**BEFORE THE HEARING PANEL**

**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of Proposed Plan Change 12 to the Operative Hamilton City District Plan

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**STATEMENT OF REBUTTAL EVIDENCE OF MICHAEL RICHARD GRAHAM**

**(URBAN LANDSCAPE/GREEN POLICIES)**

**Dated 14 August 2024**

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## INTRODUCTION

1. My full name is Michael Richard Graham.

2. My qualifications and experience are as set out in paragraphs 2 and 3 of my primary statement of evidence dated 26 June 2024.

3. I reconfirm that I have read and am familiar with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023 and I agree to comply with it.

## PURPOSE AND SCOPE OF EVIDENCE

4. The purpose of this rebuttal statement of evidence, which is provided on behalf of Hamilton City Council (**HCC**) as Plan Change 12 (**PC12**) proponent, is to respond to matters raised in submissions in relation to tree canopy cover and deep soils**.**

## EXECUTIVE SUMMARY

5. My rebuttal evidence addresses matters from a landscape architectural perspective regarding tree canopy cover and deep soils contained in the evidence of Mr Phillip Osborne, Mr Michael Campbell and Mr Phillip Jaggard, all of whom have submitted evidence on behalf of Kainga Ora.

6. In my opinion, the combination of tree canopy and deep soil provisions provide an appropriate mechanism for ensuring that the 20% tree canopy can be reestablished in residential areas undergoing redevelopment. The matters raised by Kainga Ora pertinent to my area of expertise, do not provide any further information or considerations that alter my opinion.

**RESPONSE TO EVIDENCE**

**Phillip Osborne - economics**

7. In paragraph 12 of his evidence Mr Osborne identifies *b) Removal of the Urban Tree and Deep Soil area in the GRZ and MDRZ,* and subsequently states in paragraph 14, *the provisions proposed by council have adverse implications for the efficient delivery of housing in the city*.

8. Mr Osborne outlines his concerns regarding tree canopy cover requirements from paragraph 51 through 60. The first bullet of paragraph 57 forms the basis of his concerns regarding site layout:

> (a) **Lack of flexibility and site efficiency**: The requirement to provide contiguous space for 20% tree canopy per site has the potential to materially constrain development options for residential housing.

9. With regard to *lack of flexibility and site efficiency,* this statement is incorrect, there is no requirement to provide 20% contiguous space for tree canopy per site (20% for General Residential Zone (**GRZ**) and Medium Density Residential Zone (**MDRZ**) and, 10% for the High Density Residential Zone (**HDRZ**) respectively). The proposed provision seeks to achieve a minimum 20% canopy coverage per site and does not require this to be contiguous.

10. Within the tree canopy cover provision flexibility is available as various combinations in the size and number of trees can be used to achieve the canopy coverage and best fit the site configuration.

11. As an example, the deep soil area required for a 800 $m^2$ section is 80$m^2$ (10% of the total site). Extent of landscape area required is 160$m^2$ (20% of the total site) and can include the deep soil area. The required tree canopy cover provision for the same site is 160$m^2$ (20% of the total site).

12. This canopy coverage can be achieved through either a combination of 5 trees; 3 small trees (each providing 10m$^2$ coverage) and 2 medium trees (each providing 67m$^2$ coverage), or by 10 trees; 9 small trees and 1 medium tree. The resulting deep soil areas generated by the tree selection is either 71 m$^2$ for the 5-tree scenario, or 65.5 m$^2$ for the 10-tree scenario.

13. Neither the deep soil areas nor tree canopy coverage areas are required to be contiguous, however where deep soil areas are contiguous an increase in resilience against adverse weather conditions would be anticipated. (A minimum contiguous extent of 8m$^2$ of deep soil is proposed with a minimum dimension of 2m).

14. Overall, this provision maintains flexibility in approach for a developer in terms of potential size, number and distribution of trees within a residential development. This approach allows for multiple smaller trees, or fewer larger trees, or combinations thereof. It does not alter the extent of landscaping required, when compared to the ODP provisions, and the tree canopy cover can extend over non permeable surfaces.

15. I consider that Mr Osborne has misapprehended the proposed tree canopy provisions, which are flexible, enabling a range of approaches, both in terms of layout and quantity of trees to achieve given outcomes. I note Mr Osborne's evidence offers no discussion regarding the deep soil component itself.

**Michael Campbell - planning**

16. Mr Campbell does not support the *tree canopy cover* provisions nor the *deep soil* provisions but rather proposes the retention of the Urban Tree Rules as notified.

17. Paragraph 9.5 of his evidence outlines his concerns which focus on a range of variables that may affect specimen trees such as *solar access,*

*orientation, soil quality and whether a landowner undertakes ongoing maintenance*. He also that highlights that larger trees may lead to future potential maintenance conflict with buildings, requiring an increase the area for any given tree to be accommodated and may result in adverse shading when placed on a northerly aspect.

18. I am not in disagreement with these variables and would suggest others which may affect specimen trees including extent of permeable landscape area and conflicting obstructions, such as foundations, conduits and services; the proximity of overhanging structures that are likely to conflict with the mature height or width of a tree canopy; an adequate provision of soil volume and quality to support the growth to maturity of any trees planted.

19. While the landscaping provisions within the ODP or PC12 as notified offer little guidance on these matters, the proposed *tree canopy coverage* and *deep soil* policies in association with the planting guidance, addresses appropriate soil depth and extent, and provides a range of species that fit within a particular canopy height and spread envelope.

20. The selection of an appropriate species and it's siting requires additional information that comes out of the design process for a residential development and site-specific configuration, beyond the scope of these provisions.

21. I note in paragraph 9.8 Mr Campbell repeats his concerns regarding 20% net area of tree canopy cover significantly compromising housing delivery resulting in adverse shading and *subsequent amenity effect for the landscape areas wherein tree canopy is required to be located [underscore added]*. Mr Campbell then refers to Mr Osbornes evidence regarding *the economic costs that such a requirement will place on housing developments…[underscore added]*.

22. I have addressed Mr Osbornes evidence previously (paras 7-18) and

identified he has misapprehended a requirement for *contiguous tree canopy*. I find Mr Campbell's phrasing with respect to the *landscape areas wherein tree canopy is required to be located,* suggests that he is also under the same misapprehension. This may explain his reference to *the protection of established 'tree canopy areas'* and his concerns with monitoring becoming an onerous task for *any further development of the site, even for minor works (para 9.7)*.

23. Section 10 of Mr Campbell's evidence focusses on the proposed deep soil provisions. In paragraph 10.3 Mr Campbell quotes from my primary evidence (paragraphs 41 and 43) which outline both my concerns and the need for deep soil areas, proposed to constitute 50% of the required landscape area of a site and 10% of the overall.

24. Mr Campbell does not agree with the deep soil provision and in paragraph 10.4 explains that, *in his experience, the provision of specimen planting and landscape areas <u>necessarily</u> requires sufficient soil and ground permeability for such planting/landscaping to establish and thrive*. [Emphasis added]

25. This has not been my experience as, subject to the quantity and quality of the soil, soil moisture levels and the nature of other activities around developments, what may appear as a surviving plant or tree does not mean all is well.

26. A common challenge in brownfield sites is unrelieved subsoil compaction and limited soil depth. Typically, topsoil is removed from site prior to construction as the level of organic matter makes it unsuitable for construction purposes leaving a denser subsoil surface. During subsequent construction the movement of machinery and vehicles, and the storage of materials on site, consolidate the subsoil, create bands of material that are compacted resulting in reduced porosity, little organic material and minimal moisture retention within the subsoil structure.

27. At the end of construction, stockpiled soil taken from the site may then be

reintroduced, but there is no required depth or soil remediation. A 150mm layer of topsoil will provide a permeable surface. The introduced typically shallow layer of soil now sits on a relatively impenetrable layer by plant roots that contains little moisture content. The proximity of building foundations, paths and driveways present dry areas which wick moisture from the contact surface of adjacent soil areas and further compromise soil moisture levels.

28. Deeper soils generally can provide more water and nutrients to plants than shallower soils. Deeper soils also provide greater soil productivity and less erodibility as soil depths increase from 200mm – 1000mm. Most plants also rely on soil for necessary mechanical support, and this is particularly true for tall woody plants such as shrubs and trees. (Soils of 200mm or less, while technically permeable and capable of absorbing water, are generally unsuitable for woody plants as they do provide sufficient moisture, nutrients or mechanical support).

29. While a minimal tree pit excavation may accommodate the initial establishing phase of tree growth, unless adequate soil depth and extent is available to provide moisture and nutrients, tree growth will be compromised. Depending on its intended function, the tree may not produce its potential canopy for screening, shading, produce or display, while the ongoing stress increases its susceptibility to disease. This results in additional maintenance and reduced life expectancy of a tree. Beyond premature senescence, it also increases the risk of a tree being blown over.

30. The deep soil provision provides for the life cycle of the tree through to maturity, which, in my 30 years plus experience, is not necessarily the outcome realised at implementation. In addition, given climate trends, wind speeds and drought conditions are likely to become more extreme requiring plants to place greater demands on the resources accessible to them for survival.

31. In my opinion, an explicit direction to provide sufficient resource in the

receiving environment by way of *deep soils* is necessary to re-establish the 20% canopy coverage within existing residential environments which are subject to redevelopment.

32. I do not concur with Mr Campbell's position regarding the removal of the *tree canopy cover* or *deep soil* provisions for the reasons stated above.

33. I also note Mr Campbell's comments regarding stormwater and *deep soils*, and his reliance on Mr Jaggard's evidence from a stormwater management perspective. I now turn to Mr Jaggard's evidence.

**Philip Jaggard – Three Waters**

34. It is Mr Jaggard's opinion (para 1.7) that the *rules for tree canopy and deep soil areas are not required from a stormwater management perspective.*

35. Stormwater refers to when rain, snow or another type of precipitation hits a surface and, if not already liquid, melts.

36. In natural landscapes, stormwater soaks into the ground (assuming ground saturation has not occurred) or falls directly into waterbodies. In built environments it relates to water that runs off impervious surfaces such as roofs, roads, driveways and footpaths. This runoff is collected and directed down drains or is caught in gutters, and directed into stormwater pipes or channels, and carried to rivers, lakes or out to sea.

37. Mr Jaggard deals with the water that runs off impervious surfaces within built environments. My comments regarding stormwater infiltration into deep soils references the soakage of precipitation directly into the permeable soil areas. Soil moisture is the primary source of water for trees and is only accessed through their roots. While absorption of water through leaves is possible, it is inefficient, and the required conditions are infrequent.

38. Within soil, water moves predominantly through gravity, through macro and micro pores present within a soil matrix. Water and dissolved mineral nutrients within the soil enter the roots through osmosis and travel up through the inner bark's xylem, using capillary action, into the leaves for use during photosynthesis. Compacted or poor-quality soils greatly affect the porosity of soils and the availability of soil moisture, while inadequate soil volumes limit the available reservoir.

39. The process of stormwater infiltration into soil areas does not directly bear on Mr Jaggard's sphere of professional practice. In my opinion his statement that *rules for tree canopy and deep soil areas are not required from a stormwater management perspective*, bears this out. From the natural environment perspective however, stormwater infiltration into soil areas has a direct impact on soil moisture levels which are a critical component of tree growth and survival.

**Michael Richard Graham**

**14 August 2024**