BEFORE A HEARING PANEL: WHAKATĀNE DISTRICT COUNCIL AND BAY OF PLENTY REGIONAL COUNCIL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of submissions and further submissions on Plan Change 1 (Awatarariki Fanhead, Matatā) to the Operative Whakatāne District Plan and Plan Change 17 (Natural Hazards) to the Bay of Plenty Regional Natural Resources Plan

---

STATEMENT OF EVIDENCE OF DR WENDY SAUNDERS ON BEHALF OF WHAKATĀNE DISTRICT COUNCIL

RESOURCE MANAGEMENT – PLANNING

15 January 2020

BROOKFIELDS
LAWYERS
A M B Green / R H Ashton
Telephone No. 09 979 2172
Fax No. 09 379 3224
Email: green@brookfields.co.nz
P O Box 240
DX CP24134
AUCKLAND

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

1.1. My evidence relates to:

(a) The 2013 Matatā hind-testing of the risk-based approach, and a revised version of the hind-test based on new information available since 2013; and

(b) My assessment of the Proposed Plan Changes and issues raised in the submissions.

1.2. Based on the technical risk information now available, the number of houses within the hazard area and new climate change projections, a desktop reassessment of the Saunders et al (2013) risk-based assessment of Matatā shows the 'risk' for land use planning purposes has changed from 'discretionary' in 2013, to 'non-complying' or 'prohibited'. The original assessment was undertaken to show how the risk-based approach could be applied. It did not include any engagement with landowners or other stakeholders, which would inform the outcome.

1.3. In my opinion, I consider the Proposed Plan Changes provide an appropriate planning response to the risk, ensuring the sustainable management of a high risk area. The Proposed Plan Changes provide for people's health and safety by changing the land use in the high risk areas, manage the significant risk posed, and are consistent with the Bay of Plenty Regional Policy Statement (**RPS**).

2. INTRODUCTION

2.1. My full name is Dr Wendy Susan Anne Saunders.

2.2. My evidence is given on behalf of the Whakatāne District Council (the **District Council**) in relation to:

(a) Proposed Plan Change 1 (Awatarariki Fanhead, Matatā) to the Operative Whakatāne District Plan; and

(b) Proposed Plan Change 17 (Natural Hazards) to the Bay of Plenty Regional Natural Resources Plan (a private plan change request from the District Council)

(together referred to as the **Proposed Plan Changes**).

2.3. My evidence relates to the risk-based planning approach aspects of the Proposed Plan Changes and the risk-based assessment provided in Saunders et al 2013[1] that uses Matatā as an example of how the risk-based framework could be applied. My evidence will cover:

(a) The Matatā debris flow hind-testing case study in the Saunders et al (2013), which is also available on the associated risk-based website:

https://www.gns.cri.nz/Home/RBP/Risk-based-planning/A-toolbox/Examples/Hind-Testing/Matata-Debris-Flow. This hind-testing was used to test the 2013 risk-based approach on an event which had happened in the past.

(b) Selected submission points on the Proposed Plan Changes; and

(c) Endorsement of the Proposed Plan Changes.

2.4. My evidence will not include any geotechnical advice or opinion.

3. QUALIFICATIONS AND EXPERIENCE

3.1. I hold the position of Senior Natural Hazards and Climate Change Planner at GNS Science, Lower Hutt. I have been at GNS Science since 2005.

3.2. My qualifications include:

(a) A PhD from Massey University in risk-based land use planning, conferred in 2012;

(b) A Master of Social Science from the University of Waikato; and

(c) A Bachelors of Geography and Earth Science also from the University of Waikato.

---

[1] Saunders, W. S. A., Beban, J.G. & M Kilvington (2013). Risk-based land use planning for natural hazard risk reduction. GNS Science Miscellaneous Series 67, Lower Hutt, GNS Science: 97.

3.3. I have been a full member of the New Zealand Planning Institute (**NZPI**) since 2006.

3.4. My PhD entitled 'Innovative land use planning for natural hazard risk reduction in New Zealand' was awarded the NZPI Graduate Research Award in 2012. The subsequent toolbox development of the risk-based approach and implementation of the risk-based approach by the Bay of Plenty Regional Council (**Regional Council**) in their Regional Policy Statement was awarded the NZPI Best Practice Award in 2017. The usefulness, usability and use of the approach by the Regional Council contributed to my gaining the Science New Zealand Emerging Scientist Award in 2018.

3.5. I have worked within the Social Science team at GNS Science, Lower Hutt since January 2005, with a focus on managing natural hazards and their risks through land use planning. Prior to joining GNS Science I was a Resource Management Planner for Opus International Consultants (now WSP) in Nelson and Taupo; and in 1999-2000 I was the Natural Hazards and Emergency Management Officer for the Wellington Regional Council, Wairarapa Division.

3.6. During my time at GNS Science, I have been involved in the following relevant projects:

(a) In 2007 I was the compiling co-author of the publication "Guidelines for assessing planning policy and consent requirements for landslide prone land"[2], which takes a risk-based planning approach. Appendix 3 of the guidance provides a qualitative landslide risk assessment example from the Australian Geotechnical Society method (AGS 2000). This 2007 guidance is currently under review;

(b) Hutt City Plan Change 29 (2012) – the purpose of this plan change was to intensify mixed-use development in Petone. As a corporate citizen of Hutt City, GNS Science made submissions on the plan change to raise the importance of

[2] Saunders, W, & P. Glassey (Compilers) 2007. Guidelines for assessing planning, policy and consent requirements for landslide-prone land, GNS Science Miscellaneous Series 7.

planning for natural hazards, and to advocate for further provisions to be included in the plan change to manage the risks from natural hazards. A report on our submission and process has been published[3] in order to share lessons on the contribution science can make to planning outcomes;

(c) Replacement Christchurch District Plan (2014-16) – I coordinated the all of government response to the Natural Hazards chapter of the proposed plan (i.e. submission), attended conferencing and mediation, provided expert witness evidence, and attended the hearings. This included conferencing with landslide experts for the Port Hill land instability issues, and submitting on the land instability provisions within the proposed plan; and

(d) RPS Natural Hazard Chapter – I attended expert elicitation to gain agreement on what natural hazards were to be included in the proposed RPS; that the risk-based approach was appropriate; and timeframes. I also provided review comments on the draft chapter prior to notification. As a result of the engagement process used during the development of the RPS chapter to determine levels of risk (in which I did not participate), I co-authored a report with Dr Margaret Kilvington outlining the process involved[4]. The purpose of this report was to be able to share learnings and process with other councils embarking on a similar planning framework.

4. MY ROLE

4.1. I have not been involved in the development of the Proposed Plan Changes.

4.2. I first visited Matatā on the 26 November 2007 during the Joint Geological Society Conference of New Zealand and New Zealand

---

3 Saunders, W.S.A.; Beban, J.G. 2014 Petone Plan Change 29 : an example of science influencing land use planning policy. Lower Hutt, N.Z.: GNS Science. GNS Science report 2014/23 56 p.

4 Kilvington, M. and W. S. A. Saunders (2015). 'I can live with this': the Bay of Plenty Regional Council public engagement on acceptable risk. GNS Science Miscellaneous Series 86. Lower Hutt, GNS Science.

Geophysical Society Conference field trip[5]. During this fieldtrip, I walked around the Matatā community to gain an understanding of the level of recovery; and walked up the Awatarariki stream floor to view the damage to the stream bed and walls of the catchment, and debris. On 15 August 2019 I viewed the catchment from above (by helicopter) to gain an understanding of its current environment. I drove through the area again in December 2019, along Kaokaoroa Street, Clem Elliot Drive, and Richmond Street to see the progress of house removal.

4.3. In preparing this evidence I have reviewed the following documents and reports:

(a) Saunders, W. S. A., et al. (2013). Risk-based land use planning for natural hazard risk reduction. GNS Science Miscellaneous Series 67, Lower Hutt, GNS Science, p97; and associated webpage https://www.gns.cri.nz/Home/RBP/Risk-based-planning/A-toolbox;

(b) Bull, J. M., et al. (2010). "Assessing debris flows using LIDAR differencing: 18 May 2005 Matatā event, New Zealand." Geomorphology 124(1-2), pp 75-84;

(c) GNS Science letter to Dr Rob Burden, Whakatāne District Council, dated 2 November 2012;

(d) Plan Change 1 and 17;

(e) S32 evaluation report dated 8 June 2018 by Boffa Miskell;

(f) Summary of submissions;

(g) Section 42A report dated 20 December 2019 by John Olliver;

(h) “Matatā Flooding 18 May 2005: Meteorology Update” dated 22 November 2019 by Mr Peter Blackwood and Mr Tom Bassett;

5 https://securepages.co.nz/~gsnz/siteadmin/uploaded/gs_downloads/Abstracts/2007Tauranga_abstracts.pdf

(i) Letter dated 28 November 2019 from Enfocus to Julie Bevan (BOPRC) entitled “Policy and Planning Assessment of the GHD Technical Assessment of Debris Flow Risk Management”; and

(j) Evidence of Mr Craig Batchelar, Prof Tim Davies, Dr Chris Massey, Dr Mauri McSaveney, and Mr Gerard Willis.

5. CODE OF CONDUCT

5.1. Although this is a Council hearing I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Consolidated Practice Note 2014. I also agree to comply with the Code when presenting evidence to the Hearings Panel. I confirm that the issues addressed in this brief of evidence are within my area of expertise, except where I state that I rely upon the evidence of another expert witness. I also confirm that I have not omitted to consider material facts known to me that might alter or detract from the opinions.

6. REASSESSMENT OF THE 2013 MATATĀ RISK-BASED DESKTOP ASSESSMENT

6.1. In 2013 GNS Science released a risk-based toolbox for land use planning, which outlines a five step process:

1) know your hazard;

2) determine severity of consequences;

3) evaluate likelihood of event;

4) take a risk-based approach; and

5) monitor and evaluate.

6.2. The basis of this section of my evidence relates to steps 3 and 4, assessing the consequences and likelihood of an event, taking into account the number of houses at risk (i.e. 16 at the time of the plan change notification).

6.3. In 2013 as part of developing the GNS Science risk-based planning toolbox, the consequence and likelihood framework developed was hind tested against a number of previous events, one of which is provided in the online toolbox – the Matatā debris flow. The purpose of the testing

was to see if any perverse outcomes resulted from the outcome, or if the results seemed to produce an expected outcome.

6.4. The assessment of the 2005 debris flow was undertaken using the best publicly available information at the time, from StatsNZ (population and GDP figures); journal article by Bull et al (2010, p77) [6] for return period (1:500 years) and damage descriptions; and Ministry of Transport (for cost of deaths and injuries).

6.5. The assessment was purely a desktop exercise; it did not include any input from the community or other stakeholders to inform the resulting levels of risk. As outlined in Dr Chris Massey's evidence (paragraph 7.2), it is not the role of the technical expert to make decisions about risk thresholds – these should be set by the decision makers in consultation with those at risk. The aim of the example was to show how the assessment framework could be used by decision makers; the results would change depending on any council, community, expert and stakeholder consultation to determine appropriate levels of risk. This level of engagement was undertaken as part of the development of the RPS, the process of which is documented in Kilvington & Saunders (2015)[7], and is a key input into the 2013 risk based approach.

6.6. The steps taken to determine the results of the desktop assessment are provided at https://www.gns.cri.nz/Home/RBP/Risk-based-planning/A-toolbox/Examples/Hind-Testing/Matata-Debris-Flow and in the report Saunders, Beban and Kilvington (2013, p 44-46).

6.7. The assessment purposefully showed six consent activity status categories to show what was possible. In reality not all these categories would necessarily be required within a policy framework. The outcome was that the Matatā debris flow was assessed as being a 'tolerable' level of risk, resulting in a theoretical 'discretionary' activity status.

6.8. Since 2013 more investigations and detailed information has become available, particularly the 22 November 2019 report by Blackwood and

---

6 Bull, J. M., et al. (2010). "Assessing debris flows using LIDAR differencing: 18 May 2005 Matata event, New Zealand." Geomorphology 124(1-2), pp 75-84.

7 Kilvington, M. and W. S. A. Saunders (2015). 'I can live with this': the Bay of Plenty Regional Council public engagement on acceptable risk. GNS Science Miscellaneous Series 86. Lower Hutt, GNS Science.

Bassett that provides updated meteorology analysis which includes climate change projections from the Ministry for the Environment's coastal guidance[8].

6.9. A number of factors have changed since the 2013 desktop risk assessment, including the number of buildings in the hazard zone and the return period. Table 1 below shows the original 2013 assessment criteria, and a December 2019 assessment.

Table 1 Comparison between the 2013 and 2019 assessments

Risk-based planning inputs	2013	2019
Number of private properties in hazard zone	122	34
Number of buildings in hazard zone	144	16
Likely number of occupants (as per StatsNZ)	300 (based on 2.64 per dwelling)	43 (based on 2.7 per dwelling)[9]
Regional GDP	$4.318 billion (2003)	$13,071 billion (2016)[10]
Lifelines	Road, rail, power, telecommunications, water	Road, rail, power, telecommunications, water
Critical buildings	None	None
Social cultural buildings	None	None

8 https://www.mfe.govt.nz/publications/climate-change/coastal-hazards-and-climate-change-guidance-local-government

9 http://archive.stats.govt.nz/Census/2013-census/profile-and-summary-reports/qstats-families-households/households.aspx

10 http://archive.stats.govt.nz/browse_for_stats/economic_indicators/NationalAccounts/RegionalGDP_HOTPYeMar16.aspx

Building value	$28.5 million (114 houses @ $250k)	$8.1 million (for 16 houses, as per MoU between funding partners)[11]
Debris flow return period	1:500 (Bull et al, 2010)	1:100 (Blackwood & Basset, 2019)
Cost of death	$3.77 million	$4.37 million[12]
Cost of injury	$207k	$458k[13]

6.10. The main changes are the number of houses within the hazard zone (in 2013 this was based on a desktop count of the number of buildings within the hazard zone for theoretical purposes only; no ground-truthing was undertaken); costs of causalities (deaths and injuries), building values, and return period.

6.11. Plotting the 2019 assessment on the consequence table, the result is presented below. Like the 2013 assessment a number of assumptions have been made in this reassessment. It is assumed no deaths or injuries, although as per the evidence of Kevin Hind, supported by Prof. Davies and Dr. McSaveney, it is expected that a similar event could cause death or injury; and that more than 50% (i.e. more than 8) homes within the hazard zone, would have their functionality compromised (i.e. not be able to be used immediately after an event). It is noted that the RPS consequence table (Appendix L, p 377) does not include economic consequences.

---

11 Memorandum of Understanding to effect managed retreat at Awatarariki Fanhead, Matatā between the Crown, the Whakatāne District Council, and Bay of Plenty Regional Council

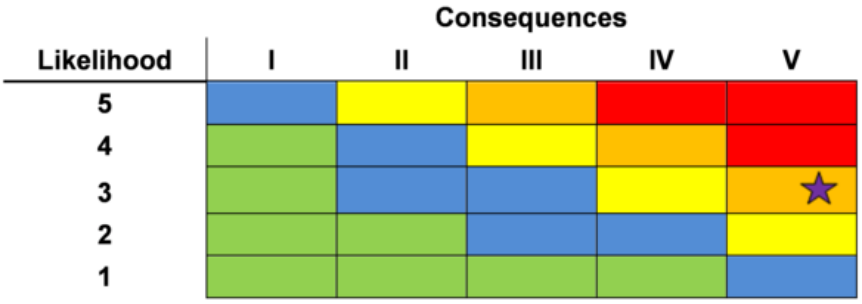
12 Ministry of Transport, 2018 value of statistical life, https://www.transport.govt.nz/mot-resources/road-safety-resources/roadcrashstatistics/social-cost-of-road-crashes-and-injuries/report-overview/

13 Ministry of Transport, 2018 non-fatal injury social cost (serious), https://www.transport.govt.nz/mot-resources/road-safety-resources/roadcrashstatistics/social-cost-of-road-crashes-and-injuries/report-overview/

Severity of Impact	Built				Economic	Health &Safety
	Social/Cultural	Buildings	Critical Buildings	Lifelines		
Catastrophic (V)	≥25% of buildings of social/cultural significance within hazard zone have functionality compromised	≥50% of affected buildings within hazard zone have functionality compromised	≥25% of critical facilities within hazard zone have functionality compromised	Out of service for > 1 month (affecting ≥20% of the town/city population) OR out of service for > 6 months (affecting < 20% of the town/city population)	> 10% of regional GDP	> 101 dead and/or > 1001 inj.
Major (IV)	11-24% of buildings of social/cultural significance within hazard zone have functionality compromised	21-49% of buildings within hazard zone have functionality compromised	11-24% of buildings within hazard zone have functionality compromised	Out of service for 1 week – 1 month (affecting ≥20% of the town/city population) OR out of service for 6 weeks to 6 months (affecting < 20% of the town/city population)	1-9.99% of regional GDP	11 – 100 dead and/or 101 – 1000 injured
Moderate (III)	6-10% of buildings of social/cultural significance within hazard zone have functionality compromised	11-20% of buildings within hazard zone have functionality compromised	6-10% of buildings within hazard zone have functionality compromised	Out of service for 1 day to 1 week (affecting ≥20% of the town/city population) OR out of service for 1 week to 6 weeks (affecting < 20% of the town/city population)	0.1-0.99% of regional GDP	2 – 10 dead and/or 11 – 100 injured
Minor (II)	1-5% of buildings of social/cultural significance within hazard zone have functionality compromised	2-10% of buildings within hazard zone have functionality compromised	1-5% of buildings within hazard zone have functionality compromised	Out of service for 2 hours to 1 day (affecting ≥20% of the town/city population) OR out of service for 1 day to 1 week (affecting < 20% of the town/city population)	0.01-0.09 % of regional GDP	<= 1 dead and/or 1 – 10 injured
Insignificant (I)	No buildings of social/cultural significance within hazard zone have functionality compromised	< 1% of affected buildings within hazard zone have functionality compromised	No damage within hazard zone, fully functional	Out of service for up to 2 hours (affecting ≥20% of the town/city population) OR out of service for up to 1 day (affecting < 20% of the town/city population)	<0.01% of regional GDP	No dead No injured

6.12. The economic consequence is calculated using (building value / RGDP) * 100, i.e. ($4 million / $13,071 billion) * 100 = 0.522% of regional GDP.

6.13. The likelihood has changed from 2012 to 2019, from 1:500 to 1:100. This changes the level of likelihood from 'unlikely' (level 3) to 'possible' (level 4). This likelihood, combined with the catastrophic consequences for the Matatā community (being 50% or more homes, within the hazard zone), equates to the following level of risk (note the purple star is the 2012 assessment outcome; white star is the 2019 assessment outcome in the below table):



Likelihood		Level of risk	Consent
5	Likely	Acceptable	Permitted
4	Possible	Acceptable	Controlled
3	Unlikely	Tolerable	Restricted Discretionary
2	Rare	Tolerable	Discretionary
1	Very Rare	Intolerable	Non complying, prohibited

The risk-based planning framework (adapted from Saunders, 2012)

6.14. This shows the 2019 assessment, taking into account the increased likelihood, would result in activities within the hazard zone, as being non-complying or prohibited.

6.15. Reassessing the likelihood of event (Step 3 of the risk-based approach) does change the outcome of the initial 2013 assessment of a 'tolerable' level of risk, and associated 'discretionary' activity status. Based on the Blackwood & Bassett (2019) assessment that "It is wisest to regard [rainfall] as around 12 to 18 percent greater than the 1% AEP rainfall intensities" (p2), this suggests that at least a 100 year return period should be used, which changes the likelihood to 'Level 4', taking into account the return period may be 100 years or less. If the return period of 200 years were to be used, the original result would remain.

6.16. Taking into account the Level 4 likelihood (at least 100 years), and a change in consequences based on 16 houses, the revised risk-based assessment is deemed to be 'intolerable', having a non-complying/prohibited consent activity status.

6.17. As per Blackwood and Bassett (2019, p5), "By the end of this century, under RCP 8.5 scenario these storms could be expected to occur on a 40 to 50 year return period, under RCP 6.0 on a 60 to 80 year return period". The RCP 8.5 scenario would change the likelihood level to 5 (up to once every 50 years), resulting in the same result outlined in point 6.15 above: the risk would be deemed 'intolerable', and have a non-complying/prohibited consent activity status.

7. ASSESSMENT OF THE PLAN CHANGES

7.1. I agree with the 'avoidance' approach outlined in the Proposed Plan Changes. The approach takes a risk-based approach, whereby the level of restrictions increases with the level of risk e.g. high risk is prohibited; medium risk has restricted development requirements via a resource consent process; and low risk areas retain residential zoning.

7.2. In my opinion the 2007 AGS methodology for assessing landslide risk is appropriate as a natural hazard risk management framework to inform land use planning decision making and policy. This opinion is reinforced by its inclusion in the Saunders & Glassey (2007) publication "Guidelines

for assessing planning policy and consent requirements for landslide prone land", and in the RPS (Appendix L and 'User Guide').

7.3. I agree with Gerard Willis' planning assessment of the GHD report outlined in a letter to the Regional Council dated 28 November 2019 (Appendix 5 in s42A report), in particular his comment that "Risk is something that applies at all scales but by simply focusing on the individual property scale, the potential exists for cumulative effect on community well-being, services and infrastructure to be over-looked" (p2). A community wide, integrated view of risk is required to ensure the best possible outcome - in this case, the management of significant risk to the community. I agree with Mr Willis' conclusion that the natural hazard zone is an appropriate scale for assessment and is consistent with the RPS.

7.4. I agree with Craig Batchelar's evidence paragraph 11.4 that both plan changes achieve a reduction in risk to those currently exposed within the High Risk Debris Flow Areas of the Awatarariki Fanhead.

7.5. Based on these assessments, I am satisfied and support the Proposed Plan Changes as being appropriate planning responses to the risk, and as a way of ensuring the sustainable management of a high risk area. In my opinion, to not proceed with these changes would not provide for people's health and safety, would result in a status quo of intolerable risk, and be contrary to the RPS.

8. RESPONSE TO SUBMISSIONS

8.1. I address the main submission points to the Proposed Plan Changes of relevance to my evidence and expertise below.

8.2. The Awatarariki Residents Incorporated submits that the Proposed Plan Changes do not promote sustainable management, and seeks a number of amendments including:

(a) No restrictions on residential activities for high and medium risk properties;

(b) Permitted status for residential activities for high risk properties where residential activity was established prior to notification of the plan change (grandparenting clause);

(c) The establishment of an early warning system to allow for a grandparenting clause; and

(d) Seeking the deletion or amendment to high, medium and low risk areas in the definitions and planning maps.

I will address each of these points in turn.

8.3. In my opinion, Plan Change 1 does promote the sustainable management of a high risk area, in doing so giving effect to Section 6(h) of the RMA (the management of significant risks from natural hazards). The purpose of the RMA includes 'health and safety', and in this case the life safety risk has been assessed as intolerable and other options (such as building design, warning systems, and reliance on insurance) are not appropriate. As outlined in the article by Saunders & Becker (2015)[14], a community needs to be sustainable and resilient; this approach allows for a safer, more resilient community by removing those properties most at risk from a future event from a catchment known to have had historic events[15], therefore providing for a future sustainable land use. This ensures the safety of those living, visiting, or maintaining services to these properties.

8.4. I support the inclusion of restrictions on residential activities for high and medium risk properties. This is the basis of risk based planning, where restrictions increase as the level of risk increases.

8.5. A grandparenting regime was proposed for existing residential activities, which would rely on a warning system and evacuation to mitigate the life safety risk. In my opinion, this approach is not achieving a reduction in risk, as residential activities will still remain with the associated life safety risk, and a warning system and evacuation plan will not provide adequate warning for evacuation, as outlined in the evidence of Prof.

---

14 Saunders, W. S. A. and J. S. Becker (2015). "A discussion of resilience and sustainability: land use planning recovery from the Canterbury earthquake sequence, New Zealand." International Journal of Disaster Risk Reduction: 9.

15 See McSaveney et al, 2005: The 18 May 2005 debris flow disaster at Matata: causes and mitigation suggestions. GNS Science Client Report 2005/71, 51p.

Davies and Dr Massey. I agree with evidence of Mr Batchelar that this is not an appropriate option (paragraphs 12.23-24).

8.6. I oppose any amendment that would allow for the deletion or amendment to high, medium and low risk areas in the definitions and planning maps. Maps are a key spatial tool for linking zones with policies and rules; definitions are key to understanding the parameters of those rules. To remove or amend these tools would undermine the policy intent of the plan changes, the RPS natural hazard provisions, and s6(h) of the RMA.

8.7. These issues overlap with Plan Change 17 submissions.

9. CONCLUSION

9.1. For the reasons described in my evidence statement, I support the Proposed Plan Changes. In summary, in my opinion the Proposed Plan Changes appropriately manage the significant risk of debris flow from the Awatarariki Stream and allow for the future sustainable use of the land.

Dr Wendy Saunders,

15 January 2020