CREATING SAFER, HEALTHIER HOMES FOR MARLBURIANS

Findings in this proposal were researched by The Collective Edge Marketing Consultancy on behalf of Freeman Group and Roofline Marlborough

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SUMMARY

There have been many initiatives in recent years with support from council for Marlborough homeowners to make improvements to their homes through the Voluntary Targeted Rates Scheme (VTR). We are seeking the same support from MDC to expand this scheme further to include the re-roofing of existing Marlborough dwellings by offering a funding service to ratepayers. The findings within this paper show that by doing so, we can continue to secure the health of the home thus increasing its energy efficiency. We can also enhance the seismic performance of dwellings and improve the health of our waterways to help meet new national environmental standards of fresh water through the removal of zinc inputs from old galvanised roofing.

We believe we have an opportunity to change the trajectory for many homeowners if we invest in new roofing solutions for Marlborough's current housing stock. Furthermore, prioritising warm, dry and safe housing also presents the potential for significant employment creation and economic stimulus for the region.

We are ready to execute this project and the supply chain is in place. Roofline Marlborough, as part of Freeman Group, requests that you consider the possibility of subsidising these improvements through the loan scheme.

ABOUT ROOFLINE MARLBOROUGH

Roofline Marlborough is an individual branch of Freeman Group. Like all eight branches of Freeman Group, Roofline Marlborough is custom configured to match the unique conditions of our region. We are passionate about our craft and are advocates for better buildings, because we know that better buildings mean healthier and happier Marlburains.

We are 100% New Zealand owned meaning all profits stay on shore with our main supplier being NZ Steel (TM). We have been purchasing the steel made at their Glenbrook steel mill, south of Auckland, since the mid 1960's under the patented and well known brands of COLORSTEEL®, MAXX/ENDURA and ZINCALUME(R). NZ Steel is unique in the world of steel making. This is because it uses its own iron sands resource as a key ingredient in the production of high quality steel and is the only company in the world making steel in this way. NZ Steel is the single largest employment site in the country and is the country's largest steel producer (620,000 tonnes of steel per year). It contributes 1% of New Zealand's GDP and over $2 billion into the economy and prides itself on being an environmentally, economically and socially sustainable business. One half of all steel is exported.

THE OPPORTUNITY

The recommendations within this proposal provide solutions to three unique issues to the Marlborough housing environment with the aim of creating healthier, safer homes for Marlburians while also contributing to the removal of heavy metals from our freshwater sources.

The current New Zealand building code has a range of minimum requirements designed to improve the thermal efficiency of New Zealand housing and in recent years we have seen initiatives towards government funded insulation and heating retro fits such as Warmer Kiwi Homes as well as local body loans such as the Clean Heating Scheme. While insulating New Zealand homes and retrofitting energy efficient heating systems are vital first steps in providing cleaner healthier homes, what good are they if the home itself has a leaking roof past its lifespan.

MDC enables Marlborough homeowners to make energy efficient improvements to their homes through a voluntary targeted rates (VTR) scheme. Improvements include home clean heating, home insulation, solar power and solar water heating. There is good appetite for these schemes from ratepayers with strong uptake each year. With such emphasis being placed on lifting the quality of New Zealand's housing stock through installing insulation and retrofitting energy efficient heating systems, we believe that providing Marlborough homeowners with solutions to re-roof their existing dwellings as part of the VTR scheme is the next vital step in ensuring that all previous efforts to secure the health of the home and it's occupants is maintained.

While it is a great initiative to add solar panels to the VTR scheme, an important consideration is whether the existing roof is up to standard. Experts recommend that unless the roof is brand new, re-roofing is of high importance prior to the solar panel system being installed to ensure it is able to cope with the extra weight. If the roof is at the end of its lifespan and showing signs of wear and tear or leaks, it would be a complete waste of resources to install a solar panel system.

This proposal also offers a solution to tackle the issue of stormwater runoff - a huge global polluter of our waterways. Zinc runoff from old galvanised roofing is one of the highest contributors to this problem. Elevated levels of metals in freshwater can be toxic to freshwater organisms such as fish and invertebrates, killing stream life and reducing biodiversity.

The benefits received from growing the VTR scheme expand further than the aforementioned. This proposal will also discuss how long run metal roofing can enhance seismic performance, minimising the impact of an earthquake on buildings, as well as the cost of repair and potential loss of life. Marlborough lies within the highest earthquake risk zone in the country due to the district being crossed by a series of fault lines associated with the relative movements of the tectonic plates beneath New Zealand. Extensive research following the Christchurch February 22 earthquake concluded that significant damage occurred to homes with heavy tile roofing aged 15 years and older. This was due to chimneys collapsing and breaking through roofing or the tiles themselves collapsing. Metal roofing generally did not collapse and was able to withstand the effects of the multitude of quakes and aftershocks the region experienced.

Research suggests the potential number of homes impacted in the Marlborough region sits at 19,260 (Figures taken from the Centre for Housing Research 1990 -2005 report and the 1991 Census data). Although it's hard to pinpoint exactly how many of these homes are in need of new roofing solutions, it gives us an indication of the proportion of homes in Marlborough aged 30 years and older.

1. EFFECTS OF POOR OR FAILING ROOFS ON THE HEALTH OF THE HOME AND ITS OCCUPANTS

A considerable body of New Zealand literature links poor housing quality with poor physical and mental health.

The strong link between damp/mouldy housing conditions and poor respiratory health is evidenced in numerous New Zealand and international studies. Poor health results in increased hospital admissions and more absences from school and work, with implications for the economy. A study of 58,000 children in various countries showed “indoor mould exposure was consistently associated with adverse respiratory health outcomes in children”.

Among developed countries, New Zealand has one of the highest rates of asthma and skin infections, made worse by mould exposure in damp homes. Nearly 600,000 New Zealanders of all ethnicities live with asthma. Maori and Pasifika are three times more likely to end up hospitalized. Around 1600 die each year from respiratory illnesses due to poor housing conditions. Cold, damp and mouldy houses in New Zealand have devastating effects on the health of its occupants. The outbreak of a global pandemic such as Covid-19 highlights these issues. Death from Covid -19 is far more likely in those that present with pre-existing respiratory problems which we know have a strong link to mouldy and damp homes.

We know that leaking roofs left unattended contribute to mould in the home. Mould will spread throughout the home’s structure, to the HVAC system and throughout the rest of the dwelling through the vents where it can invade carpets, furniture and even clothing. Mould attacks wood framing, ceiling tiles, and wall and floor coverings and can be difficult to eradicate. In places where leaking water becomes trapped in a confined space, for example, under floors or between covered wall studs, the humidity won’t dissipate and mould or mildew growth will occur. Mould will produce adverse health effects such as neurological issues, respiratory difficulties, vision and eye irritation, skin allergies, a weakened immune system, tiredness and fatigue and even issues within the reproductive system.

Some types of moulds produce toxic compounds. Stachybotrys chartarum is a toxic mould that is caused by leaks that originate from outside the building, and from leaks within wet areas in buildings. Stachybotrys is a greenish-black mould that grows on materials that contain cellulose such as wood fibreboard, fibre-cement, the paper lining of gypsum board, kraft paper wall and roof underlays, wallpaper and timber, when the material is subject to wetting.

A failing roof left unattended will cause substantial damage to the home. Often waiting until leaks appear means structural damage may have already occurred leaving homeowners with large repair bills along with various other safety and health risks. Constant external water intrusion will eventually work down from the attic area to the foundations, causing substantial costly damage on the way. Damaged rafters, ceiling joists, wall framing and even fascia boards and exterior trim can become victims of water intrusion. Chronic roof leaks lead to wood deterioration and weakened, rotten roof framing causing serious problems. It is also incredibly detrimental to roof insulation which has been a major focus in recent years when it comes to creating warmer, healthier homes. When insulation becomes saturated it will take a long time to dry out. Ongoing water intrusion will deplete the insulation significantly and the home will lose hot and cool air, which will also result in higher utility bills.

2.
INCREASING ENERGY EFFICIENCY IN THE HOME

Nigel Washer from Quality Roofing Marlborough has been in the building industry in Marlborough for over 40 years, with re-roofing older homes being his speciality.

Washer states that there are many factors at play as to how a new roof will improve the energy efficiency of the home. Once a roof has been removed, it gives the builder a good chance to inspect any damage due to water intrusion or pests, and tidy up any timber work before further damage occurs. Full insulation can then be installed. Often when insulation has been added to an older home with a low pitched roof, it is impossible to cover the full roof cavity due to areas that cannot be accessed. While the roof is off, insulation can be added to give a full envelope of the roof space ensuring there are no gaps where substantial loss of heat will occur. New building paper will also add an extra layer of insulation. Many older homes with metal roofing were built using short sheet iron. Short sheets are typically found on homes built prior to major improvements in sheet metal production that allowed corrugated sheets to be manufactured in much longer lengths. Prior to this development, the maximum length of sheets were considerably shorter (1.16-3m) and needed to be lapped at each end to make up the length of the roof. This resulted in multiple 'rows' of sheeting across the face of the roof. This is not desirable as it allows capillary action where water will be drawn up into the lap. Water then sits between the sheets and induces corrosion and eventually perforation along the line of contact thus reducing the life of the roof and potentially damaging any insulation that has been installed.

Washer recently installed a new roof on a 1940's bungalow in the Blenheim CBD. Neil Sullivan, the owner of the home had been working on increasing the dwelling's energy efficiency in recent years. The home had good floor and ceiling insulation but was still cold. After the roof was installed, Sullivan reported a 2-3 degree increase in warmth as shown on his DVS temperature gauge. A new roof, combined with other measures such as retrofitting a new clean heating fireplace, means his home now consistently sits above World Health Organization's minimum indoor temperature recommendations of between 18-21 degrees.

3. REMOVING ZINC FROM THE ENVIRONMENT

Around 93 per cent of commercial and industrial buildings and 80 per cent of New Zealand homes have galvanised metal roofs.

These are made of sheets of metal coated in zinc to improve corrosion resistance. Zinc and roofing go hand in hand and have done so since the 1800's as it has the ability to protect materials such as the steel base in galvanised steel from rusting. In 1994 ZINCALUME® was released with 1% silicon, 43.5% zinc and 55% aluminium and became the preferred alternative to galvanised steel and the new substrate for the COLORSTEEL® range. The aluminium content of 55% gives it up to twice the life of galvanised products in severe environments. As a result of its improved performance it is now used in nearly all new pre-painted roof systems and over 70% of unpainted applications. Not only does this mean good news for all building owners, it has and will continue to increasingly have a dramatic impact on the amount of zinc run-off from roofs. The problem lies in galvanized roofs aged 25 years and older. When stormwater runs off a galvanised roof, it carries dissolved metals with it, which find their way into our waterways. While roads and carparks also are a source of heavy metals, the majority of zinc originates from roofs. In Christchurch, results from field testing estimate that galvanised roofs contribute 65% of stormwater zinc to river systems.

In recent years, Auckland Regional Council (ARC) issued information over concerns of zinc build up in Auckland harbours with galvanised roofs being one of the major contributors. The ARC concern was that the level of zinc, at selected sites within the Manukau and Waitemata sub-regions, is higher than natural background conditions and is increasing. In 2003 the ARC commissioned Kingett Mitchell to look at zinc runoff from roofing.

In 2004 the Metal Roofing Manufacturers Association (MRM) commissioned Tonkin and Taylor to conduct a similar study to understand the amount of zinc runoff from various types of metal based roofing. Both studies concluded that the highest level of zinc run-off comes from unpainted galvanised roofs (100% zinc over a steel base often referred to as galvanised iron). At the other end of the scale, was painted zinc/ aluminium coated steel (COLORSTEEL®).

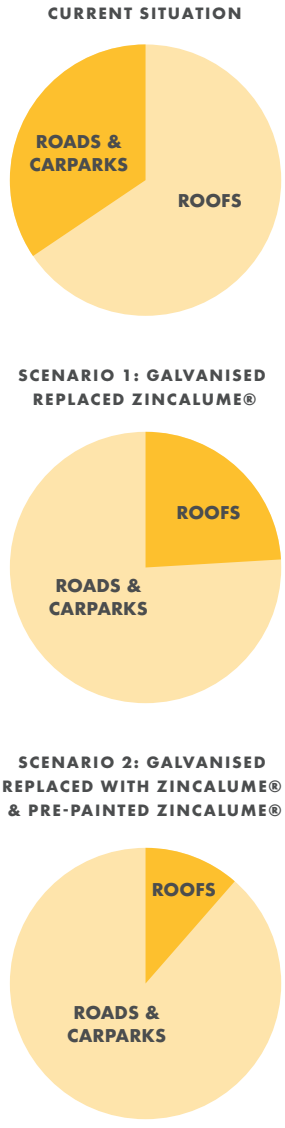


Figure 1 shows a scenario put forward following the research from Tonkin and Taylor showing the potential reduction in zinc run-off from all roofing by replacing old galvanised roofs.

Scenario 1 shows the reduction in zinc from roofs if they were all replaced with Zincalume. Scenario 2 shows a more realistic result where the galvanised roofs are replaced using a ratio of 2:1 for pre-painted COLORSTEEL® to unpainted ZINCALUME® being the replacement material. This ratio reflects the portions sold in each product group in the current market. With no change in current practices zinc in the water ways, over time, can be reduced by 20 times.

4. ENHANCED SEISMIC PERFORMANCE

Following the Christchurch earthquakes, engineering experts have recommended replacing heavy tile roofs with lightweight metal roofing.

Inspections revealed that extensive damage was caused to houses by chimneys falling through heavy tile roofs or by the tiles coming loose and falling. Conversely, metal roofing generally did not collapse under falling chimneys and was able to withstand the quakes themselves. This was one of the main findings in a report produced for Christchurch City Council and the Minister of Housing by Wayne Brown – civil/structural engineer.

Brown was part of Operation Suburb, which involved a team of 400 building inspectors and 300 welfare officers visiting all homes in the affected suburbs to assess damage following the Christchurch February 22 earthquake. In his report he stated that house damage fell into some obvious categories and some simple principles were agreed among the engineers that would have reduced the damage cost by millions if they had been in place. Flexible structures performed significantly better than rigid ones and the choice of cladding made a big difference. Earthquake responses are worse with increased structure weight, particularly weight up high.

Heavy roof tiles and brick chimneys consistently failed and as they fell they created more damage and danger to anyone below. At the opposite end of the spectrum, corrugated iron roofs performed well, even when the chimneys fell as they kept the inhabitants safe. If the February 22nd earthquake had occurred at night, many could have died from falling tiles and chimney bricks. Furthermore, in his report, Brown actually proposed the banning of heavy roof tiles and brick chimneys and advised the retrofit of iron roofs and steel chimney flues.

Another report conducted by the Royal Society of New Zealand, the Institution of Professional Engineers New Zealand, the Structural Engineering Society New Zealand, the New Zealand Geotechnical Society and the New Zealand Society for Earthquake Engineering echoes these findings stating that:

“When building, use ‘earthquake friendly’ materials like piled or waffle-slab foundations, timber (or light steel frame) walls and lightweight roofs. Remove heavy roofs like concrete tiles and replace them with lightweight materials such as steel.”

Marlborough lies within the highest earthquake risk zone in the country due to the district being crossed by a series of fault lines associated with the relative movements of the tectonic plates beneath New Zealand. The Wairau, Awatere and Clarence faults are an extension of the Alpine Fault, as are a number of other active faults of limited extent.

Although nothing can be done to prevent an earthquake from occurring, there are obvious ways in which the impact of earthquakes can be reduced. If we learn from the Christchurch February 22nd earthquake and the extensive investigation into building stock that followed, we can attempt to minimise this impact on buildings, the cost in millions for repair, and the potential loss of life that could occur simply by replacing heavy tile roofing with lightweight metal roofing such as long run iron.

5. SUSTAINABILITY

Climate change and rising energy costs have seen sustainability and environmental management gain momentum all around the world.

In New Zealand the Government has outlined some initiatives as part of a broader programme to improve energy efficiency and sustainability and the building environment will be a focus for much of this activity, with sustainable building materials being a significant part of that process.

In changes outlined in the review of the New Zealand Building Code, building designers will be required to demonstrate the "intended life" for a building and demonstrate that "sustainable" factors have been given full consideration in material selection.

New Zealand Steel, who produces COLORSTEEL® products has long been striving to minimise waste and reduce the environmental impact of its mining and manufacturing operation while still delivering innovative and sustainable steel products. Strong advocates of the Life Cycle Assessment (LCA), the company invests major resources into minimising the effects on the environment from the extraction of raw material, through to manufacture, distribution and usage to final disposal. Unique in the world of steel making, NZ Steel uses its own iron sands resource as a key ingredient in the production of high quality steel and is the only company in the world making steel in this way. The iron sand extraction process at New Zealand Steel's mine site and concentration plant is itself an exercise in improved environmental efficiency. Once the iron sand is concentrated using double drum magnetic separators and further cleaned before stockpiling, the iron sand is pumped as slurry through an underground pipeline over a distance of 18k to the Glenbrook mill. No trucks required. The sand that is left over from the extraction process - called "tailings" - is returned to the site where the iron sand was removed and these areas are being progressively planted with Marram grass and pine trees. It is almost impossible in parts of the sand dunes to tell that the area was once mined.

NZ Steel was one of the first companies in New Zealand to set up a laboratory to measure the environmental impact of its manufacturing site with air and water quality being constantly monitored. The company's objectives of managing its environment and minimising harmful effects from its Glenbrook site was recognised by achievement of ISO 140001, one of only a few major New Zealand companies to achieve this internationally recognised standard. The company had already developed its Environmental Management Systems prior to the establishment of the ISO standard in 1997 and by far the biggest percentage of capital investment in environmental control has been in the improvement of the quality of emissions into the atmosphere.

Steel can be endlessly recycled and does not suffer any product degradation, which makes its life cycle potentially continuous. Steel scrap is a necessary and integral part of the steel manufacturing process and the average recycled content of steel produced by New Zealand Steel is approximately 12%. The recovery rate of steel from buildings is 85% and a recent report on commercial construction waste found that more than 90% of steel was recycled.

New Zealand Steel has worked closely with EPD Australasia and Environmental Choice NZ to fully understand the impact their products have on the environment. The Environmental Product Declaration (EPD) communicates transparent information about the life-cycle environmental impacts of COLORSTEEL® products and the Environmental Choice licences contribute to

points under both the Green Star and Homestar rating tools. This recognises New Zealand Steel's contribution to sustainable and efficient building projects.

Capital investment

The greatest amount of capital investment at the 190 acre Glenbrook site has been directed into issues concerning the environment, specifically improving the quality of emissions into the atmosphere. NZ Steel is a member of the World Steel Association (formerly the International Iron and Steel Institute IISI) which in its first sustainability report for the world steel industry commits to seven key actions including:

- Expanding the use of efficient technology
- Research into new low carbon steel making methods
- Maximising the recycling of steel and by-products
- Developing new generation steels that improve energy efficiency of the products in which they are used.

Steel cannot be produced without the production and emission of carbon dioxide. However NZS has committed to reduce CO2 emissions to the minimum and has consistently met government targets for reducing these emissions. It is currently involved in a joint venture with a Japanese steel company researching new technology for reducing coal use in the steel making process.

6.
COSTINGS

The following costings are approximate figures based on an average roof size of 100 – 125 m2.

Factors such as the existing roofing material to be removed as well as the roof pitch determine pricing. We have allowed approximate scaffolding prices in these figures. However, depending on the roof pitch in some instances, edge protection will suffice. Figures include the current MDC VTR interest rates of 4% with repayments being made over a nine year period.

Area m2	100 - 125m2	100 - 125m2	100 - 125m2
Pitch	15-25 degrees	15-25 degrees	15-25 degrees
Existing Material	Decramastic Tile	Concrete/Clay Tile	Metal
Penetrations	1 Chimney	1 Chimney	1 Chimney
Type	Hipped	Hipped	Hipped
New Profile	Corrugate long run metal	Corrugate long run metal	Corrugate long run metal
Scaffolding	5k	5k	5k
Estimate	$15,850 - 18,475	$16,350 - 19,100	$14,850 - 17,225
Repayments p/w	$35.20 - $41.00	$36.30 - $42.40	$33.00 - $38.20

7. BENEFITS QUANTIFIED

7.1 Reducing financial and social costs associated with housing-related health conditions.

The health benefits from improving homes is well evidenced. Research commissioned by EECA found that in retrofitted houses:

- Admissions to hospitals for respiratory conditions dropped by 43%
- Days off school reduced by 23%
- Days off work reduced by 39%

Separate research of the Government's Healthy Homes Initiative (2019) has shown healthy housing interventions had a payback time of two years and ongoing benefit in following years.

7.2 Alignment with Government Policy and Party Manifestos

This project aligns with the following Acts of Parliament and government policies:

- Energy Efficiency and Conservation Act 2000
- New Zealand Energy Efficiency and Conservation Strategy 2017-22
- Zero Carbon Act 2019
- Ministry of Housing and Urban Development Statement of Strategic Intentions 2019-2023
- Goals of New Zealand's Human Rights Commissioner UN Special Rapporteur report on the right to housing, February 2020
- National Policy Statement for Freshwater Management 2020
- The Building Act 2004

7.3 Sustainable Development Goals

This project directly addresses eight of the Sustainable Development Goals. The 2030 Agenda for Sustainable Development was adopted by all United Nations Member States in 2015. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership.

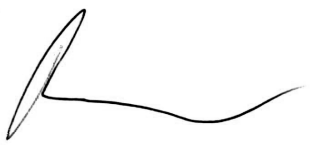
8. FINAL RECOMMENDATIONS

We recommend expanding the VTR scheme to include new roofing solutions by offering a funding service to ratepayers as an affordable option to make improvements to their home and ensure a healthier and safer living environment for Marlburians. While all other initiatives have certainly been beneficial, we believe this is the next vital step in securing all previous efforts.

Due to the need to improve the health of our waterways through the removal of zinc content and thus meet new national environmental standards of fresh water, you may wish to consider subsidising these improvements.

We hope this paper has been of use.

We look forward to discussing this and any other matters that would assist.



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