

Appendix 16: Climate Change Assessment

Memorandum

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Attention:	Rebecca Steenstra
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Date:	21 December 2022
From:	Sam Parsons
Message Ref:	Cambridge C5 Growth Cell Plan Change - Climate Change Advice
Project No:	BM210028

1.0 Introduction

This memo supports an application to the Waipa District Council (WDC) for a private plan change to develop growth cell C5 and an adjoining section of land to the east and north of C5 (hereafter 'the site'), located on the south-eastern fringe of Leamington.

Much of the site is currently zoned Deferred Residential in the District Plan, with future residential development identified in this location after 2035. In accordance with the Future Proof Strategy, to assist local authorities in responding to out of sequence and unanticipated plan changes, a set of Potential Development Scenario Criteria have been established.

The purpose of this memo is to address how development of the site would support reductions in greenhouse gas emissions and resilience to the current and future effects of climate change, in accordance with Future Proof Strategy – Potential Development Scenario Criteria A (M) and Resource Management Act (RMA) 1991 obligations.

2.0 Strategic and Regulatory Climate Change Requirements

2.1 Future Proof Strategy: Management approaches for responding to climate change

The Future Proof Strategy as a whole is underpinned by an approach that supports emissions reductions and climate resilience through planning for a well-considered, compact, and concentrated urban form.¹ It acknowledges initiatives to reduce emissions are largely led at a central government level, with territorial authorities implementing their obligations under the RMA 1991.

To ensure out of sequence and unanticipated plan changes do not compromise the Future Proof Strategy's climate change response approach, all potential development scenarios shall apply the Future Proof Criteria A(M):

M. That the development would support reductions in greenhouse gas emissions and would be resilient to the likely current and future effects of climate change, with robust evidence underpinning this assessment

¹ Future Proof Strategy, 2022. Retrieved from: <https://futureproof.org.nz/the-strategy/>

As stated in the Responding to Climate Change, Future Proof growth management approach, the key aspects to support emissions reductions and climate resilience in alignment with the wider strategy, pertinent to this out of sequence and unanticipated plan change are:

- Ensuring that future growth areas avoid waahi toitu areas, including areas subject to natural hazards such as flooding and geotechnical instability²
- Promoting urban development in areas of high accessibility by a variety of transportation modes, including walking, cycling, and micro-mobility
- Supporting a long-term shift in transportation from high levels of car dependency to a rapid and frequent public transport network service
- Supporting risk-reduced developments

2.2 Resource Management Amendment Act 2020: National Adaptation Plan and Emissions Reduction Plan

From 30 November 2022, local government must 'have regard to' Aotearoa New Zealand's first national adaptation plan and Aotearoa New Zealand's first emissions reduction plan when they prepare or change a regional policy statement, regional plan, or district plan. This is a requirement under the RMA 1991, made by the Resource Management Amendment Act 2020 to create stronger links between decision-making under the RMA and the Climate Change Response Act 2002.³

The national adaptation plan and emissions reduction plan sets the Government's strategies, policies, and actions to respond to New Zealand's most significant climate change risks and meet its set emission budgets. The strategies, policies, and actions contained in these plans span across all sectors and industries that contribute to New Zealand's emissions inventory and all value domains that are affected by climate-related hazards. As such, to 'have regard' to the national adaptation plan and emissions reduction plan in the context of this plan change for a residential development, the following key parts should be considered:

National Adaptation Plan - Priorities and Objectives

- **Priority 1:** Enabling better risk-informed decisions
 - Objective C1: Enable Communities to adapt
 - Objective INF1: Reduce the vulnerability of assets exposed to climate change
- **Priority 2:** Ensuring our planning and infrastructure investment decisions drive climate resilient development in the right locations
 - Objective HBP1: Homes and buildings are climate resilient and meet social and cultural needs.
 - Objective HBP2: New and existing places are planned and managed to minimise risks to communities from climate change
 - Objective INF2: Ensure all new infrastructure is fit for a changing climate
- **Priority 3:** Considering adaptation options, including managed retreat
 - Objective NE3: Support working with nature to build resilience
 - Objective HBP1: Homes and buildings are climate resilient and meet social and cultural needs.
 - Objective INF1: Reduce the vulnerability of assets exposed to climate change

² Includes high risk flood zones, instability risk, significant natural areas, wetlands, heritage sites, reserves, DOC land, QEII trust covenants, infrastructure corridors, outstanding natural features, steep slopes (25 degrees or greater), elite soils (LUC1), peat soil (depth greater than 3 metres), peat lakes (outside Rotokauri)

³ Sections 17, 18, and 21 are amendments of RMA section 61(2)(d), 66(2)(f), and 74(2)(d), respectively.

- **Principle 5: A productive, sustainable, and inclusive economy**
 - Building and Construction Focus Area 2: Accelerate the shift to low-emissions buildings
 - Planning and Infrastructure Action 7.6: Identify ways to support the private sector to deliver lower emissions development
 - Transport Focus Area 1: Reduce reliance on cars and support people to walk, cycle and use public transport

3.0 C5 Growth Cell Development Climate Change Assessment

3.1 Climate Change Risk

Consistent with the rest of New Zealand, climate change is projected to continue to alter long-term climatic conditions and the climatic variability in the Waikato Region. Under a high emission (RCP8.5)⁴ climate change scenario, mean temperature is projected to increase approximately 1.1°C by 2040 and 3.8°C by 2090 across the Waikato Region.⁵

While changes in mean temperature and precipitation can directly and indirectly impact the natural environment, built environment, and human health; in the context of a residential development, the resulting changes in frequency and intensity of extreme weather events often presents the greatest climate-related risk.⁶

A warmer atmosphere can hold more moisture, so there is potential for heavier extreme rainfall events with increases in temperature under climate change. NIWA's High Intensity Rainfall Design System (HIRDS version 4) allows rainfall event totals at various recurrence intervals to be calculated for any location, along with future potential rainfall event totals based on climate change scenarios. Extreme rainfall events are projected to increase with climate change in the Cambridge area. As shown in Table 1, the depth of rainfall across all duration periods for a 1% Annual Exceedance Probability (1% AEP) extreme rainfall event are expected to increase, with the greatest change in depth expected during shorter event durations.

Table 1: Rainfall depth (mm) and percentage changes in projected 1% AEP extreme rainfall event – based on RCP8.5 climate change scenario for site Cambridge C75944 for 2040 (2031-2050) and 2090 (2081-2100)

1% AEP	Historic (mm)	2040 (mm + % increase)	2090 (mm + % increase)
1 hr	53.1	59.3 (11.7%)	71.8 (35.2%)
12hr	121	132 (9.1%)	153 (26.4%)
24hr	147	157 (6.8%)	179 (21.8%)
48hr	174	185 (6.3%)	208 (19.5%)
72hr	191	202 (5.8%)	225 (17.8%)

Increased frequency and intensity of extreme rainfall events likely exacerbates the hazards associated with fluvial and pluvial flooding in residential developments presenting risks to residential infrastructure and community values. Catchment characteristics, run-off, stormwater management, and existing natural hazards

⁴ Note, while the RCP 8.5 climate change scenario represents a fossil-fuel intensive representative concentration pathway that does not align with New Zealand's emission reduction commitments, Boffa Miskell applies a 'no regrets' approach towards climate change risk screening in alignment with common practice. The use of a 'greatest plausible change' scenario supports hazard identification.

⁵ Ministry for the Environment 2018. *Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment, 2nd Edition*. Wellington: Ministry for the Environment.

⁶ National Climate Change Risk Assessment for New Zealand – Built Environment Risk #2: Risks to buildings due to extreme weather events, droughts, increased fire weather and ongoing sea-level rise. Built Environment Risk #4: Risk to wastewater and stormwater systems (and levels of service) due to extreme weather events and ongoing sea-level rise.

often determine the extent of this risk, so it is assumed that the identification of existing waahi toitu sites within the proposed development area will support indication of flood-risk change.

3.2 Climate Change Adaptation and Resilience

The proposed development site located across C5 Growth Cell and adjoining land has been assessed as meeting climate change resilience requirements under the Future Proof Strategy and in alignment with the National Adaptation Plan.

The site aligns with the Future Proof Strategy climate change resilience objective of avoiding development on waahi toitu areas, with no hazard constraint areas identified within vicinity of proposed residential development.

The proposed development plan for the site appropriately incorporates water sensitive design principles to accommodate climate change risks associated with flooding around existing bodies of water and overland flow pathways. As per the supplied proposed structure plan general arrangement and supporting Stormwater Infiltration Basin and Flood Risk documents, the development incorporates nature reserves located along the Waikato River and adjoining stream tributaries to buffer from the possible effects of fluvial flooding on built assets. These nature reserve buffers go well-beyond the 1% AEP modelled flooding extent for the Waikato River. Soakage basins have also been incorporated South of the Gully alongside the proposed High-Density zones to manage current ponding in the catchment, which has accounted for a 1% AEP + high-emission rainfall scenario.

3.3 Emissions Reduction and Accessibility

As recognised in Aotearoa New Zealand's first emission reduction plan, well considered planning and investment in infrastructure can support New Zealand's long-term emissions reductions. A well-functioning urban environment with a diversity of mixed use, medium-density, and high-density development that promotes accessibility to urban centres through a variety of transport methods will help reduce urban GHG emissions.

3.3.1 Transport and Accessibility

The Future Proof Strategy and the emissions reduction plan seek to promote urban development that is accessible to urban centres to reduce car dependency and support a variety of transportation modes, including walking, cycling, and public transport.

In terms of accessibility, the pre-identified location of Growth Cell C5 has the proposed site located in close proximity to the network of existing local and collector transport routes. The site is accessible via Maungatautari Road and Wordsworth Street, both of which connect to the main thoroughfare of Shakespeare Street for traffic to Cambridge town centre. For access to public transport services, currently the only bus service offered in Cambridge is the Regional Cambridge to Hamilton service. The service operates a one-way loop along Shakespeare Street, approximately 900m-1km from the boundary of the proposed site.

Maungatautari Road also serves as part of the route for the Te Awa River Ride, providing cycle access between the towns of Ngaruawhaia, Hamilton, Tamahere, Cambridge, and Lake Karapiro.

While the limited overall public transport services available in Cambridge likely restricts the reduction in car dependency for the proposed residential development in the near-term, the pre-identified accessible location of the growth cell supports the long-term shift in transport mode.

3.3.2 Low Emissions Development

The GHG emission benefits of higher-density residential development, in terms of lower product, construction, and operational emissions than standalone dwellings are promoted in both the Future Proof Strategy and emissions reduction plan. This approach also presents the co-benefits of enabling greater supply and diversity of housing to be built at pace and scale, improving affordability. As such, the emission reduction plan contains system settings seeking to support and accelerate the development of lower-emission housing.

At a masterplan / general arrangement level of analysis, the proposed development of the site will support the Future Proof Strategy and emissions reduction plan's intent of enabling low-emission residential

development. With the vast majority of the proposed development consisting of both medium-density and high-density housing, the calculated total emissions for new dwellings over a 90-year service life (from cradle to grave) is significantly lower than that of traditional detached housing. In New Zealand, the calculated climate impact of one medium density housing unit is 135.4 tCO₂e compared to 233.2 tCO₂e for one detached house (over a 90-year service life).⁷

The majority of the carbon footprint for detached and medium-density housing over the service life is associated with operational energy consumed for space heating, hot water, and electronics, contributing 76% to medium-density housing and 78% to detached housing. To further enhance emissions reduction benefits delivered by the proposed residential development, housing designs should incorporate measures to improve energy efficiency and reduce the embodied carbon emissions of construction materials used.

4.0 Further Climate Change Considerations

Following spatial and general arrangement planning for the proposed residential development, further climate change consideration can be incorporated into the detailed planning to support climate resilience and emissions reduction at a household level:

- Plant species selected with reference to future mean temperature and precipitation extremes to support resilience of landscaping
- Restoration areas to consider high sequestration vegetation types to support carbon positive outcomes, with reference to local biodiversity and cultural requirements
- Housing to incorporate energy efficient design aspects where appropriate to reduce operational energy use
- Transportation network to support and promote safe pedestrian, cycle, and other micro-mobility methods to reduce short vehicle trip related emissions
- Building and infrastructure design to incorporate lower embodied carbon emission materials to reduce the product and construction related emissions

⁷ McLaren, S. J., Chandrakumar, C., Dowdell, D., Bullen, L., & Jaques, R. (2020). *Application of Absolute Sustainability Assessment to New Zealand Residential Dwellings*. IOP Conference Series: Earth and Environmental Science, 588, 022064.