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

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STATEMENT OF PRIMARY EVIDENCE OF COLIN MEURK ON BEHALF OF CHRISTCHURCH CITY COUNCIL

BIODIVERSITY BENEFITS OF TREE CANOPY COVER

TREE CANOPY COVER AND FINANCIAL CONTRIBUTIONS

Dated: 11 August 2023

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EXECUTIVE SUMMARY

1. My full name is **Colin Douglas Meurk**. I am an Adjunct Fellow in Earth & Environmental Sciences at the University of Canterbury, and an Adjunct Senior Lecturer in Pest & Conservation Management, Lincoln University, and Research Associate at Manaaki Whenua – Landcare Research.

2. I have prepared this statement of evidence on behalf of the Christchurch City Council (the **Council**) in respect of matters related to tree canopy cover and financial contributions (**FC**) provisions arising from the submissions and further submissions on Plan Change 14 to the Christchurch District Plan (the **District Plan**; **PC14**).

3. My evidence addresses the benefits of urban tree canopy cover in terms of biodiversity values/services that urban trees provide, in the context of proposed tree canopy cover / financial contributions (**FC**) provisions in Plan Change 14 to the Christchurch District Plant (**PC14**). The provisions propose a requirement for provision of 20% canopy cover on residential development sites and 15% canopy cover in new road corridors.

4. Apart from carbon storage and sequestration, stormwater runoff attenuation, and urban heat island mitigation being related to urban forest canopy cover, there are additional critical benefits of indigenous species in particular (beyond species richness – of any origin) to provisioning, cultural and passive ecosystem services. Simply put, more indigenous trees or tree cover, in clusters, with greater total biomass, will improve carbon storage and sequestration, stormwater runoff attenuation, urban heat island mitigation and wildlife, landscape legibility, place-making and branding. In contrast, development intensity and impermeable surfaces (buildings and/or pavements), which are associated with reduced tree cover, threaten not only the provision of carbon storage and sequestration, stormwater runoff attenuation, and urban heat island mitigation by trees but these wildlife provisioning, cultural and passive values.

5. I have assessed a number of submissions received relating to issues of urban tree canopy cover in terms of the extent of that cover and the biodiversity benefits they provide. The relevant submissions provide a range of viewpoints. The majority were in support of the proposal[1]. Some suggested amendments, including:

[1] I refer to the section 42A report of Anita Hansbury on PC14 which deals with the tree canopy cover/financial contribution (FC) provisions, and which outlines the exact numbers of submissions in support or partial support.

(a) increasing or reducing the canopy cover threshold,

(b) changing the way that canopy cover is measured,

(c) including other forms of green infrastructure (e.g., green roof/walls, riparian planting) in tree cover measurement,

(d) Increasing tree species diversity appropriate to soil water conditions and by implication more indigenous diversity,

(e) deleting the tree canopy cover/ FC provisions altogether

6. In general, the 20% threshold for canopy cover seems appropriate as outlined in **Justin Morgenroth's** evidence. It offsets some of the impacts of development, by providing important ecosystem services and biodiversity benefits. That threshold is also consistent with the targets in the recently adopted Urban Forest Plan with which the tree canopy cover provisions should in my view be consistent.

7. The other forms of green infrastructure (e.g., green roofs/walls and riparian planting) proposed by some submitters is appropriate in specific densely developed scenarios, in their own right, but they do not provide the scale of climate mitigating benefits that trees do and should not be considered as equivalent to tree canopy cover.

8. Financial contributions appear to be a necessary offsetting tool, where tree incorporation within the property is not practicable, to ensure accessible, nearby tree cover and associated benefits for residents in the relatively high-density residential areas enabled by PC14.

9. Finally, I consider the use of incentives alongside other tools to retain and increase especially indigenous trees on private residential land is appropriate given the internationally accepted urgency.

INTRODUCTION

10. My name is **Colin Douglas Meurk**, I am an Adjunct Fellow in Earth & Environmental Sciences at the University of Canterbury, and an Adjunct Senior Lecturer in Pest & Conservation Management, Lincoln University, and Research Associate at Manaaki Whenua – Landcare Research.

11. I have previously prepared a report[2] outlining the benefits of urban tree canopy cover in terms of biodiversity values/services that urban trees

[2] https://www.ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Plans/district-plan/Proposed-changes/2023/PC14/Section-32-Appendices-1/PC14-HBC-Notification-Tree-coverFCs-S32-report-C-Meurk-evidence-Appx-2-with-Addendum-updated-15-2-23.PDF

provide. That evidence was prepared to assist with the Section 32 assessment[3] of the proposed tree canopy/FC provisions in PC14 which propose a requirement for provision of 20% canopy cover on residential development sites and 15% canopy cover in new road corridors.

12. In preparing this evidence I have:

    (a) Reviewed the PC14 proposal on tree canopy cover and FCs, the related section 32 assessment[4], and the relevant submissions (as alluded to above).

    (b) Reviewed the now adopted Urban Forest Plan for Ōtautahi Christchurch.[5]

    (c) Read the draft evidence of Justin Morgenroth on ecosystem services of trees.

    (d) Read the draft section 42A report of **Anita Hansbury** on PC14 which deals with the planning aspects of tree canopy cover and FCs, and the related submissions.

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

QUALIFICATIONS AND EXPERIENCE

14. I hold the qualifications of BSc (Hons) 1969 in Botany at University of Canterbury NZ, a PhD (Ecology) 1982, University of Otago NZ, and have various awards for services to ecology and conservation including Officer of the New Zealand Order of Merit.

15. I have over 50 years of experience researching and applying research in alpine, subantarctic, biogeographic, urban and farm environments, and contributing to restoration and landscape ecology and design, conservation, and citizen science. I have authored over 100 peer-reviewed publications and book chapters across these topics.

16. I have prepared reports for Christchurch City Council on values of canopy tree cover in 2018/19[6]. And prepared many earlier reports for Council and other clients in the development arena.

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[3] https://ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Plans/district-plan/Proposed-changes/2023/PC14/Section-32/Plan-Change-14-HBC-NOTIFICATION-Section-32-Tree-canopy-Financial-Contributions-with-no-appendices.pdf

[4] Section 32 Part 7 – Tree canopy cover – Financial contributions - https://www.ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Plans/district-plan/Proposed-changes/2023/PC14/Section-32/Plan-Change-14-HBC-NOTIFICATION-Section-32-Tree-canopy-Financial-Contributions-with-no-appendices.pdf

[5] CUS5882-Urban-Forest-Plan-WEBJune2023.pdf (ccc.govt.nz)

[6] https://ccc.govt.nz/assets/Documents/Environment/Trees/Urban-Forests/Christchurch-City-Canopy-Cover-report-2018-2019.pdf

17. I am a member of the New Zealand Ecological Society, Tane Tree Trust and many NGOs relating to nature conservation.

CODE OF CONDUCT

18. 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.

SCOPE OF EVIDENCE

19. My statement of evidence addresses the following matters:

    (a) Overview of intrinsic and non-monetised values or cultural/passive ecosystem services of trees and tree cover in general, urban trees and the Christchurch situation specifically;

    (b) Clarification of Christchurch biome status;

    (c) Matters raised in relevant submissions;

        (i) Increasing or reducing the canopy cover threshold.

        (ii) Changing the way that canopy cover is measured.

        (iii) Including other forms of green infrastructure (e.g., green roof/walls) in tree cover measurement.

        (iv) Providing financial incentives for meeting canopy cover requirements (only considered generically).

        (v) Supporting financial contributions, reducing, or removing the financial contributions (only considered generically).

        (vi) Prioritising native species and increasing the tree diversity.

    (d) Conclusions.

20. I address each of these points in my evidence below.

OVERVIEW OF THE BIODIVERSITY VALUES OF FOREST TREES - IN CHRISTCHURCH SPECIFICALLY

21. The implementation of the National Policy Statement - Urban Development (NPS-UD) - and the Resource Management (Enabling Housing Supply and Other Matters) Act will permit higher density residential developments with probable impacts on urban green space and tree cover.

22. My evidence provides support for mitigating these effects from a biodiversity perspective specifically under Direct Use Values (**Provisioning Services** - Natural Habitat supporting wildlife), Indirect Use Values (**Cultural Services** – spiritual, aesthetic/amenity, cultural diversity-sense of place, health & well-being, tourism, education), and **Passive Values** (options, existence/intrinsic, bequest).

23. Many international publications have documented the multiple measured ecosystem service values of trees/green space in the urban environment (Meurk et al. 2013).[7] Distinguishing the indigenous from generic ecosystem service values and unravelling those on public versus those on private land is more complicated as they are inevitably inter-dependent (Ausseil et al. 2011). Fundamentally these are intrinsic/existence values as demonstrated by human behaviour and choice in the marketplace (of ideas, time and spending priorities), opinion surveys, international accords, and through personal activity - 'actions speak louder than words'. These are found under Cultural and Passive Values, but indigenous trees provide habitat for native wildlife, and there are indirect economic values that could be quantified - from tourism, health, and education. These are all proxies for more quantified values that may be calculated (Roberts et al. 2015).

24. There is growing support for these values within our relatively affluent society. The Council then has the task, in partnership with Mana Whenua and the wider community, to plan and co-design the implementation of the public will. Well-being is fundamentally attached to 'sense of place' or identity with a place, whose layered history is legible for citizens and visitors alike. This might be equated with *Turangawaewae* – a place to stand comfortably and aware.

25. On the other side of the ledger, some of the 'costs – economic externalities' of exotic species, such as deciduousness and invasiveness, undermine their intrinsic values and our obligations to international conventions on biodiversity. It needs also to be acknowledged that appreciation of nature may depend first on Maslow's basic needs being met equitably within the community.[8]

26. A recommended goal, to achieve the biodiversity purposes in law[9] and international agreement[10] is that by 2050 a minimum of 60% of Street, Park,

[7] Biodiversity is positively related to mental health (phys.org)
[8] Maslow's Hierarchy of Needs (simplypsychology.org).
[9] Biodiversity Strategy - Aotearoa New Zealand Biodiversity Strategy: Biodiversity (doc.govt.nz)
[10] Chapter 12: Biodiversity | Ministry for the Environment.

Riverside, and private land trees will be indigenous and visible, thereby attracting native wildlife, providing networks, corridors or steppingstones through the urban landscape, and contributing to an historically authentic identity. This will be facilitated to some extent by the fact that many of our mature, largely exotic city trees, planted mid to late 19th Century will, under our benign oceanic climate, have reached their age limit and be declining. This is evidenced by the fact that dead or decaying trees from this era are already being taken out. By the same token, the million or so largely indigenous trees planted by Councils, community groups and landowners over the past few decades on both public and private land will be pushing across the 3.5 m height threshold of eligibility to be recorded as 'tree cover'.

27. This proposed indigenous-exotic mix should be part of achieving a 20% tree cover in the metropolitan area of the City, and >25% when incorporating the greater Christchurch area including Banks Peninsula. To be equivalent to other cities these figures should be calculated separately from areas of permanent wetlands and detention basins, and ponds dominated by tussock species, reeds, and open water. These wetlands are taoka (biodiversity treasures) and mahika kai (traditional resource gathering areas), in their own right, and should not be included in metrics that imply that the City has lesser natural value and ecosystem services than other cities. The precise figures need to be evidence-based and negotiated.

28. The planting of species should follow guides to 'right plant – right place – right time' (Lucas et al. 1996/7, 1998; Meurk et al. 1997; Meurk 2003, 2008). These will be reflected in the patterns and zonations according to underlying soils and hydrology, as well as amenity, aesthetics, and safety. It is important however that ecology is not sacrificed to simplistic concepts of safety and tidiness.All of these elements and dynamics will require careful planning, design and implementation – building eco-literacy among governors, planners, engineers, landscape architects, and community. Care will be needed to ensure everyone is well-informed. There is always a danger that co-design can be over-influenced by those who are no longer connected to their natural heritage (extinction of experience phenomenon) resulting in a biased model that may unwittingly perpetuate the single-value focus of the past colonial era. However, a large majority of randomly surveyed citizens desire more native plants and birds in their city.[11] Partnership with Mana

[11] https://www.ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Plans/district-plan/Proposed-changes/2023/PC14/Section-32-Appendices-1/PC14-HBC-Notification-Tree-coverFCs-S32-report-C-Meurk-evidence-Appx-2-with-Addendum-updated-15-2

Whenua and a Matauranga Maori world view will be essential. A robust, evidence-based process should ensure that the City achieves its goals of ecological integrity and historical legibility, and that private land contributes its share by setting aside sufficient space for large trees or making financial contributions towards mitigations in nearby adjacent lands – purchased for that purpose where necessary. If such provision is not made, for especially lower socio-economic suburbs, then human well-being will be impacted.

29. Key findings relating to the Biodiversity Value of Indigenous Trees:

    (a) The world is facing the **6th Great Extinction**.

    (b) NZ is a **biodiversity hotspot** – our country and province have an extra-ordinary duty to protect our contribution to global biodiversity – at gene, species, population, community, ecosystem, landscape, and cultural scales - and the majority of citizens support this.

    (c) **Otautahi-Christchurch has a high number of wild indigenous species** although much is hidden and has historically contributed to an 'extinction' of experience, identity with, and therefore conservation ethic towards the indigenous flora and to trees in particular. A few notable exceptions, where there is high community recognition are kowhai, lancewood/horoeka, tarata, rimu (incongruously brought over from the West Coast rainforests) and cabbage trees/ti kouka.

    (d) **'Biodiversity'** (indigenous contribution to global species diversity) is distinguished from 'species richness' (the total number of species regardless of origin). Species richness does contribute to resilience, and many exotic species provide important ecosystem services, but not those specifically related to 'natural habitat', support of indigenous wildlife, aspects of 'pest and pollinator regulation', cultural services (as taoka of Mana Whenua), and passive 'existence/intrinsic' values. This is the domain of indigenous species.

    (e) Region-specific ecosystem values of large biomass providers (trees) are especially critical in terms of **hosting or servicing** dependent indigenous microbes, invertebrates, birds, and lizards.

    (f) **Indigenous trees and forest patches outperform exotic** or un-treed residential environments in terms of indigenous wildlife.

    (g) Species richness of native trees is essential to provide **year-round supply of critical food** resources. That is, berries and nectar are provided by different tree species at different times of year, and so tree

diversity is a necessary ingredient for survival of native bush birds, in particular, throughout the year. Appropriate environmental placement is essential.

(h) **Our Biodiversity** is our unique contribution for which we have international duties (and local declarations) to protect; and is increasingly recognised as providing the basis for local place-making or turangawaewae.

(i) This **must be achieved** through protecting natural occurrences of species *in situ* (the first priority – regardless of condition or levels of degradation), removing negative influences (biosecurity, disturbances, predation, fragmentation), restoring lost or degraded habitat, and creating legible landscapes that have at least co-dominant presence of native species (trees) with high visibility – overcoming the extinction of experience. This particularly applies to urban as well as rural (that is, cultural) landscapes where most of the population live.

(j) It is possible to **monetise** physical, physiological, and sociological **ecosystem services** from trees in general (carbon, water retention, heat island effects, wind, well-being, etc) and to recognise that exotic trees can often outperform indigenous species on these metrics. International figures for medium-sized trees with different ecosystem services value ratings range from US$500 to $60 000 but intrinsic value would be a further incalculable layer on that.

(k) The biodiversity/intrinsic values of **native species cannot be replicated** – globally, culturally, or deep socially (identity), by exotic species.

(l) In the absence of clear monetisation of native trees, there are however **proxy measures** that may be employed. A significant majority of citizens wish there to be more native trees and birds, based on random and active citizen surveys, community engagement in environmental and restoration projects, choice experiments, and market dynamics. Many wish this to be within a ‘garden city’ framework – which implies abundant/accessible green space, plant diversity within attractive and tidy design.

(m) There are some indirect monetary values associated with biodiversity – in relation to **‘clean green’ brand** for produce and tourism, and well-

being/health based on authentic reference to layered history in the daily human experience.

(n) The **implementation of protection and recovery of tree cover and biodiversity** has to be achieved through incentivised, educated, gradual but progressive replacement policies, innovative/creative design that maximises the benefits and minimises detrimental effects. This will come from application of landscape models that support ecological integrity and functionality. Intensification will require **realistic compensation** (probably through financial contributions) for unavoidable losses of green space, tree cover (using generic ES monetary calculations), accessibility to all citizens, sustainability, and place-making within a desired garden city framework. Minimally a 'time-for-time' replacement formula, that emphasises the indigenous tree component, is proposed to reflect the demonstrated values. For example, a hundred-year old tree would need to be replaced by 20 times, five-year-old trees, that are looked after until established. Allowance for increased early establishment maintenance of new trees, must be built into the compensation package.

(o) This needs to be carried out in **partnership** between public and private lands and within the context of Te Tiriti. The overall balance should prevent net loss and indeed provide net gain towards the target (20% tree cover of which 60% is indigenous).

ECOSYSTEM SERVICES PROVIDED BY URBAN TREES

30. I acknowledge and concur with the analysis of Justin Morgenroth regarding urban forest ecosystem services - carbon sequestration and storage, improved urban air quality, attenuated storm-water flooding, mitigated effects of urban heat islands, conserving energy, reduced noise, and provision of habitat for urban wildlife. They also provide diverse social, economic, psychological, medical, and aesthetic benefits.

31. As Justin Morgenroth notes, urban forests may also have negative effects, such as infrastructure conflicts, health and safety impacts, aesthetic issues, and environmentally detrimental consequences[12]; these are collectively known as ecosystem disservices. Despite these disservices, studies have concluded that urban forest benefits far exceed costs, with an average

[12] Roman LA, Conway TM, Eisenman TS, Koeser AK, Ordóñez Barona C, Locke DH, Jenerette GD, Östberg J, Vogt J. 2021. Beyond 'trees are good': Disservices, management costs, and tradeoffs in urban forestry. Ambio. 50(3):615-630. https://doi.org/10.1007/s13280-020-01396-8.

benefit:cost ratio of 5.43[13]. It should also be noted that one of the main costs associated with the predominantly deciduous exotic trees is the massive leaf fall in autumn, the clogging of drains and consequent cost (and emissions) of mechanically clearing this litter off the streets.

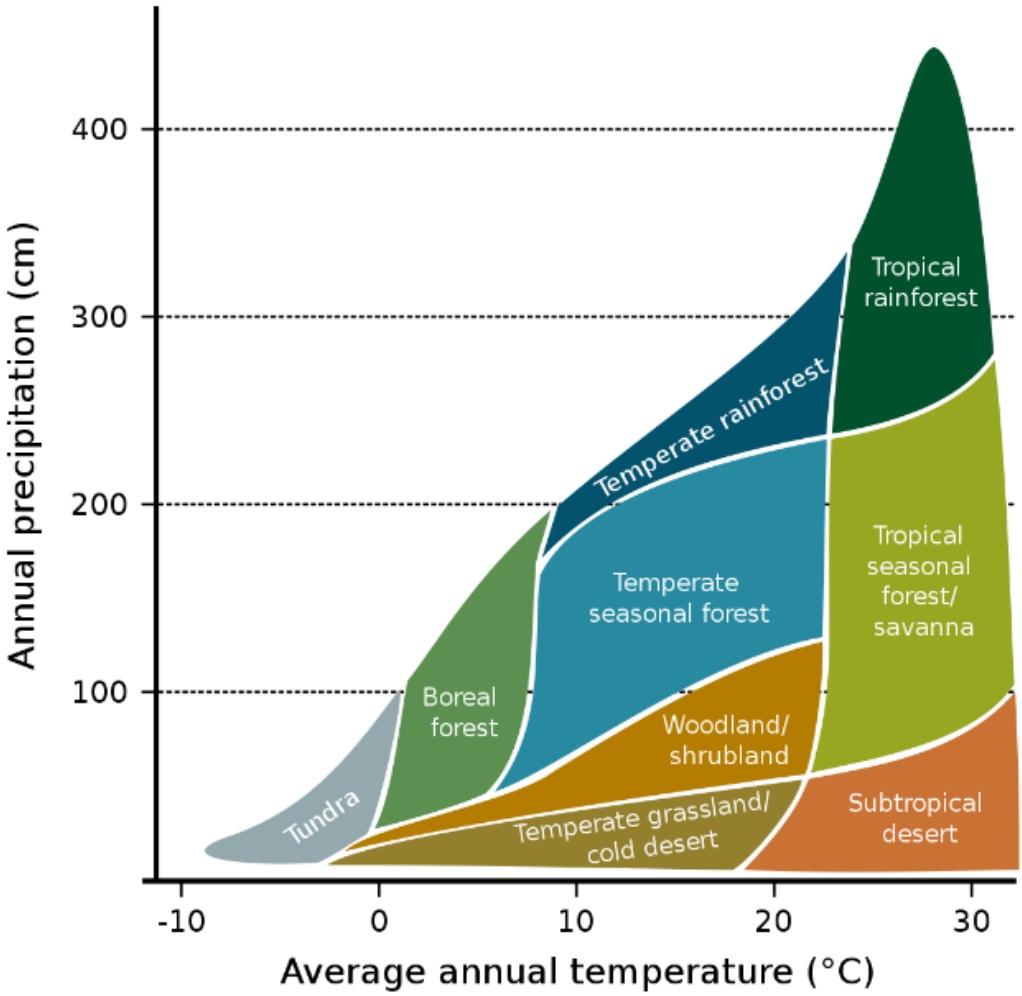
32. The level of benefits is influenced by tree density or canopy cover, their configuration (fragmentation, clustering), and structural characteristics (e.g., species-specific height, crown volume and shape, stem diameter, leaf area or density, wood density). More trees or tree cover, in clusters, with greater total biomass and wood density, will improve these regulating and other services.

CLARIFICATION OF CHRISTCHURCH BIOME STATUS

33. The target tree cover is to some extent predicated on what the natural potential of the region is – the Biome – which is a function of the climate, soil conditions and available plant growth forms. There are various depictions but one here (figure below), is a compilation for teaching purposes, and proposes 9 Biomes on an annual temperature x precipitation matrix.

34. Based on a Mean Annual Temperature of 12.3^{o}C and Mean Annual Precipitation of 650-700 mm for Christchurch, the Biome for the City sits on the border of the Woodland/Shrubland and Temperate Seasonal Forest Biomes. Areas with porous, stony, or sandy soils will tend to the former condition (kowhai-kanuka-ti kouka-Discaria/tumatakuru-totara savannah woodland) whereas those on wetter soils will tend to the latter condition (matai-kahikatea-pokaka-hinau forest) as represented by Riccarton Bush.

[13] Song, X.P., Tan, P.Y., Edwards, P., Richards, D. 2018. The economic benefits and costs of trees in urban forest stewardship: A systematic review, Urban Forestry & Urban Greening, 29:162-170, https://doi.org/10.1016/j.ufug.2017.11.017.



35. In either case the average tree cover for both forest and grassland (referred to in Justin Morgenroth's evidence) is around 20%. And this would seem to be the desired base line.

MATTERS RAISED IN RELEVANT SUBMISSIONS

Increasing or reducing the canopy cover threshold

36. Submission number 30.2 (Doug Latham) called for a reduction in the canopy cover threshold from 20% down to 10%, while submission 900.5 (Summit Road Society) suggested increasing the threshold to 25%.

37. I agree with Justin Morgenroth's conclusion that a 20% target is both defensible and pragmatic. I also note my opinion on the Biome type above which does not materially affect the target tree cover of 20% although that

limit is based on average values in cities within those Biomes, not the average values of the mature Biomes themselves.

38. The submission by Kāinga Ora (834.121) alludes to perceived practical difficulties with physically incorporating trees into particular house assemblages. Whereas I accept that not all cases are the same, this should not deter the legitimate and necessary efforts to achieving the 20% goal. Rather there should be ways found to overcome the difficulties.

39. There is scope for increasing tree cover on existing, peri-urban public lands, but much is designated for other purposes, and this does not address the demonstrated need for the living environments to be 'green' if the residents are to have a healthy and comfortable existence. While acquisition of additional lands for tree planting through the Reserve Contribution may help with the overall canopy cover, it is evident (as presented in my earlier report) that citizen well-being/health is connected to neighbourhood tree cover in close proximity to people's daily lives, such as would be provided on private properties, as well as reserves that are accessibly scattered through new urban developments.[14]

40. To just say the goal is 'unachievable' is ignoring the existential threats from climate change and biodiversity collapse, and it is like saying climate stabilisation and human health is now unachievable so why bother? We have a duty now to do our best to address these matters.

Changing the way that canopy cover is measured

41. Submission 112.7 (Nikki Smetham) suggested that canopy cover be measured not at maturity, but rather at 10 years. It was not entirely clear what the submitter was endeavouring to achieve. She referred to Council's web-based tree classification guide[15] which she regarded as indicating excessive mature sizes for lancewood and kōwhai.

42. I support the analysis of the issue provided by Justin Morgenroth in his evidence regarding Submission 112.7. The Planting Guide[16] appears not to have lancewood and needs further refinement. A number of species are

[14] See Section 4 of my report – Generic Value of Trees and Green Space – and the numerous references such as: Nieuwenhuijsen M, Dadvand P, Márquez S, Bartoll X, et al. The evaluation of the 3-30-300 green space rule and mental health. *Environmental Research*, Volume 215, Part 2, 2022, 114387. doi.org:10.1016/j.envres.2022.114387; Donovan, GH, Prestemon JP, Gatziolis D, Michael YL, Kaminski AR, Dadvand P. The association between tree planting and mortality: A natural experiment and cost-benefit analysis. *Environment International*. 2022. doi.org:10.1016/j.envint.2022.107609 ; Bum Jin Park et al., "The Physiological Effects of Shinrin-yoku (Taking in the Forest Atmosphere or Forest Bathing): Evidence from Field Experiments in 24 Forests Across Japan," Environmental Health and Preventive Medicine, May 2, 2009 ; Liqing Zhang* and Puay Yok Tan - Int J Environ Res Public Health. 2019 Feb; 16(4): 578; Published online 2019 Feb 16. doi: 10.3390/ijerph16040578

[15] https://ccc.govt.nz/environment/trees-and-vegetation/urbanforest/tree-planting-guide

[16] Tree planting guide : Christchurch City Council (ccc.govt.nz)

incorrectly assigned to size class, some others might be designated as weed species; and some species are North Island trees no longer considered appropriate here.

43. The Planting Guide recommends engaging an arborist or landscape architect when developing proposals. I would add that an ecologist should also be consulted. They are complementary skill sets and experience suggests both are required when dealing with biodiversity and landscape sustainability matters.

Including other forms of green infrastructure (e.g. green roof/walls) in tree cover measurement

44. Submission 790.4 (Jade McFarlane) asks that green infrastructure, such as green roofs, bioswales and walls be considered to make up one quarter of the target 20% tree cover. Likewise, submission 260.7 (Scentre (New Zealand) Ltd) proposes that "*the unit of measurement of "tree canopy coverage" takes into account green / living walls and roofs*". Submissions 834.121 and 834.181 (Kāinga Ora – Homes and Communities) suggest deleting Section 6.10A and all associated provisions to allow for flexibility in choice of landscaping to meet a 20% landscaped area. Such a scenario could include trees but would not require them.

45. I support Justin Morgenroth's response to Submissions 260.7, 790.4, 834.121 and 834.181. I endorse the view that it is desirable to promote green roofs, living walls, bioswales and riparian planting (also submission 900.6 – Summit Road Society) for their biodiversity and habitat value as well as the general benefits of urban greening to human well-being. But that it is a separate albeit overlapping matter to tree cover. There are nevertheless some common benefits in terms of urban greening, stormwater attenuation and biodiversity (for both terrestrial and instream species).

Providing financial incentives for meeting canopy cover requirements

46. The goals, targets and rationalisation are well established and thus whatever is required to achieve these minimum tree cover values and their attendant biodiversity parameters should be pursued. The issue of appropriate incentives and regulation will be the domain of the planners.

Prioritising native species and increasing the tree diversity

47. Submissions 900.5 (Summit Road Society) and 914.20 (Davie Lovell Smith Ltd) seek respectively prioritisation of indigenous tree planting and increase

in tree species variety for street trees that take account of ground water conditions.

48. Given we are facing the 6th Great Extinction, the country has international obligations to protect its contribution to biodiversity, the dependency of NZ wildlife on Indigenous Plant species, the critical importance of visibility in maintaining identity with the indigenous flora, and the expressed wish of citizens to increase native plants in the city, I agree indigenous species should be prioritised and now is the time to begin. This should be achieved – by planting in public lands, including streets, parks, and reserve contributions provided by developers as per my earlier evidence. There should be clear disincentives and information provided to deter inappropriate and invasive species in private properties, and incentives/advice on planting suitable indigenous species in private properties (cf Submissions 470.2 and 470.3 – Dew & Associates). Council should show the way, as it is doing in much of its land.

49. Regarding Submission 914.20 by Davie Lovell-Smith Ltd, seeking amendments to increase the species of street trees to take into account the different ground water characteristics of the site, there should indeed be appropriate species chosen for the site conditions (right plant-right place).

50. As above this should prioritise indigenous species, and there are suitable native species for all such ground variations. Slower growth rates should not be a deterrent to their use as, in due course, they come to maturity – like the streets of kowhai that are now making a significant impact in parts of Christchurch city. Improved tree cultivation technique is needed also to overcome concern of Kāinga Ora (834.121) regarding perverse incentives to grow faster exotic species. There are also ways of taking account of concerns about shade of evergreen species – e.g., planting more large evergreen native trees on north sides of streets and more spaced (indigenous) semi-deciduous trees on south sides of streets or in front of houses, so that any shadowing is of short duration.

Conclusion

51. On overall balance, I agree that a 20% threshold for tree canopy cover on private residential land is appropriate with the additional focus on the importance of and incentivising indigenous species. If this cannot be achieved directly on the private properties, then provision needs to be made for incorporation of sufficient public parkland within those densified suburbs to achieve the 20% target. This will be achieved through financial

contributions and also increasing groves of trees on existing neighbourhood parks.

52. From the human well-being perspective urban greening can be incorporated in smaller spaces within the properties through green roofs, living walls, street, swale, and riparian planting.

53. A target of 60% indigenous species is an appropriate minimum for visible planting of landscape dominant species – that is – street trees, park trees, riparian trees. In the latter case the figure should be more like 100%. The goal should be uniformly applied across the city – not segregated into say peripheral high percentage and central city low percentage. This would perpetuate the ‘extinction of experience’ discrimination referred to, that can be seen as contributing to the attrition of identity with and protection of Canterbury’s biodiversity. It is our international and legal duty to reverse the loss of indigenous plants/trees and its co-dependent wildlife.

11 August 2023

Colin D Meurk