

BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Proposed Plan Change 26 to the Operative Waipā
District Plan

STATEMENT OF EVIDENCE OF MICHAEL GEORGE CHAPMAN

Dated: 27 March 2023

TOMPKINS | WAKE

Westpac House
Level 8
430 Victoria Street
PO Box 258
DX GP 20031
Hamilton 3240
New Zealand
Ph: (07) 839 4771
tompkinswake.co.nz

1. INTRODUCTION

- 1.1 My name is Michael George Chapman. I have 24 years experience as a flood and stormwater engineer in New Zealand, India, and the UK. My career to date has focused on stormwater design and flood risk management in both urban and natural environments. I have worked for the private, public and NGO sectors.
- 1.2 I have a Bachelor of Science and Master of Science Degree (Honours) in Hydrology and Freshwater Management from the University of Waikato (1998). I am a Member of Engineering New Zealand (MEngNZ 1032906), and the New Zealand Hydrological Society and Water New Zealand.
- 1.3 I currently hold the position of Director – Stormwater Engineer with Te Miro Water Consultants Ltd (“TMW”) in Cambridge. I have held this position since 2019. Between 2010 and 2018 I held the position of Principal Engineer at Harrison Grierson Consultants Ltd in Auckland. I have been the lead author and designer for a wide range of stormwater management plans to support plan variations, resource consents and detailed design for land development projects.
- 1.4 I was technical director for the Waipā flood hazard update project, and principal engineer for the Waipā stormwater comprehensive consent renewal.
- 1.5 I have undertaken numerous stormwater management plans and flood models for land development within the Waipā District.
- 1.6 Waipā District Council (“Council”) contracted TMW to provide technical advice on the stormwater and flood hazard planning for Council’s Intensification Planning Instrument (“IPI”, proposed Plan Change 26 – “PC26”).

2. CODE OF CONDUCT

2.1 I have read the Environment Court Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023 and agree to comply with it. I confirm that the opinions expressed in this statement are 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.

3. SCOPE OF EVIDENCE

3.1 My evidence provides the following:

- (a) A brief overview of the existing stormwater infrastructure in the Waipā District;
- (b) An explanation of the stormwater mapping prepared for PC26;
- (c) The stormwater and flood hazard provisions in the Operative Waipā District Plan (“District Plan”);
- (d) My assessment of the stormwater and flood hazard provisions of PC26, particularly the Stormwater Constraint Qualifying Matter Overlay (“Stormwater Overlay”); and
- (e) Identification and response to key submission points related to stormwater and the Stormwater Overlay.

4. EXECUTIVE SUMMARY

4.1 Proposed urban planning intensification under the medium density residential standards (“MDRS”) will create new impervious areas (roof, driveways, hardstand, and roads) from new urban development. Impervious areas prevent rainwater from infiltrating to ground which

leads to increases in rainfall runoff, peak flows, volume, and faster timing of those flows to receiving environments compared to existing pervious areas. Runoff from impervious areas can also carry contaminants which are harmful to the receiving environment and furthermore new site coverage/building footprints can reduce flood storage capacity by infilling floodplain and displacing flood water.

- 4.2 Potential adverse impacts from intensification are managed through various guidance documents, district plan rules, comprehensive discharge consents and the Building Act 2004 and associated bylaws and technical evidence such as flood hazard mapping undertaken by Council.
- 4.3 The stormwater and flood hazard provisions in the District Plan relate to managing development within high hazard areas as defined by regional mapping, and impervious site coverage.
- 4.4 The District Plan has a 40% site coverage rule which, although not directly informed by flood risk management, goes some way to limiting the impacts of infilling the floodplain from new development. Above the 40% site coverage rule a resource consent is required. Likewise, the District Plan has a 60% impermeable surface rule to assess permitted activity against.
- 4.5 The level of development enabled by the MDRS would have an unacceptable level of effects in terms of stormwater, which will make it difficult for Council to comply with its Comprehensive Stormwater Discharge Consents (“CSDC”) and will be inconsistent with the objectives of Te Ture Whaimana o Te Awa o Waikato—the Vision and Strategy for the Waikato River (“Te Ture Whaimana”). In particular, an increase in building coverage or impermeable area can potentially cause adverse effects to water quality and scour of the downstream receiving environment and increase flood risk to people and property.

- 4.6 PC26 proposes to retain the current 60% impermeable surfaces rule and retain the 40% site coverage rule within the Stormwater Overlay. The Stormwater Overlay has been located based on the 100-year annual rain interval (“ARI”) flood depth layer.
- 4.7 By retaining the 40% site coverage rule within the Stormwater Overlay, the impacts of PC26 on flood hazard and stormwater are not considered to change adversely compared to the existing scenario. The current cumulative impacts on flood hazard from infill development are not well understood because the current hydraulic modelling does not provide this information. Retaining the current rules in the Stormwater Overlay is considered prudent in the absence of modelling to assess impacts of infill.
- 4.8 Urban intensification presents risk if flood storage capacity is reduced over time on a piecemeal basis resulting in cumulative impacts from uncontrolled infill under permitted activity status – adding another brick to the bathtub is a commonly used analogy to highlight how infill can displace floodwater and raise water levels. Other requirements such as in the Building Act 2004 do not consider impacts such as loss of flood storage.
- 4.9 I consider that the Stormwater Overlay is necessary to reduce these effects to a manageable level in order to comply with the Council’s CSDC and to contribute to the objectives of Te Ture Whaimana.

5. STORMWATER INFRASTRUCTURE IN THE WAIPĀ DISTRICT

- 5.1 Generally, the newer build areas in the district have high pipe capacity, reflecting the change in level of service for new developments.
- 5.2 In Cambridge, the hydraulic modelling indicates the network is generally not capable of conveying the 2-year ARI plus climate change for Existing Development scenarios (“ED”). Flooding in Cambridge is considered a low to medium hazard. High hazard areas are a product of depth in localised

ponding regions. Localised ponding areas up to 1m depth are generally shown to be at the rear of existing properties and in some cases seem to be caused as backup from road culverts.

- 5.3 In Te Awamutu, the hydraulic modelling indicates some pipes can convey the 2-year ARI plus climate change for ED scenarios but there are also areas that are interlinked with areas where the pipes are at or over capacity. This reflects the more sporadic flooding issues found in Te Awamutu when compared with Cambridge.

6. STORMWATER REPORT FOR THE SECTION 32 REPORT

Hydraulic Model to Determine Flood Plain, Hazards, and Pipe Capacity

- 6.1 TMW was engaged by the Council to undertake an assessment of flood hazard, flood impacted properties and stormwater pipe capacity. A copy of our report can be found at Appendix 9 of the Section 32 Report for PC26.
- 6.2 The report is based on hydraulic modelling undertaken by WSP Ltd¹ for Council. The hydraulic model ran various storm scenarios ranging from 2-year ARI, 10-year ARI and 100-year ARI design rainfall, including climate change assumptions for existing (2018) development. The hydraulic model covers the urban centres of Cambridge, Te Awamutu, and Kihikihi. The model ran the following three scenarios:
- (a) The 2018 development without the inclusion of climate change;
 - (b) The 2018 development with the inclusion of climate change (RCP 6.0 - 2100); and
 - (c) The District Plan assumptions for MDRS with climate change (RCP 6.0 -2100).

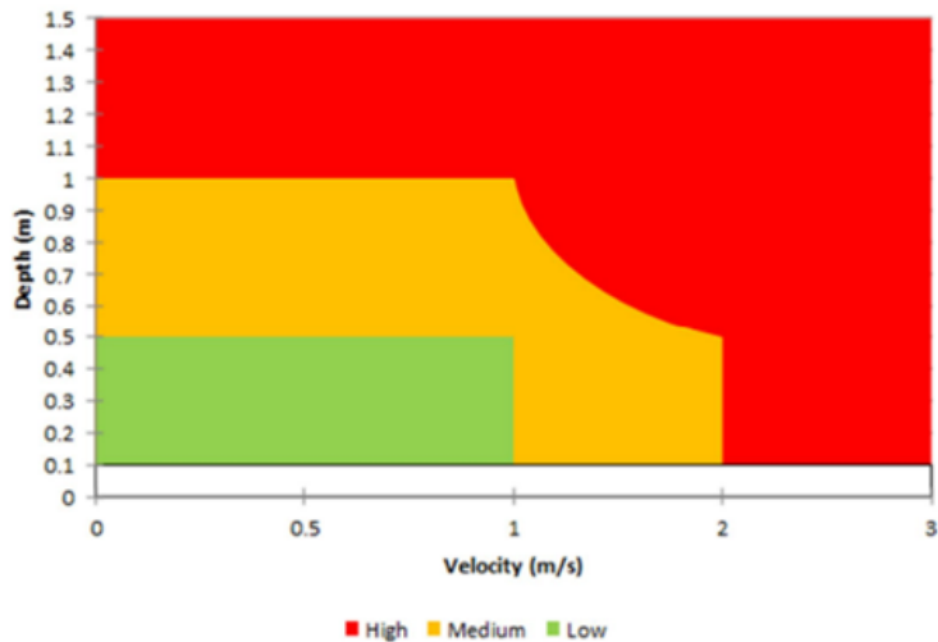
¹ As documented in Part A.1 Stormwater Modelling Overview Report November 2021.

- 6.3 The key hydraulic assumptions are provided in the technical report at Appendix 9 of the Section 32 Report.

Use of Flood Model Results

- 6.4 The flood model results used to assess level of service and flood hazard were the '2018 development with the inclusion of climate change (RCP 6.0 2100)'. The model results were used to assess:
- (a) Stormwater Infrastructure Capacity Assessment – this assessment determined if the pipes had capacity during the 2-year and 10-year ARI (the including of RCP 6.0 2100); and
 - (b) Flood Hazard Assessment – this assessment provided an extent (including ponding areas, depths, velocity, and flows), hazard and overland flow for the 100-year ARI (the including of RCP 6.0 2100).
- 6.5 The Stormwater Infrastructure Pipe Capacity Assessment showed that there was varied capacity across the existing network (in Cambridge, Te Awamutu and Kihikihi) to deal with current stormwater levels. There is a significant portion of the existing pipe network that has no capacity to cope with any increases in stormwater. There are also very few pipes that have any capacity to deal with increased demand on the network resulting in a series of flood ponding areas (from low to high risk) and overland flow paths. A full copy of the report is provided in Appendix 9 of the Section 32 Report for PC26.
- 6.6 Flood hazards were assessed by reviewing the resultant Depth (flood water depth) x Velocity (flood water velocity) calculation to determine the risk to human life. The hazard matrix is shown below in Figure 1. This matrix categorises risk to human life and is the same approach that has been adopted by Hamilton City Council. The full report on flood hazards is provided in Appendix 9 of the Section 32 Report for PC26.

Figure 1: Flood Hazard Matrix



7. DISTRICT PLAN

- 7.1 The District Plan contains a number of existing provisions relating to stormwater and flood risk. The most relevant for current purposes are the rules relating to site coverage, maximum impermeable surfaces and high risk flood zones.

Site coverage

- 7.2 Rule 2.4.2.12 of the District Plan provides that:

Rule – Maximum site coverage

Site coverage must not exceed 40% of the net site area, except that this rule does not apply to St Kilda Structure Plan Area (refer to Rules 2.4.2.14 and 2.4.2.15) and compact housing (refer to Rule 2.4.2.44).

Activities that fail to comply with this rule will require a resource consent for a discretionary activity.

- 7.3 Site or building coverage can potentially adversely affect flood hazard to people and property, by the generation of increased runoff (volume and peak flows) from new impervious surfaces, and from the physical impacts

of infilling floodplains which can reduce storage capacity and displace floodwater.

Impermeable surfaces

7.4 Rule 2.4.2.13 of the District Plan provides that:

Rule – Impermeable surfaces

Impermeable surfaces must not exceed:

- (a) 45% of the net site area in the Cambridge North Structure Plan Area; or
- (b) 60% of the net site area in the remainder of the Zone (except St Kilda Structure Plan Area).

Activities that fail to comply with this rule will require a resource consent for a restricted discretionary activity with the direction being restricted over:

- On-site stormwater disposal
- The effect of stormwater run-off to adjoining properties.

These matters will be considered in accordance with the assessment criteria in Section 21.

7.5 On-site soakage of stormwater is a preferred disposal option for Council in accordance with the Waikato Regional Infrastructure Technical Specifications (“RITS”). Limiting impermeable surfaces allows for maximum space (40% permeable area – balance of lot) to dispose stormwater to ground while providing for acceptable setbacks from foundations, other services, and property boundaries.

Flood risk

7.6 Rule 15.4.2.14 of the District Plan provides for a minimum free-board in certain circumstances:

Rule – Site suitability: within or adjoining a Flood Hazard Area

Subdivision and Development within or adjoining a Flood Hazard Area identified on the Planning Maps, or as shown on the Houchens Road Large Lot Residential Structure Plan at Appendix S13, shall have building platforms in a complying location that can achieve a minimum free-board level 500mm above the 1% AEP (100 year flood level).

Advice Note: The flood areas on the District Plan Maps are derived from: TE Awamutu Flood Management Plan, Waikato Regional Council, Technical Publication 93/10, and the Pukekura Drain Hydraulic Assessment Stage 4,

Opus, January 2011, and the Waipā River Flood Hazard Study, Waikato Regional Council.

7.7 Rule 15.4.2.15 of the District Plan provides that:

No subdivision and development shall occur within a High Risk Flood Zone.

Advice Note: The 'High Risk Flood Zone' is defined in Part B of the District Plan and relates to the 1% AEP (100 year flood level).

Activities that fail to comply with Rules 15.4.2.14 and 15.4.2.15 will require a resource consent for a non-complying activity.

7.8 The location of the High Risk Flood Zone is not identified on the planning maps, but instead is defined in the District Plan as follows:

'High risk flood zone' means land that is subject to RIVER or surface flooding during an event with ANNUAL EXCEEDENCE PROBABILITY of no more than one percent, and during such an event:

- The depth of flood waters exceeds 1m; or
- The speed of flood waters exceeds 2m per second; or
- The flood depth multiplied by the flood speed exceeds one.

7.9 I consider that this rule is robust in that it adopts a risk-based approach based on hazard mapping. The current high hazard areas are relatively confined in the district based on regional mapping of major watercourses. This rule can also be applied in the future to the current flood modelling undertaken by Council in 2018 and the subsequent hazard mapping for all main townships.

8. PLAN CHANGE 26

8.1 PC26 proposes to retain the rules relating to impermeable surfaces (now rule 2A.4.2.9) and the High Risk Flood Zone.

8.2 I support the retention of these rules. Changes to the impervious coverage could potentially have an adverse effect on flood extents by the generation of additional stormwater runoff and also means that there may be increased adverse effects to the receiving environment due to

decreased water quality and erosion risks that do not align to the Council's CSDC and the objectives of Te Ture Whaimana.

8.3 However, as part of the MDRS, new rule 2A.4.2.7 would now allow a maximum building coverage of 50% within the new Medium Density Residential Zone in Cambridge, Te Awamutu and Kihikihi.

8.4 The potential effects of increased building coverage as a permitted activity in PC26 above the 40% permitted under the District Plan are:

(a) An increase in flood hazard due to filling in a flood plain through site coverage.

(b) Increased contaminant loads entering the stormwater network due to larger building areas.

(c) Increased effects of scour and erosion in receiving waterways due to larger building areas.

8.5 These identified potential effects do not align with Council's obligations to comply with the CSDC in relation to managing the adverse effects of flooding as well as scour and erosion in the receiving environment as there is a permitted increase in coverage without any mitigation of the effects. Of particular relevance are the following general conditions of Council's CSDC:

Changes in municipal stormwater system diversion and discharge activities

4) The consent holder shall not undertake any changes to the municipal stormwater system diversion and discharge activities which would increase the scale or intensity of actual or potential adverse effects of those activities on the receiving environment.

Adverse effects of erosion

5) The consent holder shall be responsible for the structural integrity and maintenance of stormwater system diversion and discharge structures, and for any erosion control works that become necessary to preserve the integrity and stability of the river/stream channels and/or to control erosion as a result of the exercise of this resource consent.

Surface water flooding

- 6) The consent holder shall ensure that the municipal stormwater system is maintained in such a way as to reasonably minimise the potential for adverse flooding effects to land and property resulting from the stormwater diversion and discharge activities.

Significant adverse effect on existing aquatic ecosystems

- 7) The consent holder shall manage the municipal stormwater system such that the stormwater diversion and discharge activities do not result in significant adverse effects on aquatic ecosystems.”

- 8.6 To address the effects of flooding, PC26 introduces a Stormwater Overlay, which is shown on Planning Maps 56 and 57.

Extent of the Stormwater Overlay

- 8.7 The location and extent of the Stormwater Overlay is based on a collection of different information sources including:

- (a) District Plan, Waikato Regional Council river and stream flood hazard extent boundaries – assuming all District Plan flood extent boundaries are high hazard due to the associated depth of flow.
- (b) The flood hazard layer and overland flow path layer developed by TMW based on hydraulic modelling undertaken by WSP Ltd.
- (c) Properties at risk determined by intersecting the flood hazard map and overland flow path maps with property boundaries while excluding:
 - (i) Commercial, industrial, and general park areas;
 - (ii) Properties with less than 20% flooding area over the boundary. This is due to the likelihood of being able to mitigate flood risk and to remove isolated ponding and lidar errors;
 - (iii) Double ups where a medium hazard ponding area is already part of a low hazard and/or overland flow path area. The properties that overlay the flood extent are considered to be

part of the Stormwater Overlay. This is due to the likely impact this property has on high hazard ponding; and

- (iv) Likewise, where a high hazard ponding area forms part of a low and medium hazard and/or overland flow path area. The properties that overlay the flood extent are considered as part of the Stormwater Overlay. Again, this is due to the likely contribution of this property area to high hazard ponding.

8.8 Following the preparation of the 'properties at risk layer' detailed above, Council generated the Stormwater Overlay including a wider range of properties intersected by the 100-year ARI flood depth layer (i.e. the 2018 development with the inclusion of climate change (RCP 6.0 - 2013)). This layer therefore provides a more conservative qualifying matter and I consider this appropriate.

Effect of the Stormwater Overlay

8.9 PC26 proposes a new Rule 2A.4.2.8 which provides (as proposed to be amended by the Section 42A Report):

On sites located within the Stormwater Qualifying Matter Overlay, the maximum building coverage must not exceed 40% of the net site area.

Activities that fail to comply with the Rule will require a resource consent for a restricted discretionary activity with the discretion being restricted over:

- The impact on rivers and waterbodies and whether any potential adverse effects from a development can be avoided or migrated; and
- An assessment of stormwater disposal and whether this can be accommodated on-site.

These matters will be considered in accordance with the assessment criteria in Section 21.

8.10 The matters over which discretion is restricted will be considered in accordance with the assessment criteria in Section 21 (Assessment Criteria and Information Requirements) as follows:

21.1.2A.9	Building coverage	<ul style="list-style-type: none"> (a) The extent to which the site will remain characterised by generous areas of open space and garden plantings, rather than buildings. (b) The ability to provide adequate opportunity for garden and mature tree plantings around buildings. (c) The extent to which any proposed buildings will be compatible with the scale of other buildings in the surrounding area and will not result in visual domination that is out of character with the planned build form outcomes of the surrounding environment. (79.317) (d) Where provided, on site vehicle parking and manoeuvring. (30.12) (e) The extent to which increased site coverage would adversely affect adjoining properties, including historic heritage and character cluster sites in terms of dominance of buildings, loss of privacy, access to sunlight and daylight. (32.3) (f) The extent to which any increase in the level of site coverage will effect or has the potential to result in stormwater run-off to adjoining properties. (g) The ability to provide adequate outdoor space on the site for all outdoor activities associated with residential and other activities permitted on the site. (h) Building location, bult and design; that address impacts of infill development and runoff from building footprint and impervious services on food risk within the site and outside the site. (i) Stormwater disposal to treat water quality. (53.3, 53.4)
-----------	-------------------	---

8.11 I support these provisions because an increase in building footprint (which is associated with building coverage) that is proposed as part of PC26 outside the Stormwater Overlay could potentially cause adverse effects by displacing floodwater and increasing flood depths and flood extents within the site and off site. The cumulative impacts of adding another brick to the bathtub is a commonly used analogy.

8.12 I also support these provisions because an increase in building coverage can potentially cause adverse effects to water quality and scour of downstream receiving environments. By reducing the coverage back to 40% means that we are reducing the risk of water quality and scour effects back to the existing provisions in the District Plan.

- 8.13 The current District Plan provides that the maximum building coverage must not exceed 40% of the net site area as a permitted activity. PC26 proposes that maximum building coverage must not exceed 50% of the net site area outside the Stormwater Overlay.
- 8.14 The Stormwater Overlay therefore proposes a 40% building coverage which is less than the proposed MDRS (50%) in PC26. The 40% coverage is reasonably close to existing development coverage and therefore in my opinion the current impacts on flooding, scour and water quality associated with existing development remains unchanged.
- 8.15 I recommend that the building coverage rule within PC26 (outside the Stormwater Overlay) does not increase to more than 40% as per the current District Plan in order to contribute to achieving the objectives of Te Ture Whaimana, notably *“the restoration of water quality within the Waikato River so that it is safe for people to swim in and take food from over its entire length”*.

Assessment criteria

- 8.16 I recommend that the assessment criteria (Medium Density Residential Zone Assessment Criteria) in 21.1.2A.9 (Building Coverage) be amended by adding the following additional criteria addressing stormwater effects:
- (a) Building location, bulk and design; address impacts of infill development and runoff from building footprint and impervious services on flood risk (level and velocity) within the site and outside the site;
 - (b) The building design addresses the impacts of water quality as a result of building coverage through the application of on lot treatment devices; and

- (c) The building design address the impacts of downstream erosion as a result of building coverage through the application of on lot detention devices.

8.17 These amendments are required to:

- (a) Manage the adverse effects of people and property due to flood risk through increased runoff and fill in a flood plain; and
- (b) Meet the requirements of Te Ture Whaimana in terms of managing the effects of water quality and stream erosion of receiving environments.

Water quality and erosion

8.18 The Stormwater Overlay provisions go some way towards addressing potential impacts on water quality and the effects on the receiving environment of scour from intensifying development. This is because the % building coverage within the Stormwater Overlay does not increase above that provided for under the existing District Plan and is similar to the current building coverages observed within the Medium Density Residential Zone.

8.19 However, with respect to the objectives of Te Ture Whaimana, the Stormwater Overlay does not fully achieve this as it will continue to result in the discharge of contaminants and volumes of water that are not specifically treated before entering the river.

8.20 While the Stormwater Overlay means that the site coverage will move from 50% to 40% (which is similar to the existing development), the effects of water quality and erosion as a result of site coverage are likely to remain the same.

8.21 In the absence of a planning condition, New Zealand Building Code (“NZBC”) - NZBC Clause for Surface Water is E1 is relied upon (specifically

Clause E1 – SURFACE WATER), where the Verification Method E1/VM1 provides a design process which does inherently address volume management and water quality management through the provision of quantity management:

- (a) Soakage devices are required to dispose of the 1 in 10-year ARI storm (which can address volume and water quality management); and
- (b) Outfall velocities are required to minimise the impacts to the natural environment (which can address receiving environment erosion and scour).

8.22 NZBC however does not specifically require that water quality management or downstream receiving environment scour is addressed. This is particularly relevant when soakage or outfall requirements cannot be easily met, and the outcome is left to discretion and a new condition to be provided to meet the Council's CSDC.

8.23 The Council also has a stormwater bylaw which helps to manage these effects to ensure compliance with the Council's CSDC. A key purpose of the bylaw is to manage the entry of prohibited materials into the stormwater system and contribute to achieving appropriate environmental outcomes consistent with Te Ture Whaimana and the Future Proof Sub-Regional Three Waters Strategy.

8.24 In addition to these methods, I have recommended that the assessment criteria for applications for resource consent within the Stormwater Overlay include consideration of water quality management in terms of treatment and managing the erosion of the receiving environment.

9. RESPONSE TO SUBMISSIONS

9.1 I have reviewed the submission points related to the Stormwater Overlay and I respond to the key issues raised by those submissions below.

Whether Rule 2A.4.2.8 should refer to impermeable surfaces rather than building coverage

- 9.2 The submission by Cogswell Surveys Limited (submitter 53) seeks that Rule 2A.4.2.8 be removed or amended to refer to impermeable surfaces rather than site coverage. The submission requests that a maximum of 50% impermeable surfaces should apply, rather than 50% site coverage.
- 9.3 There are two rules that are proposed as part of PC26, one addresses site coverage and the other addresses impermeable surfaces. This aligns with the District Plan. There is currently no change proposed to the maximum impermeable surfaces (60%). This aligns with the CSDC and Te Ture Whaimana. There is an increase in building coverage from 40% to 50% as part of PC26, except where the Stormwater Overlay applies, where building coverage remains as per the District Plan coverage of 40%. The requirement for this percentage is to prevent the potential increase of flood risk due to filling of a flood plain.

Retaining a limit of 60% impermeable surfaces

- 9.4 A number of submissions support retaining a maximum of 60% impermeable surfaces. However, the submission by The Retirement Villages Association of New Zealand Limited (submitter 73) seeks that the maximum be amended to 70%.
- 9.5 Increasing the maximum impermeable surfaces percentage to 70% is not recommended as a permitted activity. This would result in the stormwater network being below its current level of service, increasing contaminant and volume loads within receiving environments and increasing flood risk. This increase does not give effect to the CSDC and the objectives of Te Ture Whaimana.

Whether PC26 should include on-site measures

- 9.6 The submission by Rickey Millen (submitter 19) considers that new buildings should have on-site measures such as rainwater tanks to reduce stormwater effects.
- 9.7 Onsite measures are generally addressed within the NZBC, where soakage devices are recommended for discharge to ground or the drainage network is sized to accommodate the 50% and 10% AEP design flows. Where this cannot be accommodated, it is for the discretion of Council to provide a consent condition that aligns with the CSDC. In addition, I have recommended that water quality and volume management be addressed in the assessment criteria (21.1.2A.9).

Why does Cambridge North have a maximum impermeable surface that is lower than elsewhere

- 9.8 The submission by Cogswell Surveys Limited questions why Cambridge North has a maximum impermeable surface that is less than elsewhere in the district.
- 9.9 Cambridge North has unique challenges identified during its own structure plan and discharge consent process with limited infrastructure capacity, flat grades and high water tables meaning that the maximum probable percentage area were unable to be achieved under a permitted activity status.

10. CONCLUSION

- 10.1 Allowing housing intensification that increases the risk of flooding, stormwater overflows or reduced water pressure is not consistent with the purpose of the Resource Management Act 1991 nor the directive given in section 6 in respect of matters of national importance (in particular the matters in 6(a), (b) and (e)). It is acknowledged that people

who apply for resource consents to build within the Stormwater Overlay will need to pay the costs associated with applying for resource consent as well as the required infrastructure capacity assessment.

- 10.2 The technical reports referred to in my evidence confirm that unplanned and unanticipated medium density residential intensification has the potential to significantly impact on Council's infrastructure network and give rise to adverse effects on waterbodies.
- 10.3 Current capacity mapping (2018 flood modelling) highlights numerous under capacity pipes as well as flood hazard areas and ponding areas within the district.
- 10.4 Other guidance can be referred to when undertaking infrastructure assessments such as the RITS for stormwater, in particular section 3.6.5. This section sets out requirements for the design and construction of stormwater systems for land development and subdivision.
- 10.5 It is noted that stormwater systems have the potential to convey pollutants and increase the flow rate and volume of water to a receiving environment such as streams (natural and modified), rivers, lakes and groundwater. It is recognised that discharges will impact on these environments and the environmental, cultural and social values which they support.
- 10.6 RITS provides high level guidance to designers with an understanding of the key design considerations to support good performance outcomes. RITS also requires that the design of the stormwater system ensure an acceptable stormwater service for each property by providing a treatment, control and disposal system within each property boundary, or a service connection from each property to a stormwater management system, or a combination of both.

- 10.7 Waikato Regional Council guidance also provides best practice advice on Low Impact Design and flood management relevant to the Waipā District context.
- 10.8 As per my analysis above, applying the MDRS without the Stormwater Overlay would not adequately enable the Council to manage the potential effects associated with the displacement of floodwater; this is akin to adding another brick to the bathtub. Displacement impacts are especially important in ponding areas (aka the bath-tub), with spill points currently unknown because Council have not as yet modelled displacement impacts from infill.

Michael Chapman
Date 27 March 2023