“What’s the Plan Rangitikei…?” Long Term Plan 2015-2025:

Submissions Part 2

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Alyssa Takimoana

From: Samantha Whitcombe
Sent: Monday, 4 May 2015 11:39 a.m.
To: Alyssa Takimoana
Subject: FW: Submission

-----Original Message-----
From: Carol Downs
Sent: Monday, 4 May 2015 11:37 a.m.
To: Samantha Whitcombe
Subject: FW: Submission

-----Original Message-----
From: Bruce Gordon [mailto:bruce@brucegordoncontracting.co.nz]
Sent: Monday, 4 May 2015 11:36 a.m.
To: Carol Downs
Subject: Submission

Submission to the Rangitikei District Long-term Plan (2015).

Subject: Dudding Lake

Firstly, I would like to acknowledge the support we currently receive from the Council for the maintenance and operation of the facilities at Dudding Lake.

The approach of the Trust I am involved with is to enhance the experience of visitors to the Lake and to provide other options for its use, ie. weddings.

I am sure that anyone of you that has visited the Lake over the past few years would have been impressed with its appearance, and you should feel proud of the work that has been done, as it was Council's decision to fund the Trust.

The Trust has carried out maintenance of the facilities, such as the painting of the caretaker's house, painting of the roof, (ablution block) etc.

The main purpose of this submission is to ask Council to put aside money in your roading budget for some maintenance of the drive leading into the Lake.

I would like to be heard.

Yours sincerely

Bruce Gordon
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MARTON

Sent from my iPad

4 May 2015

RECEIVED
04 MAY 2015
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File: 1-LTP15-7-1
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BY EMAIL ONLY
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Dear Ross

RANGITIKEI DISTRICT COUNCIL PROPOSED LONG TERM PLAN 2015-2025 CONSULTATION

Thank you for the opportunity to make a submission on the proposed Long Term Plan 2015-2025. Horizons generally supports the direction set out in the Consultation Document and supporting information. We would like to present our submission to the Council at the Long Term Plan hearings.

Sewerage and the Treatment and Disposal of Sewage Group of Activities

Horizons acknowledges the challenges faced by the District Council in funding reticulated wastewater services and improved treatment, to balance high water quality standards and projected decreases in communities where the population is already low. We support Council's commitment to meeting increased standards for water quality, and the inclusion of funding for improvements to a number of existing plants in the long term plan budgets. We also support the commitment to compliance with resource consent conditions through the performance measure 'Discharge compliance', which is set at no abatement or infringement notices, enforcement orders or convictions.

We encourage Council to continue to focus on the reconsenting of the Marton wastewater discharge, and the management of leachate from the Bonny Glen Landfill. Horizons also supports Council's plans to upgrade reticulation, to assist the performance of the Hunterville and Taihape wastewater systems.

With regard to the District Council's proposal to investigate the option of moving to onsite wastewater disposal in Mangaweka, we note that Horizons' role in sewage disposal is in managing the activity to effectively address its actual and potential environmental effects. The One Plan includes provisions around onsite wastewater disposal, and it is likely that many, if not all, the affected properties would need resource consent from Horizons. At this stage, we neither support nor oppose the proposal. However, we would like to be part of the ongoing discussion about Mangaweka's wastewater so we can fully understand the implications of any changes to service levels for this activity.

Stormwater Drainage Group of Activities

Horizons looks forward to continuing to work with the District Council on stormwater discharges. As acknowledged in the Long Term Plan proposals and draft Infrastructure Strategy, this process will lead to understanding whether resource consents for any discharges are needed.

Economic Development and District Promotion Activity

Horizons acknowledges the District Council's cooperation and contribution in relation to the Regional Growth Study and Central New Zealand Agribusiness Strategy. We support Council's continued commitment to economic development through the proposal to increase investment in this area and the draft Economic Development Strategy. Horizons looks forward to continuing to work with our constituent councils to progress the results of the Study and Strategy, and to realise opportunities for economic growth throughout the Region.

Roading Group of Activities

Horizons supports Rangitikei District Council's commitment to roading and bridge maintenance / renewals in the proposed Plan, which will protect the longevity of these assets and provide for the safe and effective movement of people and freight. Horizons also recognises the pressure previous emergency works have placed on the District's Roading Reserve Fund. We acknowledge the proposed funding option Council is consulting on to manage the effects of future storm or flood events on roads, and the resiliency impacts that may result.

The Regional Land Transport Plan 2015-2025 has prioritised "*Efficient Road Maintenance and Delivery*" as the most important deliverable over the lifetime of the Plan (Strategic Priority 1). Maintaining roads and bridges to a level of service is not only important for the viability and sustainability of Rangitikei's economy, but also contributes to the efficiency, resilience and positive safety outcomes of the wider regional transportation network.

Enviroschools

In this submission, Horizons Regional Council would like to thank Rangitikei District Council for its commitment to support the Enviroschools Programme from 2015-2016 onwards.

The Enviroschools Programme is a non-regulatory method that many councils use to achieve their objectives and policies. Enviroschools facilitates a whole of school / centre and community approach to effective resource management, and promotes the sustainable management of natural and physical resources by addressing issues relating to waste, water, energy, transport, and biodiversity. Because a focus of the Programme relates to building a sustainable community, these practices filter through into the home environment too. The Programme also aims to equip youth with the competencies they need to be leaders in sustainability. It helps youth think creatively and strengthens connections with the land and the cultural values associated with it, which leads to action on current sustainability issues and results in long-term behaviour change.

It is pleasing to see Rangitikei District Council join the ranks as a community leader and advocate by supporting the Enviroschools Programme. By supporting facilitation the Council is enabling action projects that have both environmental and educational outcomes that benefit not just the Enviroschool, but also the wider community, as well as youth that advocate for significant issues within their local community.

In other districts facilitation support has seen an increase in: involvement with community projects; water conservation; healthy water projects with local waterways and wetlands; waste minimisation; creating sustainable ecosystems; and genuine interest to engage with local iwi and marae. Through facilitation Rangitikei District Council will be enabling their sustainability-smart schools and early childhood centres to thrive and flourish.

Thank you for supporting the Enviroschools Programme. We look forward to furthering the outcomes of the Enviroschools Programme in the Rangitikei District.

We look forward to discussing these matters with Council at the hearing of submissions. Please coordinate the time a Horizons' representative will attend by contacting Karen Winchcombe, PA Group Secretary Strategy and Regulation on (06) 9522 849 or email karen.winchcombe@horizons.govt.nz. We would like to appear the **morning of 8 May 2015** please.

Yours sincerely

Michael McCartney
CHIEF EXECUTIVE

WHANGANUI
DISTRICT HEALTH BOARD
Te Poari Hauora o Whanganui

Submission to the Rangitikei District Council on Water Fluoridation in the Rangitikei District

Contents

Presented by
Louise Allsopp, Allied Health Manager
Barbara Dewson, Clinical Manager Dental
Jevada Haitana, Associate Director of Nursing

Submission to the Rangitikei District Council on the health impact of introducing water fluoride supplementation in the Rangitikei District

Our names are Louise Allsopp, Barbara Dewson and Jevada Haitana. We are the Manager Allied Health, the Clinical Manager Dental and the Associate Director of Nursing for the Whanganui District Health Board (WDHB).

This submission summarises the potential benefits on the health of the Rangitikei people should fluoride supplementation of the water supply be introduced. The submission is based on evidence-based best practice and proposes council consideration of fluoridation of the Rangitikei water supply.

Background

The population served by WDHB has poor dental health compared to the rest of New Zealand. We do not have a fluoridated water supply and this has impacted upon the dental health of our population, particularly our children. The WDHB Needs Assessment confirms that we have high rates of decayed, missing and filled teeth (dmft) for children aged five years and too few adolescents are accessing dental services provided by community dentists.

The New Zealand Oral Health Survey (Ministry of Health, 2010) reported that children and adults living in non-fluoridated areas had worse oral health than those living in fluoridated areas. Dental decay remains the most prevalent chronic (and irreversible) disease in New Zealand, and disparities still exist in oral health in New Zealand. In 2009, one in three adults had untreated coronal decay, and one in ten had root decay. There was evidence of active decay in all age groups, including older age groups.

While the survey was not designed as an in-depth water fluoridation study, analysis showed that children, adolescents and adults living in fluoridated areas had significantly less lifetime decay than those in non-fluoridated areas, and there were no significant differences in the prevalence of fluorosis (a possible side-effect of having too much fluoride during early tooth development) between people living in fluoridated areas and those in non-fluoridated areas.

Compared with Australian adults, New Zealand adults had poorer oral health across a range of clinical oral health indicators, and were also less likely to have visited a dental professional in the previous year.

Fluoridation

'Fluoridation' is the name given to adding fluoride to drinking water to achieve a level recommended by the New Zealand Ministry of Health (MoH) of between 0.7 mg/L to 1.0 mg/L (Armfield, 2007). This is considered the optimal concentration level that provides protection against tooth decay while minimising public health risk. Fluoride, like many other common substances such as, water, iron, vitamins A and D or even oxygen, in excess quantities can be harmful. At the very low concentrations (0.7 ppm to 1 ppm) used in water fluoridation it is not toxic, even when used over a lifetime (Armfield, 2007). The maximum level of fluoride allowed in drinking water is 1.5 milligrams per Litre (National Health and Medical Research Council, 2007). The amount added should be monitored to make sure that the levels stay within that range.

A large body of scientific literature supports fluoridation as a safe means of reducing rates of tooth decay. Extensive studies of water fluoridation and human health have been undertaken in many countries over many years. The safety of water fluoridation to general health has been reviewed in New Zealand, and overseas. These reviews have consistently found no evidence of significant adverse health effects of water fluoridation.

Mild dental fluorosis is seen in populations who do not drink fluoridated water (Royal Society of New Zealand and the Office of the Prime Minister's Chief Science Advisor, 2014).

In 1994 the New Zealand Public Health Association published a report on water fluoridation in New Zealand, which, in part, dealt with the evidence of possible adverse effects. This report found that evidence for adverse health effects such as bone fracture and cancer was inconclusive, and recommended that more research be carried out. The MoH commissioned a further review of studies on the potential adverse effects of fluoridation, and this was published in 2000. The report stated that "no persuasive evidence of harmful effects of optimal water fluoridation was revealed, and, generally, the evidence has strengthened that there are no serious health risks associated with the practice. That was particularly the case for bone fracture risk." These findings were endorsed by further research completed in 2014 Royal Society of New Zealand and the Office of the Prime Minister's Chief Science Advisor (2014). The research stated the following "There is compelling evidence that fluoridation of water at the established and recommended levels produces broad benefits for the dental health of New Zealanders.

The only side effect of fluoridation at levels used in New Zealand is minimal fluorosis, and this is not of major cosmetic significance. There are no reported cases of disfiguring fluorosis associated with levels used for fluoridating water supplies in New Zealand.

Given the caveat that science can never be absolute, the panel is unanimous in its conclusion that there are no adverse effects of fluoride of any significance arising from fluoridation at the levels used in New Zealand. In particular, no effects on brain development, cancer risk or cardiovascular or metabolic risk have been substantiated, and the safety margins are such that no subset of the population is at risk because of fluoridation.

All of the panel members and ourselves conclude that the efficacy and safety of fluoridation of public water supplies, within the range of concentrations currently recommended by the MoH, is assured. We conclude that the scientific issues raised by those opposed to fluoridation are not supported by the evidence.

The benefit of fluoride on children's oral health

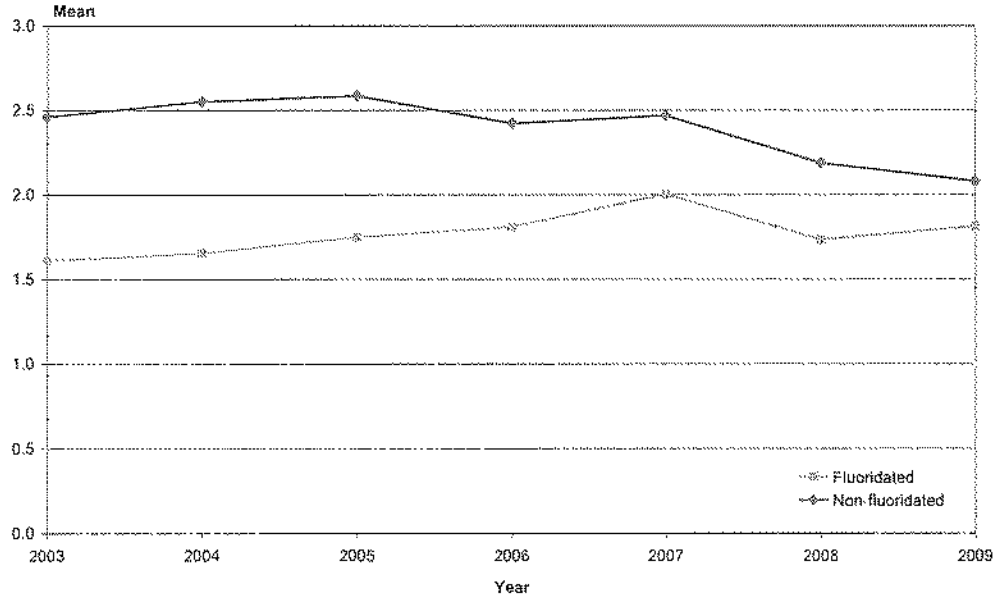
Evidence of inequalities in oral health status between children in fluoridated and non-fluoridated areas in New Zealand have been observed consistently in the School Dental Service data and in regional studies.

School Dental Service data from 2008 showed that five-year-olds attending schools in non-fluoridated areas had a higher prevalence and severity of dental decay (55.0% were caries-free; dmft = 2.2) than five-year-olds attending schools in fluoridated areas (58.7% were caries-free; dmft = 1.8) (Ministry of Health 2010).

Figure three shows that these differences have been seen consistently over time. (While the gap appears to have reduced since 2007, the timeframe for this change is short. This possible trend requires further monitoring and may warrant further research.)

Similarly, among Year 8 children (12–13-year-olds), 45.1% of children attending school in non-fluoridated areas were caries-free (DMFT = 1.7), compared with 56.2% of children attending schools in fluoridated areas (DMFT = 1.2) in 2008.

Figure three: Mean dmft (for five-year-olds), by water fluoridation status, 2003–2009, New Zealand



Source: School Dental Service data, MoH

These national findings are supported by regional studies. In Wellington and Canterbury, five-year-olds living in non-fluoridated areas had higher caries experience (dmfs[1] = 3.8) than those in fluoridated areas (dmfs = 2.6), as did 12-year-olds living in non-fluoridated areas (DMFS[2] = 2.4) and fluoridated areas (DMFS = 1.4) (Lee and Dennison 2004).

Similarly, studies found that 9–10-year-olds continuously exposed to water fluoridation had half the dental caries experience of those who had no water fluoridation, in Auckland (Kanagaratnam et al 2009) and Southland (Mackay and Thomson 2005). Another Auckland study of nine-year-olds similarly found lower levels of dental caries in children in fluoridated areas than non-fluoridated areas (Schluter et al 2008).

New Zealand and international research has shown that water fluoridation and area of residence have moderating effects on the relationship between caries experience and both ethnicity and socioeconomic status (Evans et al 1984; Fergusson and Horwood 1986; Kilpatrick et al 2008; Slade et al 1996; Thomson and Mackay 2004; Treasure and Dever 1991, 1994). School Dental Service data suggest that inequalities in oral health by ethnicity in New Zealand are mediated by fluoridation status, with Māori and Pacific children living in non-fluoridated areas having worse oral health than those in fluoridated areas (Ministry of Health 2009). In 2008, among Māori five-year-olds, those in non-fluoridated areas had a lower prevalence of being caries-free (32.0%) and a higher mean dmft (4.2) than those in fluoridated areas (40.0%; dmft = 2.9). For Māori Year 8 children, a similar difference was seen, with those in non-fluoridated areas having a more severe dental decay experience (30.8% caries-free, DMFT = 2.7) than those in fluoridated areas (44.2% caries- free, DMFT = 1.7).

Impact for lower socio economic groups, Maori and Pacific

As fluoridated water acts irrespectively of an individual's behaviour, ethnic or socio- economic status, it is considered that it is effective in addressing some of the inequalities that exist in oral health with the greatest potential to benefit among the most vulnerable population groups. Children from low socioeconomic status areas, Maori and Pacific peoples in particular, experience poorer oral health outcomes compared to other population groups. Older people also have increased oral

[1] dmfs refers to the number of decayed, missing (due to dental decay) or filled surfaces of primary teeth.

[2] DMFS refers to the number of decayed, missing (due to dental decay) or filled surfaces of permanent teeth.

health needs, are increasingly dentate (have their own teeth) and therefore more likely to benefit (Ministry of Health, 2010). In addition, preventing dental caries leads to the prevention of dental pain and the prevention of dental diseases and serious dental infections requiring Hospital treatment.

Evidence suggests the introduction of fluoride to the Rangitikei water supply could have a greater impact on the oral health of children from lower income households and for Maori and Pacific Island people's households.

Health and local government working together

The MoH recommends water fluoridation where technically feasible as a safe and effective means of improving oral health (Ministry of Health, 2010). Under current New Zealand law, district health boards (DHBs) are responsible for protecting the health of their populations, while local councils are charged with deciding whether to fluoridate the water supplies they operate. With water fluoridation being a controversial issue, it is important that DHBs and the MoH have access to the best scientific evidence.

To this end, the Ministry has established a National Fluoridation Information Service. The function of the Service is to:

1. Monitor public discussion and decision-making processes on water fluoridation in New Zealand
2. Provide a central authoritative, accurate and up-to-date source of information and critical commentary on research pertaining to fluoridation
3. Coordinate support, communication and clinical and technical advice to, and on behalf of, DHBs and the MoH
4. Ensure consistent, accurate, and up-to-date information and messages are communicated by DHBs and the MoH
5. Evaluate the effectiveness of the Service in advancing water fluoridation in New Zealand.

Cost effectiveness

New Zealand evidence suggests that community water treated with fluoride achieves a net economic benefit to communities with populations of 1,000 people or more (Public Health Association of New Zealand 2004), (Wright et al, November 1999).

Ethical and individual autonomy considerations

We support the process of community participation in decisions around water fluoridation. We recognise that communities themselves need to balance individual rights against wider community benefits and in particular those of children. However we note that those most affected by this decision (Maori and Pacific children from lower socio-economic backgrounds living in the Rangitikei region) are unable to advocate for their own needs. We believe this places a responsibility on local authorities to give particular consideration to the health needs of these children over the expressed needs of wealthier, articulate adults and those living out of the area.

Conclusion and recommendations

The WDHB acknowledges that there are many factors that impact on the oral health of our population. Education, diet, regular brushing and flossing of teeth and access to dental

therapists/dentists contribute to good oral health; however, fluoridation in drinking water supports oral health for those that may not be so privileged to have access to the other named factors.

Our assessment on the basis of current evidence is that the health gains associated with introducing water fluoridation are likely to exceed any costs. For this reason we support the consideration of fluoride supplementation to Rangitikei water supplies.

Information section

Key findings from Our Oral Health key findings of the 2009 New Zealand Oral Health Survey

- Oral health of New Zealanders has improved over time. The prevalence of total tooth loss has decreased dramatically among New Zealand adults since 1976, and adults are retaining more of their natural teeth into older age. Among children, the proportion of 12–13-year-olds who are caries-free almost doubled between 1988 (29%) and 2009 (51%).

- Dental decay remains the most prevalent chronic (and irreversible) disease in New Zealand, and disparities still exist in oral health in New Zealand. In 2009, one in three adults had untreated coronal decay, and one in ten had root decay. There was evidence of active decay in all age groups, including older age groups.

- Children and adolescents had relatively good oral health, as well as good access to oral health care. Overall, one in two children and adolescents aged 2–17 years were caries-free, and four in five had visited a dental professional in the previous year. Māori and Pacific children and adolescents aged 2–17 years had poorer past-year access. Additionally, worse oral health outcomes were experienced by Māori and Pacific children and adolescents, and children and adolescents living in areas of higher socioeconomic deprivation.

- Among adults with natural teeth, one in four (23%) had experienced trauma to one or more of their upper six front teeth, as had one in six (16%) children and adolescents aged 7–17 years.

- There was clear evidence of unmet need for dental care among adults, with nearly half of adults feeling they currently needed dental treatment. In the past year, nearly half of all adults had avoided dental care due to cost and one in four adults had gone without recommended routine dental treatment due to cost.

- The majority of adults usually used oral health services when they had a dental problem, rather than visiting for routine check-ups. People who visited only for a dental problem had significantly worse oral health than regular users.

- In adults, poorer oral health and lower dental service attendance rates were found in particular among men, younger adults (aged 25–34 years), Māori, Pacific peoples, and people living in areas of higher socioeconomic deprivation.

- Dental problems have an indirect cost to society, with one in ten adults aged 18–64 years having taken, on average, 2.1 days off work or school in the previous year due to problems with their teeth or mouth.

- Adults and children are recommended to brush their teeth twice daily with standard (1000 ppm or greater) fluoride toothpaste. The survey showed that about two in three adults met this toothbrushing recommendation. About two in three children and adolescents brushed their teeth twice a day; however, less than one in two children and adolescents brushed twice daily with standard fluoride toothpaste, as per the Ministry recommendations.

- While the survey was not designed as an in-depth water fluoridation study, analysis showed that children, adolescents and adults living in fluoridated areas had significantly less lifetime decay than those in non-fluoridated areas, and there were no significant differences in the prevalence of fluorosis (a possible side-effect of having too much fluoride during early tooth development) between people living in fluoridated areas and those in non-fluoridated areas.

- Compared with Australian adults, New Zealand adults had poorer oral health across a range of clinical oral health indicators, and were also less likely to have visited a dental professional in the previous year.

Water Fluoridation Public Health Association of New Zealand Policy

The Public Health Association notes that:

- The lifetime benefit from drinking fluoridated water is estimated to be the prevention of 2.4 to 12.0 decayed, missing or filled teeth per person (PHC 1994).

- Water fluoridation contributes to equity of health outcomes as the benefit of dental caries prevention is greater for people in lower socio-economic groups, Maori and children (PHC 1995).

- A New Zealand survey (Treasure et al 1992) showed that fluoridation protected 5-year-olds in lower socio-economic groups (SES groups 4-6) from more decay than it did for those in higher socio-economic groups SES groups 1-2.

- A review of the efficacy of water fluoridation, based on surveys conducted from 1979 to 1989 in Australia, Britain, Canada, Ireland, New Zealand and the United States concluded that the current data show a consistently and substantially lower decay prevalence in fluoridated communities (Newbrun 1989).

- The effectiveness of water fluoridation has decreased as the benefits of other forms of fluoride have spread to communities lacking optimal water fluoridation but there is still a significant benefit from water fluoridation (PHC 1995).

- Recent information has shown that water fluoridation is effective throughout a person's life time, preventing root caries in adults and older people, so that fluoride can be seen to be of benefit to anyone with their natural teeth, not just children (Grembowski et al 1992; Hunt et al 1989; Newbrun 1989; PHC 1995; Thomas et al 1992; WHO 1994).

- At a population level, it is estimated that water fluoridation prevents between 58,000 and 267,000 decayed, missing or filled teeth in New Zealand per year (PHC 1994). Based on current levels of 50 percent of the population receiving fluoridated water, it is estimated that the annual cost savings are up to $14.3 million (PHC 1995).

- The number of elderly people with their own teeth is expected to increase dramatically in the next fifty years. Prevalence studies reveal fewer root caries among older people in fluoridated areas (Thompson 1997).

- The Centers for Disease Control and Prevention has included water fluoridation in the list of the *Ten Great Public Health Achievements 1900-1999* based on the opportunity for prevention of death, illness and disability in a population.

- The risks of adverse health outcomes from ingestion of fluoridated drinking water are considered negligible to nil. Recent reports by the Public Health Commission, National Health Medical Research Council of Australia and World Health Organization address many of the concerns raised regarding cancer, bones and fractures. In the review of published literature and other reports on fluoride research, it is noticeable that many of the articles that raise fears about water fluoridation lack substance or repeat previous statements already shown to be without scientific validity. For example, many studies are *in vitro* and cannot, therefore, be extrapolated to public health effects on the human population. If the results were applicable to humans, there would be solid epidemiological evidence of increased rates of adverse health effects in fluoridated areas when compared with non-fluoridated areas. This is not the case, as there is no such epidemiological evidence.

- The National Health and Medical Research Council of Australia draft *Review of Water Fluoridation and Fluoride Intake from Discretionary Fluoride Supplements* (Melbourne, 1999) notes that 'water fluoridation ... continues to provide significant benefits for both deciduous and permanent teeth. The evidence for a protective effect on dental health is strongest in childhood but can also be demonstrated in adults. ... [It] remains the most effective and socially equitable means of achieving community-wide exposure to the caries preventive effects of fluoride. It

should remain unchanged until evidence accumulates that further action fluoride exposure is required. There is insufficient evidence to establish a link between fluoridated drinking water and an increased risk of bone or other cancers. The evidence does not suggest an increased risk of osteoporosis from exposure to drinking water fluoridated at the optimal levels ...'

- Reports of independent experts in relevant fields of medicine, epidemiology, oral health and water engineering have been unanimous that benefits of water fluoridation outweigh any (very small) potential risks. Research studies on the safety of water fluoridation have been reviewed repeatedly by international and Australasian experts, including a World Health Organization expert group (WHO 1994). The conclusion of all these reports is uniform. There are no significant health risks associated with water fluoridation at optimal levels. Mortality rates and health statistics (other than for oral health) in fluoridated and non-fluoridated communities are similar.

- Cost-benefit analysis shows that, based on national demography, the cost of fluoridation is equal to or less than the averted dental cost savings for populations between 800 and 900 people; and the cost-benefit is increasingly positive for water fluoridation for populations over 1000 people (Wright et al, November 1999).

The Public Health Association affirms the following principles:

- The adjustment of fluoride to between 0.7 and 1.0 ppm in drinking water is the most effective and efficient way of preventing dental caries in communities receiving a reticulated water supply.(This is the level recommended by the MoH and World Health Organization.).

- The Public Health Association recommends the continuation of water fluoridation programmes and their extension where technically feasible.

The Public Health Association believes that the following steps should be taken:

1. That the roles of central and local government in supporting the fluoridation of water supplies be investigated, including central government subsidies for water fluoridation, the ability of central government to direct a water supplier to adjust the level of fluoride in drinking water to between 0.7 and 1.0 ppm, and the ability for health authorities to charge water suppliers for the increased costs of government-funded dental care where a water supply serving over 800 to 900 people is non-fluoridated.

2. That the concerns of local government about the impact of the activities of antifluoridationists and the difficulty of councillors deciding between the relative arguments of anti-fluoridationists and public health advocates be considered by the MoH, together with mechanisms to resolve these concerns.

3. That the key messages relating to the safety and efficacy of water fluoridation be promoted by the MoH, public health service providers, oral health and other health professionals.

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WHANGANUI
DISTRICT HEALTH BOARD
Te Poari Hauora o Whanganui

Ten common misconceptions about water fluoridation

1. "Recent scientific studies show no benefit from water fluoridation"

Independent reviews of studies from around the world continue to find strong evidence that water fluoridation benefits oral health (between 30% and 50% reduction in tooth decay) [i,ii,iii,iv,v,vi,vii]. Some individual studies have found no benefit but these studies are considerably outnumbered by studies demonstrating positive benefits. Studies have also been performed in areas where fluoridation has been discontinued and independent reviews of these studies have shown an overall trend of an 18% increase in decay after fluoride levels are allowed to fall below ideal levels.

2. "Fluoridated toothpaste means we don't need fluoridated water"

Fluoridated toothpaste was introduced in 1974. Studies conducted after the introduction of fluoridated toothpaste continued to report benefits from fluoridated water in addition to the benefits from fluoridated toothpaste use[vi].

3. "Sugar in the diet is the problem that we need to address for oral health"

Sugars are undoubtedly the most important dietary factor in the development of dental decay[viii]. However this is not the same as saying removal of sugar from the diet is the solution. This is because other factors contribute to oral health and the effectiveness of community strategies to reduce sugar consumption is limited.

4. "Fluoride is not part of a normal diet"

Fluorine is the 13th most common element. This means that all people are exposed to dietary fluoride because it is common in the environment. In many parts of the world fluoride occurs naturally in drinking water at recommended or even excessive levels. Like most substances consumed by humans the question is about what is the ideal level for human consumption.

5. "Recent scientific studies suggest fluoride in water is unsafe"

The US National Research Council (NRC)[ix] recently studied the safety of naturally occurring fluoride levels in drinking water. The council concluded that consumption of water with naturally occurring fluoride levels at the current US maximum allowable level (4 mg/L) was associated with a risk of severe fluorosis and it recommended that the US should reduce the level. The US Environment Protection Agency (EPA) has not yet set the new level but the maximum allowable level in New Zealand drinking water is 1.5 mg/L. The NRC study did not examine the safety of fluoride at NZ recommended levels (0.7 mg/L to 1.0 mg/L) but other systematic literature reviews from around the world have found no evidence of health risks from water fluoride at these levels[ii,iii,iv,vii]

6. "Water fluoridation causes skeletal fluorosis and arthritis"

Prolonged exposure to high concentrations of fluoride can increase bone density (skeletal fluorosis) and cause arthritic bone spurs (osteophytes) [ix]. This requires the ingestion of much larger amounts of fluoride than anyone in New Zealand would be exposed to [x].

7. "Most countries in the world do not fluoridate their water"

Millions of people worldwide consume water with fluoride added or naturally at recommended levels. The United Nations World Health Assembly has recommend that "those countries without access to optimal levels

of fluoride, and which have not yet established systematic fluoridation programmes, consider the development and implementation of fluoridation programmes"[xi].

8. "The fluoride used is contaminated with heavy metals including lead"

Fluoride products are manufactured from the breakdown of soils and rocks by chemical supply companies. Cleansing processes during manufacturing ensure that final products conform to the New Zealand standard[xii].

9. "Fluoridated water causes bone cancer"

Research studies on possible links between fluoride and primary bone cancer continue to find no clear association even in people with skeletal fluorosis[ii,iv]. A study by Bassin and colleagues in 2006 did report an association between water fluoridation and bone cancer in teenage males[xiii]. However unpublished analysis of a larger group of cases from the same study showed no association and a study of bone samples from cases showed no association with drinking water fluoride levels[xiv].

10. "Infants under one year should not be given fluoridated water"

The Center for Disease control and Prevention (CDC) advised that there may be a risk of very mild to mild fluorosis for infants fed primarily with infant formula mixed with fluoridated water[xv]. This may result in very minor changes to the appearance of teeth such as patches that are a different shade of white. CDC suggests that if parents are concerned about this risk they could make formula with filtered or deionised water[xv].

The Ruapehu District Council should supplement natural water fluoride levels because:

- the level of naturally occurring fluoride in Waimarino water is not high enough to protect the teeth of the community;
- water fluoride at ideal levels (between 0.7 and 1.0 mg per litre) helps protect against tooth decay in people of all ages and is particularly important for young children who don't control their own diet;
- water fluoridation has been used safely;
- water fluoridation is cost-effective;
- water fluoridation is recommended by expert professional health bodies including the Ministry of Health, Plunket, New Zealand Dental and Medical Associations and the World Health Organization.

i Truman, B., Gooch, B., Sulemana, I., Gift, H., Horowitz, A., Evans, Griffin, S., Carande-Kulis, V., The Task Force on Community Preventive Services (2002) Reviews of Evidence on Interventions to Prevent Dental Decay, Oral and Pharyngeal Cancers, and Sports-Related Craniofacial Injuries. Am J Prev Med 2002;23(1S).

ii McDonagh, M., Whiting, P., Bradley, M., Cooper, J., Sutton, A., Chestnutt, I., Misso, K., Wilson, P., Treasure, E., Kleijnen, J. (2000) A Systematic Review of Public Water Fluoridation. NHS Centre for Reviews and Dissemination, University of York. Report 18.

iii National Health and Medical Research Council (2007) A Systematic Review of the Efficacy and Safety of Fluoridation. Australian Government 2007.

iv iv Jones, S., and Lennon, K. (2004) One in a Million. The facts about water fluoridation. 2nd edition. The British Fluoridation Society, The UK Public Health Association, The British Dental Association and The Faculty of Public Health.

v Liteplo, R., Gomes, R., Howe, P., and Malcolm, H. (2002) Fluorides. Environmental Health Criteria 227. World Health Organization, Geneva.

vi Adair, S., Bowen, W., Burt, B., Kumar, J., Levy, S., Pendrys, D., Rozier, R., Selwitz, R., Stamm, J., Stookey, G., and Whitford, G. (2001) Recommendations for Using Fluoride to Prevent and Control Dental Decay in the United States. MMWR; 50(RR14);1-42

vii McDonagh, M., Whiting, P., Wilson, P., Sutton, A., Chestnutt, I., Cooper, J., Misso, K., Bradley, M., Treasure, E., and Kleijnen, J. (2000) Systematic review of water fluoridation. BMJ; 321;855-9.

viii World Health Organization (2003) Diet, Nutrition and the Prevention of Chronic Diseases. Report of a Joint WHO/FAO Expert Consultation. WHO Technical Report Series 916. Geneva, Switzerland

ix ix Committee on Fluoride in Drinking Water, National Research Council (2006) Fluoride in Drinking Water: A Scientific Review of EPA's Standards.

x Ministry of Health website: http://www.moh.govt.nz/moh.nsf/wpg_index/About-fluoride-faqs#15, accessed 14 August 2009.

xi World Health Assembly (2007) Oral health: action plan for promotion and integrated disease prevention. WHA60.17.

xii New Zealand Water and Waste Association. Standard for the Supply of Fluoride for Use in Water treatment. January 1997. available from http://www.waternz.org.nz/

xiii Bassin, E., Wypij, D., Davis, R., and Mittleman, M. (2006) Age-specific fluoride exposure in drinking water and osteosarcoma (United States). Cancer Causes Control; 17:421–428.

xiv Douglass, C., and Joshipura, K. (2006) Caution Needed in Fluoride and Osteosarcoma study). Cancer Causes Control; 17:481–482.

xv Centers for Disease Control and Prevention. (2008) Community Water Fluoridation. Background: Infant Formula and the Risk for Enamel Fluorosis. Website accessed 17 August 2009: www.cdc.gov/fluoridation/safety/infant_formula.htm

With acknowledgement to Hawke's Bay District Health Board

Water Fluoridation

What is fluoride?
Fluoride is a common natural element found in air, soil, fresh water, sea water, plants and lots of foods. It is known to have a protective effect on teeth when used at the right concentrations.

Fluoride helps to protect our teeth from decay by strengthening teeth and reversing or slowing the early stages of tooth decay.

In New Zealand, fluoride is found naturally in all water supplies, but mostly at a level too low to protect against tooth decay (dental caries).

What is water fluoridation?

Water fluoridation is the adjustment of natural fluoride levels in water supplies to a level that will give extra protection against tooth decay.

The recommended level of fluoride in New Zealand community water supplies is 0.7 to 1 part per million (or 0.7 to 1 milligram per litre), and is sometimes called the "optimal level". This is the lowest amount at which the benefits to dental health can be achieved, while minimising any risk of fluorosis or white flecking on teeth (see pages 2-3).

Why do we fluoridate water?

The Ministry of Health, and many international health bodies, recommend that fluoride levels in drinking water be adjusted to optimal levels to improve and protect oral health.

Tooth decay can have a significant impact on appearance, self-esteem, social interaction and the ability to speak and chew. Un-treated decay may cause pain, dental abscesses or serious infection. Treating decay is costly and can be unpleasant and painful. However tooth decay is largely preventable.

Drinking optimally fluoridated water is a safe, simple and effective way to help prevent and reduce tooth decay in the whole population.

Who benefits?

More New Zealanders are keeping their teeth for life. Water fluoridation can benefit all people with natural teeth regardless of age, income or education level. It gives the greatest benefits to children and especially those most at risk of tooth decay.

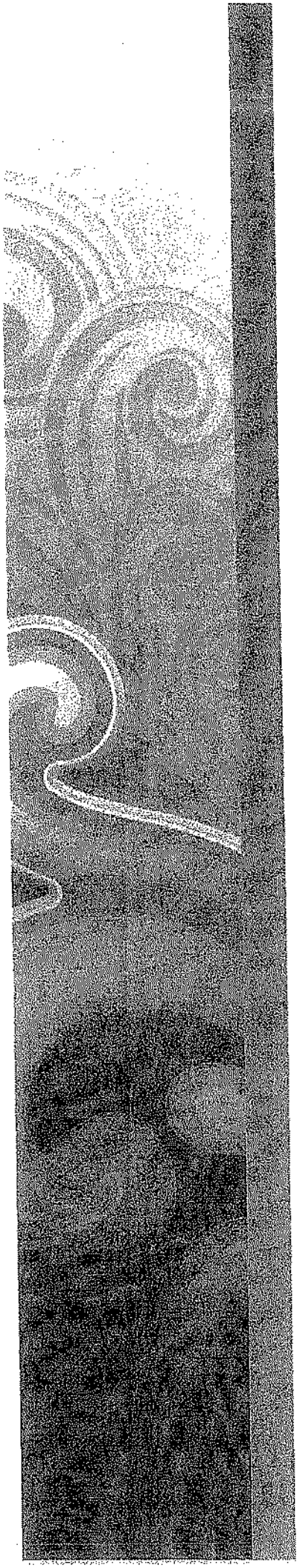
How is water fluoridated?

Fluoride is added to the water supply by feeder and pump systems that are specially designed to add carefully controlled amounts. Once dissolved in water, the added fluoride is no different to naturally-occurring fluoride. Local water authorities have constant monitoring systems which include checking the amount of fluoride in water regularly. Local Councils must ensure their water supplies meet the standards in New Zealand Drinking Water Standards 2005 (revised 2008).

Water fluoridation is effective

Data collected in the United States in the 1930s and 1940s demonstrated that children drinking water with very little or no naturally-occurring fluoride had higher decay rates than children consuming water with higher levels of fluoride.

This led to the establishment of water fluoridation programmes to top-up fluoride to optimal levels. The effectiveness of water fluoridation has been reported in scientific literature for well over 60 years.



The protective action of fluoride on teeth is well documented. Water fluoridation delivers the benefits of fluoride across a population. It is intended to support good oral hygiene, such as cleaning your teeth with a fluoride toothpaste at least twice a day (morning and night), and complements other forms of fluoride use, such as professionally applied varnishes.

The prestigious US-based Centers for Disease Control and Prevention describes water fluoridation as one of the 10 most important public health advances and disease prevention measures of the twentieth century[1].

The Public Health Commission has estimated that water fluoridation prevents between 2.4 - 12.0 decayed, missing or filled teeth in the average person over a lifetime, or between 58,000 and 267,000 decayed, missing and filled teeth in New Zealand per year[2].

New Zealand research published in 2004 confirmed that decay severity was 31% lower in 5-year-old and 41% lower in 12-year-old children living in fluoridated Wellington than in non-fluoridated Canterbury[3]. Regional differences in patterns of decay exist for a number of social and clinical reasons, but the overwhelming result is that water fluoridation provides dental protection. This beneficial effect of fluoride is still evident despite the wide availability of fluoride toothpaste.

Water fluoridation is safe

Extensive studies of water fluoridation and human health have been undertaken in many countries over many years. A review of these studies in 2007 confirmed again that fluoridation at optimal levels, is safe and effective[4].

The 2007 review found no clear evidence of a link between fluoridation and bone or other cancers, and little or no effect on the risk of fractures. There was also no reliable evidence to link water fluoridation with conditions such as Down's Syndrome, allergic conditions, mutations and enzyme dysfunction.

The World Cancer Research Fund has noted that there is no substantial evidence that suggests that fluoride (as consumed in water or foods) has any significant effect on the risk of any cancer[5].

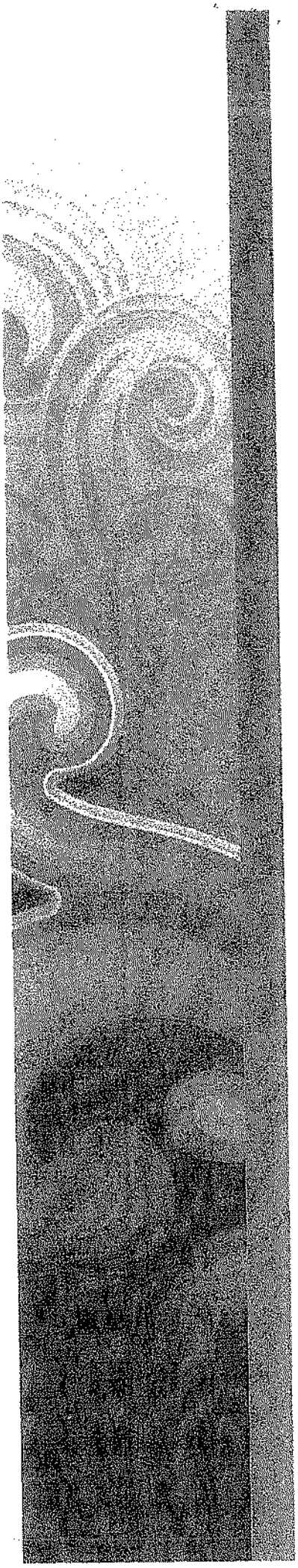
A 2010 review by the European Commission that looked at the risk and benefit of fluoridated drinking water found that it is generally considered beneficial[6].

The Ministry of Health monitors the scientific literature on the effects of water fluoridation to ensure its policy is in line with international best practice. Key resource documents are available on the Ministry of Health website: www.moh.govt.nz/fluoride.

Fluorosis

Dental fluorosis occurs when young children are exposed to excessive amounts of fluoride when their teeth are developing. Dental fluorosis is a known side effect of water fluoridation. However, in New Zealand, only the mildest forms of fluorosis are linked with optimally fluoridated water, and these don't have cosmetic or functional impact on the tooth or individual.

Research has reviewed the level of dental fluorosis in New Zealand. Studies published in 2005 and 2008 found that very mild fluorosis levels have been fairly stable since the 1980s[7].



[1] CDC *MMWR*, October 22, 1999;48(41);933–940, the other 9 measures include vaccinations, family planning, control of infectious diseases, reducing coronary heart disease and stroke, safer and healthier foods, healthier mothers and babies, motor vehicle safety measures, safer workplaces and recognising tobacco use as a health hazard.

[2] Public Health Commission, 1994, *Water Fluoridation in New Zealand: an analysis and monitoring report.*

[3] Lee M and Dennison PJ, 2004, *Water fluoridation and dental caries in 5-and 12-year-old children from Canterbury and Wellington* New Zealand Dental Journal 100(1):10-15.

[4] NHMRC, 2007, *A systematic review of the efficacy and safety of water fluoridation.* Canberra, National Health and Medical Research Council, Australian Government. For a summary view see NHMRC Public Statement: Efficacy and Safety of Fluoridation.

[5] World Cancer Research Fund/American Institute for Cancer Research, 2001, *Food, Nutrition, Physical Activity and the Prevention of Cancer: a Global Perspective*, Washington, p150.

[6] Scientific Committee on Health and Environmental Risks, European Commission, 2010. Critical review of any new evidence on the hazard profile, health effects and human exposure to fluoride and the fluoridating agents of drinking water.

[7] *Mackay and Thomson, 2005*, Enamel defects and dental caries among Southland children, *New Zealand Dental Journal 101.(2):35-43, Schluter et al, 2008*, Prevalence of enamel defects and dental caries among 9-year-old Auckland children, *New Zealand Dental Journal,104(4):145-152.*

In New Zealand mild to moderate fluorosis may occur if children eat large amounts of toothpaste or incorrectly use fluoride tablets[8]. Some countries overseas have extremely high levels of naturally occurring fluoride in their drinking water which can cause severe fluorosis. New Zealand does not have this problem

Water fluoridation is cost-effective

Fluoridation is one of the most cost-effective ways to reduce dental decay in communities. The financial costs of treating dental disease are high, while the costs of water fluoridation are relatively low.

In 1999, a group of independent scientists and economists advised that the economic argument for water fluoridation is very strong, especially for communities with lower socio-economic status. In a town of around 50,000 people, fluoridation would prevent an estimated 74,200 cases of decay over 30 years. On those figures it was conservatively estimated it would cost around $4.20 to prevent each case of decay. Without fluoridation it would cost around $117.25 to treat each case of decay[9]. This shows that treating decay is around 30 times more expensive than preventing it with water fluoridation.

Fluoridated water and infant formula

There has been concern about the amount of fluoride young babies may consume if they are fed infant formula made up with fluoridated water.

In New Zealand, fluoride levels are well controlled in both water and infant formula, through the New Zealand Drinking Water Standards and the Australia New Zealand Food Standards Code. Fluoride is not permitted to be added to infant formula made in New Zealand, although it may be present in very small amounts in the base ingredients.

Recent clinical advice on the use of fluorides in New Zealand, confirms there are no safety concerns with using fluoridated tap water to make up infant formula[10].

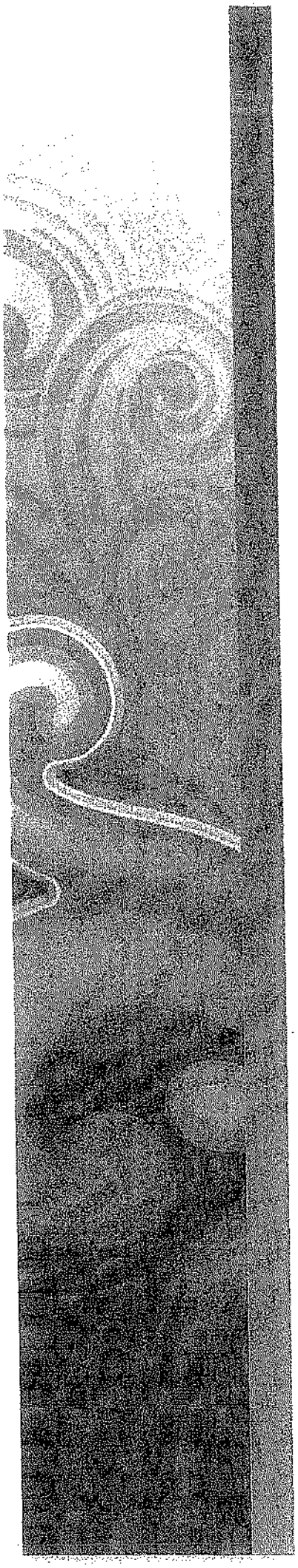
What about personal choice?

Some people see water fluoridation as a form of mass medication, which takes away their individual rights.

In 1960, the Human Rights Commission stated that "in all circumstances ... it is considered that the question of fluoridation of water supplies by public authorities does not constitute a denial of human rights."[11]

In 1964, the Privy Council considered water fluoridation and stated that "the addition of fluoride adds no impurity and the water remains not only water but pure water and becomes greatly improved and still natural water containing no foreign elements."[12]

Water treatment devices for the home, such as reverse osmosis filters and steam distillers can be used if people wish to remove fluoride from their drinking water. Bottled water may or may not be fluoridated – check the label for details.



[8] Fluoride tablets are no longer recommended (except on the advice of a dental professional) because of the risk of fluorosis.

[9] *ESR, 1999* ,The Cost-Effectiveness of Fluoridating Water Supplies in New Zealand, *Institute of Environmental Science and Research Limited.*

[10] *New Zealand Guidelines Group, 2009,* Guidelines for the Use of Fluorides, *Wellington.*

[11] *Agenda item no. 9, Proceedings of the Human Rights Commission, 13 August 1980.*

[12] *Privy Council Appeal no. 25 of 1964, Her Majesty's Attorney General of NZ v the Mayor, Councilors and Citizens of the City of Lower Hutt .*

Where does fluoride for water fluoridation come from?

Some people claim that fluoridating water is a way for industry to dump waste products; however this is not true. Industries such as aluminium smelters, oil refineries, steel production, brickworks and ceramic factories may release fluoride through their processes. However this material is not a source of fluoride for water fluoridation.

In New Zealand, fluoride for water treatment is supplied as sodium fluoride, sodium silicofluoride or hydrofluorosilicic acid. Some is manufactured locally and some is sourced overseas. Whatever the source or the form, the fluoride has to meet strict quality and purity standards.

Is it toxic?

In its concentrated form, fluoride is toxic, as is the concentrated chlorine used to kill bacteria in drinking water. That is why the containers have hazard markings on them. Once diluted to optimal levels, the added fluoride is not harmful and does not change the nature or purity of water.

An adult would have to drink many thousands of glasses of fluoridated water in one sitting to get a lethal dose of fluoride. However this amount of water would be lethal in itself.

Fluoride does not accumulate in the body. The level of fluoride in your blood reflects the level in the water you drink and the food you consume.

Why do some countries not use water fluoridation?

Some countries have natural fluoride levels that provide protection. At least 50 million people live in areas with naturally occurring fluoride in their water at around the optimal level. Technical reasons mean that some countries are not able to add fluoride to their water systems and some use alternatives such as fluoridated salt.

Even though some countries do not use water fluoridation, fluoride is still the key ingredient for the prevention and minimisation of tooth decay, through means such as fluoridated toothpaste, salt, tablets, varnishes or gels. Some countries also spend more on oral health services for their populations.

Key international health agencies, such as the World Health Organization, continue to recommend water fluoridation.

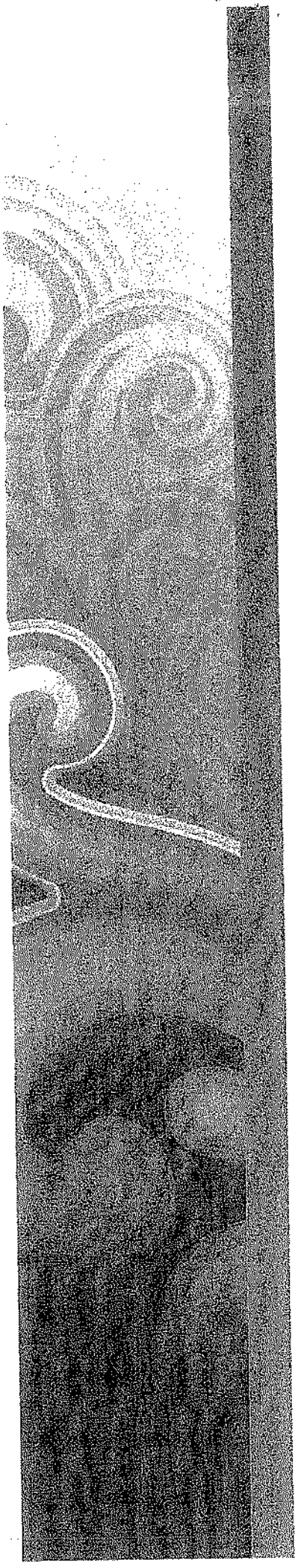
Finding unbiased information on fluoridation

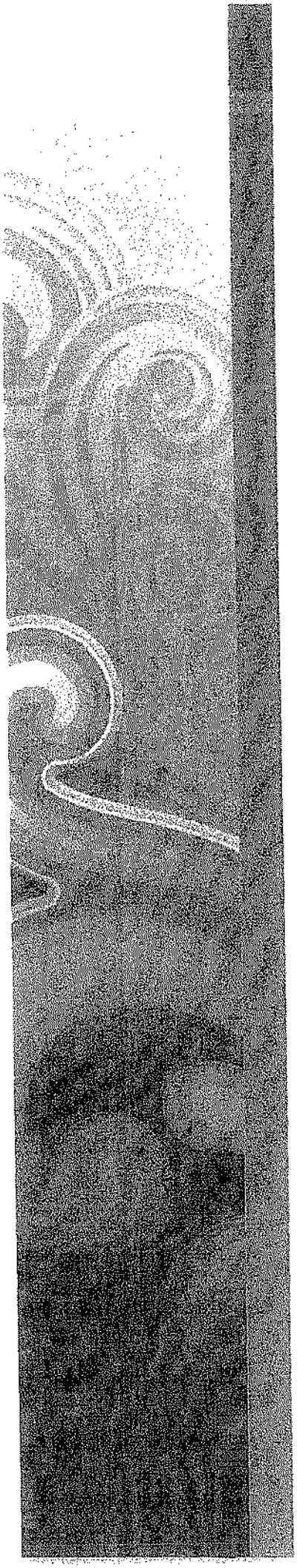
The internet holds a lot of information about water fluoridation but the quality and reliability of information is often difficult for the lay person to assess. Many scientific articles are contained in journals that are subscription-based and may not be readily available to the public. Assessing health benefits and risks can be complicated, and research can appear contradictory or inconclusive.

Websites opposing water fluoridation often quote research with little regard for context, validation or subsequent reviews that have discounted questionable research.

There are research papers that question the efficacy or safety of fluoridation – however in many cases such research may be of poor quality, be inconclusive, not comparable to New Zealand's situation, or be only one result compared to a large body of evidence that has different results.

The Ministry of Health regularly scans the international literature to ensure its policy position takes account of significant scientific findings. The Ministry of Health webpage has information about fluoridation, links to relevant research papers and key international agency statements on water fluoridation, and other oral health issues; see www.moh.govt.nz/fluoride.



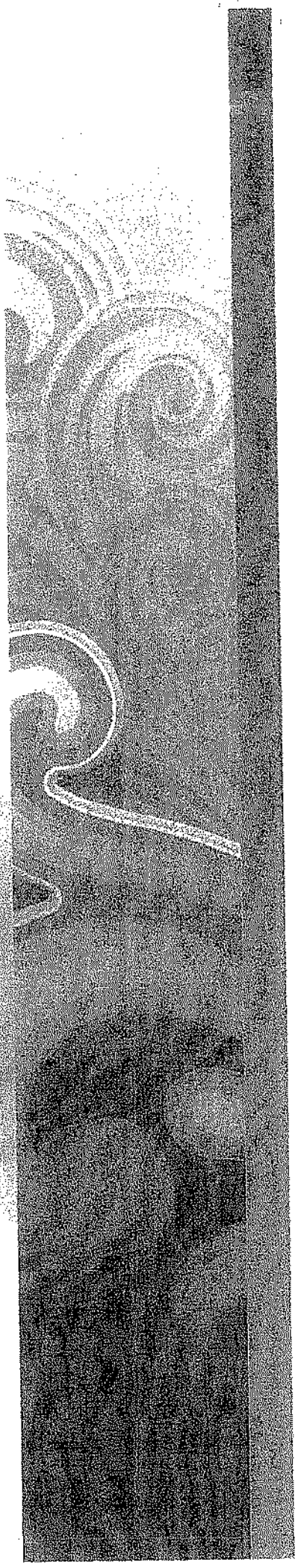


Summary

The table below summarises the key issues discussed in this paper and addresses concerns often raised by people seeking more information, or by those strongly opposed to fluoridation.

Questions?	Response
Is water fluoridation effective?	• Yes. Even where use of fluoride toothpaste is widespread, recent studies confirm that water fluoridation continues to provide benefits across the whole population, and especially to children and those most at risk of tooth decay. • Key international dental and general health agencies continue to support water fluoridation as a safe, effective way to protect teeth.
Does water fluoridation cause serious illness or disease?	• No. Recent systematic reviews of the scientific evidence over the last 60 years confirm that there are no significant health concerns arising from optimally fluoridated water.
Can you get severe fluorosis from optimally fluoridated water?	• No. Optimally fluoridated water does not lead to severe fluorosis. • Very mild to mild fluorosis may result, but it generally makes the teeth whiter and does not require treatment. • Levels of very mild fluorosis in New Zealand are fairly stable.
Is water fluoridation a form of mass medication?	• No. Fluoride is not a medicine – it is a naturally occurring element. Topping up fluoride to optimal levels does not change the nature or purity of water. • Individuals who object can opt out by using special filters for their drinking water.
Where does the fluoride come from?	• Fluoride used for drinking water comes mostly from soils and rocks. The manufactured product needs to meet strict quality and purity standards.

Questions?	Response
Is the fluoride used for drinking water toxic?	• While concentrated fluoride is toxic, it is not harmful when appropriately diluted. The same applies to chlorine, which is also commonly added to drinking water. • Once added to water, the added fluoride is no different to naturally-occurring fluoride. • An adult would have to drink several thousand glasses of fluoridated water in one sitting to get a lethal dose of fluoride.
Why don't some other countries fluoridate their water?	• Some countries have natural fluoride levels that provide protection. • Some countries cannot fluoridate water for technical reasons, but may use salt fluoridation schemes, or may support dental health in other ways. • The World Health Organization continues to recommend water fluoridation as a safe, effective way to protect dental health across the population.

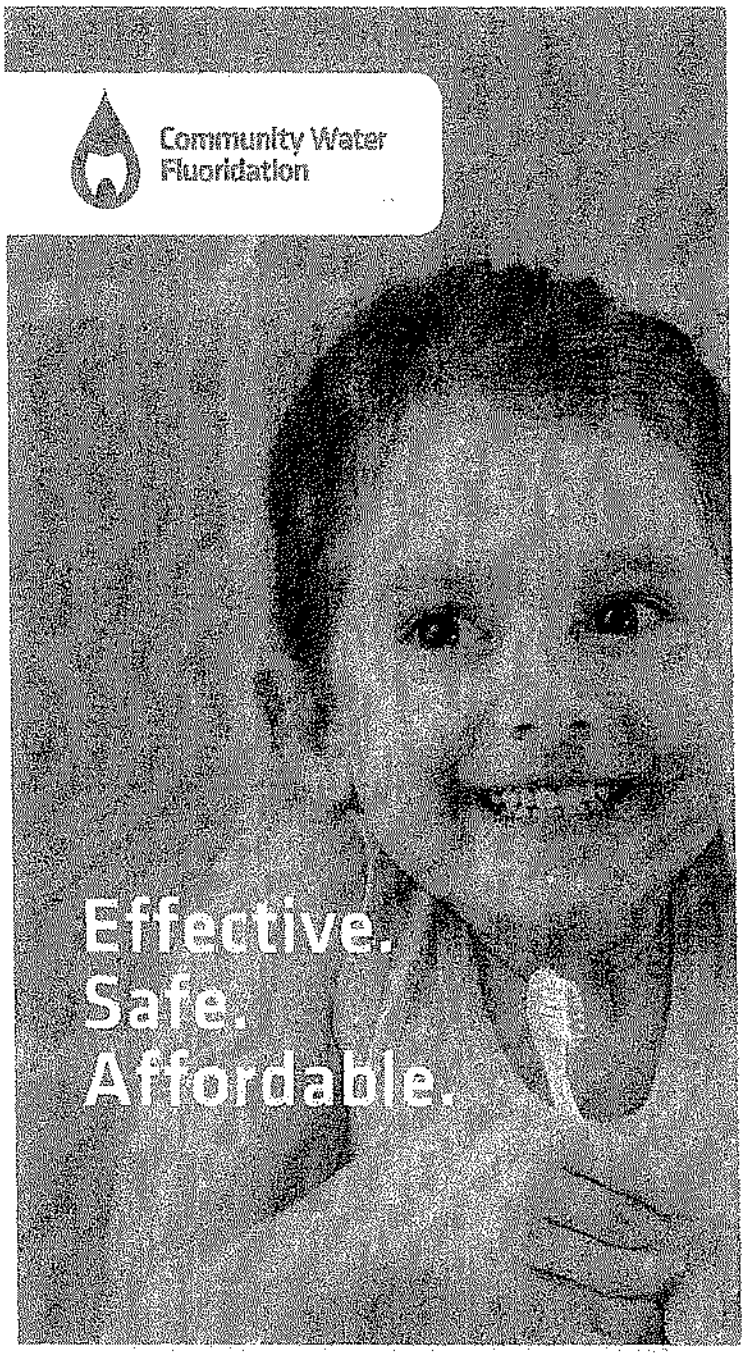


fluoride

Further information www.moh.govt.nz/fluoride

MINISTRY OF HEALTH
MANATŪ HAUORA

New Zealand Government


Community Water
Fluoridation
Effective.
Safe.
Affordable.
MINISTRY OF HEALTH
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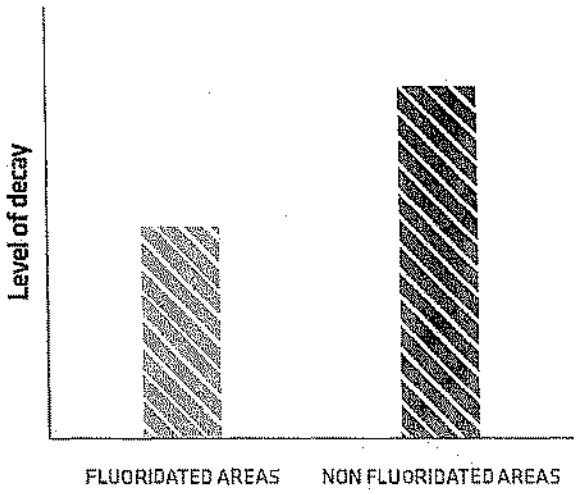
NEW ZEALAND
DENTAL ASSOCIATION
NZMA
Supported by your local District Health Board

Community Water Fluoridation is an effective, safe and affordable way to prevent and reduce tooth decay for everyone.

THE FACTS

IT'S EFFECTIVE

40% less tooth decay on average for children in fluoridated areas shown by the most recent national New Zealand study

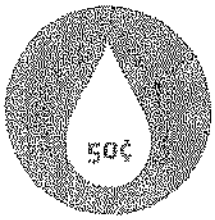


Ministry of Health's NZ Oral Health Survey, 2009.

Numerous studies have shown that children and adults living in areas with community water fluoridation have significantly less tooth decay than those living in non fluoridated areas.

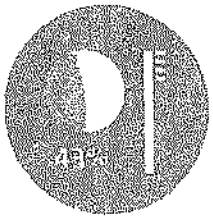
IT'S AFFORDABLE

Provides benefits to everyone – cost effectively



Cost of fluoridation approx
50c per person per year

Cost of a
single filling



Only 43% of children brush twice daily with the recommended strength fluoride toothpaste

'Community water fluoridation is a very cost effective way to provide the dental health benefits of fluoride to everyone in a community. If fluoridation is removed communities can expect higher levels of tooth decay with potentially higher costs both for individuals and the health system in treating that decay'

Dr Robyn Halsman-Welsh, Chief Dental Officer, Ministry of Health.

IT'S SAFE

Overwhelming evidence from decades of having Community Water Fluoridation is that it is safe

'It is absolutely clear that at doses used in New Zealand to adjust the natural level to one that is consistent with beneficial effects (0.7-1.0mg/litre), there is no risk from fluoride in the water'

Professor Sir Peter Gluckman, Chief Science Advisor, Office of the Prime Minister's Science Advisory Committee.

Organisations that endorse community water fluoridation

- Ministry of Health
- World Health Organization (WHO)
- The New Zealand Dental Association
- New Zealand Medical Association
- Public Health Association of New Zealand
- New Zealand Nurses Organisation
- Te Ao Marama - The Māori Dental Association
- Toi Te Ora - Public Health Service
- New Zealand College of Public Health Medicine
- NZ Dental and Oral Health Therapists Association
- NZ Oral Health Clinical Leadership Network Group
- NZ Society of Hospital and Community Dentistry
- Royal New Zealand Plunket Society
- Cancer Society of New Zealand
- Office of the Children's Commissioner
- The Royal Australasian College of Physicians
- Royal Australasian College of Dental Surgeons
- British Dental Association
- British Medical Association
- Australian Dental Association
- Australian National Health and Medical Research Council
- Department of Health, Victorian Government, Australia
- US Surgeon General
- American Dental Association
- Centre for Disease Control and Prevention (USA)
- FDI World Dental Federation

FREQUENTLY ASKED QUESTIONS

Q. If people brushed their teeth would it mean we don't need water fluoridation?

Keeping your teeth healthy also requires brushing twice a day with fluoride toothpaste, dental care and reducing sugar. Community water fluoridation provides additional benefits even if you do all these things. Over half of New Zealand adults avoid going to the dentist because of cost, and over half of New Zealand children don't brush their teeth twice a day with the recommended strength fluoride toothpaste. That's why water fluoridation is so important – it makes basic care for your teeth accessible to all.

Q. How do we know it's safe?

Fluoride already exists in water. It is topped up to levels that provide a benefit to teeth. At these carefully monitored levels fluoride is safe and within the guidelines of the World Health Organization and other international public health agencies.

'There has been much research over many decades indicating that fluoridation is a safe and effective measure for reducing dental caries'

Professor Sir David Skegg,
President of the Royal Society of New Zealand

The Ministry of Health has established the National Fluoride Information Service to provide an authoritative and up-to-date source of information and critical commentary on international research. Their ongoing review has not revealed any evidence to substantiate the evolving list of adverse health claims made by those opposed to community water fluoridation. These reviews include assessing the quality of the studies.

Q. Are there any known side effects to community water fluoridation?

'One side effect of fluoride is for a portion of the population it causes minimal white mottling of the enamel... This is very rarely discernable and is definitely not the severe fluorosis that is so often pictured on websites of those opposed to fluoridation of the public water supply'

Professor Sir Peter Gluckman, Chief Science Advisor,
Office of the Prime Minister's Science Advisory Committee

Q. Can you have too much fluoride?

Yes. Anything is harmful if you take too much of it, including water, iron, some vitamins or even oxygen. It is impossible to experience fluoride toxicity from the very low levels of fluoride in New Zealand water.

Q. What do other countries do?

The World Health Organization recommends boosting fluoride to optimum levels and community water fluoridation as the best method to do this. Community water fluoridation in Australia and the USA has expanded. In some countries in Europe, due to the practicalities in adding fluoride to the water supply, alternative methods are used to boost fluoride to optimal health levels such as adding fluoride to salt or milk.

To find out more and hear from New Zealand health professionals see:

www.fluoridefacts.govt.nz

Further information is also available from:

Ministry of Health **www.health.govt.nz** and click on *Our Work* and then *Preventative Health/Wellness*

Your local District Health Board's website

New Zealand Dental Association **www.healthysmiles.org.nz**

New Zealand Medical Association **www.nzma.org.nz**

National Fluoridation Information Service **www.nfis.org.nz**

HP 5717 | September 2013

Office of the Prime Minister's
Chief Science Advisor

the ROYAL SOCIETY of NEW ZEALAND
TE APĀRANGI

Health effects of water fluoridation: A review of the scientific evidence

A report on behalf of the Royal Society of New Zealand
and the Office of the Prime Minister's Chief Science Advisor

August 2014

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Office of the Prime Minister's
Chief Science Advisor

the ROYAL SOCIETY of NEW ZEALAND
TE APĀRANGI

20 August 2014

Dr Roger Blakeley
Chief Planning Officer
Auckland Council

Dear Dr Blakeley

In February this year, on behalf of several Councils, you made similar requests to the Prime Minister's Chief Science Advisor (PMCSA), the Royal Society of New Zealand (RSNZ), and the Ministry of Health, to review the scientific evidence for and against the efficacy and safety of fluoridation of public water supplies. After discussion between the parties, it was agreed that the Office of the PMCSA and the RSNZ would establish a panel to undertake a review. This review would adhere strictly to the scientific issues of safety and efficacy (or otherwise), but take into account the various concerns that have been raised in the public domain about the science and safety of fluoride. It would not consider the ethical and philosophical issues that have surrounded fluoridation and influenced legal proceedings lately. The Prime Minister gave his consent for the Office of the PMCSA to be involved and funding was provided by Councils through your office and by the Ministry of Health.

We are pleased to advise the report is being delivered on the timetable agreed.

Process
Given this is inevitably an issue that arouses passions and argument, we summarise in some detail the process used.

As this was the first formal scientific review conducted jointly between the Office of PMCSA and the Royal Society a memorandum of understanding for the process was developed and has been followed.

The essence of the process was that the PMCSA appointed an experienced literature researcher to undertake the primary research and literature reviews. Following an initial scoping that included an extensive reading of the literature (informal, grey and peer reviewed) on the subject, a draft table of contents was agreed between the PMCSA and the President of the RSNZ. The RSNZ then appointed a panel of appropriate experts across the relevant disciplines that was approved by the PMCSA.

A member of civil society with expertise in local body issues, Ms Kerry Prendergast, was invited to be an observer to the panel and to be included in the discussions and drafting to be sure that it met local body needs. The scientific writer then produced an early partial draft of the report that was presented to a meeting of the expert panel, and their input was sought both as to framing and interpretation of the literature. The panel paid particular attention to the claims that fluoride had adverse effects on brain development, on the risks of cancer, musculoskeletal and hormonal disorders – being the major areas where claims about potential harms have been made.
Over the following weeks, the panel members joined in an iterative process with the scientific writer to develop the report. In its advanced form all the members of the panel, together with the PMCSA and the President of the RSNZ, agreed via email exchange on the final wording of the report and its executive summary. In this form it was sent out for international peer review by appropriate scientific experts in Australia, UK and Ireland. Following their suggestions (which were minor and did not affect the panel's conclusions), the report and executive summary were returned to the panel for comment.

Findings and recommendations

The report and its executive summary are very clear in their conclusions.

There is compelling evidence that fluoridation of water at the established and recommended levels produces broad benefits for the dental health of New Zealanders. In this context it is worth noting that dental health remains a major issue for much of the New Zealand population, and that economically and from the equity perspective fluoridation remains the safest and most appropriate approach for promoting dental public health.

The only side effect of fluoridation at levels used in NZ is minimal fluorosis, and this is not of major cosmetic significance. There are no reported cases of disfiguring fluorosis associated with levels used for fluoridating water supplies in New Zealand.

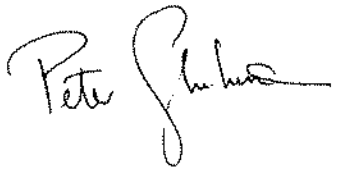
The use of fluoridated toothpastes does not change these conclusions or obviate the recommendations.

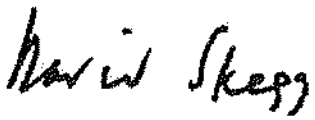
Given the caveat that science can never be absolute, the panel is unanimous in its conclusion that there are no adverse effects of fluoride of any significance arising from fluoridation at the levels used in New Zealand. In particular, no effects on brain development, cancer risk or cardiovascular or metabolic risk have been substantiated, and the safety margins are such that no subset of the population is at risk because of fluoridation.

All of the panel members and ourselves conclude that the efficacy and safety of fluoridation of public water supplies, within the range of concentrations currently recommended by the Ministry of Heath, is assured. We conclude that the scientific issues raised by those opposed to fluoridation are not supported by the evidence.

Our assessment suggests that it is appropriate, from the scientific perspective, that fluoridation be expanded to assist those New Zealand communities that currently do not benefit from this public health measure – particularly those with a high prevalence of dental caries.

Yours sincerely





Sir Peter Gluckman
Prime Minister's Chief Science Advisor

Sir David Skegg
President, Royal Society of New Zealand

Acknowledgements

This report was commissioned by Sir Peter Gluckman, the New Zealand Prime Minister's Chief Science Advisor (PMCSA), and Sir David Skegg, the President of the Royal Society of New Zealand (RSNZ), at the request of Auckland Council on behalf of several local Councils to review the scientific evidence for and against the efficacy and safety of fluoridation of public water supplies. Funding was provided by local bodies and the Ministry of Health. An Expert Panel (including a Panel Lay Observer) was appointed by the RSNZ to undertake the review, and international peer reviewers were selected. The report was prepared by Dr. Anne Bardsley, PhD, a researcher/writer in the PMCSA office working in close collaboration with the Expert Panel. The report was peer reviewed by international experts and the Director of the New Zealand National Poisons Centre before its release. Advisors from the New Zealand Ministry of Health (Departments of Oral Health, and Environmental & Border Health) provided comments on the final draft. In addition to the panel members and invited reviewers, we thank members of PMCSA staff for their contributions.

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Health effects of water fluoridation:
A review of the scientific evidence

Executive Summary

Oral health and tooth decay in New Zealand

Despite notable overall improvements in oral health over the last half century, tooth decay (dental caries) remains the single most common chronic disease among New Zealanders of all ages, with consequences including pain, infection, impaired chewing ability, tooth loss, compromised appearance, and absence from work or school. Tooth decay is an irreversible disease; if untreated it is cumulative through the lifespan, such that individuals who are adversely affected early in life tend to have pervasive decay by adulthood, and are likely to suffer extensive tooth loss later in life. Prevention of tooth decay is essential from very early childhood through to old age.

The role of fluoride

Fluoride is known to have a protective effect against tooth decay by preventing demineralization of tooth enamel during attack by acid-producing plaque bacteria. In infants and young children with pre-erupted teeth, ingested fluoride is incorporated into the developing enamel, making the teeth more resistant to decay. Drinking fluoridated water or brushing teeth with fluoride toothpaste raises the concentration of fluoride in saliva and plaque fluid, which reduces the rate of enamel demineralisation during the caries process and promotes the remineralisation of early caries lesions. When ingested in water, fluoride is absorbed and secreted back into saliva, where it can again act to inhibit enamel demineralisation. A constant, low-level of fluoride in the mouth has been shown to combat the effects of plaque bacteria, which are fuelled by dietary sugars. Drinking fluoridated water accomplishes this through both topical and systemic actions.

Community water fluoridation as a public health measure

New Zealand water supplies generally have naturally low concentrations of fluoride. Fluoridation of public drinking-water supplies involves the deliberate adjustment of fluoride concentrations in drinking water from their naturally low levels (~0.1-0.2 mg/L* in most parts of New Zealand), upwards to between 0.7 and 1.0 mg/L. Public health authorities worldwide agree that community water fluoridation (CWF) is the most effective public health measure to reduce the burden of dental caries, reducing both its prevalence within a population and its severity in individuals who are affected. With a history dating back to the 1940s in the US, CWF is now practised in over 30 countries around the world, providing over 370 million people with optimally fluoridated water. Epidemiological evidence of its efficacy and safety has been accumulating for over six decades. The fluoride concentrations

* *Fluoride concentrations in water are expressed as either mg/L or parts per million [ppm]; these units are effectively interchangeable. Fluoride concentrations in toothpaste are typically expressed as ppm.*

recommended for CWF have been set based on data from both animal toxicology studies and human epidemiological studies to provide a daily oral exposure that confers maximum benefit without appreciable risk of adverse effects.

Naturally occurring concentrations of fluoride in water in some parts of the world (e.g. parts of China, Africa, and India) are much higher than those found in fluoridated water, and in some of these regions high fluoride intakes are known to cause problems in teeth and bones (dental and skeletal fluorosis). It is important to distinguish between effects of apparent fluoride toxicity at very high intakes, and effects that may occur at the much lower intakes from CWF. Some studies have failed to do so, giving rise to potentially misleading statements and confusion.

There remains ongoing debate about the long-term safety of adding fluoride to drinking water. It is important to separate concerns that are evaluable by science and those concerns that arise from philosophical/ideological considerations. With respect to the former it is important to note that the inherent nature of science is such that it is never possible to prove there is absolutely no risk of a very rare negative effect – science can only draw conclusions that are highly probable, but not absolute.

Most recently, the concerns for potential side effects have revolved around (a) whether consuming fluoridated water increases the risk of cancer (in particular osteosarcoma), and (b) the effects of fluoride on the cognitive development of children. The potential for increased bone fracture risk has also been extensively examined. While the scientific consensus confirmed in this review is that these are not significant or realistic risks, as a matter of public health surveillance, such claims continue to be studied and monitored in populations receiving fluoridated water.

'Artificial' vs 'natural' fluoride

The fluoride-containing compounds used for adjusting fluoride levels in drinking water have been shown to dissolve fully in water to release fluoride ions. These ions are identical to those found naturally in the water. The reagents used for water fluoridation in New Zealand are regularly tested for purity and to ensure that any trace metals (or other impurities) that they may contain, when added to drinking water, are well below the maximum safe limits described in the Drinking Water Standards for New Zealand. The water supply itself is then regularly monitored to ensure fluoride levels and any impurities (including from the source water) are within the maximum safe limits set in the Drinking Water Standards.

Evidence for benefits of water fluoridation

Analysis of evidence from a large number of epidemiological studies and thorough systematic reviews has confirmed a beneficial effect of CWF on oral health throughout the lifespan. This includes relatively recent studies in the context of the overall reduced burden of caries that has resulted from the widespread use of topical fluoride products (e.g. toothpastes, mouth rinses, and fluoride varnishes). In New Zealand, significant differences in decay rates between fluoridated and non-fluoridated communities continue to exist, despite the fact that the majority of people use fluoride toothpastes. These data come from multiple studies across different regions of the country conducted over the last 15 years, as well as from a national survey of the oral health status of New Zealanders conducted in

2009. Various studies indicate that CWF has an additive effect over and above that of fluoride toothpaste and other sources of fluoride that are now in common use. The burden of tooth decay is highest among the most deprived socioeconomic groups, and this is the segment of the population for which the benefits of CWF appear to be greatest.

Known effects of fluoride exposure – dental fluorosis

Dental fluorosis is a tooth enamel defect characterised by opaque white areas in the enamel, caused by excess exposure to fluoride while the teeth are forming in the jaw and before they erupt into the mouth. Tooth development occurs during the first 8 years of life; beyond this age children are no longer susceptible to fluorosis. In the common, mild forms it is of minor or no cosmetic significance, but severe forms result in pitted and discoloured teeth that are prone to fracture and wear. Dental fluorosis reflects overall fluoride absorption from all sources at a young age, and is a known effect of drinking water containing naturally very high concentrations of fluoride. The amount of fluoride added to water in CWF programmes is set to minimise the risk of this condition while still providing maximum protective benefit against tooth decay. No severe form of fluorosis has ever been reported in New Zealand.

The prevalence of mild dental fluorosis has increased somewhat since the initiation of CWF in communities around the world, but further increases have coincided with the widespread use of fluoridated dental products, particularly toothpaste and fluoride supplements. There is a substantial evidence base to indicate that inappropriate use of such dental products (e.g. young children swallowing large amounts of toothpaste; inappropriate prescribing of supplements) is the main factor in increasing fluorosis risk, as the prevalence of fluorosis has increased more in non-fluoridated areas than in fluoridated ones. Most of the dental fluorosis that occurs in this country is very mild, having effects that are only identified by professional dental examination. The levels of fluoride used for CWF in New Zealand are relatively low in the range that is known to cause minimal risk for cosmetically problematic fluorosis, as reflected in data from the 2009 New Zealand Oral Health Survey, which showed the overall prevalence of moderate fluorosis to be very low. The survey indicated that fluorosis prevalence is not increasing, and that levels of fluorosis are similar between fluoridated and non-fluoridated areas.

The risk for mild fluorosis that is associated with fluoride exposure is highest for formula-fed infants, and young children who are likely to swallow toothpaste. In some cases the fluoride intake by these groups can approach or exceed the currently recommended conservative upper intake level, but the rarity of cosmetically concerning dental fluorosis in New Zealand indicates that such excess intake is not generally a safety concern.

Analysis of evidence for adverse effects

A number of potential adverse effects of the consumption of fluoride have been suggested, though many have only been reported in areas where the natural level of fluoride in water is very high.

Most recently, the main issues in question are whether fluoride in drinking water has an impact on cancer rates (particularly the bone cancer osteosarcoma) or on the intellectual development (IQ) of children. Because fluoride accumulates in bones, the risk of bone

defects or fractures has also been extensively analysed. While there are published studies suggesting that such associations exist, they are mostly of very poor design (and thus of low scientific validity) or do not pertain to CWF because the fluoride levels in question are substantially higher than would be encountered by individuals drinking intentionally fluoridated water.

Cancer

The large majority of epidemiological studies have found no association between fluoride and cancer, even after decades of exposure in some populations. This includes populations with lifetime exposure to very high natural fluoride levels in water, as well as high-level industrial exposures. The few studies that have suggested a cancer link with CWF suffer from poor methodology and/or errors in analysis. Multiple thorough systematic reviews conducted between 2000 and 2011 all concluded that based on the best available evidence, fluoride (at any level) could not be classified as carcinogenic in humans. More recent studies, including a large and detailed study in the UK in 2014, have not changed this conclusion.

Bone cancers have received specific attention because of fluoride's deposition in bone. Although a small study published in 2006 claimed an increased risk for osteosarcoma in young males, extensive reviews of these and other data conclude that there is no association between exposure to fluoridated water and risk of osteosarcoma. Likewise, in the New Zealand context, data from the New Zealand Cancer Registry from 2000-2008 show no evidence of association between osteosarcoma incidence and residence in CWF areas.

We conclude that on the available evidence there is no appreciable risk of cancer arising from CWF.

Effects on IQ

Recently there have been a number of reports from China and other areas where fluoride levels in groundwater are naturally very high, that have claimed an association between high water fluoride levels and minimally reduced intelligence (measured as IQ) in children. In addition to the fact that the fluoride exposures in these studies were many (up to 20) times higher than any that are experienced in New Zealand or other CWF communities, the studies also mostly failed to consider other factors that might influence IQ, including exposures to arsenic, iodine deficiency, socioeconomic status, or the nutritional status of the children. Further, the claimed shift of less than one standard deviation suggests that this is likely to be a measurement or statistical artefact of no functional significance. A recently published study in New Zealand followed a group of people born in the early 1970s and measured childhood IQ at the ages of 7, 9, 11 and 13 years, and adult IQ at the age of 38 years. Early-life exposure to fluoride from a variety of sources was recorded, and adjustments were made for factors potentially influencing IQ. This extensive study revealed no evidence that exposure to water fluoridation in New Zealand affects neurological development or IQ.

We conclude that on the available evidence there is no appreciable effect on cognition arising from CWF.

Bone fractures

Fluoride is incorporated into bone during bone development and remodeling. Evidence from both animal and human studies suggests that water fluoride levels of 1 mg/L – a level considered optimal for prevention of tooth decay – may lead to increased bone strength, while levels of 4 mg/L may cause a decrease in bone strength.

Prolonged exposure to fluoride at five times the levels used in CWF (~5 mg/L) can result in denser bones that may be more brittle than normal bone, and may increase the risk of fracture in older individuals. However, despite a large number of studies over many years, no evidence has been found that fluoride at optimal concentrations in water is associated with any elevated risk of bone fracture. In children, intake of fluoridated water does not appear to affect bone density through adolescence.

We conclude that on the available evidence there is no appreciable risk of bone fractures arising from CWF.

Other effects

A number of other alleged effects of CWF on health outcomes have been reviewed, including effects on reproduction, endocrine function, cardiovascular and renal effects, and effects on the immune system. The most reliable and valid evidence to date for all of these effects indicates that fluoride in levels used for CWF does not pose appreciable risks of harm to human health.

Fluoride exposure in specific population groups

A number of public health agencies around the world, including the US Institute of Medicine, Health Canada, the European Food Safety Authority, the Australian National Health and Medical Research Council, and the New Zealand Ministry of Health provide recommendations on adequate intakes (AIs) for nutrients considered necessary for optimal health, as well as safe upper levels of intake (ULs). Fluoride is included among the nutrients assigned AI and UL recommendations.

Infants

Infants who are exclusively breastfed to 6 months of age have very low fluoride intake, and the low recommended intake level for this age group (0.01 mg/day) reflects this. Infants 0-6 months of age who are exclusively fed formula reconstituted with fluoridated water will have intakes at or exceeding the upper end of the recommended range (UL; 0.7 mg/day). The higher intakes may help strengthen the developing teeth against future decay, but are also associated with a slightly increased risk of very mild or mild dental fluorosis. This risk is considered to be very low, and recommendations from several authoritative groups support the safety of reconstituting infant formula with fluoridated water.

Young children (1-4 years)

Typical intakes of fluoride from water, food, and beverages in young children in New Zealand are within or below the recommended levels (0.7-2.0 mg/day depending on age and weight). However, intake of fluoride from toothpaste contributes a significant proportion of total ingested fluoride in this group. In combination with dietary intake this can raise the total daily intake above the recommended adequate intake level.

Consumption of fluoridated water is highly recommended for young children, as is the use of fluoride toothpaste (regular strength – at least 1000ppm), but only a smear of toothpaste should be used, and children should be supervised during toothbrushing to ensure that toothpaste is not swallowed/eaten.

Children (5+years) and adolescents

Fluoride exposure estimates for children and adolescents in New Zealand indicate that the average total dietary intake for this age group (including fluoride ingested from toothpaste) is below the recommended adequate intake level even in fluoridated areas. This group is not considered at high risk of exposure to excess fluoride, and consumption of fluoridated water and use of fluoride toothpaste (≥1000ppm) are both recommended.

Pregnant or breastfeeding women

Pregnant women are not themselves any more vulnerable to the effects of fluoride than their non-pregnant counterparts, but they may have concerns about fluoride ingestion and its possible effects on their unborn fetus. However, no studies to date have found any evidence of reproductive toxicity attributable to fluoride at or around levels used for CWF. The recommendations for fluoride intake for pregnant women therefore do not differ from those for non-pregnant women – i.e. they are encouraged to drink fluoridated water and to use full-strength fluoride toothpaste throughout their pregnancy. This is considered beneficial to their own oral health (which is often compromised by physiological changes in pregnancy) and safe for their offspring.

The same recommendations apply during breastfeeding. Fluoride does not transfer readily into breast milk, so the fluoride intake of the mother does not affect the amount received by her breastfeeding infant.

Adults and the elderly

Although most studies of the effects of CWF have focused on benefits in children, caries experience continues to accumulate with age, and CWF has also been found to help reduce the extent and severity of dental decay in adults, particularly with prolonged exposure. Elderly individuals may have decreased ability to undertake personal oral healthcare, and therefore are vulnerable to tooth decay, particularly in exposed root surfaces. As with other groups who are at high risk of tooth decay, consumption of fluoridated water can have important preventive impact against this disease in the elderly. Epidemiological studies have shown that elderly individuals indeed benefit from drinking fluoridated water, experiencing lower levels of root decay and better tooth retention. It should be noted that the increasing retention of natural teeth in the elderly brings with it an increased need for long-term maintenance of tooth function, and a continuing benefit of CWF exposure in this group.

Individuals with kidney disease

Chronic kidney disease is relatively common in New Zealand, with a higher prevalence amongst Māori, and numbers are increasing due to the increasing prevalence of hypertension and diabetes. Because the kidney is the major route of fluoride excretion, blood fluoride concentrations are typically elevated in patients with end-stage kidney disease, and this group may be considered to be at increased risk of excess fluoride

exposure. However, to date no adverse effects of CWF exposure in people with impaired kidney function have been documented.

Cost-effectiveness of water fluoridation

Tooth decay is responsible for significant health loss (lost years of healthy life) in New Zealand. The 'burden' of the disease – its 'cost' in terms of lost years of healthy life – is equivalent to 3/4 that of prostate cancer, and 2/5 that of breast cancer in New Zealand. Tooth decay thus has substantial direct and indirect costs to society.

There is strong evidence that CWF is a cost-effective use of ratepayer funds – with it being likely to save more in dental costs than it costs to run fluoridation programmes (at least in communities of 1000+ people). There is New Zealand evidence for this, along with evidence from Australia, the US, Canada, Chile and South Africa. CWF appears to be most cost-effective in those communities that are most in need of improved oral health. In New Zealand these include communities of low socioeconomic status, and those with a high proportion of children or Māori

Conclusions

The World Health Organization (WHO), along with many other international health authorities, recommends fluoridation of water supplies, where possible, as the most effective public health measure for the prevention of dental decay.

A large number of studies and systematic reviews have concluded that water fluoridation is an effective preventive measure against tooth decay that reaches all segments of the population, and is particularly beneficial to those most in need of improved oral health. Extensive analyses of potential adverse effects have not found evidence that the levels of fluoride used for community water fluoridation schemes contribute *any* increased risk to public health, though there is a narrow range between optimal dental health effectiveness and a risk of mild dental fluorosis. The prevalence of fluorosis of aesthetic concern is minimal in New Zealand, and is not different between fluoridated and non-fluoridated communities, confirming that a substantial proportion of the risk is attributable to the intake of fluoride from sources other than water (most notably, the swallowing of high-fluoride toothpaste by young children). The current fluoridation levels therefore appear to be appropriate.

This analysis concludes that from a medical and public health perspective, water fluoridation at the levels used in New Zealand poses no significant health risks and is effective at reducing the prevalence and severity of tooth decay in communities where it is used. Communities currently without CWF can be confident that this is a safe option that is cost saving and of significant public health benefit – particularly in those communities with high prevalence of dental caries.

Review methodology

This report aimed to evaluate the current state of scientific knowledge on the health effects of water fluoridation, in order to inform decision-making on continuing or implementing community water fluoridation, particularly within the New Zealand context. Several previous rigorous systematic reviews were used as the basis for this analysis, and literature searches in Medline, EMBASE, the Cochrane library database, Scopus, and Web of Science were undertaken to identify subsequent studies in the peer-reviewed scientific literature. Alleged health effects from both the scientific and non-scientific literature were considered, and many original studies relating to these claims were re-analysed. The main review sources are presented in the Appendix.

Aside from animal toxicity studies, articles considered for this review were those that had a primary focus on community water fluoridation or human exposure to fluoride at levels around those used for CWF. Studies were assessed for robust design, including adequate sample size, appropriate data collection and analysis, adjustment for possible confounding factors, and conclusions appropriate to the data analysis.

The report does not consider in depth the broader philosophical issues that lead some people to have objections to CWF.

Health effects of water fluoridation:
A review of the scientific evidence

1. Background to water fluoridation issues

Fluoridation of public water supplies began as a public health measure in the United States in the 1940s, following results of epidemiological studies showing a link between elevated levels of fluoride in drinking water and reduced prevalence and severity of tooth decay (dental caries) in local populations. Community water fluoridation (CWF) entails an upward adjustment of the fluoride concentration in fluoride-poor water sources to a level that is considered optimal for dental health, yet broadly safe for the population that drinks the water.

Geological factors cause a significant variation in the natural concentration of fluoride in water around the globe. Much of the early work on fluoride was concerned with the effects of naturally occurring excessive fluoride concentrations in water and the associated prevalence of varying degrees of dental fluorosis, a tooth enamel mineralization defect that causes changes to the appearance of the enamel.[1] Investigations into the causes of such enamel changes led to the discovery of the dental health benefits – specifically a protective effect against tooth decay – of an appropriate concentration of fluoride in drinking water. The link between moderately elevated levels of fluoride in water and reduced prevalence and severity of tooth decay led to trials of the addition of fluoride to drinking water supplies in some areas where the natural level of fluoride in the water was low.

Fluoridation of water supplies in New Zealand began in 1954. Currently more than half the population receives fluoridated water. Some of the larger centres without fluoridated water supplies currently are Whangarei, Tauranga, Whanganui, Napier, Nelson, Blenheim, and Christchurch and Rotorua. The most recent decision to fluoridate a low-fluoride community occurred in South Taranaki in 2014. New Plymouth and Hamilton have recently stopped their fluoridation programmes, though a decision has been made to restart fluoridation in Hamilton. A map of fluoridated water supplies in New Zealand can be viewed at: http://www.drinkingwater.esr.cri.nz/supplies/fluoridation.asp.

Despite its long history and a wealth of data showing marked improvements in oral health in communities following the introduction of fluoridated drinking water, and in general a broad social license for its use, this public health measure remains controversial. There is a perception that some questions of the potential for adverse health effects of water fluoridation remain incompletely resolved, and its usefulness has been debated given the significantly lower overall prevalence of caries (attributed to the widespread use of topical fluoride dental products), and in light of its known side effect of mild dental fluorosis. Recent years have seen some reevaluation of recommended fluoride levels in water, based on current research into fluoride availability in the broader environment, including intake from processed foods and beverages, and the introduction of new and/or improved fluoride dental products into the marketplace.

This report aims to evaluate the current state of scientific knowledge on the health effects of water fluoridation, in order to inform decision-making on continuing or implementing CWF, particularly within the New Zealand context.

1.1 Why is there societal concern?

At the core of opposition to water fluoridation is the viewpoint that it conveys an unacceptable risk to public health. It is also argued that adding fluoride to public water supplies is an infringement on individual rights. Silicofluorides used in CWF have been labelled by some opponents as 'unlicensed medical substances' that pose unknown dangers to human health. Such views have been put forth in essay format by Connett, [2] on anti-fluoride websites, [3] and in books such as '*The Fluoride Deception*', [4] the foreword of which describes fluoride as "another therapeutic agent...that had not been thoroughly studied before it was foisted on the public as a panacea to protect or improve health."[†]

The public perception of risk can differ from that of scientists and experts, and involves not only the perception of the potential 'hazard', but also 'outrage factors' that include voluntariness and control. Outrage factors, as initially defined by Sandman,[5] modify the emotions associated with a risk and thereby inflate the perception of the risk. When exposure to a hazard is voluntary, it is perceived as being less risky. Disagreement between apparent 'experts' indicates to the public that the risks are unknown or unknowable, in which case they tend to take the 'worst case scenario' and judge the risk as more serious. In debates about water fluoridation, the public is confronted with wildly conflicting claims (largely via the internet and news media), and most citizens are not able to easily distinguish differences in authority of the 'experts'. Such confusion leads many to choose what they view as the 'safe' course – to vote against water fluoridation.

A recent survey in Australia indicated that Sandman's[5] outrage factors were indeed linked to opposition to water fluoridation.[6] However, the survey also found that the majority of respondents expressed support for water fluoridation, and overall, little outrage. To the opponents in the minority, fluoridation remains a high-outrage issue, despite scientific evidence that is strongly suggestive of its very low risk. The objection to CWF as a violation of rights is a philosophical argument that may vary with ease of access to non-fluoridated water. Such an objection would not necessarily diminish with increasing availability of evidence-based scientific information on fluoridation effects.

[†] *The foreword to 'The Fluoride Deception' also declares that fluorine is "an essential element in the production of the atom bomb, and there is good reason to believe that fluoridated drinking water and toothpaste – and the development of the atom bomb – are closely related."*

Examples of issues that have caused some to express concern

- Dental fluorosis of any degree (although typically very mild) is fairly common. Fluorosis of some aesthetic concern may occur in around 8% of children consuming water containing fluoride at 1.0 mg /L from birth.
- Intake of fluoride by infants exclusively fed formula reconstituted with water fluoridated at 1.0 mg/L can reach or exceed the currently recommended daily upper level of intake, potentially increasing their risk of dental fluorosis.
- There are claims of health risks including cancer and reduced IQ in children. This is against the background that science cannot ever give absolute proof of the certainty of no risk – only state that risk is imperceptibly small.
- Some people are concerned about the lack of choice when their water supply is fluoridated and therefore the inconvenience of obtaining non-fluoridated water.

1.2 Consensus and Debate

Analysis of the peer-reviewed scientific literature reveals a clear consensus on the effectiveness of CWF: a large number of epidemiological studies and thorough systematic reviews concur that CWF has a beneficial effect on oral health throughout the lifespan. This includes relatively recent studies in the context of the overall reduced burden of caries that has resulted from the widespread use of topical fluorides. Yet the effectiveness of CWF continues to be questioned by a small but vocal minority. The avenues used to present opposing views tend to be those most easily accessed by the public, giving the impression that there is an even debate among 'experts.' In reality, the weight of peer-reviewed evidence supporting the benefits of water fluoridation at the levels used in New Zealand is substantial, and is not considered to be in dispute in the scientific literature.

There is, however, considerable ongoing debate about the long-term safety of adding fluoride to drinking water, because it is difficult to determine cause and effect and to definitively rule out all potential risks. The nature of science is such that no conclusion can be absolute, and while something can be readily proved to be unsafe, conceptually it is never possible to say that something has absolutely no risk associated with it. In other words, epidemiological methods cannot prove beyond a shadow of a doubt that there is no negative effect – it can make a conclusion highly probable, but not 100% certain. Absolute certainty is therefore an impossible claim. Demanding it can lead to the inappropriate use of the precautionary principle, causing unnecessary public alarm when the weight of evidence indicates that significant harm is extremely unlikely. Most recently, the CWF debate has revolved around (a) whether consuming fluoridated water increases the risk of cancer (in particular osteosarcoma), and (b) the effects of fluoride on the cognitive development of children. It is important to review the quality of evidence for such claims. While there are published studies suggesting that such associations exist, they are mostly of low validity (being poorly conducted or improperly analysed) or do not pertain to CWF because the fluoride levels in question are substantially higher than would be encountered by individuals drinking intentionally fluoridated water. Nonetheless, while the scientific consensus is that these are not significant risks, the nature of public health surveillance is

such that such claims will continue to be studied and monitored in populations receiving fluoridated water. The evidence for and against these and other claimed adverse effects of water fluoridation is presented in section 4.

There is a consensus that chronic consumption of high levels of fluoride in water increases the risk of dental fluorosis, and, at very high levels, skeletal fluorosis (changes in bone structure resulting from excess fluoride accumulation) can occur. Naturally occurring fluoride concentrations in water can range from very low (<0.1 mg/L,[‡] as is common in New Zealand) to in excess of 20 mg/L in parts of China and Africa. Risk/benefit analyses of fluoride concentrations associated with reducing the burden of caries and varying risks of dental fluorosis has established a range between 0.7 and 1.2 mg/L as a level of fluoride in water at which caries prevention is optimal and dental fluorosis risk is minimised (but not absent). Skeletal fluorosis does not occur with fluoride concentrations in this range.

The range of 0.7-1.2 mg/L was recommended for fluoridation of water supplies in the US to account for possible differences in fluid intake based on ambient air temperature (i.e. the lower bound was used in hotter climates where water consumption was assumed to be higher). However, more recent data have shown that tap water intake does not differ substantially based on ambient temperature, indicating that there is no need for different recommendations in different temperature zones, at least in the US. In 2011 the Department of Health and Human Services proposed that 0.7 mg/L fluoride should be the target level throughout the country.[7] This updated recommendation assumes that significant caries preventive benefits can be achieved, and the risk of fluorosis reduced, at the lowest concentration of the original recommended range. Health Canada also recommends 0.7 mg/L as the fluoride target level for CWF.[8] These lowered targets reflect concerns about increasing risks of dental fluorosis because of increasing fluoride exposure from additional sources, including toothpastes and food and beverages made with fluoridated water (see section 3.3). The revised fluoridation target level has not yet been widely adopted in the US, so the effects of this change are as yet unclear.

Knowns	Unknowns
• Tooth decay remains a major health problem in New Zealand, especially among low socioeconomic groups • Water fluoridation at levels used in New Zealand reduces the prevalence and severity of tooth decay without causing significant health effects • High intakes of fluoride can cause dental and skeletal fluorosis • High intakes of fluoride do not regularly occur in New Zealand	• The absolute level of risk for potential, very rare health effects other than fluorosis • While benefit is certain there is less clarity as to the magnitude of the beneficial effect against the background of additional fluoride sources

[‡] *Fluoride concentrations in water are expressed as either mg/L or parts per million [ppm]; these units are effectively interchangeable. Fluoride concentrations in toothpaste are typically expressed as ppm.*

1.3.1 Beneficial vs toxic doses

Like many elements that affect human health, fluoride is beneficial in small amounts and toxic in excess. More than 500 years ago, the physician and alchemist Paracelsus first stated the basic principle that governs toxicology: "All things are poisons, for there is nothing without poisonous qualities. It is only the dose which makes a thing poison." In other words, for substances that have beneficial effects on health, "the dose differentiates a poison from a remedy." Fluoride clearly benefits dental health when used topically or ingested in small doses, but in very high doses it is poisonous, and has been used as a component of pesticides. Similar examples can be found among beneficial health-promoting vitamins, including vitamin D, which in high doses is an effective rodenticide used to eradicate rats and possums, and in humans can cause musculoskeletal and renal disease.[9]

A principle of toxicology is that the individual response of an organism to a chemical increases proportionally to the exposure (dose). For most chemicals, there is a threshold dose below which there is no apparent adverse effect; however, this may depend on the sensitivity of the measurement technique and the size of the study. The larger a study is, the smaller the effect that can be detected. Further, a biological effect might be detected but have no functional (or health) significance. Threshold concentrations causing acute toxicity are determined through dose-response experiments in laboratory animals. The progression and reproducibility of an effect over multiple doses (known as a dose-response curve) can allow extrapolation of the potential for, or lack of, effects at other doses. Animal studies can sometimes provide evidence of potential impacts of long-term exposure to a range of different doses; in humans this requires epidemiological studies. From such studies, a 'no observed adverse effect level (NOAEL)' is derived, from which a tolerable daily intake (TDI) reference dose is determined by applying a safety margin of several orders of magnitude. The TDI indicates a daily oral exposure to the human population (including sensitive groups) that is estimated to be without an appreciable risk of deleterious effects during a lifetime.

Water fluoridation is a measure to regulate the fluoride concentrations in community water supplies to a level that is beneficial to health and not harmful for human ingestion. Because fluoride exhibits both beneficial and harmful effects, the World Health Organization (WHO) recognises an adequate lower level of intake and sets an upper limit on levels of fluoride in water (range 0.5-1.5 mg/L).[10] The recommendations are devised to ensure protection against adverse effects over the course of a lifetime, including in the most sensitive segments of the population. Likewise, the US Institute of Medicine (IOM), the Australian National Health and Medical Research Council (NHMRC), the New Zealand Ministry of Health (NZMoH), and other health authorities similarly recommend optimal intake levels for fluoride in their dietary guidelines for nutrients, but also set upper levels of intake to protect against potential adverse effects (see section 2.4).

1.3.2 Risk assessment

In public health and risk management terms, a distinction is made between a hazard, or an intrinsic propensity to cause harm, and a risk, which is the likelihood that a hazard will result in harm. Fluoride in high doses (beyond those used in CWF) does indeed pose a hazard, but in low doses the risk is considered minimal. Public health policy is based on the best estimate of true human risk.

Hazard = an intrinsic propensity to cause harm
Risk = likelihood that a hazard will result in harm

Estimates of risk from epidemiological studies, combined with toxicokinetic and mechanistic data, provide a starting point for risk analysis. Randomised, controlled clinical trials are not generally possible with an intervention such as CWF, so human data must come from epidemiological studies that compare exposed populations to non-exposed ones and make a statistical evaluation to determine whether there is an association between the exposure and a human health effect. A causal relationship is inferred based on the strength and consistency of the association in a sufficient number of different circumstances, and the presence of a graded relationship (for example, a progressive increase or decrease in adverse effect rates over a range of fluoride levels), as well the existence of a plausible biological mechanism by which fluoride could cause the effect. A common error is to accept an hypothesis on the basis of isolated supportive findings without looking at the evidence as a whole. A further error is to confuse observed associations between two factors with evidence for causation – i.e. that one factor causes the other.[5] Epidemiology has a number of ways of trying to resolve between association and causation.

Human risk estimates should be based on reproducible results, preferably in studies of human populations that have similar characteristics and exposures. Findings from studies of populations chronically exposed to high levels of fluoride – for example, those found naturally in groundwater and/or from industrial pollution or coal burning, as in China (where levels are often >4 mg/L) – cannot be easily extrapolated to populations receiving fluoride primarily from intentionally fluoridated drinking water over the range of 0.5-1.5 mg/L recommended by WHO.

In the case of CWF, epidemiological data have been gathered and scrutinised for over six decades, and vast amounts of research into its positive and negative effects have been published. Suggestions of harmful effects are put forth regularly, and the scientific and health communities regularly assess the risks with the best available laboratory and epidemiological tools. But science cannot prove a negative – it is not possible to design an experiment that proves without doubt that no harm will ever come from ingesting fluoride. Instead, results must be tested against the 'null hypothesis,' which posits that there will be no difference in health impact between a group that ingests fluoridated water and a control group that does not.

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[5] *To use a trite example, ice cream consumption and burglaries might be correlated in an epidemiological study. This does not mean that eating ice cream causes bad behavior (burglaries); rather the association could be explained by the increased likelihood that in hot weather people eat more ice cream, and are also more likely to leave their windows open.*

The most reliable and valid evidence indicates that fluoride in levels used for CWF does not pose appreciable risks of harm to human health, and that the benefits significantly outweigh the risks.

1.4 Fluoridation around the world

The WHO recommends fluoridation of drinking water as the single most important intervention to reduce dental caries in communities.[10] Around 30 countries worldwide have intentionally fluoridated water supplies, serving an estimated 370 million people. An additional >50 million people drink water that is naturally fluoridated at or near the optimal level, including those supplied from some water sources in Canada, the UK, Spain, Japan, Finland, Chile, Argentina and Australia that have natural fluoride levels of around 1.0 mg/L. Some of the countries where CWF is practised are shown in table 1, along with the percent of the population reached by the CWF schemes and also the number of people in these countries who have access to naturally-fluoridated water that is around the CWF optimum level (~1.0 mg/L).

It is sometimes claimed that European nations have abandoned the practice of fluoridation; this, in fact, is not the case. As of 2014, the UK, Ireland, and Spain fluoridate their water, while other nations put fluoride in table salt or acquire it naturally from higher levels present in drinking water, as in Sweden and Italy. Most experiences gained through water fluoridation, accumulated over decades of epidemiological research, also apply to salt fluoridation. As with water fluoridation, salt delivers fluoride both systemically and topically, and is used in some areas where water fluoridation is not feasible. Approximately 70 million Europeans consume fluoridated salt, including most of the population of Germany and Switzerland. The use of salt for fluoridation in Europe is based on the precedent of iodisation of salt to prevent endemic goitre, where, in Austria and Switzerland, a universally implemented salt iodisation programme totally prevented iodine-deficiency diseases. Salt fluoridation has been used in Switzerland since 1955.[11] For many European communities, salt is used because their complex water systems make water fluoridation impractical.

Water fluoridation ceased in Germany after reunification of the country in 1990. A continued decrease in caries after cessation of CWF was observed, and has been put forth by some as proof that water fluoridation is both ineffective and unnecessary. However, the caries decline coincided with several other trends, including the introduction of fluoridated salt in 1992, a decrease in national sugar consumption in 1993 (down to 1967 levels of intake), and complete restructuring of the dental care system after reunification.[12] A further study of other former East German cities suggested that the caries decline was unlikely to be caused by any one single factor, but that the availability of topical fluorides probably had the greatest impact. The authors concluded that for Germany "from our point of view, water fluoridation would still seem to be reasonable in all heavily-populated industrial areas with high or increasing caries prevalence."[13]

Fluoridation practices in Asia were reviewed in 2012 by Petersen et al.[14] Several countries that are currently unable to implement CWF programmes have used fluoridation of salt (e.g. Cambodia, Laos) or milk (Thailand) as a community public health measure. Costa Rica, Jamaica, and Colombia have salt fluoridation programmes that reach virtually 100% of their populations.[11] In 2007, the 60th World Health Assembly called on countries that have not yet established fluoridation schemes (water, where feasible, or alternatively salt or milk) to consider doing so.[15]

Table 1 – Countries/regions with fluoridated water (including community water fluoridation (CWF) and naturally fluoridated)

Country/region	Total population with CWF (number)	Population with naturally fluoridated water (number)	% of the population with optimally fluoridated water
Pacific			
New Zealand	2,330,000	--	56
Australia	17,600,000	144,000	80
Fiji	300,000	NA	36
Papua New Guinea	102,000	70,000	6
North America			
USA	194,206,000	10,078,000	74**
Canada	14,260,000	300,000	44
Central and South America			
Argentina	3,100,000	4,500,000	19
Brazil	73,200,000	NA	41
Chile	11,000,000	800,000	70
Guatemala*	1,800,000	NA	13
Guyana	45,000	200,000	32
Panama*	510,000	NA	15
Peru	500,000	80,000	2
Asia/Middle East			
Brunei	375,000	NA	95
Hong Kong	6,968,000		100
Libya	400,000	1,000,000	22
Malaysia	20,700,000	NA	75.5
Singapore	5,080,000	--	100
South Korea	2,820,000	NA	6
Vietnam	3,500,000	NA	4
UK/Europe			
Republic of Ireland	3,250,000	200,000	73
Serbia	300,000	NA	3
Spain	4,250,000	200,000	11
UK	5,797,000	330,000	10

Data from the British Fluoridation Society. *One in a million: the facts about fluoridation* (3rd edition March 2012)[16]

*pre-2003 data; **as % of population connected to public water supplies.

2 Fluoride sources, fluoridation, intakes & exposure

2.1 Naturally occurring fluoride levels

Fluoride is the naturally occurring reduced form of the electronegative element fluorine, which is found in all water sources in small but traceable amounts. High fluoride concentrations are found in groundwater in areas where fluoride-bearing minerals are common. Thermal waters of high pH are generally rich in fluoride. Seawater typically contains around 1.3 mg fluoride/L; surface waters such as rivers and lakes usually contain well below 0.5 mg/L. High natural groundwater fluoride concentrations have been reported from India, Pakistan, Africa, Thailand, Sri Lanka, Southern Asia, the Eastern Mediterranean countries, and many areas of China, where levels as high as 20 mg/L are reported. Both shallow and deeper groundwaters are affected; in general, the deeper groundwaters have higher concentrations. These areas are affected by endemic fluorosis (see section 4.3.2).[10]

Many groundwater resources in Central Europe exceed the WHO guideline value of 1.5 mg/L.[17] Concentrations in natural waters span more than four orders of magnitude (most 0.1-10.0 mg/L but some higher and lower).[18] It is not possible to predict the fluoride content of water on the basis of geology alone, other than in general terms.

In New Zealand, the highest natural levels of fluoride in groundwater are around 0.56 mg/L; rivers and lakes typically have fluoride levels around 0.05 mg/L. In most areas the fluoride levels are around 0.1-0.2 mg/L, though some areas (e.g. Northland) have natural fluoride levels of around 0.02-0.03 mg/L.[19] Geothermal or hydrothermal waters are the most likely to contain elevated fluoride levels, but these sources are not used for drinking-water supplies.[20]

2.2 Water fluoridation levels and monitoring in NZ

The NZMoH recommends that, for oral health reasons, the level of fluoride in drinking water in New Zealand should be between 0.7 and 1.0 mg/L. Based on WHO advice, the maximum acceptable value for fluoride in drinking water is 1.5 mg/L to prevent any known adverse health effects (dental or skeletal fluorosis).[21]

Actual fluoride levels in areas where fluoride is added to drinking water in New Zealand vary slightly, but are generally in the range of 0.7-0.9 mg/L. Samples from Dunedin ranged between 0.7 and 0.8 mg/L, with no evidence of attenuation with distance from the dosing point.[22] Other treatment plants show similar consistency in maintaining fluoride concentrations within a narrow range. The majority of samples were below 0.75 mg/L from most treatment plants in 2012-2013, with an average *maximum* level of 0.89 mg/L.[23] Fluoride levels in fluoridated supplies around the Auckland region average ~0.8 mg/L.[24]

2.2.1 Fluoride forms used for fluoridation

The fluorine-containing compounds used for fluoridation include sodium fluoride (NaF), sodium fluorosilicate (Na_2SiF_6), and hydrofluorosilicic acid (H2SiF6; also known as hexafluorosilicate [HFA]). The latter is most commonly used in New Zealand.[25] HFA is a liquid and is therefore easier to handle and to measure accurately into bulk water. This fluoride source is comparatively dilute; 15% acid contains just under 12% fluorine by mass (NaF contains 46% and Na_2SiF_6 contains 60% F).

To produce HFA, phosphate rock containing fluoride and silica is treated with sulphuric acid to produce two gases: silicon tetrafluoride and hydrogen fluoride. These gases are passed through scrubbers where they react with water to form hydrofluorosilicic acid.[26]

'Artificial' vs 'natural' fluoride in water

There have been assertions that 'artificial' fluorosilicates differ from 'natural' fluorides in their dissolution in water and their bioavailability following ingestion in humans. Jackson et al.[27] addressed these issues, and determined that HFA used to fluoridate water is effectively 100% dissociated to form fluoride ion under water treatment conditions, with bioavailability comparable to natural fluoride. Testing a range of water pH values and HFA concentrations, Finney et al.[28] also reported that at around pH7.0 and typical drinking water fluoride concentration, HFA dissociation to produce free fluoride ions was essentially complete.

In terms of chemistry and bioavailability there is no difference between added and "natural" fluoride. The laws of chemistry dictate that fluoride ions in solution in water are identical regardless of their source. The pharmacokinetics of exposure to natural vs artificial fluorides in water is discussed below in section 2.4.2.

Fluoridation compounds and interactions

The analysis by Jackson et al.[27] also concluded that fluoride at a concentration of 1 mg/L has essentially no interaction with other chemical species in water and no appreciable effect on the chemical speciation of iron, copper, or lead, and therefore would not influence their bioavailability and potential toxicity. The quantities of trace metal impurities occurring as a result of fluoridation were also determined to be very small, having no discernible impact on drinking water quality. The Irish Forum on Fluoridation (2002)[29] examined this issue with specific regard to HFA, which is also used for fluoridation in New Zealand. The assessment showed that the resulting concentrations of heavy metals in the HFA additive (including arsenic, mercury, chromium, cadmium, lead, nickel, selenium and antimony) after dilution in drinking water would be a minute fraction of the guideline values recommended by the WHO, and would have no appreciable toxic effects. The reagents used for water fluoridation in New Zealand are regularly tested for purity and to ensure that any trace metals (or other impurities) that they may contain, when added to drinking water, are well below the maximum safe limits described in the Drinking Water Standards for New Zealand.[30] The water supply itself is then regularly monitored to ensure fluoride levels and any impurities (including from the source water) are within the maximum safe limits set in the Drinking Water Standards.

There has been concern that fluoride in drinking water may increase human exposure to lead because it would cause the release of lead from pipes. This concern appears to be based on a single case study suggesting a relationship between fluoridation levels and blood lead concentrations,[31] and a study testing the release of lead from pipes with water containing fluoride at 2 mg/L in combination with chlorine, chloramine and/or ammonia.[32] The impact of fluoridation on lead biovailability was carefully analysed by Urbansky and Schock,[33] who found no evidence for adverse health impacts of fluoridation *via* effects on lead. They concluded that reports linking fluoridating agents with human lead exposure were "inconsistent with accepted scientific knowledge" and that the chemical assumptions were "scientifically unjustified." An evaluation by the European Commission's Scientific Committee on Health and Environmental Risks (SCHER) in 2011[34] concurred with this conclusion.

2.2.2 Monitoring systems

There are 46 treatment plants for water fluoridation in New Zealand, supplying over two million people with drinking water in 116 'zones'. To comply with the Drinking Water Standards for New Zealand[30], fluoridated drinking water supplies must be sampled at least weekly to monitor levels at the point where the water leaves the treatment plant. Fluoride added to drinking water is not considered a contaminant or a health risk at the usual level of application, but is listed as a 'Priority 2' determinand** for monitoring in drinking water in New Zealand, based on the known effects of high concentrations of fluoride on human health.[30]

NZMoH publishes an annual report detailing the levels of monitored substances in drinking water.[35] In 2012-2013, no fluoride exceedances were found in water leaving any fluoridating treatment plant. Monitoring of fluoride was adequate for water supplied to 92 zones (2,059,000 people), but inadequate (low) at seven treatment plants supplying 12 zones (64,000 people). The previous year (2011-2012) the maximum acceptable value (MAV; 1.5 mg/L) was exceeded in one fluoridated zone (744 people), in 1 out of 52 samples. The fluoride concentration in this sample exceeded the MAV by 0.1 mg/L, and "action was taken to reduce the dose when the test result was obtained."[35]

In general, it is concluded that fluoride levels in public water supplies are well controlled. Most of the test results fall within the required range according to the Drinking Water Standards for New Zealand[30], and are predominantly towards the lower end of the range (~0.7-0.8 mg/L).

** *Priority 2 determinands are substances known to have some adverse effects on human health, but do not have to be measured in every water supply. They are distinguished from Priority 1 determinands - substances or organisms of public health significance with the highest priority for monitoring*

2.3 Other sources of fluoride in NZ

2.3.1 Dental products

Aside from drinking water, toothpaste is the most common source of ingested fluoride in New Zealand. Young children have relatively poor control over swallowing reflexes, and are likely to swallow toothpaste during toothbrushing.[36, 37] This has led to concern that it could result in excessive intakes of fluoride.

Regular fluoridated toothpastes contain 1000 ppm fluoride, though higher strength varieties (1450 mg/L) have recently become available; those marketed for children 0-6 years contain 400-500 ppm fluoride. However, currently available data suggest that low fluoride toothpastes are not very effective in preventing tooth decay in children, and the NZMoH, as well as other health bodies such as Public Health England (PHE), recommends the use of toothpaste containing at least 1000 ppm fluoride in children 0-6 years of age (using a smear of toothpaste only), beginning as soon as the first primary tooth erupts. PHE recommends higher concentrations for children >6 years of age, and for adolescents and adults. A 2014 PHE report on oral health in England concluded that the risk of fluorosis from ingesting too much fluoride is linked more to the amount of toothpaste that is used, rather than to the fluoride concentration in the toothpaste.[38]

Data on actual toothpaste use in New Zealand children are not available, but, based on other studies, it is assumed that infants under the age of 12 months ingest 80% of the toothpaste dispensed on the brush, while children between 12 months and 3 years of age swallow ~68-72% of the toothpaste on the brush.[39]

2.3.2 Food and beverages

Most foods, aside from tea and marine fish, are relatively low in fluoride (<0.05 mg/100g[40]), although foods and beverages prepared with fluoridated water can contain appreciable amounts, depending on the fluoride concentration in the water. Tea leaves have high concentrations of fluoride (up to 400 mg/kg dry weight), and individual exposure due to the consumption of tea can range from 0.04 to 2.7 mg/day. High consumption of some types of tea (e.g. 'brick tea' made from older tea leaves) over long periods has been associated with the development of skeletal fluorosis in some developing countries, particularly if the water used for brewing is high in fluoride.[41] This has not been observed in New Zealand.

Infant formula

There has been some legitimate concern about the systemic intake of fluoride by infants and young children, and in particular, the level of fluoride present in infant formulas. The average intake by infants exclusively fed formula made up with fluoride-free water was estimated as 0.056 mg/day, or approximately 0.01 mg fluoride per kilogram body weight per day (mg/kg/day), which is at the lower end of the recommended range (see below – section 2.4.1). This is because infant formulas currently available in New Zealand are low in fluoride, but if they are reconstituted with water fluoridated at 0.7-1 mg/L, they can provide infants with fluoride at levels approaching or exceeding the recommended upper level for daily intake (particularly at the upper end of the fluoridation range, and for exclusively formula-fed infants drinking the maximum amount).[39]

The Australia New Zealand Food Standards Code specifies that powdered or concentrated infant formulas containing >17µg of fluoride per 100 kilojoules (prior to reconstitution), or 'ready to drink' formulas containing >0.15mg fluoride per 100mL must indicate on the label that consumption of the formula may cause dental fluorosis.[42]

2.4 Fluoride intakes and pharmacokinetics of exposure

In 2009, the Institute of Environmental Science & Research (ESR) estimated the total intake of fluoride from dietary sources (including water) and dental products by New Zealanders of all age groups using dietary modeling and analysis of total diet studies in the scientific literature.[39] The overall conclusion of the ESR report is that, aside from infants and young children, most New Zealanders have fluoride intakes that are below levels considered adequate for the prevention of dental caries, whether or not they consume fluoridated water.

2.4.1 Nutrient Reference Values and typical intakes

Nutrient Reference Values (NRVs) for Australia and New Zealand are provided by the NHMRC and NZMoH,[43] and include recommendations for fluoride intake. Dietary Reference Values (DRVs) used in Europe, which are similar to the NRVs, have recently been reviewed by the European Food Safety Authority (EFSA).[44] The US IOM also provides recommended dietary intakes for fluoride.[45]

The NRVs include recommendation on adequate intakes (AIs) for nutrients considered necessary for optimal health, as well as safe upper levels of intake (ULs). The AI level is estimated to be adequate for about 50% of the population (i.e. some will need more, and some less), and the UL is the highest intake level that is likely to cause no adverse effects in most of the population. In the case of fluoride, however, the UL for children up to 8 years of age (0.7-2.2 mg/day depending on age – see table 2) is based on the 'lowest observed adverse effect level' (LOAEL) for the occurrence of moderate dental fluorosis (see table 3 in section 3.3 for explanation of fluorosis levels), which is considered a cosmetic rather than functional adverse effect. For older children and adults, the UL is 10 mg/day, which is considered a 'no observed adverse effect level' (NOAEL) for the occurrence of skeletal fluorosis (i.e. there are no signs of skeletal fluorosis at this level of intake).[43, 45]

The ESR report suggests that the UL values should be reviewed, given the rarity of moderate dental fluorosis in Australia and New Zealand populations. Current data indicate that fluoride intake exceedances that occur occasionally in New Zealand do not constitute a safety concern.[39] As is the case with many environmental exposures, very young children are the group at greatest risk of exceeding the UL. This is because some infant diets rely heavily on foods/formula made up with the addition of water that may be fluoridated, and because young children tend to ingest fluoride from toothpaste[39] (see below).

Table 2 Nutrient reference values for fluoride as recommended by the US IOM[45] and the Australian NHMRC/New Zealand MOH[43]

Age group (reference weight)	Adequate Intake (AI)		Upper Level of intake (UL)[c]	
	mg/kg/day	mg/day	mg/kg/day	mg/day
Infants				
0-6 months		0.01		0.7
7-12 months (9kg)	0.05	0.5	0.1	0.9
Children				
1-3 years (13kg)	0.05	0.7	0.1	1.3
4-8 years (22kg)	0.05	1.0	0.1	2.2
9-13 years (40kg)	0.05	2.0	0.1	10
Adolescents				
14-18 years boys (64kg)	0.05	3.0	0.1	10
14-18 years girls (57kg)	0.05	3.0	0.1	10
Adult males				
19+ years (76kg)	0.05	4.0	0.1	10
Adult females				
19+ years (61kg)	0.05	3.0	0.1	10
Pregnant (61kg)	0.05	3.0	0.1	10
Lactating (61kg)	0.05	3.0	0.1	10

The Agency for Toxic Substances and Disease Registry (ATSDR) in the USA derived a chronic-duration, oral Minimal Risk Level (MRL) for fluoride of 0.05 mg/kg/day.[37] This represents an estimate of daily human exposure that is unlikely to pose any appreciable risk of adverse health effects. The MRL equates to a daily fluoride intake of 3.5 mg/day for a 70 kg adult or 0.65 mg/day for a 13kg toddler. These values are lower than the NHMRC ULs (0.9-1.3 mg/day for toddlers and 10 mg/day for adults).

In assessing the US Environmental Protection Agency (EPA) standards for maximum allowable levels of fluoride in drinking water (set at 4 mg/L – substantially higher than the MAV recommended by the WHO and used in New Zealand), the US National Research Council (NRC) determined that intakes in the 0.03-0.1 mg/kg/day range would be reached by persons with average exposures at fluoride concentrations of 1-4 mg/L in drinking water, especially the children.[46] These concentrations exceed those encountered in New Zealand, where drinking water supplies are normally below 0.9 mg/L (see section 2.2). The highest intakes (>0.1 mg/kg/day) would be reached by some individuals with very high intakes of water containing fluoride at 1 mg/L (e.g. 7L for a 70kg adult).

Infants

The adequate intake (AI) recommendation for fluoride for infants up to 6 months of age is 0.01 mg/day, which is based on the average concentration of fluoride in breast milk. It is estimated that breastfed infants (up to 6 months of age) have an average daily fluoride intake of 0.003-0.01 mg/day, reflecting ingestion of ~780 ml breast milk (less for newborns) at a fluoride concentration of 0.013 mg/L.[45] The AI of 0.5 mg/day for infants 7-12 months old is based on the well-documented relationship between water fluoride concentrations and caries.[43, 45] This corresponds to an intake of ~0.05 mg fluoride/kg bodyweight/day. The recommended upper intake level (UL) is 0.7 mg/day and 0.9 mg/day for infants 0-6 months and 7-12 months, respectively.

The average intake of fluoride for breastfed infants is low compared with that of formula-fed infants, regardless of whether the formula is reconstituted with fluoridated or non-fluoridated water. The fluoride content of prepared infant and toddler formula products available in New Zealand range from 0.069 to 0.081 mg/L.[39] Infants consuming formula made with non-fluoridated water will have fluoride intakes of around 0.059 mg/day – well below the UL of 0.7 mg/day (note – intake of 0.7 mg fluoride/day in formula equates to ~0.11 mg/kg/day for a 6kg infant[39]). However, if formula is reconstituted with water containing 0.7 or 1.0 mg/L fluoride, the mean estimated intakes are 0.66 and 0.93 mg/day, respectively.[39] A further modelling of fluoride intake by formula-fed infants in New Zealand calculated similar intake estimates,[47] and concluded that infants who are exclusively fed formula made with water fluoridated at 1.0 mg/L will thus regularly exceed the current UL for fluoride. However, it was also noted that the elevated risk associated with such exposure was almost exclusively for 'very mild' or 'mild' forms of fluorosis.(see section 3.3.4)

For infants aged 6-12 months whose teeth are brushed with a fluoride toothpaste, the estimated intake of fluoride is 0.14 mg/day for toothpaste with 400 mg/L fluoride, and 0.35 mg/day if the toothpaste contains 1000 mg/L fluoride. Based on modeling and diet studies, the ESR report concluded that fluoride ingestion from toothpaste combined with intake from food and drink would raise the total daily fluoride intake to just above the UL of 0.9 mg/day in fluoridated areas.[39] It is recommended that a minimal amount (a smear) of toothpaste should be placed on the brush when brushing an infants teeth.

Children and adolescents

The AI for children is based on the same mg/kg body weight requirement as infants (0.05 mg/kg/day), adjusted for standard body weights for the different age groups (see table 2). For older children who are no longer at risk of dental fluorosis, the maximum level for fluoride was set at 10 mg/day regardless of weight.

For a 4-year-old of average body weight (18 kg) and average water consumption (0.65 L/day;[48]), a fluoride concentration of 1.5 mg/L equals a daily dose of approximately 0.05 mg/kg/day. This average fluoride exposure is roughly equivalent to the US EPA reference dose (TDI) value of 0.06 mg/kg/day.[49] The TDI indicates a daily oral exposure that is estimated to be without an appreciable risk of adverse effects.

In young children, intake of fluoride from toothpaste contributes a significant proportion of total ingested fluoride, particularly in low-fluoride areas. The estimated mean intake of fluoride from toothpaste in toddlers aged 1-3 years is 0.3 mg/day for the recommended 1000 mg/L toothpaste (or 0.12 mg/day for 400 mg/L toothpaste). In combination with dietary intake this can raise the total daily intake above the AI.[39]

For children aged 5 and above, the estimated total dietary intake (including fluoride ingested from toothpaste) is below the AI even in fluoridated areas.[39] A study conducted in 6-7 year old children in the UK in 2007 found that total fluoride intake, urinary excretion and fluoride retention no longer reflect the fluoridation status of the community in which they reside, in part because of intakes from fluoridated dental products.[50]

Adults

The recommendation for fluoride intake in adults in Australia and New Zealand is 3 mg/day for women and 4 mg/day for men.[43] This is the same recommendation given by the US IOM.[45]

The average fluoride intake for adults living in fluoridated communities in the US ranges from 1.4 to 3.4 mg/day, while it is 0.3 to 1 mg/day in non-fluoridated areas.[45] The highest tolerable fluoride intake (10 mg/day) is only exceeded in areas with exceptionally high levels of natural fluoride in drinking water. This assumes that over three litres of water per day, containing ≥3 mg/L fluoride is consumed daily. [34] The estimated mean fluoride intakes for New Zealand adults, based on total diet and dietary modeling approaches, range from ~1.4 to 2.5 mg/day with fluoridated water, and ~0.8-1.3 mg/day with non-fluoridated water.[39] Only very high fluoride diets (0.1% of diets that include fluoridated water) would exceed the UL of 10 mg/day.

The US EPA recently reviewed and updated exposure estimates for fluoride, which account for dietary intake, changes in fluoridation practices and current use of consumer dental products,[51] and clarified the relationships between fluoride exposure and dental fluorosis. The agency identified a reference dose (TDI) of 0.08 mg/kg/day (5.6 mg/day for a 70 kg person) for protection of 99.5% of the vulnerable population against severe fluorosis.

In Germany, Austria, and Switzerland, reference values for nutrient intake are in agreement with the 0.05 mg/kg/day (3.5 mg/day for a 70 kg person) recommendations of the IOM, EFSA, and Australian NHMRC/NZMoH. If the fluoride content of drinking water is below 0.7 mg/L, the use of fluoridated table salt and/or fluoride supplements is recommended in these countries.[52]

Pregnant or breastfeeding women

The recommendations for fluoride intake for pregnant and breastfeeding women do not differ from those for non-pregnant women (AI 3 mg/day; UL 10 mg/day). Fluoride supplements are not required, as studies have not found a significant benefit to the offspring's dentition from enhancing maternal fluoride intake. Typical intake levels for women in New Zealand are considered safe for pregnant women. There are no data that show an increased susceptibility to fluoride that would warrant establishing a different intake recommendation for pregnant or breastfeeding women.[43, 45]

During pregnancy, fluoride is transferred from maternal blood through the placenta to the fetus. However, there are also data to suggest that the placenta sequesters some fluoride, resulting in lower concentrations in umbilical cord blood than in maternal blood.[53] Fluoride levels in cord blood reach, on average, 87% (~60-90%) of those in maternal blood.[54] The differences in concentrations suggest that the placenta acts as a partial filter.[55] Fluoride accumulation in the peripheral regions of the placenta has been observed, possibly correlating with foci of calcification.[56] This may limit passage of fluoride to the fetal circulation to some degree, such that the fetal blood fluoride concentration is not increased to the same extent as maternal plasma fluoride when maternal fluoride intake is increased. The effect of maternal intake on fluoride concentration in the amniotic fluid and fetal blood does not vary between intakes of 0.25 and 1.0 mg/day.

Only a small percentage of the fluoride from 1 mg/L drinking water reaches the fetal teeth. [57]

The transfer of fluoride from maternal plasma into breast milk is minimal (average concentrations are <0.02 mg/L),[42] and is virtually unaffected by the mother's fluoride intake unless intake is very high. Even at high daily intakes (e.g double the UL of 10 mg/day), breast milk fluoride levels were only found to be around 0.03 mg/L. [58]

2.4.2 Fluoride pharmacokinetics

Absorption, distribution and clearance

Most fluoride in food or water enters the bloodstream rapidly via the digestive tract, and about half leaves the body quickly in urine, usually within 24h unless large amounts (>20mg) are ingested. The majority of the fluoride that remains in the body is deposited in teeth and bones.[37, 46] There is substantial inter-individual variation in the metabolism of fluoride, which can be affected by dietary factors, age, and health status. The ingestion of fluoride with food delays its absorption and reduces its bioavailability.[59] In particular, intake of milk or other calcium-rich foods significantly lowers the peak plasma concentration of fluoride after ingestion. The plasma fluoride concentration is also modulated by the rate of urinary excretion. There are no apparent age-related differences in renal clearance rates between children and adults,[60] but renal insufficiency delays fluoride clearance.[61] Individuals with reduced glomerular filtration are likely to have increased plasma fluoride levels, and consequently, increased levels of fluoride in tissues, making them more susceptible to fluorosis (see section 4.6.5).

The amount of fluoride taken up by bone and retained in the body is inversely related to age. More fluoride is retained in young, growing bones than in the bones of older adults. Whereas adults retain about 50% of ingested fluoride, young children may retain as much as 80%, because it is incorporated into the rapidly developing skeleton and teeth.[61]

Once absorbed, fluoride is rapidly distributed throughout the body via the circulation. Ingested fluoride is taken up from the bloodstream into bone, and can be released back into blood as bone is remodelled. No homeostatic mechanism maintains blood fluoride concentrations – levels are determined by intake and exchange with fluoride accumulated in remodelling bone.[62] Fluoride also moves from blood into the salivary glands and back into the oral cavity in saliva. With regular intake, salivary fluoride concentration is maintained at a higher level, reflecting fluoride concentrations in the blood.[63] This is relevant to understanding the mechanisms of fluoride action in preventing dental caries (see section 3.2.2).

Exposure to 'natural' vs 'added' fluoride

The absorption, distribution, and excretion of fluoride that has been added to drinking water is similar to that of naturally occurring fluoride. Maguire et al.[64] analysed the pharmacokinetics and bioavailability of fluoride from naturally and artificially fluoridated tap waters with different degrees of water hardness (which is due to minerals in the water supply). The study concluded that any possible differences in bioavailability of fluoride between drinking waters in which fluoride was present naturally or added artificially (or hard

vs. soft waters) are insignificant compared with the large within- and between-individual variation in fluoride absorption following ingestion of water with fluoride concentrations close to 1.0 mg/L. No differences in fluoride absorption, distribution, or excretion in humans have been found for water fluoridated with any of the three commonly used fluoride sources.[65]

3. Water fluoridation and dental health

3.1 Oral health in New Zealand

Oral health is integral to general health and well-being. The 2009 New Zealand Oral Health Survey[66] has provided a detailed snapshot of the status of the nation's oral health, including data on the effect of CWF at a national level. The report concluded that, although oral health in New Zealand is generally good (and despite notable overall improvements in oral health in the last half century), dental caries remains the single most common chronic disease among New Zealanders of all ages, with consequences including pain, infection, impaired chewing ability, tooth loss, compromised appearance, and absence from work or school.[66] Caries is both cumulative and irreversible, continuing through the lifespan at an average rate of around one tooth surface per person per year. This has large direct and indirect costs to society. A 2013 report on health loss in New Zealand[67] found that dental caries was the cause of a loss of 7536 disability-adjusted life years (DALYs) in 2006, taking a greater toll on health than lower respiratory tract infections and chronic kidney disease. This is equivalent to 77% of the health loss from prostate cancer (9786 DALYs), and 42% of the health loss from breast cancer (17,870 DALYs).

A recent cohort study of 430 adolescents examined in 2003 at age 13 and again at age 16 showed that caries is still an important health problem in this age group in New Zealand adolescents, particularly among low-socioeconomic groups.[68] Although the study provides further evidence of the overall decline in caries prevalence and severity since the 1980s, it also suggests that there have been no improvements in recent years. Nearly 80% of the adolescents studied had experienced caries in their permanent teeth. There was a high proportion of Māori and people of low-socioeconomic status with untreated decay, confirming substantial ethnic and socioeconomic inequalities in dental health.

Significant disparities still exist in oral health status and access to services for children and adolescents, particularly for those of Māori and/or Pacific ethnicity. Cost remains an important factor in accessing dental care, and most adults receive care only when there is a problem, rather than attending for routine check-ups.[66]

3.2 Fluoride and caries prevention

3.2.1 Causes of dental caries

Dental caries is one of the most prevalent diseases in children, and remains a significant public health issue throughout the lifespan. Carious lesions are brought about by the metabolism of fermentable carbohydrates (dietary sugars) by oral bacteria, producing acid that diffuses into the tooth and dissolves the mineral of the enamel and dentine. The disease is initiated within the bacterial biofilm (dental plaque) that covers the tooth surface. It is initially reversible by removal of plaque, but otherwise progresses into chronic decay of the tooth surfaces.[69]

Caries is a disease process that ideally needs to be prevented and managed over a person's lifetime. In addition to the removal of plaque by tooth brushing and professional dental services, the most obvious approach to primary prevention of caries is to reduce sugar intake. These measures, however, require individual compliance and political will (e.g., only a few countries have adopted taxes on sugar-sweetened beverages or other high sugar products, and the impact of such fiscal approaches remains uncertain). Fluoride is an important complementary approach and is recognised as the main factor responsible for the considerable worldwide decline in caries prevalence that has occurred over the past half-century. Fluoride toothpaste has well-proven clinical effectiveness for caries prevention[70] and is the leading intervention for self-administered care, but as with brushing alone, is dependent on individual oral hygiene practices. In contrast, protection from caries by fluoride in the water supply appears to be independent of oral hygiene. The effects of fluoride toothpaste and fluoridated water are independent and additive.[71]

3.2.2 Mechanisms of fluoride action

The protective effect of fluoride in tooth enamel is due to its strong, spontaneous reaction with mineral ions such as calcium. Upon systemic exposure during tooth formation, fluoride is incorporated into fluorapatite [$Ca_5(PO_4)_3F$] in tooth enamel, replacing hydroxyapatite [$Ca_5(PO_4)_3OH$]. The fluorapatite crystals are more symmetric and stack better than hydroxyapatite, resulting in the formation of stronger teeth with shallower fissures, and enamel that is more resistant to decay.[73] After topical exposure to fluoride in dental products (e.g. toothpaste) or water, fluoride can be found in several compartments in the oral cavity: ionized in saliva and plaque fluid, bound as calcium fluoride, bound to enamel, and bound to soft tissues.[74] A constant low level of fluoride ion in saliva and plaque fluid reduces the rate of enamel demineralisation during the caries process and promotes the remineralisation of early caries lesions[72, 73] The usual levels in saliva are 0.03 mg/L fluoride or less, dependent on the use of fluoride products and fluoride in the drinking water. Models have predicted that a concentration of 0.1 mg/L fluoride in saliva would be almost completely protective against caries progression.[75, 76] In a review of studies of dental enamel chemistry and the mechanism of fluoride action on caries lesions, Robinson[77] determined that fluoride must continuously enter caries lesions to combat the effects of demineralisation by plaque.

These various studies suggest that the predominant effect of fluoride is mainly local (interfering with the caries process) rather than systemic (pre-eruptively changing enamel

structure), though the latter effect should not be dismissed (see below). To affect the caries process, fluoride must be present in plaque fluid and saliva during or shortly after sugar exposure in order to interfere with demineralization events.[63] This can be achieved either by topically-applied or water-borne fluoride.

A 2005 study by Ingram et al.[78] established that fluoride at the low levels found in fluoridated drinking water was capable of interacting with enamel apatite mineral in the presence of other salivary components. This research showed that a range of fluoride concentrations up to those in fluoridated water areas produced discernible differences in salivary fluoride levels, favourably influencing remineralisation.

Contribution of pre-eruptive fluoride exposure to preventive effects

Despite a substantial body of evidence suggesting that the predominant effect of fluoride in mitigating the caries process occurs post-eruptively and topically, some recent studies provide additional evidence of a systemic effect of fluoride on pre-erupted teeth. Singh et al.[79] found that fluoride is acquired in enamel during crown completion in the first permanent molars, during the time that the matrix is formed and calcified in the first 26-27 months of life. The same group had previously evaluated the pre- and posteruptive effects of fluoride exposure at the individual level, controlling for multiple fluoride sources and potential confounders, and showed a significant effect of pre-eruptive fluoride exposure on caries in permanent teeth.[80] However, they determined that maximum benefit was gained by having both pre- and post-eruptive fluoride exposure. Other groups have also found that a higher percentage of total lifetime exposure to fluoride was associated with lower caries burden,[81-83] indicating that fluoride is effective throughout the lifespan, including pre-eruptively.

3.2.3 Epidemiological evidence of CWF effects

Most of the studies and systematic reviews discussed below evaluated the efficacy of water fluoridation on dental caries prevention in children and adolescents. Studies that specifically looked at effectiveness of fluoridation in adults and the elderly are presented separately in section 3.2.4.

Evidence from international reviews and recent studies

Acknowledging that the prevalence of dental caries has declined markedly since the 1980s, a number of thorough systematic reviews have been carried out since 2000 to assess the ongoing public health effects and effectiveness of water fluoridation in the modern context. Some of the criteria used in these reviews to assess the quality of evidence, and a summary table of the main reviews and studies, are provided in the Appendix (tables A2 and A3). A number of additional comprehensive reviews provide support for the conclusions discussed below, including those published by the US Public Health Service in 1991,[84] the New Zealand Public Health Commission in 1994[85] the US Centers for Disease Control and Prevention (CDC) in 2001,[86] the UK Medical Research Council in 2002,[87] the Institut National de Sante Publique du Quebec in 2007,[88] and SCHER in 2011,[34] among others. These are summarised in the table A2 and are not described in detail here.

There are two common outcome measures reported in studies of the effect of fluoridation on dental caries. The percentage of caries-free children measures the proportion of children

in the population who have no past or current experience of caries in their teeth, and the number of decayed, missing, or filled teeth (designated 'dmft' for primary teeth, and 'DMFT' for permanent teeth) measures the severity of dental decay in an individual.

The UK NHS/York Review[89, 90] used stringent inclusion criteria of studies of the beneficial effect of CWF on caries. That is, it included only before/after studies (CWF was initiated after a baseline survey and caries prevalence/severity assessed later in the same age group – i.e. different group of children) or prospective cohort studies (following the same group of children from prior to initiation of fluoridation for a number of years, compared with a control group in a non-fluoridated area). Studies with a cross-sectional design were excluded, as these were not considered to be of sufficient epidemiological quality to draw conclusions (see Appendix table A2 for quality of evidence criteria used in the York review). This limited the number of included studies to 26, which were of 'moderate' quality, as most were not blinded (i.e. the examiners were aware of subject exposure status), and multivariate analysis was not used to control for potential confounding factors.

The review concluded that the best evidence available at the time (2000) supported fluoridation of drinking water for reducing caries prevalence, "both as measured by the proportion of children who are caries free and by the mean change in dmft/DMFT score." The report calculated the 'number needed to treat' as 6 (i.e. a median of six people need to receive fluoridated water for one extra person to be caries free). It also concluded that caries prevalence increases in communities that were fluoridated after withdrawal of fluoride from the water.[89, 90] Evidence from a subset of these studies conducted after 1974 (n = 10) also suggested that CWF has an additive effect over and above that of fluoride toothpaste and other sources of fluoride that are now in common use.

The second major systematic review of CWF was conducted by the Australian National Health and Medical Research Council in 2007.[91] This review included comparative cross-sectional studies that had been excluded in the York review, and additional studies that had been carried out in the intervening years. Only one additional relevant study was identified,[92] and this did not alter the conclusion of the York review. This new study was carried out by the US Community Preventive Services Task Force, which has recently released a statement recommending CWF "based on strong evidence of effectiveness in reducing dental caries across populations. Evidence shows the prevalence of caries is substantially lower in communities with CWF. In addition, there is no evidence that CWF results in severe dental fluorosis."[93] The NHMRC review pooled and reanalysed data from the York review and, after multivariate meta-regression analysis to adjust for confounding variables, found a 14.3% mean difference in the percentage of caries-free children following the introduction of CWF. In answer to the posed question 'Is intentional water fluoridation more efficacious than no water fluoridation in the prevention of dental caries?', the review concluded that 'the existing evidence strongly suggests that water fluoridation is beneficial at reducing dental caries'.[91]

The North South survey of children's oral health in 2002[94] found that decay rates among children in the Republic of Ireland, where water fluoridation reaches >70% of the population, were significantly lower than among children from non-fluoridated Northern Ireland. For example, among 5-year-old children, the average dmft (decayed, missing, or

filled primary teeth) was 1.3 in the Republic of Ireland vs 2.2 in Northern Ireland. This difference existed in spite of children in the Republic of Ireland having less favorable dental habits, including higher sugar intake, less frequent tooth-brushing, and lower usage of fluoride toothpaste. Caries levels among 15-year-olds with water fluoridation in the Republic of Ireland were 39.5% lower than those for the same age group with no water fluoridation in Northern Ireland.

Public Health England's 2014 Water Fluoridation Health Monitoring Report[95] on the effects of England's water fluoridation schemes on dental health indicators (including tooth decay and related hospital admissions and dental health inequalities) found that five-year-olds living in CWF areas were (on average) 15% less likely to have tooth decay than those in non-CWF areas (this was adjusted to 28% when deprivation and ethnicity were taken into account). Likewise, 12-year-olds were 11% less likely (21% accounting for deprivation and ethnicity) to have tooth decay than children of the same age in non-CWF areas. The lower caries experience associated with CWF was most apparent in the most deprived areas. In CWF areas, there were 45% fewer hospital admissions of children aged one to four for dental caries (mostly for extraction of decayed teeth under a general anaesthetic) than in non-CWF areas.

A recent (2014) Australian study of early-life fluoride exposure[96] used a cross-sectional population-based design that included 2,611 children aged 8-12-years from New South Wales, where >60% were exposed to fluoridated water almost continuously during their first 3 years of life, and just under 15% had no early exposure. Exposure to fluoridated water during the first 3 years of life was associated with better oral health of school-age children. The association between exposure to fluoridated water and dental caries in the primary dentition was confirmed in multivariate models for both the prevalence (prevalence ratio 0.83 for 100% exposure in first 3 years vs no exposure) and extent of dental caries (risk ratio 0.65). Exposure during the first 3 years was also associated with significantly lower caries experience in permanent teeth (RR 0.76 for 100% exposure vs 0% exposure). Another recent Australian study found that the introduction of CWF in 2005 to five remote indigenous communities with very poor oral health resulted in a significant reduction in the prevalence and severity of dental caries by 2012, particularly in children who had lifetime exposure to fluoridated water (4-8 year-olds in 2012 vs 4-8 year-olds in 2004).[97]

The US IOM Committee on Examination of the Evolving Science for Dietary Supplements analysed the evolution of evidence for relationships between nutrient intake and disease status in 2002[98] and found that the evidence for fluoride in reducing dental caries had strengthened since the previous report in 1997.[45] Fluoride was one of the few nutrients for which there was increased confidence in the relationship between the nutrient and a health effect (the others being calcium and vitamin D in relation to bone status). The additional evidence reviewed was considered to support and strengthen previous conclusions that exposure to fluoride at all ages (from fluoridated water, supplements, and topical application) prevents dental caries, and that both pre- and post-eruptive exposure has cariostatic (decay-stopping) effects.

The WHO considers fluoride a micronutrient with a beneficial effect on oral health. Following reviews of the evidence for health effects of fluoride in drinking water,[10, 99] the WHO continues to recommend fluoridation of water supplies, where possible, as the most

effective public health measure for the prevention of dental decay, as stated in their 2010 document for decision makers[100] and reiterated on the current (2014) WHO website, which states: "Public health actions are needed to provide sufficient fluoride intake in areas where this is lacking, so as to minimise tooth decay. This can be done through drinking water fluoridation, or, when this is not possible, through salt or milk fluoridation."[101]

Recent data from New Zealand

A number of studies have been carried out in New Zealand over the last decade that provide epidemiological data on oral health in relation to community access to optimally fluoridated drinking water.

The New Zealand Oral Health Survey 2009[66] found that overall, the NZ population had relatively good oral health, showing substantial improvements since the 1980s. The survey found that significant differences in decay rates between fluoridated and non-fluoridated communities continue to exist, despite the fact that the majority of people use fluoride toothpastes. The prevalence and severity of dental decay in five-year-old children was higher in non-fluoridated areas (55% caries-free; dmft = 2.2) than in fluoridated areas (58% caries-free; dmft = 1.8), a pattern that has been consistent over time. Similarly, 12-13-year-olds from non-fluoridated areas were less likely to be caries-free than their counterparts in fluoridated areas (45.1% vs 56.2%) and more likely to have higher DMFT scores (1.7 vs 1.2; i.e. more decayed, missing or filled permanent teeth), indicating more severe decay.

Importantly, levels of fluorosis were similar between fluoridated and nonfluoridated areas, and the overall prevalence of moderate fluorosis was very low. The findings support international evidence that water fluoridation has oral health benefits for both adults and children, and minimal risk of increasing fluorosis.

Auckland

In 2009, Kanagaratnam et al.[102] collected data on a cohort of 9-year–old children in the Auckland region in relation to their length of residence in fluoridated versus non-fluoridated areas, and observed a dose-response relationship between fluoride exposure and the prevalence of both dental caries and enamel defects (specifically diffuse opacities). The prevalence of decay in primary (deciduous) teeth was lowest in continuous residents of fluoridated areas (51%), highest in continuous residents of non-fluoridated areas (67%), and intermediate for those with intermittent fluoridation residency status. The severity of deciduous caries (dmft scores) also followed this pattern.

Northland

A cross-sectional epidemiological survey was conducted in 2007 that provided baseline data prior to initiation of fluoridation in two Northland communities (Kaitaia and Kaikohe); two other towns (Dargaville and Kawakawa/Moerewa) served as non-fluoridated control areas. The prevalence and severity of caries in Northland was very high compared with the rest of New Zealand (e.g. mean dmft of 5.6 vs a national mean of 2.3).[103] A second cross-sectional survey constituted the final report.[19] This study found that the water treatment plants serving the fluoridated communities did not consistently achieve fluoride concentrations at the desired level (levels ranged from 0.20-0.78 mg/L in Kaikohe and from 0.24-0.84 mg/L in Kaitaia, while they were 0.02-0.03 mg/L in the non-fluoridated areas).

Fluoridation for 2 years was associated with some improvement in caries levels, particularly among 12-13-year-olds. Of note was that the caries prevalence and severity in this age group was 2.5x the national average at baseline. This study has some weaknesses but suggests that fluoridation at optimal levels would be effective in reducing caries prevalence and severity in this region of very high caries burden.

Southland

A 2005 cross-sectional survey in which 436 children (mean age 9.8 years) were examined for enamel defects and dental caries found that children who were continuous residents of fluoridated communities had about half the caries experience (50% lower DMFS scores) of residents of non-fluoridated communities, but also a greater risk for diffuse enamel opacities (which were seen in just over half of all the study participants).[104] Children who had lived all of their lives (to age 4) in a fluoridated area had over twice the odds of having mild enamel fluorosis (diffuse opacity). Children who were reported as having eaten toothpaste before the age of 4 had 4-fold higher odds of having a hypoplastic defect (moderate fluorosis).

Canterbury and Wellington

A large cross-sectional analysis in 2004 of routinely collected data from school dental services examined differences in dental caries rates between children (8375 5-year-olds and 7158 12-year-olds) living in fluoridated and non-fluoridated areas of Canterbury and Wellington.[105] This study also looked at differences between ethnic and socio-economic groups. Overall, the study determined that the benefits of CWF continue to be significant in New Zealand. The prevalence and severity of caries was >30% lower in fluoridated areas, than in non-fluoridated areas. The advantage of fluoridation was greatest for Māori and Pacific children, and those in low socioeconomic groups.

Otago

A recent (2013) retrospective analysis of the need for treatment under general anaesthesia for children in fluoridated and non-fluoridated areas of Otago found that children from non-fluoridated areas underwent treatment at younger ages and had more teeth affected by caries than those from areas with CWF.[106] This suggests that CWF may have a positive impact on early childhood caries at the severe end of the spectrum, where the disease has the greatest cumulative negative consequences over the lifespan.

3.2.4 Studies in adult and elderly populations

With the exception of water fluoridation, virtually all primary caries-preventive programmes target children and youth, yet caries experience continues to increase with age. For example, among military recruits in Australia, those aged 31-35 had mean DMFT scores that were more than double that of the 17-20 year old group. Recruits who had lived more than half of their life with access to fluoridated drinking water had approximately 25% less caries experience than those with no lifetime exposure.[107] Young military recruits with long-term exposure to CWF had 38% less caries experience in approximal tooth surfaces (between teeth), and 26% reduction in caries in occlusal (chewing) surfaces than those with no or limited exposure.[108]

Griffin et al.[109] performed a systematic review that included 9 studies of the effect of CWF in adult populations, and concluded that CWF was beneficial in adults of all ages. Overall, the caries-prevented fraction was 34.6% in populations with lifetime exposure (vs no exposure). For the five studies conducted after 1979 (i.e. since the introduction of fluoridated dental products), the prevented fraction was 27.2% for water fluoridation.

A thorough review of adult oral health in Ireland in 2007[110] revealed that adults exposed to water fluoridation had lower DMFT scores, less caries on the aesthetically important teeth in the front of the mouth, and an average of 2.8 more healthy teeth than those in the non-fluoridated group. The New Zealand Oral Health Survey 2009[66] also found a statistically significant difference in DMFT scores for adults living in fluoridated vs non-fluoridated areas.

Slade et al. 2013[111] reported that Australian adults with prolonged exposure to fluoridated water had significantly lower age-adjusted DMFT and fewer decayed or filled tooth surfaces than those with negligible exposure. This included adults born before 1960, who were not exposed to CWF during early childhood, indicating that later but prolonged exposure was still effective in reducing the prevalence and severity of tooth decay in adults.

Elderly

The long history of CWF around the world now means that many adults in late life have experienced a lifetime of fluoridation. The benefits for adult dental health include lower levels of root caries, and better tooth retention into old age. A 2010 study in the US,[112] using data from the Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System annual survey data (1995-1999), estimated the association between adult tooth loss and current CWF, CWF 20 years ago, and CWF at time of birth in a cohort of adults born between 1950 and 1969. They reported that CWF levels in an individual's county of residence at the time of birth were significantly associated with tooth loss – consistent with a lasting effect of early fluoride exposure throughout the lifespan. Similarly, elderly individuals in Ireland whose water supplies were fluoridated were found to be more likely to retain their natural teeth than those in non-fluoridated areas.[110]

It should be noted that the increasing retention of natural teeth in the elderly brings with it an increased need for long-term maintenance of tooth function. Elderly individuals may have decreased ability to undertake personal healthcare due to frailty, sarcopenia (loss of muscle strength), poor vision, and/or dementia. As with other groups who may have inadequate oral healthcare habits, the consumption of fluoridated water can have important preventive impact against caries in the elderly.

3.2.5 Health inequalities and cost effectiveness

A number of studies have suggested that the benefits of CWF are greatest among the most deprived socioeconomic groups, although the magnitude of the difference is uncertain.

The York Review[89] assessed 15 UK studies of the effect of CWF on social equity in dental health and concluded that the caries reduction benefit for disadvantaged social classes was greater than for higher social classes (the difference in mean DMFT score between fluoridated and non-fluoridated areas was 52.6% among low socioeconomic groups and

38.9% among high socioeconomic groups). However, the methodology used in the studies varied, and statistical analysis was not possible, so the reviewers suggested caution in interpreting the results. Other studies demonstrating a greater difference in caries reduction from CWF for low vs high socioeconomic groups include communities from New Zealand,[105, 113] Australia,[114] Ireland[115], and a recent blinded study from the UK.[116]

Cost-effectiveness

The cost-effectiveness of CWF in New Zealand was last evaluated in 1999; the findings were published in 2001.[117] CWF was found to be "cost-saving (dental cost savings exceeded fluoridation costs) for communities above about a thousand people". The authors noted that for smaller communities, CWF may be considered cost-effective, depending on how a prevented decayed tooth surface is valued. They also reported that CWF was particularly cost-effective for "communities with high proportions of children, Māori, or people of low socio-economic status". These conclusions may indeed underestimate the value of CWF in that this study did not include benefits of CWF after age 34 years and cost savings after age 45 years. It also used a relatively high discount rate (of 5%) compared to contemporary health economic practice in New Zealand (typically 3%).

In 2012 a cost-effectiveness study was performed in Australia,[118] a country that shares many characteristics with New Zealand. This study reported that extending CWF to all communities of at least 1000 people would lead to improved population health (3700 disability-adjusted life-years (DALYs), 95% uncertainty interval: 2200–5700 DALYs), and that there would be a 100% probability of this being cost saving. Furthermore, it found that by "averting 760,000 (430,000–1,300,000) child and adolescent caries lesions, the intervention can reduce the total cost of caries treatment by $95 million ($45 million–$170 million)" (Australian dollars).

These New Zealand and Australian studies detailed above are compatible with other studies which indicate cost savings from CWF in the US,[119, 120] Australia,[121, 122] and Quebec, Canada.[123] A modelling study on CWF in South Africa also reported that benefits of CWF would exceed costs.[124] At least since the year 2000, there appear to be no published studies in the peer-reviewed literature that show that CWF is not cost-effective (i.e., in communities over 1000 people and where the water is not naturally fluoridated).

3.3 Dental fluorosis

Dental fluorosis is a type of hypomineralisation of tooth enamel that manifests as visually detectable differences in enamel opacity. Fluorosis develops from pre-eruptive exposure to excess fluoride in susceptible children; its effects occur only while the teeth are forming in the jaw and before they erupt into the mouth (age <8 years). In the mildest forms, the tooth is fully functional but has cosmetic alterations -- almost invisible opaque white spots. In more severely fluorosed teeth, the enamel is pitted and discoloured and is prone to fracture and wear. An explanation of the different levels of fluorosis is provided in table 3. There is a dose-response relationship between fluoride intake and fluorosis, even when intake level is

relatively low.[34, 96] A higher prevalence of dental fluorosis has been observed concomitantly with overall lower caries experience.[125]

Table 3. Explanation of levels of fluorosis (scores according to the WHO Oral Health Surveys Manual)[126]

0 = Normal.	Enamel surface is smooth, glossy and usually a pale creamy- white colour
1 = Questionable	The enamel shows slight aberrations in the translucent normal enamel and which may range from a few white flecks to occasional spots
2 = Very mild	Small opaque, paper-white areas scattered irregularly over the tooth but involving less than 25% of the labial tooth surface
3 = Mild	White opacities of the enamel involving more than 25% but less than 50% of the tooth surface
4 = Moderate	The enamel surfaces show marked wear, and brown staining
5 = Severe	The enamel surfaces are severely affected and the hypoplasia is so marked that the general form of the tooth may be affected. There are pitted or worn areas and brown stains are widespread; the teeth often have a corroded appearance

There are other conditions that appear similar to very mild fluorosis, most notably the white spotting of teeth caused by use of antibiotics such as amoxycillin during childhood.[127] Enamel hypomineralisation can also occur as a result of illness (e.g. measles) or other major upset during tooth formation. The common misdiagnosis of these conditions may contribute to an over-estimation of the overall prevalence of fluorosis.

Dental fluorosis reflects overall fluoride absorption from all sources at a young age. The development and severity of fluorosis is highly dependent on the dose, duration, and timing of fluoride exposure.[34] The timing of fluoride exposure relative to developmental events for dentition is shown in table 4. The exposures listed therein do not imply that fluorosis can occur as a result of each exposure; for example, maternal fluoride intake during pregnancy and breastfeeding are unlikely to have a significant impact on the dentition of the fetus or nursing infant, unless intakes are extremely high (i.e. doses that would be toxic to the mother). From an aesthetic point of view, the only fluorosis that is of concern is that affecting the permanent incisors and canines, and the timing is restricted to a few years when the crowns of these teeth are forming.

Table 4. Timing of fluoride exposure relative to developmental events for dentition

Developmental event	**Timing**	**Means of fluoride exposure**
Early ossification of jaw and development/ amelogenesis of deciduous teeth	4-8 months *in utero*	Maternal intake crossing placenta
Eruption of deciduous teeth	6-24 months	Systemic ingestion – breast milk or formula
Amelogenesis of unerupted permanent teeth	3 months to 5 years	ingested milk (breast/formula/dairy), water, dental products
Eruption of permanent teeth enamel surface	5-16 years	food, water, soft drinks, tea, dental products

3.3.1 Mechanisms of fluorosis

The presence of excess amounts of fluoride during tooth formation can temporarily disturb the function of cells (ameloblasts) that secrete enamel-forming proteins during tooth development. Such disruption can cause hypomineralisation defects in the enamel of unerupted teeth,[75] and may represent a perturbation of fluoride's cariostatic effects on stabilisation of calcium apatite crystals and proteins in enamel. Excess fluoride alters the activities of calcium-dependent proteases, resulting in a delay in protein removal and disrupted mineralisation at the maturation stage of enamel formation. Continuous intake of excess fluoride during and after the secretory phase increases the risk of these defects occurring.[128]

There is some evidence for a genetic predisposition to fluorosis, possibly relating to differences in fluoride metabolism, which may explain some of the variability in fluorosis severity among individuals with similar fluoride intakes.[129]

3.3.2 Infant formula and fluorosis risk

Human breast milk is very low in fluoride, and it is clear that infants who are exclusively formula-fed have higher fluoride intakes than breastfed infants, and are thus at higher risk of dental fluorosis. However, the magnitude and significance of this increased risk is not clear. Levy et al.[130] suggested that the six- to nine-month-old period is most important for development of dental fluorosis in the primary teeth. An increase in fluorosis risk was found with greater intakes of reconstituted infant formula (with fluoridated water) between the ages of 3 and 9 months.[131] A review of changing trends in fluoride intake and fluorosis in infants[132] concurred that the higher risk of fluorosis in formula-fed infants related mainly to the reconstitution of powdered formula with fluoridated water (and not the formula itself), and suggested that, when feasible, low-fluoride water should be used. Erdal and Buchanan[133] used a health risk assessment approach to quantify fluoride intakes from infant formula and other sources associated with fluorosis in children. Their report supported concerns that a segment of the infant population in the US may be exposed to amounts of fluoride that elevate the risk of mild fluorosis, but the specific contribution of infant formula to this risk was not determined. It was again suggested that infant formula could be made up with low-fluoride water in order to reduce the potential risk.

A 1977 study in Sweden had reported that intakes of 0.1 mg fluoride/kg bodyweight/day caused some fluorosis in formula-fed infants. At the time, it was assumed that this level could be consumed by low-weight infants fed formula in low fluoride areas, by normal-weight infants in 0.8 mg/L fluoride areas, and by high-weight infants in 1.2-1.5 mg/L fluoride areas.[134] More recently, a systematic review found some data supporting the association between infant formula consumption and a higher prevalence of enamel fluorosis in permanent dentition, but considered the evidence for this effect to be weak.[135] The 2013 EFSA review determined that an intake of less than 0.1 mg F/kg bodyweight/day in children up to 8 years old corresponds to no significant occurrence of "moderate" forms of fluorosis in permanent teeth.[44]

Recommendations in the US previously suggested that powdered infant formula should be reconstituted with low-fluoride water to reduce the risk of dental fluorosis, but updated

recommendations are to use water fluoridated at around 0.7 mg/L.[136] Advice from Australia indicates that infant formula is safe for consumption whether reconstituted with fluoridated or non-fluoridated water.[137] Fluoridated water supplies in New Zealand are also considered safe for use in infant formula, though as with recommendations elsewhere, if parents are concerned with the risk of mild fluorosis, low-fluoride bottled water can be used for reconstitution in order to reduce fluoride exposure in this age group.

3.3.3 Topical fluorides and fluorosis risk

Intake of fluoride from fluoridated water in infants and young children is clearly not the only risk factor for dental fluorosis. Higher intake of fluoridated toothpaste between 16 and 36 months was also found to increase the risk of mild fluorosis.[131] A Cochrane review of topical fluoride and fluorosis in children found a statistically significant reduction in fluorosis if brushing of a child's teeth with fluoride toothpaste commenced after the age of 12 months, based on observational studies (odds ratio 0.70).[138] Randomised controlled trials showed use of toothpaste with 1000 mg/L fluoride was associated with an increased risk of mild fluorosis. The review concluded that if fluorosis is of concern, the fluoride level of toothpaste for children under 6 should be <1000mg/L. For children considered at high risk for dental caries (by a dentist), the benefits of higher fluoride toothpaste may outweigh risks of fluorosis – but careful parental monitoring is recommended.[138] Young children should use only a smear of toothpaste and should be supervised during toothbrushing to ensure that toothpaste is not swallowed/eaten.

3.3.4 Water fluoride levels associated with fluorosis

The increased prevalence of fluorosis that has been observed since the 1970s has been primarily attributed to the widespread availability of discretionary fluorides such as fluoridated toothpaste, fluoride supplements, and professionally applied fluoride varnishes, because the increase has occurred in both fluoridated and nonfluoridated areas. An examination of fluorosis trends in the US from the 1930s to the 1980s showed that the largest increase in fluorosis prevalence occurred in areas with suboptimal water fluoride levels.[139] The NHS/York review[89, 90] estimated that the overall prevalence of any fluorosis is 48% in areas fluoridated at 1.0 mg/L, and predicted that fluorosis of aesthetic concern would affect 12.5% of the population drinking water at this level of fluoride. The report acknowledged, however, that there is some debate about the significance of the lowest fluorosis scores of each of the various indices for defining an individual as 'fluorosed'.

In the US, some water supplies have natural fluoride levels around 4 mg/L, which is the concentration corresponding to the 'maximum contaminant level goal' (MCLG) – set by EPA. Severe enamel fluorosis occurs at an appreciable frequency, approximately 10% on average, among children in US communities with water fluoride concentrations at or near the current MCLG of 4 mg/L.[46] The prevalence of severe enamel fluorosis is very low (near zero) at fluoride concentrations below 2 mg/L.

The high levels of fluoride approaching the MCLG in the US are not found in drinking water in New Zealand, where most water supplies are below 1.0 mg/L fluoride (and closer to 0.7-

0.8 mg/L) most of the time. The NZ Oral Health Survey 2009[66] reported that 44.5% of 8–30-year-olds in New Zealand had some dental fluorosis, with the majority of fluorosis being 'questionable' or very mild; i.e. effects that are only identified by dental examination. Moderate dental fluorosis was rare (2.0%), and severe fluorosis was not observed (0.0%). In 9-year-old children living continuously throughout their lives in fluoridated areas of Southland, 'questionable' mild to moderate fluorosis could be detected by a dental professional in around 29%. Very mild, mild or moderate fluorosis was equally prevalent between fluoridated and nonfluoridated areas.[66]

A 2011 analysis by the US Department of Health and Human Service of fluorosis trends and fluoride concentrations showed that a plateau in the caries-preventive effects of fluoride occurred as levels in water increased between 0.7 and 1.2 mg/L, but that the percentage of children with at least very mild dental fluorosis continued to increase with increasing fluoride concentrations. This led to a proposal that the fluoride concentration for fluoridated water supplies should be adjusted to 0.7 mg/L rather than a range between 0.7 and 1.2 mg/L.[7] An evaluation of fluorosis prevalence in children before and after a minor downward adjustment in target fluoride levels (from 1.0 to 0.7 mg/L) in Hong Kong drinking water showed that fluorosis was less prevalent in children who were born after the reduction than in cohorts born before. Older cohorts with longer exposure to the higher fluoride concentration had correspondingly higher, but generally mild fluorosis prevalence.[140] Although it was not assessed directly in this study, a previous survey suggested that this reduction in fluorosis did not occur at the expense of increased dental caries, as the prevalence of caries continued to decline in Hong Kong during the period of the study.[141]

A 2010 report by the US EPA,[49] using studies that analysed caries scores in relation to fluorosis scores, found a U-shaped fluoride-caries relationship (i.e. high caries with both low [<0.5 mg/L] and high [>4 mg/L] fluoride) but a linear fluoride-fluorosis relationship (low fluorosis with low fluoride, high with high). Optimum fluoride between 0.7 and 1.0 was protective against caries and had minimal impact on fluorosis incidence.

3.3.5 Fluorosis of aesthetic concern

It is important to note that the seemingly high prevalence of fluorosis reported in some studies and systematic reviews includes mainly mild and very mild (and sometimes questionable) degrees of fluorosis, with only a small proportion that would be considered to be of aesthetic concern.

Surveys have shown that very mild to mild dental fluorosis is not associated with negative impact on perception of oral health,[142] and that adolescents actually preferred the whiteness associated with mild fluorosis.[143] In a recent study, adolescents answered a questionnaire regarding the impact of enamel fluorosis on dental aesthetics, older adolescents rated photographs of mild fluorosis more favorably than younger ones. A fluorosis score indicative of moderate fluorosis was the level considered to have aesthetic significance. Carious teeth were rated significantly lower than fluorosed teeth.[144]

Findings from a longitudinal cohort study of 314 South Australian children (aged 8-13 years) analysing the natural history of dental fluorosis were presented at the 2013 conference of

the International Association for Dental Research (IADR). The data showed that the diffuse mottling of enamel indicative of fluorosis fades during the adolescent years, with over 60% of teeth with mild fluorosis at baseline in 2003-4 showing no fluorosis at follow-up in 2010-11.[145] These changes are most likely the result of ongoing mineralisation by saliva.

4. Water fluoridation and potential health risks

A number of potential adverse effects of the consumption of fluoride have been suggested, though many have only been reported in areas where the natural level of fluoride in water is very high. Reports of possible adverse effects have been systematically reviewed in both the York review[89] and the more recent Australian NHMRC review.[91] Although the York review excluded a large number of cross-sectional studies when assessing CWF benefits, it included all studies for evaluation of potential adverse effects. The NHMRC used similar inclusion criteria. Evidence from these reviews as well as subsequent studies supporting or refuting these claims is evaluated below.

4.1 General toxicity

Over the years, fluoride has been tested in many of the same assays and test systems that are applied in the safety evaluation of new drugs and pesticides, including *in vitro*/*in vivo* genotoxicity assays, acute and chronic dose toxicity assays, and 2-year carcinogenicity studies in rats and mice.[59]

Acute toxic doses in animals are several hundred times higher than human intake levels in CWF areas (typically 0.05-0.1 mg/kg/day). Multiple-dose animal experiments show potential adverse effects on bone, liver, kidney, heart and testes, but only at doses greater than 4.5 mg/kg/day – again, far exceeding typical human exposures.[59] With regard to genotoxicity, various assays have shown inconsistent results. Fluoride does not show mutagenic potential in standard bacterial systems, but at high doses can produce chromosome aberrations in mammalian cells.[146] The 2002 WHO/IPCS[59] and 2006 NRC reviews[46] considered the evidence for genotoxic effects of fluoride, including assays using blood from people exposed to high levels of fluoride, to be inconclusive, and not relevant to exposures to humans from intentionally fluoridated water.

The York review[89] did not include analysis of *in vitro* or animal studies because the reviewers considered the available human data to be the most relevant in assessing the potential effect of doses used in CWF schemes, outweighing the potential effects of very high doses administered to animals or applied to cells in *in vitro* toxicity studies.

Nonetheless, animal and *in vitro* studies can generate mechanistic and toxicological data that provide biological plausibility for claims of cause and effect. Where appropriate, results of these toxicity studies will be described as background to the review of each type of potential human adverse effect in the following sections.

4.2 Cancer

A number of studies have investigated hypothetical mechanisms by which fluoride could act as a potential carcinogen, either directly via genotoxic or mitogenic effects, or indirectly via effects on thyroid and immune function. These studies were reviewed in a recent analysis by the California EPA,[147] which considered that an effect of fluoride on the development of osteosarcoma was mechanistically plausible, but concurred with previous analyses that human epidemiological evidence for fluoride carcinogenicity has not been demonstrated.

4.2.1 Animal data

A large number of animal carcinogenicity studies have been reported, and to date no effects have been observed at concentrations relevant to intentionally fluoridated drinking water. In most studies in which fluoride was administered orally to rodents, no mutagenic effects were observed. The most comprehensive carcinogenicity studies were conducted as part of the US National Toxicology Program (NTP) in the early 1990s. The first study showed a small number of bone cancers in male rats (but not in mice or female rats) exposed to fluoride in drinking water at concentrations up to 175 mg/L (intakes of 2.5-4.1 mg/kg body weight/day – 50 times the typical human exposure).[148] A follow-up NTP study found no increase in risk when fluoride concentrations were increased to 250 mg/L.[149]

Animal data have not shown a positive link to other forms of cancer. A two-year diet study in male and female rats (4-25 mg/kg/day in food) found no treatment-related tumors of any type despite clear signs of fluoride toxicity in teeth, bones, and stomach[150] A further study which showed an increased incidence of non-malignant osteomas in mice was confounded by possible effects of retroviral infection; thus the osteomas cannot be interpreted as an effect of fluoride.[151] In the more than 20 years since these studies were published, no experimental evidence of an association between cancer and fluoride has been reported.

4.2.2 Human data

Most studies have not found any association between fluoride and cancer in humans, even after decades of exposure in some populations. This includes industrial exposures as recorded and analysed by the US ATSDR.[37] A 1985 review of epidemiological evidence gathered since the introduction of CWF (~70 studies using data from 12 different countries), which included a commissioned reevaluation of some of the data,[152] found an absence of demonstrable effects on cancer rates following long-term exposures to either naturally elevated levels of fluoridated water or artificially fluoridated water supplies. The review found that studies suggesting an association between CWF and cancer had failed to consider the effects of social and environmental differences between the comparator groups, had applied and/or selected data inappropriately, and/or made errors in analyses. More rigourously conducted studies in the UK, Canada, Australia, and New Zealand did not reveal any association between CWF and cancer. The large human populations observed, and the consistency of the findings from many different sources of data in multiple countries, allowed the reviewers to conclude that CWF was not linked to cancer.

An ecological study of nine communities in the US examined cancer incidence rates in 36 body sites in relation to the proportion of residents supplied with CWF. Rates were positively correlated with the proportion of residents with CWF for 23 cancer types, negatively for four types, and for nine types no significant relationship was seen.[153] This study is considered to be flawed because actual fluoride concentrations were neither measured nor considered, and no adjustments for other causes of cancer were made.

Two additional ecological studies reported either no association[154] or an inverse relationship between water fluoride levels and cancer incidence (i.e. low cancer incidence in areas with high fluoride concentrations in the drinking water),[155] but these studies are also of low validity and should be interpreted with caution.

4.2.3 Osteosarcoma

Bone cancers have received attention because of fluoride's deposition in bone. A number of studies have been conducted in human populations to evaluate the potential association of CWF with osteosarcoma (a rare cancer, but the most common type of bone cancer). A 1993 review by the US NRC Committee on Health Effects of Ingested Fluoride[36] concluded that the weight of evidence available at that time did not support an association between fluoridation and osteosarcoma. A 1995 case-control study in osteosarcoma patients under the age of 25[156] found an inverse relationship between total fluoride exposures and osteosarcoma in males, (that is, high concentrations of fluoride were associated with less cancer), but no association in females. The study concluded that CWF exposure does not increase the risk of osteosarcoma, and may be protective. Other case-control studies also failed to find a link between CWF and osteosarcoma.[157, 158] The York review in 2000 concluded that there was no clear association between exposure to fluoridated water and risks of osteosarcoma or other cancers.[89]

A study published since the York review by Bassin et al.[159] has been the source of many claims linking fluoridated water with osteosarcoma. The study used a hospital-based case-control design with fluoride exposure assessment based on retrospectively collected data. A statistically significant increased risk was observed for males who were exposed to CWF at the upper end of the CDC target level (1.2 mg/L F) between 6 and 8 years of age, a time that coincides with the mid-childhood growth spurt in boys. No increased risk was observed in females. A subsequent correspondence submitted by some of the study's co-investigators warned that the findings of this preliminary study were not replicated in the larger study.[160] Patients recruited later than those in the preliminary subset agreed to provide bone samples in which the levels of fluoride could be tested, as fluoride levels in bone serve as an objective biomarker of chronic fluoride exposure. It has since been reported that bone fluoride levels in these samples did not correlate with the occurrence of osteosarcoma.[161]

Systematic reviews including the 2006 NRC review,[46] the 2007 NHMRC review,[91] and the 2011 SCHER report[34] all concluded that based on the best available evidence, fluoride could *not* be classified as carcinogenic in humans.

More recent studies have not changed this conclusion (see Appendix table A4 for a summary of cancer epidemiology data/conclusions and key animal studies):

- Analysis of data from the Northern Ireland Cancer Registry (NICR) and the National Cancer Registry of Ireland (NCRI) in 2011 on osteosarcoma incidence found no difference in incidence rates between fluoridated Republic of Ireland and non-fluoridated Northern Ireland (though no statistics were presented for specific age groups under 25 years).[162]
- An ecological analysis in 2012 of CDC Wonder database data on osteosarcoma incidence and fluoride in drinking water concluded that water fluoride status has no influence on osteosarcoma incidence rates.[163]
- A large and detailed study in England, Scotland and Wales, published in 2014, included 2566 cases of osteosarcoma and 1650 cases of Ewing sarcoma (a rare bone cancer) diagnosed in 1980-2005 and data on fluoride levels in small areas of residence. The analysis, which is more informative than those of previous ecological studies, found no correlation between fluoridated water consumption and these cancers.[164]
- A recent Water Fluoridation Health Monitoring report published by Public Health England[95] found no evidence of a positive association between fluoridation and osteosarcoma or other forms of cancer.
- Finally, in the New Zealand context, National Fluoridation Information Service (NFIS) data from New Zealand cancer registries from 2000-2008 shows no evidence of association between osteosarcoma incidence and residence in water fluoridated areas.[165]

4.3 Skeletal effects

4.3.1 Animal studies

Fluoride naturally accumulates in bone, but its prolonged maintenance there requires a rate of uptake equal to or exceeding the rate of clearance.[166] Thus, from a mechanistic viewpoint, fluoride may be expected to have effects on bone following high and prolonged exposure. Chronic, high-dose fluoride exposure studies in rats (22-50 mg/L in drinking water for up to 18 months) have shown inhibition of bone mineralization and reduced femoral bone strength, and bone remodelling alterations were observed in pigs given fluoride at 2 mg/kg/day.[59] These exposures are 20-50 times those experienced by people drinking optimally fluoridated water, but are relevant to areas of endemic fluorosis where natural fluoride levels are very high.

When considering exposures closer to those associated with CWF, evidence from animal studies suggests that a water fluoride level of 1 mg/L may lead to increased bone strength, while levels ≥4 mg/L may cause a decrease in bone strength.[167]

4.3.2 Skeletal fluorosis

Skeletal fluorosis is the result of very high fluoride intake over long periods of time – e.g. intakes of 20 mg/day over periods of 20 years or more cause crippling fluorosis

characterised by osteomalacia, osteoporosis, and/or osteosclerosis. Areas of the world where this is prevalent include parts of India, China, South Africa, and Tanzania.

The NRC 2006 report used modelling to test whether the EPA MCLG (4 mg/L) was protective against skeletal fluorosis.[46] The model estimated that bone fluoride concentrations resulting from lifetime exposure to fluoride in drinking water at 2 mg/L or 4 mg/L fall within or exceed the ranges historically associated with stage II and stage III skeletal fluorosis. However bone fluoride concentrations at which skeletal fluorosis occur can vary widely. The potential for fluoride accumulation in the skeleton is increased in patients with reduced renal function, who therefore have a higher risk for skeletal fluorosis. Nonetheless, evidence indicates that high fluoride intakes are still required (e.g. consumption of 4-8 L/day of water containing fluoride at 2-3 mg/L, or 2-4 L/day at 8.5 mg/L) to become symptomatic.[46] According to the ATSDR, skeletal fluorosis is extremely rare in the United States; it has occurred in some people consuming greater than 30 times the amount of fluoride typically found in fluoridated water.[37] Skeletal fluorosis has *not* been known to occur in New Zealand.

4.3.3 Fractures

The effects of fluoride intake on fracture risk and bone strength have been studied in animal models and in a large number of epidemiological studies, which have been extensively reviewed in the NRC report.[46], and more recently in a dose-response analysis by the US EPA.[49] The weight of evidence indicates that increasing amounts of fluoride might increase bone volume, but there is less strength per unit volume. The ATSDR found that fluoride at five times the level found in fluoridated water can result in denser bones that may be more brittle than normal bone and may increase the risk of fracture in older individuals.[37]

When study results were combined, a dose-response relationship indicated a gradient of exposure and increasing fracture risk at fluoride concentrations between 1.0 and 4.0 mg/L.[46, 49] The EPA review council concluded that lifetime exposure to fluoride at drinking-water concentrations of 4 mg/L or higher is likely to increase fracture rates in the population, compared with exposure to 1 mg/L, particularly in some demographic subgroups that are prone to accumulate fluoride into their bones (e.g., people with renal disease).

It should be noted that in many of the studies, the reference group was exposed to 1.0 mg/L fluoride in drinking water, and fracture rates were compared with groups having higher exposures. This makes these studies somewhat irrelevant to studying the effect of CWF. A study in Chinese populations with water fluoride levels ranging from 0.25 to 7.97 mg/L found a U-shaped pattern for prevalence of bone fracture and fluoride level; i.e. both high and low fluoride levels were associated with increased risk.[168] The lowest fracture rate was observed in populations where the fluoride concentration in water was 1-1.06 mg/L – near optimal levels used in CWF.

The York report[89] reviewed 29 studies (all of low validity) that assessed whether there was an association between water fluoridation and bone fractures or bone development problems. No evidence of an elevated risk of fractures could be attributed to water

fluoridation at optimal levels. In children, intake of fluoridated water does not appear to affect bone density parameters through adolescence.[169]

4.4 Neurotoxicity/IQ effects

4.4.1 Animal studies

Animal studies using extremely high doses of fluoride have revealed various deficits in learning and behaviour following prolonged exposure. For example, Pereira et al.[170] studied rats fed 100 mg/L fluoride in drinking water for 30 days – 100 times the level in optimally fluoridated water – and noted memory deficits compared with rats who were not dosed with fluoride. Other studies fed rats sodium fluoride by gavage at a level of 5.0 mg/kg/day – again 100 times the recommended level for children (0.05 mg/kg/day). In one study, rats consuming fluoridated water (0, 2.9, 5.7, 11.5 mg/kg body weight/day) showed no evidence of learning deficits in any of the fluoride-exposed groups.[171] This represents chronic ingestion up to 230-fold higher than that experienced by humans whose main source of fluoride is fluoridated water. While these studies are informative from a high-dose, chronic toxicity standpoint, they have little relevance for typical exposures to humans from drinking water at levels used in CWF regimens.

4.4.2 Human studies

Recently there have been a number of reports from China and other areas where fluoride levels in groundwater are naturally very high (fluorosis endemic regions) claiming an association between high water fluoride levels and slightly reduced intelligence (measured as IQ) in children. These studies, which were almost all of very low validity (no adjustment for confounding variables, population level data), were reviewed and meta-analysed by Choi et al,[172] who concluded that the results supported a possibility of adverse neurodevelopmental effects of high fluoride intake. The definition of 'high' fluoride varied considerably in these studies, but most levels were higher than those considered acceptable in the US, and much higher than any level found in New Zealand. In many cases the fluoride level of the 'low' fluoride group was similar to that of artificially fluoridated regions of New Zealand. Setting aside the methodological failings of these studies, Choi et al. determined that the standardised weighted mean difference in IQ scores between "exposed" and reference populations was only -0.45. The authors themselves note that this difference is so small that it "may be within the measurement error of IQ testing".[172] The studies considered only fluoride exposure from drinking water at the population level, although it is likely that other significant environmental sources of fluoride exposure may have been overlooked. In China, for example, grains and other foods are often contaminated with fluoride from coal fires.[173] Most of the studies fail to consider the effects of lead, arsenic, iodine deficiency, socioeconomic status, or nutritional status of the children; thus the strength of evidence is questionable,[46] and not considered relevant to the situation in New Zealand.[174] The 2011 SCHER report also concluded that human studies do *not* support the conclusion that fluoride in drinking water impairs children's development at levels permitted in the EU.[34]

In including fluoride in a list of chemicals possibly causing human developmental toxicity, Grandjean and Landrigan[175] cite only the Choi et al.[172] review, of which Grandjean is a coauthor, as evidence. While no plausible biological mechanism explains the alleged association of fluoride with IQ, overall there is some evidence of possible, slight adverse effect on the developing brain at high fluoride concentrations. There is no convincing evidence of neurological effects at fluoride concentrations achieved by CWF.

A recently published prospective, longitudinal study in New Zealand compared data on IQ and reasoning abilities in a cohort of 1037 individuals born in 1972-73. IQ was assessed at ages 7, 9, 11 and 13 years and averaged into a measure of childhood IQ. Adult IQ was assessed at the age of 38 years. Early-life exposure to fluoride from a variety of sources was recorded using prospective data, and adjustment was made for potential confounding variables. This relatively high quality study revealed no evidence that water fluoridation affects neurological development or IQ.[176]

4.5 Other effects

4.5.1 Reproductive and related effects

No laboratory animal studies have reported reproductive toxicity at low fluoride doses.[37] Decreased fertility and sperm and testes damage have been observed in laboratory animals (rats) at extremely high doses (over 100 times higher than levels of fluoridated water). Other studies reviewed by the ATSDR found no effect.[37] The 2006 NRC review of EPA fluoride standards[46] concluded that adverse reproductive and developmental outcomes occur only at very high concentrations that are unlikely to be encountered by US populations. Although a single, small study on rats exposed to 2, 4, and 6 mg/L sodium fluoride for 6 months reported adverse affects on fertility and reproduction (reduced sperm motility),[177] other larger studies have shown no reproductive effects over multiple generations of rats exposed to fluoride in drinking water at doses up to 175 mg/L[178-180] and no effects on spermatogenesis in doses up to 100 mg/L.[181, 182] A study of Mexican men found that fluoride intakes up to 27 mg/day did not affect sperm motility or other sperm parameters. Some of the men had occupational exposure to fluoride in addition to exposure from drinking water at a concentration of ≥3 mg/L.[183]

Rats exposed to very high doses of sodium fluoride (100 or 200 mg/L) in drinking water for 6 months exhibit ovarian dysfunction, possibly as a result of increased oxidative stress in ovarian cells.[184] Female fertility also decreased following 12 weeks of exposure of rats to these same excessive concentrations of fluoride. The daily fluoride intake of these rats was 5.2 mg/kg/day.[185]

The York review in 2000[89] did not find any evidence of fluoride-attributable reproductive toxicity in humans, and the 2006 NRC review of EPA fluoride standards[46] concluded that adverse reproductive and developmental outcomes occur only at very high concentrations that are unlikely to be encountered by U.S. populations. Equally, these high concentrations of fluoride are unlikely to be found in New Zealand. The 2011 SCHER report[34] found no

new studies indicating that fluoride in drinking water influences human reproductive capacity. No additional studies have been identified since this review.

Birth defects

Animal studies have not found any increase in the incidence of birth defects at doses that do not cause maternal toxicity (i.e. the fetus is not more sensitive than the mother).[37] This, in combination with the lack of clear genotoxicity data, brings into question the plausibility of fluoride having a potential effect on the incidence of birth defects, particularly at the low exposure levels associated with CWF.

Nonetheless, several epidemiological studies have looked at the incidence of Down's Syndrome births in relation to fluoridation status. Early links between CWF and Down's syndrome were refuted by later studies.[186, 187] Takahashi[188] reworked the data of the later studies and claimed that fluoride exposure in optimally fluoridated areas was associated with increased risk of Down syndrome for younger mothers (<30-32y). However, a systematic review by Whiting et al.[189] judged all of the available evidence as being of low validity (see Appendix table 1 for criteria) as the studies did not properly assess or adjust for multiple confounding factors, and no conclusion of a link between fluoride exposure and Down's syndrome could be drawn.

The Water Fluoridation Health Monitoring Report for England 2014[95] analysed the ditribution of Down's syndrome births in 324 local authorities by fluoridation status and also found no evidence of an association of CWF with Down's syndrome.

Sudden Unexplained Death of an Infant (SUDI)

Studies from New Zealand [190, 191] found no association between fluoride and SUDI (also known as 'sudden infant death syndrome' or 'cot death'). In one of those studies[191], a nationwide case-control database of SUDI was evaluated for fluoride exposure status and controlled for the method of infant feeding (breast or reconstituted formula) with the conclusion that exposure to fluoridated water prenatally or postnatally at the time of death did not affect the relative risk of SUDI.

4.5.2 Endocrine effects

Questions have been raised about potential thyroid impacts from fluoridated drinking water. Studies of animals with iodine deficiency showed effects on thyroid function at fluoride doses of 3-6 mg/kg/day,[192-194] and in one study, at doses in the range of 0.4-0.6 mg/kg/day.[192] The levels of thyroid hormones T3, T4, and TSH are altered in response to excess fluoride in rodents.[59]

The mechanisms of potential fluoride effects on endocrine organs and hormones have been extensively reviewed by the NRC.[46] Most of the reviewed animal studies were designed to ascertain whether certain effects occurred, and not to determine the lowest exposures at which they occurred. The report concluded that fluoride (at unspecified levels) can affect normal endocrine function or response, and that better characterisation of fluoride exposure in humans in epidemiological studies is needed to investigate the potential endocrine effects of fluoride. Two small studies in India that examined the relationship between dental fluorosis and thyroid hormone alterations yielded contradictory results. [195, 196]

Studies conducted in areas of endemic fluorosis suggest that excess fluoride may be associated with thyroid disturbances similar to those observed in iodine deficiency (e.g. goitre), and that high fluoride intake could exacerbate the effects of iodine deficiency. A review of the literature to 1984, including well-controlled studies in large populations exposed to fluoride over long periods, found no convincing evidence of a link between human goitre and fluoride intake.[197] Systematic analysis of studies by the NHS/York review[89] also yielded no significant association between fluoride levels in water and the prevalence of goitre. The York review included a study by Jooste et al.,[198] which examined the prevalence of childhood goitre in relation to water fluoride levels in six towns in the Northern Cape of South Africa where iodine deficiency was not noted. The study found that goitre prevalence did not correlate with fluoride levels: although goitre prevalence was highest in towns with high fluoride (where moderate to severe dental fluorosis was prevalent), it was also high in towns with low fluoride levels, and lowest in one town with optimal fluoride. The authors suggested that the high rates of stunting and undernutrition in the other towns predisposed the children to the risk of goitre development, which could be exacerbated in the presence of excess fluoride.

Both the NHS/York (2000)[89] and the SCHER (2011)[34] reviews concluded that neither animal or human studies to date support a role for fluoride-induced thyroid perturbations in humans in the absence of iodine deficiency.[34]

4.5.3 Cardiovascular and renal effects

Because fluoride accumulates in calcified tissues, there is a suggestion that exposure to fluoride will affect aortic calcification. In fact in animal studies, fluoride (50 mg/L in drinking water) did not affect the deposition of calcium in rat aorta – but blocked increase in phosphorus (in vivo and in vitro models). A number of studies indicate that fluoride may reduce aortic calcification in experimental animals and humans.[199] This preventive effect was recently confirmed by *in vitro* experiments, but *in vivo* findings from the same studies showed the opposite result – that phosphate-induced aortic calcification was accelerated following exposure of uremic rats to fluoride in water at around 1.5 mg/L.[200] The authors suggested that chronic kidney disease could be aggravated by relatively low concentrations of fluoride, which (in turn) accelerates vascular calcification. However, further studies are required to test this hypothesis.

Liu et al.[201] conducted a cross-sectional analysis of the possible relationship between excess fluoride intake from drinking water and carotid atherosclerosis development in adults in fluoride endemic areas of China. They reported a correlation between atherosclerosis prevalence and water fluoride concentration. However, no attempt was made to adjust for confounding variables or moving between regions. The 'normal' fluoride level group (considered low in this study) had mean fluoride water level of 0.85 mg/L (range 0.04-1.20 mg/L), which is similar to or higher than CWF levels in New Zealand. Epidemiological research suggests no link between water fluoride levels and heart attacks.[202-204]

A 1987 clinical case report suggested a possible link between long-term exposure to high-fluoride water (8.5 mg/L) and the development of renal disease,[205] but other studies and systematic reviews have found no evidence that consumption of optimally fluoridated drinking water increases the risk of developing kidney disease. However, individuals with impaired kidney function experience higher/more prolonged fluoride exposure after ingestion because of reduced urinary fluoride excretion, and those with end stage kidney disease may be at greater risk of fluorosis.[206]

The Water Fluoridation Health Monitoring Report for England 2014[95] analysed the incidence of kidney stones in relation to CWF and found evidence that the incidence was lower in fluoridated areas than in non-fluoridated areas.

4.5.4 Immunological effects

There are two types of potential effects of fluoride on the immune system – hypersensitivity reactions and immunotoxicity effects (weakening of the immune system). Information on both is limited. Earlier reviews concluded that the evidence did not support claims that fluoride was allergenic.[36, 87] The NRC committee, who analysed effects of fluoride in drinking water at the EPAs MCLG level of 4 mg/L, did not find any human studies where immune effects were carefully documented. The report suggested that immunosuppressed individuals could be at greater risk of potential immunological effects of fluoride.

An interesting case is presented by a study in Kuopio Finland, where a planned and publicised discontinuation of CWF was carried out one month early, without the public being told. Surveys were taken at three time points: 1) when the public was aware CWF was currently implemented, 2) when the public believed CWF was still implemented but it had been discontinued, and 3) when the public was aware the CWF had been discontinued. Symptoms of allergic skin reactions were reported for surveys 1 and 2 but the number of reports substantially diminished in survey 3, suggesting that some 'reactions' to fluoride were related to beliefs rather than actual exposure.[207]

4.6 Impact on specific demographic groups

4.6.1 Pregnant women

Pregnant women are not themselves any more vulnerable to the effects of fluoride than their non-pregnant counterparts, but they may have concerns about fluoride ingestion and its possible effects on their unborn fetuses. In humans, fluoride crosses the placenta and is transferred from mother to fetus,[208] but there is also evidence that the placenta may act as a partial barrier to accumulation of fluoride in the fetal circulation, since levels in amniotic fluid and cord blood are lower than in maternal blood. None of the major reviews of fluoride effects (2000 NHS/York,[89] NHMRC 2007,[91] SCHER 2011[34] found any evidence of reproductive toxicity attributable to fluoride at or around levels used for CWF. No new data have been published since these reviews.

In the past, fluoride supplements were recommended for pregnant women as fluoride was considered beneficial to fetal tooth development. The first enamel is formed in the

developing fetus around the third to fourth month of gestation. Although fluoride is not essential for tooth development, enamel containing fluoroapatite is more resistant to acids (dissolves at a lower pH) than enamel containing only hydroxyapatite.[73, 209] However, studies of fluoride supplementation in pregnancy have not shown them to be effective, and because of the possibility of increased risk of fluorosis, fluoride supplements are no longer recommended.

Physiological changes occurring in pregnancy can negatively affect maternal oral health. There is also evidence for *in utero* transmission of cariogenic bacteria from mother to child.[210] The American Academy of Pediatric Dentistry considers perinatal fluoride exposure a protective factor against the development of early childhood caries by helping to delay colonisation of the infant oral cavity by cariogenic bacteria.[211] Pregnant women are therefore encouraged to use fluoridated toothpaste and to consume fluoridated water.

4.6.2 Formula-fed infants

There is no evidence that typical fluoride intakes from formula feeding, using optimally fluoridated water for reconstitution, has any adverse effects on infant or child development aside from a possible greater risk of dental fluorosis. Feeding with formula reconstituted with fluoridated water may be associated with lower caries experience in permanent teeth.[212]

The American Dental Association have provided evidence-based recommendations[136] that suggest infant formula can be made up with 'optimally fluoridated' drinking water (now 0.7 mg/L in the US), but that parents should be aware of the potential risk for development of mild enamel fluorosis. If fluorosis is a concern, or in areas where local water supplies contain fluoride at higher levels, ready-to-feed formulas or powdered formulas reconstituted with low-fluoride water are recommended.

4.6.3 Young children

It is possible that some children in New Zealand could exceed the UL for fluoride intake when fluoridated water is consumed, although most evidence points to the effect of swallowing toothpaste in contributing to excess fluoride intake, and the development of mild to moderate fluorosis in young children.[39] Very young children should be supervised while toothbrushing, and should use only a smear of toothpaste with a fluoride concentration of 1000 ppm.

The UL for fluoride intake in children is based on the endpoint of increased risk of moderate dental fluorosis. Because moderate fluorosis is very rare in New Zealand, the level of exceedance of UL that may occur in New Zealand children is not considered to be a safety concern.[213]

4.6.4 Elderly

Fluoride plasma and bone concentrations tend to increase with age, partially due to accumulation over time, and also to decreased renal clearance. [46] The elderly are therefore likely to have relatively higher bone fluoride concentrations. However, epidemiological data to date do not suggest any increased risk of fracture due to fluoride exposure in this older population. Nevertheless, the NRC review[46] suggested that more

research is needed on bone concentrations in the elderly as a potentially sensitive population. A recent EPA study analysing exposure and risks [51] suggested that 0.08 mg/kg/day intake of fluoride was protective against fractures in all populations (including vulnerable groups).

4.6.5 Renal-impaired individuals

Chronic kidney disease affects a significant proportion of the New Zealand population, with a particularly high prevalence among Māori and Pacific people. Numbers of affected individuals are increasing due to the increasing prevalence of hypertension and diabetes. Because the kidney is the major route of excretion, blood fluoride concentrations are typically elevated in patients with kidney disease.[214, 215] Only a few studies have examined fluoride concentrations in bone in renal patients, but these have noted markedly elevated (possibly up to 2-fold) bone fluoride levels[46]. However, the potential effect of these higher bone fluoride levels is currently unknown. Adverse effects of fluoride exposure from CWF in renal-impaired individuals have not been documented. However, the scarcity of data indicates that further studies are required.

5. Summary

A large number of studies and systematic reviews have concluded that water fluoridation is an effective preventive measure against tooth decay that reaches all segments of the population, and is particularly beneficial to those most in need of improved oral health. Extensive analyses of potential adverse effects have not found evidence that the levels of fluoride used for community water fluoridation schemes contribute any increased risk to public health, though there is a narrow range between optimal dental health effectiveness and a risk of mild dental fluorosis.

In establishing guidelines for drinking-water quality, the WHO notes that fluoride is one of few chemicals for which the contribution from drinking water to overall intake is an important factor in preventing disease. Conversely, it is also noted as causing adverse health effects from exposure through drinking water when present in excessive quantity. WHO states that "it may not be possible to achieve effective fluoride-based caries prevention without some degree of dental fluorosis, regardless of which methods are chosen to maintain a low level of fluoride in the mouth"[216] A guideline value of 1.5 mg/L fluoride in drinking water has been recommended as a level at which dental fluorosis should be minimal.[10] A 2011 update of the WHO Guidelines for Drinking-Water Quality concluded that this guideline value should be maintained, as there is no new evidence to suggest a need for revision.[21] For optimal dental health, WHO suggests that the optimal range should be 0.8-1.0 mg/L, and that drinking water supplies should have fluoride levels raised or lowered to this range if possible.[100, 217]

Water fluoridation in New Zealand has been ongoing since the 1950s, with notable benefits to the oral health of its residents. The levels of fluoride found naturally in New Zealand water sources (typically 0.1-0.2 mg/L) are below those known to benefit oral health, but are

adjusted to between 0.7 and 1.0 mg/L (usually ~0.8 mg/L) in areas served by CWF schemes. The most recent New Zealand Oral Health Survey[66] indicated that fluoridation continues to be of benefit to communities that receive it, despite overall reductions in tooth decay that have resulted from widespread use of fluoridated dental products since the mid-1970s. The prevalence of fluorosis of aesthetic concern is minimal in New Zealand, and is not different between fluoridated and non-fluoridated communities, confirming that a substantial proportion of the risk is attributable to the intake of fluoride from sources other than water (most notably, the swallowing of high-fluoride toothpaste by young children). The current fluoridation levels therefore appear to be appropriate. It is important, however, that the chosen limit continues to protect the majority of high-exposure individuals.

This analysis concludes that water fluoridation continues to provide dental health benefits to the population of New Zealand, with no evidence of serious adverse effects after many decades of exposure. Based on these findings, we conclude that CWF is a sound public health policy practice. Communities that currently do not provide CWF – particularly those with high dental caries prevalence – would benefit from its implementation. To be effective, a public health intervention must be meeting a public health need – the effectiveness of the intervention is highest where there is the highest need. There is strong evidence that CWF is a cost-effective use of tax payer funds – with it being likely to save more in dental costs than it costs to run fluoridation programmes (at least in communities of 1000+ people). There is New Zealand evidence for this, along with evidence from Australia (three studies), the US (two studies), Canada, Chile and South Africa. The New Zealand study reported that CWF was most cost-effective in "communities with high proportions of children, Māori, or people of low socio-economic status".

Conclusions

Councils with established CWF schemes in New Zealand can be confident that their continuation does not pose risks to public health, and promotes improved oral health in their communities, reducing health inequalities and saving on lifetime dental care costs for their citizens. Councils where CWF is not currently undertaken can confidently consider this as an appropriate public health measure, particularly those where the prevalence and severity of dental caries is high. A forthcoming study from the Ministry of Health is expected to provide further advice on how large a community needs to be before CWF is cost-effective (current indications point to all communities of 1000+ people).

It is recommended that a review such as this one is repeated or updated every 10 years – or earlier if a large well-designed study is published that appears likely to have shifted the balance of health benefit vs health risk.

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Abbreviations

AI = adequate intake
ATSDR = Agency for Toxic Substances and Disease Registry (USA)
CWF = community water fluoridation
dmft = decayed, missing, or filled primary (deciduous) teeth
DMFT = decayed, missing, or filled permanent teeth
DRV = dietary reference value
EFSA = European Food Safety Authority
EPA = Environmental Protection Agency (USA)
ESR = Environmental Science & Research (NZ)
HFA = hydrofluorosilicic acid; hexafluorosilicate
H_2SiF_6 = hydrofluorosilicic acid; hexafluorosilicate
IOM = Institute of Medicine (USA)
LOAEL = lowest observed adverse effect level
MAV = maximum acceptable value
MCLG = maximum contaminant level goal
MRL = minimal risk level
NaF = sodium fluoride
Na_2SiF_6 = sodium fluorosilicate
NHMRC = National Health and Medical Research Council (Australia)
NOAEL = no observed adverse effect level
NRC = National Research Council (USA)
NRV = nutrient reference value
NTP = National Toxicology Program (USA)
NZMoH = New Zealand Ministry of Health
PHE = Public Health England
TDI = tolerable daily intake reference dose
SCHER = Scientific Committee on Health and Environmental Risks (Europe)
UL = tolerable upper level of intake
WHO = World Health Organization

Appendix

Table A1. Study characteristics and levels of evidence criteria for epidemiological studies of community water fluoridation (CWF) – used in the UK NHS/York review[89] and the Australian NHMRC review. [91]

HIGH quality of evidence – minimal risk of bias
• Prospective study design (not retrospective or cross-sectional), starting around the time of either initiation or discontinuation of CWF, and with a long follow up • Randomisation, or addressing and adjusting for multiple possible confounding factors • Blinded: fluoridation status of participants is unknown to those assessing outcomes.
MODERATE quality of evidence – moderate risk of bias
• Studies that started within three years of the initiation or discontinuation of CWF, with a prospective follow up for outcomes. • Studies that measured and adjusted for at least one confounding factor (but less than 3) • Not blinded - fluoridation status of participants was known to those assessing primary outcomes, but other provisions were made to prevent measurement bias.
LOWEST quality of evidence – high risk of bias
• Cross-sectional or retrospective studies using concurrent or historical controls • Studies that failed to adjust for confounding factors.

Table A2. Major reviews, guidelines, and oral health reports on community water fluoridation (CWF)

Review	Year	Scope of review/inclusion criteria	Conclusions	
			CWF efficacy	CWF adverse effects
Public Health Service – USA [84]	1991	Comprehensive qualitative assessment of health benefits and risks, prepared by PHS Ad Hoc Subcommittee on Fluoride. Analysed NTP fluoride carcinogenicity studies, published studies on humans and animals, Public input was requested and submissions reviewed.	Fluoride has substantial benefits in the prevention of tooth decay. Numerous studies, taken together, clearly establish a causal relationship between water fluoridation and the prevention of dental caries. The health and economic benefits of water fluoridation accrue to individuals of all ages and socioeconomic groups, especially to poor children.	- CWF at optimal level does not pose a detectable cancer risk to humans. - More studies are needed to determine whether there is a link between CWF levels and bone fractures. - No indication of adverse effects in other organ systems. - Mild fluorosis has increased in all areas (fluoridated or not) due to introduction of additional fluoride sources
Public Health Commission - NZ [85]	1994	Review of the benefits and costs of CWF, with particular attention to recent scientific literature and NZ-related literature	Average individual lifetime benefit of CWF in NZ = prevention of 2.4-12.0 DMFT; At population level (with 50% of population exposed to CWF) = prevention of 58,000-267,000 DMFT/year in NZ. Greatest caries prevention benefit in lower SES groups, Māori, and children	- Possible small increased risk of hip fracture. - No evidence of link to cancer, except possible small increased risk of osteosarcoma cannot be ruled out. - Little/no adverse cosmetic impact from dental fluorosis; moderate fluorosis likely due to other fluoride sources · No scientific basis for concern about other health effects from CWF at 1 mg/L
NHS Centre for Reviews and Dissemination, University of York (UK) [89]	2000	Systematic review of 214 studies in all languages using strict quality criteria for inclusion. Cross-sectional studies were excluded. Overall the validity of the studies was considered moderate or low.	The best available evidence suggests that CWF does reduce caries prevalence, both as a proportion of children who are caries free and by the mean change in dmft/DMFT score. A beneficial effect was still evident in spite of the assumed exposure to non-water fluoride in all study populations after 1974	- Fluorosis of any degree was estimated to occur in 48% of people consuming water at 1.0 mg/L fluoride. - Bone fracture studies found no association with CWF - No clear association was found between CWF and cancer incidence or mortality (including bone cancers, thyroid cancer, and all cancer) - Insufficient evidence exists for other possible negative effects

Table A2 continued				
Review	**Year**	**Scope of review/Inclusion criteria**	**Conclusions**	
			CWF efficacy	**CWF adverse effects**
Centers for Disease Control and Prevention (CDC) - US [86]	2001	Review/guideline on use of fluorides for prevention and control of dental caries in the US – looks at all modalities. Does not review safety.	Recommends that all persons drink water with an optimal fluoride concentration and brush teeth twice daily with fluoride toothpaste	Not assessed
Medical Research Council (MRC) – UK [87]	2002	Mostly reiterated York review but considered what future research could help inform risk management decisions on water fluoridation.	Conclusions as per those in York. Also found that water fluoridation reduced dental caries inequalities between high and low SES groups. Suggested studies needed to provide better estimate of effects of CWF against background of widespread use of fluoride toothpaste.	- Evidence suggests no link to cancer, and no effect on fracture risk (but cannot rule out the possibility of a small %change - either increase or a decrease - in hip fractures.) - No evidence of any other significant health effects
US Task Force on Community Preventive Services [92]	2002	Reviews 21 qualifying studies of CWF, including 15 starting of continuing CWF, 5 stopping or reducing CWF, and 1 with changes in both directions.	Strong evidence shows that CWF is effective in reducing the cumulative experience of dental caries within communities. Starting CWF decreased caries experience by 30-50%. Stopping CWF lead to ~17% increase in caries experience. CWF was cost saving in all studies.	Not assessed
Ireland Forum on Fluoridation [29]	2002	First major review of CWF in Ireland since it was introduced in 1964. Based on presentations by Irish and international experts examining scientific evidence representing views both for and against CWF. Also addressed issues of concern to the Irish public.	CWF has been very effective in improving oral health in the Irish population, especially children, but also adults and the elderly, and should continue as a public health measure	- Best available and most reliable evidence indicates that human health is not adversely affected by CWF at the maximum permitted fluoride level (1 mg/L) - There is evidence that dental fluorosis is increasing in Ireland.
Ireland North-South survey of children's oral health [94]	2002	Survey of oral health in fluoridated Republic of Ireland (RoI) compared with non-fluoridated Northern Ireland (NI)	CWF was the major contributor to lower decay rates in RoI compared with NI, despite worse oral health habits in RoI.	Fluorosis is increasing in Ireland, more so in fluoridated areas.

Table A2 continued				
Review	**Year**	**Scope of review/inclusion criteria**	**Conclusions**	
			CWF efficacy	**CWF adverse effects**
WHO – International Programme on Chemical Safety (IPCS) [59]	2002	Environmental Health Criteria report on the relationship between fluoride exposure and human health, to provide guidelines for setting exposure limits - focused on adverse effects	Not assessed	Effects on teeth and skeleton (both beneficial and harmful) are observed at exposures below those associated with other adverse health effects. Effects on bone are the most relevant with regard to assessing potential adverse effects of long-term exposure
WHO - Fluoride in Drinking Water [10]	2006	A detailed review and guideline primarily focusing on effects of high natural fluoride and its removal. Also reviews animal and in vitro evidence for adverse effects of fluoride exposure	Fluoride concentrations in drinking-water of about 1 mg/L are associated with a reduced incidence of dental caries, particularly in children, compared with lower water fluoride levels.	Although health effects of high natural fluoride are documented, no credible evidence was found that water fluoridation is associated with any adverse health effects aside from dental fluorosis
National Research Council (NRC) – US [46]	2006	Review of health effects associated with the US EPAs maximum contaminant level goal (MCLG) for fluoride (4 mg/L)	Not assessed	A threshold for severe dental fluorosis occurs at ~2 mg/L F in water. Other effects at the MCLG level were equivocal. Review concluded that the MCLG should be lowered
National Health and Medical Research Council (NHMRC) - Australia [91]	2007	Synthesis of eveidence on efficacy and safety of different forms of fluoridation. Included York review + 5 additional studies since 1999	CWF remains the most effective and socially equitable means of achieving community-wide exposure to the caries preventive effects of fluoride.	- CWF is associated with dental fluorosis, but the majority is not of aesthetic concern. Prevalence reduced by more appropriate use of other fluoride sources - Minimal effect on fracture risk. Fluoridation at 0.6-1.1 mg/L may lower risk compared with higher and lower levels No clear association with cancer Insufficient evidence to conclude regarding other possible negative effects
Scientific Advisory, Institut National de Sante Publique du Quebec [88]	2007	Synthesis of current evidence with respect to safety and efficacy of CWF to determine whether Quebec fluoridation policy (CWF at 0.7 mg/L) needs to be reviewed or remain unchanged	CWF is the most effective and economical public health measure for preventing caries.	The scientific data currently available does not show that water fluoridation at concentrations deemed beneficial to dental health is harmful to humans.
Griffin et al. – [109]	2007	Systematic review of 9 studies of CWF effectiveness in adults 20-60+ years (n = 7,853 subjects).	Caries prevented fraction for lifetime exposure vs no exposure was 34.6%. and 27.2%. in 5 studies published after 1979	Not assessed

Table A2 continued				
Review	**Year**	**Scope of review/Inclusion criteria**	**Conclusions**	
			CWF efficacy	**CWF adverse effects**
Ireland adult oral health report [110]	2007	Survey designed to analyse the differences in oral health of Irish adults according to exposure to CWF.	Exposure to CWF has a statistically significant impact on number of teeth retained and caries experience in adults	Not assessed
Scientific Committee on Health and Environmental Risks (SCHER) report - EU [34]	2010	Critical review of available information on hazard profile and epidemiological evidence of adverse and/or beneficial effects of fluoride (particularly evidence since 2005 or any evidence not considered by SCCP [212] and EFSA [218] panels	CWF reduces caries prevalence and severity, especially among children from low SES groups. However, topical fluoride application (toothpaste or varnish) is the most effect in preventing tooth decay.	- Acknowledges risk for mild dental fluorosis in children. - Concludes that typical human fluoride exposures do not influence thyroid function, IQ, or reproductive capacity. - Fluoride cannot be classed as to carcinogenicity. CWF is not expected to lead to unacceptable risks to the environment.
US EPA Dose-Response analysis of non-cancer effects [49]	2010	Technical analysis of human dose-response data on dental and skeletal fluorosis, and skeletal fractures	Not assessed	Severe dental fluorosis may be experienced by a small % (0.5%) of populations exposed to F at 2 mg/L. No clear evidence that F at this level will cause other types of adverse health effects (skeletal fluorosis or bone fractures)
2009 Oral Health Survey - NZ [66]	2010	Detailed survey of oral health status in New Zealand. Not designed as an in-depth CWF study, but data examined for any protective effect against caries, and impact on prevalence and severity of dental fluorosis	Overall, children and adults living in fluoridated areas had significantly lower lifetime experience of dental decay (ie, lower dmft/DMFT) than those in non-fluoridated areas. CWF cost-effectively provides benefits above and beyond those from other fluoride sources alone (eg, toothpaste and tablets).	Overall prevalence of moderate fluorosis was very low (~2%; no severe fluorosis was found), and no significant difference in the prevalence of moderate fluorosis (or any of the milder forms of fluorosis) between people living in fluoridated and non-fluoridated areas.
Health Canada Drinking Water Guidelines [8]	2010	Encompasses all major reviews, + case reports and clinical studies. Based on Health Canada's review of available science, as supported by the Expert Panel Meeting on fluoride.	A fluoride concentration of 0.7 mg/L in drinking water provides optimal dental health and is protective against adverse effects	The weight of evidence does not support a link between exposure to fluoride in drinking water at 1.5 mg/L and any adverse health effects including cancer, immunotoxicity, reproductive and/or developmental toxicity, genotoxicity, and/or neurotoxicity

Table A2 continued				
Review	**Year**	**Scope of review/inclusion criteria**	**Conclusions**	
			CWF efficacy	**CWF adverse effects**
Rugg-Gunn and Do [219]	2012	Review of studies pre and post 1990	Effect of CWF on caries reduction is smaller in studies post 1990 vs earlier. Studies analysing continuous vs non-continuous residency in CWF areas clearly show the caries preventive effect increases with higher % of life exposed to fluoridated water	Not addressed
Public Health England [95]	2014	Water fluoridation Health monitoring report for England	CWF areas vs non CWF areas –45% fewer hospital admissions for caries in children aged 1-4y –15% fewer 5 year olds with caries (28% taking into account SES and ethnicity) –11% fewer 12 year olds with caries (21% adjusting for SES/ethnicity)	–No significant effect of general health, hip fracture, osteosarcoma, overall cancer, Down's syndrome, or all cause mortality –Kidney stones, bladder cancer lower in CWF areas. –Dental fluorosis higher in CWF areas but still low overall (1% vs 0.2%)

Table A3. Cancer data – major reviews, recent studies, and key animal data

Major reviews	**Year**	**Conclusions**
UK Working Party on Fluoridation of Water and Cancer [152]	1985	Extensive analysis of cancer epidemiological evidence found an absence of demonstrable effects on cancer rates following long-term exposures to naturally elevated or artificially fluoridated water - permits conclusion of safety of fluoridated water.
International Agency for Research on Cancer (IARC)/WHO [220]	1987	Studies show no consistent trend of higher cancer rates in CWF areas, but evidence inadequate to draw firm conclusions. Fluorides labeled "non-classifiable as to their carcinogenicity in humans."
Public Health Service – USA [84]	1991	Animal studies "fail to establish an association between fluoride and cancer." Population-based studies (n >50 over 40 years) indicate "Optimal fluoridation of drinking water does not pose a detectable cancer risk to humans." An evaluation by NCI of osteosarcomas using nationwide age-adjusted incidence data from the entire SEER database for the years 1973-1987 found a slightly increased incidence in young males in fluoridated vs. non-fluoridated areas, but "an extensive analysis reveals that it is unrelated to the introduction and duration of fluoridation."
National Research Council (NRC), USA [36]	1993	"Laboratory data are insufficient to demonstrate a carcinogenic effect of fluoride in animals." "The weight of the evidence from epidemiological studies completed to date does not support the hypothesis of an association between fluoride exposure and increased cancer risk in humans."
NHS Centre for Reviews and Dissemination, University of York (UK) [89]	2000	"No clear association between water fluoridation and incidence or mortality of bone cancers, thyroid cancer, or all cancers was found."
WHO – International Programme on Chemical Safety (IPCS) [59]	2002	"In spite of the large number of studies conducted in a number of countries, there is no consistent evidence to demonstrate any association between the consumption of controlled fluoridated drinking-water and either morbidity or mortality from cancer"
WHO - Fluoride in Drinking Water [10]	2006	Conclusion unchanged from 2002 WHO-IPCS report[59]
National Research Council (NRC) – US [46]	2006	Data from humans, genotoxicity assays, and studies of mechanisms of actions in cell systems indicate "the evidence on the potential of fluoride to initiate or promote cancers, particularly of the bone, is tentative and mixed."
National Health and Medical Research Council (NHMRC) - Australia [46]	2007	Included 4 additional studies + York review. Conclusions unchanged from York review [46] This analysis includes the case-control study of Bassin et al. [89]
California EPA, [147]	2011	The hypothetical mechanisms of fluoride carcinogenicity are considered to be plausible, but overall, the current body of epidemiologic evidence on the carcinogenicity of fluoride is considered inconclusive.
Public Health England [95]	2014	No differences were found between fluoridated and non-fluoridated areas in overall cancer rate or osteosarcoma incidence. Bladder cancer rates were lower in fluoridated areas than in non-fluoridated areas.
Recent studies	**Year**	**Conclusions**
Bassin et al. [159] (+comment [89])	2006	Preliminary data suggested that exposure to fluoride in drinking water was linked to increased risk of osteosarcoma in boys but not girls. Analysis of full study data did not support this conclusion.
Kim et al. [161]	2011	Fluoride levels in bone samples from osteosarcoma tumors were the same as in other bone cancers that did not show increased risk with CWF.
Comber et al. [89]	2011	Data from 1994–2006 on osteosarcoma incidence from the Northern Ireland Cancer Registry (NICR) and the National Cancer Registry of Ireland (NCRI) were analysed, with cases divided into 'fluoridated/non-fluoridated groups based on residence at time of diagnosis. No significant differences were observed between fluoridated and non-fluoridated areas in either age-specific or age-standardised incidence rates of osteosarcoma.

Table A3 continued		
Recent studies	**Year**	**Conclusions**
Levy and Leclerc [163]	2012	Used cumulative osteosarcoma incidence rate data from CDC Wonder database and SEER 9 cancer registries categorised by CWF status between 1992 and 2006 – concluded that water fluoridation status in the continental U.S. has no influence on osteosarcoma incidence rates during childhood and adolescence. The study provides no evidence that young males are at greater risk of osteosarcoma from fluoride in drinking water than females of the same age group.
Blakey et al. [164]	2014	Ecological analysis using high-quality population-based data on osteosarcoma and Ewing sarcoma cases diagnosed in Great Britain between 1980 and 2005. Fluoride levels were assigned on a small-area basis, allowing improved classification of exposure. Found no evidence of association between these cancers and fluoride in drinking water (whether from CWF or naturally occurring at optimal level)
Key animal studies		
National Toxicology Program (NTP, USA [148]	1990	Statistically significant increases in osteosarcomas observed in male rats drinking water with up to 175 mg/L fluoride, but not in female rats or male or female mice similarly exposed.
National Toxicology Program (NTP, USA [149]	1992	Findings from previous NTP study not replicated in male rats of the same strain receiving a higher fluoride dose (250 mg/L), also via drinking water, for 2 years
Maurer et al. [150]	1990	No treatment-related tumor findings were observed in two-year diet studies in male and female Sprague-Dawley rats

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FORM 5 – SUBMISSION ON PROPOSAL TO CHANGE THE RANGITIKEI DISTRICT PLAN

Clause 6 of the First Schedule, Resource Management Act 1991

Submission on 10 Year Long Term Plan

SUBMITTER/S DETAILS

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Phone Number 06 345 6729 ext 2
(if different from above)

SUBMISSION ON [redacted] Long Term 10 Year Plan

Name of Applicant

Plan Change Proposal Number

☑ I **support** the application ☐ I **oppose** the application

My submission is (*specific parts of the plan change proposal; whether you wish to have the proposal amended; the reasons for your views*) We wish to add to the Council's District Plan for the fixing and ongoing upkeep of Toroa Road along with all other roads in Taihape District.

Taihape Kindergarten backs onto Mt Stewart Reserve. There are current issues with the water runoff and drainage onto Toroa Road and the ongoing issues with the roadway being eaten away due to the water run off.

The Whanganui Kindergarten Association is a non-profit Charitable Trust that provides high quality Early Childhood Education to members of the wider Taihape community. Please see the attached map showing the wide Geographical spread of families that are currently accessing the Kindergarten.

There are currently 65 families accessing the Kindergarten all of who use the driveway twice a day during drop off and pick up times. The Kindergarten also holds community events including holding days when grandparents are invited to share a day at the Kindergarten with children, fundraising events including Matariki Celebrations and Disco where members of the family are also invited to the Kindergarten. The Kindergarten also operates during the term breaks offering a holiday programme which has now been operating for over 12 months....continued *(continue on a separate sheet if necessary)*

I seek the following decision from the Rangitikei District Council *(give precise details)*
For the Kindergarten Access Road to be bought up to Council standards for curbing, footpaths and drainage for the water runoff from Mt Stewart Reserve then for the Road and footpath to be included in the ongoing maintenance schedule for Taihape District Roads.

☑ I **wish** to be heard in support of my submission

☐ I **do not wish** to be heard in support of my submission

☑ If others make a similar submission, I will consider presenting a joint case with them at a hearing

Signature [signature] Date 30/4/15

(Person making the submission, or the person authorised to sign on behalf of the person making the submission)

Please make sure the submission is received by the Council before the due date.

The issue

The issue we are facing is the continual erosion of the road due to the water run off from Mt Stewart Reserve. There is currently no drainage diverting the flow of water from under the road, which is causing the road seal to break down. The asphalt becomes soft and when vehicles drive over the road they are creating potholes due to the softened asphalt.

No matter how often we fill the potholes the water continues to erode away and the potholes return. This is creating a hazard for vehicles and we are aware that this has caused damage to the wheels and tyre rims of cars that are using the roadway. If they don't want to cause damage to their vehicles they would have to park on the adjacent street then walk their children into the Kindergarten.

The footpaths leading into 7b Toroa Road are also in need of repair and have been identified as a hazard under the Health and Safety Act so this is also not an advisable practice. It is also not practicable for this to happen in winter months when members of the Community would be faced with severe weather conditions including snow, ice, wind and rain.

The roadway is currently used by the Kindergarten community (who are members of the wider Taihape Community), by members of the public who park and access Mt Stewart reserve, as well travellers who call in and park in order to picnic on the grass or access the gumboot. The Kindergarten has no way of restricting assess to the road and therefore cannot control the damage that is being done to the road.

An integral community service

We are a not for profit Charitable organization and we do not charge fees for children being able to attend Kindergarten like other private providers. All income that is received from the Ministry of Education is used for operating expenses and for resourcing the Kindergarten to ensure that they can deliver a rich and diverse learning programme for children. All our Kindergartens are safe and welcoming and are well resourced because of this practice.

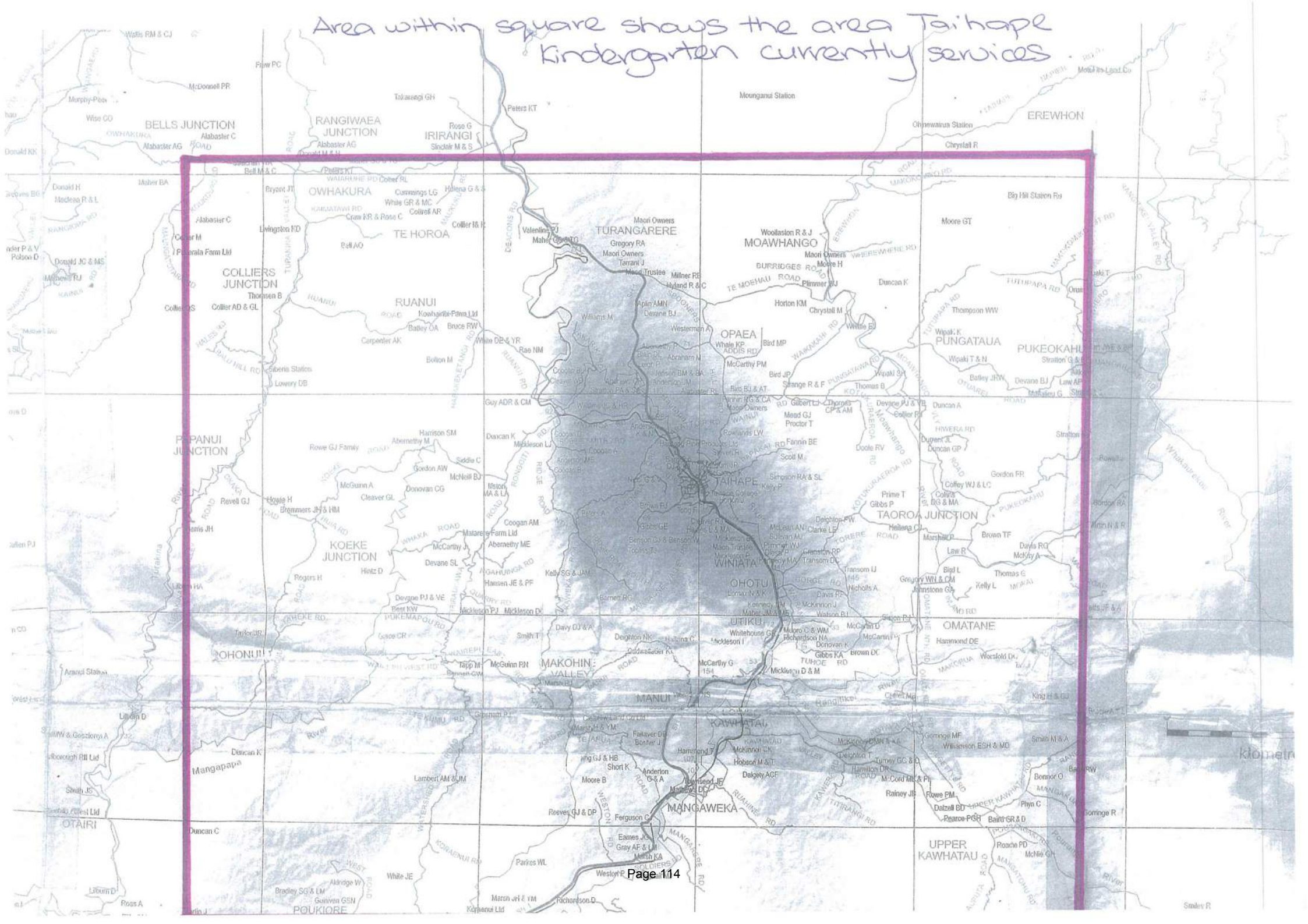
We provide a high quality free Early Childhood Education service for Taihape residents and their rural residents. There are limited Early Childhood Education services available to the wider districts and parents and children that attend the Kindergarten cannot walk as they could in a town environment.

We strive to meet the Governments Better Public Service standards of having over 98% of children under 5 accessing some form of Early Childhood Education. Unfortunately the current road condition is causing problems for parent's vehicles and there is concern that they will stop bringing their children to Kindergarten in fear of the damage that the road is doing to their vehicles.

As all our money goes back to the Kindergarten and we are a not for profit organization we do not have the financial resources to fix and maintain the road to the Council's standards. We have over the past 2 years put together a small amount of money ($20,000.00) that we con contribute towards to cost of fixing the roadway but this is insufficient to complete the work required to bring the road up to standard. It was estimated that the cost of the work to be undertaken two years ago was around $58,000.00.

The road way is in urgent need of repair and we hope that you would consider our submission positively so that the work can be undertaken and make it safe for members of the public to safely use.

Thank you for your consideration.


Area within square shows the area Taihape Kindergarten currently services.
BELLS JUNCTION
RANGIWAEA JUNCTION
IRIRANGI
EREWHON
OWHAKURA
TE HOROA
TURANGARERE
MOAWHANGO
COLLIERS JUNCTION
RUANUI
OPAEA
PUNGATAUA
PUKEOKAHU
PAPANUI JUNCTION
TAIHAPE
TAORUA JUNCTION
KOEKE JUNCTION
WINIATA
OHOTU
UTIKU
OMATANE
OHONUI
MAKOHINE VALLEY
MANUI
KAWHATAU
MANGAWEKA
OTAIRI
UPPER KAWHATAU
POUKIORE
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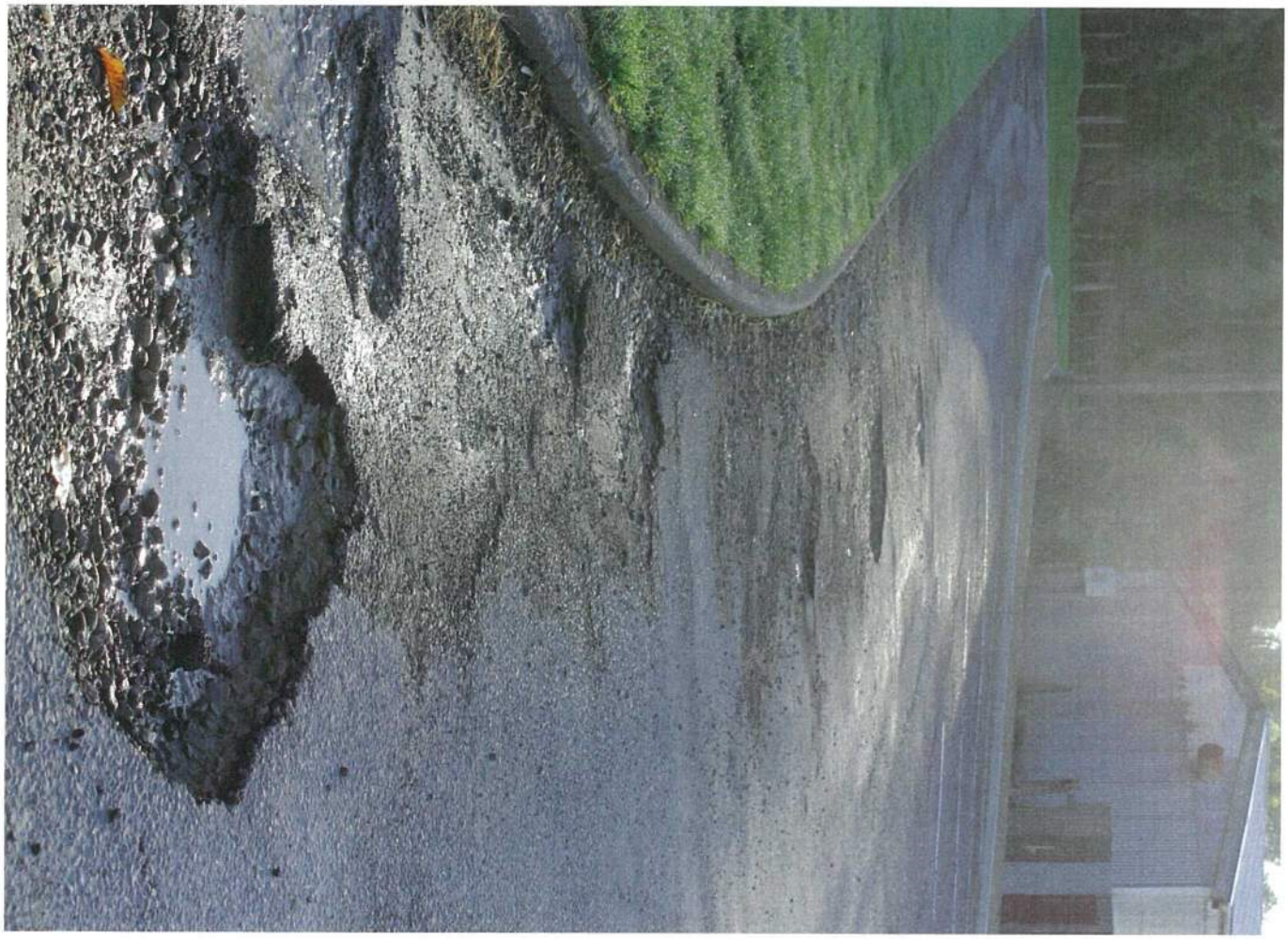


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(6) Signature: [signature]
Name: Rae Sinclair
Address: RD5 Taihape
Phone: 06 3881392

Susannah Revell
361 Okaka Rd
R.D.1
Taihape (06) 3887519
[signature]

(7) Signature: [signature]
Name: Philke Flickroft
Address: 23 Rawhiti Street
Phone: 04 5637813

(8) Signature: [signature]
Name: Lorraine Krutf
Address: 20 Richard Grove
Phone: (04) 5636742

(9) Signature: [signature]
Name: Ipenra McGregor
Address: 300 Fegruson Street Palmerston North
Phone: 0273806140

(10) Signature: [signature]
Name: Bruce Sinclair
Address: RD5 Taihape
Phone: 06 3880809

(11) Signature: [signature]
Name: Ben Gum
Address: 3 Olympus Circle Linton
Phone: 0211336475

(12) [signature]
Anna Patrick
0273142401

(1) Signature: [signature] .... [signature]
Name: Dylan Katana — Sophie Luoni
Address: RD5 waiarohe rd — 32 pukeko St
Phone: 027305 10/7 — 027 2846442.

(2) Signature: [signature] ....
Name: Banny Thompson
Address: RD 1, Taihape.
Phone: 3880171

(3) Signature: SA Sinclair ....
Name: Suzanne Sinclair
Address: RD5 Taihape
Phone: 06 3881392

(4) Signature: Mark Sinclair ....
Name: Mark Sinclair
Address: RD5 Taihape
Phone: 06 3881392

(5) Signature: [signature] ....
Name: Jessica Sinclair
Address: RD5 Taihape
Phone: 0273872069

(6) Signature: RC Sinclair ....
Name: Rae Sinclair — Susannah Revell
Address: RD5 Taihape — 361 Okaka Rd R.D.1 Taihape
Phone: 06 3881392 — (06) 3887519
SuRevell

(7) Signature: [signature] ....
Name: Philke Flickroft
Address: 23 Rawhiti Street
Phone: 04 5637813

(8) Signature: [signature] ....
Name: Lorraine Kauff
Address: 20 Richard Grove
Phone: (04) 5636742

(9) Signature: [signature] ....
Name: Jenna McGregor
Address: 300 Ferguson Street Palmerston North
Phone: 0273806140

(10) Signature: [signature] ....
Name: Bruce Sinclair
Address: RD5 Taihape
Phone: 06 3880809

(11) Signature: [signature] ....
Name: Ben Gum
Address: 5 Olympus Circle Linton
Phone: 0211336495

(12) Anna Rose Patrick
Anna Patrick
0273142401

Submission Form

Issue 1

Should Council increase its investment in economic development?

- ☐ **Option 1 – Yes I support Council's proposal** of allocating $205,000 per year – funded 50% from general rates and 50% UAGC.
- ☐ **Option 2 – Do Nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Compromise** – I do not support Council's proposal, but I do support investing an additional annual provision of $100,000 for strategic research or $105,000 for local initiatives.

Other Comments:

Issue 2

Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?

- ☐ **Option 1 – Yes I support Council's proposal** to upgrade or build new civic/community centres in Bulls, Marton and Taihape with Council's capital contribution of $1.6M for Bulls, $1.64 for Marton and $1.78 for Taihape.
- ☐ **Option 2 – Do nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Upgrade Bulls only** – I do not support Council's proposal, but I do support the upgrade for Bulls with Council's capital contribution of $1.6M.

Other Comments:

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities

- ☐ **Option 1 – Yes I support Council's proposal** to install on-site treatment facilities at Mangaweka, and maintain all other existing urban water and wastewater systems, at a cost of $1.768 million, in 2022/23.
- ☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

I'm very concerned about the leachate that come from Midwest Disposal's Bonny Glen facility being dumped into the Marton Waste water treatment plant. I feel that the Rangitikei residents will have to pay for the problems caused by non compliance of the waste water treatment plant caused by the acceptance of the leachate into the plant. As rubbish is accepted from all over the country why do we as ratepayers have to be financially responsible for this problem, surely Midwest Disposal should pay to fix the problem as they are paid for the disposal of the rubbish and leachate is part of the rubbish. I'm also concerned to where the sludge will go when the ponds are emptied, will Midwest Disposal take this back? And at what cost.

Issue 4

What should we do with our community facilities?

A. Swimming pools

- ☐ **Option 1 – Yes I support Council's proposal** to maintain the status quo at Taihape, Hunterville and Marton pools.
- ☐ **Option 2 – Reduce the swimming season at Taihape and Marton** – I do not support Council's proposal and support a reduced swimming season at Taihape and Marton pools.
- ☐ **Option 3 – Extend the swimming season at Taihape and Marton** – I do not support Council's proposal and support an extended swimming season at Taihape and Marton pools.

Other Comments:

B. Community housing

☐ **Option 1 – Yes I support Council's proposal** to invest $100,000 for the next three years to upgrade all housing units.

☐ **Option 2 – Status quo** – I do not support Council's proposal.

Other Comments:

C. Parks upgrades

☐ **Option 1 – Yes I support Council's proposal** to rely on community donated labour and materials for improving our parks.

☐ **Option 2 – Council funded provision** – I do not support Council's proposal and support Council including an annual $50,000 provision to upgrade facilities and equipment at our parks.

Other Comments:

Issue 5

Should we increase rates to build a larger Roading Reserve Fund?

✓ **Option 1 – Yes I support Council's proposal** to increase the roading reserve to a maximum of $3.5M.

☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Submissions close at 12noon on Monday, 4 May 2015.

Submitter details (please print clearly):

Your name:

Peter Lissington

Email address:

P.lissington@xtra.co.nz

Preferred contact phone number:

06 3276156

Your postal address:

556 Wellington Road

Town: Marton

How would you prefer to receive correspondence relating to your submission and the hearings:

✓ Email ☐ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.

✓ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?

☐ Yes ✓ No

☐ Yes I would like to subscribe to Council's e-newsletter

Thinking of Council's communication with residents in general, do you think the Council is doing better or worse than last year, or about the same?

☐ Worse than last year

☐ About the same

☐ Better than last

☐ Don't know

Are you writing this submission as:

☐ an individual, or

☐ on behalf of an organisation

If on behalf of an organisation, please provide details:

Organisation:

Position:

Privacy Act 1993

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Submission Form

Issue 1

Should Council increase its investment in economic development?

☐ **Option 1 – Yes I support Council's proposal** of allocating $205,000 per year – funded 50% from general rates and 50% UAGC.

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Other Comments:

Issue 2

Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?

☐ **Option 1 – Yes I support Council's proposal** to upgrade or build new civic/community centres in Bulls, Marton and Taihape with Council's capital contribution of $1.6M for Bulls, $1.64 for Marton and $1.78 for Taihape.

☐ **Option 2 – Do nothing** – I do not support Council's proposal.

☐ **Option 3 – Upgrade Bulls only** – I do not support Council's proposal, but I do support the upgrade for Bulls with Council's capital contribution of $1.6M.

Other Comments:

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities

☐ **Option 1 – Yes I support Council's proposal** to install on-site treatment facilities at Mangaweka, and maintain all other existing urban water and wastewater systems, at a cost of $1.768 million, in 2022/23.

☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Issue 4

What should we do with our community facilities?

A. Swimming pools

☐ **Option 1 – Yes I support Council's proposal** to maintain the status quo at Taihape, Hunterville and Marton pools.

☐ **Option 2 – Reduce the swimming season at Taihape and Marton** – I do not support Council's proposal and support a reduced swimming season at Taihape and Marton pools.

✓ **Option 3 – Extend the swimming season at Taihape and Marton** – I do not support Council's proposal and support an extended swimming season at Taihape and Marton pools.

Other Comments:

Careful consideration should be given to extending the opening period for both the Taihape and Marton pools before a decision is arrived at.

It would be questionable that the council provide 2 facilities offering extended opening hours when in fact the Taihape pool is clearly a summer operation standing alongside the pool in Hunterville providing a valuable community asset which is well supported.

The Marton pool on the other hand has a more varied clientele with 3 private schools, 10 Marton primary or secondary schools, provision of pool space for approx 8 visiting swim teams that have been regular users of the facility over the past seasons, an aging population, swimming club resident competitive training squads including 4 current NZ champions, approx 50 regular early morning swimmers that will relish the opportunity extended hours will provide, surf-club training and all associated aquatic activities.

The existing 50 meter pool has huge potential to grow however it must be approached with caution and only move forward when the opportunities present themselves, which they are at present.

Trevor Nicholls

B. Community housing

☐ **Option 1 – Yes I support Council's proposal** to invest $100,000 for the next three years to upgrade all housing units.

☐ **Option 2 – Status quo** – I do not support Council's proposal.

Other Comments:

C. Parks upgrades

☐ **Option 1 – Yes I support Council's proposal** to rely on community donated labour and materials for improving our parks.

☐ **Option 2 – Council funded provision** – I do not support Council's proposal and support Council including an annual $50,000 provision to upgrade facilities and equipment at our parks.

Other Comments:

Issue 5

Should we increase rates to build a larger Roading Reserve Fund?

☐ **Option 1 – Yes I support Council's proposal** to increase the roading reserve to a maximum of $3.5M.

☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Submissions close at 12noon on Monday, 4 May 2015.

Submitter details (please print clearly):

Your name:

Trevor Nicholls

Email address:

trevor@nicswim.co.nz

Preferred contact phone number:

21540034

Your postal address:

198 college street

Town: Palmerston North

How would you prefer to receive correspondence relating to your submission and the hearings:

✓ Email ☐ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.

✓ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?

☐ Yes ☐ No

☐ Yes I would like to subscribe to Council's e-newsletter

Thinking of Council's communication with residents in general, do you think the Council is doing better or worse than last year, or about the same?

☐ Worse than last year

☐ About the same

☐ Better than last

☐ Don't know

Are you writing this submission as:

☐ an individual, or

✓ on behalf of an organisation

If on behalf of an organisation, please provide details:

Organisation:

Nicholls Swim Academy

Position: Managing Director

Privacy Act 1993

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Submission Form

Issue 1

Should Council increase its investment in economic development?

☐ **Option 1 – Yes I support Council's proposal** of allocating $205,000 per year – funded 50% from general rates and 50% UAGC.

✓ **Option 2 – Do Nothing** – I do not support Council's proposal.

☐ **Option 3 – Compromise** – I do not support Council's proposal, but I do support investing an additional annual provision of $100,000 for strategic research or $105,000 for local initiatives.

Other Comments:

The council should review the spending along with the proposed investment into the rejuvenation of the Marton, Bulls and Taihape town centres.

The public need to be properly engaged in the process. The attendance by rate payers at the Project Marton and LTP presentation that we went to was poorly attended.

Issue 2

Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?

☐ **Option 1 – Yes I support Council's proposal** to upgrade or build new civic/community centres in Bulls, Marton and Taihape with Council's capital contribution of $1.6M for Bulls, $1.64 for Marton and $1.78 for Taihape.

✓ **Option 2 – Do nothing** – I do not support Council's proposal.

☐ **Option 3 – Upgrade Bulls only** – I do not support Council's proposal, but I do support the upgrade for Bulls with Council's capital contribution of $1.6M.

Other Comments:

A proper assessment needs to be carried out. Marton can not wait another two years before anything is done. Funds need to be diverted and replaced accordingly.

The current Project Marton strategy needs an overhaul.

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities

☐ **Option 1 – Yes I support Council's proposal** to install on-site treatment facilities at Mangaweka, and maintain all other existing urban water and wastewater systems, at a cost of $1.768 million, in 2022/23.

✓ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Better engagement with the communities affected needs to take place to provide a sympathetic approach.

Adjustments need to made in policy so that water treated to a potable standard is not used for garden watering. This may result in subsidies for residents to develop rainwater harvesting, for example, to use for gardens and vehicle washing.

Future generations should not be saddle with debt particularly if the population is declining.

Issue 4

What should we do with our community facilities?

A. Swimming pools

☐ **Option 1 – Yes I support Council's proposal** to maintain the status quo at Taihape, Hunterville and Marton pools.

☐ **Option 2 – Reduce the swimming season at Taihape and Marton** – I do not support Council's proposal and support a reduced swimming season at Taihape and Marton pools.

✓ **Option 3 – Extend the swimming season at Taihape and Marton** – I do not support Council's proposal and support an extended swimming season at Taihape and Marton pools.

Other Comments:

A thorough review needs to take place of all operating costs and capital expenditure required. Marton pool is run by a 3rd party and this needs to be assessed.

The pools are a significant asset to all and has recently feature as a facility for training local young triathletes. The profile needs to be raised and access for all in the way of classes needs to be promoted.

B. Community housing

✓ **Option 1 – Yes I support Council's proposal** to invest $100,000 for the next three years to upgrade all housing units.

☐ **Option 2 – Status quo** – I do not support Council's proposal.

Other Comments:

The housing stock and revenue needs to be run as a commercial entity. There are landlords making significant returns on rental property. The asset can be leveraged for projects such as the rejuvenation of the town centres.

A similar approach could be taken with other council assets.

C. Parks upgrades

✓ **Option 1 – Yes I support Council's proposal** to rely on community donated labour and materials for improving our parks.

☐ **Option 2 – Council funded provision** – I do not support Council's proposal and support Council including an annual $50,000 provision to upgrade facilities and equipment at our parks.

Other Comments:

Council should contribute on a like for like basis. General maintenance of parks should be brought back to be run by direct labour organisations.

Issue 5

Should we increase rates to build a larger Roading Reserve Fund?

☐ **Option 1 – Yes I support Council's proposal** to increase the roading reserve to a maximum of $3.5M.

✓ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

A single fund for all capital expenditure should be generated with rules set for how much can be used for particularly categories.

Cars contribute little to wear and tear and there will be structural issues beyond our control. Lorries cause the greatest damage sites/properties who have lorry movements should be levied accordingly.

Submissions close at 12noon on Monday, 4 May 2015.

Submitter details (please print clearly):

Your name:

Robert Snijders

Email address:

moolookiwi@outlook.com

Preferred contact phone number:

0210 410001

Your postal address:

5 Grey Street

Town: Marton

How would you prefer to receive correspondence relating to your submission and the hearings:

✓ Email ☐ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.

✓ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?

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Thinking of Council's communication with residents in general, do you think the Council is doing better or worse than last year, or about the same?

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If on behalf of an organisation, please provide details:

Organisation:

Position:

Privacy Act 1993

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SOUTH RANGITIKEI SCHOOLS' PRINCIPALS CLUSTER INCORPORATED

May 2015

Issue 4: What Should We Do With Our Community Facilities?

The Southern Rangitikei Schools' Principals' Cluster is appreciative of the effort that the Rangitikei District Council, in particular Samantha Whitcombe, is putting into supporting learn to swim programmes for the students in our schools.

In the past our schools have received funding to support specific year groups of students learning to swim and to provide transport by bus to the SwimShed for those in outlying areas.

However, we have had a range of issues with equity across schools and within each school. Initial programmes only covered specific year groups, leaving other children with either a lesser programme or a high cost to the school and /or parents.

We believe it is imperative that students learn to swim at an early age, gaining confidence and skills to be safe and enjoy the water. Our children are privileged to have access to pools, rivers and beaches in our area. They need the necessary skills to be safe.
Research shows that most children cannot swim well enough to save themselves if they get in trouble in the water. This coupled with Water Safety NZ's goal of zero drownings, shows how vital it is to support our children to learn to swim.

Currently the maximum charge is $2.00 entry to the pool AND $6.00 for a 45 minute swimming lesson. We propose that in order to ensure all children in our community get the opportunity to learn to swim the Rangitikei District Council consider:

1. Providing FREE entry to the SwimShed for all South Rangitikei school children attending ANY school-based swimming lesson.
2. Reviewing the $6.00 Swim for All Programme charge, instead working on $3.25 per child per 45 minute swim lesson as indicated by a $65.00 hour / 8-12 students per group (average).
3. RDC continues to seek funding to support Swim for All Programme - up to 1000 students at $2.25 per student (average) - $22,500.00
4. Schools contribute $1.00 per student / swim lesson - $10,000.00
5. RDC continues to seek funding for buses to transport students to the SwimShed, ensuring equity of access - $15,000.00
6. Funding be sourced for the January - December year, as some schools swim in Term 1 and others in Term 4.
7. Each school be advised of allocated funding by November / December for the following year for budgeting purposes.

I appreciate your consideration of our submission and would be happy to talk to it at the scheduled meetings.

Yours sincerely

Brya Dixon

on behalf of The Southern Rangitikei Schools' Principals' Cluster Incorporated

4 May 2015

Andy Watson
Mayor
Rangitikei District Council
Private Bag 1102
Marton 4741

Dear Andy

Community Plan Submission – Tutaenui Stream Restoration Society

This submission follows recent discussions with representatives of the Tutaenui Stream community, community groups, council staff and Rangitikei District Councillors.

Background

The Tutaenui Stream is a water body in need of some care and attention. It provides our community with drinking water, carries flood flows to protect the Marton community, receives our town's waste and it is struggling in the light of these sorts of pressures.

Over this past 12 months a small group of residents have talked about the need to address some of the matters within our control, and perhaps draw our Marton community back to having some pride in their local stream.

We have worked up a concept for council consideration and seek council's endorsement and support for the first step through the current Community Plan process.

In essence, we propose the formation of a society that would take responsibility for managing the landscape in and around the Tutaenui Dams, and equally work with community agencies to enhance the Tutaenui Stream as far as Marton township, through fencing, riparian restoration and the provision of public access where there are willing landowners.

Ultimately the vision of the 'team' is a walking or cycling access in close proximity to Marton township, which culminates in access to the restored landscape in and around the Tutaenui Dams. It is easy looking through the lens of today, to have some difficulty imagining this outcome. Not so for the community in this part of the district. There is a practical and pragmatic group of people prepared to make their time, energy and equipment available over these next few years to make a real difference.

What we require from council is a partnership that makes a financial contribution to compliment the contribution of the community, support via the operations team for agreed projects and assistance with project management from your fantastic staff.

Over the next six to 12 months, it is our intention to fully engage with the community of interest for the project, and if council were mindful to support the project, we would have the Tutaenui Stream Restoration Society established and would be undertaking initial work in the vicinity of the dams to enhance the key values that are present.

We seek support from council to meet the goals described above, of $10,000 per annum as a contingency sum. This sum would be drawn down against an agreed project plan with the District Council over the next 12 months. It would cover expenses only, would not be utilised to cover the time of participants and critically, council would be able to see any expenditure it commits evidenced in physical enhancement of the upper Tutaenui catchment. It is our view that this community project and the works it undertakes using community support would offset existing financial commitments council has in the project area.

We look forward to presenting this project to the Rangitikei District Council team at its forthcoming hearings.

Kind regards

Greg Carlyon
Tutaenui Stream Restoration Society

RANGITIKEI COLLEGE

STRIVING TOWARDS HIGHER THINGS

AD ALTIORA

4 May 2015

Andy Watson
Mayor
Rangitikei District Council
Private Bag 1102
Marton 4741

Dear Andy

Community Plan Submission – Rangitikei College

Rangitikei College wishes to record its huge thanks for the ongoing support it receives from Rangitikei District Council, on an annual basis.

Whether by way of support from the annual scholarships, logistical support from the operations team, strategic support in various community forums, or the huge commitment of time from you to community events - our school benefits.

Rangitikei College and I am sure, the District Council, appreciate the critical role of a high performing college in the life of Marton township and the southern Rangitikei community. That is not possible without your ongoing support.

We would welcome an opportunity to briefly outline our successes over the past year, and the contribution Rangitikei District has played to that success, in order that your Councillor team might favourably consider ongoing support of the college in its current Community Plan process.

Kind regards

Greg Carlyon
Chair, Board of Trustees
Rangitikei College

20 BREDINS LINE, MARTON 4710, NEW ZEALAND • TELEPHONE +64 6 327 7024 • FAX +64 6 327 8287
EMAIL admin@rangitikeicollege.school.nz • WEBSITE www.rangitikeicollege.school.nz

Submission Form

* The 4 options supported agree with Bulls Community Committee Submissions

Issue 1

Should Council increase its investment in economic development?

- ☑ **Option 1 – Yes I support Council's proposal** of allocating $205,000 per year – funded 50% from general rates and 50% UAGC.
- ☐ **Option 2 – Do Nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Compromise** – I do not support Council's proposal, but I do support investing an additional annual provision of $100,000 for strategic research or $105,000 for local initiatives.

Other Comments:

Issue 2

Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?

- ☑ **Option 1 – Yes I support Council's proposal** to upgrade or build new civic/community centres in Bulls, Marton and Taihape with Council's capital contribution of $1.6M for Bulls, $1.64 for Marton and $1.78 for Taihape.
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- ☐ **Option 3 – Upgrade Bulls only** – I do not support Council's proposal, but I do support the upgrade for Bulls with Council's capital contribution of $1.6M.

Other Comments:

Issue 3

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- ☑ **Option 1 – Yes I support Council's proposal** to install on-site treatment facilities at Mangaweka, and maintain all other existing urban water and wastewater systems, at a cost of $1.768 million, in 2022/23.
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Other Comments:

Issue 4

What should we do with our community facilities?

A. Swimming pools

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- ☐ **Option 3 – Extend the swimming season at Taihape and Marton** – I do not support Council's proposal and support an extended swimming season at Taihape and Marton pools.

Other Comments:

There was not time to make an informed decision

B. Community housing

☐ **Option 1 – Yes I support Council's proposal** to invest $100,000 for the next three years to upgrade all housing units.

☐ **Option 2 – Status quo** – I do not support Council's proposal.

Other Comments:

C. Parks upgrades

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Other Comments:

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☑ **Option 1 – Yes I support Council's proposal** to increase the roading reserve to a maximum of $3.5M.

☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Submissions close at 12noon on Monday, 4 May 2015.

Submitter details (please print clearly):

Your name: Jo Rangooni

Email address: jorangooni@slingshot.co.nz

Preferred contact phone number: 06 322 1969

Your postal address: 5 Bull St

Town: Bulls

How would you prefer to receive correspondence relating to your submission and the hearings:

☑ Email ☐ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.

☑ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?

☐ Yes ☐ No

☐ Yes I could like to subscribe to Council's e-newslettter

Are you writing this submission as:

☐ an individual, or

☑ on behalf of an organisation

If on behalf of an organisation, please provide details:

Organisation: Bulls District Community Trust

Position: Chairperson

Privacy Act 1993

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Submission 2015
Rates Affordability

The Mayor wisely mentions this topic in his introduction.
Are we meant to accept continuous rises in spending, and therefore Rates?
Recently a large ratepayer and contributor to employment locally, commented that the first thing the Council has done in Bulls, is put in the Bridge St footpath.
With an aging and declining population, partnerships, which result in improved service, make sense. I notice the Council has some productive partnerships.
Any rate increase, impacts the people we have in our Community, who budgeting may or may not reach. Some of our families struggle to put food on the table for children. We also have older people who have regular cuts in discretionary income due to fixed costs rising.
It is great that council staff actively source outside funding for projects, where this is applicable. I notice they sometimes compete with charitable groups.
We need essentials, clean drinking water. Wastewater and storm water need to be treated so that our rivers stay alive.
Road costs are a problem. Roads need to be safe. How soon in the future will the way we use roads change? Do large land owners pay their share of rates? Do they get a disproportionate help from small ratepayers with roads, their water and their service towns,
If the Strategic Water investment results in more money into our District, how widely are the benefits shed across the people?
Rebates. How does Council know that everyone eligible claims?
Borrowing. Interest rates do not make good reading from 2016/17 onwards.
Rating policy I have always felt this looks so complicated that I worry that councillors and most Staff understand it.
Would the District fall to pieces of Rates were held for 3 years and we agreed to lower standards, services and salary /fee increases?

Leachate from the Bonny Glen Dump
If previous Decision makers have caused/allowed this to happen it is vital that we work to do something to improve the situation. Most of us have lived in a comparatively clean safe environment and it is unthinkable to pass on to future generations a polluted environment. A person suggested that maybe volunteers would/could have some involvement to improve the situation. The situation must be improved.

Josephine A. Rangooni
5 Bull St, Bulls ph 06 322 1969 jorangooni@slingshot.co.nz

Submission 2015
From Bulls and District Community Trust

Support for RDC funding of position: Bulls Community Development Manager

Bulls and District Community Trust encourage Rangitikei District council to continue funding this position.
The position works to encourage economic Development and investment in Property and Business. Information is provided and links made to help people. Data bases of business, organizations and volunteers are updated.
Use of Community assets is encouraged and feedback given to RDC where appropriate. Success stories and information are communicated through the Bull-It-Inn, and Bulls Facebook. A Website is managed.
Events are held which encourage access for all of the community to fun/cultural and a range, of experiences.
Close working relationship with Marton and Taihape ensure promotion of each other's projects, and careful use of resources. Volunteers are encouraged to participate in developing a lively community, which is attractive to families to live in.
Funding is sourced for Events, improving the attractiveness of the town, and encouraging community members to engage with each other, to develop social capital.
Emphasis on engaging youth has seen youth participation in place making projects. Relationships with youth are developing so that appropriate projects can be help to develop leadership and a youth voice.
Trustee time and resources add a considerable value to this project.
We request that the present level of funding is maintained.
This submission is supported by Bulls Community Committee.
Josephine Rangooni
Chairperson Bulls and District Community Trust
Ph 322 1969 jorangooni@slingshot.co.nz

Submission Form

Issue 1

Should Council increase its investment in economic development?

- ☐ **Option 1 – Yes I support Council's proposal** of allocating $205,000 per year – funded 50% from general rates and 50% UAGC.
- ☐ **Option 2 – Do Nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Compromise** – I do not support Council's proposal, but I do support investing an additional annual provision of $100,000 for strategic research or $105,000 for local initiatives.

Other Comments:

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Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?

- ☐ **Option 1 – Yes I support Council's proposal** to upgrade or build new civic/community centres in Bulls, Marton and Taihape with Council's capital contribution of $1.6M for Bulls, $1.64 for Marton and $1.78 for Taihape.
- ☐ **Option 2 – Do nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Upgrade Bulls only** – I do not support Council's proposal, but I do support the upgrade for Bulls with Council's capital contribution of $1.6M.

Other Comments:

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities

- ☐ **Option 1 – Yes I support Council's proposal** to install on-site treatment facilities at Mangaweka, and maintain all other existing urban water and wastewater systems, at a cost of $1.768 million, in 2022/23.
- ☑ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Detailed objections as in attachment.

Issue 4

What should we do with our community facilities?

A. Swimming pools

- ☑ **Option 1 – Yes I support Council's proposal** to maintain the status quo at Taihape, Hunterville and Marton pools.
- ☐ **Option 2 – Reduce the swimming season at Taihape and Marton** – I do not support Council's proposal and support a reduced swimming season at Taihape and Marton pools.
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Other Comments:

B. Community housing

☐ **Option 1 – Yes I support Council's proposal** to invest $100,000 for the next three years to upgrade all housing units.

☐ **Option 2 – Status quo** – I do not support Council's proposal.

Other Comments:

C. Parks upgrades

☐ **Option 1 – Yes I support Council's proposal** to rely on community donated labour and materials for improving our parks.

☐ **Option 2 – Council funded provision** – I do not support Council's proposal and support Council including an annual $50,000 provision to upgrade facilities and equipment at our parks.

Other Comments:

Issue 5

Should we increase rates to build a larger Roading Reserve Fund?

☐ **Option 1 – Yes I support Council's proposal** to increase the roading reserve to a maximum of $3.5M.

☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Submissions close at 12noon on Monday, 4 May 2015.

Submitter details (please print clearly):

Your name: Maree Bannigan

Email address: mareebrannigan@gmail.com

Preferred contact phone number: 021-311-558

Your postal address: P.O Box 75

Town: Mangawelca.

How would you prefer to receive correspondence relating to your submission and the hearings:

☑ Email ☐ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.

☑ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?

☑ Yes ☐ No

☐ Yes I would like to subscribe to Council's e-newsletter

Are you writing this submission as:

☑ an individual, or

☐ on behalf of an organisation

If on behalf of an organisation, please provide details:

Organisation:

Position:

Privacy Act 1993

Please note that submissions are public information. The content on this form including your personal information and submission will be made available to the media and public as part of the decision making process. Your submission will only be used for the purpose of the long term plan process. The information will be held by the Rangitikei District Council, 46 High Street, Marton. You have the right to access the information and request its correction.

Submission: Rangitikei District Council Long Term Plan 2015-202S

Delivered by hand Marton RDC Office
Monday 4 May before midday

Dear Mayor Andy Watson and Rangitikei Councillors

This submission is made in specific response to ISSUE 3: Replacing reticulated and waste water schemes for smaller communities as described in the Consultation Document and in particular is a submission AGAINST the Council's preferred option 1 – the installation of on-site treatment facilities at Mangaweka and therefore, by default of the options presented IN FAVOUR of option 2 wait and see.

This document outlines the numerous factors which lead to my opposition to this proposal for closure of a fundamental service for our community. They are explored in depth and can be summarised as:

1. Questionable reasoning and rationale for preferential status of option 1
2. Apparent lack of due diligence and genuine exploration of options, including feasibility of proposed option
3. Insufficient information on which to engage in consultation and decision making
4. Inconsistencies in plan and other documentation
5. Deficit approach to community development
6. Negative impacts

1. Questionable Reasoning and Rationale
In both the Consultation Document, the draft Long Term Plan and stated at the Mangaweka Community meeting 13 April, the main reasons stated for this proposal to close the Mangaweka WWTP are:

a. Declining population
b. Tighter resource consents
c. Higher compliance costs

Whilst it is certain we are facing a population decline, both across the RDC region and in Mangaweka, I am unsure how this will affect the rate payer base. Less people living in their properties does not equate to less rates. Loss of services such as this may force me to leave the district to seek better standards of living, but unfortunately I will not be able to merely leave my obligations to pay rates on my property as I leave the district. Conversely, less people living in their connected, rateable properties will put less load on the communal system, which may in fact have a positive consequence on the achievement of the future consent.

Secondly, the notion that in ten years time 'conditions for the new consent are likely to require higher levels of treatment" as a basis for decision making now seems somewhat crystal ball gazing-ish. When specifically asked about this at the town meeting, the response was that Council can't be sure of consent status and needs to flag this as a potential issue. The clear statement of the preferred option to decommission the WWTP and implement alternative on-site options *prior* to consent expiry is neither 'flagging a possible issue' nor allowing for the possibility of the next consent being achieved within the newly refurbished, currently compliant system.

Finally, the statement of higher compliance costs is unsupported with any specific financial considerations of status quo and projected future scenarios. Again, on questioning at the town meeting, it appeared there has not been any financial modelling to back up this reason to decommission the WWTP.

2. Due Diligence

The preferred option is a significant change and a loss of one of the very few Council supported services delivered specifically to the ratepayers of Mangaweka. With such a radical option as the Council preferred choice, a fair expectation would be that Council staff would have conducted due diligence to consider a range of options, to enable Council to make an informed decision to both recommend to the region and label as 'preferred'.

This does not seem to be the case and from the brief amount of research I have undertaken it would appear not only is the preferred option objectionable on a number of levels, but more fundamentally it may not even be possible.

I would urge the Council to review the Horizons regulations in this regard and specifically point out that under current guidelines from the Manual for On-site Wastewater Design and Management 2010, it would appear a densely filled residential area as Mangaweka township would present insurmountable problems with regards to requirements for boundaries and land area use and land in reserve before any consideration is even given to such things as soil and groundwater. The regulations have become more stringent for cumulative environmental effects and Horizons clearly states:

> *" The risks from cumulative environment effects need to be considered when there is more than one system per 5,000 m2 of land area."*

This is clearly the case for 63 connections within the town boundaries of Mangaweka and I can not see how any series of on-site systems could achieve consent requirements to be installed. Our situation would certainly appear to fall outside of the standard site installation and as such would have to be considered under discharges that are not in accordance with the Manual for On-site Wastewater Systems Design and Management (Horizons Regional Council 2010), which states:

> *the Regional Council must make decisions on resource consent applications, and set consent conditions for on-site discharges of domestic wastewater to ensure that:*
>
> *(a) the site is suitable for the intended on-site wastewater management system,*
>
> *(b) the discharge does not result in actual or potential contamination of:*
>
> *(i) groundwater at any point of abstraction utilised for irrigation, stock or domestic drinking water.*
>
> *(ii) surface water bodies,*
>
> *(iii) stormwater drains,*
>
> *(iv) artificial watercourses, or*
>
> *(v) neighbouring properties,*
>
> *(c) the discharge does not constitute a public health threat,*
>
> *(d) the discharge does not cause any offensive or objectionable odour beyond the property boundary, and*
>
> *(e) a sufficient area of land is set aside as a reserve disposal area*

I submit it is both remiss and negligent of Council to put forward an option into the 10 year plan, without at very least a feasibility study to assure residents it is possible, let alone preferable.

Further to this, I believe labelling in the consultation document of option 1 as Council's Preferred option, is misleading and misrepresentative, the implication in this language being that Council has considered a range of options and presents this as their preferential selection. When challenged to address this point at the Mangaweka town meeting, the response from the Mayor was to suggest that "perhaps the language we have used is a bit harsh" but there is a requirement for Council to state preferred options. Surely the point of making statements around preferences is to have undertaken due diligence and explored a range of options, considered them against relevant criteria, their feasibility and alignment with local priorities and then making an informed recommendation to the constituents. There is no evidence that any such investigation has been done.

3. Insufficient Detail

I have already discussed the lack of genuine investigation and/or disclosure of pertinent facts leading to the preferred option being tabled.

Of even more concern is the lack of depth behind the $1.768 million dollar expenditure that is budgeted to be spent to implement the on-site systems. Firstly, I have been unable to access any breakdown of this figure. At the town meeting when specifically asked if the intention was this would be managed as a grant to current property owners or handled as a loan to be recovered through rating, both the Mayor and CEO were unprepared to provide a certain answer, mentioning they hadn't thought that far ahead. Surely, even being included in the draft plan, one should fairly expect something as fundamental as to whether this expenditure was a grant or a loan would be planned.

Further, the figure of $1.768 million is apparently indicative, with the suggestion significant savings could be made, with a starred indication:

> *"5 this is based on installing septic tanks. Composting toilets would be around half that cost."*

This is misleading at best, Horizons make it very clear that this suggestion is unfounded:

> *"Wherever a composting system is installed it will still be necessary to install a greywater treatment and land application system. The greywater system to be designed in accordance with a domestic system using the per capita flows allowance..." pg40 Horizons Manual for On-site Wastewater Systems Design and Management 2010*

A further concern is whether RDC has given any consideration into the expectation of Central Government in terms of expenditure and funding of the preferred option, should this make it into the plan. Would ratepayer monies be expected to pay for capital works to central government assets (School, Fire Station, Dept of Conservation premise) and other community owned assets (Playcentre, Plunket rooms (housing Mangaweka Library), Churches. If the expectation is these would be self funding, we may well be faced with the loss of these functioning assets and their invaluable contribution to the wellbeing of our local Mangaweka, and wider Rangitikei, communities.

4. Inconsistency

On reading widely into associated documentation, the inconsistencies inherent in Council's proposal and approach to Mangaweka's wastewater become increasingly obvious and contradictory. To illustrate, from Council's "Asset Management Plan 3 Waters 2014", the provision of stormwater is clearly articulated beyond a simple infrastructure water management function: Quote page 41 (my highlight):

> *The key drivers of the levels of service for stormwater are community outcomes. The activity contributes equally to the treasured natural environment, buoyant economy and enjoying life in the Rangitikei.*
> *In line with Council's strategic priorities, the provision of this activity provides the basic infrastructure which enables the District to attract and retain people and businesses.*

It is curious and genuinely inconsistent, that Council does not afford sewage and grey water management a similarly significant role in the areas of community outcomes and buoyant economies which retain people and businesses. I suggest that council should afford this essential infrastructure a similar role in community outcomes as the stated ones for stormwater. This then clearly would not align with Council's preferred option to close the communal WWTP.

Another example of inconsistency rife in this approach arose at the Town meeting with the Mayor's assertion that as technology advances so quickly, in the indicated time period there may be huge advances in on-site WWTP such that we can not anticipate. It is interesting to note these advances were presented only as a positive step for on-site solutions, when actually they are just as applicable to the communal system and could certainly be part of a positive solution for keeping our town's WWTP efficient and effective.

5. Deficit approach to community development

The underlying driver of this option and indeed much of the subtext of the entire LTP is that small communities are just going to have to face the loss of all collective services available to them directly, yet continue to contribute to shared services for others, simply by virtue of the almost single minded focus on population and population loss ie big supported by small as opposed to small supported by big. This deficit approach will not achieve anything except encourage even more population loss from small settlements.

This is unsettling for a number of reasons, as a region, we can readily be considered as 'small' in our entirety – every town in the Rangitikei is essentially small town rural NZ and I challenge our Council to be more focused on active development of our entire community – it is possible for Council to play an active role, in the regeneration of our whole region, including small settlements and not simply 'pick winners' based on population size. This is not dictated by funding provision, but is certainly doomed if base services are withdrawn. Mangaweka for example showed an 9% increase in business locations in the 2013 census – why not select that figure as the statistic to base decisions on, rather than the population decline, and ensure services are sufficient to continue this growth area.

Central Government has recently shown its commitment to Mangaweka specifically with substantial capital upgrades to:

a. Our local primary school, with an estimated $500,000 spend on brand new office and toilet blocks
b. Playcentre building, new build currently underway, funded through local fundraising efforts and grants, with upgrade to toilet facilities a key reason for this development
c. Fire brigade building upgrade and substantial work on sealed areas and driveway

The implications of flow on effects if the on-site proposal is passed into the LTP is most concerning when considered against this background of recent investment in development of these facilities based on expectations of the current services. Whilst I would not like to make any assumptions about likely scenarios for these organisations if option 1 is actioned, I would urge Council to take careful consideration of the potential impact this recent expenditure and commitment shown in our small town.

6. Negative Impacts

It is difficult to identify any benefit from this proposal at all that can even begin to balance the immediate as well as long term, extensive and irreversible negative impacts of the preferred option should it make it into the plan, and worse, be implemented (were that even possible).

Timing and development: It is absolutely immoral to include this 'option' in a ten year plan with its significant impact on all aspects of property values, sales and renovations. The likely immediate flow on impact will be no new development on existing properties at all during the 'unknown' period leading to a decisive action plan being implemented, leading to even further collapse of local property market. It would be fundamentally hypocritical for RDC to issue any building consents in existing properties for work which council is knowingly targeting for disconnection at some nearing future point.

Negative impact on economic activity; with such uncertain 'planning' and clear lack of commitment to local infrastructure, there is little to invite, retain and grow business activity for existing and potential enterprise.

This proposal flies in the face of community wellbeing and I believe seriously contravenes the social contract we have with each other across the RDC. I urge council to reconsider the impact of this option both in terms of the issues specific to decommissioning the Mangaweka WWTP itself presenting as an implausible, ill-conceived idea with little to recommend itself and also as part of a wider context, which does not positively contribute to the quadruple bottom line, failing to provide benefit to fiscal management and economic growth, and neither contributing to environmental sustainability, community vitality or social equity.

I urge each and every Councillor to ensure this option is removed from the longterm plan.

Yours sincerely

Maree Brannigan

25 & 27 Broadway,
Mangaweka
021-311-558

mareebrannigan@gmail.com

Rangitikei DISTRICT COUNCIL

Submission Form

Issue 1

Should Council increase its investment in economic development?

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Other Comments:

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- ☑ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Opposition to Option 1 as detailed in attached letter & supported by 62 signatories.

Issue 4

What should we do with our community facilities?

A. Swimming pools

- ☐ **Option 1 – Yes I support Council's proposal** to maintain the status quo at Taihape, Hunterville and Marton pools.
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Other Comments:

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Submitter details (please print clearly):

Your name: Maree Brannigan

Email address: mareebrannigan@gmail.com

Preferred contact phone number: 021-311-558

Your postal address: PO Box 75

Town: Mangaweka.

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☑ Email ☐ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.

☑ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?

☑ Yes ☐ No

☐ Yes I would like to subscribe to Council's e-newsletter

Are you writing this submission as:

☐ an individual, or

☑ on behalf of an organisation

If on behalf of an organisation, please provide details:

Organisation: Mangaweka Town meeting & friends opposed to option 1"

Position: organiser.

Privacy Act 1993

Please note that submissions are public information. The content on this form including your personal information and submission will be made available to the media and public as part of the decision making process. Your submission will only be used for the purpose of the long term plan process. The information will be held by the Rangitikei District Council, 46 High Street, Marton. You have the right to access the information and request its correction.

13 April 2015

Collective Notice to Mayor Andy Watson and Rangitikei District Council re What's the Plan Rangitikei...?

This notice is to raise issues that are significant and in response to the Council's specific proposal as per point 3. Replacing reticulated water and wastewater scheme for smaller communities *(Reference "What's the Plan Rangitikei..? Consultation Document of the Proposed Long Term Plan.")*

The points raised below are both specific to the proposal regarding the replacement of Mangweka's Waste Water Treatment plant in the consultation document and are also stimulated by a wider point of view about implications of this proposal in the broader context of the entire LTP.

"One of the implications of declining populations, higher compliance costs and tighter resource consent conditions is the potential shrinkage of reticulated water and wastewater systems in smaller settlements" *(Reference page 12 "What's the Plan Rangitikei..? Consultation Document of the Proposed Long Term Plan.")*

1. Declining Population

The litany of 'declining and aging population' is referred to frequently and extensively throughout the consultation document. In the circumstance of the wastewater system in Mangaweka, referencing declining population as rationale for the council's preference to decommission is either misinformed or disingenuous:

- 63 connected properties will remain as rateable properties regardless of occupation (and actual use of the service)
- Fewer occupied properties, whilst continuing to contribute at current levels to operational costs through rates remission, will reduce loading on wastewater system.

2. Higher Compliance costs and resource consent conditions

The current Mangaweka system is meeting 100% of consent compliance. There are existing Rangitikei WWTP not achieving current compliance requirements and the threat of tighter consents and increased compliance costs will likely have a more significant impact on those systems and our region's ratepayers.

It is questionable that the proposed alternative (preferred option from Council) would be able to meet consent requirements either, or indeed even be feasible or possible. Without specific exploration of feasibility and *a range of options* explored, it does not seem appropriate for the council to present a preferred option as such.

3. Financial reporting

There is insufficient financial detail in the proposal to invite informed consultation from the district and due diligence does not appear to have been met when alternative options are at best only mentioned in passing for example; "composting toilets would be around half that cost" or not presented at all, for example the option of upgrading the current communal system to meet likely compliance requirements is not presented as an option.

4. Regional and local Economic Development

An underpinning issue is RDC's apparent approach to systemically marginalising small communities in the RDC region, taking a deficit approach to development. Mangaweka has achieved a 9% increase in business locations since the last census, and this in difficult times, and we encourage RDC to take a multi-dimensional view to economic development in the district, with due recognition of the essential impacts of infrastructure on this actual and potential growth.

On the basis of these points, and reflecting the will of many in our community and our expectation of the social contract we have with RDC, we strongly urge Council to retract the option of decommissioning the current wastewater reticulation system at Mangaweka from the consultation document and the long term plan, or AT VERY LEAST retract the *preferred* option status from the consultation document.

We urge Council to reconsider the impact of both this specific proposal and the general approach of the draft LTP, in terms of the quadruple bottom line, with a broadened multi dimensional view of fiscal management and economic development, as well as equal weight placed on environmental sustainability, community vitality and social equity.

Signatories:

Maree Brannigan
Resident 25 & 27 Broadway
Mangaweka

Drew Ferry
Resident 25 & 27 Broadway
Mangaweka

Signatories to:

Collective Notice to Mayor Andy Watson and Rangitikei District Council re What's the Plan Rangitikei...? As presented to Council presentation, Mangaweka Town Hall 13 April 2015

Name (print)	Address	Signature
Mangaweka Plunket	Broadway Mangaweka	
Mangaweka playcentre	Broadway Mangaweka	
Warwick. J. Reardon.	6 Bank St Mangaweka.	
Raewyn Wallace	4 Bank St Mangaweka	
Julie Oliver	11 Koraenui St Mangaweka	
Cathy Satherley	16 Cage Rd Mangaweka	
Joanne Leggett	SH1 Mangaweka	
Jemma Kerley	Te Kapua Rd	

Signatories to:

Collective Notice to Mayor Andy Watson and Rangitikei District Council re What's the Plan Rangitikei...? As presented to Council presentation, Mangaweka Town Hall 13 April 2015

Name (print)	Address	Signature
G.O.CARTER	23 Broadway	
Alicia Carter	23 Broadway	
Alison Dorrica	2 Bank Street	
Viv EAMES.	MAIN ROAD MANGAWEKA	
John Eames	"	
Todd Chapman	6 Tekapua Rd Mangaweka	
Annette Lane	Soldiers Rd Mangaweka	
TUi Pitt	Broadway Mangaweka	

Signatories to:

Collective Notice to Mayor Andy Watson and Rangitikei District Council re What's the Plan Rangitikei...? As presented to Council presentation, Mangaweka Town Hall 13 April 2015

Name (print)	Address	Signature
M.J. LOUGHNAN	P.O. Box 98 MANGAWEKA	
LORAINE GOLDFINCH	12 KORAENUI ST 10 KORAENUI ST	
WAYNE TRAVIS	12 KORAENUI ST	
ROD McLaggie	KORAENUI ST	
RACHEL DEAN.	15 KORAENUI ST	
JOCELYN GRIFFITHS	21 BROADWAY	
Gaile Bilton	17 Broadway Mangaweka	
DAVID GRIFFITHS	21 BROADWAY Mangaweka	

Signatories to:

Collective Notice to Mayor Andy Watson and Rangitikei District Council re What's the Plan Rangitikei...? As presented to Council presentation, Mangaweka Town Hall 13 April 2015

Name (print)	Address	Signature
Michelle Reardon	6 Bank Street Mangaweka	
Paul Connor	8 Bank street Mangaweka	
Jo Rix	8 Bank St Mangaweka	
Begno Aussell	te kapua Rd	
Cal Peacock	KAWA KAWA ST Mangaweka	
ROY LUNDON	18 BROADWAY MANGAWEKA	
Fred Fallen	SH1 Mangaweka	
Borrie Short Mangaweka		B. J Short

Signatories to:

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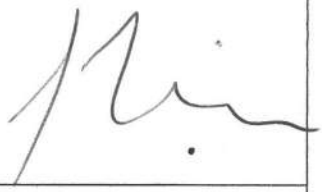
Name (print)	Address	Signature
LYNNE MATSON	68 CAGE RD. MANGAWEKA	
Jack Beveridge	2 Broadway Mangaweka	
Ange Corbett	10 Bank St Mangaweka,	
Emma O'Connell	9 Kovaenui St Mangaweka	
Kali Mansell	536 Te Kapua Road Mangaweka.	
Sarah White	192 Terrace Rd Mangaweka.	
Bridget King	525 Te Kapua Rd RD7 Mangaweka	
Bronwyn Robbs	396 Mangarere Rd RD7 Mangaweka	

Signatories to:

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Name (print)	Address	Signature
Alan Webster	6371 Mangawhararikiki Rd Mangaweka.	
Ashley Brien	4 Kawakawa St Mangaweka	
Natalie Townsend	Main Road South Mangaweka	
Irene D. LODER Dip. teng. B.A.	13 Broadway mangaweka	
TRISH PEACOCK 6 Koraenui.	6 KORAENUI ST MANGAWEKA	
Carla Tritt & Joe Wilson	2 Broadway and Kawakawa St. Mangaweka	
Manaka Cant Aidan Rogers	1 Weka Street Mangaweka	
Judy Townsend.	50 Cage Rd. Mangaweka	J Townsend.

Signatories to:

Collective Notice to Mayor Andy Watson and Rangitikei District Council re What's the Plan Rangitikei...? As presented to Council presentation, Mangaweka Town Hall 13 April 2015

Name (print)	Address	Signature
REX NOBLE	MANGAWEKA	RN.
K Reardon	24 BROADWAY. Mangaweka	KKR
N. Rae	1 Raumaewa Rd Mangaweka	N. Rae.
G. Sprochotb	PIO BOX 19 MANGAWEKA	
GARY JOHNS	30 KAKA RD, TAIHAPE	
MANGAWEKA ASSEMBLY of God CHURCH.	BOX 38 MANGAWEKA	
R. G. Collins	BOX 38 MANGAWEKA	
C. Reardon.	572, Wellington Rd. Mtn.	

Marton Community Committee - 2015 Long Term Plan Submission

Issue 1
Should Council increase its investment in economic development?
We support the option of $105,000 for local initiatives.

In addition we recommend the employment of an Economic Development Officer:
- Someone who could provide advice to new/potential businesses
- Be a point of contact regarding requirements for new business start-ups.
- Actively advertise "Reasons businesses should to move to Rangitikei".
- Actively promote facilities for events be they commercial, retail, industrial or community. Focussing on the provision of facilities not the organising of the event.

Issue 2
Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?
We support the plans to improve the Town Centres in the order of Bulls, Marton then Taihape at the rates specified.

Issue 3
Replacing reticulated water and wastewater schemes for smaller communities.
We prefer Option 2 to "Wait and See", we feel the recommendations of affected Mangaweka properties should guide the final decision.

Issue 4
What should we do with our community facilities?
A. Swimming pools
We are in favour of the proposal to maintain the status quo at Taihape, Hunterville and Marton pools. However, we recommend opening hours could be adjusted or extended to capture the school and public holidays (eg Easter) before and after the normal opening periods.

B. Community housing
We support Council's proposal to invest $100,000 for the next three years to upgrade all housing units.

C. Parks upgrades
We recommend a mixture of Options 1 and 2 - have a provision to match community (or externally) raised funds, up to a total annual limit of $50,000.

D. Youth Services
Please see the attached document regarding funding for Youth Services.

E. IT Hub
We recommend the IT Hubs/Centres are retained.

F. Toilets
The Toilets in High Street - we recommend the inside is upgraded to a more colourful finish.
We recommend the provision of toilets at Centennial Park.

Issue 5

Should we increase rates to build a larger Roading Reserve Fund?

The Committee recommend the fund should be a minimum of $3.5m.
We do not agree with rushing to achieve the $3.5m suggested, we are in favour of a more conservative approach, to this end, it is also recommend that some form of layering insurance(s) is taken out to provide cover between the current level up to (if not beyond) the targeted amount of $3.5m.

Submissions close at 12noon on Monday, 4 May 2015.
Submitter details: ..... Marton Community Committee
Your name:..... Carolyn Bates
Email address: ..... martoncc.cab@gmail.com
Preferred contact phone number: ..... (06) 327-8088
Your postal address:..... 7 Dalrymple Place
Town: ..... Marton

How would you prefer to receive correspondence relating to your submission and the hearings:
By Email.

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.
Yes Ann George and Nathan Kane will talk to this Submission.
If you email me, I will pass details to them.

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?
Assuming there will be an opportunity to present in Marton, it is unlikely this service will be required.

Are you writing this submission as:.....on behalf of an organisation

If on behalf of an organisation, please provide details:
Organisation:.....Marton Community Committee
Position:.....Secretary

Privacy Act 1993 – Please note that submissions are public information. The content on this form including your personal information and submission will be made available to the media and public as part of the decision making process. Your submission will only be used for the purpose of the long term plan process. The information will be held by the Rangitikei District Council, 46 High Street, Marton. You have the right to access the information and request its correction.

Attachment to:
Marton Community Committee - 2015 Long Term Plan Submission

SUBJECT: **Future funding for Youth in Rangitikei**

TO: RDC

FROM: Marton Community Committee

DATE: 29TH April 2015

1 Background

1.1 The Marton Youth Club (MYC) was established in 2011 at the (Centennial Park) Shelton Pavilion.

1.2 In 2012 this service was then delivered from the 'Centennial Park Marton Bowling Club' as larger facilities were needed to cater for the growth in numbers attending. It was also pertinent that more secure and stable premises were made available to increase the activities and equipment offered to youth and to alleviate the need to 'pack down' daily due to the pavilion being a multi-used facility.

1.3 The focus was to create a safe environment where it kept youth entertained, engaged and learn key life skills. (Manners, respect, positivity, team work, leadership and communication skills etc).

1.4 Initially there was a particular focus on high school-age young people, supporting their educational and employment goals. Currently the age range is open to include primary school age students as well.

1.5 The use of the facility has been made available to other community groups and will continue to do so.

2 Current situation – future funding

2.1 It is estimated that the annual cost to continue these services is approx. $36,000. In addition, Council has been providing in-kind support which covers the venue, power, internet and phone costs.

2.2 Funding has previously been secured through Mayors Taskforce for Jobs and currently Ministry of Youth Development. These funding options are available on application but not guaranteed to provide sustainability of this service for our local youth.

3 Considerations

3.1 That the 'facilitator' of MYC, Marton Community Committee and other support networks collectively combine efforts and resources to create sustainability.

3.2 Future plans for MYC is to develop a Youth One Stop Shop.

4 Recommendations

4.1 That Council looks to support the continuation of the Marton Youth Club by way of committing an annual budget allocation of $36,000.

4.2 That Council continue to provide in-kind support to cover the annual costs associated with venue, power, phone and internet costs.

Anne George
Chairperson
Marton Community Committee

Nathan Kane
Marton Community Committee Member

RDC 2015 LTP Submission - Carolyn Bates

Issue 1

Should Council increase its investment in economic development?

- I recommend the portion of option 3 regarding $105,000 to be used on local initiatives
- I recommend the employment of an Economic Development Officer, who would:
  - Advertise (at least within New Zealand) "reasons to move to Rangitikei" and actively promote the District via international tourism and immigration channels.
  - Be a dedicated person to provide advice to potential business owners as well as provide advice to new businesses in the district.
  - Actively promote facilities for events, be they commercial, retail, industrial or community - focussing on the provision of facilities, not the organising of the event.
  - Work with current organisations to help build complementary relationships aimed at expanding employment opportunities in the District.

Issue 2

Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?

In principal I am in favour of the proposals to improve Bulls, Marton and Taihape with capital contribution of $1.6m for Bulls, $1.64m for Marton and $1.78m for Taihape.

- I recommend the upgrade to Bulls in the form of a new civic complex is given priority over Marton and Taihape.
- I believe the Marton and Taihape Town Centre Plans do not accurately reflect the views of the respective communities. I recommend that prior to the next review of the LTP, independent input is obtained from the respective residents which is then actioned.
- While the views of residents are obtained, towns should benefit from a clean/tidy-up in the form of painting (using elegant/paler - not overly strong/gawdy colours).

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities.

- I feel returning to septic tanks and tanked water is a backwards step for residents.
- I recommend carrying out the preferences of residents in the affected areas.

Issue 4

What should we do with our community facilities?

A. Swimming Pools

- I am not a regular user of the swimming pools, but am aware this facility is useful to many residents and visitors. I believe all pools should have roofs and, in an ideal world would be open all year round, but acknowledge this possibly, is not, economically viable.
- I recommend that each respective pool should be open to cover school and public holidays at the start/end of their opening periods.

B. Community Housing

- I support the proposal to invest $100,000 for the next three years to upgrade all housing units.
- I recommend any improvements are offset by the payment of higher rents.

C. Parks

- I recommend a funding option with a provision to supplement community (or externally) raised funds, contributing 40-60% of community raised funds to a total annual limit of say $50,000.
- I recommend the provision of children's play equipment at all parks in the district.
- The portion of Wilson Park adjoining Nga Tawa Road - this could be sold off for housing, while keeping an access route to allow vehicular access onto the park (not necessarily from Nga Tawa Road).
-

D. Libraries

- I recommend the continued provision of libraries in the District.

E. IT Hub

- I recommend the continued provision of IT Hubs/Centres in the District.

F. Youth Services

- I recommend the continued provision of Youth Services in the District.

Issue 5

Should we increase rates to build a larger Roading Reserve Fund?

- No.
  - I recommend the roading fund is built up to a minimum of $3.5m.
  - I do not agree with rushing to achieve the $3.5m, I am in favour of a more conservative approach - to this end, I also recommend utilising layering insurance(s) to provide cover between the current level up to (if not beyond) the targeted amount of $3.5m.

Additional Recommendations

These are provided in no particular order, I am simply sharing my views

Supporting Local Businesses

- As part of RDCs funding of entities and activities in the District, there should be a requirement for events which attract suppliers eg Market Day / Harvest Fair / Schmemozzle:
  - Incentives should be provided for Rangitikei entities eg discounted charges for stalls and/or services.

Community Project Officer

- I recommend a permanent person who would co-ordinate volunteer group/volunteer(s) to achieve central management of local community projects. I see that there are numerous groups in various locations who (I believe) would be more productive if there was one person who could be called upon to liaise between all groups. The person could have specific days where they were in specific locations eg a day in Taihape, a day in Marton thereby enabling local residents to meet face to face.

Promotion of the District

- I recommend active promotion of Rangitikei - not featured on websites eg NZPost / Trade Me.
-

Funding

- I recommend that applications are continued to be sought for External Funding.

Minimise Debt

- I do not agree that debt is a good way to fund activities, I recommend a conservative approach of saving up for something - the cost overall will be reduced for rate payers by way of no/limited interested charges on borrowing.

Pedestrian Crossings

- I recommend the provision of crossings outside (or close by) all schools, kindergartens and child-care centres, parks and playgrounds.

Animal Control

- Dog Licensing - The cost of Dog Services should be totally met by dog owners. Further, if penalty costs are increased that would (hopefully) act to deter less responsible owners.

Toilets

- Toilets in High Street, I recommend the inside is renovated/updated eg using colourful tiles.
- I recommend the provision of public toilets at all parks - at Centennial Park and other similar locations, specifically the toilets are available when groups use the parks.

Submissions close at 12noon on Monday, 4 May 2015.
Submitter details:
Your name:.....Carolyn Bates
Email address:.....a-cbates@paradise.net.nz
Preferred contact phone number:....(06) 327-8088
Your postal address:.....7 Dalrymple Place
Town: .....Marton

How would you prefer to receive correspondence relating to your submission and the hearings:
By Email.

Would you like to speak to your submission at the hearings being held on 7 and 8 May?
These will be held in Marton and potentially in Taihape, if required. Yes, Marton is preferred.

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged? No

Thinking of Council's communication with residents in general, do you think the Council is doing better or worse than last year, or about the same?
About the same

- The newsletter is informative and helpful being on-line as well as hard copies being available.
- More could be done to promote activities eg Posters re what is being consulted on.
- The website does not always have new items at the top of the front page.
- There does not appear to be any official input onto the various Marton facebook pages to counter incorrect views/statements of the members.

Are you writing this submission as: an individual

16 Milne St
Marton.
1st May 2015

Submission to Draft Long Term Plan 2015.

I am one of a number of ratepayers who have submitted on the unfairness of the rural subsidy of urban water supplies which has been a part of the rating policy of the Council for the past three years. A few minor tweakings have been made over this period, but the basic unsatisfactory policy remains. Last year we were told that any significant changes to the rating policy could be made only within the context of changes to the long term plan, so this is the time for such a decision.

Earlier this year, during the stress of the dry weather, when rural people were under stress for water supply, one ratepayer made a publicity protest, which I'm sure councillors remember. The Mayor's response at that time was that he felt the "public good component of the rating system for water supply was now pretty well accepted" I strongly challenge that assumption. There may well be an impression that, because there is not now so much discussion about it, people have accepted it. It is more likely to be that people realise that the Council remains unwilling to front up to the unfairness of the policy and make the necessary changes, so they have given up on trying to seek a change. That would be a most unsatisfactory situation.

The fact remains that rural ratepayers, with no connection to an urban supply, either for good water or waste water, are being required to contribute towards the cost of maintaining those urban supplies. Those rural ratepayers have, in addition, to cover the cost of their own supplies, both capital and ongoing maintenance. This is totally unfair and should not be allowed to continue.

The cost of water rates is undoubtedly a large component of the urban ratepayer's rates bill, and it is understandable that the Council is concerned to keep this as low as possible, but the answer is not to shift a significant portion of this over to rural ratepayers. One could be excused for wondering whether the Council's thinking is that many rural ratepayers are paying so much in rates anyway, because of the value of their properties, that a few more hundred dollars is neither here nor there, and may well not be noticed much. A hundred dollars is still a hundred dollars, whatever percentage that may be of the total rates bill.

In my submission last year, I sought to find out the comparison in the incidence of rating increases for rural and urban ratepayers over a ten year time frame, by going back over the properties listed in the examples of the incidence of rating in the draft annual plan, for the ten year period. In spite of an additional request to a senior staff member, and the C.E.O, this was unavailable. Those figures must be available within the system, and should be made available publicly, so that the public can see how fair, or otherwise, the rating policy is. There have been other significant changes to the rating policy over recent years, particularly the removal of the differential in the roading rate between the northern and southern areas of the district, which are likely to have had an adverse effect on ratepayers in the rural south of the district. I hope the Council will agree to make these figures available, without the need to resort to more arbitrary measures.

In the absence of official figures, I have done a survey of a few, hopefully representative properties, (attached), which show a high comparative level of rate increases, which do nothing to alleviate my concerns. Only a proper assessment from the Council will give us the true picture.

Please address the concerns of this submission, third time lucky!, and please also address my request for a ten year summary of rates increases across all types of properties across the district, so that a full understanding of the long term trends can be assessed.

I would like to speak to this submission.

Jim Howard.

RANDOM SELECTION OF SOUTHERN RURAL RATE INCREASES.

Location.	Rates 2008-9.	Rates 2014-5.	Increase.	Avge Annual % Inc.
Sth Makirikiri.	3746	5374	1628	7.24
Tutaenui Rd.	3041	3934	893	4.89
Fern Flats	2260	3035	775	5.7
Greatford.	20826	23169	2343	1.9

CC

SUBMISSION TO RANGITIKEI DISTRICT COUNCIL LONG TERM PLAN.
From RANGITIKEI ENVIRONMENT GROUP.

The Rangitikei Environment Group (R.E.G.) welcomes the renewed participation of the Rangitikei District Council, following our submission to last year's Annual Plan, in REG's ongoing work to control Old Man's Beard,(O.M.B.) and other weeds, in R.D.C. lands, especially Reserves and roadsides. We would like to formalise this continuing co-operation through commitments in the Long Term Plan currently being developed.

The areas of funding assistance identified in last year's submission were;

- Roadside weed spraying.
- Track maintenance in Reserves.
- Signage and Community Education.

Roadside Weed Spraying. R.D.C. agreed last year to include Old Man's Beard in the schedule of weeds to be controlled within it's M.O.U.with Horizons Regional Council for roadside weed control. They commissioned their weed-spraying contractor to do this work, but for a number of reasons the result was not satisfactory. Discussions between staff of R.D.C. and Regional Council identified the reasons as ; O.M.B. spraying needs to be done at a different time from other brush weeds, as it is a deciduous vine which comes in to leaf at a later time than conventional roadside weed spraying; a different herbicide, Versatil, often has to be used to avoid damaging desirable native vegetation over which the O.M.B. is scrambling; the contractor's practice of spraying from a gun held by the driver is inadequate to cover O.M.B. up to 10 metres from the road edge and climbing over higher vegetation. For these reasons, discussions through the season suggested that a better solution would be for the work to be done by R.E.G work teams during the course of their regular work programmes, and for R.D.C. to pay R.E.G. for the cost of this work, estimated at $10,000 per year.

Track maintenance in Reserves. A start was made in this area of work, but only at the very end of our work season. There is a considerable amount of such work to be done and, of course, there is always seasonal work to be done to maintain the tracks against weather damage. An annual sum of $10,000 is recommended for this activity.

Signage and Community Education. This should be the main purpose for the work going in to weed control in Taihape's Scenic Reserves. They are a magnificent asset to the community, second to none in the country, but their value is very limited if the community, particularly school children, are not encouraged to be involved in them. Years ago, there were extensive signs naming and describing significant trees in the reserves, but these are now just blank, decaying pieces of wood. A comprehensive signage programme, with weather-proof descriptive signs which are now available, is essential to develop the full potential of these valuable reserves. Again a realistic estimate of the annual cost of such a programme would be $10,000.

Re-vegetation. As we make substantial progress in the control of O.M.B. in the reserves, this leaves considerable areas of un-vegetated land. We have discussed plans for re-vegetation, but they have not progressed because they are more than we can cope with within our current funding, and because such work needs to be done in winter time, outside the times of our work programmes. We have made a few attempts to get some of this work done voluntarily, but this has not been very successful. Extra funding to enable us to purchase plants and to employ labour outside of our six month work programme would enable real progress in this important area. Again, a suggested sum would be $10,000.

These 4 areas of funding, each of $10,000, a total of $40,000 per annum, would establish a real partnership between R.E.G. and R.D.C. and would enable very substantial progress to be made in

building on the weed control work being done by R.E.G. and re-developing these reserves in to the very valuable asset that they should be for the benefit of the residents of the district.

We would welcome the opportunity to speak to this submission.

Jim Howard.

Chairman. JAHoward.

Hugh Stewart

Member. Hugh R. Stewart.

Rangitikei Environment Group

LTP Submissions
Rangitikei District Council
Freepost 172050
Private Bag 1102
Marton 4741

Tena Koe

A Treasured Natural Environment Group Submission to the draft Long Term Plan 2015-2025

The Treasured Natural Environment Theme Group is one of the six community-led groups throughout the District based under the Path to Well-being Initiative. It was formed in recognition that collaborative initiatives to improve the natural environment are more effective.

The Treasured Natural Environment Group has a broad cross section of representation – including local authorities, Iwi/hapu, environmental advocacy groups, farmers, interest groups and river users. The advantage of bringing these groups together in this way is that we have the opportunity to collaborate, work on projects and produce positive environmental outcomes. Through collaboration we can create tangible change for the health, recreational enjoyment and use of the natural environment throughout the Rangitikei.

Administrative support

We would like to thank the Rangitikei District Council for the staff support, funded through the Path to Well Being funding programme. This support is fundamental to ensuring regular meetings and collaboration occurs. It is greatly appreciated and the group would like to ensure it is retained throughout the Long Term Plan.

Financial support

The group would also like to request $5,000 per annum funding to support projects surrounding the access points to the Rangitikei River. The Rangitikei River should be a source of pride for the District and provides numerous recreational opportunities for locals and tourists. However, many of the access points along the River are run down and require maintenance. Due to the collaborative nature of the Treasured Natural Environment Group, it is the ideal group to implement projects in these areas. Improving the access points will increase community and tourist interaction with the River, helping to improve economic and social well-being.

Wastewater Treatment Plants

The group would also like to support Council's consideration of future provision of wastewater facilities throughout the District. The group places very high importance on retaining or improving water quality in our fresh water bodies. However, the District's wastewater treatment plants are contributing to reduced water quality. The group would like to encourage Council to consider all possible alternative options for providing wastewater services and would like to collaborate with Council officers in this decision making process. Options that seek to discharge waste water to land are favoured but a process of continuous improvement of these facilities is encouraged.

Thank you again for the opportunity to comment on the draft Long Term Plan 2015-2025.

Heoi ano

Chris Shenton
Chair – Treasured Natural Environment Group

Submission Form

Issue 1

Should Council increase its investment in economic development?

- ☐ **Option 1 – Yes I support Council's proposal** of allocating $205,000 per year – funded 50% from general rates and 50% UAGC.
- ☐ **Option 2 – Do Nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Compromise** – I do not support Council's proposal, but I do support investing an additional annual provision of $100,000 for strategic research or $105,000 for local initiatives.

Other Comments:

Issue 2

Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?

- ☐ **Option 1 – Yes I support Council's proposal** to upgrade or build new civic/community centres in Bulls, Marton and Taihape with Council's capital contribution of $1.6M for Bulls, $1.64 for Marton and $1.78 for Taihape.
- ☐ **Option 2 – Do nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Upgrade Bulls only** – I do not support Council's proposal, but I do support the upgrade for Bulls with Council's capital contribution of $1.6M.

Other Comments:

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities

- ☐ **Option 1 – Yes I support Council's proposal** to install on-site treatment facilities at Mangaweka, and maintain all other existing urban water and wastewater systems, at a cost of $1.768 million, in 2022/23.
- ☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Issue 4

What should we do with our community facilities?

A. Swimming pools

- ☐ **Option 1 – Yes I support Council's proposal** to maintain the status quo at Taihape, Hunterville and Marton pools.
- ☐ **Option 2 – Reduce the swimming season at Taihape and Marton** – I do not support Council's proposal and support a reduced swimming season at Taihape and Marton pools.
- ☐ **Option 3 – Extend the swimming season at Taihape and Marton** – I do not support Council's proposal and support an extended swimming season at Taihape and Marton pools.

Other Comments:

B. Community housing

☐ **Option 1 – Yes I support Council's proposal** to invest $100,000 for the next three years to upgrade all housing units.

☐ **Option 2 – Status quo** – I do not support Council's proposal.

Other Comments:

C. Parks upgrades

☐ **Option 1 – Yes I support Council's proposal** to rely on community donated labour and materials for improving our parks.

☐ **Option 2 – Council funded provision** – I do not support Council's proposal and support Council including an annual $50,000 provision to upgrade facilities and equipment at our parks.

Other Comments:

Issue 5

Should we increase rates to build a larger Roading Reserve Fund?

☐ **Option 1 – Yes I support Council's proposal** to increase the roading reserve to a maximum of $3.5M.

☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Submissions close at 12noon on Monday, 4 May 2015.

Submitter details (please print clearly):

Your name: Kathleen Reardon

Email address:

Preferred contact phone number: 063277240

Your postal address: 70 Wings Line RD 1

Town: Marton

How would you prefer to receive correspondence relating to your submission and the hearings:

☐ Email ☑ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.

☑ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?

☐ Yes ☐ No

☐ Yes I could like to subscribe to Council's e-newslettter

Are you writing this submission as:

☑ an individual, or

☐ on behalf of an organisation

If on behalf of an organisation, please provide details:

Organisation:

Position:

Privacy Act 1993

Please note that submissions are public information. The content on this form including your personal information and submission will be made available to the media and public as part of the decision making process. Your submission will only be used for the purpose of the long term plan process. The information will be held by the Rangitikei District Council, 46 High Street, Marton. You have the right to access the information and request its correction.

I am pleased to see that Council acknowledges the importance of water quality for the health of our rivers on page 11 of "*What's the Plan Rangitikei...?*

I am concerned however, that the issue of the acceptance of leachate at the Marton Waste Water Treatment Plant has not been likewise acknowledged in the consultation document giving the public and opportunity to understand and comment on this very important issue.

I am deeply concerned about the acceptance of leachate from Bonny Glen and would like to suggest that Council:

- communicates this issue clearly and honestly (through media releases; in Council's own publications and on-line) as the issue has the potential to affect all ratepayers of the Rangitikei District.

- ensures that the problems associated with the acceptance of leachate at the Marton Waste Water Treatment Plant are fixed promptly to avoid further costs including [potential] fines; the disposal of contaminated sludge and continuing environmental damage.

- that accountability is built into Council's decision making process around this issue so that the burden of costs for "putting it right" does not come back on all of the ratepayers of the Rangitikei District in years to come.

- that Midwest Disposal pays a realistic contribution to the continuing acceptance of leachate at the Marton Waste Water Treatment Plant replacing the current "gentleman's agreement" with a legally binding contract and are responsible for any costs associated with remediating the current situation.

This is a serious issue which has not been addressed by successive Councils and I am concerned about the health, environmental and financial costs to current and future generations particularly as the landfill is about to expand its capacity.

Thank you for considering my submission.

Could I please have a time to Speak after 3 oclock Thankyou Kathy Reardon

SUBMISSION

TELEPHONE 0800 327 646 | **WEBSITE** WWW.FEDFARM.ORG.NZ

FEDERATED FARMERS OF NEW ZEALAND

To:	Rangitikei District Council
Submission on:	Proposed Long Term Plan 2015-25
Date:	4 May 2015

From: Federated Farmers of New Zealand

JAMES STEWART
PROVINCIAL PRESIDENT
Manawatu -Rangitikei Federated Farmers

BRIAN DOUGHTY
PROVINCIAL PRESIDENT
Wanganui Federated Farmers

Address for Service: **SARAH CROFOOT / KRISTY McGREGOR**
REGIONAL POLICY ADVISORS
Federated Farmers of New Zealand
PO Box 945, Palmerston North, 4340
M 027 551 1673
E kmcgregor@fedfarm.org.nz

SUBMISSION TO THE RANGITIKEI DISTRICT COUNCIL ON THE PROPOSED LONG TERM PLAN 2015-2025

1. INTRODUCTION

1.1 Federated Farmers welcomes the opportunity to comment on the Rangitikei District Council's Proposed Long Term Plan 2015-25

1.2 Rates and other local government fees and costs make up a significant portion of farm business expenses. As a result, Federated Farmers is very concerned with the transparency of rate setting and the overall cost of local government to agriculture.

1.3 Of particular interest to Federated Farmers are those activities which deliver value to the rural rate payers of the Rangitikei District.

1.4 Federated Farmers wishes to be heard in support of its submission. Our preferred hearing date is May 8.

2. KEY RECOMMENDATIONS

2.1 That council introduce a differential for rural properties to offset the unfairly high proportion of general rates paid by rural properties

2.2 Council charge information centres and district promotions as targeted rate on commercial properties. Or at the very least have a greater proportion of these expenses covered by the UAGC.

2.3 That the council utilise the UAGC to its maximum (30%) by including additional activities such as Community Awards, Halls, Property, Computer & Vehicles and environmental and regulatory services (where the balance is not met by user charges) to provide a more equitable rating structure.

2.4 That council pursue the 'wait and see' alternative for Key Issue 5: Roading Reserve Fund and only add an additional $100,000 a year to the Roading Reserve Fund

2.5 That council separate footpaths and streetlighting from the roading rate and charge it as a separate targeted rate to those properties whom have footpaths adjacent to their properties with a higher differential for commercial properties.

2.6 That the council add the Targeted rate for Wastewater Public Good to the Targeted Wastewater rate for connected properties, so those who receive the benefit are the ones bearing the cost.

2.7 That upgrades to wastewater facilities are funded by the communities who benefit through a targeted rate.

2.8 That tourism related activities be funded by targeted rates.

2.9 That the Council's role in economic development is clearly defined and based on both sound principles, providing a clear assessment of what Rangitikei needs, what is practically achievable, and importantly who is best placed to deliver the desired outcomes in the most effective and efficient manner.

2.10 That Council primarily focusses on acting as a conduit of information flow from central government to the private sector, an advocate for the District, and identifying resource management and infrastructural constraints to the outcomes sought.

2.11 We recommend council play a facilitative role, listening to and addressing the concerns of primary producers and rural communities and developing solutions to address these concerns, particularly in respect to potential resource management issues and/or regulatory costs imposed on the sector.

2.12 We recommend that Council has a key role to play in explaining the options for, and benefits of, irrigation to the local communities and water users.

2.13 That Council is identified as a key driver into the investigation of the potential of stock and irrigation water schemes through advocacy for co-funded programs from central government. That Council is also identified for their role in advocacy of water storage.

2.14 We recommend that sector groups on primary production and intensification, diversification of rural production as appropriate are led by the private sector.

2.15 That a local procurement policy is developed provided local contractors remain competitive with outside quotes.

2.16 We recommend that council invest in economic development but it is funded through the UAGC and targeted rates on the communities that benefit, not using the general rate.

3. FORECAST RATES INCREASES

3.1 Federated Farmers commends the council on the reduction in rates for the majority of rural ratepayers. We understand this stems from the reduction in roading rate due to increase in FAR and general rate.

4. REVENUE AND FINANCING POLICY

General Rate

4.1 Federated Farmers would like to commend the council for the changes made to the general rate including the removal of stormwater, urban water and wastewater from the General Rate.

4.2 We would also like to commend the council for the decrease in the overall level of the general rate and a number of individual areas. However we believe there is still more that can be done to provide a more equitable rating scenario.

4.3 Since the previous Long Term Plan 2012-2022 Federated Farmers has expressed concern that no differentials operate within the Rangitikei District.

4.4 The use of differentials is a useful mechanism which recognises that different property types benefit from Council services by differing amounts.

4.5 As the Council is proposing to continue to charge the General Rate without a differential, farms pay significantly more than residential or commercial properties for activities such as community awards, information centres, district promotions, emergency management and halls. Farms clearly do not do not receive a benefit which is proportional to the level of general rates they pay for these activities and therefore it would be appropriate to apply a differential.

4.6 At the conclusion of our submission is a table illustrating the rating disparity between urban and rural properties.

4.7 A major contributing factor to this disparity is that farming (excluding lifestyle) makes up 64% of the districts value even though it only accounts for 23% of the number of properties. This means they pay 64% of any Roading or General Rate based activity. While the residential properties account for over 50% of the districts properties yet pay only 17% of the general and roading rate.

4.8 Using information from page 245 of the draft Long Term Plan we see that, the average residence in town ($125,000 - $200,000) will pay $86.26 to $138.02 in general rates plus the $596.85 UAGC, plus $244.88 to $391.80 for roading. Contrast this with a one family farm with a capital value of $2 million – they will pay General Rates of $1380.20 plus $596.85 UAGC, plus $3918 for roading, irrespective of the relative benefit received from these activities.

4.9 In terms of activities where the benefit accrues on a 'per person' basis, the relative contributions outlined above are inequitable.

4.10 Information Centres (increasing 6%) and District Promotions (increasing 32%) have long been activities we have advocated would be more appropriately funded as a targeted rate on commercial properties and/or tourism, accommodation, food service and retail businesses rather than being included in the general rate as they are directly benefiting from the funding.

4.11 We strongly recommend the Rangitikei district council make use of differentials in order to more equitably collect rates from high value rural properties which do not receive a higher rate of service from the general rates collected.

4.12 It is relevant to note that in the neighbouring district of Manawatu a differential exits for both the general and roading rates.

UAGC

4.13 UAGC's are a fair way for Council's to rate for services that provide an equal or indistinguishable amount of benefit across ratepayer groups. Especially when compared to a general rate calculated by capital value which results in groups such as farmers paying more for an activity which they are unlikely to use more than any other group in a community. However, there is a 30% cap on the amount of UAGC that can be applied.

4.14 Where a Council is aware that they have not reached their maximum 30% UAGC allowance and choose not to rectify the situation then they are actively choosing to disadvantage groups such as the farming community.

4.15 The draft LTP states that the UAGC level will sit around 23% which even though the UAGC has increased in 15/16 as a proportion of total rate take its at the same level as 14/15 due to the inclusion of targeted rates (excluding those collected solely for water and wastewater) that are set on a uniform basis to all rating units as specified in Section 21 of the Local Government (Rating) Act 2002.

4.16 This leaves scope to fund additional activities through the UAGC. Where the benefit received or the contribution to the cost of the activity has no correlation to property value, or where the activity does not provide any specific benefit to any particular ratepayer groups, should be included in the UAGC calculation. These include halls (increasing by 62%), property, community awards and environmental and regulatory services where the balance is not met by user charges.

4.17 We respect the Councils concerns that the effects of increasing the UAGC would be regressive and impact upon lower capital value properties. Federated Farmers suggests that the rates remissions scheme, alongside the broader central government welfare system, remain the most robust and efficient methods of progressive redistribution, with the ability to target each concern on a case by case basis in a way that is not possible using the blunt property value basis afforded by rates. . We are not aware of any research the Council has carried out to establish the ability of sectors of its community to afford or not afford its proposed rates impost, and it cannot assume that the Rating Valuation of a Property is any indication of an individual's ability to meet the rates on that property. Like many senior citizens, farmers tend to have a large property asset when compared to their income, because their business relies on large areas of land to generate a modest income. Farmers face tough times, as is apparent in the current media. Consideration about the economic pressures that these rural businesses are facing is necessary, as it is unlikely that they are in a better position to afford rates over the wider community.

Recommendations:

That council introduce a differential for rural properties to offset the unfairly high proportion of general rates paid by rural properties

Council charge information centres and district promotions as targeted rate on commercial properties. Or at the very least have a greater proportion of these expenses covered by the UAGC.

That the council utilise the UAGC to its maximum (30%) by including additional activities such as Community Awards, Halls, Property, Computer & Vehicles and environmental and regulatory services (where the balance is not met by user charges) to provide a more equitable rating structure.

5. ROADING

5.1 Federated Farmers would like to commend the council for their success in getting the Normal Funding Assistance Rate (FAR) provided for roading increased from 59% –

62% then 63%. Given that roading is by far the highest rate faced by rural rate payers this is a warmly welcomed outcome. For rural ratepayers, the roading activity is the only Council service they really care about since it determines their income, therir costs and ultimately their property value

5.2 Regarding Key Issue 5: Roading Reserve Fund. Federated Farmers support the wait and see path. Put aside the additional $100,000 that has come about from the increase in the FAR rate, but wait and see how the need for emergency works and the governments response to this pans out over the next three years before adding even further to the rates burden of rural residents who pay 64% of the roading rates.

5.3 However neighbouring Councils are seeing lump sum clawbacks of FAR funding proposed, which are seeing reductions in subsidies for road funding and consequentially less money spent on local roads. Rangitikei faces forest harvest pressure on narrow hill country roads in the next 10 to 20 years, which will test road foundations and bridge strength. Road funding changes seem likely to reduce emergency/storm damage subsidy rates, and Rangitikei, because of its geology has been a high user historically of such assistance, and it seems prudent to maintain a limited financial buffer for such funding challenges. Such a Reserve Fund also allows an ability to utilise funds immediately for restoration, before the bureaucratic authority has ramped up sufficiently to respond, allowing contractors to be engaged before they are snapped up by the other competitors for their services. This can result in much faster opening of closed roads, which is vital in hill country areas.

5.4 Federated Farmers has a long held frustration with the inclusion of footpaths and streetlighting in the roading rate which is then charged based on capital value.

5.5 Federated Farmers believes that footpaths and streetlighting should be rated separately from general roading as a targeted rate which is not applied to all rating units or applied using a differential. Supporting this is the NZTA FAR subsidy which is available for roads, but not footpaths and urban street lighting. Merging subsidised and unsubsidised activities as the Council has defeats the transparency objectives of the Local Government Act, as below:

S101 Financial Management

(3) The funding needs of the local authority must be met from those sources that the local authority determines to be appropriate, following consideration of, -

6. *In relation to each activity to be funded, -*

6.1 *the community outcomes to which the activity primarily contributes; and*

6.2 *the distribution of benefits between the community as a whole, any identifiable part of the community, and individuals; and*

6.3 *the period in or over which those benefits are expected to occur; and*

6.4 *the extent to which the actions or inaction of particular individuals or a group contribute to the need to undertake the activity; and*

6.5 *the costs and benefits, including consequences for transparency and accountability, of funding the activity distinctly from other activities; and*

6.6 *the overall impact of any allocation of liability for revenue needs on the community.*

6.7 This is because footpaths and streetlighting have direct beneficiaries –those properties which have access to the 88 kilometres of footpaths and streetlights outside their property. Clearly, properties which have a footpath or street light outside them receive a greater level of benefit than a farm which is situated many kilometres away. However, since Council is rating for footpaths and lighting by capital value, the farm pays significantly more. Further to this, Federated Farmers considers that commercial properties which have even greater benefits from enhanced footpaths, under veranda lighting and town decorations should pay a higher differential than residential properties.

Recommendations:

That council pursue the 'wait and see' alternative for Key Issue 5: Roading Reserve Fund and only add an additional $100,000 a year to the Roading Reserve Fund

That council separate footpaths and streetlighting from the roading rate and charge it as a separate targeted rate to those properties who have footpaths adjacent to their properties with a higher differential for commercial properties.

7. WASTEWATER PUBLIC GOOD RATE

7.1 Federated Farmers commend the council for removing Storm water, waste water and Urban Water from the General Rate. However questions remain over the targeted "Public Good" targeted rate which is charged to all properties, connected or not.

7.2 Federated Farmers understands that Council is facing costly upgrades for its service networks however this is not a good reason to charge properties for the upgrades that receive no direct benefit from the service. 14% of the costs for wastewater are funded by 2902 properties who don't receive benefit from the wastewater service.

7.3 Federated Farmers agrees that there is a public good element to having effective utilities but there is also a public good element to rural properties having safe and effective sewage disposal and effluent treatment yet no-one subsidises rural ratepayers when they must establish, maintain or upgrade their septic tanks or treatment systems which come at considerable cost.

7.4 Whether property owners must supply and maintain their own utility services or the Council does that on their behalf, ultimately the cost must be borne by the property receiving the benefit.

7.5 Federated Farmers response to the council argument that those not connected benefit by use of that connected service when in town, is that we are paying for those connections through the use of whatever service is being utilised. Eg if it is council services such as utilising public toilets or toilets in council buildings such as the library, they are already paying through their rates for those facilities to be provided. If it is through use in a commercial service provider such as a restaurant, the costs of those connection should be absorbed by the business owner and can be passed on

through prices if necessary - just as a farmer has to absorb their connection costs even though they have no immediate ability to pass the cost on.

7.6 Federated Farmers recommend the Targeted rate for Wastewater Public Good be added to the Targeted Wastewater rate for connected properties, so those who receive the benefit are the ones bearing the cost.

7.7 In regard to Key Issue 3: Replacing reticulated water and waste water schemes for smaller communities. We agree that this is a critical issue and understand the challenges faced by complying with Regional Council consents which have been tightened under the NPS as it is a challenge many of our members are currently facing on their farms. We think it is crucial that council services are maintained to the required level, just as farmers have to maintain theirs.

7.8 Federated Farmers view on the appropriate funding mechanism has been articulated in the preceding paragraphs - that those who benefit should pay. So the upgrades should be funded via a targeted rate on those connected properties, with some costs shared across the remainder of the community who have the ability to connect to the service in the future.

7.9 If the Council decided to put in on site treatment options on properties, the cost should be born by those properties and not be subsidised by the whole region, just as farmers who don't have the ability to connect to wastewater systems have to fund their own schemes.

Recommendations:

That the council add the Targeted rate for Wastewater Public Good to the Targeted Wastewater rate for connected properties, so those who receive the benefit are the ones bearing the cost.

That upgrades to wastewater facilities are funded by the communities who benefit through a targeted rate.

8. TOURISM AND ECONOMIC DEVELOPMENT

8.1 As mentioned in our comments on the General Rate, Federated Farmers recommends the use of a targeted rate for Economic Development activities including Information Centres and District Promotion. The current use of the general rate for these activities results in farmers and other property owners which have higher property values paying a premium for services which do not relate to their business or directly benefit them in any way.

8.2 Tourism is only 1.7% of Rangitikei's gross domestic product, yet the primary industry sector is being asked to contribute 64% of Council's tourism related costs.

8.3 We are also disappointed that commercial and industrial properties are rated exactly the same as residential properties (unless they have extra toilets or metred water). We consider this unfair considering the extra benefits commercial and industrial properties receive from footpaths, streetlighting, economic development, information centres and District promotion and town centre development. Yet their rates for these

activities don't reflect the benefit they receive. Particularly for those in tourism, accommodation, entertainment and retail sectors who receive a direct benefit from increase visitor numbers.

8.4 While tourism income provides *indirect* economic benefit to all ratepayers, so too do other industries that fund their own promotion, such as agriculture. The distribution of economic benefit resulting from tourism is not evenly spread among the community, and nor should the costs of promotion. Tourism and economic development promotion is not a public good service and should not be funded as such.

8.5 All farmers pay levies their respective industry good bodies under the Commodities Levy Act. For Dairy farmers that is Dairy NZ for every kilogram of milk solids produced. For Sheep and Beef farmers it is Beef + Lamb New Zealand for every sheep and cattle beast they kill. This money is spent helping farmers to improve their management practices, animal productivity, reduce their environmental impact, assist with biosecurity, gaining market access, researching greenhouse gas emissions, developing people in their industries and many other activities.

8.6 Farmers pay considerable sums for the development and promotion of their own industries and do not expect other industries to subsidise their promotion for them. So we feel the tourism industry should be the same and the use of targeted rates for tourism related activities would be a more equitable mechanism. To ensure residents and farmers are not supporting the incomes of businesses that should be able to support themselves.

Rangitikei Economic Development Strategy

8.7 Please note that many of the following comments have also been made to the Council in our submission on the Rangitikei Growth Strategy. A copy of our full submission to the Rangitikei Growth Strategy is attached at the conclusion of this submission.

8.8 Central government has identified the region as a potential area for investment. Federated Farmers supports the interest of the region to harness opportunity from the government's intention to double agribusiness exports from the Manawatu-Whanganui region by 2025.

8.9 Ongoing and sustained economic development outcomes result from the effective operation of the private sector. While there is a role for local government in promoting, providing and/ or enabling economic development at the local level, any such involvement should balance the risk that Council may crowd out private sector development and innovation, or simply result in a transfer of funding from ratepayers to commercial operations. Where local government involvement does not achieve this balance, the result is restricted, not better economic development.

8.10 We believe it is critical that Council's role in economic development is clearly defined and based on both sound principles, providing a clear assessment of what Rangitikei needs, what is practically achievable, and importantly who is best placed to deliver the desired outcomes in the most effective and efficient manner. In many instances it is likely that Council's optimal role will be simply to coordinate the development of a shared vision for Rangitikei and a forum for discussion including key stakeholders. As

well as being a conduit of information flow from central government to the private sector without stepping into the role of private enterprise.

8.11 From Federated Farmers perspective, Council's key roles include providing an appropriately enabling resource management framework, and infrastructure, including roading, telecommunications and power, to ensure that agricultural production is enabled. In some instances there may be a need to provide coordination and assistance, where scale and a lack of industry or sector coordination are material issues for the economic development of the District.

8.12 Federated Farmers believes a partnership approach is critical to the success of any economic development strategy. We commend the Council's goals to lead and facilitate the partnership between local and regional stakeholders. However, the role of the Council will arguably be different for each theme areas and initiatives, depending on the economic drivers, needs and considerations for each grouping.

8.13 On page 3 in the Economic Development Strategy in the supporting documents to the Long Term Plan. It is stated that the council has a role in community leadership to influence, where it can, the wider determinants of economic prosperity, such as: Employment, Education level and opportunities for skill development, Creation and distribution of wealth, Income levels, Working conditions, Childcare. We feel the councils role in some of these needs to be carefully considered and defined. This would avoid the risk of the council attempting to be all things to all people, which would reduce the effectiveness of the strategy and run the risk of Council extending its efforts into areas where its involvement is not appropriate.

8.14 With regard to Employment, while we agree Council is in itself a large employer, we believe it has only limited responsibilities in respect to employment in the District overall. While the Council's roles in respect to education, working conditions and childcare are ideally as an advocate and a facilitator, little more.

8.15 We disagree strongly that Council has some role to play in the distribution of wealth; this is purely a central government responsibility. Council's funding policies, cost recovery and rating should seek to fund Council activities in the most appropriate manner following a consideration of those who benefit from the activity, as outlined in S101 (3) of the Local Government Act; Council funding mechanisms are not intended as or efficient mechanisms for redistribution.

8.16 We encourage Council to play a facilitative role, listening to and addressing the concerns of primary producers and rural communities and developing solutions to address these concerns, particularly in respect to potential resource management issues and/or regulatory costs imposed on the sector. For instance we believe Council has a critical role in supporting business through keeping rates to an acceptable cost and having an effective and efficient consenting process.

8.17 This facilitative role includes providing easy access to District Plan rules, consents, infrastructure plans and connections, information, statistical and demographic data. There may be circumstances where Council has a role in introducing collaborative partners for cluster type activities but this extends only to the initial contact or helping with a plan change.

8.18 Rates holidays and other inducements are tough on other existing businesses in the District, particularly competitors, as they are often in effect a subsidy, and increase the cost burden to other ratepayers, eroding the value of other ratepayer's properties and destroying investment confidence. New businesses needing support to that level may simply be under-capitalised and unlikely to survive in the long term.

8.19 Council investment in common infrastructure including roads, amenities such as libraries, swimming pools and parks, and the beautification of our town centres further supports business activity. This investment helps to maintain our province as a nice place to live and attracts new people to the area.

8.20 Federated Farmers acknowledges that Council has a role in community leadership to influence, where it can, the wider determinants of economic prosperity in the community. However, Federated Farmers believes that the private sector should be the driver of business activity, and the development of potential business opportunities. The drivers of business activity need to be entrepreneurs with skin in the game.

Rangitikei Economic Development Key Result Areas

Activity	*Support/oppose*	*Reasoning*
KRA1: Economic development leadership	Support in part	We believe these actions are appropriate, although we would favour the deletion of "Supporting local contractors to bid successfully for Council contracts, as far as practicable and in line with the procurement policy" with a more comprehensive and considered review of the procurement policy itself.
KRA2: Growth and development of the identified sectors, specifically agribusiness, education and Maori economic development	Support in part	We oppose the intention to co-fund research/evaluation into ways to achieve increased productivity, in both urban and rural areas of the District. Agriculture, as an example, already provides sufficient funding through industry good bodies to address industry good concerns, and the remaining aspects of this goal are better addressed by the private sector. We also oppose the provision of targeted funding incentives representing co-investment in projects with potential to intensify economic activity. We believe this is a good example of the types of activity Council should avoid; effectively 'picking winners' and that the costs and risks associated are better shouldered by the private sector.
KRA3: High-class infrastructural, utilities and telecommunications network throughout the district	Support	We support this activity in it's entirety; it is critical to the success of the District and core business for Council.
KRA4: Vibrant and attractive towns that entice growth	Support	Pending more detail on the costs of providing limited rates remission for earthquake strengthening, we support this proposal.

KRA5: Promotion of the District as a great place to visit and to live	Support	We consider these within the broad advocacy and community support roles of Council.

Sector Development Actions focusing on Primary Production

8.21 Federated Farmers notes that these actions support Key Results Areas 1, 2 and 3 above and that we have been identified as a stakeholder.

8.22 Federated Farmers supports the facilitation by council of sector groups on primary production provided this is being lead by the Primary Industry who are the ones with skin in the game and will be responsible for taking the risks associated with any developments.

8.23 Federated Farmers supports the intent of further development of agriculture sectors by growing more of what the District is good at and processing it locally. We believe this is the role of private enterprise, and the Council has a role to support what comes from private enterprise through ease of consent conditions and unnecessary cost imposition.

8.24 Federated Farmers supports the Key Action to examine irrigation opportunities through increased community understanding and engagement. Council has a key part to play given existing water infrastructure, and can facilitate support for potential water users, and advocate to central government. In addition, it is often vital for projects to have community support, and Council has a key role to play in explaining the options for and benefits of irrigation to the local communities and water users.

8.25 We support the development of a local procurement policy for councils own goods and services and for other businesses in the community, as it has spin on effects as the money continues to be recycled throughout the community. However this must remain aligned with the Council's current procurement policy and not come at an additional cost. The local contractors must be competitive with external quotes and it shouldn't be used to allow them to become complacent in their ongoing development, efficiency and competitiveness which would be to the determent of the region long term.

8.26 We support the strategic investment of new roads to ensure productivity gains for the primary sector alongside existing renewal and maintenance programmes provided it is done alongside the local landowners and have a measurable benefit relative to the costs incurred.

8.27 We support the council advocating to central government for infrastructural maintenance and the upgrade of utility services as we see this an important role for the council with measurable benefits, that will enable to the rural community to continue to operate their businesses in an efficient manner and not be hampered by challenges which would never be acceptable in urban areas.

Investment in Economic Development

8.28 With regard to Key Issue 1: Should we increase our investment in economic development? We support the investment provided it is appropriately rated. We recommend the most equitable way to rate these activities is with a combination of UAGC and targeted rates, as opposed to including 50% as general rates. The targeted rates should be on those properties commercial and otherwise that receive the benefit from those activities. For example commercial business should pay a higher proportion of district promotion and events strategy, communities benefiting

from revived town centres should pay more for that, and those benefiting from improved water infrastructure should pay more for it.

Recommendations

That tourism related activities be funded by targeted rates.

That the Council's role in economic development is clearly defined and based on both sound principles, providing a clear assessment of what Rangitikei needs, what is practically achievable, and importantly who is best placed to deliver the desired outcomes in the most effective and efficient manner.

That Council primarily focusses on acting as a conduit of information flow from central government to the private sector, an advocate for the District, and identifying resource management and infrastructural constraints to the outcomes sought.

We recommend council play a facilitative role, listening to and addressing the concerns of primary producers and rural communities and developing solutions to address these concerns, particularly in respect to potential resource management issues and/or regulatory costs imposed on the sector.

We recommend that Council has a key role to play in explaining the options for and benefits of irrigation to the local communities and water users.

We recommend that sector groups on primary production and intensification, diversification of rural production as appropriate are led by the private sector.

That a local procurement policy is developed provided local contractors remain competitive with outside quotes.
We recommend that council invest in economic development but it is funded through the UAGC and targeted rates on the communities that benefit, not using the general rate.

9. COMMUNITY ACTIVITY AND FACILITIES

9.1 Federated Farmers supports the investment in the rejuvenation of the town centres of Bulls, Marton and Taihape (Key Issue 2) provided it is what each community wants and is funded appropriately, through targeted rates and the UAGC.

9.2 The argument for this is strengthened by the high cost of earthquake strengthening.

Community Facilities (Key Issue 4)

9.3 Federated Farmers supports the councils preferred option for Swimming Pools as it is an acceptable outcome and we feel the UAGC is an appropriate rating mechanism.

9.4 We support the councils preferred option for Community Housing with the view to get out of the business over the medium term. *(NB has no impact on rates)*

9.5 We support the councils preferred option for the Park Upgrade to rely on community donated labour and materials as this reflects those that use and value these facilities.

10. FEDERATED FARMERS OF NEW ZEALAND

10.1 Federated Farmers of New Zealand is a primary sector membership organisation representing farming families and rural businesses throughout New Zealand. The economic importance of the agricultural sector to New Zealand's economy is well recognised. Its direct and indirect contribution to New Zealand's economy is about 15% and land-based primary sector exports comprise about 70% of New Zealand's total exports. Any regulation or additional cost which affects farm businesses also has the potential to impact on the New Zealand economy.

Submission Ends

Federated Farmers wishes to be heard in support of this submission.

Thank you.

GENERAL RATE APPORTIONMENT FOR VARIOUS PROPERTIES (From P 245 Draft Long Term Plan)										
ACTIVITY	Rate per $100000 CV 15/16	% change	Rate per $100000 CV 14/15	Property Capital Value						
	100,000			125,000	150,000	200,000	1,000,000	2,000,000	4,000,000	8,000,000
				AV. HOUSE				AV. FARM		
Community Awards	0.07	133%	0.03	0.09	0.11	0.14	0.70	1.40	2.80	5.60
Property	1.97	-42%	3.38	2.46	2.96	3.94	19.70	39.40	78.80	157.60
Building Inspection	8.25	-14%	9.61	10.31	12.38	16.50	82.50	165.00	330.00	660.00
District Planning	5.37	-3%	5.51	6.71	8.06	10.74	53.70	107.40	214.80	429.60
Dog Control	2.32	-39%	3.81	2.90	3.48	4.64	23.20	46.40	92.80	185.60
Health Inspection	1.07	78%	0.60	1.34	1.61	2.14	10.70	21.40	42.80	85.60
Resource Consents	0.87	-44%	1.54	1.09	1.31	1.74	8.70	17.40	34.80	69.60
Stock Ranging	0.96	-23%	1.24	1.20	1.44	1.92	9.60	19.20	38.40	76.80
Information Centres	9.40	6%	8.88	11.75	14.10	18.80	94.00	188.00	376.00	752.00
District Promotions	14.63	32%	11.11	18.29	21.95	29.26	146.30	292.60	585.20	1,170.40
Civil Defence	2.51	-5%	2.63	3.14	3.77	5.02	25.10	50.20	100.40	200.80
Rural Fire	4.35	-2%	4.44	5.44	6.53	8.70	43.50	87.00	174.00	348.00
Hails	13.14	62%	8.13	16.43	19.71	26.28	131.40	262.80	525.60	1,051.20
Rural Water	2.38	-22%	3.04	2.98	3.57	4.76	23.80	47.60	95.20	190.40
Comp. & Vehicles	1.72	-9%	1.88	2.15	2.58	3.44	17.20	34.40	68.80	137.60
Total	**69.01**			**86.26**	**103.52**	**138.02**	**690.10**	**1380.20**	**2760.40**	**5520.80**
Roading	195.90			244.88	293.85	391.80	1,959.00	3,918.00	7,836.00	15,672.00
Total Including Roads	264.91			331.14	397.37	529.82	2649.10	5298.20	10596.40	21192.80

SUBMISSION

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FEDERATED FARMERS OF NEW ZEALAND

To: Rangitikei District Council
Private Bag 1102
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Date: 20th April 2015

Submission on: **Rangitikei Growth Strategy**

Submission by: Federated Farmers of New Zealand

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The Manawatu Rangitikei Province of Federated Farmers welcomes the opportunity to submit on the *Rangitikei Growth Strategy*.

SUMMARY OF RECOMMENDATIONS

- That the Strategy more directly outlines the specific role Council will play in respect to delivering the outcomes sought through the strategy, and the roles of other parties.
- That Council primarily focusses on acting as a conduit of information flow from central government to the private sector, an advocate for the District, and identifying resource management and infrastructural constraints to the outcomes sought.
- That clarification is provided as to whether key stakeholders and partners to the strategy have agreed with and committed to the actions, or whether they were only identified as possible drivers by other individuals.
- That Council's roles in respect to these areas need to be carefully considered and defined.

- That the strategy is amended to read Council to play a facilitative role, listening to and addressing the concerns of primary producers and rural communities and developing solutions to address these concerns, particularly in respect to potential resource management issues and/or regulatory costs imposed on the sector.

- That Council has a key role to play in explaining the options for and benefits of irrigation to the local communities and water users.

- That the facilitation of sector groups on primary production and intensification, diversification of rural production as appropriate and identified within the Regional Growth Strategy be amended to be led by the private sector.

- That investigation of realistic opportunities for further developing these sectors in the district, including a detailed investigation of the additional rural production potential of the district be led by the private sector.

- That the facilitation of skills clusters around processing of regional products is amended to be led by the private sector. Council can support these initiatives through their core activities.

- That Council is identified as a key driver into the investigation into the potential of stock and irrigation water schemes through advocacy for co-funded programs from central government. That Council is also identified for their role in advocacy of water storage.

- That small business training for innovation and excellence is offered by those with small business expertise.

- That the Lion's Den concept is deleted from the strategy, and focus is made on other areas of business support services.

1 GENERAL SUBMISSIONS

1.1 Ongoing and sustained economic development outcomes result from the effective operation of the private sector. While there is a role for local government in promoting, providing and/ or enabling economic development at the local level, any such involvement should balance the risk that Council may crowd out private sector development and innovation, or simply result in a transfer of funding from ratepayers to commercial operations. Where local government involvement does not achieve this balance, the result is restricted, not better economic development.

1.2 It is critical that Council's role in economic development is clearly defined and based on both sound principles, providing a clear assessment of what Rangitikei needs, what is practically achievable, and importantly who is best placed to deliver the desired outcomes in the most effective and efficient manner. In many instances it is likely that Council's optimal role will be simply to coordinate the development of a shared vision for Rangitikei and act as a forum for discussion, without stepping into the role of private enterprise.

1.3 From Federated Farmers perspective, Council's key roles include providing an appropriately enabling resource management framework, and infrastructure, including roading and telecommunications, to ensure that agricultural production is

enabled. In some instances there may be a need to provide coordination and assistance, where scale and a lack of industry or sector coordination are material issues for the economic development of the District.

1.4 Federated Farmers supports Rangitikei District Council's efforts to recognise and reflect local economic strengths and comparative advantages within the Rangitikei Growth Strategy. We believe this is a critical factor to the success of the strategy. We also support acknowledgement that agriculture and associated or downstream manufacturing is the dominant driver of Rangitikei District's economy. Federated Farmers acknowledges that the prosperity of the rural landscape is varied according to weather patterns and market forces, amongst other variables, however in the long term we believe that we can all look forward to a good and prosperous future, and enjoy the lifestyle that the Rangitikei District has to offer.

2 EXECUTIVE SUMMARY

2.1 Central government has identified the region as a potential area for investment. Federated Farmers supports the interest of the region to harness opportunity from the government's intention to double agribusiness exports from the Manawatu-Whanganui region by 2025.

2.2 Federated Farmers acknowledges the role that Council has a role to play in participating as a conduit of information flow from central government to the private sector. However, this does not mean Council needs to be the driver of, or consider itself responsible for, new business activity.

2.3 The Growth Strategy Executive Summary notes that during February – April 2014 workshops established vision and mission statements, outcomes, key result areas and key drivers. Federated Farmers supports the strategic identification process, and the development of key drivers and responsibilities. Federated Farmers expects that by the very nature of their inclusion in the document, key stakeholders and partners to the strategy have agreed with, and committed to, the actions.

2.4 Federated Farmers supports the view that the Growth Strategy is not only a role for Council but is a shared vision that will need support from a wide range of local and regional stakeholders. A partnership approach is essential, with clearly defined roles stemming from an assessment of who is most appropriate to deliver on the outcomes sought.

2.5 Federated Farmers commends Council's goals to lead and facilitate the partnership between local and regional stakeholders. However, the role of the Council will arguably be different for each theme areas and initiatives, depending on the economic drivers, needs and considerations for each grouping.

Recommendations:

That the Strategy more directly outlines the specific role Council will play in respect to delivering the outcomes sought through the strategy, and the roles of other parties.

That Council primarily focusses on acting as a conduit of information flow from central government to the private sector, an advocate for the District, and identifying resource management and infrastructural constraints to the outcomes sought.

That clarification is provided as to whether key stakeholders and partners to the strategy have agreed with and committed to the actions, or whether they were only identified as possible drivers by other individuals.

3 COUNCIL'S COMMITMENT TO THE RANGITIKEI GROWTH STRATEGY

3.1 Federated Farmers supports Council outlining it's commitment to the strategy. However, we either disagree with Council's ideal role in respect to some of the particular determinants of economic prosperity in the District, or feel these roles should be better qualified. These are outlined on page 9:

- Employment
- Education level and opportunities for skill development
- Creation and distribution of wealth
- Income levels
- Working conditions
- Childcare

3.2 Federated Farmers believes Council's roles in respect to these areas need to be carefully considered and defined. For example, while we agree Council is in itself a large employer, we believe it has only limited responsibilities in respect to employment in the District overall. The Council's roles in respect to education, working conditions and childcare are ideally as an advocate and a facilitator, little more.

3.3 We disagree strongly that Council has some role to play in the distribution of wealth; this is purely a central government responsibility. Council's funding policies, cost recovery and rating should seek to fund Council activities in the most appropriate manner following a consideration of those who benefit from the activity, as outlined in S101 (3) of the Local Government Act; Council funding mechanisms are not intended as or efficient mechanisms for redistribution.

3.4 It is important that Council better defines its roles in respect to these areas so as to clarify where these roles begin and end. Simply including these very broad measures of economic prosperity without appropriate qualification runs the risk of indicating the Council will, can or should be 'all things to all people'; this in turn reduces the effectiveness of the strategy or runs the risk of Council extending its efforts into areas where its involvement is not appropriate.

3.5 We encourage Council to play a facilitative role, listening to and addressing the concerns of primary producers and rural communities and developing solutions to address these concerns, particularly in respect to potential resource management issues and/or regulatory costs imposed on the sector. For instance we believe Council has a critical role in supporting business through keeping rates to an acceptable cost and having an effective and efficient consenting process.

3.6 This facilitative role includes providing easy access to District Plan rules, consents, infrastructure plans and connections, information, statistical and demographic data. There may be circumstances where Council has a role in introducing collaborative partners for cluster type activities but this extends only to the initial contact or helping with a plan change.

3.7 Rates holidays and other inducements are tough on other existing businesses in the District, particularly competitors, as they are often in effect a subsidy, and increase

the cost burden to other ratepayers, eroding the value of other ratepayer's properties and destroying investment confidence. New businesses needing support to that level may simply be under-capitalised and unlikely to survive in the long term.

3.8 Council investment in common infrastructure including roads, amenities such as libraries, swimming pools and parks, and the beautification of our town centres further supports business activity. This investment helps to maintain our province as a nice place to live and attracts new people to the area.

3.9 Federated Farmers acknowledges that Council has a role in community leadership to influence, where it can, the wider determinants of economic prosperity in the community.

3.10 However, Federated Farmers believes that the private sector should be the driver of business activity, and the development of potential business opportunities. The drivers of business activity need to be entrepreneurs with skin in the game.

3.11 Rangitikei District Council does not have the money nor the resources to operate a major business development agency, nor should it. We will comment broadly on the five activity categories outlined on pages 9 and 10 of the draft strategy, below:

Activity	*Support/oppose*	*Reasoning*
KRA1: Economic development leadership	Support in part	We believe these actions are appropriate, although we would favour the deletion of "Supporting local contractors to bid successfully for Council contracts, as far as practicable and in line with the procurement policy" with a more comprehensive and considered review of the procurement policy itself.
KRA2: Growth and development of the identified sectors, specifically agribusiness, education and Maori economic development	Support in part	We oppose the intention to co-fund research/evaluation into ways to achieve increased productivity, in both urban and rural areas of the District. Agriculture, as an example, already provides sufficient funding through industry good bodies to address industry good concerns, and the remaining aspects of this goal are better addressed by the private sector. We also oppose the provision of targeted funding incentives representing co-investment in projects with potential to intensify economic activity. We believe this is a good example of the types of activity Council should avoid; effectively 'picking winners' and that the costs and risks associated are better shouldered by the private sector.
KRA3: High-class infrastructural, utilities and telecommunications network throughout the district	Support	We support this activity in it's entirety; it is critical to the success of the District and core business for Council.
KRA4: Vibrant and attractive towns that entice growth	Support	Pending more detail on the costs of providing limited rates remission for earthquake strengthening, we support this proposal.

KRA5: Promotion of the District as a great place to visit and to live	Support	We consider these within the broad advocacy and community support roles of Council.

Recommendations:

That Council's roles in respect to these areas need to be carefully considered and defined.

That the strategy is amended to read Council to play a facilitative role, listening to and addressing the concerns of primary producers and rural communities and developing solutions to address these concerns, particularly in respect to potential resource management issues and/or regulatory costs imposed on the sector.

4 RANGITIKEI AGRIBUSINESS STRATEGY

4.1 Federated Farmers supports the Council's identification of stakeholders as including Regional and District Council, Iwi, Federated Farmers, local businesses and ratepayers.

4.2 Federated Farmers supports the Key Action to develop a central business hub that includes regulatory requirements, financial advice, leases arrangements, and available resources in the District including a register of vacant businesses and facilities in the area. This is largely an 'enabling' role that provides useful support for the private sector at a minimal cost while stopping short of stepping into the private sector decision making and risk arena.

4.3 Federated Farmers supports the intent of further development of agriculture sectors by growing more of what the District is good at and processing it locally. We believe this is the role of private enterprise, and the Council has a role to support what comes from private enterprise through ease of consent conditions and unnecessary cost imposition.

4.4 Federated Farmers supports the Key Action to examine irrigation opportunities through increased community understanding and engagement. Council has a key part to play given existing water infrastructure, and can facilitate support for potential water users, and advocate to central government. In addition, it is often vital for projects to have community support, and Council has a key role to play in explaining the options for and benefits of irrigation to the local communities and water users.

4.5 Federated Farmers supports the facilitation of sector groups on primary production and intensification, diversification of rural production as appropriate and identified within the Regional Growth Strategy. We believe this should be privately led.

4.6 We support the investigation of realistic opportunities for further developing these sectors in the district, including a detailed investigation of the additional rural production potential of the district. However, as this is where capital and risk is undertaken, we believe these opportunities need to come from the private sector. Again, it is important to bear in mind the primary sector also provides funding directly to industry good bodies and commercial processors and these parties may have a key role to play in this area.

4.7 Federated Farmers supports the facilitation of skills clusters around processing of regional products. These initiatives need to come from the private sector and then be supported by the Council through its core activities.

4.8 Federated Farmers supports the identification of specific initiatives from the Strategic Water Assessment and to work with MPI further on co-funded programmes to ensure water availability for production purposes. Irrigation is a key mechanism for delivering both better environmental and economic outcomes. In particular irrigation can enable better downstream economic activity through processing of primary production. If irrigation solely provided benefits to those irrigating, the answer would be simple; those benefitting should pay. However, it is often the case that major water users can not fund the scoping or feasibility stages of irrigation investment, particularly where the benefits are significant community good in nature.

4.9 Federated Farmers believes Council has a role to play in water storage and irrigation opportunities, through water storage and delivery assets that may be utilised to harness opportunity. Investigation into the potential of stock and irrigation water schemes through co-funded programs from central government can result in the private sector investing in water projects to the benefit of the wider community benefiting. Council has a role in the advocacy of these programs.

4.10 We support the investigation of realistic opportunities for further developing the agribusiness sector in the district with the support and inclusion of Maori/Iwi interests. We believe in working alongside iwi in a capacity that they see is appropriate.

4.11 Federated Farmers supports the development of business support services available in the district, provided they are fitting with the local context.

4.12 We believe small business training for innovation and excellence; including business plan advice and go to services facilitated by those with small business expertise will add value to the District.

4.13 We support the establishment of a database of local business mentors.

4.14 Federated Farmers supports the development of an online training facility and video conferences space with adequate support services to provide local businesses the opportunity to link with expertise not available in the region.

4.15 Federated Farmers supports examination of alternative models for service provision, such as the encouragement or mobile rural banking services. We would see Council's role as to support innovative thinking in adopting and supporting such a model to start up in the region.

4.16 Federated Farmers does not believe that the Lion's Den of local business and investors is appropriate for the business activity in the region. Most business activity in the Rangitikei is capital investment heavy, including farming, processing, manufacturing and retail, with poorer return on capital. To propagate this business activity requires financial advice. The Lion's Den concept is more suited to higher risk business opportunities that require a smaller capital investment to get started with higher risk of success and failure.

4.17 Federated Farmers supports the role of Council in using Council newsletters and other local media share the messages of the District and celebrate success.

Recommendations:

That Council has a key role to play in explaining the options for and benefits of irrigation to the local communities and water users.

That the facilitation of sector groups on primary production and intensification, diversification of rural production as appropriate and identified within the Regional Growth Strategy be amended to be led by the private sector.

That investigation of realistic opportunities for further developing these sectors in the district, including a detailed investigation of the additional rural production potential of the district be led by the private sector.

That the facilitation of skills clusters around processing of regional products is amended to be led by the private sector. Council can support these initiatives through their core activities.

That Council is identified as a key driver into the investigation into the potential of stock and irrigation water schemes through advocacy for co-funded programs from central government. That Council is also identified for their role in advocacy of water storage.

That small business training for innovation and excellence is offered by those with small business expertise.

That the Lion's Den concept is deleted from the strategy, and focus is made on other areas of business support services.

5 ABOUT FEDERATED FARMERS

5.1 Federated Farmers welcomes the opportunity to comment on the *Rangitikei Growth Strategy*.

5.2 Federated Farmers of New Zealand is a voluntary, member-based organisation that represents farming and other rural businesses. Federated Farmers has a long and proud history of representing the needs and interests of New Zealand farmers.

5.3 The Federation aims to add value to its members' farming businesses. Our key strategic outcomes include the need for New Zealand to provide an economic and social environment within which:

- Our members may operate their business in a fair and flexible commercial environment;
- Our members' families and their staff have access to services essential to the needs of the rural community; and
- Our members adopt responsible management and environmental practices.

This submission is representative of member views and reflects the fact that local government decisions impact on our member's daily lives as farmers and members of local communities.

Federated Farmers thanks the Rangitikei District Council for considering our submission.


FEDERATED
FARMERS
OF NEW ZEALAND

Rangitikei DISTRICT COUNCIL

Submission Form

Issue 1

Should Council increase its investment in economic development?

- ☐ **Option 1 – Yes I support Council's proposal** of allocating $205,000 per year – funded 50% from general rates and 50% UAGC.
- ☐ **Option 2 – Do Nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Compromise** – I do not support Council's proposal, but I do support investing an additional annual provision of $100,000 for strategic research or $105,000 for local initiatives.

Other Comments:

Issue 2

Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?

- ☐ **Option 1 – Yes I support Council's proposal** to upgrade or build new civic/community centres in Bulls, Marton and Taihape with Council's capital contribution of $1.6M for Bulls, $1.64 for Marton and $1.78 for Taihape.
- ☐ **Option 2 – Do nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Upgrade Bulls only** – I do not support Council's proposal, but I do support the upgrade for Bulls with Council's capital contribution of $1.6M.

Other Comments:

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities

- ☐ **Option 1 – Yes I support Council's proposal** to install on-site treatment facilities at Mangaweka, and maintain all other existing urban water and wastewater systems, at a cost of $1.768 million, in 2022/23.
- ☑ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Detailed objections as in the attachmet.

Issue 4

What should we do with our community facilities?

A. Swimming pools

- ☐ **Option 1 – Yes I support Council's proposal** to maintain the status quo at Taihape, Hunterville and Marton pools.
- ☐ **Option 2 – Reduce the swimming season at Taihape and Marton** – I do not support Council's proposal and support a reduced swimming season at Taihape and Marton pools.
- ☐ **Option 3 – Extend the swimming season at Taihape and Marton** – I do not support Council's proposal and support an extended swimming season at Taihape and Marton pools.

Other Comments:

B. Community housing

☐ **Option 1 – Yes I support Council's proposal** to invest $100,000 for the next three years to upgrade all housing units.

☐ **Option 2 – Status quo** – I do not support Council's proposal.

Other Comments:

C. Parks upgrades

☐ **Option 1 – Yes I support Council's proposal** to rely on community donated labour and materials for improving our parks.

☐ **Option 2 – Council funded provision** – I do not support Council's proposal and support Council including an annual $50,000 provision to upgrade facilities and equipment at our parks.

Other Comments:

Issue 5

Should we increase rates to build a larger Roading Reserve Fund?

☐ **Option 1 – Yes I support Council's proposal** to increase the roading reserve to a maximum of $3.5M.

☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Submissions close at 12noon on Monday, 4 May 2015.

Submitter details (please print clearly):

Your name: Drew Ferry

Email address: drewferry@hotmail.com

Preferred contact phone number: 021-353-015

Your postal address: PO Box 75

Town: Mangaweka.

How would you prefer to receive correspondence relating to your submission and the hearings:

☑ Email ☐ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.

☑ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?

☐ Yes ☑ No

☐ Yes I would like to subscribe to Council's e-newsletter

Are you writing this submission as:

☑ an individual, or

☐ on behalf of an organisation

If on behalf of an organisation, please provide details:

Organisation:

Position:

Privacy Act 1993

Please note that submissions are public information. The content on this form including your personal information and submission will be made available to the media and public as part of the decision making process. Your submission will only be used for the purpose of the long term plan process. The information will be held by the Rangitikei District Council, 46 High Street, Marton. You have the right to access the information and request its correction.

Submission: Rangitikei District Council Long Term Plan 2015-2025

Delivered by hand Marton RDC Office
Monday 4 May before midday

Dear Mayor Andy Watson and Rangitikei Councillors

This submission is made in specific response to ISSUE 3: Replacing reticulated and waste water schemes for smaller communities as described in the Consultation Document and in particular is a submission AGAINST the Council's preferred option 1 – the installation of on-site treatment facilities at Mangaweka and therefore, by default of the options presented IN FAVOUR of option 2 wait and see.

This document outlines the numerous factors which lead to my opposition to this proposal for closure of a fundamental service for our community. They are explored in depth and can be summarised as:

1. Questionable reasoning and rationale for preferential status of option 1
2. Apparent lack of due diligence and genuine exploration of options, including feasibility of proposed option
3. Insufficient information on which to engage in consultation and decision making
4. Inconsistencies in plan and other documentation
5. Deficit approach to community development
6. Negative impacts

1. Questionable Reasoning and Rationale
In both the Consultation Document, the draft Long Term Plan and stated at the Mangaweka Community meeting 13 April, the main reasons stated for this proposal to close the Mangaweka WWTP are:

a. Declining population
b. Tighter resource consents
c. Higher compliance costs

Whilst it is certain we are facing a population decline, both across the RDC region and in Mangaweka, I am unsure how this will affect the rate payer base. Less people living in their properties does not equate to less rates. Loss of services such as this may force me to leave the district to seek better standards of living, but unfortunately I will not be able to merely leave my obligations to pay rates on my property as I leave the district. Conversely, less people living in their connected, rateable properties will put less load on the communal system, which may in fact have a positive consequence on the achievement of the future consent.

Secondly, the notion that in ten years time 'conditions for the new consent are likely to require higher levels of treatment" as a basis for decision making now seems somewhat crystal ball gazing-ish. When specifically asked about this at the town meeting, the response was that Council can't be sure of consent status and needs to flag this as a potential issue. The clear statement of the preferred option to decommission the WWTP and implement alternative on-site options *prior* to consent expiry is neither 'flagging a possible issue' nor allowing for the possibility of the next consent being achieved within the newly refurbished, currently compliant system.

Finally, the statement of higher compliance costs is unsupported with any specific financial considerations of status quo and projected future scenarios. Again, on questioning at the town meeting, it appeared there has not been any financial modelling to back up this reason to decommission the WWTP.

2. Due Diligence

The preferred option is a significant change and a loss of one of the very few Council supported services delivered specifically to the ratepayers of Mangaweka. With such a radical option as the Council preferred choice, a fair expectation would be that Council staff would have conducted due diligence to consider a range of options, to enable Council to make an informed decision to both recommend to the region and label as 'preferred'.

This does not seem to be the case and from the brief amount of research I have undertaken it would appear not only is the preferred option objectionable on a number of levels, but more fundamentally it may not even be possible.

I would urge the Council to review the Horizons regulations in this regard and specificaliy point out that under current guidelines from the Manual for On-site Wastewater Design and Management 2010, it would appear a densely filled residential area as Mangaweka township would present insurmountable problems with regards to requirements for boundaries and land area use and land in reserve before any consideration is even given to such things as soil and groundwater. The regulations have become more stringent for cumulative environmental effects and Horizons clearly states:

> *" The risks from cumulative environment effects need to be considered when there is more than one system per 5,000 m2 of land area."*

This is clearly the case for 63 connections within the town boundaries of Mangaweka and I can not see how any series of on-site systems could achieve consent requirements to be installed. Our situation would certainly appear to fall outside of the standard site installation and as such would have to be considered under discharges that are not in accordance with the Manual for On-site Wastewater Systems Design and Management (Horizons Regional Council 2010), which states:

> *the Regional Council must make decisions on resource consent applications, and set consent conditions for on-site discharges of domestic wastewater to ensure that:*
>
> *(a) the site is suitable for the intended on-site wastewater management system,*
>
> *(b) the discharge does not result in actual or potential contamination of:*
>
> *(i) groundwater at any point of abstraction utilised for irrigation, stock or domestic drinking water.*
>
> *(ii) surface water bodies,*
>
> *(iii) stormwater drains,*
>
> *(iv) artificial watercourses, or*
>
> *(v) neighbouring properties,*
>
> *(c) the discharge does not constitute a public health threat,*
>
> *(d) the discharge does not cause any offensive or objectionable odour beyond the property boundary, and*
>
> *(e) a sufficient area of land is set aside as a reserve disposal area*

I submit it is both remiss and negligent of Council to put forward an option into the 10 year plan, without at very least a feasibility study to assure residents it is possible, let alone preferable.

Further to this, I believe labelling in the consultation document of option 1 as Council's Preferred option, is misleading and misrepresentative, the implication in this language being that Council has considered a range of options and presents this as their preferential selection. When challenged to address this point at the Mangaweka town meeting, the response from the Mayor was to suggest that "perhaps the language we have used is a bit harsh" but there is a requirement for Council to state preferred options. Surely the point of making statements around preferences is to have undertaken due diligence and explored a range of options, considered them against relevant criteria, their feasibility and alignment with local priorities and then making an informed recommendation to the constituents. There is no evidence that any such investigation has been done.

3. Insufficient Detail

I have already discussed the lack of genuine investigation and/or disclosure of pertinent facts leading to the preferred option being tabled.

Of even more concern is the lack of depth behind the $1.768 million dollar expenditure that is budgeted to be spent to implement the on-site systems. Firstly, I have been unable to access any breakdown of this figure. At the town meeting when specifically asked if the intention was this would be managed as a grant to current property owners or handled as a loan to be recovered through rating, both the Mayor and CEO were unprepared to provide a certain answer, mentioning they hadn't thought that far ahead. Surely, even being included in the draft plan, one should fairly expect something as fundamental as to whether this expenditure was a grant or a loan would be planned.

Further, the figure of $1.768 million is apparently indicative, with the suggestion significant savings could be made, with a starred indication:

> *"5 this is based on installing septic tanks. Composting toilets would be around half that cost."*

This is misleading at best, Horizons make it very clear that this suggestion is unfounded:

> *"Wherever a composting system is installed it will still be necessary to install a greywater treatment and land application system. The greywater system to be designed in accordance with a domestic system using the per capita flows allowance..." pg40 Horizons Manual for On-site Wastewater Systems Design and Management 2010*

A further concern is whether RDC has given any consideration into the expectation of Central Government in terms of expenditure and funding of the preferred option, should this make it into the plan. Would ratepayer monies be expected to pay for capital works to central government assets (School, Fire Station, Dept of Conservation premise) and other community owned assets (Playcentre, Plunket rooms (housing Mangaweka Library), Churches. If the expectation is these would be self funding, we may well be faced with the loss of these functioning assets and their invaluable contribution to the wellbeing of our local Mangaweka, and wider Rangitikei, communities.

4. Inconsistency

On reading widely into associated documentation, the inconsistencies inherent in Council's proposal and approach to Mangaweka's wastewater become increasingly obvious and contradictory. To illustrate, from Council's "Asset Management Plan 3 Waters 2014", the provision of stormwater is clearly articulated beyond a simple infrastructure water management function: Quote page 41 (my highlight):

> *The key drivers of the levels of service for stormwater are community outcomes. The activity contributes equally to the treasured natural environment, buoyant economy and enjoying life in the Rangitikei.*
> *In line with Council's strategic priorities, the provision of this activity provides the basic infrastructure which enables the District to attract and retain people and businesses.*

It is curious and genuinely inconsistent, that Council does not afford sewage and grey water management a similarly significant role in the areas of community outcomes and buoyant economies which retain people and businesses. I suggest that council should afford this essential infrastructure a similar role in community outcomes as the stated ones for stormwater. This then clearly would not align with Council's preferred option to close the communal WWTP.

Another example of inconsistency rife in this approach arose at the Town meeting with the Mayor's assertion that as technology advances so quickly, in the indicated time period there may be huge advances in on-site WWTP such that we can not anticipate. It is interesting to note these advances were presented only as a positive step for on-site solutions, when actually they are just as applicable to the communal system and could certainly be part of a positive solution for keeping our town's WWTP efficient and effective.

5. Deficit approach to community development

The underlying driver of this option and indeed much of the subtext of the entire LTP is that small communities are just going to have to face the loss of all collective services available to them directly, yet continue to contribute to shared services for others, simply by virtue of the almost single minded focus on population and population loss ie big supported by small as opposed to small supported by big. This deficit approach will not achieve anything except encourage even more population loss from small settlements.

This is unsettling for a number of reasons, as a region, we can readily be considered as 'small' in our entirety – every town in the Rangitikei is essentially small town rural NZ and I challenge our Council to be more focused on active development of our entire community – it is possible for Council to play an active role, in the regeneration of our whole region, including small settlements and not simply 'pick winners' based on population size. This is not dictated by funding provision, but is certainly doomed if base services are withdrawn. Mangaweka for example showed an 9% increase in business locations in the 2013 census – why not select that figure as the statistic to base decisions on, rather than the population decline, and ensure services are sufficient to continue this growth area.

Central Government has recently shown its commitment to Mangaweka specifically with substantial capital upgrades to:

a. Our local primary school, with an estimated $500,000 spend on brand new office and toilet blocks
b. Playcentre building, new build currently underway, funded through local fundraising efforts and grants, with upgrade to toilet facilities a key reason for this development
c. Fire brigade building upgrade and substantial work on sealed areas and driveway

The implications of flow on effects if the on-site proposal is passed into the LTP is most concerning when considered against this background of recent investment in development of these facilities based on expectations of the current services. Whilst I would not like to make any assumptions about likely scenarios for these organisations if option 1 is actioned, I would urge Council to take careful consideration of the potential impact this recent expenditure and commitment shown in our small town.

6. Negative Impacts

It is difficult to identify any benefit from this proposal at all that can even begin to balance the immediate as well as long term, extensive and irreversible negative impacts of the preferred option should it make it into the plan, and worse, be implemented (were that even possible).

Timing and development: It is absolutely immoral to include this 'option' in a ten year plan with its significant impact on all aspects of property values, sales and renovations. The likely immediate flow on impact will be no new development on existing properties at all during the 'unknown' period leading to a decisive action plan being implemented, leading to even further collapse of local property market. It would be fundamentally hypocritical for RDC to issue any building consents in existing properties for work which council is knowingly targeting for disconnection at some nearing future point.

Negative impact on economic activity; with such uncertain 'planning' and clear lack of commitment to local infrastructure, there is little to invite, retain and grow business activity for existing and potential enterprise.

This proposal flies in the face of community wellbeing and I believe seriously contravenes the social contract we have with each other across the RDC. I urge council to reconsider the impact of this option both in terms of the issues specific to decommissioning the Mangaweka WWTP itself presenting as an implausible, ill-conceived idea with little to recommend itself and also as part of a wider context, which does not positively contribute to the quadruple bottom line, failing to provide benefit to fiscal management and economic growth, and neither contributing to environmental sustainability, community vitality or social equity.

I urge each and every Councillor to ensure this option is removed from the longterm plan.

Yours sincerely

Drew Ferry

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drewferry@hotmail.com

Submission Form

Issue 1

Should Council increase its investment in economic development?

- ☐ **Option 1 – Yes I support Council's proposal** of allocating $205,000 per year – funded 50% from general rates and 50% UAGC.
- ☐ **Option 2 – Do Nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Compromise** – I do not support Council's proposal, but I do support investing an additional annual provision of $100,000 for strategic research or $105,000 for local initiatives.

Other Comments:

Issue 2

Should Council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?

- ☐ **Option 1 – Yes I support Council's proposal** to upgrade or build new civic/community centres in Bulls, Marton and Taihape with Council's capital contribution of $1.6M for Bulls, $1.64 for Marton and $1.78 for Taihape.
- ☑ **Option 2 – Do nothing** – I do not support Council's proposal.
- ☐ **Option 3 – Upgrade Bulls only** – I do not support Council's proposal, but I do support the upgrade for Bulls with Council's capital contribution of $1.6M.

Other Comments:

Attached

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities

- ☐ **Option 1 – Yes I support Council's proposal** to install on-site treatment facilities at Mangaweka, and maintain all other existing urban water and wastewater systems, at a cost of $1.768 million, in 2022/23.
- ☑ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Plenty – attached

Issue 4

What should we do with our community facilities?

A. Swimming pools

- ☐ **Option 1 – Yes I support Council's proposal** to maintain the status quo at Taihape, Hunterville and Marton pools.
- ☐ **Option 2 – Reduce the swimming season at Taihape and Marton** – I do not support Council's proposal and support a reduced swimming season at Taihape and Marton pools.
- ☐ **Option 3 – Extend the swimming season at Taihape and Marton** – I do not support Council's proposal and support an extended swimming season at Taihape and Marton pools.

Other Comments:

B. Community housing

☐ **Option 1 – Yes I support Council's proposal** to invest $100,000 for the next three years to upgrade all housing units.

☐ **Option 2 – Status quo** – I do not support Council's proposal.

Other Comments:

C. Parks upgrades

☐ **Option 1 – Yes I support Council's proposal** to rely on community donated labour and materials for improving our parks.

☐ **Option 2 – Council funded provision** – I do not support Council's proposal and support Council including an annual $50,000 provision to upgrade facilities and equipment at our parks.

Other Comments:

Issue 5

Should we increase rates to build a larger Roading Reserve Fund?

☐ **Option 1 – Yes I support Council's proposal** to increase the roading reserve to a maximum of $3.5M.

☐ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

Submissions close at 12noon on Monday, 4 May 2015.

Submitter details (please print clearly):

Your name: John Eames

Email address: mangaweka@hotmail.com

Preferred contact phone number: 027 782 5717

Your postal address: Po Box 12

Town: Mangaweka 4746

How would you prefer to receive correspondence relating to your submission and the hearings:
☑ Email ☐ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.
☑ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?
☐ Yes ☐ No

☐ Yes I could like to subscribe to Council's e-newslettter

Are you writing this submission as:
☑ an individual, or
☐ on behalf of an organisation

If on behalf of an organisation, please provide details:

Organisation:

Position:

Privacy Act 1993

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Long Term Plan Submission

to

Rangitikei District Council

from

John Eames

Issue 3
Mangaweka Wastewater Proposal

Council's 'preferred option' to decommission the existing very good wastewater system at Mangaweka when the current consent expires in 2024 has been met with universal disbelief. For a start there is no reason to believe that the present system will not still be consentable. It is unquestionably a backward step and the authors of the proposal agree, stating it will result in a 'decreased level of service in Mangaweka'. A massive understatement.

Effect on Property Values

Merely putting this proposal in the consultation document, particularly as the preferred option, is enough to start an erosion of values. If it reaches the final plan real estate agents will have to disclose this to buyers, seriously affecting already low values.

Houses could well become almost unsaleable. The prospect of on-site disposal of all wastewater and the mere mention of composting toilets will see to that. Not to mention the hassle and expense of each property having to have its own consent.

Whether you like it or not the perception is 'third world' and the valuation damage is not confined to the property owners. It erodes the Council's rating base too.

Feasibility

Recently I installed a septic tank system on my farm for a 3 b/r house. The extent of the distribution field required for consent (400 square metres) far exceeds what can be accommodated on a town section (unless perhaps it hasn't got a house on it ? !). Two other rural systems have been installed locally since mine and they are similar. Either we've been made to install giant overkill or on-site disposal in most town properties simply can not be consentable. All three locations referred to have better drainage than much of Mangaweka, which is known to be poor in this respect. It is obvious that most properties served by the present scheme are far too small for this to work. I believe the issue is this serious. Either you plan to maintain the existing system or you write Mangaweka off. New developments with Mangaweka's advantages of SH1 and the river are always a possibility. This backward proposal will pretty much rule that out.

Proposing to set aside a substantial sum for installing some vastly inferior and almost certainly unworkable alternative instead of maintaining the asset we have is nonsense and the concept should be removed from the plan.

Funding the System Maintenance

Issue 2 concerns investing in the rejuvenation of the town centres of Bulls, Marton and Taihape. I support Option 2 there – do nothing. Until the essential services of sewage and water are properly funded throughout the district not one dollar should be spent titivating any town centre. Resist the 'nice to have' spending and stop planning to reduce essential services before that disease spreads to other places in the district.

LTP Submission from Taihape Community Board 4 May 2015.

Issue 1 – Should council increase its investment in economic development?
Option 1 YES.

We believe that RDC needs to come up with a package for interested parties who wish to start up businesses here in the district. This package should be a one stop shop for businesses to find out what is available, including buildings, land etc, to assist them in a decision to set up their business here.
Possibly this package needs a SWOT analysis of each town or something similar as each town has its own characteristics that may appeal to a potential business owner or householder.

Issue 2 – Should council be investing in the rejuvenation of the town centres of Bulls, Marton and Taihape?
Option 1 YES

Taihape Community board recommends that, before making any decisions about redeveloping our Town Hall site/Building, that the Council obtains a second more expert assessment of the Taihape Town Hall strengthening work. We would like to see another engineer who specializes in older buildings. We would like to recommend as an example Peter Smith of "Spencer Homes Ltd, Peter Smith has serviced as the Chairman of the Seismic Retrofit Research Board for the combined Auckland University and Canterbury University, FRST Research project on Seismic Retrofit of Existing Buildings, and is currently on the Engineering Advisory Group, advising the Department of Building and Housing on the Christchurch earthquake recovery for domestic and commercial buildings). This Engineer was recommended to Peter Oliver by two different top Wellington architects who have been involved in earthquake strengthening of old buildings around the country, (but more particularly in Wellington).The Community Board recommends that before any decisions are make about redeveloping the Town hall site/building in the LTP, a 2nd opinion is needed pertaining to the cost and extent of the strengthening required for the Taihape Town Hall.

Issue 3 – Replacing reticulated water and wastewater schemes for smaller communities.
Option 2 – Wait & see.

Why are we going down this route? This is all compliant at this stage; Council has seen no foreseeable problems in the future. We need to see better, substantiated facts that indicate this is necessary. The Mangaweka system was state of the art when upgraded in 2006.
We do not support individual site septic tanks, it seems not to be a practical, or viable option for the Mangaweka Area. Local issues such as soils slope and water tables all need to be taken into account when making these decisions. We feel that in the case of Mangaweka to issue has been solely driven by projected population change.

Issue 4 – What should we do with Community Facilities?
Swimming Pool
Option 1 – Yes we support Council's proposal, to maintain status quo at Taihape, Hunterville and Marton

We do not believe that we should reduce the swimming season at Taihape. We also believe that from the numbers for patronage at the end of March that we cannot extended the swimming season at Taihape, until the numbers have increased.
We would prefer to see an asset management plan created for the Taihape and Marton pools so that future maintenance and capital spends are well signalled and traceable. We would prefer that when major change to the management plan takes place that the Council consults with the Community Board .It would be our preference to use Taihape based local contractors/local knowledge when it is available for all work at the Taihape Pool.

B. Community Housing.
Option 1. Yes we support Councils proposal to invest $100,000 for the next three years to upgrade all housing units.

We would encourage council or a potential trust to consider flexibility in the design of an "New Builds" because the structure (masonry block) of many of the current units makes them very hard to reconfigure for other uses or number of inhabitants. We want our tenants to be warmer, healthy and happier.

C. Park Upgrades
Option 2, Yes
To establish an ongoing annual provision of $50,000 for upgraded facilities and equipment at Councils park to be allocated by council each year. (Community and RDC work together)
To invest 10,000 to each of the 3 skate parks in the district.
Taihape Area School submitted on this to RDC, last year.
Taihape Community Board would like RDC to investigate further into the Mountain Bike/Cycleway/Fitness challenge trails at Memorial Park to Papakai Park.
This would all fit in with RDC's "Youth Policy and Recreation Policy"'.

Issue 5 – Should we increase rates to build a larger roading reserve fund?
Option 1 – YES
As a board we understand and support why we need to do this but we also have concerns that 45% of our current rates are going towards road maintenance (dominantly rural roads) and how this will affect the urban ratepayers of Taihape.

Taihape Kindergarten Driveway/Road.
Taihape Community Board supports Taihape Kindergarten in its submission to get RDC to maintain and renew this access road. There is a water run off issue coming from Mount Steward reserve which exacerbates the damage

and potholes along this road. The kindergarten's role is to teach our children, not to spend its precious time and money maintaining a road.
Commercial vehicles such as trucks are often seen driving around the loop, as it is a convenient place for them to turn.
All kindergarten parents/caregivers who use this drive to deliver and pick up their children are ratepayers of the Taihape Ward and deserve support from the council in maintaining this road. We recognise that the history of access to this site is somewhat clouded, but we emphasise that as a community we do need to move forward on this issue.

Gumboot Lane
This area needs urgent attention to sort out the drainage problems. (Photos attached). This area is used by passing through traffic everyday. The state it's in is disgusting currently with a pool of water on top of the gumboot throwing platform after every rainfall.

Maori landlocked property
Taihape Community Board supports RDC in getting the owners access to their landlocked land.

Rural Halls
To have individual asset management programmes assigned to them? We would recommend that like our engineered assets a formalised approach to maintenance be put in place for these community owned and run assets.

Irrigation of Memorial Park
We have had issues with the turf maintenance and watering of Memorial park through the dry summers that have occurred the last few years, we would support the idea of irrigation of Memorial Park.
We would also like to see the grandstand and memorial park to be properly wired for sound for all our events on the park, such as A & P Show, Horse events and Gumboot Day.

UAGC
Taihape Community Board has concerns on how the UAGC formula is applied.

Main Street Banner
TCB supports all efforts to erect a simple and effective structure for the flying of banners across Hautapu Street as soon as is possible.
Any organisation can then put a banner up without a traffic management plan.
This is a great place to advertise events throughout the district, bring more people to the town for events such as A & P Show, Horse versus Man, Gumboot Day.

Walkway SH1 – Dixon Way
Taihape Community Board would like an investigation into the provision of an unpaved walking surface on the road shoulder of SH1 between the intersection of Dixon way and the intersection of Achilles drive. This section of highway currently has high levels of pedestrian use from Dixon way, residents and tenants of the backpacker hostel situated in Dixon way and many runners

and walkers who use the Otaihape Valley Road and SH1 as a circuit for fitness and walking recreation. Currently the verge is either grassed or bare soil which causes people to walk on the sealed shoulder of the highway in wet weather and not on the verge approximately half of the verge lies within the 50 km zone. The verge is only 0.5 wide at best and users often need to walk on SH1 to get around signs and obstacles. The verge is very uneven, and this lack of footpath is a serious accident waiting to happen. As Dixon way is now classified as urban zone it needs to be connected to the rest of the town without the users having to walk on the busy SH1.

On behalf of Taihape Community Board

Michelle Fannin - Chairperson
thefannins@xtra.co.nz
0211526412
62 Kiwi Road Taihape 4720

I would like to speak on behalf of this submission.

Submission Form

Issue 1

Should Council increase its investment in economic development?

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Other Comments:

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Other Comments:

UP GRADE EXISTING BUILDINGS

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities

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Other Comments:

Issue 4

What should we do with our community facilities?

A. Swimming pools

☐ Option 1 – Yes I support Council's proposal to maintain the status quo at Taihape, Hunterville and Marton pools.

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Other Comments:

TAIHAPE SWIMMING POOL IS THE MOST WASTED ASSET I'VE EVER SEEN. SO MANY POSSIBILITIES WASTED I.E CAFE - SALADS, CAFFE, OPEN ALL YEAR ROUND, OR AT THE VERY LEAST MAKE YOUR EXISTING HOURS MORE USER FRIENDLY I.E NOT OPENING AT 6:30AM DURING

B. Community housing

☑ Option 1 – Yes I support Council's proposal to invest $100,000 for the next three years to upgrade all housing units.

☐ Option 2 – Status quo – I do not support Council's proposal.

Other Comments:

C. Parks upgrades

☑ Option 1 – Yes I support Council's proposal to rely on community donated labour and materials for improving our parks.

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Other Comments:

Submissions close at 12noon on Monday, 4 May 2015.

Submitter details (please print clearly):

Your name: Gary Johnson

Email address: garyjohnson@xtra.co.nz

Preferred contact phone number: 06-3885185

Your postal address: 30 Kawa Rd.

Town: Taihape

How would you prefer to receive correspondence relating to your submission and the hearings:

☐ Email ☑ Letter

Would you like to speak to your submission at the hearings being held on 7 and 8 May? These will be held in Marton and potentially in Taihape, if required.

☑ Yes ☐ No

Would you prefer to present your views to Council via an audiovisual link, if that could be arranged?

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4 MAY 2015
TO: S.W. 1-15
FILE: 15 9350
DOC:
4-5-15

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Other Comments:

Un sure.

Issue 2

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Other Comments:

Yes — too involved for this space!!!

Issue 3

Replacing reticulated water and wastewater schemes for smaller communities

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☑ **Option 2 – Wait and see** – I do not support Council's proposal.

Other Comments:

no real alternative research done on this issue it seems, shabbily done

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Other Comments:

Keep the pools open – encourage winter fitness. — particularly older people

33

B. Community housing

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☐ Option 2 – Status quo – I do not support Council's proposal.

Other Comments:

They probably need the maintenance anyway

C. Parks upgrades

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Submitter details (please print clearly):

Your name: L LIDER

Email address:

Preferred contact phone number: 06 3825880

Your postal address: PO Box 44

Town: Wanganui

How would you prefer to receive correspondence relating to your submission and the hearings:

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