

**BEFORE INDEPENDENT HEARING COMMISSIONERS
IN CHRISTCHURCH**

TE MAHERE Ā-ROHE I TŪTOHUA MŌ TE TĀONE O ŌTAUTAHI

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the hearing of submissions on Plan Change 14 (Housing and Business Choice) to the Christchurch District Plan

**STATEMENT OF PRIMARY EVIDENCE OF NICHOLAS JOHN HEAD ON
BEHALF OF CHRISTCHURCH CITY COUNCIL**

QUALIFYING MATTERS - SITES OF ECOLOGICAL SIGNIFICANCE

Dated: 11 August 2023

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
QUALIFICATIONS AND EXPERIENCE	2
CODE OF CONDUCT	3
SCOPE OF EVIDENCE	3
BACKGROUND	4
ECOLOGICAL OVERVIEW OF THE CHRISTCHURCH DISTRICT	4
THE SES QUALIFYING MATTERS	7
SUBMISSIONS RELATED TO THE SES QM	10

EXECUTIVE SUMMARY

1. My full name is **Nicholas John Head**. I am employed as the Senior Ecologist for the Christchurch City Council.
2. I have prepared this statement of evidence on behalf of the Christchurch City Council (the **Council**) in respect of matters arising from the submissions and further submissions related to Sites of Ecological Significance (**SES**) Qualifying Matter (**QM**) on Plan Change 14 to the Christchurch District Plan (the **District Plan; PC14**).
3. The Christchurch District has experienced significant loss of indigenous species and habitats, particularly in lowland environments. Remaining indigenous ecosystems are significant when assessed in accordance with the criteria in the Canterbury Regional Policy Statement (**CRPS**)¹, regardless of typically being modified, degraded, small and fragmented.
4. Urban development and encroachment into and around SES will most likely cause adverse ecological effects, including habitat loss, fragmentation, configuration changes and edge effects.
5. The full extent of remnant significant ecosystems in the zones proposed for housing intensification is uncertain, posing a risk of accidental loss of indigenous biodiversity.
6. I support the inclusion of all SESs currently identified in the District Plan as a QM that is necessary to safeguard indigenous biodiversity from intensive housing development.
7. Including all currently identified SESs as a QM is a bare minimum requirement for protecting ecological values from adverse effects of intensification. SESs should ideally also include all sites that meet ecological significance criteria currently but are not yet listed in the District Plan schedule of SESs. However, I understand that providing for additional listed SESs will require a separate plan change.
8. Finally, in my view further controls beyond what is currently included in the District Plan are needed to mitigate edge effects from adjoining land use that can pose a significant threat to remnant ecosystems. Again, that is a matter for a separate plan change.

¹ <https://www.ecan.govt.nz/document/download?uri=2075337>

9. I am authorised to provide this evidence on behalf of the Council.

QUALIFICATIONS AND EXPERIENCE

10. I have a Master of Science (Hons) degree in plant ecology from Lincoln University and a BSc with a double major in plant ecology and physical geography from the University of Canterbury. I have almost 30 years' experience working as a plant ecologist throughout New Zealand.
11. Since 2017 I have been employed as the Senior Ecologist for the Council. For the previous 23 years I worked as a plant ecologist for the Department of Conservation (**DOC**), where I was responsible for the eastern South Island. Prior to that I worked for Landcare Research New Zealand Ltd as a botanist for the Rabbit and Land Management Programme and Semi-Arid Lands Programme, based in Alexandra.
12. I am very familiar with the ecological values of the Canterbury Region and those of the Christchurch District. From a practical perspective, I have extensive field experience assessing, researching, recording and reporting on botanical matters throughout New Zealand, with a particular focus on rare and threatened ecosystems and plant species in the eastern South Island. I have undertaken many botanical assessments ranging in size from greater than 40,000 hectares to less than one hectare.
13. I have a thorough understanding of ecological significance and its assessment context. I was part of Environment Canterbury's (**ECan**) ecologist working party to develop ecological significance criteria for the 2013 CRPS. I was also responsible for, and co-authored, the preparation of DOC's national guidelines for assessing significant ecological values².
14. I have been involved in three Protected Natural Area Programme (**PNAP**) surveys in Canterbury that used a standard scientific approach to assess significant ecological values across large areas. I have surveyed many sites that form the basis of Significant Natural Areas (**SNAs**) in district plans across the South Island, including many protection proposals that resulted in purchase of areas through successful applications to the Nature Heritage Fund (**NHF**).

² Davis, M.; Head, N. J.; Myers, S. C.; Moore, S. H. 2016. Department of Conservation guidelines for assessing significant ecological values. Department of Conservation, Wellington, 71p.

15. I have presented evidence on ecological matters in numerous hearings in Council hearings and the Environment Court, including for the Crown in the replacement Christchurch District Plan. In addition to my involvement in hearings, I offer a wide range of botanical and ecological advice to colleagues and the general public. Over the years, I have published numerous articles on threatened plant species and ecosystems. Some of these articles can be found in the references section of this evidence.
16. I am a member of the Canterbury Botanical Society, NZ Ecological Society, and I am a long serving trustee on the Maurice White Conservation Trust (Hinewai).

CODE OF CONDUCT

17. While this is a Council hearing, I have read the Code of Conduct for Expert Witnesses (contained in the 2023 Practice Note) and agree to comply with it. Except where I state I rely on the evidence of another person, I confirm that the issues addressed in this statement of evidence are within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from my expressed opinions.
18. I confirm that, while I am employed by the Council, the Council has agreed to me providing this evidence in accordance with the Code of Conduct.

SCOPE OF EVIDENCE

19. My statement of evidence provides the following information and addresses the following matters:
 - (a) Background;
 - (b) Ecological overview of the Christchurch District;
 - (c) The SES Qualifying Matter:
 - (i) Overview of the SESs in the District Plan;
 - (ii) Remaining Significant Ecological Values and Knowledge Gaps;
 - (iii) Edge Effects from Adjoining Land Use; and
 - (d) Conclusions.
20. I address each of these points in my evidence below.

BACKGROUND

21. New Zealand has evolved a biologically unique flora and fauna owing to long periods of isolation from other land masses. The rate of endemism for New Zealand species (i.e., species that are found only in New Zealand) is remarkably high; 85% of plants, 45% of birds, 100% of land mammals and reptiles, and 90% of invertebrates are endemic to New Zealand³.
22. Despite this, New Zealand has one of the worst records of indigenous biodiversity loss in the world. Some 22% of the New Zealand flora, 61% of birds, 83% of reptiles, and at least 5% of invertebrates are now directly threatened with extinction⁴. A higher proportion of New Zealand's invertebrate species are currently threatened with extinction than in any other country⁵.
23. The loss of indigenous species and habitats has been most pronounced in lowland (sea level to 500m) and montane environments (between 500m and 900m). The dry eastern parts of the South Island, where the topography and climate have been particularly attractive for agricultural development, are among the areas that have been most susceptible to species and habitat loss. Indigenous ecosystems remaining have typically been reduced into small, highly fragmented and modified remnants that are poorly protected on private land, and this is certainly the case in the Christchurch District. On the Canterbury Plains, for example, less than 0.5% of the land area remains in native cover⁶.
24. Halting the decline of indigenous biodiversity is a matter of national importance. Councils have a core statutory responsibility to achieve this in managing Council reserve land, and on private land through advocating for indigenous biodiversity generally.

ECOLOGICAL OVERVIEW OF THE CHRISTCHURCH DISTRICT

25. The Christchurch District territorial boundary falls within two Ecological Regions (**ER**)⁷ that correspond with the flat alluvial Canterbury Plains

³ Ministry for the Environment & Department of Conservation 2000. The New Zealand Biodiversity Strategy. Department of Conservation, Wellington, New Zealand.

⁴ Hitchmough, R. (Comp.) 2002. New Zealand Threat Classification System Lists - 2002. Threatened species occasional publication 23 210 p. Department Conservation, Wellington.

⁵ Bradshaw, C. J., Giam, X., & Sodhi, N. S. (2010). Evaluating the Relative Environmental Impact of Countries. PLoS One, 5(5), e10440, <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0010440>.

⁶ Meurk, C. D.; Steven, J. 1996. Low and High Plains Ecological District, Plains Ecological Region, Canterbury. Department of Conservation unpublished report, Christchurch. 119 p.

⁷ The ecological character of New Zealand is divided into areas of similar ecological character called **Ecological Regions ("ER")** by a scientific panel. ERs are subdivided into **Ecological Districts ("ED")** that differentiate finer scale patterns of climate, geology and landforms. There are 85 ERs and 268 EDs in New Zealand (McEwen

(**Plains ER**), and the volcanic hills of Banks Peninsula (**Banks ER**). The Banks ER comprises three Ecological Districts (**ED**) (Akaroa, Herbert and Port Hills ED), as does the Plains ER (Upper Plains, Low Plains and Ellesmere ED). The ED scale reflects the finer scale environmental variation and associated ecological differences that gives the Christchurch district its ecological character.

26. The corresponding land environments (**LENZ**)⁸ broadly relate to the alluvial soils of the Waimakariri floodplain, the loess covered volcanic Banks Peninsula, and to a lesser extent the wetland areas associated with Te Waihora and coastal deposition at Kaitorete. At the broad scale (level I and II), these are classified as follows:
- (a) F3 - Central Hill Country and Volcanic Plateau the volcanic hills of Banks Peninsula - vast majority of Banks Peninsula occurs within this LENZ.
 - (b) I3 - Central Poorly Drained recent soils = associated with old wetlands soils around the base of Bank Peninsula and Te Waihora.
 - (c) J2 - Central well-drained recent soils, Kaitorete spit, recent flood plain soils of the Waimakariri, Brooklands dunes, alluvial valley floors of major Banks Peninsula valleys.
 - (d) N1 - Eastern South Island plains –alluvial gravels of the Canterbury Plains.
 - (e) B3 – Central dry lowlands, small areas.
27. Prior to human arrival, much of the Christchurch District supported diverse forest and wetland communities. Banks Peninsula was extensively covered in mostly podocarp (totara, matai, kahikatea) forest associations, with beech forest (red and black beech) dominating the wetter and cooler climate of the south-eastern areas of the Akaroa ED⁹. Shrublands, sub-alpine plant communities made up relatively minor proportions on the driest,

1987). The ED scale is the accepted framework that underpins ecological significance assessment criteria used to determine ecologically significant sites, such as the criteria outlined in the Canterbury RPS and the DOC assessment guidelines.

⁸ **Land Environments of New Zealand**. Land Environments ("L.E.") of New Zealand is a tool to provide a quantitative structural framework to help determine areas of similar ecological character throughout New Zealand. Based on national geomorphology and climate information, L.E. can predict the likely pre-human pattern of terrestrial ecosystems (patterns and gradients) and indigenous biodiversity. Four levels of detail are available, i.e., 20 (National-scale), 100, 200 or 500 (Regional to District-scale) environments (levels I, II, III and IV). Leathwick, J.; Wilson, G.; Rutledge, D.; Wardle, P.; Morgan, F.; Johnston, K.; McLeod, M.; Kirkpatrick, R. 2003. Land Environments of New Zealand. David Bateman, Auckland. 184p.

⁹ Wilson, H. 2013.

highest and most exposed sites. Specialist plant communities occupied volcanic rock bluffs and coastal cliffs that are prominent features of the Peninsula's ecological character.

28. On the plains, prior to the construction of stop-banks in the 1940s, the active flood plain of the Waimakariri River was expansive. Numerous irregularly flooded channels spread gravels across the plains. These areas supported scrub, shrublands, silver and fescue tussock grasslands, bracken, and ephemeral riverbed plant communities, depending on age and flood return periods. Light forest (kowhai and kanuka) was the predominant cover where not regularly disturbed by flood events. Kahikatea swamp forest and wetlands occupied the poorly drained eastern fringe between the plains' alluvium and the coast. Coastal lagoons and swamps were also a prominent feature of Christchurch's ecological character, most notably the Avon Heathcote estuary, Brooklands lagoon, Wairewa and Te Waihora, with the latter extending inland to about Lincoln, forming extensive flax swamps that encircled Banks Peninsula.
29. Almost all the original ecosystems and associated native vegetation of the Christchurch District have been cleared for human settlement and agricultural development. Nothing is left of the original alluvial forests of the Canterbury Plains, with only scattered remnants of highly modified seral shrublands, grasslands and herbfields that have survived on the driest stoniest soils¹⁰ typically on public land. Riccarton (Deans') Bush (~6 ha) is the only surviving remnant of the original plains swamp forest in the Christchurch district. The once extensive dunelands of Pegasus Bay are gone except for the immediate coastal edge where they are almost entirely colonized by exotic vegetation including conifer plantations. At Kaitorete Spit, however, remains one of the finest examples of a natural dune ecosystem remaining in New Zealand.
30. On Banks Peninsula, less than 1% of the original old growth forest remains, although the subsequent regeneration of scrub and forest on 'unproductive sites' has increased cover to about 15%¹¹. Wetlands have been extensively drained and developed. Even coastal wetlands, internationally significant for wildlife, Brooklands Lagoon, the estuary and Te Waihora/Lake Ellesmere,

¹⁰ Collectively all remnants on the Canterbury Plains comprise less than 0.5% of its area making it one of the most transformed landforms in the world (Steven and Meurk 1996).

¹¹ Wilson 2013; Landcare Research Ltd 2015.

have been substantially reduced in area and are severely affected by adjoining land use.

31. Up to 21 vascular plant species have become extinct on Banks Peninsula since the arrival of humans¹², with an untold number lost from the Canterbury Plains. A further 137 are listed as either Threatened or At Risk.

THE SES QUALIFYING MATTERS

Overview of SESs in the District Plan

32. To understand SESs and their inclusion in the District Plan, it is useful to provide background to the assessment of ecological values in New Zealand, and the criteria used to evaluate significance in terms of section 6(c) of the Resource Management Act 1991 (**RMA**).
33. In New Zealand, ecological assessment criteria used in District Plans have evolved from the Protected Natural Areas Programme (**PNAP**), which is the original framework for assessing significant ecological and botanical values in New Zealand¹³. The PNAP was initiated in 1981 by the (then) National Parks and Reserves Authority in response to concerns that New Zealand's protected natural area system did not fully represent the range of natural diversity, and that natural areas were continuing to be lost, these concerns remain pertinent to this day.
34. The PNAP utilised a standard scientific approach that was consistent, simple to implement and repeatable. It adhered to international best practice by using multiple assessment criteria to objectively determine ecological values¹⁴. The identification of significant sites (SNA, SES etc) was done by applying these assessment criteria in the context of the specific ED. The assessment process involved reconnaissance, field survey, and evaluations.
35. The PNAP framework and assessment criteria (or updated variants thereof¹⁵) are still used by central and local government to ascertain

¹² Wilson 2013.

¹³ Kelly, G. C.; Park, G. N. eds 1986. The New Zealand protected natural areas programme: a scientific focus. Biological Resources Centre Publication No 4. Wellington, Department of Lands and Survey. Pp. 63-87.

¹⁴ The assessment criteria are: representativeness, diversity and pattern, rarity and special features, naturalness, size and shape, buffering/surrounding landscape and boundaries, and long-term ecological viability (the latter 3 are often combined into a broader Ecological Context criterion).

¹⁵ Assessment criteria definitions vary somewhat from the original PNAP and between regional/district plans. Most have also been updated to account for the 4 National Priorities (typically included within the Rarity criterion). Also, the Canterbury RPS merged the Naturalness criterion into Diversity and Pattern, whereas DOC retained the Naturalness criterion in its guidelines as per the PNAP standard. Nonetheless, in my view, the Canterbury RPS (and CRP) criteria are adequate to meet policy expectations toward the protection and maintenance of indigenous biodiversity.

significant indigenous biodiversity in various districts and regions. It continues to provide an objective and scientific method for identifying ecological values and establishing protection priorities in New Zealand.

36. The criteria used to identify SESs in the Christchurch District are considered appropriate for this use as they align with the PNAP assessment framework and are identical to those listed in the CRPS¹⁶.

Remaining significant ecological values, knowledge gaps, and other SESs not yet in the District Plan

37. Our understanding of botanical values within the Christchurch district is reasonable, although not exhaustive. Professional ecologists have conducted PNAP surveys across the Christchurch District¹⁷, yielding valuable information about botanical values present on Banks Peninsula and to a lesser extent on the Canterbury Plains. Surveys have identified well over 300 potentially significant sites according to the specified significance criteria. Significant habitats for fauna, however, are more uncertain, which can often be entirely exotic vegetation.
38. In my opinion, it is important that the SESs¹⁸ currently listed in the District Plan are included as a QM in PC14 to ensure that what remains of the district indigenous biodiversity is adequately provided for. However, currently, only a small proportion of the full extent of potential significant sites have been listed in the Council's schedule (A) of SESs. Of those SES listed in schedule A, the vast majority are on protected public land. Even then, some areas with high ecological values on public land are not included in the current schedule of SESs.
39. The inadequate listing and understanding of SESs and the full extent of remnant ecosystems in zones designated for more intensive housing pose a substantial risk of unintentional loss of the remaining indigenous biodiversity in the district. This risk is particularly pronounced for the Canterbury Plains, which have not undergone comprehensive ecological surveys, and where nearly all remnants are likely to be ecologically

¹⁶ <https://www.ecan.govt.nz/your-region/plans-strategies-and-bylaws/canterbury-regional-policy-statement/>

¹⁷ Meurk, C. D.; Steven, J. 1996. Low and High Plains Ecological District, Plains Ecological Region, Canterbury. Department of Conservation unpublished report, Christchurch. 119 p.

Wilson, H. D. 1992. Banks Ecological Region, Port Hills, Herbert and Akaroa Ecological District. Protected natural areas programme survey report No 21. Department of Conservation, New Zealand.

¹⁸ More commonly referred to as significant natural areas (SNAs) such as in the NPSIB, either way SES and SNAs mean the same thing.

significant when assessed according to accepted ecological criteria such as those in the CRPS.

40. Remnants on the plains are almost invariably modified and often degraded, making them easily overlooked. Despite their modified state, these remnants hold significance because they represent the last vestiges of the district's natural character. They serve as vital habitats for indigenous biodiversity, potentially supporting populations of Threatened and At-Risk species.
41. Any encroachment into SESs from urban development will cause adverse ecological effects. Adverse effects include the reduction in ecosystem extent, loss of habitats for indigenous biodiversity, ecological fragmentation and/or altered configuration. Given the rarity, irreplaceability, and vulnerability of SESs it is unlikely that adverse effects could be adequately addressed through the effects management hierarchy.
42. Overall, therefore, I consider the inclusion of currently listed SESs as a QM to be the bare minimum level of protection for ecological values from adverse effects of intensification. The SES QM would ideally include any potential site that meets the RPS criteria for ecological significance. This would ensure the maintenance and enhancement of indigenous biodiversity where more intensive housing is proposed throughout the district. Additions to the list of SESs are not, however, proposed through PC14, being a matter for future planning processes.

Edge effects from adjoining land use

43. QMs would ideally consider the need for controls to ameliorate adverse effects of adjoining land use, such as the establishment of adequate buffer zones (setbacks) around SESs.
44. The increase in housing density around SESs increases the threat of edge effects. Of the current schedule of SESs listed in the District Plan, all are relatively small, fragmented, and/or lack adequate buffering from adjoining land use. Consequently, they are vulnerable to degradation caused by edge effects. Edge effects are one of the most pervasive threats to remnant ecosystems and associated indigenous biodiversity. Edge effects encompass both biotic and abiotic influences, such as the invasion of weeds and animal pests (incl. domestic cats and dogs), as well as changes in humidity due to wind, shade or water incursion. Smaller remnants are

particularly susceptible to edge effects due to their higher edge-to-interior ratios, where the edge area is proportionally larger than the core area.

45. The severity and extent of edge effects depend on factors such as the type of adjoining land use, terrain/topography, and environmental conditions like wind, soil type, slope, and aspect. On the flat Canterbury plains, which are frequently exposed to strong winds, various substances like water, fertilizer, fine soil, plastic, and seeds can be transported over long distances into SESs. Moreover, since many SESs on the plains consist of open, short-statured native plant communities, they are especially sensitive to edge effects due to the limited barriers they have against invasive species.
46. As with the identification of additional SESs, I understand that protecting SESs from edge effects is a matter for future planning processes.

SUBMISSIONS RELATED TO THE SES QM

47. A small number of submissions were received on the SES QM. Submission from **Kāinga Ora – Homes and Communities**, e.g., **submission point #834** seeks to retain the SES QM, Outstanding natural Landscapes and Significant Natural Features QM, and the Sites of Cultural Significance QM. I concur with the planning recommendation of Ms Hansbury to accept the relevant submission points.
48. **Submission 155.3** from **Trudi Bishop** opposes PC14 to the extent that she seeks that there should be no more development allowed on the Port Hills, adjacent to Bowenvale Reserve and in Banks Peninsula. While PC14 does not apply to Banks Peninsula, except for Lyttelton, it is my view that development around any SES or Reserve increases the threat of edge effects, where unwanted species (weeds and pests) invade into the reserve from private sections (as I have explained above).
49. Regarding Bowenvale Reserve in particular, it has significant ecological values. These values include supporting an important stronghold population for the nationally threatened Jersey fern (*Anogramma leptophylla*) where it occurs on bluff habitats that are very vulnerable to weed invasion from garden escapees. There is, however, no SES applicable to any part of Bowenvale Reserve and potential creation of one or consideration of other protection measures will need to be done through a future plan change due to limited scope of PC14. PC 14 does not propose intensification in the Bowenvale area or any additional residential zoning beyond the areas

currently zoned Residential Hills, therefore the status quo is proposed to be retained.

11 August 2023

Nicholas Head