
Beacon Pathway Submission to the Christchurch City Council Annual Plan

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What is Beacon?

Beacon Pathway Incorporated aims to transform New Zealand's homes and neighbourhoods to be high performing, adaptable, resilient and affordable. Beacon has extensive experience in demonstration projects, a sound base of robust research and a collaborative approach to creating change. A number of Beacon's tools, developed through earlier research and projects, have the potential to contribute to the redevelopment of Christchurch.

In the post Canterbury rebuild, Beacon has been active in:

- **demonstrating the opportunity to rebuild and repair Christchurch housing to a higher level of performance with two projects.**
 - Build Back Smarter. Beacon (with support from Council along with CAFÉ, EECA, Fletcher Building and the Ministry for Science and Innovation) initiated a project to demonstrate that performance upgrades can and should be included alongside earthquake repairs. Upgrades include: insulation in walls, ceiling and underfloor, efficient space and water heating, energy efficient lighting, double glazed windows, rainwater collection and re-use. Build Back Smarter has effectively demonstrated that such improvements can be carried out at same time as repairs and they do not delay the repair process. We are now working with key agencies and industry to see this model adopted.
 - The High Performance House at HIVE. Beacon project managed the design, construction and demonstration of an innovative show home at the HIVE Home Innovation Village. The house showcases a new technology, Warmframe, which allows speedy accurate offsite construction and very high performance, and is a collaborative project from five industry partners (NZ Steel, Fletcher Aluminium, Frametek-RFS, InsulPro and Resene). It was awarded an 8 star design rating by Homestar.
- **advocating for wall insulation at time of repair.** Beacon strongly advocated alongside EECA, Council and MBIE for EQC to change their repair policy and allow homeowners to retrofit wall insulation at time of repair. Beacon prepared a fact bank on wall insulation and provided evidence to support wall insulation retrofit.
- **Demonstrating that in the rebuild programme that the residential construction sector can deliver high performance smaller houses for Canterbury residents via off site manufacture.** At only 100m², the HIVE High Performance House was built off-site in 10

weeks and demonstrated that there are realistic, attractive alternatives to the current market model.

- **initiating projects which will deliver to meet 21st century housing needs in Christchurch.** Beacon, along with Christchurch City Council and MBIE, facilitated the scoping of the ‘Breathe – a New Urban Village’ project, contributed to the technical working group and assisted in securing industry funding for stage 2 of the competition.
- **actively participating in the Canterbury Sustainable Homes Working party.** Beacon has been working with this group to advocate for regulatory interventions in the Land Use Recovery Plan which will result in more resilient housing which meets future needs.

Beacon’s Members include: Christchurch City Council, EECA, New Zealand Steel, Fletcher Aluminium, Certified Builders, Resene and InsulPro Manufacturing.

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Beacon Pathway Submission on Full Annual Plan

<u>Issue(s) /Topic(s)</u>	<u>Comments</u>
<u>Council is a key player determining Christchurch's housing outcomes, particularly with Build Back Smarter Service</u>	<p><u>Council as a key player in determining Christchurch's housing outcomes</u></p> <p>In the quake rebuild / repair process there is the opportunity for Christchurch City Council to build a 21st century New Zealand City. Opportunities where Council can immediately make a difference are:</p> <ul style="list-style-type: none"> ■ <u>Council to set aside funding for operation of Build Back Smarter Service</u> – CCC, (with support from CERA, MBIE, EECA, CDHB and ECan) have funded the establishment phase of the Build Back Smarter Service. <p>The Build Back Smarter Service will enable residents in the greater Christchurch area to improve the quality and performance of their homes within the earthquake repair and build process.</p> <p>A successful pilot of 10 homes had the support of the Insurance Council, major Insurers, major Project Management Organisations (PMO's) involved in rebuild and has demonstrated that homes can be upgraded alongside the repair process, without slowing it down or incurring additional costs beyond the incremental costs of performance upgrade interventions.</p> <p>A Business Case has been prepared for funders and with significant numbers of homes still to be repaired the business case reveals for an annual investment of \$1.2m (spread across central / local government stakeholders) to fund the service, the resulting net benefit to the region will be considerable in increased economic activity, reduced health costs and lower social costs which currently result from the substandard, houses yet to be repaired.</p> <ul style="list-style-type: none"> ■ <u>Appoint Eco Design Advisors to provide independent advice to ratepayers on the opportunities to create more sustainable, cost effective improvements to their homes.</u> The eco design advisor service (refer www.ecodesignadvisor.org.nz/) operates in seven cities throughout New Zealand. Results are significant: <ul style="list-style-type: none"> – More than 80% took action as a result of the advice, putting in more insulation, curtains, draughtproofing, underfloor vapour barriers and efficient heating and moisture extraction. – More than 60% also changed the way they use the house, making better use of the sun and windows for ventilation during the day, and closing curtains at night, drying clothes outside and turning off lights and appliances when not needed. <p>Homeowners have noticed immediate results, with 77% saying the house was warmer, 63% was more comfortable, 43% noticing less mould and moisture, and 30% saying it has led to lower power and water bills. Twenty percent reported improved health outcomes as a result.</p>
<u>Water Supply Activity (pp 32-34)</u>	<p>Beacon support the Level of Service (LOS) - Increase/maintain public awareness of water conservation and Target 2015 - At least 70% public awareness of sustainable water use. However Beacon recommends that:</p>

<p>Support for:</p> <p><i>LOS - Increase/maintain public awareness of water conservation</i></p> <p><i>Target 2015 - At least 70% public awareness of sustainable water use.</i></p>	<ul style="list-style-type: none"> ■ The target be raised over time. ■ Projects be undertaken to implement sustainable water use, not just awareness of it. <p>Beacon supports projects to manage demand for services and create more resilient, localised and diverse networks. Encouraging and enabling the use of supplementary water supply with rainwater tanks, aggressive promotion of demand management and good neighbourhood design is required. Beacon has done extensive work on the benefits to local government of demand management – including cost benefits and value analysis. We draw your attention to the Value Case for Supplementary Rainwater Supply prepared by the Canterbury Sustainable Homes Working Party attached at Appendix 3 and Beacon’s report <i>Slowing The Flow – A Comprehensive Demand Management Framework for Reticulated Water Supply and Water Demand Management: An Economic Framework to Value</i> (www.beaconpathway.co.nz/further-research/article/reports_and_presentations_water) as sources of information around best practice demand management approaches.</p>
<p><u>Regulatory Services</u></p> <p><u>(pp46-54)</u></p>	<p>Beacon submits that the Council provides advice on opportunities for more sustainable design – from subdivisions layout to sustainable building design. Houses currently being built in the suburbs and on periphery of the city are often poorly orientated to the sun and will place an unnecessarily high burden on the region’s infrastructure. Where it is necessary to build on the urban fringe, Council must take steps to facilitate the development of more sustainable housing by:</p> <ul style="list-style-type: none"> ■ Ensuring all subdivisions orientate sites for maximum solar gain. ■ Incentivising developers to remove covenants which: <ul style="list-style-type: none"> – restrict the use of off-site house manufacture and limiting the re-use of modern houses from within the red zone – require minimum house sizes which effectively block many red zone homeowners from being able to afford to rebuild in many parts of Christchurch. We refer you to the research that has been done on this significant problem by the Canterbury Sustainable Homes Working Party attached at Appendix Two. ■ Incentivising developers to include rainwater capture/re-use, lowering the demand on Christchurch’s already stressed water infrastructure and making better use of what nature provides. ■ Aligning Council infrastructure policies and practices to better support on site supplementary water supply systems. While the Council clearly articulates water conservation as an activity of water supply “educate the community to minimise water use and encourage better utilisation”, there is often a lack of support for water savings devices such as rainwater tanks at the time of implementation. We would refer you to the Value Case for Supplementary Rainwater Supply developed by the Canterbury Sustainable Homes Working Party attached at Appendix Three. <p>Beacon submits that the Council employ two eco-design advisors to provide information to the public on sustainable development options.</p>
<p><u>Rating</u></p>	<p>Beacon submits that the Council:</p> <ul style="list-style-type: none"> ■ rate for water and wastewater on the basis of usage, not based on a percentage of capital vales, as currently charged ■ Implement a programme to financially assist people to retrofit their home through the provisions of a targeted rate similar to Auckland Council’s Retrofit your Home programme

Appendix 1 Beacon Resources

A summary of the key programmes of work undertaken by Beacon which could assist Christchurch City Council is provided in this section. Further details are available free of charge on the Beacon website www.beaconpathway.co.nz or through contacting Beacon directly.

1.1 Neighbourhoods

Neighbourhood Sustainability Framework and Assessment Kit

Neighbourhoods are important because the way they are laid out and organised has significant impacts on how a home performs and on the direct, as well as indirect, costs to households.

Beacon's Neighbourhood research team has developed a framework and tools to measure the sustainability of New Zealand neighbourhoods - *The Neighbourhood Sustainability Framework and Assessment Kit*.

This research indicates that the neighbourhood scale presents opportunities for:

- House retrofit
- New design and construction awareness/desirability
- Distributed reticulation systems – electricity and water
- Improved stormwater management
- Improved connectivity and mixed use
- Reduced transport costs
- Community inclusion and leadership, including bottom-up planning.

The Kit is available free to help planners, designers, neighbourhood managers and developers identify, discuss and prioritise changes to improve the sustainability of both new and existing neighbourhoods. This is currently being updated. Please contact Beacon for further details.

The value of neighbourhoods

Beacon's research has identified that low density non-mixed use (e.g. neighbourhood that are almost entirely residential) generate net costs rather than net benefits for a city. As a corollary, mixed use, medium density neighbourhoods are of value to cities, socially, economically and environmentally. Research which awarded monetary values to different neighbourhoods showed that a sustainable neighbourhood is worth \$1,362 per household compared to a negative value of \$595 per household for NZ's least sustainable neighbourhoods.

Find out more at

[www.beaconpathway.co.nz/images/uploads/Final_Report_NH3112\(2\)_Valuing_neighbourhoods.pdf](http://www.beaconpathway.co.nz/images/uploads/Final_Report_NH3112(2)_Valuing_neighbourhoods.pdf)

1.2 Homes

HSS High Standard of Sustainability®

New Zealand homes can and should perform better. Homes that perform well have benefits that go beyond direct financial savings; they benefit the whole economy, local council budgets, and, most importantly, families.

A sustainable home is the sum of its parts. Beacon's focus is on whole-of-house sustainability - encompassing energy, water, indoor environment, waste and material/product selection. This focus is reflected in our work on a set of performance benchmarks to achieve a sustainable home - the HSS High Standard of Sustainability®.

See

www.beaconpathway.co.nz/being-homesmart/article/beacons_hss_high_standard_of_sustainability

Policy Options for Sustainable Homes – A resource manual for local government

Beacon Pathway has conducted research into the council-induced barriers to building and renovating homes to a high standard of sustainability. The research found that policy and regulatory barriers to sustainable building choices exist in:

- administering the Building Act and Building Code
- inflexible conventional infrastructure standards (particularly for water)
- District Plan provisions that provide no allowance for sustainable designs such as passive solar orientation or features such as rainwater tanks (e.g. traditional development controls for height, yards, and height-in-relation-to-boundary).

Beacon research has shown that councils throughout New Zealand have developed a range of initiatives to encourage people to make more sustainable choices in their homes and neighbourhoods, and are seeing some good results. The resource manual of policy options for councils provides an overview of the range of tools available to councils, and gives detailed examples of policies and practices already in place in New Zealand.

Download the Manual from

www.beaconpathway.co.nz/further-research/article/a_resource_manual_for_local_government

National Value Case

Beacon's *National Value Case for Sustainable Housing Innovations* showed that there were clear national benefits to encouraging housing improvements on a wider scale. In particular, it showed the economic value to New Zealand of:

- A direct private economic gain to households of 1% GDP (\$2 billion in 2007 \$ terms).
- Savings in household energy consumption of 22PJ/year with reduction of CO₂ emissions of 3600kt/year.
- Direct water savings of 130 million m³/year.

Renovation and job creation

Beacon research, supplied to the Job Summit 2009, established the value to the nation of large-scale home renovation by illustrating that housing is a critical part of urban infrastructure and that renovation is a viable source of job creation. *Large scale renovation is BIG on job creation* showed that for every 1,000 houses retrofitted to perform to Beacon's HSS®, a total of 392 full time equivalent jobs are required.

See www.beaconpathway.co.nz/further-research/article/large_scale_renovation_creates_jobs

Water demand management

Beacon's water research has demonstrated the value of a demand management approach and provided a framework for councils considering instituting it. *Slowing the Flow: A Demand Management Framework* is a guide to the development of water demand management strategies and policies for all those working in reticulated water supply.

Beacon's research has also developed a comprehensive approach to valuing council implementation of water demand management. A case study of Tauranga City Council's demand management measures showed that the Council delayed the implementation of the next major water supply infrastructure by approximately 10 years with a net benefit to the community of \$53.3 million in 2009 terms.

See www.beaconpathway.co.nz/further-research/article/reports_and_presentations_water

1.3 Expertise

Beacon Pathway has considerable expertise and networks in the sustainability of New Zealand homes and neighbourhoods, has viewed best practice overseas, and has worked extensively with local councils. We welcome the opportunity to further discuss how we can help Christchurch City Council.

Appendix Two: Covenants affecting affordability

COVENANTS AFFECTING AFFORDABILITY

Although there is demand for affordable housing, it's getting harder to find a site to build a modest home. In Christchurch, for example, restrictions by developers on house size are leaving some red zone residents unable to afford replacement housing.

By Lois Easton, Beacon Pathway, Tricia Austin, The University of Auckland, and David Hattam, Selwyn District Council

As a result of the Canterbury earthquakes, over 10,000 dwellings are being demolished, with 5,100 homeowners from the red zone areas alone potentially seeking new land to build their replacement home on.

Many affected homeowners are from the lower property value eastern suburbs of Christchurch or lower property value areas such as Kaiapoi. Alongside the lower property values, many of the affected households are on low or fixed incomes, meaning that affordability of replacement housing is a critical issue.

Older houses more modest

A range of factors affect the affordability of housing, many of them canvassed in the Productivity Commission's *Housing Affordability Inquiry, March 2012 Report*. However, a fundamental factor not considered in any detail by the Commission is dwelling size.

The Department of Building and Housing advises that the average cost per square metre of new house construction in Christchurch is between \$1618/m² and \$1778/m². Based on their estimates, a house of 150 m² will cost an average estimated \$266,700 to build, and a 200 m² house will cost \$323,600 to build.

The floor area of most houses in the worst-affected areas of Christchurch is considerably smaller than many of today's new homes. Many households are receiving payouts for their homes and land around \$300,000.

Inevitably, affected homeowners will be looking to rebuild on land they can afford, with a more modest dwelling size than usually found in many new subdivisions today. With an average cost of \$160,000 for a section in Rolleston and using one of the cheaper home builders, it would be possible to build a smaller – for example, 110 m² – house in Rolleston, with a \$300,000 payout.

Developers imposing larger houses

New house sizes have increased substantially over the past few decades, increasing by 50% in the last 25 years from 134 m² to 209 m².

There is a range of reasons for this, but a significant contributor is the increasingly common use by land developers of minimum house size covenants on lots created during subdivision.

Research recently undertaken by David Hattam of Selwyn District Council and John Raven of Lincoln University looked at the prevalence of restrictive covenants in the Canterbury township of Rolleston. They found that 75% of new house sites created in the township had a restrictive



Affordability and covenants are issues as homeowners in Christchurch with damaged modest older houses look to new subdivisions to rebuild.

covenant requiring a minimum house size of at least 160 m², with a typical requirement being 180 m², and 25% of sections had a requirement of a minimum house size of 200 m².

Even for the 25% of sections where there were no explicit size controls, almost all required house designs to be approved by the developer – with houses greater than 180 m² predominating in these subdivisions. Only 3% of sections created since 1990 had no minimum size covenants.

Affordable options not possible

Terraced houses and medium-density development are often proposed as a mechanism to provide for more affordable housing and better housing choice – with smaller sites and smaller footprints available for development. In Christchurch, Hattam and Raven noted that what has resulted instead are 200 m² 2-storey houses with very small gardens because developers have squeezed the same sized house on a smaller section.

Just as significantly, where small lots of around 350 m² were created, the minimum house size was often 160 m², showing that reducing section size does not necessarily provide new housing choices.

An alternative response for addressing housing construction costs is to design more flexible housing, starting with a relatively small central unit, enabling the owner to add additional rooms if needed and as resources allow. While this might be beneficial to households in Christchurch, it would also be impossible if a covenant required a minimum dwelling size.

It's worth noting that the cost of raw land is typically less than 20% of the cost of a section, so reductions in section size – without reductions in house size – do not result in significant increases in affordability. For instance, in Rolleston, the cost of a half-size 350 m² section is usually only around \$20,000 less than that of a full-size section.

Covenants are a nationwide issue

Some researchers have recognised the use of restrictive covenants by developers as a widespread problem across New Zealand. It hasn't been dealt with because:

- regulation of covenants has been considered too difficult by many councils since they are imposed after the council has signed off the titles
- under the Resource Management Act, there is no mechanism available for councils to address this issue
- conditions on a subdivision consent could specify no covenants, but this would have to be put on a consent notice at the time of issue of title and the covenants would be put on at the same time.
- developers can put in place agreements with land purchasers – a group builder, for example – separate to the title.

Local planning legislation needed to over-ride covenants

As with many affordability issues, the problem is a well recognised one overseas. In Australia and the United States, most states and territories have addressed this issue specifically in local planning legislation.

In New South Wales, for example, the Environmental Planning and Assessment Act 1979 specifically enables environmental planning instruments to over-ride restrictive covenants. This is the kind of mechanism needed by, but not currently available to New Zealand local governments working under the Resource Management Act.

The best way to provide houses that are more affordable is to make them cheaper to build, and the easiest way to do this is to make them smaller. The prevalent development paradigm denies people the choice to build a house that would suit their needs.

Action needed in Christchurch

The government has acted to free up land, ostensibly to make sure that houses are provided for the people of Christchurch. Yet the developers of that land continue to impose covenants that allow only very large houses to be built, which will not address the needs of many of the people displaced from their homes.

While reforming the Resource Management Act to enable district plans to over-ride covenants might be something for the long term, the rebuild of Christchurch may require more immediate action. Special powers enabling the district plan to over-ride residential covenants could enable local Cantabrians to remain living in the region, without destroying the residential amenity that no doubt covenants were put in place to protect. ■

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Appendix Three: Regulating for supplementary water supply in Christchurch

Canterbury Sustainable Homes Working Party – Regulation

Regulating for supplementary water supply (rainwater tanks) in new and rebuilt homes in greater Christchurch

Goal

The goal is to have greater resilience, reduced water demand in summer and mitigation of storm water runoff during rain events through the installation of rainwater tanks in all new homes and rebuilds following the earthquakes in greater Christchurch.

Method

The preferred method is through using s27¹ of the CER Act 2011 to instigate Plan Changes in the CCC, SDC and WDC District Plans.

Plan change 75 for the Kapiti Coast District Plan provides guidance for this process.²

Rationale

The Canterbury earthquakes disrupted the reticulated supply of water through damage to reservoirs, pumping stations and pipes. Some residents were without water for many weeks, and were reliant on bottled water, tanker supplies or neighbour's private wells

While more than eighty percent of the Christchurch water supply was restored within two weeks of the February earthquake, boil-water notices remained in place citywide until April 2011, due to the risk of cross-contamination from broken pipe works. Shortly after the 22 February earthquake, chlorine was introduced to the water supply to address potential contamination issues, and remained until December 2011.

Experience in Christchurch suggests that current UN-based recommendations of 3 litres of water per person per day, to meet water needs in a disaster situation, may fall well below the actual needs of an urban population. The CDEM Wellington Emergency Preparedness guide (December 2010) suggests 3 litres per person to meet daily drinking needs, and more for cooking, hygiene and pet care³.

In Christchurch City in summer 2011/12 level 3 restrictions were imposed because of the reduced storage in the water supply system.

If more homes had rainwater tanks they would have had access to an emergency supply, particularly for non-potable purposes such as clothes washing or garden watering, and there would have been reduced demand on the Councils' supplies.

Significant construction cost savings (up to 50%) can be realised by installing the rainwater tank and dual plumbing systems in new 'greenfield' developments (and new homes) compared to retrofitting existing 'brownfield' areas⁴ (or retrofitting in existing homes).

Ministry of Health guidelines indicate that only about five litres per person per day (l/p/d) needs to be biologically and chemically safe. Average domestic water use is about 300-350 l/p/d – all of which is currently cleaned to a potable standard. Clothes and cars are washed, toilets flushed and gardens watered with high quality drinking water. Using rainwater for some of these activities would reduce the demand on potable water.

¹ S27 (1) The Minister may, by public notice, suspend, amend, or revoke the whole or any part of the following, so far as they relate to any area within greater Christchurch: (a) an RMA document

² <http://www.kapiticoast.govt.nz/Documents/Downloads/District%20Plan%20Changes/Plan-change-75-Commissioners-Report.pdf>

³ Moore, R.M. and Abbott, S 2011. *Benefits of Rainwater Tanks in the Event of Damage to Centralised Water Supplies in the Wellington Region*. Report to the Institute of Geological & Nuclear Sciences Ltd. (Contract No: C05X0907)

⁴ Kettle, D. March 2010. Barriers to Water Demand Management: health, infrastructure and maintenance. Report WA7060/6 for Beacon Pathway Limited.

Putting in place legislation requiring rainwater tanks homes being built or rebuilt will incorporate resilience for the future.

- This is already signalled in the Christchurch City Council's Water Supply Strategy as Action 12, scheduled for 2014/15⁵.
- In the Waimakariri District Council Water Conservation Strategy⁶ rainwater collection and reuse is recognised as a way to reduce peak water demand, but regulatory measures will be reviewed in the 2013 review of the strategy.
- Selwyn District Council has no specific reference to domestic rainwater collection in their five-water strategy.

Definition

Rainwater harvesting involves the collection, storage and distribution of rainwater from the roof, for use inside and outside the home. Rainwater collected from the roof via gutters and pipes flows through screening devices to remove dirt and debris, and is then stored in tanks outside the house for use in the garden, toilet and laundry. The reticulated supply would still be used for drinking, cooking and other potable purposes.

Each rain tank can save a home about 50% in terms of their water usage when rainwater is re-used for the laundry use and toilet.⁷



Benefits

- An invaluable alternative water supply when a disaster damages the reticulated system
- Reduces the demand for water from the main water supply
 - Reduces the extraction from groundwater
 - Reduces householders dependence on mains water
 - Offers more resilience when water restrictions are in place
- Reduces costs in the delivery of reticulated water supply, e.g. pipe size, reservoirs, energy costs
 - Avoids oversizing of water supply network and associated costs inefficiencies
 - Can delay capital works
 - Reduced energy costs in embodied energy of infrastructure, operational costs of treatment and pumping,
 - Lower householders water bills (if water is charged for by volume)
- Reduced storm water runoff
 - Prevents the impact of storm water run-off on the local environment
 - Reduces peak flow in storm water system
- Education and awareness
 - On site systems give timely feedback to the householder on water consumption increasing awareness about the limits of water availability and cost of infrastructure/maintenance⁸
 - Householders have increased control over their water source
 - Rain tanks are part of a broader societal shift towards more eco-friendly behaviour and tanks facilitate a transition to more sustainable values and behaviours.

⁵ Action 12 in <http://resources.ccc.govt.nz/files/WaterSupplyStrategy2009Full.pdf>

⁶ http://www.waimakariri.govt.nz/Libraries/Public_Documents/Water_Conervation_Strategy_-_June_2010_-_Final.sflb.ashx

⁷ <http://www.waitakere.govt.nz/AbtCnl/to/pdf/brochure-rainwatertanksintheurbanarea.pdf>

⁸ Presentation - Sustainable water supply for Auckland – Craig Brown Consulting – 5 February 2010
www.thesustainabilitysociety.org.nz/docs/Forum-20-Brown.ppt

If the councils introduced a volumetric charge on domestic water supply the financial benefits would be higher.

Costs

- Costs vary with the amount of rainwater to be stored and its intended uses.
- Tank prices plus the cost of installation and additional fittings

Rainwater tanks as a water efficiency mechanism are frequently cited as being high cost for the benefits compared with other technology – these calculations need to be checked that operational costs and life cycle benefits are included; benefits to storm water/wastewater systems are accounted for; and assumptions on treatment standards/equipment are realistic and practical.

Barriers

Some health regulators believe that health risks are manageable for rainwater use as a non-potable water use. In New Zealand, at present, some health authorities believe that if water tanks are properly installed, labelled and maintained, they are safe to use for non-potable use - flushing toilets, laundry and garden use⁹.

Regulatory Mechanisms

- The Resource Management Act 1991 (RMA)
 - Regional Policy Statement (RPS) - identify that District Plans of Territorial Authorities should make provision for the mandatory inclusion of rain tanks as a 'rule'. A Section 32 cost benefit analysis and public notification would be required with a public consultation process under the RMA.
 - Regional Plans – the Canterbury Land and Water Plan (replacing the NRRP)
 - District Plan - Plan Change to include policies and a rule around the requirement for rainwater tanks. This process would require a Section 32 cost-benefit analysis to be undertaken.
- The Local Government Act 2002
 - A territorial authority must, from time to time, assess the provision within its district of water services and other sanitary services. An assessment may be included in the territorial authority's long-term plan, but, if it is not, the territorial authority must adopt the assessment using the special consultative procedure
 - If this assessment signals the need for water conservation to avoid or push out further infrastructure development then such measures can be considered under the Long Term Plan (LTP) and considerably shorten the public consultation process required for inclusion in the District Plan.
 - A council can pass a bylaw requiring a supplementary water supply for new houses

The preferred method is through using s27¹⁰ of the CER Act 2011 to instigate Plan Changes in the CCC, SDC and WDC District Plans.

⁹ Kettle, D. March 2010. Barriers to Water Demand Management: health, infrastructure and maintenance. Report WA7060/6 for Beacon Pathway Limited.

¹⁰ S27 (1) The Minister may, by public notice, suspend, amend, or revoke the whole or any part of the following, so far as they relate to any area within greater Christchurch: (a) an RMA document

Appendix 1: Key regulatory processes to influence uptake of rain tanks¹¹

Process	Scale of Influence	Likely Timeline	Priority	Likelihood of success
District Plan Changes	Local	2-3 years but would benefit from RPS or other policy work to set the scene	High	Success would require education and good consultation
Regional Policy Statement	Canterbury Region	Would take several years to be given effect to and filter through to implementation	Medium	Medium to high, needs good collaboration with ECan
Regional Plans – NRRP and Land and Water Regional Plan	Canterbury Region	Planning process just beginning	Low	Medium to high, needs good collaboration with ECan
Building Code	National	12+ months	Low	High but entirely dependent on involvement in code review and degree of interaction with DBH.
Bylaw	Local	6 month process	Medium	Medium – needs support from council to recognise a problem and begin bylaw-making process.

Appendix 2: Rainwater tanks as part of integrated water management

The increasing cost and decreasing availability of water supply will require a more efficient and conservation-oriented supply and management approach if New Zealand is to achieve widespread household sustainability. Rainwater tanks need to be considered as part of a larger water management system:

- **Reduce** water use: demand management
 - Cheapest, but not sufficient in context of increasing population
 - Cost savings (energy and infrastructure)
 - Delays upgrading and renewing water supply and wastewater collection/treatment infrastructure
- **Reuse** water with minimal treatment, locally
 - Greywater recycling
 - Reduces base wastewater flow
 - Wastewater concentration increases
 - On-site wastewater irrigation
- **Rainwater:** a new source without knock-on infrastructure upgrades
 - Integrated Urban Water Management
- **Recycle:** collect and highly process water before using it again
 - Effectively it is another product

The benefits of an integrated water management system are:

- savings in operational (including electricity) and capital costs required for water supply and wastewater treatment
- increased awareness for consumers of water consumption
- increased provision of indirect use values through the reduction of water taken from ecosystems

¹¹ Adapted from Lawton M., Birchfield D. and Kettle, D. (2007) - Making policy and regulation rain tanks friendly. Report PR 205 for Beacon Pathway Limited.
http://www.beaconpathway.co.nz/images/uploads/Final_Report_PR205_Making_PolicyRegulations_Raintank_Friendly.pdf

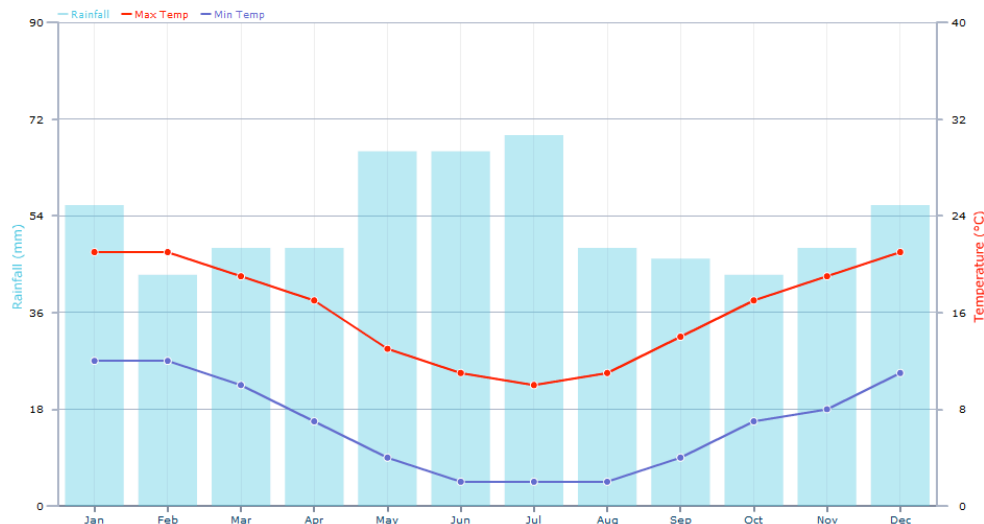
- reduced emissions of greenhouse gases.

Appendix 3: Example - Kapiti Coast District Council

Kapiti Coast District Council (KCDC) has introduced the mandatory requirement for rain tanks for water conservation as a rule in their District Plan. They did this through their Long Term Council Community Plan (LTCCP), a Section 32 analysis, and a Plan Change notification and consultation process. The rule is triggered when there is an application for land use change or sub-division. In making their case for a plan change the council primarily considered resiliency of their system, especially in the light of climate shocks and water use efficiency, using non-potable water where appropriate. Current water supply can meet potable and hygiene requirements but cannot always supply outdoor needs.

Appendix 4 : Rainfall and tank sizing

Figure 1: Christchurch Rainfall



Total rainfall per year (average) = 637mm

Rainfall varies across the city – wetter in the west, dryer in the east.

Volume available from a 200m² roof

= 200 m² x 0.637m

= 127.4 m³

= 127,400 litres

Less 20% ≈ 100,000 litres

In Christchurch the water abstraction rate for public supply averages between 430 and 450 l/p/d, with a median of 435 l/p/d. The daily peak in winter is mid-morning, whereas in summer it is in the evening because of garden watering.

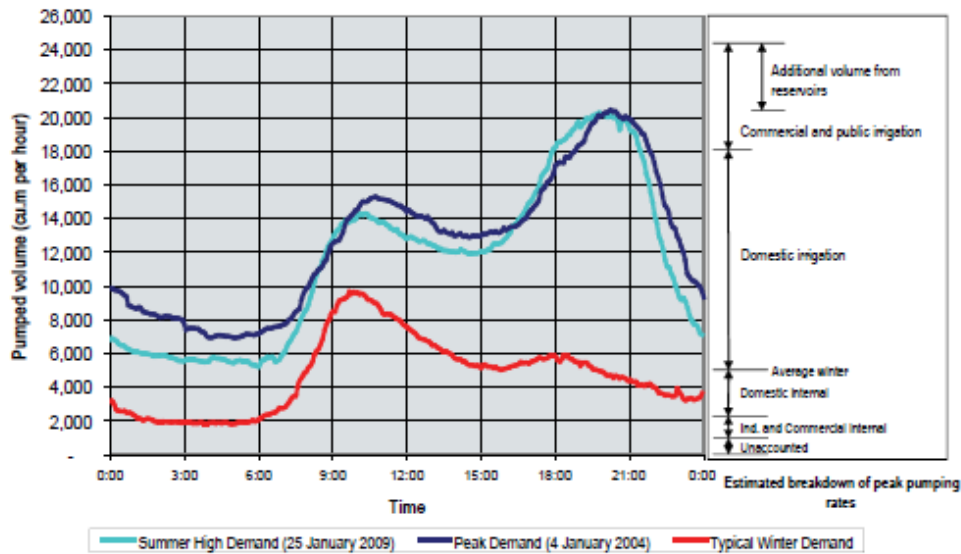


Table 2: Tank sizing

1 Main Building area		
Building width (metres)	10	
Building depth (metres)	8	
Rain Collection Area 1 (square metres)		80
2 Extension/conservatory/porch/garage/shed etc		
width (metres)		
Depth (metres)		
Rain Collection Area 2 (square metres)		0
3 Calculate the area of any remaining useful roofs as a figure		
In square metres and enter directly in the yellow box to the right		
4 TOTAL of collectable roof areas (square metres)		80
5 Rainfall per year in your area (mms)		1251
6 Collectable rainwater per annum (In litres - discounted by 20% to account for water loss) (YIELD)		80,064
7 Use of water in the building		
<i>Washing machine and toilet flushing are the main usage for rain water in domestic systems. Add an allowance for daily garden use</i>		
Number of people in the house	5	people
Number of clothes washing cycles per day (50 litres each)	1.25	63
Number of toilet flushes per day (4.42 flushes per person, average 3 litres each)	22	66
Outdoor use per day (min 5 litres per person per day)	or adjust till F39 - F29 more or less	
		35
8 Amount of water you require every day		164
Amount of water you require every year (DEMAND)		59,787
9 How many days drought protection do you need? Enter a number in the box to the right, typically 28		28
10 Capacity of water storage in litres required for drought protection		4,586
The lesser of YIELD (6) or DEMAND (8) per annum		59,787
Therefore, volume of rainwater storage required (litres)		4,586