongst others.

In general terms, ecological implications of increased housing density development in the PSPA are in respect of urbanisation effects such as increased traffic, noise, lighting and impervious surfaces, alongside vegetation removal and habitat fragmentation effects. Although spatially the SBHA remain unchanged, as do the lighting controls and buffer setbacks, the MDRS enable more dense residential development within the Peacocke Medium Density Residential Zone.



All development including residential, community centres and retirement villages that are adjacent to the natural Open Space Zone and Bat Habitat Areas are subject to artificial lighting restrictions as recommended by the lighting experts to achieve no more than 0.3 lux measured at the boundary at any height (to achieve the target of no more than 0.1 lux 3m within bat habitat) and no outdoor lighting in exceedance of 2700K colour temperature. Further discussion of lighting restrictions and details of what is reflected in the updated PC5 provisions is contained in the lighting technical report prepared by John McKenney²².

5.2 NATIONAL POLICY STATEMENT ON INDIGENOUS BIODIVERSITY

The NPS-IB exposure draft (released in June 2022) provides important direction for this Plan Change with regards to the objectives to protect, maintain, and restore indigenous biodiversity²³. Several policies are of particular relevance, including:

- **Policy 3:** A precautionary approach is adopted when considering adverse effects on indigenous biodiversity.
- **Policy 5:** Indigenous biodiversity is managed in an integrated way, within and across administrative boundaries.
- **Policy 6:** Significant indigenous vegetation and significant habitats of indigenous fauna are identified as significant natural areas (SNAs) using a consistent approach.
- **Policy 7:** SNAs are protected by avoiding and managing adverse effects from new subdivision, use and development.
- **Policy 8:** The importance of maintaining indigenous biodiversity outside SNAs is recognised and provided for.
- **Policy 13:** Restoration of indigenous biodiversity is promoted and provided for.
- **Policy 14:** Increased indigenous vegetation cover is promoted in both urban and non-urban environments.
- **Policy 15:** Areas outside SNAs that support specified highly mobile fauna are identified and managed to maintain their populations across their natural range, and information and awareness of specified highly mobile fauna is improved.
- **Policy 16:** Regional biodiversity strategies are developed and implemented to maintain and restore indigenous biodiversity at a landscape scale.
- **Policy 17:** There is improved information and regular monitoring of indigenous biodiversity.

These policies have been considered in guiding the development of plan provisions (acknowledging that the final gazetted NPS-IB wording is uncertain), especially with regard to protecting biodiversity, using the precautionary principle, providing a landscape-scale approach, and increasing indigenous vegetation cover.

6 RESPONSE TO SUBMITTERS

In general terms, submitter comments with respect to ecological matters included:

²² Plan Change 5 – Peacocke Structure Plan, Supplementary Technical Report, John McKenney dated 29 August 2022; Statement of Evidence of John McKenney, Attachment 1.

²³ Although the exposure draft does not have statutory effect, it indicates Government's current national policy direction on indigenous biodiversity.



- Request for more detail in the plan regarding information requirements;
- Broadening of policy objectives to be more encompassing of whole ecosystem protection and ecosystem services;
- Comments regarding the extent and location of identified ecological features and protection areas;
- Comments with regards to bat ecology and protection, including vegetation removal and lighting effects;
- Comments regarding aquatic values, and consideration of further aspects such as fish passage and aquatic ecosystems;
- Comments in regard to financial compensation and offsetting; and
- Comments on management plans and monitoring.

We summarise these submissions and respond by topic in the following sections.

Appendix 1 outlines the finding of five site visits undertaken at the request of several submitters in relation to ecological matters.

Appendix 2 provides our specific responses to the submission of the Director-General of Conservation (DGC) as this submission was the most detailed and specific to ecological matters. We have also included more generalised responses to the DGC submission points in the following sections.

6.1.1 LIGHT ATTENUATION

Some submissions²⁴ comment that a vegetation buffer should be required adjacent to bat habitat areas to attenuate light intrusion into bat habitat. However, based on the Amberfield decision and associated lighting standards, ecologists and Council's lighting expert have confidence that light intrusion can be managed through lighting design and setbacks, based on the physics of light dispersal. Given 5m setbacks are provided for from any bat habitat area, and the requirement of no more than 0.3 lux measured at a property boundary, no further buffer planting will be required to achieve the target of no more than 0.1 lux within bat habitat as per the Amberfield conditions.

6.1.2 VEGETATION LOSS

Several submitters²⁵ comment that the loss of vegetation should be minimised and avoided in SNA. This is agreed, and the effects management hierarchy should be followed in all instances where intrusion into mapped SNAs is proposed by consent applications, and unless vegetation removal is in relation to pest species for ecological restoration, removal should be avoided in the first instance. Where vegetation removal cannot be avoided, bat tree-felling protocols should be applied for trees greater than 15 cm DBH, and offset or compensation approaches used to determine the replacement planting required to replace the removed vegetation with indigenous plant species and/or other measures which enhance roosting habitat for long-tailed bats and other fauna species as required on a case by case basis.

²⁴ Sub 30, 55

²⁵ Sub 20, 36, 55



6.1.3 ECOLOGICAL MANAGEMENT AND RESTORATION PLANS

A submission²⁶ commented that revegetation efforts should be targeting ecological enhancement through using appropriate species and through including a focus on restoring bat habitat (including short, medium and long term roost tree provision). We agree with this submission and note that the updated PC5 provisions do account for this matter now.

The updated PC5 provisions require an ecological management and restoration plan required to be prepared by a suitably qualified ecologist for subdivisions greater than 2 ha. We recommend that from an ecological perspective, this area threshold triggering a subdivision consent requirement in relation to ecological matters needs to be set to encompass as many subdivision consent applications within the PSPA as practical to ensure the majority of potential ecological impacts of land use change on the ecological values of the PSPA (and significant habitats of bats in particular) are captured by this approach. In this regard we would prefer a threshold of 0.5 ha rather than 2 ha.

6.2 WETLANDS

Submissions on wetlands were broadly in two categories. Several submitters request the location of proposed stormwater wetlands to be revisited.

6.2.1 LOCATION OF STORMWATER WETLANDS

The proposed constructed stormwater wetlands appear to be located outside of the areas we have identified as SNAs or SBHAs in the AESR. We consider this good practice from an ecological perspective. Where constructed wetlands are adjacent to the Natural Open Space Zones, SNAs or SBHA there may be opportunities to create synergies whereby suitable plantings and physical designs within and around the stormwater wetlands may also be suitably restored to provide functional habitat for native fauna to use.

6.2.2 PROTECTION OF WETLANDS

Some submissions²⁷ focused on the need to protect all wetlands (in line with the NPS-FM), and asked to delineate all wetlands as SNAs. The criteria used to determine significant wetlands in relation to section 6(c) of the RMA (e.g. criterion 6 of the WRPS criteria), are not the same as those used to determine 'natural wetlands' as defined by the NES-F, therefore a wetland deemed to meet the natural wetland criteria may not necessarily meet the WRPS criteria, and vice versa. We note that wetland identification and SNA assessment was a desktop exercise in the AESR. Therefore, where submitters have raised matters in relation to specific SNA identified and mapped wetlands, re-evaluation (which may also require ground-truthing) may be the most robust approach to address the matter in the specific cases where the wetland delineation has been questioned.

6.3 RIVER, STREAMS & GULLIES

6.3.1 PROTECTION OF MANGAKÖTUKUTUKU GULLY AND WAIKATO RIVER MARGINS

²⁶ Sub 36

²⁷ Sub 36



Waikato Regional Council submissions²⁸ request a new policy as part of the Natural Environment policies to *'Preserve the natural character of the Mangakōtukutuku Gully and Waikato River margins and protect it from inappropriate development. Where natural character has been compromised utilise opportunities to restore and enhance it.'*

We recommend that this amendment be adopted, as the use of natural character provisions in the RMA is a good policy tool to identify and address potential effects on these river margins and gully systems with multiple, inter-linking abiotic and biotic values as well as amenity and landscape values.

6.3.2 FISH PASSAGE

Waikato Regional Council submissions²⁹ noted that restoration efforts should also include fish passage in gully systems, as they too form corridors for aquatic species.

Fish passage should be considered for all stream related works, including removing fish barriers as part of any consents for development. References to fish passage have been included in the updated PC5 provisions with regards to ecological effects assessment and management plan information requirements (PC5 Appendix 1 District Plan Administration, 1.2.2.25).

6.3.3 FISH MANAGEMENT

With regards to aquatic environments, Waikato Regional Council submissions³⁰ requested further information requirements for management plans. Specifically, they requested:

- To add fish species abundance to fish management plans;
- To add specific mitigation measures, monitoring plans and responsibilities to fish management plans;
- To add sediment quality, aquatic habitat and fish passage to E17 1.3.3 p1.128; and
- To add offsetting requirements to 1.3.3 p.158).

The submissions also requested to require detailed integrated catchment management plans that focus on maintaining and enhancing aquatic habitat and ecological function.

Provisions have been updated to reflect further information requirements with regards to aquatic species and management of aquatic habitats (PC5 Appendix 1 District Plan Administration, 1.2.2.25).

²⁸ Sub 36

²⁹ Sub 36

³⁰ Sub 36



6.4 TERRESTRIAL FAUNA EXCLUDING BATS

Submissions by Waikato Regional Council³¹ (WRC) note that other fauna species aside from bats should also be considered in terms of ecological effects, mitigation, and ecological enhancement. Changes have now been made to the updated PC5 provisions to broaden the scope of the policy objectives and rules around ecological mitigation and restoration plans to include other terrestrial fauna species (PC5 Appendix 1 District Plan Administration, 1.2.2.25). We agree with these amendments.

6.5 BATS

6.5.1 SIGNIFICANT BAT HABITAT AREAS

Submissions vary in regards to SBHA. Several³² note that bat habitat imposes on the potential and value of developable land. Some suggest to make the habitat buffer developable (though a ‘no build’ zone). Submissions state that corridors were either not currently bat habitat, or else bats would cease using the area once development is complete.

Transpower³³ in particular object to the presence of an SNA at their Hall Road site. The confirmation of a utilised bat roost at the Transpower site warrants protection of the area including all surrounding trees and features. While the site is dominated by exotic trees, it forms a habitat feature in the wider landscape that data shows has been used by bats as a roosting and likely allowing used for commuting. We therefore recommend that this SNA is not amended to exclude the known roosting trees. However, the location of the corridor along the west edge of the site may be able to be amended to exclude some of the infrastructure within the compound provided that lighting standards can be maintained (refer to Appendix 1 – site visit memo).

SBHAs and SNAs based on bat habitat value have been set aside across the PSPA to ensure the persistence of the species despite urban development. These areas protect those features most used, or likely to be most used, by currently present bats. In addition, bat corridors have been proposed to link these habitat features to enable bats to move through the landscape largely uninhibited by the effects of residential development. Whether an area is currently bat habitat or not is therefore secondary in the case of corridors.

Kainga Ora supports SBHAs, but notes where they are to be used by the public, they need to be subject to crime prevention principles. Similarly, WRC point out the potential conflict between public use and bat habitat, e.g. through lighting and where it may require (in future) the removal of potential bat roost trees due to public safety concerns. We understand amendments have been made to the PC5 provisions to accommodate these concerns.

The DGC submission³⁴ requested the renaming of bat habitat features (including ecological corridors for the movement of bats, SNAs, development setbacks to buffer ecological corridors along with roost trees and their respective buffers or development setbacks) to Bat Priority Areas. We do not agree with this as the SNAs cover other aspects of biodiversity aside from significant bat habitats. In addition,

³¹ Sub 36

³² Sub 12, 13, 14, 15, 17, 39, 42, 43

³³ Sub 21

³⁴ Sub 38



SBHAs are mapped on the PC5 planning maps and defined in the updated PC5 provisions, which we support.

The DGC submission considered that ‘low’ and ‘medium’ bat habitat should be mapped. We do not agree that mapping of these habitats will necessarily be beneficial as the refinement needed to provide accurate spatial boundaries and the data to support these spatial boundaries would require a level of analysis which we consider not to be practically feasible. In addition, we consider that other methods, aside from mapping can achieve the same result in terms of section 6(c) of the RMA.

To this end, we agree with the DGC submission that all significant habitat of indigenous fauna and significant indigenous vegetation needs to be protected or otherwise addressed by the mitigation hierarchy as a consequence of land use change in the PSPA (including business centres and other infrastructure, as well as medium and high density housing areas). The updated PC5 provisions address this matter by requiring control of the felling of trees greater than 15cm diameter at breast height (DBH) in the PSPA, and by requiring a consenting pathway to address effects on bat habitats throughout the entire PSPA, including low and medium value bat habitats.

The DGC submission states that the removal of actual and potential bat roost trees due to health and safety requirements may be required within SNAs and SBHAs. We agree that the updated PC5 provisions require a requirement that walking/cycleways are located and designed to avoid the removal of bat roosts and other habitat in the first instance. Where this is not possible protocols for minimising the risk of felling bat roosts must be adhered to.

The DGC submits that; *“More could be done to provide for the connectivity of bat habitat within the PSPA”* and that *“ More of the ‘moderate habitat’ could be added to the network of ecological corridors to better provide for the movement of bats. In particular, bat habitat north of the sports field could be added to connect the rest of the network with the bat corridor at the northern margin of the PSPA.”*

We agree in part. We recommend the low and moderate value bat habitat areas be addressed in the updated PC5 provisions as currently there is no objective to address the loss of these habitats, but we do not consider mapping of these areas practical or necessary to achieve protection. If land use change results in loss or degradation of this habitat, the updated PC5 provisions should require that mitigation offsetting or compensation is required for loss of pasture/tree land to housing and addressing residual adverse effects, as we detail in the PAEER and section 4 of this report. We also consider, where feasible, opportunities to retain or re-create areas of trees, including shelterbelts, within the proposed sports park and educational areas to further assist bats in their movement through the PSPA should be provided for, and updated PC5 provisions are developed to allow consideration for the protection and enhancement of habitat for significant indigenous fauna, particularly bats, in these ‘non- natural’ public spaces.

6.5.2 BAT CORRIDOR FRAGMENTATION

Submissions³⁵ requested to maximise bat ‘hop over’ habitats and opportunities for any streets intruding or intersecting with bat buffer or corridor habitats (including shelterbelts). While this is difficult to do and no method is proven effective, minimising fragmentation of roads was a major component of Amberfield consenting and a similar approach should be used. This involves minimising any gaps in corridors and maximising canopy cover across roads and applying best design principals to

³⁵ Sub 30, 38



reduce artificial lighting glare from street lamps and car headlamps. The updated PC5 provisions address these matters by requiring bat management plans for all applications within or adjacent to bat corridor and SNAs on this matter.

The DGC submission asks for consideration of, and provision for, the buffers and other measures that will be required to protect the SNAs and SBHAs from housing intensification (and Business Centres). We consider that this is already addressed, in part, in the updated PC5 provisions in terms of the lighting restrictions, buffer areas and requirements to apply for consent for land use change as outlined in the updated PC5 provisions. Further amendments may assist to capture all land use change zones, such as sports or community parks with flood lighting, Local Centre Zones and Neighbourhood Zones adjacent to NOSZs.

6.5.3 BAT MONITORING

Some submissions³⁶ stated that no bat monitoring should be undertaken, as this is expected to frustrate housing developments and cause unnecessary delays. Given the sensitivity of bats to development in this area, monitoring pre and post urbanisation is recommended. Bat monitoring should be clear in its aims, and ideally centrally integrated. It could be beneficial to conduct all bat monitoring independently from development at a central location. This way monitoring would also be better able to account for cumulative effects.

Submitters³⁷ recommended that monitoring should be undertaken at a landscape level rather than for individual properties, and that it be undertaken by HCC or another body. We agree that this option should be considered. Similar to the discussion in the paragraph above, landscape level monitoring is preferable to account for cumulative effects and monitor changes across the area; also for consistency and transparency. It would also be better to conduct independent monitoring rather than monitoring for any particular subdivision or property.

Submitters³⁸ also requested monitoring requirements to be more specific and detailed, and in line with the recommendations made in the LTBR. Further details have been included in the updated PC5 provisions in relation to felling of potential bat roost trees (PC5 Appendix 1 District Plan Administration, 1.2.2.27). This includes reference to the use of the most current DOC Bat Roost Protocols for vegetation removal.

6.5.4 LIGHTING

With regards to lighting effects on bats, submissions³⁹ are concerned with the risk that 5-storey buildings near bat habitats will cause higher lighting and glare risks to bats, and that effects of glare should be considered for high density buildings. We defer to the lighting experts, but we understand that lighting impacts on bat habitats depend on the spatial buffer (i.e. physical distance) between edge of building and edge of bat habitat so that there is sufficient space to allow light to diffuse. This is the case at all building heights, whether 2 or 5 stories. As long as the limit of 0.3 lux and suitable colour

³⁶ Sub 13, 14

³⁷ Sub 46

³⁸ Sub 30, 55

³⁹ Sub 16, 38



warmth at the SBHA boundary is complied with at all heights (in accordance with 25.6.4.4), no additional considerations need to be given to high density buildings (assuming all design guidelines, setbacks and buffers are adhered to).

Submitters⁴⁰ raised concerns regarding lighting at sports parks close to bat habitat areas. We agree that these artificial effects need to be considered no differently than artificial lighting associated with urbanisation.

6.6 ECOLOGICAL CORRIDORS

6.6.1 EXTENT OF CORRIDORS

Several submitters⁴¹ disagree with the extent and locations of the proposed bat corridors mapped as SBHAs on the PC5 planning maps, including stating that there is no current bat habitat in some of the corridor locations. Some state that bat corridors will not be needed because bats will not use the area once developed. The key objective of SBHAs is to ensure that bats use the area despite development, with appropriate buffering, planting and development design in place to achieve this aim. This also includes the new creation of commuting and feeding habitat in areas currently dominated by open pasture, to enable movement through the landscape in a development setting.

The rationale behind the corridor locations is discussed in section 3.1 and further detailed in the LTBR, AESR and PAER reports. The approach to mapping these areas taken was not random or broad-brushed but includes designated corridors in areas that make sense from an ecological, and bat behaviour, perspective. However, further site visits were conducted to refine some of these locations, and recommendations for minor amendments are recommended as detailed in the site visit memo (See Appendix 1).

Though no research findings exist in the New Zealand and long-tailed bat context, the minimum width of 50m has been chosen as the minimum width considered to be ecologically meaningful by the authors of the LTBR, who all have many years' experience in studying and assessing the effects of infrastructure and urban development on long-tailed bats. A submission⁴² makes reference to the Amberfield decision stating that it is 35 m in width, though this is not entirely correct as the width of the East-West corridor is 35 m wide in some places but wider in parts, as it is consolidated and consolidated by a bat habitat area to the north of this corridor. Comparing the corridor width to the Amberfield decision is not meaningful because the objective for the PSPA corridors is to both enable bats to move through the landscape (as for Amberfield) and to mitigate effects of urbanisation on a landscape scale (unlike for Amberfield). The Amberfield decision was also retrofitting corridors to an existing subdivision design, whereas the plan change process allowed to create corridors to be designed with an ecological and landscape focus. Corridors should not be less than 50m wide in any location.

However, we do consider that a network of open space and SBHA can provide for well-designed and located passive recreation opportunities where they do not conflict with ecological values, for example as long as the structural elements of these areas retain their primary elements which retain functional

⁴⁰ Sub 38.58

⁴¹ Sub 12, 13, 14, 15, 17, 39, 42, 43

⁴² Sub 46



long-tailed bat habitat passive recreation opportunities, such as walkways, cycleways, passive parkland, gardens and playgrounds.

6.6.2 SETBACKS

Submissions on development setbacks range between setbacks not being wide enough, and setbacks lacking purpose other than further restricting development.

Some do not support buffers as there is no research available to determine how wide they should be. Some submitters also state that having a habitat buffer and setback is unnecessary.

The design of the core bat habitat area, the habitat buffer and the development setbacks is clearly outlined in the LTBR and illustrated in Figure 8 of that report. While there is no research on exactly how wide buffers and setbacks should be, the design accommodates buffering of habitat from urbanisation in a way that it seeks to minimise effects while optimising land use.

The proposed SNAs and buffer zones are adequate to preserve bat habitat assuming lighting/development effects are managed. In addition, buffers provide additional usable bat habitat, whereas the setbacks provide some spatial removal of development and the bat corridor. In our view there is sufficient evidence before us to justify the application of setbacks to buffer urbanisation effects on high value bat habitat areas.

6.6.3 FRESHWATER CORRIDORS

While a key focus of PC5 is on terrestrial habitat, one submission⁴³ notes the need to ensure that the stream network is also identified as an ecological corridor as this is critical for fish movement and migration. It suggests to amend DEV01-PSP: P39 to *‘Provide ecological corridors along the arms of the Mangakōtukutuku Gully to enable the movement of migratory native fish’* in order to include aquatic biodiversity values.

We agree that streams form important corridors, and that fish passage should be ensured. However, protection of these areas is ensured through the updated PC5 provisions as they stand in our view. Fish passage has been explicitly added to the information requirements for subdivision in the updated PC5 provisions (PC5 Appendix 1 District Plan Administration, 1.2.2.25).

6.6.4 NATURAL OPEN SPACE ZONES

In several submissions⁴⁴ the extent of Natural Open Space Zone (NOSZ) is not supported due its imposing on development plans, or not supported in principle. Requests are made, as with bat habitat areas and corridors, for Council to purchase NOSZ land to create reserves vested to council.

One submission⁴⁵ supports NOSZ but asks for freshwater fish to be added to the policy (NOSZ – PREC1-P: O7 ‘Natural Open Space areas in the Peacocke Structure Plan Area are identified, protected and enhanced to provide and protect habitat for long tailed bats and threatened freshwater fish’).

⁴³ Sub 36

⁴⁴ Sub 15, 17, 21, 34, 39, 41, 44, 46, 48, 53

⁴⁵ Sub 36



This links to the freshwater corridor aspect discussed above; we agree with the recommendation but note that freshwater systems are largely captured by SNAs in any case.

The DGC submission requests provisions for addressing kauri dieback disease. We note that there is not naturally occurring kauri forest within the PSPA.

6.7 OFFSETS, COMPENSATION RECOMMENDATIONS TO ADDRESS RESIDUAL ADVERSE EFFECTS

6.7.1 FINANCIAL CONTRIBUTIONS

One submission⁴⁶ requests a new policy that provides for financial contributions to deliver maintenance and enhancement (restoration) of the defined natural environment and open space network within Peacocke, to provide for appropriate biodiversity mitigation and offsetting, and to provide a precautionary approach to achieving catchment hydrology targets of the Integrated Catchment Management Plan (ICMP).

We agree with this submission. There needs to be a mechanism for delivering compensation for residual effects. Financial contributions, or some similar financial instrument would assist in this regard.

We need an automated and integrated approach for offsetting/compensation of adverse effects given the potential for ‘death by a thousand cuts’, with lots of small developments having unquantified cumulative effects on ecosystems. This can be achieved through an updated version of the BCM that also calculates financial contribution requirements (based on expected revegetation and/or pest management costings). These contributions would be used to fund habitat restoration and enhancement measures to address residual effects.

6.8 MANAGEMENT PLANS, RESTORATION & OFFSETTING/COMPENSATION

Several submissions⁴⁷ ask for Ecological Rehabilitation and Management Plans (ERMPs) to be required only for public areas, not imposed on private landowners or subdivisions. Our view is that development next to a bat habitat area or in fact across the entire PSPA should require the development and implementation of an EMRP for any consent application and subdivision to manage effects of urbanisation of the ecosystem, irrespective of land ownership. This approach is consistent with the submission of the DGC on this matter.

WRC submissions request more specificity regarding what an ERMP entails for subdivision consent (1.2.2.25). Additional details in the plan regarding steps for restoration and planting specifications could provide certainty for all parties, without being overly prescriptive to allow for site-specific restoration measures.

Two submissions⁴⁸ request implementation of a ban on domestic cats across the PSPA. One states that the Environment Court decision placed a cat ban on Amberfield, and made it clear that while it was unable to require this for the rest of Peacocke, it is necessary. Cats can predate on foraging bats in particular, so a cat ban would have benefit to bats in the area. However, we consider that all animal

⁴⁶ Sub 36

⁴⁷ Sub 46, 53

⁴⁸ Sub 30, 38



pests need to be controlled (both feral and domestic); a cat ban alone without any other animal pest control is not likely to necessarily achieve the best outcome for roosting bats. The updated PC5 provisions include requirements around consent applicants presenting proposals for pest control measures as part of their applications, including for feral and domestic cats.

The submission of the DGC states that PC5 lacks clear guidance for plan users on biodiversity offsetting in terms of bat habitat and other significant biodiversity such as wetland and wetland fauna and requests the updated PC5 provisions be amended to provide clear guidance in the Structure Plan on biodiversity offsetting. The DGC also submits that all significant habitat of indigenous fauna and significant indigenous vegetation needs to be protected or otherwise addressed by the mitigation hierarchy, by avoiding adverse effects in the first instance. We agree, for reasons provided within section 4 and the BEMP which outlines our approach and recommendations on this matter. We recommend amendments are made to the relevant policies, objectives and rules of PC5 to ensure that:

- Effects of land use change in areas of low and medium bat habitat value are addressed through the effects management hierarchy (see Table 7 of this report), and
- Identified high value bat habitats and other significant habitat of indigenous fauna and significant indigenous vegetation are protected and enhanced from the adverse effects of land use change.

6.9 MONITORING

6.9.1 BAT MONITORING REQUIREMENTS

Several submissions⁴⁹ request more specific details regarding requirements for bat monitoring pre- and post development, in line with the recommendations made in section 4.3 of the LTBR. The technical report contains development-focused monitoring guidelines (Appendix A of the report), developed to provide consistency and rigour to any bat monitoring conducted in the PSPA.

We understand that a bat enhancement panel modelled on the Amberfield, led by Council, is proposed and we support this approach. This would ensure that bat monitoring and effects management is done as an integrated and landscape-scale approach.

We agree that monitoring should follow the guidelines contained in our technical report. Additional wording has been added to the Bat Management Plan requirements in this regard and we support them as they link monitoring obligations to the Bat and Habitat Enhancement Review Panel in Chapter 3A of the updated PC5 provisions.

Some submissions oppose bat monitoring⁵⁰. Monitoring will be required to effectively manage the impacts of development on the species.

⁴⁹ Sub 30, 38, 55

⁵⁰ Sub 13, 14



6.9.2 BAT ROOST PROTOCOLS

Submissions⁵¹ request the reference to and use of the DOC-developed Bat Roost Protocols (version October 2021)⁵² for vegetation removal and consent applications. We agree. As roost protocols tend to change and be updated over time as further information and best practice get developed, the PC5 provisions have been updated to reference the most recent DOC protocols as available at the time (1.2.2.27 E).

6.9.3 LANDSCAPE LEVEL MONITORING

One submission⁵³ notes that bat monitoring should be undertaken at a landscape level rather than for individual properties or subdivisions and undertaken by Council or another body. As discussed in Section 6.9.1 above, we agree with this comment. Centralised landscape level monitoring is preferable to account for cumulative effects and monitor changes across the area. It would be beneficial also for consistency and transparency.

We agree that it would also be preferable to conduct independent monitoring coordinated by a central body rather than monitoring for any particular subdivision or property.

6.10 BAT AND HABITAT ENHANCEMENT PANEL

The DGC submission seeks that PC5 be amended to include provision for the formation of a Bat and Habitat Enhancement Panel, stating:

“The Panel would be similar in composition to that required by Condition 80 of the Amberfield subdivision resource consent, including representatives of the Department of Conservation. The Panel would be required to make recommendations on: (a) The initial preparation of Bat Protection Plans and subsequent reviews; (b) sub-plans for Construction Works within the Bat Priority Areas; (c) the review of monitoring and compliance reports.”

We agree with this submission point, as in addition a panel would be useful to 'centralise' and audit all monitoring and compliance; as well as direct financial contributions (or similar) as a method to address residual adverse effects. The updated PC5 provisions in Chapter 3A have addressed this matter.

⁵¹ Sub 36, 38, 58

⁵² Department of Conservation. 2021. Protocols for minimising the risk of felling bat roosts (Bat Roost Protocols (BRP)) Version 2: October 2021 approved by the New Zealand Department of Conservation's Bat Recovery Group

⁵³ Sub 46



7 RECOMMENDATIONS

7.1 SUPPORT FOR UPDATED PLAN PROVISIONS

We have reviewed the updated PC5 provisions and consider them a significant step forward from the notified provisions and we generally support them. The identification and preservation of SBHA in addition to SNA, and associated buffer in terms of setback and lighting standards, are likely to preserve significant fauna habitat values in the PSPA. The creation of SBHAs in locations that are predominately in open pastureland means the restoration planting of large areas across the PSPA, in order to create additional habitat and maintain habitat linkages through the landscape.

Adoption of DOC Bat Roost Protocols for managing vegetation removal; further information requirements for Bat Management Plans; the broadening of management plans to cover biodiversity values other than bats, such as aquatic species, aquatic corridors and fish passage, and other terrestrial fauna; more detailed information requirements for ecological effects assessments; and further details with regards to lighting design are amendments in the updated PC5 provisions which will strengthen protection of significant habitats for indigenous fauna.

The updated ERMP requirements and proposal for Council to lead a Bat and Habitat Enhancement Review Panel and requiring a more standardised and landscape-wide approach to monitoring is also strongly supported.

Nevertheless, we recommend further refinements as detailed in Section 7.2 below.

7.2 KEY RECOMMENDED CHANGES TO PROVISIONS AND RULES

We recommend these provisions are strengthened further to give effect to our recommendation regarding pursuit of the NNL/NG outcomes we have identified in our report for low- and medium-value bat habitats. The loss of low- and medium-value bat habitat is currently not fully addressed by the overall ecological effects assessment across the PSPA, and is not contained in the information requirements of the updated PC5 provisions.

Additional mechanisms are required to address the adverse residual effects of urbanisation with the growth cells of the PSPA on the low and medium value long-tailed bat habitats of the PSPA. Where vegetation clearance of significant indigenous vegetation or significant habitats of indigenous fauna cannot be avoided, uniformly applied and transparent offset or compensation approaches should be used to determine the quantum of habitat restoration or enhancement required to address this residual adverse effect.

Through our compensation model (see sections 4 and 5) we estimate that to achieve the NNL/NG outcome, the following additional measures are required in addition to the designation of the Natural Open Space Areas, SNAs, SBHAs and other related provisions of the plan change:

- Habitat restoration within PSPA public open space areas (native revegetation, weed management and long-term mammalian pest control within riparian pasture) of some 66 ha;
- Habitat enhancement within PSPA public open space areas (native enrichment planting, weed management and long-term mammalian pest control within existing forested habitat equating to about 62 ha); and
- Habitat restoration and/or enhancement outside of the PSPA. This comprises;
 - 190 ha of habitat restoration (native revegetation, weed management and mammalian pest control within riparian pasture); or



- 700 ha of habitat enhancement mammalian pest control in perpetuity within high value bat habitat known to support bat roosts; or
- A lesser combination of both habitat restoration and enhancement.

7.3 OTHER RECOMMENDATIONS

Compensation sites are required to enable pest control and/or restoration planting to address residual ecological effects. These are likely to be located at least partially outside the PSPA, and possibly outside HCC's territorial boundaries. Based on preliminary investigations, suitable compensation sites are available in the wider landscape. However further work will be needed to provide assurance that available sites can be secured and that financial mechanisms are in place to fund the required habitat restoration and enhancement activities.

Reference is made to a landscape-scale approach to management in some of the PC5 objectives. However, in contrast, the rules around subdivisions and other matters take an individualised (property-based) approach which does not link back to the stated approach in the objectives. This could mean that adverse effects on ecological values —and in particular cumulative effects on bats— are not adequately addressed. A landscape-scale approach is important in the PSPA because of the 'very high' level of adverse effect on a threatened (nationally critical) highly mobile species. We recommend that HCC investigate and where feasible, implement non-statutory tools to achieve a landscape approach to protecting and restoring biodiversity in Hamilton City including those recommended in section 5 of the LTBR:

- Investigation of a PSPA wide animal pest control programme, in collaboration with other key stakeholders, particularly those with statutory obligations to protect bats, such as the Department of Conservation and Waikato Regional Council, targeting the key animal pests of long-tailed bats in urban areas, and including measures to control the widespread introduction of domestic cats as urbanisation occurs; and
- Fostering and contributing towards further research on the effects of urbanisation on long-bat populations and their habitats, including monitoring the effectiveness of avoidance and mitigation measures.

We recommend the centralisation of bat monitoring as sought by several submitters. We also recommend adoption in the updated PC5 provisions of monitoring guidelines to standardise all bat monitoring. To this end we recommend the following changes to the updated PC5 provisions as follows:

Chapter 3A Peacocke Structure Plan DEV01-PSP: Components of the Peacocke Structure Plan:

A Bat and Habitat Enhancement Review Panel:

D Support Hamilton City Council with the review of monitoring and compliance reports provided by consent applicants required via resource consent conditions, **and facilitating a scientifically robust and consistent centralised approach to landscape wide monitoring of long-tailed bats and their habitats.**

We recommend that effects of land use change in areas of low and medium bat habitat value are addressed through the effects management hierarchy. In this regard we recommend the following changes to updated PC5 provisions as follows:

- Section 1.3.3.3 P3 Development in the Peacocke Precinct



j) *The extent to which the proposal **avoids, remedies, mitigates** ~~or~~ off-sets **or compensates** the effects of development on identified Significant Bat Habitat Areas and non-identified low to moderate habitat values within the Medium Density Residential Zone, through the provision of re-vegetated and enhanced ecology corridors to provide new and enhanced bat habitat.*

- Section 1.3.3.3 P5 Subdivision in the Peacocke Structure Plan

x) *The extent to which the proposal **avoids, remedies, mitigates,** ~~or~~ off-set **or compensates** the effects of development on identified Significant Bat Habitat Areas and non-identified low to moderate habitat values within the Medium Density Residential Zone, through the provision of re-vegetated and enhanced ecology corridors to provide new and enhanced bat habitat*

The updated PC5 provisions require an ecological management and restoration plan to be prepared by a suitably qualified ecologist for subdivision consent applications greater than 2 ha. We recommend that from an ecological perspective the area threshold triggering a subdivision consent requirement in relation to ecological matters needs to be set to encompass as many subdivision consent applications within the PSPA as practical to ensure the majority of potential adverse effects of land use change on the ecological values of the PSPA (and significant habitats of bats in particular) are captured by this approach. In this regard we would prefer a threshold of 0.5 ha rather than 2 ha.

Implementation of the concepts associated with natural character help to identify and address complex adverse ecological effects on the intrinsic ecological values of the Waikato River margins and associated gully systems. These areas all have multiple, inter-linking abiotic and biotic values as well as amenity and landscape values, associated with urbanisation of this area. In Section 7.3.1 we therefore recommend an amendment to the Natural Environment policy to read:

‘Preserve the natural character of the Mangakōtukutuku Gully and Waikato River margins and protect it from inappropriate development. Where natural character has been compromised, utilise opportunities to restore and enhance it.’



APPENDIX I DETAILED RESPONSE TO THE DIRECTOR – GENERAL OF CONSERVATION'S
SUBMISSION IN RELATION TO ECOLOGICAL MATTERS



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
Terminology	DGC	Amend the Structure Plan to refer to significant bat habitat such as ecological corridors for the movement of bats, Significant Natural Areas (SNAs), development setbacks to buffer ecological corridors along with roost trees and their respective buffers or development setbacks to Bat Priority Areas	Given SNAs have other protection values aside from protecting bat habitat we don't agree.
Mapping	DGC	c.500 ha of habitat that has been classified as low and medium value bat habitat is not mapped	It should be identified
DEV01-PSP: 013	DGC	Bat habitat outside of identified habitat: Of the 720 ha Structure Plan Area there will be the loss of c.500 ha of habitat that has been classified as low and medium value habitat. The Director-General considers all significant habitat of indigenous fauna and significant indigenous vegetation needs to be protected or otherwise addressed by the mitigation hierarchy. It is also unclear how the structure plan will achieve this for bat habitat that is not protected through an SNA, corridor or buffer.	Consistent with recommendations in our reports
Walking /Cycleways	DGC	Location of walking/cycleways within and at the margins of Bat Priority Areas may require the removal of actual and potential roost trees due to health and safety requirements	Include a directive that walking/cycleways are located and designed to avoid the removal of bat roosts and other habitat in the first instance. Where this is not possible, protocols for minimising the risk of felling bat roosts must be adhered to.
Density of housing in proximity to bat habitat	DGC	Density of housing in proximity to bat habitat. Include consideration of, and provision for, the buffers and other measures that will be required to protect the Bat Priority Areas from housing intensification	This is already addressed in buffers and other lighting requirements along SNAs and bat corridors
Restoration and enhancement	DGC	In addition, the Structure Plan lacks clear guidance for plan users on biodiversity offsetting in terms of bat habitat and other significant biodiversity such as wetland and wetland fauna. Provide clear guidance in the Structure Plan on biodiversity offsetting.	Refer to sections 4 and 5 of the technical summary report and the PAEER for our recommendations on this matter



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
Bat and Habitat and Enhancement Review Panel	DGC	Structure Plan to require the formation of a Bat and Habitat Enhancement Panel. The Panel would be similar in composition to that required by Condition 80 of the Amberfield subdivision resource consent, including representatives of the Department of Conservation. The Panel would be required to make recommendations on: (a) The initial preparation of Bat Protection Plans and subsequent reviews; (b) sub-plans for Construction Works within the Bat Priority Areas; (c) the review of monitoring and compliance reports.	A panel would be useful to 'centralise' and audit all monitoring and compliance; as well as direct financial contributions. It should also include direction on where development contributions from offsetting and compensation requirements should be best directed.
Monitoring	DGC	There is no directive to monitor and report on the effectiveness of measures to avoid, remedy and mitigate (or offset and compensate). The absence of such a directive compromises the efficacy of the plan in carrying out its functions under Part 2 of the RMA	Monitoring pre and post development is required but it may be more effective to have a PSPA-wide monitoring programme to ensure it is aligned and landscape-wide.
Domestic cats	DGC	Amend the structure plan to include objectives, policies and rules prohibiting domestic cats within the PSPA. Provide further information on how the Structure Plan will minimise the impact of predation on long-tailed bats and other indigenous fauna.	We support a full cat ban in theory. There may be other mechanisms to ensure domestic cats do not predate on bats while they are in roosts, though there may also be predation while bats are foraging, which would require other mechanisms of protection such as keeping cats indoors.
Road	DGC	Bat Priority Areas will adjoin or intersect with sections of the roading network in the PSPA. This is likely to have an adverse impact on long-tailed bats and their habitat if roads are inappropriately designed and located. Consider relocation of roading sections that cross Bat Priority Areas and introduce Policies and Rules to avoid and minimise the effect of road lighting and light emission from vehicle headlights on long-tailed bats and their habitat.	In addition, any crossings could be based on the parameters for road crossings developed for Amberfield
Kauri Dieback	DGC		There are no natural kauri stands in PSPA so we can't see the need for this.
Business Centres/ Local Centres	DGC	Design so impact on bats is avoided.	If business centres are located in the vicinity of bat corridors/areas, consideration should be given to aspects such as minimising lighting



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
Vegetation removal	DGC	Minimise vegetation removal, avoid where at all possible, consider the removal of any actual or potential bat roost trees	Beyond bat habitat zones, this is a valid point. Partially addressed through inclusion of DOC Bat Roost Protocols for vegetation clearance.
Bat Management Plan	DGC	Amend BMP to include clear objectives and reflect measures established as part of Amberfield consent	Recommend including with details on how to minimise vegetation clearance and risk to bats outside of bat habitat areas
DEV01-PSP: O7	DGC	The Director-General considers this objective is inconsistent with Section 6(c) of the RMA. Urban development should 'protect' rather than respond to the area's natural environment and ecological values.	Consistent with s6(c)
DEV01-PSP: O8	DGC	The Director-General submits that Business Centres should not adversely impact the form and function of long-tailed bats and their habitat just as other development needs to respond to the presence of long-tailed bats.	Suggest: Business Centres in the Peacocke Precinct are well designed to avoid, remedy or mitigate adverse effects on long-tailed bats and their habitat and integrate with surrounding neighbourhoods, to provide for multi-level apartment buildings and to create distinctive places that are functional, safe, attractive and vibrant.
DEV01-PSP: O11	DGC	The Director-General considers the earthworks objective should aim to protect ecological values.	Suggest: Earthworks in the Peacocke Structure Plan are undertaken in a comprehensive and integrated manner, ensuring a high amenity urban environment that protects identified significant ecological values.
DEV01-PSP: O13	DGC	The Director-General considers all significant habitat of indigenous fauna and significant indigenous vegetation needs to be protected or otherwise addressed by the mitigation hierarchy. It is also unclear how the structure plan will achieve this for bat habitat not protected through an SNA, corridor or buffer.	Effects of land use change in areas of low and medium bat habitat value are not addressed in the objectives of PC5 at present and need to be addressed through the mitigation hierarchy. Protect and enhance identified significant habitat of indigenous fauna and significant indigenous vegetation. Avoid, remedy or mitigate adverse effects on low and medium value bat habitat areas.
DEV01-PSP: O14	DGC	Changes need to be made to the structure plan maps to protect all significant long-tailed bat habitat, corridors and buffers within the PSPA. There also needs to be an acknowledgment that the purpose of creation and protection of open space corridors is to enable long-tailed bats to thrive.	Effects of land use change in areas of low and medium bat habitat value are not addressed in the objectives of PC5 at present and need to be addressed through the mitigation hierarchy. Please clarify that PC5 objectives are clear that primary purpose of SNAs and bat corridors is to protect significant 6c values and to create buffers and corridors for bats.



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
DEV01-PSP: O15	DGC	The objective needs to acknowledge that ‘ecological areas’ are home to New Zealand’s critically endangered long-tailed bats and that development should effectively apply the mitigation hierarchy by practising avoidance of adverse effects in the first instance.	Enable development adjacent to SNAs and bat corridors where it is designed to avoid the adverse effects of development on the function of these areas.
DEV01-PSP: O16	DGC	The Director-General considers these objectives need to enable New Zealand’s critically endangered long-tailed bat to thrive.	Establish a network of open space, and ecological corridors Bat Priority Areas that support ecological values such as protection and enhancement of long-tailed bat habitat of the Peacocke Area, and provide passive recreation opportunities where these do not conflict with ecological values
Additional Objective	DGC	Additional Objective : The Director-General submits that more could be done to provide for the connectivity of bat habitat within the PSPA. For instance, the 4Sight long-tailed bat report identifies ‘low’, ‘moderate’ and ‘high’ value bat habitat throughout the PSPA while the proposed Structure Plan Zoning Map only identifies ‘high value’ areas for protection. More of the ‘moderate habitat’ could be added to the network of ecological corridors to better provide for the movement of bats. In particular, bat habitat north of the sports field could be added to connect the rest of the network with the bat corridor at the northern margin of the PSPA.	The low and moderate habitat areas require addressing in the updated PC5 provisions as currently there is no objective to address the loss of these habitats. If land use change results in loss or degradation of this habitat the updated PC5 provisions require that mitigation offsetting or compensation is required for loss of pasture/tree land to housing. While not of high bat habitat value these areas still have habitat value which is lost. Mitigation should focus on a) retaining trees in development areas where possible, b) early replanting of lost vegetation at a high ratio c) pest control targeting known bat roost areas as a priority, but area-wide
DEV01-PSP: P5	DGC	The Director-General considers co-location of recreational activities with bat priority areas would be inappropriate. It is suggested the policy is revised to require avoidance of the actual or potential adverse effects of these activities on long-tailed bat habitat.	Some recreational uses can take place in bat habitats, but each recreational use requires some form of assessment on a case-by-case basis. Recreational use can co-exist with bats as long as effects such as lighting are managed. We have some concerns around the removal of potential roost trees in a clash with H&S requirements in these areas in particular.
DEV01-PSP: P6	DGC	This policy should give consideration to the protection of long-tailed bat habitat.	Suggest: <i>Promote appropriate and improved access to the Waikato River to better enable sporting, recreational, and cultural opportunities while protecting long-tailed bats and their habitat.</i>



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
DEV01-PSP: P13	DGC	The Director-General is concerned that part 2 of P13 may conflict with the protection and enhancement of long-tailed bats and their habitat.	Suggest: High-density development may be provided along adjacent to-areas of natural open space including the river corridor and gully network as long as the bat habitat protection performance standards are met.
DEV01-PSP: P23	DGC	The Director-General considers P23 should be revised to specifically include protection of long-tailed bats.	Suggest: Near identified ecological corridors , ensure the design and location of buildings, infrastructure and lighting is managed throughout the Peacocke Structure Plan in order to maintain the ecological role and function of those corridors, including protection for long-tailed bats.
DEV01-PSP: P27	DGC	The Director-General supports the intent of Policy DEV01-PSP: P27, however requests amendments to ensure the policy gives effect to the WRPS	Suggest: The loss of significant vegetation is minimised avoided then follows the mitigation hierarchy to address residual adverse effects
DEV01-PSP: P30	DGC	The Director-General requests amendments to Policy DEV01-PSP: P30 to provide clear protection of long-tailed bats.	Suggest: Protect the physical integrity and ecological and stormwater function of the Mangakōtūkutuku Gully and Waikato River margins, including protection for long-tailed bats and their habitat.
DEV01-PSP: P31	DGC	The Director-General generally supports Policy DEV01-PSP: P31 but requests amendments to direct that revegetated gullies and river margins provide for the protection and enhancement of long-tailed bat habitat.	Disagree - Suggest wording change to make more clear overall intent of the policy: <i>Provide for revegetated gullies and river margins to enable enhancement of significant indigenous vegetation and habitats of significant indigenous fauna</i>
DEV01-PSP: P35	DGC	The Director supports the intent of this policy but considers significant long-tailed bat habitat is not restricted to the Mangakōtūkutuku Gully and Waikato River. The Director-General requests the policy be amended to include all significant long-tailed bat habitat such as, Significant Natural Areas, ecological corridors, bat habitat buffers and all actual and potential bat roosts.	Disagree - current wording reflects its purpose in line with our technical reports
DEV01-PSP: P36	DGC	The Director-General generally supports Policy DEV01-PSP: P36 but requests the policy be amended to include all development adjacent to long-tailed bat habitat including but not limited to, significant natural areas, ecological corridors, bat habitat buffers and actual and potential bat roosts. P36 should include a directive requiring development meet performance standards, such as lighting standards as setbacks alone are insufficient to support the ecological function of bat habitat	Suggest: Require development adjacent to the gully network, the Waikato River and Significant Bat Habitats to meet required setbacks and performance standards to support the ecological function of these areas.



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
DEV01-PSP: P37	DGC	The Director-General requests amendments to Policy DEV01-PSP: P37 to ensure connectivity is provided between significant areas of bat habitat across the PSPA. Bat habitat is not restricted to the Mangakōtukutuku Gully and Waikato River.	Disagree - the current policy wording meets the intent of our technical reports on the matter.
Additional Policy addressing the prohibition of cats.	DGC	The Director-General considers there needs to be consistency between the Amberfield subdivision and the Peacocke Structure Plan. For example, if there is not a cat ban in the Peacocke Structure Plan, the efficacy of the cat ban in Amberfield will be compromised. Peacocke Structure Plan aims to incorporate 8000 homes into the area. Cat occupancy in urban areas is around 35% (van Heezik et al. 2010). This means that if there is no cat ban there will be an influx of c.2800 cats to the area. Cats are known to be predators of long-tailed bats (Dwyer 1962, Daniel & Williams 1984, O'Donnell 2000, Unpublished Department of Conservation records) so an increase of thousands of cats is liable to have a significant adverse effect on bats.	Disagree: A domestic cat ban may be effective - see bat technical report for further insight into our views. However, the wording proposed by DGC is not practically feasible. It may be technically feasible to "exclude cats and other predators" from an area of land, but it would require creating a pest-proof fence around the entirety of the structure plan area and having some sort of checkpoint at every road and walkway to ensure predators were not brought into the SP area. This policy is therefore unachievable.
Additional Policy to address monitoring of long-tailed bats	DGC	The Director-General considers that to protect, enhance and restore long-tailed bat habitat and to enable bats to thrive, stakeholders will need to have a more complete understanding of the long-tailed bat population within the PSPA. This will require bat surveys and other monitoring by appropriately qualified person/s to be undertaken prior to the granting of resource consents. Further, there will need to be on-going reporting on the efficacy of measures to avoid, remedy, mitigate or offset and compensate for the adverse effects of development on bats. Consequently, the Director-General submits there should be a policy directive to enable sustained monitoring of long-tailed bats within the PSP	Suggest working in conjunction with DOC, WRC and Iwi to ensure a coordinated and shared/transparent resource/data exchange approach is taken to monitoring and research. Monitoring should also ideally be implemented centrally across the PSP area to ensure it can be audited, can address cumulative effects, and can be independently reviewed in a comprehensive and landscape focused fashion: Add a policy directing that monitoring of the PSPA long-tailed bat population must occur before and after development. Amendments to the 'Information requirements' Appendix will be required to make this policy effective.



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
Additional Policy to address connectivity of bat habitat	DGC	The Director-General requests a further transportation policy directing that the transport network will be designed to avoid adverse effects on long-tailed bats and their habitat by using such methods as a maximum artificial light spill from street lighting, maximum colour temperature for lights of 2700 K, planting to provide 'hop-overs', and screening planting along the sides of roads to reduce the adverse impact of headlight spill-over into long-tailed bat habitat. The Director-General notes that design of the transportation network needs to integrate with and account for the effects mitigation and offsetting measures being undertaken as part of the Southern Links project. In planning for the Peacocke transport network it should be acknowledged that together with the Southern Links Road there will be cumulative effect on long-tailed bats that needs to be minimised.	The transport network, including the Southern Links Road is designed to promote the physical and functional connectivity of significant habitats of indigenous fauna.
DEV01-PSP: Components of the Peacocke Structure Plan - Natural Environment	DGC - see following rows		
	DGC	While these paragraphs provide a reasonably comprehensive discussion on long-tailed bat habitat, it should be noted that the Zone Plan does not show as much bat habitat as the paragraph suggests – the long-tailed bat habitat erroneously referred to in the 4Sight's long tailed bat report as medium to low value habitat has been largely omitted from the zoning map.	Suggest: Amend the Natural Environment component to address protection of and avoidance of adverse effects, areas of medium and low value bat habitats as well as high value bat habitats.
5m buffer	DGC	The Director-General considers there needs to be consistency between the Amberfield subdivision and the Peacocke Structure Plan. To achieve this consistency the 5-metre setback area would have no buildings minimal external lighting within it.	Disagree - current policy reflects our technical report and buffers to corridors and bat habitat designed to manage lighting and urbanisation effects.
Lighting controls	DGC	The Director-General considers there needs to be consistency between the Amberfield subdivision and the Peacocke Structure Plan. The maximum light level applying in the Amberfield subdivision consent is 0.1 lux 3 metres inside the boundary of Bat Priority Areas. The Director-General requests that the paragraph dealing with lighting controls be amended to refer to standards to avoid artificial light spill from buildings and roads, including	We defer to the lighting experts regarding the best practice lighting performance standards .



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
		maximum lux levels and colour temperatures, and buffer planting for light screening.	
Additional components of Long-tailed bat habitat not discussed	DGC	The Director-General requests that consideration be given to other long-tailed bat protection measures not discussed in this component. The importance of actual and potential roost trees i.e., all trees greater than 15 cm diameter at breast height, the need for a prohibition on domestic cats, and of predator control.	Suggest: Include a discussion of the importance of actual and potential roost trees i.e., all trees greater than 15 cm diameter at breast height and of predator control.
Sports Park	DGC	It is unclear in this discussion how the operation of the major sports park will be compatible with the protection of long-tailed bats if night lighting is used at the park.	Suggest: Include a discussion of how the operation of the major sports park will be compatible with the protection of long-tailed bats if night lighting is used at the park.
Local Business Centre	DGC	The local centre identified on the zoning map abuts Bat Priority Area. There is no discussion on how the local centre will be developed in a way that recognises this and ensures protection for Long-tailed bats and their habitat.	Suggest: Include discussion on how the local centre will be developed in a way that recognises this and ensures protection for the habitat of long-tailed bats
MRZ – PREC1-PSP: ISSUES	DGC	The Director-General submits Hamilton is one of the few cities that long-tailed bats can be observed in peri-urban areas. How medium density housing will protect long-tailed bats and their habitat needs to be addressed in the issues section	Disagree - not sure if what the DGC is asking for is useful here as other policies and objectives cover protecting bat habitats.
MRZ-PREC1-PSP-Rules	DGC	The rules generally provide for permitted activities that comply with the standards set out in the rules R36 to R48. These standards do not provide adequately for protection of long-tailed bats and their habitats, including no restriction on the removal of actual and potential roost trees, no prohibition on external lights within the 5-metre building setback, and no rule on the keeping of domestic cats. The Director-General considers these rules should apply across all zones in the PSPA. It is noted that a lighting standard has been added to the City-Wide Chapter 25.6 Lighting and Glare. The Director-General considers this should be referenced within the rule's framework in Chapters 4A and 23A for clarity.	Address the removal of actual and potential roost trees, standards in relation to external lighting within the 5-metre building setback.
Additional Objective	DGC	The Director-General requests including an objective to ensure residential development is compatible with protection and enhancement of long-tailed bats and their habitat	But needs to allow for remedy and mitigation/offset in low and medium-value bat habitats.



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
MRZ-PREC1 – PSP: P13	DGC	The Director-General requests the intent of Policy MRZ-PREC1 – PSP: P13 specifically includes preservation of actual and potential bat roosting trees. This will require restrictions on the removal of any tree which has a breast height diameter greater than 15 cm.	The removal of Significant vegetation and trees including actual and potential bat roosting trees is avoided in the first instance. If a bat roost tree is to be removed, then best practice protocols will be implemented to reduce the risk of harm to long-tailed bats and offset or compensate for the loss of the bat roost tree proposed to be removed
MRZ - PREC1- PSP: P21	DGC	The Director-General requests Policy MRZ - PREC1- PSP: P21 be amended to protect long-tailed bats and their habitat from the effects of lighting	Residential development is designed to avoid adverse ecological effects on adjacent areas of Natural Open Space and high-value long-tailed bat habitats
SUB – PREC1-PSP: RULES	DGC	These rules do not provide adequately for protection of long-tailed bats and their habitats, including no restriction on the removal of actual and potential roost trees, no prohibition on external lights within the 5-metre building setback, and no rule on the keeping of domestic cats. The Director-General considers these rules should apply across all zones in the PSPA. It is noted that a lighting standard has been added to the City-Wide Chapter 25.6 Lighting and Glare. The Director-General considers this should be referenced within the rule's framework in Chapters 4A and 23A for clarity.	Add rules to address the removal of actual and potential roost trees, loss of low and medium-value habitat, and lighting standards within the 5-metre building setback. The matter of banning of domestic cats is supported but practical application of a PSPA-wide cat ban is a planning matter.
NOSZ – PREC1- P: P18	DGC	The Director-General is generally supportive of Policy NOSZ – PREC1- P: P18 but considers it could be strengthened by amending clause 2 to provide for enhancement of habitat as well as extending clause 3 by listing the important adverse effects to avoid. It is also unclear how ensuring access to long-tailed bat habitat is necessary for their protection as appears to be inferred in clause 1).	Ensure the protection and enhancement and access to identified habitat of long-tailed bats; 2) Provide habitat and connections for long-tailed bats; 3) Avoid, remedy or mitigate the adverse effects of development on habitat of long-tailed bats d) protect occupied roosting sites within the structure plan area; and e) avoid injury and/or mortality of roosting long-tailed bats during any potential bat roost tree removal.
NOSZ – PREC1- P: RULES	DGC	These rules do not provide adequately for protection of long-tailed bats and their habitats, including no restriction on the removal of actual and potential roost trees, no prohibition on external lights within the 5-metre building setback, and no rule on the keeping of domestic cats. The Director-General considers these rules should apply across all zones in the PSPA. It is noted that a lighting standard has been added to the City-Wide Chapter 25.6 Lighting and Glare.	To address the removal of actual and potential roost trees, prohibition of external lights within the 5-metre building setback is supported, as is banning of domestic cats. We note however that practical application of a PSPA-wide cat ban is a planning matter.



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
		The Director-General considers this should be referenced within the Rules framework in Chapters 4A and 23A for clarity.	
Chapter 6A: Peacocke Neighbourhood Centre Zone & Chapter 6B: Local Centre Zone	DGC - see following rows		
Issues: NZC – PREC1-PSP: OBJECTIVES: NZC – PREC1-PSP: Policy; LCZ – PREC1-PSP: ISSUES; LCZ – PREC1-PSP: OBJECTIVES: LCZ – PREC1-PSP: POLICES	DGC	The Director-General appreciates that Neighbourhood Centres are being located near open space to act as walkable nodes for these areas. That said, several proposed Neighbourhood Centres will abut Bat Priority Areas and one will be contained within a Bat Priority Area. Consequently, there should be a thorough discussion of how Neighbourhood Centres will be designed and located to avoid and minimise their impact on long-tailed bats.	To include discussion of how neighbourhood centres will be designed and located to avoid and minimise their impact on long-tailed bats. Addressing the compatibility of neighbourhood centres with long-tailed bats and their habitat. Such an objective should provide for the protection, enhancement and restoration of bats and their habitat to give effect to the WRPS and be in accordance with Section 6(c) of the RMA.
Chapter 23A – Subdivision -Peacocke Precinct	DGC		
SUB-PREC1-PSP: O8	DGC	The Director-General submits that subdivision should create a transport network that protects and enhances the physical and functional connectivity of bat habitat	Subdivision creates a transport network that: 7) Protects and enhances the physical and functional connectivity of bat habitat.
SUB – PREC1- PSP: O9	DGC	The Director-General is generally supportive of Objective SUB – PREC1- PSP: O9 but considers it could be strengthened with the addition of a protection directive.	Recommend minor revision for consistency with s6c and to provide a policy direction which allows for biodiversity offsetting, compensation and targeted biodiversity enhancement financial contributions/biobanking, as follows: <i>Subdivision [provides opportunities] to responds to, protect and restore the natural environment with a focus on those areas identified in the Peacocke Structure Plan including the creation and protection and enhancement of identified ecological corridors.</i>
SUB-PREC1-PSP Policies	DGC – see following rows		



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
SUB-PREC1-PSP: P19	DGC	The Director-General considers this policy should be amended to include an enhancement directive.	Require subdivision to be designed to provide ecological areas where they are identified within the Peacocke Structure Plan and ensure that the role, function and connectivity of ecological areas is maintained [protected and enhanced.]
SUB – PREC1-PSP: RULES	DGC	These rules do not provide adequately for protection of long-tailed bats and their habitats, including no restriction on the removal of actual and potential roost trees, no prohibition on external lights within the 5-metre building setback, and no rule on the keeping of domestic cats. The Director-General considers these rules should apply across all zones in the PSPA. It is noted that a lighting standard has been added to the City-Wide Chapter 25.6 Lighting and Glare. The Director-General considers this should be referenced within the rule's framework in Chapters 4A and 23A for clarity	Add rules: To address the removal of actual and potential roost trees, the prohibition of external lights within the 5-metre building setback is a matter for the lighting experts to address. If 0.3lux /2700K can be met at boundary then the external light ban is not required. Rule on the keeping of domestic cats - it is our preference to have a SP wide cat ban, which is consistent with the Amberfield Environment Court decision, but giving effect to such a ban is a planning matter to address.
Amendments to Chapter 25 – City Wide	DGC		
25.2 Earthworks and Vegetation Removal	DGC		
25.2.2.1a	DGC	The Director-General submits Policy 25.2.2.1a should consider the effects of earthworks and vegetation removal specifically on indigenous biodiversity given the significance of the PSPA and other peri-urban areas in Hamilton City to New Zealand's indigenous biodiversity. For example, the PSPA contains habitat for significant indigenous vegetation, herpetology and avifauna such as New Zealand's critically endangered long-tailed bats.	Additional wording : viii. Adopts a precautionary approach towards decisions that may result in significant adverse effects on indigenous biodiversity and, in particular, those effects that threaten serious or irreversible damage to indigenous biodiversity.
Chapter 25.6 Lighting and Glare	DGC – see following rows		
25.6.2.2; 25.6.2.2a; 25.6.2.2b;	DGC		DGC asking for word changes throughout PC5 so that "Significant Bat Habitat" reads " Bat Priority Areas". However we prefer current wording.



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
Additional standards	DGC	The Director-General submits that additional lighting standards should be added to create a bat-sensitive road lighting regime adjacent to Bat Priority Areas to minimise spill into Bat Priority Areas.	Disagree wording suggestion; standards should be consistent with those recommended in our bat technical report and Amberfield decision.
25.6.4.4 Peacocke Medium Density Zone: Peacocke Precinct	DGC	The Director-General submits there should be consistency between the Amberfield subdivision and the Peacocke Structure Plan. Residential lighting within the Amberfield subdivision is restricted to a bat friendly 0.1 lux 3 meters from the inside of the Bat Priority Area boundary. The agreed maximum lighting colour temperature for Amberfield was 2700k. 25.6.4.4 lighting standard should also apply to subdivision occurring in the wider Peacocke Precinct, not just those areas zoned for medium density development	Consistency between the Amberfield subdivision lighting requirements and those of the Peacocke precinct needed. The lighting standard should apply to the entire Peacocke precinct, not just areas zoned for medium-density development. But we recommend expert lighting opinion on those standards.
Appendices Appendix 1 District Plan Administration Appendix 1.2 Volume 2 Information Requirements	DGC		
1.2.1(h)(iii)	DGC	The Director General requests that guidance on ecological offsetting and compensation to achieve no net loss be added, along with a bullet point addressing ecological effects with a focus on long-tailed bats.	Suggest change the wording to: The AEE should identify how any adverse environmental effects are to be avoided, remedied, or mitigated, or otherwise offset and compensated for and shall also ensure that the following matters are addressed. <ul style="list-style-type: none"> Ecological effects of the proposal including effects on critically endangered fauna such as long-tailed bats.



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
1.2.2.2 & 1.2.2.1(b)	DGC	The Director General requests that guidance on the development of management plans be more detailed.	Make amendments 1.2.2.2 to clarify: That management plans should be developed by a suitably qualified person prior to a resource consent being granted. Management plans should outline measures to avoid, remedy, mitigate, offset or compensate for lost values. Management Plans should be reviewed by Council or an independent overarching body to ensure consistency across the PSPA. 1.2.2.2 should also offer guidance on the objectives and structure of management plans such as a description of the management methods to achieve the objective, financial costs, monitoring and reporting.
1.2.2.1 Note	DGC	The Director-General requests an additional note that any offset, compensation or biobanking package must account for the time delay in the creation of bat habitat. Creation of habitat should commence well in advance of any clearance works.	Add a note: • Any offset or compensation package must account for the time delay in the creation of bat habitat. Creation of habitat should commence well in advance of any clearance works.
1.2.2.25	DGC	The Director-General considers the Ecological Rehabilitation and Management Plan (ERMP) should address herpetofauna and avifauna where values are affected, including within areas outside of any Open Space Zone and less than 2ha.	These matters should be addressed
1.2.2.27	DGC	The Director-General considers the Bat Management Plan (BMP) should be amended with clear objectives and measures to avoid and remedy as well as mitigate the effects of development on long-tailed bats.	We agree in general terms; however, the DGC's proposed wording is very prescriptive.
Appendix 1.3 Assessment Criteria	DGC		



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
Matter of Discretion P – Peacocke Structure Plan P3(e); P3(i)	DGC	The Director-General submits that the extent to which ecological function is enhanced should be a matter of discretion. The Director-General submits that the extent to which light has been designed and located to protect and enhance adverse effects on the function and quality of long-tailed bat habitat should be a matter of discretion. This will better align with the mitigation hierarchy as set out in the WRPS and give effect to Section 6(c) of the RMA.	Disagree - In reality creating a subdivision which enhances ecological function may be difficult to achieve for high and medium density developments. The critical aspect is to avoid effects of these urban areas on high value bat habitats as far as possible in the first instance and to address residual adverse effects through avoidance, remediation mitigation, offsetting or compensation measures. However, we do note that passive non-natural parks and sports parks could provide opportunities to create additional corridors and other habitats for bats and other indigenous fauna.
P5 (p)	DGC	The Director-General submits that the extent to which a proposed subdivision protects, enhances and restores populations of at-risk, threatened or critically endangered flora and fauna should be a matter of discretion.	Change the wording to: The extent to which the proposal in dealing with residual adverse ecological effects: 1. provides on-site or offsetting/compensation opportunities which Restores, protects and enhances aquatic and terrestrial ecological values associated with springs, streams, waterways, wetlands and their margins in Peacocke or in wider habitat of highly mobile At-Risk or Threatened fauna species
P5 (q)	DGC	The Director-General submits the matter of discretion P5 (q) should address the extent to which the proposal has been designed to avoid the adverse effects of development and subdivision on the role and function of Significant Bat Habitat. This will better align with the mitigation hierarchy as set out in the WRPS and give effect to Section 5(2)(c) of the RMA. It is also considered the matter of discretion outlined in P5 (r) will adequately contemplate mitigation.	Change the wording to: P5 (q) The extent to which subdivision has been designed to manage and avoid the adverse effects of development and subdivision on the role and function of Significant Bat Habitat {Bat Priority Areas}.
P5 (r)	DGC	The Director-General submits the matter of discretion P5 (r) should address the extent to which the proposal mitigates, remedies, or otherwise compensates for Significant Bat Habitat. It is considered the full mitigation hierarchy should be considered where avoidance is not achieved. Further, measures to remedy, mitigate, offset or compensate effects need to be considered beyond the provision of ecological corridors	Suggest the following wording: The extent to which the proposal remedies, mitigates, or otherwise offsets or compensates for the effects of development on Significant Bat habitats and Medium/Low-value bat habitats, including the provision and enhancement of ecological corridors.



Plan Ref	Submitter	Submission Point	HCC Ecologist Response
Appendix 1 – District Plan Administration – 1.4 Design Guides	DGC		
1.4.10 Peacocke Local Centre Design Guide	DGC	The local centre identified on the zoning map will abut a Bat Priority Area which adjoins an ecological corridor. There is no discussion on how the local centre will be developed in a way that recognises this and ensures protection of long tailed bat habitat.	Impacts of local centre developments on bats should be considered and minimised through design guidelines.

