



Department of  
Building and Housing  
*Te Tari Kaupapa Whare*

# **Building for the 21<sup>st</sup> Century: Review of the Building Code**

## **Synopsis of submissions**

This report does not necessarily reflect the views of the Department of Building and Housing, and does not reflect official Government policy.



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# Foreword

This report provides a synopsis of the submissions received on the discussion document *Building for the 21<sup>st</sup> Century: Review of the Building Code*.

The Building Code review is a major initiative for the Department of Building and Housing. The discussion document sought the views of New Zealanders on the scope and content for the new Building Code. Feedback from focus groups and workshops with submitters is included in this report.

On some issues, the submissions reflect a wide range of views. Receiving and analysing diverse views is part of the process of public submission, and all comments will be considered for the next stage of the review. The Department will continue to consult with building users and industry representatives, so that the recommendations of the review can lead to the best outcomes for all New Zealanders.

A second discussion document is scheduled for publication in the first half of 2007. It will seek public comment on specific performance requirements for buildings, and the transition to a new or revised Building Code.

The Department is required to report to the Government in November 2007 on options for a new Building Code. Changes will occur after that date.

The Department will continue to consult with building users and industry representatives, and ensure the public is kept updated on progress. Regular communication updates are published on the Department's website ([www.dbh.govt.nz](http://www.dbh.govt.nz)) and in our publications.

Thank you to everyone who took the time to make a submission or participate in a focus group. We look forward to your continued involvement in the Building Code review.

John Kay  
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# Contents

<b>Foreword</b>	<b>1</b>
<b>Executive summary</b>	<b>4</b>
Introduction	4
Response	4
Main findings	4
Main points by sector segment	9
<b>Discussion document <i>Building for the 21st Century</i></b>	<b>12</b>
Introduction	12
Background and role of the Building Code	12
Publication and call for submissions	13
Methodology for analysing submissions	13
Number and types of submission	13
<b>Synopsis of responses</b>	<b>15</b>
<b>Other consultation</b>	<b>143</b>
Focus groups	143
Workshops with submitters	144
<b>Appendix 1: Index of discussion document questions</b>	<b>146</b>

# Executive summary

## Introduction

This document summarises submissions received in response to the public discussion document *Building for the 21<sup>st</sup> Century: Review of the Building Code* (the discussion document), which the Department of Building and Housing (the Department) published in late May 2006.

The Building Code review is taking place over 3 years and, when it is completed, will include recommendations setting out any amendments to the Building Code that are considered necessary or desirable. There will be a further opportunity for comment at the next stage of the review.

The Department also held focus group meetings during the public consultation period, and convened workshops with submitters before completing this report. This report includes feedback from the focus groups and workshops.

The Department would like to thank all submitters and focus group participants for their contributions.

## Response

The Department received 265 submissions from a range of individuals, and community and commercial organisations.

Submitters were not required to provide identification details so it is not possible to provide a full breakdown of submissions by submitter type. To the extent that submitters did provide their identification details, or where such details could be inferred, 28 submissions were from component manufacturers, 75 from industry professionals (such as builders, designers, architects and engineers), 42 from local government and 14 from central government agencies. The balance of 106 could not be categorised.

## Main findings

The main findings of the public consultation are set out below. Findings from the written submissions were generally consistent with those from the focus groups and workshops.

### General comments

- Submitters wanted alignment of the Building Code with other legislation, particularly the Resource Management Act.
- There was support for balancing any new provisions with affordability and cost.
- A significant number of submitters appeared to confuse the Compliance Documents (Acceptable Solutions and Verification Methods) with the Building Code.

- The style of the Objective Statements was described as being too complex and better framed in language that is more positive.

### **Performance criteria and Code structure**

- For most segments of the sector, there was mixed support for the Building Code to be organised by outcome, but also significant opposition from design professionals, who preferred to keep the status quo (organised by building component).
- There was strong support for a performance-based Code, but there were different interpretations of what this meant and the level in the hierarchy at which the performance should be stated.
- There was general support for expressing performance requirements as ‘what’, ‘how much’ and ‘where’, but strongly expressed views from those not in favour. Some submitters thought this would be too prescriptive.
- There was a range of views about ‘best practice’ and ‘minimum acceptable practice’.
- ‘Acceptable solutions’ for particular types of building were generally supported, and suggestions were made that the requirements within the Acceptable Solutions should be arranged by building component or trade.

### **Safety**

- Submitters noted the possible effects of climate change and commented that its impact on buildings needed considering in the Building Code, particularly for disaster events, such as flooding.
- Most submitters agreed that buildings should be designed for the hazards that were identified in the discussion document, but many questioned whether the Code should cover less frequent hazards such as tsunamis, volcanic eruption and wildfire. The majority of submitters commented that adequate warning systems were a better method for dealing with these less frequent hazard events. This is because there are few practical engineering solutions available to ensure structural integrity against these hazards, and they are unlikely to reduce risk without high financial and/or environmental costs.
- Some submitters would like importance levels introduced that categorise different levels of acceptable risk for different types of building. It was suggested that these importance levels could be based on those in the Standard for Structural Design Actions, AS/NZS 1170.
- The current Building Code requires buildings to be designed for a 1 in 50-year storm event, but some regional councils use a higher level of a 1 in 100-year storm event or an alternative level based on a flood-risk assessment. Submitters would like this inconsistency dealt with.
- Nearly all submitters supported the proposed objectives for fire safety.
- Submitters held differing views about whether escape routes that are accessible for people with disabilities should be required in the Building Code. Some thought it an essential requirement, while others thought that this would create an unreasonable financial burden on building owners.

- Generally, submitters supported the proposed objectives and features for safety in use, but a mixed response was received on the proposals to protect building occupants against fire alarm noise, and from hot and cold surfaces.
- Opponents of the proposals to protect building occupants against fire alarm noise said that the critical issue was that the alarms were loud enough to be heard by occupants.
- In the case of hot and cold surfaces, some submitters said that education was a more effective solution or that the issue should be dealt with by other organisations, such as ACC or OSH.

## Health

- The proposed objectives and features were not new and were generally supported.
- There was support for including sustainable development concepts for disposing of waste and water, for example, space for waste and recyclables in multi-unit dwellings and commercial/industrial buildings.
- Submitters noted the need to align water requirements with health legislation and new drinking water legislation in preparation, as it is the Code's responsibility to ensure the water that comes out of the tap is not contaminated.
- There was support for the Building Code providing for storage space for waste and cleaning equipment in multi-unit dwellings, and commercial or industrial buildings. These provisions are not in the current Code, but were in the earlier regulations.
- Some submitters suggested that laundering and cleaning facilities requirements should vary depending on the building type, in other words, there could be a communal laundry in an apartment building.
- Submitters said there was a need to raise awareness of hazardous materials that caused health problems. Some submitters questioned what the role of the Code was in reducing the use of toxic products.
- Submitters linked health outcomes to thermal performance and energy-efficient design, and stated that the Code should set a level of building thermal performance that requires conscious consideration of energy-efficient design.
- Submitters supported the use of star rating schemes, such as the Home Energy Rating System, to focus homeowners on energy use and design.
- Some submitters commented that the need to circulate air outweighed any benefits of preventing draughts, and they did not want requirements that led to sealed houses.
- Limiting the minimum and maximum indoor temperature was not widely supported. Many submitters thought the Code was attempting to regulate the temperature at which people maintained their homes. Many submitters thought that temperature was a personal preference and that this was a matter for the occupier to decide.

## Wellbeing

- There was support for universal design/lifetime design principles (wide doorways, lever door handles, lever handles on taps), but as guidelines rather than Code requirements. Some felt that this was an education issue and that designers were already incorporating these principles

in their work. Some submitters felt that the disability needs of the future could not be predicted and that, therefore, provisions should not be made in the Code for adaptability.

- Submitters supported providing for people with visual and intellectual disabilities and there were many suggestions on ways to do this. It was also noted that the Code needed to avoid conflicting requirements for the various disabilities.
- Submitters questioned the practicality of providing accessible routes to all occupied buildings, particularly in areas with challenging topography, and linked this to possible increases in the cost of compliance.
- Some submitters pointed out that section 118(1) of the Building Act 2004 had particular requirements about reasonable and adequate access being provided to ensure people with disabilities could visit or work and carry out normal activities and processes in buildings.
- Submitters also suggested that factories and industrial buildings where fewer than 10 people are employed, which are currently exempt from section 118(1), should not be.
- Views differed on whether accessibility provisions should be in one section or throughout the Code.
- Submitters supported the Building Code covering indoor noise. Some submitters noted that it was the responsibility of other agencies (such as territorial and regional authorities) to control the outside noise environment, and that the Building Code could not prevent excessive external noise.
- Submitters suggested that the Code should cover the problem of buildings obscuring natural light and views. Awareness of the outdoors is an issue for apartment development and views being built out.
- There was support for some regulation of unwanted entry (a new feature) by the Code, for example, strengthened doors and windows.
- There was support for the Code requiring workplaces that contain personal hygiene facilities to provide hot water. Submitters noted that providing hot showers would promote walking and cycling as modes of transport to work, which is linked to sustainable development through reducing transport energy consumption.
- Views were divided on minimum space requirements in residential buildings.

## **Sustainable development**

- Several submitters noted that New Zealanders are making durability decisions based on trends and aesthetics, rather than what material was best for the climate it was being built in.
- Submitters noted that affordability of high-quality durable materials could be a problem, but that often the upfront costs were less than those for ongoing maintenance of lower-quality products.
- Submitters generally supported the idea of a maintenance plan, but many noted that it would be difficult to enforce. Several suggestions were made about enforcing maintenance plans. Many submitters said that educating homeowners on home maintenance was necessary. Others felt that owners should be responsible for their own maintenance (personal responsibility).

- Increasing the design life of a building was suggested. The current design life is 50 years. Submitters stated that this would result in an improvement in the material used to build houses and therefore fewer low-quality buildings and houses.
- Comments about the objectives for materials were wide-ranging. Some felt that the objectives were too vague and needed more detail, while others were supportive, but felt that the objectives would be difficult to implement.
- Submitters noted that the whole-of-chain environmental impact areas, while good in theory, would be difficult to implement in the Building Code. They also noted that New Zealand did not have enough information in this area yet.
- There was a general feeling of wanting more government guidance and intervention in the energy efficiency area. Suggestions included incentives, low-interest loans, tax credits, and so on.
- Many submitters focused at the solution level (for example, mandatory solar water heating, increasing insulation values, double-glazing). These are solutions that could be used to achieve the objectives and will be useful for the next stages of the review.
- A number of submitters commented on the link between energy, and health and wellbeing.
- There was a range of views expressed about water conservation and efficiency, ranging from views that water conservation should apply in all instances, regardless of the location or type of building, to views that the market was the best mechanism to decide the efficient use of water.
- There was widespread comment that too much water was wasted both residentially and commercially. Submitters noted that water was becoming an increasingly scarce resource and that there was an environmental cost to its use and disposal, which was exacerbated by inefficient use.
- Reuse and recycling of water was suggested frequently as a solution, but submitters also noted that these suggestions should be balanced with affordability and minimising the health risks.
- Some submitters called for a broader approach to waste minimisation, beyond the use of waste management plans. Some submitters noted that waste management should be included at the design and specification stages.
- Enforcement of waste management plans was raised as an issue, and submitters cautioned against additional bureaucracy.
- Some submitters suggested that education, incentives or using other legislation, such as District plans or the New Zealand Waste Management Strategy, would minimise waste more effectively.
- It was also noted that infrastructure would be required for re-use and recycling regulations to be practical.
- Some submitters questioned whether protection of other property was the role of the Building Code and suggested the Resource Management Act might be more appropriate.
- Submitters noted that people should have the assurance that their property will not be damaged by surface water, fire, construction and demolition waste, and failed utility networks.

- Several people commented that they wanted to be protected from neighbouring developments obscuring natural light and views.
- There was also a call for control of site-works and landscaping to ensure the stability of adjacent property was not compromised.
- Many submitters agreed that historic, heritage and cultural buildings needed to be treated differently to preserve their value. A distinction was made between heritage/historic buildings and new buildings that had a cultural purpose. Generally, submitters felt that new buildings with cultural significance should have no concessions from Building Code requirements.
- Submitters noted that there should be flexibility to allow these buildings to be assessed on a case-by-case basis, for example, for seismic upgrades, handrails, disabled access, fire egress and insulation. However, there should be no compromise on health and safety, regardless of the building's heritage and cultural value (people first).

## **Main points by sector segment**

Where the segment of the sector that submitters came from was known or could be inferred, submissions were analysed to determine any particular segmentation of responses.

### **Local government**

- Submitters felt tsunami, volcanic activity and wildfire risk was best dealt with under the Resource Management Act and was not a Building Code issue.
- There was support for the proposed accessibility features.
- There were mixed views on requiring the front door of every residential unit to be accessible, as well as on adaptability and universal design provisions, and features helping people with intellectual disabilities.
- The proposed noise objectives and features generated widespread support from this segment.
- Provisions for natural ventilation, natural light and awareness of the outdoors were strongly supported.
- However, proposals for minimum indoor temperature and security against unwanted entry were not widely supported.
- In the facilities area, all features were strongly supported, except provision for storage facilities for personal effects.
- There was strong support for proposals for durability, energy and water.
- In areas where there were overlaps with the Resource Management Act (waste management, protection of other property, water efficiency in areas of water shortage and historic/heritage buildings), there was no obvious common view among local authorities and polarised views were presented (although for all there was still majority support).
- This segment offered mixed views about how the Building Code should be arranged. Some favoured basing the Building Code structure on the principles and purposes of the Building

Act 2004, while others felt it should be a practical tool based on building element. The model for performance criteria was strongly supported.

### **Architects/designers/engineers**

- Submitters felt tsunamis were best dealt with through warning systems, rather than Code regulation. The occurrence of volcanic activity and wildfire was deemed too infrequent to warrant inclusion in the Code.
- Submitters supported the proposed objectives and features for indoor conditions for health. Provisions for minimum and maximum indoor temperatures were not supported by this group, and there was moderate support for the proposed accessibility features.
- In common with other groups, there was not support for requiring the front door of every residential unit to be accessible and including adaptability and universal design provisions in the Building Code.
- In the noise area, all proposed features were supported.
- In the facilities area, all features were supported, except provision for storage facilities for personal effects and provision for habitable spaces for activity, furniture and personal needs, which drew a mixed response.
- Of the low number of submitters in this area, there was very strong support for the sustainable development objectives and features. There were no areas with significantly polarised views.
- Architects, designers and engineers felt that the structure of the Building Code should be based on its practical application, for example, by building element. Some felt that the ‘what’, ‘how much’ and ‘where’ model would be too prescriptive.
- Building designers favoured the proposed Housing Acceptable Solution, but expressed concern about whether it would become a prescriptive solution.
- The majority of submitters from this category felt there should be one acceptable level of performance. It was felt that a tiered approach was not appropriate for the Building Code and that it would ultimately confuse users.

### **Builders**

- Builders were opposed to including tsunami, volcanic activity and wildfire requirements. All submitters from the building industry were in favour of the fire safety proposals, but there was little support for the additional safety-in-use proposals about fire alarms and hot and cold surfaces.
- While there was mixed support for a minimum indoor temperature, a maximum indoor temperature provision was not supported.
- There was good support for the proposed objectives and features for accessibility, except requiring the front door of every residential unit to be accessible and including adaptability and universal design provisions in the Code.
- This group supported the proposed noise provisions.
- Provisions for security against unwanted entry received mixed support.

- Submitters in this group strongly supported provisions for natural ventilation, natural light and awareness of the outdoors.
- Proposals on the location and number of sockets and light switches was the only area under ‘services’ that received divided views.
- In the facilities area, all features were supported, except provision for storage facilities for personal effects.
- Views were divided about minimising water consumption from network utility operators in areas of water shortage, banning non-sustainable materials, and in the historic/heritage buildings area.
- An appropriate education programme was considered an important component when implementing the Code.
- Builders generally supported the performance model, but also expressed concerns that it could lead to de facto prescriptive solutions.
- Submitters felt that the Building Code should stipulate the acceptable minimum level and that market forces were the best determinant of the level of building quality.

### **Not categorised**

- Submitters opposed including tsunamis, volcanic activity and wildfire under the Code because of the relative infrequency of these events and the financial burden of designing buildings to mitigate these risks.
- All submitters were in favour of the proposed fire safety objectives and features.
- Several submitters questioned the need for regulation of noise emitted by fire alarms and protection from hot and cold surfaces.
- Unlike other groups, requiring the front door of every residential unit to be accessible and including adaptability provisions in the Code did have majority support.
- Support for universal design provisions was mixed, with those against slightly in the majority.
- This group supported the proposed noise provisions.
- There was less agreement on the provisions for increasing the protection of other property (from those already included in the Code) and water efficiency in areas of water shortage (although, strangely, this group was strongly in favour of minimising consumption of water from network utility operators in areas of water shortage).
- No clear preference for the arrangement of the Code was able to be determined from this group. The model for performance criteria was not widely supported by this group. It was felt it would be difficult to implement practically.

# Discussion document *Building for the 21st Century*

## Introduction

This document summarises submissions received in response to the public discussion document *Building for the 21<sup>st</sup> Century: Review of the Building Code* (the discussion document).

The purpose of this summary of submissions is to collate and present the views of submitters in a clear and concise way, as a public record of submissions and to help with the next phase of the review: researching and analysing issues and developing options.

## Background and role of the Building Code

The Building Act 2004 introduces provisions to review the whole process of building, looking at each of the different stages – design, consent, construction and inspection. The Act requires the Building Code to be reviewed to ensure performance standards for buildings are clear and meet the requirements set out by the Act.

The review of the Building Code is a major Government initiative and it will take a fundamental look at how and what we build. The Code sets the standards for the construction of buildings and houses; it reflects what we, as New Zealanders, expect from the places where we live, work and play. It is the first substantive review of the Building Code since the Code was introduced in 1991.

The Building Code is central to the building sector. The purpose of the Building Code is to prescribe functional requirements for buildings, and the performance criteria with which buildings must comply in their intended use. In prescribing these, the Building Code should reflect the purpose and principles of the Building Act. It must take account of the requirements of the Building Act about:

- the safety and health of people in buildings
- buildings having attributes that contribute to the health, physical independence and wellbeing of the people who use them
- people who use a building being able escape from the building if it is on fire
- buildings being designed, constructed and able to be used in ways that promote sustainable development.

In practical terms the role of the Building Code depends on the needs of the person using it:

At a societal level it is a statement of the minimum acceptable requirements of building users to meet their needs for safe and healthy and shelter in a socially, environmentally and economically responsible way.

For Building Consent Authorities and designers, the Building Code is a statement of the minimum acceptable standards for buildings that must be delivered.

For builders, the Building Code provides the rationale for the specifications and drawings for construction work that they are engaged to build.

## **Publication and call for submissions**

In late May 2006, the Minister for Building Issues announced the release of the public discussion document *Building for the 21<sup>st</sup> Century: Review of the Building Code*.

The Department published a full version of the discussion document and also an appendix that summarised the proposed objectives and features. Before the discussion document was released, the Department called for registrations of interest. Three hundred and ninety-one individuals or organisations took the opportunity to pre-register and they were either posted or emailed a copy of the discussion document when it was released. In addition, advertisements were published in the five main daily newspapers. Individuals and organisations that were identified as having an interest in the Building Code review were sent copies of the discussion document and invited to make a submission.

The closing date for submissions was 31 August 2006.

A complete list of the questions posed in the discussion document is provided in Appendix 1.

## **Methodology for analysing submissions**

An online database was developed to help analyse consultation feedback. Submissions made online captured the submitter's details and summarised responses according to the questions posed in the discussion document.

All submissions were considered thoroughly. The aim of the analysis was to:

- summarise common themes from responses
- identify the main issues within these themes
- identify submissions outside the scope of the Building Code review
- compile relevant issues into a report for publication.

## **Number and types of submission**

The Department received in total 265 submissions. Submissions were received online, and by email, fax and post, although the large majority of submissions were made online. Submissions received by email, fax or post were entered into the database manually. Sometimes the same submission was sent in two or more ways, for example online and by email.

Submitters were not required to provide identification details so it is not possible to provide a full breakdown of submissions by submitter type. To the extent that submitters did provide their identification details, or their identity could be inferred, 28 submissions were from component manufacturers, 75 from industry professionals (such as builders, designers, architects and engineers), 42 from local government and 14 from central government agencies. The balance of 106 could not be categorised.

## Synopsis of responses

Submitters were asked for opinions on the proposed objectives and features, and to respond to these ‘multiple-choice’ questions by agreeing ‘strongly’, ‘somewhat’, ‘not really’, ‘definitely not’ or ‘no opinion’. Submitters could add comments to these responses. Other questions asked for comments only. The questions posed are contained in Appendix 1 to this report.

The following figure presents the responses to the multiple choice questions that sought to assess the general acceptability of the questions posed. The figure only includes those responses where an opinion was expressed.

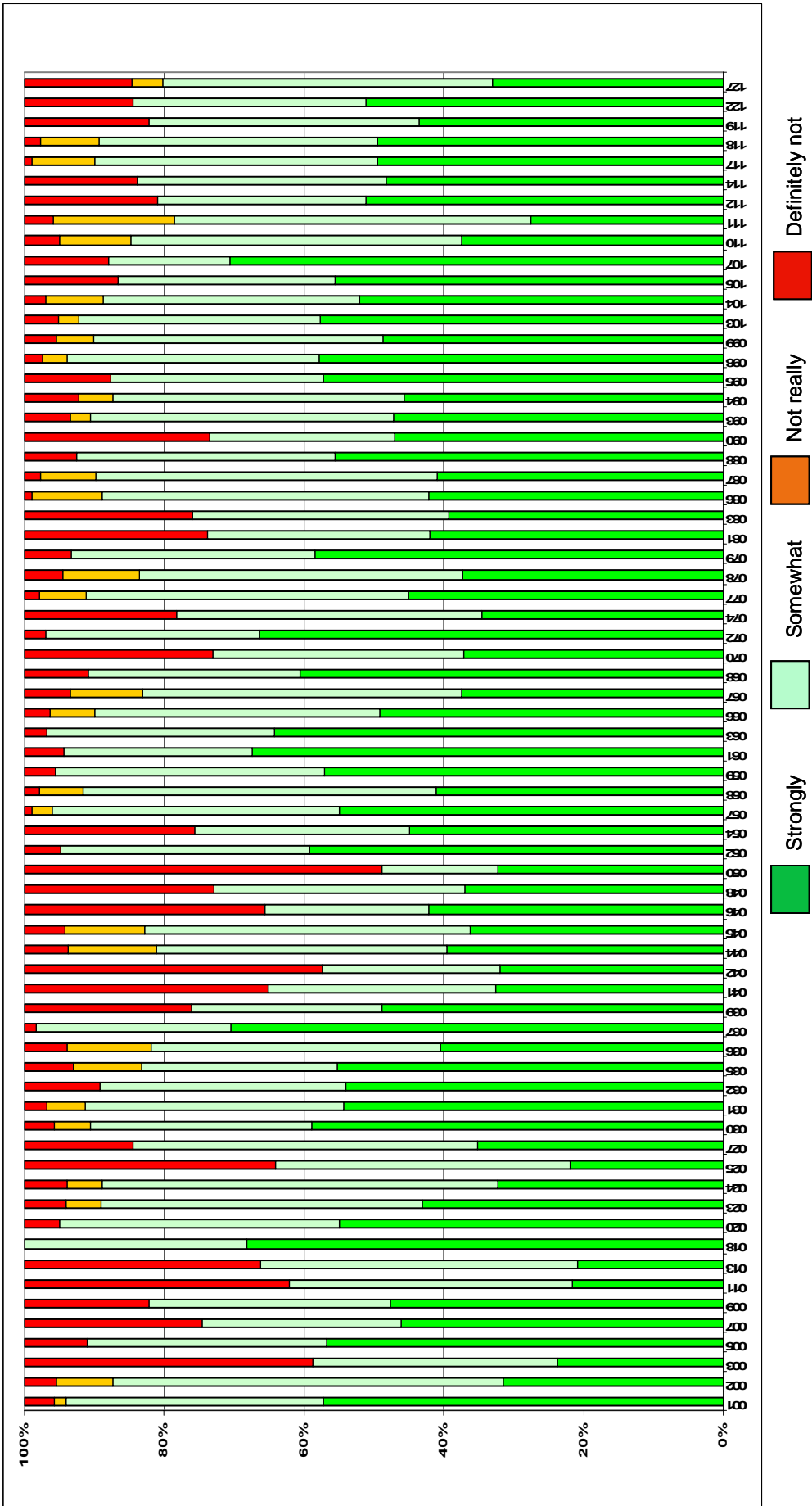


Figure - Response to multi-choice questions

## **Question 1: Do you agree with the proposed objectives for structural safety?**

The large majority of submitters were strongly or at least somewhat in favour of the proposed objectives for structural safety. The extent of comments was very broad and ranged across:

- supporting the provisions in their current form
- a desire to include natural hazards identified under section 71 of the Building Act 2004, but not infrequent or low-risk natural hazards
- supporting the approach proposed in the Building Code review discussion document for structural safety.

A large number of comments were received about the extent of regulation for structural safety and the types of hazard event the Building Code should include. The majority of submitters believed it was appropriate to address all the hazards identified under section 71 of the Building Act 2004 (erosion, falling debris, subsidence, inundation and slippage), but questioned whether the Code should include infrequent and seemingly low-risk hazards, such as tsunamis, solar radiation, volcanic eruption and wildfire.

Many submitters thought that less frequent hazard events, particularly those that are region-specific, would be better dealt with by territorial authorities through the Resource Management Act 1991 and the District plan process. Virtually all submitters who offered an opinion on this matter suggested there should be greater synergy between the Resource Management Act, territorial authorities' district plans and the Building Code.

Some submitters wished to see the Building Code set the requirements for buildings in hazard zones, as they thought this would ensure more consistent district planning across New Zealand. However, it was also noted that well-founded evidence is required before a territorial authority can justify establishing a hazard zone. Where significant research is required, this would lead to greater ratepayer and compliance costs, which would need to be carefully considered.

Submitters felt that greater clarification of the structural objective was required to express that the structure features are not mutually exclusive, and a combination of loads will often be required for structural design.

Some changes to the wording of the objective were viewed as desirable, including:

- making reference to the 'use' and 'demolition' of the building under SO1 Structural safety
- clarifying the meaning of 'unacceptable risk of injury'
- expressing the objective in positive rather than negative language.

Some submitters also noted that the scope of structural safety should be broadened to include property protection issues as well as life safety issues, and the protection of sanitary service connections associated with the structure.

## **Question 2: Do you agree with the proposed features to address structural safety?**

Overall, submitters were in favour of the proposed features to address structural safety, with very few submitters opposing the proposals.

A wide range of submissions was received about the issue of expanding the Code's requirements to include a number of new structural load design features. Analysis of the responses shows that submitters were generally satisfied with the current regime of structural design requirements, supported the inclusion of features such as fire, landslide, coastal erosion and flooding under the Code, but held reservations or opposed the inclusion of perceived low-risk or infrequent hazard events, such as tsunamis and volcanic eruptions.

The majority of submitters believed adequate warning systems are a better method for relatively infrequent disaster events, such as tsunamis and volcanic eruptions, and that these do not have to be included in the Building Code. It was suggested that catastrophic design events are better dealt with by territorial authorities in their district plans and in line with the provisions of the Resource Management Act 1991.

The consistent justification put forward for this view was that there are few practical engineering solutions available to ensure structural integrity against these disasters, and that these solutions are unlikely to significantly reduce risk without large financial and environmental costs.

The general view was that structural design requirements should take into account local environmental issues, societal circumstances and potential economic trade-offs.

Again, submitters noted that the Code should make it clear that structures need to be designed and constructed to withstand appropriate combinations of the effects of hazards and not just the individual hazards themselves.

Submitters would also like to see importance levels introduced for buildings, where particular types of building should have different performance requirements from others, for example, ancillary sheds compared to housing.

Some comments were also made about individual structural design features, for example:

- including preventing damage from hail as a structural design requirement
- excluding solar radiation protection, as it is not a relevant structural design requirement.

## **Question 3: How important do you think it is for the Building Code to make provision for buildings at risk of tsunami?**

Submitters were generally opposed to the Building Code providing for buildings at risk of tsunami. They based this view on the risk of tsunami being so low and its force being so great that the cost and resources of protection could not be justified, particularly in light of the Code's proposed sustainability requirements.

Instead it was suggested that life-safety risks would be best mitigated by an adequate early

warning system. It was also felt that district planning issues, which would highlight tsunami hazard zones, should be dealt with under the Resource Management Act 1991. The majority of submitters believed that this would sufficiently ensure critical infrastructure assets and facilities are located away from tsunami-prone areas. It was also felt that future owners of buildings in hazard areas could have their interests protected by noting the risk on the building's land information memorandum.

Several submitters noted that any structural performance standard based on tsunami should be subjected to a rigorous cost–benefit analysis.

Reasons for opposing a Building Code provision for buildings at risk of tsunami included:

- it would severely impede coastal development
- the risk of tsunami could be covered by a generic flooding or inundation feature
- catastrophic tsunamis occur very infrequently
- the cost of building to survive a catastrophic tsunami would be too great, given the low probability of their occurrence.

Submitters in favour of including the risk of tsunami believed it was an important consideration for coastal areas and that the risk has been underestimated in the past. For this reason, they considered it important to learn more about tsunami design approaches and features that minimise damage and loss of life.

#### **Question 4: Do you have any suggestions on ways to address the issue of buildings at risk of tsunami?**

Almost all submitters to this question perceived the risk of a tsunami event to be very low and consequently it was felt that any additional Code requirements should be minimised. It was suggested that if additional requirements are to be included in the Code, they should be limited to importance level 4 and 5 buildings, as described in AS/NZS 1170: 2002.

A number of submitters felt this was not an issue for the Code. A few submitters suggested that if building owners and insurers are prepared to assume the risk of tsunami, they should be able to build in tsunami-prone areas.

The main solutions proposed for dealing with tsunami risk included:

- focusing on an effective early warning system
- maintaining the current requirement for ‘surface water’, which includes water flowing from the sea (it was felt this is sufficient to cover tsunami risk)
- regulating for tsunami risk via the Resource Management Act and district planning consents.

### **Question 5: How important do you think it is for the Building Code to make provision for buildings at risk of flooding?**

More than half of all submitters who voiced an opinion on this issue considered it very important for the Code to cover the risk of flooding.

The primary concern of submitters was to ensure greater consistency in the Code's flooding performance standards. Currently, the Building Code requires that surface water with a 2 percent annual exceedance probability (AEP) must not enter buildings, whereas some regional councils require a higher level of performance of 1 percent AEP or an alternative level based on a flood-risk assessment. Some submitters felt this inconsistency undermined the more stringent requirements of regional councils because territorial authorities are able to default to the lesser requirement of the Building Code.

A number of submitters were concerned that the proposals did not sufficiently deal with the risk of global warming and rising sea levels. Submitters thought greater consideration should be given to this issue, as variable weather patterns are likely to exacerbate flooding concerns.

Better alignment between the Building Code and the Resource Management Act 1991 was proposed by submitters to create synergy between the building, planning and consents processes for building in flood areas.

To provide greater information about the risk of flooding in an area, submitters suggested that historical flood information be recorded on a building's land information memorandum. This would enable potential purchasers of land to better assess the risk of flooding in an area. For example, it was suggested that high water mark information be collected following a flood and recorded, and that all new subdivision titles should be required to state the potential for flooding.

A number of submitters were not in favour of including flooding requirements in the Building Code. One submitter believed that flooding requirements should not be contained in the Code because it was likely to inhibit development, while another thought the Code should only deal with life safety and structural integrity rather than property protection issues. Meanwhile, a further group of submitters thought that this was a district planning rather than a Building Code issue.

One submitter felt that the focus should be on early warning systems.

It was also submitted that the inclusion of flooding requirements into the Code removes the need for separate tsunami requirements.

### **Question 6: Do you have any suggestions on ways to address the issue of buildings at risk of flooding?**

A number of submitters submitted that the 2 percent annual probability of exceedance used in the current Building Code is too conservative and that consideration should be given to raising this level to a 1 in 100-year event (1 percent). It was felt this would also align the different regional council and Code requirements. An alternative proposal was that the 1 percent low

probability flood could be adopted as a minimum, with the actual standard being determined after considering the individual hazard conditions and existing measures aimed at reducing flooding.

Numerous submitters noted that if a building or structure is approved within a floodplain or overland flowpath identified by the procedures outlined in sections 72 to 74 of the Building Act, the hazard would be noted on the land title.

It was proposed that the flooding objective in the Building Code should recognise the construction practices and environmental factors that cause flooding (filling in the floodplain, inadequate provision for overland flow) and to outline ways to minimise these and the subsequent impacts on people.

Some submitters commented on the need for improved integration between the Building Act, the Building Code, the Resource Management Act and the Local Government Act to manage development impacts on surface water and downstream flood-prone environments. Alternatively, some submitters thought this was best dealt with by the Resource Management Act alone and was not a Code issue.

One respondent thought that the Code requirements should extend to coastal inundation and not cover only storm events.

Several design solutions were proposed, including:

- building houses on wooden or steel poles that are heavily braced (at least 1.2 m above the ground)
- providing sufficient floor-level concrete basements
- not building on floodplains
- allowing only non-habitable buildings in flood-prone areas
- ensuring buildings in flood-prone areas are built with sufficient height to ensure a liveable floor area stays above forecast flood levels
- designing for historical flood height and floor level
- providing better hazard maps that more clearly define 100-year flood levels
- requiring houses subject to flooding to incorporate flood design techniques such as CCA plywood floors, nog-free framing with drainage holes in the bottom plates, polystyrene insulation (not fibreglass or other self-supporting insulation).

Suggested performance criteria were to:

- require the building to be elevated so that the floor is above the 50-year flood level
- revise the Building Code's current surface water requirement from 2 percent annual probability of exceedance to 1 percent or 0.7 percent AEP
- maintain current Code requirements.

### **Question 7: How important do you think it is for the Building Code to make provision for buildings at risk of coastal erosion?**

Opinion differed on whether the Building Code should state requirements for buildings at risk of coastal erosion. While the majority of submitters thought that it should, a sizeable number were strongly opposed to this proposal.

The majority of opponents thought this issue is best dealt with via the Resource Management Act and local government district plans, and not the Building Code. The justification for this was that in most cases coastal erosion is not a rapid event like an earthquake, fire or cyclone and that additional requirements placed on the structural design of a building are unlikely to protect it. For these reasons, it was suggested it would be impractical to deal with coastal erosion in the Code.

It was suggested that a generic category that included all coastal hazards (storm surge, tsunami and coastal erosion) should be grouped together with exacerbating phenomena such as climate change and sea-level rise.

Several submitters agreed that the existing Building Code requirements adequately covered coastal erosion. They suggested there was sufficient scope in either the Clause B1 Structure requirements (under 'effects of water' and 'removal of support') or within the earth pressure, fluid pressure, and impact or flooding requirements.

Some submitters felt that building should be restricted in areas prone to erosion. They felt that this restriction should also be extended to areas of stream and riverbank erosion.

Some submitters who thought this was an issue of personal responsibility rather than something that could be regulated favoured the principle of caveat emptor or 'let the buyer beware'. To help aid potential purchasers or developers, it was suggested that the susceptibility of an area to coastal erosion be highlighted in the land information memorandum.

One submitter argued that this was not a Code concern because sections 71–74 of the Building Act 2004 cover it adequately.

### **Question 8: Do you have any suggestions on ways to address the issue of buildings at risk of coastal erosion?**

Several submitters promoted a risk assessment of the building site for coastal erosion. It was suggested that consideration should also be given to the likelihood of risk increasing over time due to rising sea levels, climate change and generally eroding coastlines.

It was felt that the requirements of sections 71–74 of the Building Act 2004 should be closely considered for the review of the Building Code. The Building Act 2004 requires a building consent authority to refuse consent if land is subject to or could worsen due to a natural hazard, unless adequate provision has been made to protect the property or to restore any damage. This would effectively prohibit building in erosion-prone areas, unless the developer could show sufficient measures were being taken to mitigate the risk.

Another method suggested for covering coastal erosion under the Building Code was to take an

all-hazards approach to coastal hazards. It was proposed that this be done by linking building consents to effective land-use planning and enforcement via regional policy statements and district plans.

One respondent suggested a risk-based performance framework to deal with this issue. The respondent proposed that Code provisions impose performance measures based upon a risk-management approach and the importance of buildings. Under this framework, factors such as the likelihood of occurrence and the importance of the building would be used to derive a risk factor for the building, which in turn would determine the varying degrees of performance measures.

Several submitters believed that coastal erosion mapping and development controls at the district or regional plan level should be increased. It was submitted that this information could be noted on land information memoranda to inform people of the hazard risk.

Specific design features proposed for at risk coastal environments included:

- using relocatable structures
- increasing foundation requirements to make piling mandatory within a prescribed distance of coastline
- reducing areas of grassed/impervious surfaces and increasing planted areas to distribute rainwater naturally
- requiring foundations to be of such depth and rigidity that the foundation can survive erosion – locating buildings further away from the coast
- reducing surface run-off in coastal areas.

### **Question 9: How important do you think it is for the Building Code to make provision for buildings at risk of landslides?**

The overwhelming majority of submitters believed that the risk of landslide was an important issue to be addressed in the Building Code. Opinion on the best way to deal with the issue varied, either through using the Building Code, the Resource Management Act and district plans, or as part of the section 71–74 Building Act 2004 considerations.

A number of submitters felt that landslide risk is sufficiently covered by the requirement for a geotechnical assessment in risk areas. It was argued that geotechnical assessments can be used to inform building consent authorities of the risk of building within the proposed area and to judge whether sections 71–74 of the Building Act 2004 have been satisfied.

The concern was raised that councils do not have global assessment information for their districts and the potential for landslides. It was suggested that the cost involved in achieving this would be significant and ultimately a burden on ratepayers. The alternative proposed is to require applicants to provide specialist reports for all building consents on land with prescribed characteristics that reflect a landslide risk, such as steep grades, gullies or sites with fill.

A few submitters felt that greater consideration should be given to aligning the Code and the Resource Management Act so that certain buildings are prohibited in very high-risk areas. However, another submitter proposed that the Resource Management Act and planning devices

are more appropriate tools to restrict building in landslide-prone areas and that this should be left out of the Code entirely. This submitter believed that the individual should be allowed to assume the risk, as long as appropriate measures are taken to mitigate the hazard.

It was suggested that more emphasis be placed on protecting properties when proposing to build in areas of landslide risk.

Another submitter believed that the current Building Code should place more emphasis on the integrity and stability of the ground that buildings sit on, and not just on the structural aspects of buildings. The submitter felt that houses are increasingly being built in precarious positions, evidenced by recent landslides throughout New Zealand.

### **Question 10: Do you have any suggestions on ways to address the issue of buildings at risk of landslides?**

The primary suggestion put forward by submitters on this question was to restrict building on at-risk areas unless appropriate geotechnical assessments are carried out, which indicate the building is viable. It was also suggested that the actual building should be engineer-designed and constructed.

Many submitters believed that sections 71–74 of the Building Act 2004 provide adequate protection for buildings at risk of landslide. These submitters stated that buildings that are proposed in areas of landslide risk should be permitted only if adequate protection is provided as a condition of consent. Where adequate protection cannot be provided, the majority of submitters felt that building should be prohibited. However, a few submitters believed that developers should still be entitled to proceed with the development if they, their insurers and the appropriate building consent authority were willing to accept the risk.

One submitter noted that education and/or information was the best way to mitigate landslide risk. It was suggested that a more thorough knowledge database be introduced and maintained to provide future owners with more information about the potential landslide risk of a building. Another submitter noted that such landslide hazard information should then be noted on land information memoranda to inform future owners of the risk.

Several submitters considered this to be a Resource Management Act issue to be dealt with under district plans, and not a Building Code issue.

One submitter thought that if the Building Code was to deal with the risk of landslide, then it could be adequately covered under the generic headings of gravity, earth pressure, fluid pressure, impact and flood, and did not require separate consideration of landslide risk.

A design solution proposed was the introduction of re-locatable buildings, which would mitigate a building's future susceptibility to landslides.

Submitters suggested a number of considerations they thought should be taken into account for landslide design and performance.

- Loading forces
- Pressure tolerance

- Foundation anchoring
- General structural strength
- Building materials
- Use of a retaining wall
- Site context
- Storm water run-off
- Cumulative effect of high rainfall
- Seismic compaction of fill for residential purposes

**Question 11: How important do you think it is for the Building Code to make provision for buildings at risk of volcanic activity?**

The likelihood of volcanic activity was deemed by the majority of submitters to be too low or remote for a volcanic activity requirement to be considered in the Building Code. Submitters felt that the potential costs far outweighed any perceived benefits and that regulation was best left at the current level, where frequent loads such as snow, wind and surface water are accounted for.

For buildings in zones where the ash load risk is comparable to that of earthquake, it was suggested that regulations should be flexible and open-ended to incorporate any relevant imposed load that the building is likely to experience. The majority of submitters felt that this risk is best covered under the Resource Management Act 1991 and territorial authorities' district plans.

A few submitters believed there should be some provision for ash loads under the Building Code in those areas subject to volcanic activity. However, submitters were generally against ash load requirements being established for all buildings. They thought the low likelihood of occurrence would not justify the potential costs.

Due to the cost involved, a small number of submitters proposed that authorities were better to focus on volcanic monitoring and early warning systems rather than attempting to regulate the design of buildings under the Building Code.

One submitter thought that only certain important buildings with large occupant populations or post-disaster functions should be designed to resist ash loadings.

It was also suggested that this proposal was a property protection rather than a life protection issue and therefore should not be regulated in the Code.

**Question 12: Do you have any suggestions on ways to address the issue of buildings at risk of volcanic activity?**

The majority of submitters felt that alternatives existed outside the Building Code to protect buildings, such as greater research on the probabilities and consequences of volcanic activities.

Submitters felt that if the Building Code were to deal with the risk of volcanic hazard, the best

method would be in the Code's roof-loading performance standards. It was stated that the use of load per unit area as a standard ensures that, regardless of the nature of material exerting the pressure, the roof should be able to withstand it within defined risk parameters. A further suggestion was that ash loads for roofs could be specified in the Compliance Document for Building Code Clause B1 Structure.

It was suggested that building should be restricted in areas of high risk of volcanic activity and that, in medium-risk areas, it should only be permitted if adequate protection is required as a condition of consent.

Another suggestion was to provide for the possible weight of ash in the event of a disaster event when calculating design loads for important buildings and infrastructure. However, submitters felt that this should not be applied universally and cited cost as the reason.

Design solutions proposed by submitters to mitigate the risk of volcanic activity were:

- increased roof pitch
- more durable exterior materials
- guttering.

### **Question 13: How important do you think it is for the Building Code to make provision for buildings at risk of wildfire?**

Due to the practical difficulties of monitoring the risk of wildfire, the majority of submitters were against the Building Code including its risk on buildings. They suggested that the Building Code should only cover scenarios with a high likelihood of occurrence because otherwise compliance costs would likely be too high. They thought that wildfire presented only a low likelihood of occurrence.

A number of submitters believed this was not a Building Code issue and should be managed by territorial authorities under the Resource Management Act.

On submitter stated that the focus should be on providing more information about wildfire risk to purchasers or developers and, ultimately, for them to assume the risk with their insurers.

A submitter noted that it is important to balance the threat of wildfire against the amenity issues of bush removal.

It was suggested that building owners should generally be able to determine their own risk unless the building in question was a public building that was critical to infrastructure needs. Additional requirements may be necessary for these buildings.

The importance of life safety, with buildings allowing for safe evacuation in the event of a fire, was noted by one submitter. It was also suggested that this could be managed by including the risk of wildfire under the general fire category.

#### **Question 14: Do you have any suggestions on ways to address the issue of buildings at risk of wildfire?**

Numerous submitters believed consideration should be given to Australian Building Code provisions about the risk of wildfire. Due to the increased likelihood of wildfire in Australia, the Australian Code makes greater provision for wildfire and it was thought that this framework could be used as a reference point for New Zealand.

A number of submitters were in favour of linking building consents to effective land use planning and enforcement via regional policy statements, district plans and other statutory and non-statutory planning documents.

A proposal was made that wildfire become a subset of the general fire category.

It was proposed that the risk of wildfire be defined in a way that is consistent with existing references, such as corrosive zones in NZS 3604.

A submitter noted that the ventilation and drainage planes required by E2/AS1, Third Edition are areas where fire sparks could enter a structure.

Further proposals were made about ways to address the issue of buildings at risk of wildfire, including to:

- treat it as a risk-management issue
- focus on the safe evacuation of buildings
- take the same approach as the current Code
- refer to ‘NZ Wildfire threat analysis – National Rural Fire Authority 2005’.

A number of design solutions were proposed for buildings at risk of wildfire, including to:

- construct ‘fire cells’ within buildings for shelter for occupants
- require specified separation from native and exotic bush and limit plantings to provide that separation (to be regulated by territorial authorities)
- manage low ground cover vegetation only through an ongoing Resource Management Act requirement
- install internal domestic sprinklers, external sprinklers and fireproof spouting
- create firebreaks in some areas
- require on-site water tanks and a minimum non-vegetated area around buildings
- maintain defensible space
- provide clear access for fire appliances
- design guttering to minimise ash accumulation
- make fire extinguishers and smoke alarms compulsory in all buildings
- have an open surface water culvert or moat around the boundary of buildings.

### **Question 15: Is there anything else about structural safety you think the Building Code should make provision for?**

It was suggested the Code should take an all-hazards approach and recognise those hazards listed in the Civil Defence and Emergency Management Act 2002. Therefore, the focus would be on minimising damage and reducing the effects of structural hazards on people and property. This would mean that the building should be functional following a hazard event, as well as protecting its occupants.

A submitter thought the Code needs to provide a specific control for buildings on hazard-prone land, which, it was argued, was not sufficiently covered under the Resource Management Act. It was suggested that this could be done by reflecting the natural hazards identified under section 71 of the Building Act in the Code.

It was felt that the Code should provide exemptions where public buildings are located in inaccessible environments that cannot be reached by people with disabilities, for example, most tramping huts and buildings with unprotected sea/beach access. Submitters believed the recreational use of these structures should be recognised.

One submitter noted that greater efforts should be made to increase enforcement of Building Code provisions. They felt that enforcement has been lacking in the past, in particular surface water and tsunami design requirements.

A submitter stated that there should be a strong link between structural and durability requirements, for example, by considering rot and corrosion beyond the nominal life of the building.

A submitter requested that structural remediation standards be introduced for heritage buildings.

Submitters also proposed that consideration be given to:

- combating climate change
- promoting creativity and innovation in building
- creating a robust risk-management tool to balance occupant safety against cost
- maintaining existing Code requirements
- making available more information about non-engineering structural design.

Some additional structural hazards were identified to be considered in the Code, including:

- corrosion
- wave action
- action of running water (scour)
- temperature variation
- expansion
- hail
- microwaves and soundwaves

- contraction.

### **Question 16: Do you agree with the proposed objectives for fire and other emergency safety?**

Submitters were heavily in favour of the Code maintaining its focus on life safety and the evacuation of occupants. It was submitted that this is sufficiently covered by the current Code requirements, but that the Code should be continually updated to reflect new technological developments.

Concerns were raised about the rising costs of compliance, in particular if additional fire safety requirements were to be placed on detached dwellings. Submitters felt that a balance needs to be found between preventing the risk of injury from fire and the costs of compliance with Code provisions.

One submitter felt the Code should provide an element of property protection to recognise that key infrastructure should be accorded greater levels of protection to enable it to function after a disaster.

Comments about whether properties adjacent to a building should be protected from fire under the Building Code were varied. Approximately half of the submitters that commented on this issue were in favour of the Code providing protection to adjacent properties, while the other half were against.

Submitters made a number of comments about areas they felt should be addressed within the fire and emergency objective, including that:

- detached dwellings should be excluded from the requirements for 'fire control systems' and 'fire-fighting facilities' – resistance to arson should be a requirement for susceptible buildings
- the 'means of escape in emergency' should apply to all occupied buildings.

A number of submitters were confused by the wording of the objective, which indicates that greater clarification or definition of the objective might be required. Examples of confusion of the wording included:

- replace 'limit probability of [...] unacceptable risk' with 'prevent unacceptable risk'
- the use of the term 'injury' implies no risk of fatal injury
- ignitability needs to be better defined.

### **Question 17: Do you agree with the proposed features to address fire and other emergency safety?**

Almost all submitters were in favour of maintaining the life safety focus of the current and proposed features. The following comments were made about the specific 'fire and other emergency safety' features.

Fire or explosion occurring:

- It is confusing to manage the risk of fire together with the risk of explosion.

- This does not appear to deal with the issue of containment of fire.

Materials of construction (ignitability):

- The risk of fire or explosion occurring should apply to all three categories under the heading ‘Fire or explosion occurring’ and not just the first category.
- There is some concern about materials of construction (ignitability) as an objective. The emphasis should instead be on the rate of fire spread, risk of building deformation, smoke levels and toxic gases because of ignitability. These aspects pose a risk to life safety.

Fire or explosion impacting areas beyond its point of origin:

- It is confusing to manage the risk of fire together with the risk of explosion.
- No definition is provided for fire impact beyond the point of origin.
- The ‘Materials of construction’ feature should apply to all buildings.
- The ‘Active means of fire suppression’ heading is misleading because not all methods of fire control need to be active. This could be changed to ‘Means of fire control’.
- It was suggested that better definitions of ‘Active means of fire suppression’ and ‘Fire suppression systems’ is required.
- It was suggested that the ‘active means of fire suppression’ and ‘fire control systems’ features could be combined.
- It was suggested that the installation of sprinklers in detached dwellings and all multi-unit dwellings would be too expensive to justify.
- It was suggested ‘fire control system’ requires better definition.

Fire safety and other emergency systems failing to function as expected:

- There was some confusion over the meaning of ‘failing systems’.
- It was argued that designers expect that fire safety systems will operate as designed, when supported by a maintenance system.
- It was felt that detached dwellings should be included for the ‘fire suppression systems’ and ‘fire control systems’.

People being delayed in or impeded from moving to a safe place during a fire or other emergency:

- It was felt detached dwellings should also be included under the ‘means of escape in emergency’ feature.

### **Question 18: How important do you think it is for the Building Code to make provision for fire safety measures in houses?**

Given that almost all fire fatalities and injuries occur in houses, the overwhelming majority of submitters felt it was very important for the Building Code to provide for fire safety measures in houses. It was felt that the level of protection should be related to the level of risk, which should be underpinned by house fire reports and statistics.

Some submitters felt there is a disparity of provision for risk when comparing houses and commercial properties. They also believed more emphasis should be placed on ensuring the safety of those in lower socioeconomic groups.

**Question 19: Do you have any suggestions on ways to address the issue of fire safety measures in houses?**

Many submitters felt it was important for the Building Code to mandate the installation of hard-wired smoke detectors and/or domestic sprinkler systems in houses.

Many commented that the minor cost of installation of both these measures in new houses would go a long way to prevent the risk of injury from fire.

Submitters also thought it was important to regulate the use of hazardous building materials and paths of egress.

Some submitters suggested that NZS 4517: 2002 Fire Sprinkler Systems for Houses should be used as the basis of a minimum performance standard for all new buildings.

Several issues were raised about fire safety in high-rise apartments and complex multi-unit developments, including:

- ensuring sprinkler systems are operational at all times
- emerging design for apartments and multi-unit dwellings designates the kitchen as the only access to an exit, representing a potential escape issue
- emergency services are unable to enter apartments/multi-unit dwellings because of apartment security arrangements
- lifts and corridors have proven to be too small to cater for stretchers and other emergency equipment.

**Question 20: How important do you think it is for the Building Code to explicitly require a means of emergency egress from buildings that is accessible to people with disabilities?**

When questioned on the importance of providing accessible emergency egress, the great majority of submitters felt it was either somewhat or very important. This contradicted slightly with the nature of the comments for this question, which tended to indicate a mixed response of submitters in favour of or against this proposal.

Almost all submitters felt that a cost–benefit analysis of providing accessible emergency egress paths for all buildings needs to be carried out. The majority were under the impression that this would be expensive and therefore prohibitive.

However, some submitters noted that all buildings should require an accessible means of emergency exit and stated that if the Building Code requires that people with disabilities be able to access a building then they should be able to exit the building in an emergency.

Two submitters felt it would be appropriate to require public buildings to have accessible egress

paths.

One submitter noted that section 4 of the Building Act only refers to people with disabilities entering and carrying out normal activities and processes in a building and does not mention means of escape. Therefore, the submitter thought the Building Act would require amendment if this were to be incorporated under the Code.

### **Question 21: Do you have any suggestions on ways to address the issue of emergency egress from buildings for people with disabilities?**

Submitters cited New Zealand Standard 4121:2001 Design for Access and Mobility: Buildings and Associated Facilities, which refers to the egress requirements of the Fire Safety (Evacuation of Buildings) Regulations 1992.

Regulation 21 states that ‘no problems of fire safety and evacuation from a building shall be cause to limit or prevent any person with disabilities from entering or carrying out normal activities and processes within the building or any part of it which the person would otherwise be permitted to enter and use.’ The submitters suggested that Regulation 21 of the Fire Safety Regulations 1992 be maintained as a minimum for fire safety evacuation requirements.

Two proposals were put forward for addressing the issue of emergency egress. The first focused on education about emergency evacuation, which might include nominating able-bodied people to help people with disabilities, or informing people about safe zones for them within emergency egress paths. The second was to require universal design for all buildings, including accessible egress paths.

One submitter proposed that all buildings should have a minimum of two wheelchair accessible and usable emergency exits. It was also suggested that all commercial multi-storey buildings with lift and stair access only (no ramps throughout) should have evacuation chairs on every elevated floor.

A number of design solutions to address the issue of accessible emergency egress were proposed.

- Fire-safe sprinklered areas
- Fire safety management plans
- Wide, unobstructed fire-rated egress with all doors two-way operable
- Wide doorways (860 mm minimum)
- Multi-use pathways
- Stair evacuation chair
- Ramps
- Mechanical/hydraulic external lift systems alongside exterior stairwells
- Protected refuge areas
- Fire-resistant lifts in multi-storey buildings
- Accessible safe accommodation by fire exits

- Visual warning alarms
- A minimum of two external exits

**Question 22: Is there anything else about fire and other emergency safety you would like the Building Code to make provision for?**

Submitters would like to see more information about and greater use of non-combustible building materials. One submitter proposed a table in the fire safety Compliance Documents that depicted common building linings with their respective spread of flame index (SFI) and smoke developed index (SDI) ratings.

One submitter felt the Code should consider providing a greater level of property protection for certain important buildings in the case of fire.

It was proposed that measurable criteria be provided in the Code such as Available Safe Evacuation Time (ASET).

A concern was raised that rising costs in regulatory requirements and building materials may become an issue if the Building Code was too prescriptive about fire safety.

The need to annually inspect and maintain sprinkler systems was raised.

**Question 23: Do you agree with the proposed objectives for safety in use?**

Almost all submitters agreed with the proposed objectives for safety in use.

It was suggested the objectives should consider the safety of property and damage to associated property, and therefore an element of property protection, and not focus solely on life safety.

A submitter noted that while they thought the overall safety objective was very generally worded and would appear to encompass people with disabilities using a public building, the more specific objectives, such as SO3, do not mention the safety needs of people with disabilities. They felt that this should be expressly included in the relevant objectives.

It was felt that the current building warrant of fitness system addresses the safety in use objectives adequately without extra need for regulation in the Building Code.

The need for people to be able to exercise individual responsibility was highlighted.

Exposure to high levels of sound from alarm systems was not viewed as an important issue for the Building Code.

**Question 24: Do you agree with the proposed features to address safety in use?**

While some concerns were raised in the feedback about the proposed features to address safety in use, almost all submitters indicated support for the measures.

A number of submitters felt there has to be a clear understanding that occupants are ultimately responsible for their safety in a building and that accidents are not always preventable. The

Building Code's focus should therefore be on mitigation and reducing the risk. This issue was raised several times in relation to SO3.2 (contact with hot or cold surfaces or substances).

A large number of submitters felt SO3.5 (exposure to high levels of sound from alarm systems) was not necessary.

Some submitters also raised concerns about the validity of SO3.6 (people being trapped in confined spaces). While some submitters questioned whether the objective was necessary at all, others felt it was very narrow in its focus and could conceivably be broadened to include other buildings that have confined spaces.

Some submitters questioned whether escalators and moving walks are appropriate examples of confined spaces.

Some submitters felt the Building Code cannot be expected to protect people from every possible occurrence.

It was stated that the 'way-finding' feature might best be incorporated into another section, as it seemed out of place here. Another submitter thought way-finding should not apply to detached single residences.

In relation to the 'Swimming pools and water storage containers' feature, it was proposed that the word 'water' be removed so the objective reads 'swimming pools and storage containers'. The submitter felt that the feature should encompass all storage containers that carried a potential drowning risk and not just water storage containers.

It was thought that some features require qualification according to building type and use.

### **Question 25: How important do you think it is for the Building Code to make provision for protection of people from noise emitted by fire alarms?**

Responses were polarised on this issue. The majority of submitters felt the Building Code should not regulate the level of noise emitted from fire alarms, but a large portion of submitters considered this a legitimate concern that needed attention.

The following depicts the range of comments against the Building Code regulating to protect people from noise emitted by fire alarms.

- It is questionable whether there is evidence formal building control is needed to protect people from noise emitted by fire alarms.
- It is not important to make provision for the protection of people from noise emitted by fire alarms because people need to be aware of the alarm.
- This proposal does not fit within the scope of the Code and would be better regulated by manufacturers.
- Implementing a provision that would limit the volume of a fire alarm system to protect hearing seems onerous and unenforceable.
- Alarms must be able to wake people from their sleep. It would be dangerous to consider reducing the audibility of alarms.

- Intrusive noise indicates an effective alarm system. The results are early evacuation and early alert for emergency assistance.
- The noise emitted is the lesser of two evils. Loud alarms are necessary to alert occupants of the emergency. The noise level can be adjusted on the alarms if necessary.

In comparison, the following comments were made in favour of provision being made in the Building Code.

- Very loud alarms can have a dramatic effect on a wide range of people with disabilities and can add to disorientation and confusion in an emergency.
- Some people who are hypersensitive to loud sound and hearing aid users can also be affected by this level of noise.
- Alarms need to be unpleasant enough to ensure people evacuate. However, in stairwells and other evacuation routes, the volume should be lowered as people are already on the move and do not need to be subject to a potentially damaging noise level.
- Occupants should be protected from all excessive noise sources, including fire alarms, and therefore fire alarms should be a subset of the regulation of excessive noise sources.

**Question 26: Do you have any suggestions on ways to address the issue of protection of people from noise emitted by fire alarms?**

The majority of submitters did not believe that the Building Code should address this issue at all.

For those who did make a suggestion about how people could be protected by noise emitted from fire alarms, the following comments were made.

- A greater number of and better placed alarms of less volume should be required in office and commercial buildings.
- Noisy factories may need loud alarms.
- Alarms should be kept out of stairwells and main fire exits.
- Alarms could include flashing warning lights.
- Alarms should have a defined decibel rating and this rating should be tested during the building warrant of fitness checks.
- Manufacturers should be required to address any problems.
- There should be warning systems with voice messages rather than constant noise because such systems can lower stress and protect from auditory damage.
- Alarm volume should be reduced in stairwells and other evacuation routes.

**Question 27: How important do you think it is for the Building Code to make provision for protection of people from hot and cold surfaces?**

Almost all submitters thought this was a minor issue that did not require attention within the Building Code, and that it could be better regulated by other institutions, such as ACC and OSH. However, when directly questioned on how important submitters thought it was to protect people

from hot and cold surfaces, the majority felt the issue was at least somewhat important.

It was suggested that the current Building Code requirements address the issue adequately and additional provisions would be too prescriptive. The comment was made that building users must be able take responsibility for their own actions.

However, there were some exceptions. It was felt that some provision should be made for the very young and the old, and possibly within public buildings and industrial buildings where there is a hazard risk. Under these circumstances, it was felt that measures should be taken to protect people from hot and cold surfaces, particularly where a person could not be reasonably expected to know the surface temperature.

One submitter noted that if protective measures are to be required for such buildings, building owners should be able to choose how they address the issue. This would allow flexibility, for example, to include non-building elements as a protection.

### **Question 28: Do you have any suggestions on ways to address the issue of protection of people from hot and cold surfaces?**

The majority of submitters felt there were better ways to protect people from hot and cold surfaces other than regulating in the Code. The favoured alternative was to focus on educating building users about potential hazards and allowing them to take responsibility for their own actions.

One exception was for aged and disabled facilities, industrial buildings and hotels. For these buildings, submitters felt there was a greater need for regulation in the Code.

A number of design suggestions were proposed by submitters to protect people from the risk of injury from hot and cold surfaces.

- Warning signs and labels
- Pipe lagging
- Hazard guards
- Insulated surfaces
- Flue/firebox protectors
- More effective tempering valves
- Limiting the temperature range
- Hazard isolation
- Limiting the surface temperature of radiators
- Location design

### **Question 29: Is there anything else about safety in use you would like the Building Code to make provision for?**

One submitter noted that for some more progressive sustainability measures, such as micro wind turbines, there are some safety concerns that should be set out in the Building Code. This would ensure designers could be clear about what to expect when seeking building consents.

A respondent also requested that the Code provide for removing asbestos sheets from the existing building stock and replacing them with safe materials.

### **Question 30: Do you agree with the proposed objectives for sanitation?**

The proposed objectives for sanitation cover the potential hazards associated with exposure to human or domestic waste, consumption of contaminated water, inadequate facilities for sanitation and contact with hazardous materials, substances and processes.

The majority of submitters who responded to this question agreed with the proposed objectives for sanitation, which were neither new nor controversial. The following comments reflect the range of views expressed on this topic.

- The concept of ‘hazardous materials’ does not fit neatly under the sanitation objective. Either the Sanitation objective should be renamed or the ‘Contact with hazardous materials, substances and processes’ feature should be shifted elsewhere.
- There is a potential overlap in several areas of the Health, Wellbeing and Sustainable Development Objectives, as proposed, and there should be clarity as to what is intended to be achieved under each.
- Code requirements for sanitation should fit in with sustainable development provisions to encourage the adoption of alternative grey water and black water on-site systems that recycle water for reuse in buildings, rather than just for on-site irrigation.
- There needs to be better delineation between the Building Act and the Resource Management Act.
- Water requirements need to align with health legislation and new drinking water legislation in preparation.
- An objective should be included to reduce the risk of exposure to domestic wastewater from on-site wastewater disposal systems (in non-reticulated areas).
- The wording of the objective should be changed to take out the words ‘to limit the probability’. ‘An objective of this Building Code is to ensure that the design and construction of the building does not expose a person in or adjacent to the building to an unacceptable risk of illness due to unsanitary conditions’ or ‘An objective of this Building Code is to reduce the risk that a person is exposed to illness caused by unsanitary conditions resulting from a building's design, construction, use or demolition.’

### **Question 31: Do you agree with the proposed features to address sanitation?**

The majority of those who answered this question agreed with the proposed features to address sanitation.

The following comments reflect the range of views presented.

- Sanitation features should take account of sustainable development objectives. The ‘Solid waste disposal’ feature should read ‘Solid waste disposal/recycling’ and the ‘Liquid waste’ feature should read ‘Liquid waste disposal/recycling’.
- The ‘Solid waste disposal’ feature is particularly relevant to multi-unit residential complexes where there is often inadequate storage space for waste and recyclables.
- Current provisions under G15 are inadequate to achieve purpose 3(d) of the Building Act 2004, ie, that buildings promote sustainable development.
- The Acceptable Solution or referenced Standard should require a specific area or volume of storage space for collection of general waste, paper, other recyclables (expressed per building occupant).
- Facilities for waste disposal in multi-unit developments should be a district plan issue or should be addressed through the body corporate.
- There is a need to allow for innovative solutions to waste, such as composting toilets and guidelines for safe and sanitary use of waste reduction technology. Legislation for inspection of systems should be produced if deemed necessary.
- Design and construction for on-site wastewater treatment and disposal should meet specific performance criteria but it may be difficult to include in the Building Code due to varying standards throughout the country and the fact that councils under the Resource Management Act administer the design standards. Reference should at least be provided to local and regional council design guidelines and AS/NZS 1547: 2000 and 1546 1-.3 Australian New Zealand Standards for On-Site Domestic Wastewater Management (all of which are undergoing revision).
- An additional feature could be added for protection of on-site detained water collected in rain tanks for reuse. This feature would need to be supported by requirements for the maintenance of these harvested water systems.
- Intensive farming practices (especially dairying) mean that there is now more chlorine in our drinking water supplies. All occupied buildings should have filter protection systems to remove chlorine from all drinking and shower water supplies.
- Rainwater for human consumption should be required to comply with water standards.
- It should be possible to assume all water supplies are potable unless there is a notice to state otherwise.
- The ‘Laundering and other cleaning facilities’ feature should depend on the building type, for example, there could be a communal laundry in an apartment building.
- Exemptions to accessible personal hygiene facilities for people with disabilities should be reconsidered. Requirements do not currently apply to housing, outbuildings, ancillary buildings and industrial buildings where no more than 10 people are employed.

### **Question 32: How important do you think it is for the Building Code to make provision for storage space for waste and cleaning equipment?**

The majority of submitters who answered this question were in favour of the Building Code providing for storage space for waste and cleaning equipment.

Their comments are summarised below.

- Storage space for waste and cleaning equipment is considered particularly an issue in cities with high-density living, important in multi-unit dwellings and industrial and commercial premises, but not so important in separate dwellings.
- This is not a Code matter, but a question of personal choice, and the market should be self-regulating on this issue.
- Residential buildings should have a childproof cupboard or shelf to enable storage of dangerous substances or materials. Storage of chemicals high up out of reach of children needs to be encouraged, and high-level storage does not require increased floor space.
- A Code requirement for the storage of cleaning or waste equipment should be limited to buildings where children would have unsupervised access and movement within the building.
- This issue could be addressed outside the Building Code in the resource consent process, as waste management plans are approved under the Resource Management Act.
- Waste as a fire risk – the Code needs to be compatible with Part 1 of the Fire Safety and Evacuation of Buildings Regulations 2006 (Part 1 not altered from 1992).

### **Question 33: Do you have any suggestions on ways to address the issue of storage space for waste and cleaning equipment?**

Suggestions on ways to address the issue of storage space for waste and cleaning equipment are summarised in the comments below.

- It was asked whether this was a matter for the Code or whether responsibility lay elsewhere.
- There is a need to consider storage for waste as an issue in the design of commercial mixed-use and multi-unit residential developments, both inside the individual units and for collection areas for the whole development. Whether this could be adequately covered under the design and assessment criteria of district plan rules for different building uses or whether it should be a Building Code issue needed to be decided and clearly stated. There are cases for both options and further discussion with territorial authorities should be included in the next stage of the review process. Issues for discussion may include:
  - requiring adequate storage space for appropriately sized receptacles for refuse, recyclables and putrescible waste
  - rubbish chutes in multi-storey buildings
  - proximity of waste storage spaces to occupied spaces in the building.
- Education would be preferable to regulation in this area.
- Solutions depend on building type and the number of occupants.
- Larger buildings could provide space for recycling and composting to meet sustainable development objectives.

- Large or multi-unit commercial, residential or public buildings should be designed with maintenance and janitorial spaces that do not contaminate indoor air quality or local wastewater treatment systems.
- All floors and separate areas of all (single and multi-storey) buildings must have purpose-designed waste and cleaning equipment storage areas.
- There should be adequate provision for the ingress and egress of waste collection vehicles from sites.
- This is especially important in small apartments and needs to be consistent with space/amenity.
- Storage space for waste and cleaning equipment should be isolated from prime living spaces, with ventilation provided.
- The cleaner's cupboard should have ventilation, hot and cold water and storage facility for the regular cleaning of the building.
- Cleaning contractors bring in their own equipment; there is less use of mops.
- The Code should encourage buildings to use green housekeeping and maintenance compounds that contain little or no volatile organic compounds (VOCs) or other harmful compounds that can adversely affect air and water.

**Question 34: Is there anything else about sanitation you think the Building Code should make provision for?**

Other comments on sanitation are summarised below.

- Consideration needs to be given to health issues in relation to rainwater harvesting and dual water supplies (potable water and water for non-drinking purposes), but Acceptable Solutions should not prevent innovative sustainable practices.
- There is an increasing demand for the reuse of rainwater in urban areas and the reuse of highly treated wastewater in non-reticulated densely populated rural/coastal areas for toilet flushing and other uses. Specifications are required in the Code for dual reticulation systems for such situations and, if practicable, reference to performance criteria for minimum standard of pre-treatment systems, depending on the water source and quality.
- There have been significant difficulties in implementing design and necessary maintenance standards for such systems to satisfy health recommendations. In the Auckland region, such systems will also require a discharge consent under the proposed regional rules (to ensure maintenance requirements are in place).
- There is a need to provide information on how to re-use water.
- Stormwater can become contaminated during construction and demolition, through the transport of waste and sediment, but also during the life of a building, through selection of materials.
- There is a need for methods of limiting or preventing stormwater inflow and infiltration into wastewater systems. Excessive flows during rainfall can result in overflows from the wastewater network.

- There needs to be provision for the collection of grey water to be recycled for toilet flushing without the requirement to treat that grey water again to potable or near-potable level before it can be used.
- The layouts of kitchen, toilet and laundry facilities need to be considered from a sanitation perspective. Toilet spaces should be placed away from food preparation areas.
- Code requirements should not prevent washing machines in food preparation areas etc.
- Solid waste storage areas need water available for cleaning and traps for draining of wash-out material.
- There needs to be more control of and better systems for septic tanks and effluent. Annual warrants of fitness should be provided by the homeowner.
- Changing facilities in public toilets should cater for adults as well as infants.
- Roof water collection should not be contaminated by either roof materials or materials falling onto the roof.
- Minimum design life requirement for structures associated with on-site systems should be increased (they are currently only 15 years).
- All extensively modified, extended or rebuilt buildings and residential dwelling places must have an appropriate number of wheelchair accessible wet-area shower and/or toilet rooms. There should be at least one such accessible shower and toilet area for every six accommodation dwelling units in any accommodation building.

### **Question 35: Do you agree with the proposed objectives for indoor conditions?**

The proposed objectives for indoor conditions covered the potential hazards associated with inadequate indoor air quality, inadequate temperature, and excessive moisture.

The majority of submitters who answered this question agreed with the proposed objectives for indoor conditions for health.

Comments are summarised below.

- Areas identified as significant new scope (draughts, indoor temperature) are not required.
- The reason for the inclusion of concealed spaces was not clear.
- The need for the objective for this section to refer to a person in an adjacent building being exposed to risk of illness was questioned.
- These requirements should apply to all occupied buildings except for industrial areas where protective clothing is provided.
- Alternative wording for the objective was proposed: ‘An objective of this Building Code is to ensure that the design and construction of the building does not expose a person in or adjacent to the building to an unacceptable risk of illness due to the indoor conditions.’

### **Question 36: Do you agree with the proposed features to address indoor conditions for health?**

The majority of submitters who replied to this question agreed with the proposed features to address indoor conditions for health.

The following comments reflect the views presented.

- The ‘Prevention of draughts’ feature does not fit. Draughts assist air changes to achieve air quality. Prevention of draughts could equate to passive vents or no open-able windows.
- Submitters questioned the practicality of this requirement being relevant to all buildings. They thought this was an unreasonable requirement for farm buildings, such as a woolsheds or milking sheds. A question was asked whether there had been examples of illness from draughts to people working in these places that merited such a requirement. It was suggested that buildings such as these should have a natural indoor/outdoor component to them and that to require no draughts would not only be unreasonable but also impractical.
- Inadequate removal of cooking fumes and moisture can cause fire detection equipment to activate, leading to high rates of unwanted alarms in poorly ventilated buildings, particularly apartments. This can be a serious wellbeing problem for those affected. Current standards are considered inadequate or are not being applied properly. New provisions should remove false alarm risk and cater for health issues.
- HO2.3.1 Mould and fungi control and HO2.3.2 Building envelope should apply to public toilets as well as occupied buildings.
- The minimum ventilation rate to control all the background building material emissions and moisture sources that are too distributed to manage with targeted ventilation usually exceeds the ventilation of occupied spaces required for air for respiration (HO2.1.3)
- Interstitial moisture was considered a health issue as well as a durability issue.
- Maximum indoor temperatures must also be addressed.
- Consideration also needs to be given to body corporate rules for apartment owners. Clothes are often dried on racks in living areas as owners are not allowed clothes lines outside and there are no other drying facilities.

### **Question 37: How important do you think it is for the Building Code to make provision for controlling moisture generated by the use of fixtures and appliances (eg, showers, cooking facilities, gas stoves, clothes dryers and unflued gas heaters)?**

The majority of submitters who responded to this question thought that it was very important for the Building Code to provide for controlling moisture generated by the use of fixtures (for example, showers, cooking facilities, gas stoves, clothes dryers and heaters). The following comments reflect their views.

- This issue is important but needs to be performance based, for example, earth plasters and walls are hygroscopic – absorbing and releasing moisture vapour depending on the moisture load. It should not be assumed that fans are always needed.

- Modern society now has high usage of dishwashers and clothes dryers, which do not remove moisture like the overhead rangehood. The installation of appliances such as clothes dryers and portable gas heaters is not defined as building work and is therefore not controlled by the Building Act 2004. These items are consumer appliances that can be used or installed/uninstalled in buildings without the need for consent at any time during a building's life. Other government mechanisms (for example, the Existing Building Quality Project) may better address this issue.
- All these fixtures and appliances can be designed so they vent through ceiling/wall spaces to the outside.
- Moisture from showers can set off smoke alarms leading to high rates of unwanted alarms, which is a serious wellbeing problem for those affected. New provisions should remove false-alarm risk and cater for health issues.
- It is important to protect against temperature differences between cold and warm environments within a building, such as a garage adjoining a living room, to avoid condensation forming and subsequent mould growths.
- If the Code restricted draughts, then moisture problems would increase significantly. Buildings should be allowed to breathe and should not be sealed up. Vents should be allowed in building frames.
- The installation of continuous passive ventilation for enclosed spaces should be mandatory.
- There should be adequate means of ventilation, either fixed or mechanical. Where a commercial building adjoins or is in close proximity to household units, the ventilation outlet should be located so that any discharges will not cause a nuisance to neighbouring properties.

**Question 38: Do you have any suggestions on ways to address the issue of controlling moisture generated by the use of fixtures and appliances (eg, showers, cooking facilities, gas stoves, clothes dryers and unflued gas heaters)?**

There were many suggestions on ways to control moisture generated by the use of fixtures and appliances. The following comments cover the solutions presented.

- For fixed items (showers, dryers, stoves), venting systems can be required. Little can be done with movable items such as gas heaters.
- Moisture and carbon monoxide should be removed close to source by either fan or adequate openings. The use of unflued gas heaters should probably continue to be controlled by affixed warnings about their use. There are situations where unflued gas heaters are the best heat source, such as marquees and well ventilated factories, and a total ban would not be appropriate. All fixed gas heaters should be required to be flued or tested to ensure that no carbon monoxide is emitted.
- In single dwellings, performance requirements for natural ventilation of indoor space need to be adequate to control moisture generated by most fixtures and appliances, except for clothes dryers and perhaps cooking facilities, which should be vented directly to the outdoors.
- In apartments, especially those with a single aspect, it may be necessary to regulate for forced air extraction for bathroom and laundry spaces as well.

- Passive ventilation is the first choice and should be a required consideration in building design.
- All occupied buildings should have at least two small, permanent fixed vents.
- There should be an extractor fan in bathrooms controlled from the light switch, with a timer to run for a period after the light is turned off.
- Showers and gas stoves need some form of mechanical ventilation. Showers must have easily accessible windows for ventilation and ceiling extractor fans or in-built dehumidifiers.
- There should be mandatory installation of mechanical extraction systems in all buildings.
- Installation of ventilation systems in the wet zones of houses or the use of home ventilation systems throughout should be specified. There should still be adequate provision in the Code to achieve this via passive design means.
- Any new building should have a method of heating installed as a part of the design and construction of the building. Heating devices should be sized to fit a design energy performance profile. For example, heaters installed in a house must enable that house to be heated to 18 degrees, given known outdoor conditions.
- There should be ventilation to the outside, but through and not into the roof space.
- The current clauses are sufficient.
- Ventilation should be increased through trickle ventilators in windows.
- The design of windows should not require the opening of a very large window to let a little air in or out.
- Bathroom windows should have provision to be left open (such as with a ‘securistay’) to allow for constant natural ventilation, while remaining secure.
- There should be provision for a large, low-speed, axial-flow, industrial fan in the loft and the use of open windows as appropriate.
- Earth plasters, uncoated timber and air-to-air heat exchanger fans should be used, as well as opening windows.
- All extractor fans should have a switch-off timer. This would ensure that extractor fans do not consume unnecessary energy.
- Windows in areas where moisture is generated should be readily accessible. It was observed that windows that are difficult or impossible to reach do not get opened.
- Unflued gas heaters should be banned.
- Heat sources should be provided in bathrooms separate from mechanical ventilation to create a warm airflow across showers and baths to remove moist air from the room. If the room temperature is raised so that wall surfaces are above dew point temperature, moisture does not condense on the walls, and ceiling and air temperature is raised so more moisture can be carried then there is more chance to relieve dampness.
- Fan venting of point-source indoor humidity should consider the fact that fan vents create a negative air pressure in the building that encourages the infiltration of outdoor air around doorjamb, window frames and other points of air leakage.

- Indoor air that is dumped to the outside carries with it the cooling or heating energy that must be re-expended to cool or heat the infiltrating air. Infiltration and energy loss impairs the thermal comfort of tenants and the energy efficiency of the building. Providing outside air supply directly to the fan vent location can reduce inside-outside air pressure differentials. In some cases, the use of an Energy Recovery Ventilator (ERV) can reduce energy loss from vented interior air.
- Particleboard (impregnated or otherwise) should not be installed in bathrooms. Timber treated to hazard class H3 should be used instead. Particleboard does not last long when wet and it becomes a breeding ground for mould.
- All aluminium windows should incorporate ventilation sashes to let in fresh air even when shut.
- Outlets and inlets should be well separated to prevent heat pumps and air-conditioners drawing air from a contaminated source.
- Short-term events like showers require ventilation.
- Through-ventilation can be achieved by having large openings facing in opposite directions.
- Where air-conditioning is installed in apartments, a minimum opening window area should be required that is a percentage of the floor area of the living room and all bedrooms.
- Apartments/multi-unit dwellings should have access to outside air other than solely by means of light wells or building setbacks enclosed on three sides by other buildings.
- If entrance halls, kitchens, kitchen-dining areas, bathrooms, toilets and laundries are not naturally ventilated, then they must be ventilated by mechanical means.

**Question 39: How important do you think it is for the Building Code to extend the provision for a minimum indoor temperature beyond aged care facilities and early childhood centres to housing or other occupied buildings?**

The majority of submitters who replied to this question thought that it was important to extend the provision for a minimum indoor temperature beyond aged care facilities and early childhood centres to housing or other occupied buildings.

Many submitters thought that the Code was attempting to regulate the temperature at which people maintained their homes. Many submitters thought that temperature was a personal preference and that this was a matter for the occupier to decide.

However, several submitters noted that minimum temperatures in residential buildings could not be governed by the Code, but that the Code could require buildings to be designed and constructed to be able to achieve healthy indoor temperatures with the minimum amount of energy.

There were many suggestions on the required temperature and ways to achieve it.

The following comments reflect the common themes.

- Houses should be designed and built with the ability to maintain minimum indoor temperatures with built-in means.

- The Code needs to address the temperature levels required in all habitable rooms of all residential situations. Presently, many low-cost houses have only one heat source located in the living room, with no provision for heat transfer to bedrooms and utility areas, so allowing unacceptably low temperatures that lead to chronic respiratory problems.
- Once heated, buildings should be able to maintain temperatures.
- The standards need to vary with the lowest winter temperature area having the greatest degree of protection.
- Buildings should be able to meet World Health Organization recommendations for a minimum temperature of 18 degrees Celsius. In addition, it was thought that temperatures above 25 degrees are also a health risk.
- Passive solar design should be mandatory.
- There should be regulation for the installation of fixed heating in homes to meet a minimum indoor temperature. This could have the effect of reducing reliance on space heaters with a commensurate reduction in fire risk.
- New provisions should cater for reducing reliance on space heaters as well as health issues.
- Both public buildings and private dwellings need to be designed and built to receive maximum light and sun.
- Good sustainable design would make most of these requirements redundant.
- Pure air temperature is not necessarily the best measure of comfort – it would be better measured by a black bulb thermometer that includes radiant heat in the measurement. For example, sitting alongside a large single-glazed window on a clear cold winter night, the air temperature in the room might be 20 degrees Celsius but a person would still feel cold from the heat being sucked away from their body by the cold night air. Likewise, with an earth house designed for passive solar energy, in the evenings a person would be surrounded by warm surfaces gently radiating heat and would be comfortable at a much lower air temperature.

**Question 40: Do you have any suggestions on ways to address the issue of minimum indoor temperature?**

Suggestions on ways to address the issue of minimum indoor temperature are summarised in the following comments.

- Buildings should be built so that they are affordable and simple to heat and cool, and have minimal heat loss and gain.
- Design approval should be required, which demonstrates how the house would be heated to meet the minimum standard. The minimum insulation standards should be connected to best practice, not minimum compliance.
- The current Building Code performance requirement is for a house to have a minimum Building Performance Index. The index needs to be raised, with sufficient performance-based options that lead to a healthy indoor environment.

- It is important that the Code allow for innovative methods of obtaining adequate thermal comfort rather than legislating for certain materials or systems to gain minimal levels of glazing insulation thermal mass.
- An outside air temperature range should be specified over which the inside of the building needs to maintain a set minimum temperature (that is, a performance standard). This could be achieved with insulation or the installation of heating systems.
- Thermal insulation of buildings should meet performance standards that at the very least allow the defined minimum indoor temperature to be attained and maintained with a calculated minimum input of energy.
- Where possible, passive heating design should be encouraged, perhaps through an incentive process as the energy gain benefits are difficult to quantify and it would be difficult to require them under the Building Code.
- Sufficient installed heating capacity is needed to meet minimum indoor conditions at a design outdoor temperature (depending on location).
- The Code should set a level of building thermal performance that requires conscious consideration of energy-efficient design and renewable energy opportunities. A well-designed passive solar house would maintain a comfortable and healthy indoor temperature throughout the year without a significant need for occupants to heat and/or cool, or to invest in large heating/cooling systems.
- Passive heating techniques should be encouraged, including the orientation of buildings to take advantage of the sun, with large windows to the north and smaller ones to the south. There should also be minimum levels of insulation, the use of heat sinks in the floors of buildings, and mass concrete collection.
- Solar heating should be used on all new houses.
- There is a need to have design mass in buildings – mass is capable of storing and releasing energy. For example, walls (and other building elements) could be built with sufficient mass to collect and then gradually release energy as outside temperatures reduce at night. This would involve sunlight-gathering techniques, which can come from roof spaces through windows. Homes that cannot be designed this way would need radical insulation concepts. Some countries have moved to 150 mm walls to accommodate extra insulation. However, it was thought that this is not good wall engineering. Insulating the outside of the wall would be far superior and would allow timber to become part of the energy-storing mass.
- High thermal mass materials should be used, such as cob and rammed earth.
- There should be star ratings/scoring systems such as HERS (Home Energy Rating System) to focus homeowners on energy use and design.
- There should be computer modelling and energy-efficient design incorporating good insulation.
- European energy efficiency standards should be introduced for heating to make it affordable.
- The minimum requirements should be introduced for the thermal performance of the building thermal envelope (50-100 percent higher R-values for opaque and transparent building elements than is currently required).

- Minimum average wall 'U' value should be specified. Builders would then have to trade window size and to consider double-glazing. Minimum average floor and roof 'U' value should be specified.
- Housing should be built to enable owners to achieve minimum indoor temperatures without further purchase, for example, through built-in heating. Heating suppliers could then be required as an industry to develop a homeowners' heating guide, which would be supplied with every new house and made available to existing house occupiers.
- 21 degrees Celsius, measured at between 500 and 750 mm above floor level, should be adopted as a universal minimum indoor temperature for health and comfort.
- One way to achieve this would be mechanical heat pumps.

**Question 41: How important do you think it is for the Building Code to provide for a maximum indoor temperature?**

Opinions were divided over the issue of whether the Building Code should provide for a maximum indoor temperature. A slight majority did not agree.

- This was thought to be an occupier problem.
- Submitters stated that different people have different temperature preferences.
- If a maximum temperature were set in Compliance Documents, outlining sustainable solutions would be needed or else air-conditioning would increase. There are also parts of the country that regularly have days where the temperature exceeds 35 degrees. Meeting a Code maximum temperature there could require air-conditioning.
- Workplaces may need controls, but in houses, occupants have options, such as changing clothing. Therefore housing should be treated differently.
- Such a requirement could force air-conditioning on buildings, increasing environmental, capital and energy costs.

The following summary reflects many of the comments by those who considered that the Building Code should provide for a maximum indoor temperature.

- It is very important to consider maximum indoor temperatures in buildings. High temperatures can cause occupant distress, particularly for the young and old, leading to premature death in more severe cases. In addition, extreme temperatures can reduce occupant productivity.
- Controlling maximum indoor temperatures would be very important if external temperatures are predicted to rise. Given possible climate changes, buildings should be designed with the knowledge that they may need to be cooled.
- Most housing can be maintained at a comfortable temperature below the maximum suggested through passive ventilation techniques and shading elements. Even if adequate cooling is not initially being achieved in a residential building, many passive solutions can be incorporated relatively easily and economically.
- As such, it was suggested that this is just another indoor conditioning issue that should meet efficiency targets (like the insulation requirements for heating efficiency). As for the

temperature minimum, the maximum could also be addressed by solar design, thermal mass, insulation, location, orientation, and appropriate space-conditioning appliances.

- This could include building features such as shading, insulation to manage heat gain, heat loss window treatments (for example, low-e glass) and thermal mass (for example, concrete walls and/or floors).
- Maximum indoor temperature is very important because many houses being built today (presumably under Acceptable Solutions) have high levels of glazing with no eaves. This leads to major overheating in summer and usually leads owners to install heat pumps as cooling solutions. This is an unnecessary expense and places unnecessary demands on the national power grid to supply power all year round. Good design is crucial to preventing temperatures from getting too high in houses in the summer.
- The use of computer modelling tools as verification methods can further contribute to improved energy-efficient design. For houses, tools such as AccuRate can predict the temperature of individual living areas throughout the year and the number of occasions when they would not meet recommended temperature guidelines. These tools allow housing designs to be manipulated so that building energy performance is improved and extremes of temperature are reduced. Similar modelling tools are available for commercial buildings.
- This issue should be considered on a regional basis to allow for climatic differences and to avoid undue construction costs and energy consumption.

**Question 42: How important do you think it is for any provision for maximum indoor temperature to apply beyond aged care facilities and early childhood centres to housing or other occupied buildings?**

The majority of submitters who responded to this question did not think that it was important for any provision for maximum indoor temperature to apply beyond aged care facilities and early childhood centres to housing or other occupied buildings.

The following comments reflect their views.

- The provision should not apply to private housing. People should be responsible for their own environment.
- Air temperature for aged care facilities is covered by other legislation. It would be too difficult to enforce for the other facilities.
- This issue is not as important as maintaining a minimum temperature.
- Rules should not be imposed that could lead to an air-conditioner in every house.
- The current Building Code requirements for thermal insulation (effectively controlling the amount of glazing), ventilation and energy efficiency of lighting (in commercial buildings) give occupants the means to prevent overheating.
- Maximum indoor temperatures are not so relevant in the domestic dwelling settings but should be included in the Code for early childhood centres and old people's homes. People have more control over indoor temperatures in the residential setting than those in other sectors. The maximum levels should also extend to the workplace.

- There does not appear to be sufficient health risk from high temperatures in New Zealand to require any more than passive design to limit solar gains combined with ventilation in most building types. To require any more than this could lead to an unwarranted jump in energy use. There are guidelines for many building types, such as healthcare and education facilities.

Those who thought it important for maximum indoor temperature provisions to apply beyond aged care facilities and early childhood centres commented as follows.

- The measure would be justified in light of climate change concerns and the problems experienced in Europe recently.
- Although older people and the very young are at greater risk, the health risk exists for all building occupants.
- There are established links to poor health in damp, unheated homes, so heating capability has to be regarded as a basic building attribute. Larger buildings (core load dominated buildings) are less of a problem.
- Workplaces need to be included because temperature negatively affects work performance and can be an occupational health and safety issue; the same applies to learning institutions where children and adolescents are required to attend.
- Regulating maximum temperature is particularly important in working environments, such as offices. In Germany, the maximum temperature allowed is 26 degrees Celsius.
- This issue is more important in commercial buildings, offices and places of assembly – buildings where occupants do not have individual control over heating and ventilation systems that maintain indoor temperature, and where discomfort from overheating may affect their health or activities.
- There are certain areas of New Zealand where this may be more important than elsewhere. Humidity may also be a problem.
- The provision for a maximum indoor temperature should apply to all occupied buildings, except backcountry huts.

**Question 43: Is there anything else about indoor conditions for health you think the Building Code should make provision for?**

Other areas of concern about indoor conditions for health are covered in the following comments.

- In many residential developments, internal entry to the home from the garage is considered a desirable feature. There is a tendency in the design of some dwellings and especially in intensified housing developments to have access from garages directly into residential living and/or kitchen spaces. The probability of exhaust fumes infiltrating those rooms is high and direction needs to be given, ideally through the Building Code, as to whether this is acceptable or not. If not, the extent of separation between garages and living rooms should be regulated and Acceptable Solutions provided.
- The Code should promote materials that improve and provide a healthy environment to reduce respiratory diseases such as asthma. Materials that do not require treatment for termites or are free of resin adhesives or chemicals are desirable.

- Concerning the use of building materials, submitters were keen to see reliance on less toxic and allergenic products (but in balance with their effectiveness).
- It was recommended that, as far as smoking areas in commercial premises are concerned, the Building Code considers the requirements of the Smoke-Free Environments Act and the Ministry of Health's policy on open and internal areas.
- There should be stronger awareness of materials that can cause health problems, such as paints, chemicals in carpets, particleboard and treated timber.
- Landlords in particular need to be more actively encouraged to upgrade their properties so that they are able to be heated properly at a reasonable cost.
- Health must include cultural considerations that are affected by building shape, orientation, layout etc.
- It would be a good idea to formally adopt World Health Organization (or some other) guidelines for contaminants in non-workplace buildings.
- Risks of airborne public health concerns, such as legionnaires disease, should be covered under the 'Inadequate indoor air quality' feature in respect of public or large use/occupancy buildings.
- Over-regulation will result in increased costs of compliance, which will have little real effect because the ongoing indoor environment will be determined by the occupant.
- More use should be made of uPVC double-glazing units that reduce condensation and increase comfort.
- Solid floors should be constructed so that heat is reflected up from the ground. and insulation is provided between the ground and the floor.
- There should be more emphasis on DVS-type systems (positive ventilation).
- Consideration should be given to the 'sick building syndrome'.
- The use of cheap building products – formaldehyde, glues, glue stick, carpets, paints and cleaning products – creates a very toxic environment. Even with good ventilation, many people find this a real barrier to being able to access many of our buildings (shops, offices, libraries, as well as homes).
- Super-insulated, airtight buildings can provide significant energy savings but, at the same time, indoor air quality can suffer unless indoor air is replaced often enough by fresh outside air. The use of CO<sub>2</sub> sensors should be encouraged to monitor build-up of CO<sub>2</sub> in inhabited spaces, triggering outside air supply as needed to maintain CO<sub>2</sub> levels at an optimum. The use of energy-recovery ventilation should be encouraged as an integral part of outside air supply ventilation systems. Widespread use of indoor green walls should be encouraged as CO<sub>2</sub> absorbers, oxygen sources, and air particulates and toxics scrubbers.
- The Building Code should ban mechanical ventilation systems that do not supply air taken from the external atmosphere, but air taken from roof or sub-floor spaces, which may be polluted even when filtered and may therefore pose a potential health risk. This ban should apply to both buildings with or without adequate provision for natural ventilation.
- Performance requirements about excessive electric fields should be added.

- Care needs to be taken with the ‘Mould and fungi control’ feature. For example, the present Acceptable Solution to this requires R0.6 walls, yet hygroscopic earth walls, even if they have a lower insulation value than this, do not get condensation.
- The interior environment issue needs to be carefully worked through at stage two of the review as it is one of the major factors that influences primary health care.
- There are long-term possible health risks of having homes built with chemically treated timber of unknown toxicity. Many houses are now also taking the safe and simple route of using entirely H3 treated framing.
- Any toxins could create health problems indoors. The Code should incorporate a ‘green’ standard to be attained, similar to green building codes worldwide. This would lead to a reduction in the use of toxic products.
- Doctors’ waiting rooms should have a minimum forced air change.
- Some modern synthetic building materials, especially interior fittings, give off fumes for a considerable time after application and may make a poorly ventilated building hazardous for a long time after its completion.

#### **Question 44: Do you agree with the proposed objectives for accessibility?**

The proposed objectives for accessibility were covered by sub-objectives:

- access routes
- way finding
- mechanical installations for access (for example, lifts, escalators, cable cars, moving walks)
- features that assist people with physical disabilities
- features that assist people with visual disabilities
- features that assist people with hearing loss
- features that assist people with intellectual disabilities.

A large majority of those who replied to this question agreed with the proposed objectives for accessibility. However, some submitters did not support universal design for all buildings and noted that even disability experts acknowledge universal design for all buildings is impractical, and instead suggest adaptable designs and lifetime design principles.

A number of submitters expressed concern with the practicality of providing accessible routes to all occupied buildings in areas with challenging topography and with possible increases in the cost of compliance.

Some submitters questioned the wording of the objective, and the use of the term amenity. An alternative suggestion for the objective was: An objective of this Building Code is to ensure that the design and construction of the building does not expose a person in or adjacent to the building to an unacceptable quality of occupancy due to a lack of access.

Some submitters also questioned the consistency of the wording with the Building Act.

- Physical independence is a clear purpose of the Act under section 3(b), yet that purpose is not expressly recognised in the overall wellbeing objective or the specific wellbeing objectives.
- The objective (unacceptable loss of amenity) is inconsistent with section 118(1) of the Building Act 2004, which requires reasonable and adequate access. The Building Code should be consistent with that statutory requirement. It was recommended to use of the wording from the Building Act as follows: To ensure persons [sic] with disabilities can visit or work and carry out [their] normal activities and processes in buildings.

Concern was expressed by one submitter that a degree of harm was accepted as a basic starting point, which was incompatible with the no-exemption basis for access requirements established in the Building Act, as cross-referenced with the Human Rights Act.

A number of submitters noted the need for cost and benefit analyses. Health professionals pointed to the reduction in health spending through these concepts reducing the occurrence of accidents, and reducing the need to modify properties to meet disability needs.

One submitter noted that the ‘Access Routes’ feature applies to all occupied buildings and that, under the building classification, that includes all buildings except out-buildings and ancillary buildings. The document gives public toilets as an example of an outbuilding, but these need to be accessible.

Another submitter pointed to the need to reconsider the current exemption to industrial buildings where no more than 10 people are employed.

Concern was expressed at the practicality of ‘Exposure to human or domestic waste’ feature in relation to all commercial, industrial and public buildings. The example was given of the woolshed in the country and it was noted that the average size of a woolshed or milking shed does not require way-finding information.

Approximately one-sixth of the submitters who addressed this question did not agree with the proposed objectives for accessibility, and generally thought that it was up to the homeowner or occupant to make any adjustments required.

One submitter did not agree with the proposed objectives for accessibility because they watered down the accessibility definition, which requires that the accessible route be ‘accessible to enable people to carry out normal activities and processes within the building’, and that the access route be ‘a continuous route that can be negotiated unaided by a wheelchair user’.

#### **Question 45: Do you agree with the proposed features to address accessibility?**

The majority of submitters who answered this question agreed with the proposed features to address accessibility.

Some submitters questioned whether provisions for people with disabilities should be in one section or throughout the Code.

One submitter was not in favour of a ‘separatist’ approach to requirements for Compliance Documents. He advocated a universal approach that incorporated all requirements in a single document, as per NZS 4121. It was also thought vital that access and usability requirements

were presented together in the necessary accessible route sequence to ensure the priority design decisions were addressed in their appropriate order. The separatist approach had the potential to play off one disability group against another and to create segregated special-purpose solutions that usually advantaged one disability group and disadvantaged others.

Another submitter made the point that it was unclear from the document whether features such as rails and adaptations to toilet/personal hygiene facilities came within this section or the safety section. This was both an accessibility and safety issue. If the current headings/objectives were to be retained, then this requirement would need to be addressed under both sections of the Code.

It was suggested that the three features intended to help people with ‘physical, visual and intellectual disabilities’ should be combined into one category with sub-categories.

It was suggested that there was a need to define more clearly the buildings, and that detached buildings should not be treated differently from semi-detached buildings.

The point was made that the accessibility of multi-level private buildings needed to be considered. Such features would enable more people to remain in their dwellings after developing disabilities. In addition, it was suggested that accessibility for furniture needed to be considered, for example, to be able to get a double bed into a bedroom. Some stairways do not allow such access.

A number of submitters made the point that all houses should include features with people with disabilities in mind, such as wider hallways, doors, light switches and disability sanitary features.

A small number of submitters did not agree with the proposed features. One made the comment that it was difficult to endorse these features without an understanding of what performance measures would be set and what the costs and benefits in New Zealand would be.

One submitter considered that people with disabilities should have solutions specifically designed for them. It was also suggested that there needed to be more information about the costs of the possible options and that there may be a better option to allow movement from a less suitable to more suitable dwelling as people aged and their needs changed.

One submitter stated that consideration of people with intellectual disability in all occupied buildings was too onerous and recommended this was limited to public and specialist buildings.

Finally, it was noted that, as NZS 4121 is cited in the Building Act as a means of complying with the Building Code, the requirements on visual disabilities, way-finding and so on are already considered part of the Building Code.

**Question 46: How important do you think it is for the Building Code to make provision for the front door of every residential unit (including apartments) to meet accessibility requirements?**

A slight majority of submitters who responded to this question thought that it was important for the Code to provide for the front door of every residential unit (including apartments) to meet accessibility requirements.

However, it was noted that this would not always be practicable. Further comments suggested the following.

- It is important that the Code require that an accessible route be provided from the street boundary to the front door or to an entrance to every new residential unit, including apartments, where it is practicable to do so.
- If the subject were approached from the standpoint that a certain width of door and corridor is needed for everyone to enjoy the property, then wheelchair users would be catered for as well.
- This should be the desired outcome and, where cost-neutral, at least one external door should meet accessibility standards.
- It was questioned whether accessibility requirements should then follow through into the building.

Some of the cautionary comments were as follows.

- This should also take into account the possible constraints of a site to meet Code requirements. Examples of this could include heritage values, topography and protected trees.
- While it is recognised that a number of people with disabilities may need to modify their houses to accommodate their needs, it would be unduly restrictive to require access to all houses. This is the area with the greatest chance of making houses unaffordable. Many things can be done at initial build without hugely extending cost. However, if every house has to be wheelchair-accessible, it creates much greater dead corridor spaces in multi-occupancies and limits the sections in places like Wellington where buildings can be put.
- It could be costly – encouragement rather than regulations were suggested.
- In certain localities, access to every occupied building would be impossible. Such a requirement would also limit many sites from being developed and would restrict innovative residential designs that are well suited to the majority of occupants.
- Flexibility is needed to cater for design preferences.
- There are also ground clearance issues in such a provision, which are contrary to other provisions about flood protection.
- This is a matter of personal preference. Dwellings without access for people with disabilities are less adaptable to a change of use or circumstance and that should affect the market price.
- Common sense should be applied when applying these requirements in practice.

Other comments included the following.

- It is important for such people as meter readers and couriers to be able to have access to the front door of any dwelling. This is becoming increasingly difficult with gated communities, and apartment buildings that only allow entry with swipe cards, making this kind of access harder to enforce.
- This is an important feature for elderly people, including those using mobility scooters. This should be a feature for all new residential household units.
- It was asked whether there should be two accessible doorways due to safety issues/fire exits to create safe egress.

- This would enable longer-term tenure in homes. It would be much less expensive to do this when the house was first built, rather than to modify it subsequently.
- The proposal should not necessarily apply to the front door. Sometimes there is not a front door – any door would do. Even if it were possible, it would potentially compromise the siting of the proposed dwelling, thereby affecting other wellbeing aspects of space, view and sunlight.
- It should be mandatory for handrails (as in section 8.6 and Appendix F of the Standard NZS 4121: 2001) to be installed on both sides of any steps leading up to the front door of all new residential buildings.
- There is a need to clearly identify which buildings this should be a requirement for in the Code.

**Question 47: Do you have any suggestions on ways to address the issue of accessibility to the front door of residential units (including apartments)?**

Suggestions on ways to address the issue of accessibility to the front door of residential units are reflected in the following statements.

- Good accessible design by architects should be encouraged. Accessible features can also be aesthetically pleasing. The design industry should be educated to be ‘accessibly creative’.
- The market will place value on residences designed with this in mind and will increase incidence of this voluntary design.
- Any measures would also need to conform to good urban design principles.
- This was thought to be a town-planning issue.
- Adaptability is more important than accessibility for private dwellings.
- The issue is about having external access to a unit, but that need not be a front door.
- It was felt that while a number of people with disabilities might need to modify their houses to accommodate their need for access, it would be unduly restrictive to require accessibility to all detached houses when first constructed.
- The common entry lifts, corridors and unit entrances of apartments should have dimensions that allow movement not only for those with disabilities, but also for furniture movers, parents with prams etc. The minimum size that suits all such needs could be established and required. Such space requirements would also cover the access needs of those with permanent or temporary disabilities, but would consequently introduce implications for exit in the event of fire or emergency in multi-storey buildings. This issue is further complicated when considering not only the needs of building occupants with disabilities, but also the needs of those with disabilities who wish to visit occupants who live on the upper floors of an apartment building.
- Designers should consider communal lifts and accessible stairways in multiple high-rise apartments, instead of private stairways to individual units, which would make later upgrading costly.
- There should be versatile mobility devices. Voice communication should be possible between visitors and occupants.

- It is more important to have flush-level access to decks from inside.
- This could be achieved by providing performance criteria for the width of access into all new buildings, including residential ones.
- All that is necessary is a requirement to have a ground-floor or a low-level complying apartment in a block of apartments.
- Apartments and multi-unit dwellings should have access (level, ramped or lift) to an entry lobby, with lifts beyond that. All other scenarios should be considered, as appropriate.
- Apartments are easier to deal with than semi-detached dwellings (for example, semi-detached Housing New Zealand dwellings) because a single system can service multiple apartment dwellers (for example, installing a lift or intercom system to control door unlocking).
- The Code should establish minimum clear opening widths that all anticipated users (including those with children or those moving furniture) would find acceptable. This would encompass physical access requirements for wheelchair users and those of larger stature using sticks.
- All entries should be ramped with appropriate gradients and ‘grip’ of surfaces.
- Video intercom and remote operated security doors should be provided so that access can be controlled from within apartments, and so that people who are hearing impaired would be able to see who is at the door.
- There should be automatic or sensor doors so that there is no need to reach out to open heavy doors.
- There should be accessible and user-friendly positioning of doorbells to include use for wheelchair users.
- Lifts should be provided in buildings higher than a certain number of storeys.
- For apartment buildings, the accessible route should be provided to and throughout the public areas within the complex, including to such facilities as gyms and swimming pools, which are sometimes also provided. This would ensure that, should the complex change from private to public (for example, apartments to serviced apartments/hotels), the entire complex would meet the requirements for access.
- The standard door size should be increased.
- The Code needs to recognise that 1:12 slope pathways will be impractical in hilly areas and instead allow slopes that are steeper but still enable assisted wheelchair access.

**Question 48: How important do you think it is for the Building Code to make provision for residences to be easily adapted to provide accessibility in the future?**

Opinion was divided among those who replied to this question on whether the Building Code should provide for residences to be easily adapted to provide accessibility in the future, but slightly more were in favour than against.

The following comments reflect the range of views.

- Younger people with severe disabilities are surviving and, due to improved technology, such as powered wheelchairs, and rising expectations, expect to be able to have a normal range of

housing and accommodation options over their life span. Their options would be increased by not having to shift as their needs progressed, or, if they had to shift to an area for a particular reason, there was a good stock of accessible or easily adaptable housing available.

- It makes good sense both from a commercial and a social perspective to ensure residences are easily adapted. This is important with an ageing population. It also makes homes desirable to a wider range of people and does not limit who can rent or buy them.
- Adaptability could be provided for in the Code by including standards for the placement of strengthened framing within the structure of a building to enable the conversion of showers and baths to accessible wet areas, and for the placement of hand and grab rails by toilet pans and in other areas where disabled people would prefer them. However, the whole-of-building-life costs need to be considered, including any specific requirements.
- Making provision for future accessibility requirements would make economic sense.
- Some construction materials, such as wood, may be easier to adapt to accessibility than others, such as concrete walls. If so, the Building Code should provide for new dwellings to be made from materials that are easier to adapt for accessibility in the future.
- Toilets should be installed so that if the dwelling were adapted, major plumbing work would not be required.

Some submitters expressed qualified agreement.

- The two major problems associated with adapting buildings are the width of circulation routes and changes in level. After that, most buildings can be adapted for people either to live longer in their own homes, as they grow older, or to occupy their homes as wheelchair users. Consequently, as long as width and level are covered in the Code, most other adaptations will be easy.
- This is not appropriate for all residences, but public buildings and apartments are potential examples where the provision could be made for adapting them for accessibility purposes.

The views of submitters who disagreed.

- This issue should be market-driven.
- Every building is adaptable, subject to cost.
- It is possible to move to a building that is more accessible.
- Adding cost and taking away design choice for the possibility that residences could be adapted easily in the future is outside the scope of the Building Act and removes individual choice. This provision would be hard to administer and enforce, and very unpopular.
- In residential design, it was asked whether priority should be given to the current inhabitant or to a fictional future resident, at the expense of the current one. It was asked to what extent should people's freedom be removed to have their own spaces customised the way they want them.
- In many projects (particularly alterations), space is a concern. For instance, requiring a bathroom of sufficient size to become accessible at a future date for an unknown occupant may reduce available storage space, and so inconvenience the current client. If the work could not be carried out to these new requirements due to space constraints, it was asked whether the client would be able to do any work at all.

- It was stated that a property on a steep hill could not have an accessible entrance, so it would not make sense for its walls to be designed for future grab rails.
- It was suggested that the best solution would be a government grant for conversions of suitable properties to meet accessibility needs when and if required, particularly bearing in mind that different disabilities have different needs in a dwelling. These would best be installed to meet the specific requirements of the user. The generic approach suggested is not efficient.
- In purchasing or renting properties, all new buyers have a certain set of requirements. If buildings do not meet their requirements, then they can either not buy them or alter them to fit.
- Housing should be looked at in terms of best fit to the users' needs at the time. If it no longer meets users' requirements, then they should either move or make whatever changes are required to adapt the existing dwelling.
- Requiring future accessibility is too broad – future disability may be of many different types and the adaptations required for the dwelling will be different for each of them.
- Differing levels of accessibility are required for differing disabilities.
- The requirement would be overly prescriptive and could limit design options.

**Question 49: Do you have any suggestions on ways to address the issue of residences being easily adapted to provide accessibility in the future?**

The following comments reflect the range of views on ways to address the issue of residences being easily adapted to provide accessibility in the future.

- The New Zealand housing stock is predominantly timber-framed construction, which is inherently easily adapted. Adaptable housing includes structural features that allow for cost-efficient alterations, which will make the dwelling readily useable for anyone. Features may include:
  - open plan, step-free or level entry
  - wider doorways
  - strengthened walls in bathroom areas (grab rails can be installed at a later date)
  - step-free showers
  - adjustable kitchen cupboards and benches
  - an increased number of power points installed higher than the current installation.
- Mandatory minimum requirements for corridor widths in all residential buildings should be introduced, as this would be a difficult and expensive alteration to achieve after original construction. There should be double studs with full width lintels on one side of door openings (for example, under 800 mm wide) to provide for easy widening if necessary later.
- There should be minimum-width doors (810 mm and preferably 860 mm), minimum-width hallways (1,100 mm), with sufficient space at turning points, minimum plan dimensions for bathrooms, toilets and bedrooms. There should be no floor-level impediments caused by doorframes (for example, ranchslider door frames should be required to be rebated into the floor edge). Sufficient space should be set aside or the stairway configured so that a small lift or balustrade-mounted chair can be added, if needed, to access an upper floor. There should

be slip-resistant flooring. Doors should be able to be opened by someone in a wheelchair. There should be ability to provide bedrooms on the ground floor of two-level dwellings. The height of light switches and power points should be considered.

- The Code should provide width and level access requirements that will suit everyone and will enable future adaptation. A 20 mm step-up at a threshold is not acceptable. It is a problem for wheelchair users and a trip hazard for everyone else. Level thresholds are easy to design.
- There should be provision of cabling and wiring in newly built residences to allow for electronic/remote control/voice activated-style equipment to be installed if required in the future (for example, to open doors or windows). Currently, the cost of installing such equipment makes it prohibitive for many people with disabilities. Possible changes in technology would need to be factored into such provisions.
- There should be reinforcements in ceilings for the installation of ceiling track hoists, extra studs in bathroom walls for the installation of grab rails, and the installation of water pumps for adequate water pressure if hand showers are required in future.
- Encouraging future changes to a building to allow accessibility is an education rather than Code issue. The Code could refer to options such as the inclusion of wider doors, the design of wider hallways and the position and height of toilets.
- These should be guidelines only.
- These issues vary from person to person, and with new products becoming available. In general, all access ways to and within buildings should be accessible.
- The proposals should look at existing retrofits. Each is unique and neatly solves the problem.
- This cannot be required without greatly increasing overall costs to provide for a very small number of people.
- It was suggested that users should buy another house. The council could designate accessible sections in its district plan (ones that have easy access to services) and require that all houses on them be of accessible design.

### **Question 50: How important do you think it is for the Building Code to make provision for universal design for all residences?**

The majority of submitters who addressed this question did not think that it was important for the Building Code to provide for universal design for all residences. The following comments reflect the views presented.

- This is an important ultimate goal, but one that is not likely to be achieved in the near future for all residences (choice, cost and terrain could make this difficult to achieve).
- Adaptable design of multi-unit dwellings is very important, but, given that as many as 10 families could reside in each residence over a 50-year building lifespan, universal design is too restrictive for individual residences. It may be better to ensure a certain number of units in multi-unit dwelling developments are fully accessible.
- People who thought they were planning ahead by pre-wiring their homes for the computer age have found that wireless technology has made that redundant.

- Encouraging future changes to a building to allow accessibility is an education rather than Code issue. The Code could refer to options such as inclusion of wider doors, design of wider hallways, and the position and height of toilets.
- Full universal design for all residences should not be part of the Building Code. However, people should be aware of the accessibility enhancements and future proofing they can make to their residential design as part of best design practice. This could include minimum door widths, room sizes and corridor widths, but these should be voluntary. Some terrains are not suited to accessible access and a mandatory requirement would add substantial cost, loss of amenity and, often, no future benefit.
- This issues should be left to individuals.
- It should be voluntary – requiring provision for access may cause financial burdens, especially for first-home buyers.
- There are pitfalls in a ‘one-size-fits-all’ approach.
- This would encourage 'Coronation Street' uniformity, restrict choice and discourage innovation.
- Each individual is different and his or her needs are different.

Some submitters thought that the Building Code did have a role in promoting universal design.

- This should be the fundamental basis of all design.
- It is essential that all residences have accessible doors and hallways, and at least one accessible wet area shower and toilet room.
- Inaccessible houses are a big barrier to returning to homes following newly acquired disability.
- It is reported that the cost of building a house using universal design concepts is approximately 5 percent more than the cost of building a standard home. The cost of retrofitting a house to the same standard is much more.
- It makes good commercial and social sense to do this. It is easier to build it into the design at the beginning than to try to alter it further down the track.
- No one is disadvantaged by a universally designed built environment.
- Lifetime design considers the aspects of good design and adaptability to be built so that changes can be made to housing through the life of the building to suit its residents at the time.
- This type of design is suitable for both children and people of all ages with ambulant disabilities.
- If many of the requirements of people with disabilities can be met by simple changes to existing design with no adverse outcomes for the wider population, then these design changes should be considered.
- This would align with the Government's inclusion and social interaction policies, and with the New Zealand Disability Strategy.
- Certain minimum standards for universal design should be mandatory for the building of new homes that will be used by the elderly or people with disabilities. Examples include

retirement village/council/Housing New Zealand housing. Although this would be ideal for all new Housing New Zealand homes, if this were not possible, at least a proportion of new Housing New Zealand homes should meet these minimum standards. The reasoning is that a lot of unnecessary funding is spent on adapting current council and Housing New Zealand housing to make it accessible for people with disabilities, whereas, if some minor changes were made in the initial construction of such housing, this funding could be eliminated or reduced.

Other comments were as follows.

- Leave the interpretation of accessibility requirements to designers.
- The Code should provide only in some areas, such as light switches, door handle height etc.

### **Question 51: Do you have any suggestions on ways to address the issue of universal design for all residences?**

The following comments reflect the range of views on ways to address the issue of universal design for all residences.

- Examples of how universal design is becoming commonplace in New Zealand are in the installation of lever-style taps (instead of knobs) and flexible shower hoses (instead of fixed shower roses). All homes in retirement villages/council/Housing New Zealand properties should have these features as standard when built, including handrails by all steps (that is, no open-sided steps without rails), wet area showers (rather than shower cubicles or showers over baths), handrails by toilets, and electric sockets installed 500-1200 mm above floor level.
- The seven principles of universal design provide a guide to ensure the full range of abilities is considered. These are:
  - 1 equitable use – the design allows people of all abilities to use
  - 2 flexibility in use – the design can be adjusted to meet a wide range of individual preferences and abilities
  - 3 simple and intuitive use – the design is easy to understand
  - 4 perceptible information – the design communicates information effectively and efficiently
  - 5 tolerance for error – the design is safe
  - 6 low physical effort – the dwelling can be used easily
  - 7 size and space for approach and use – appropriate size and space is considered for approach reach manipulations and takes account of the full range of abilities.
- Building elements, facilities and spaces that can meet universal design standards with no inconvenience to any users and/or with very little extra cost to original construction budgets should be included as mandatory requirements under the Building Code.
- For instance, minimum/maximum height range requirements for light switches, socket outlets and door handles should be set. There should be extensive consultation with organisations

that can advise on the range of building design elements that present universal design issues for those they represent (for example, retirement home and village developers).

- This goal would be more achievable if there were a set of progressive goals over a long period. For example, initially all new houses would be built to universal design principles. Later, it could be that any major renovations to homes had to introduce this same level of access. Later again, it could be that all homes had to be built to universal design. There would be a need to consider how adaptability fitted into this scheme. Adaptability should not be seen as a long-term alternative for all homes, as having to adapt still comes at a financial and human cost. Adaptability is better than nothing, but universal design is the long term preference.
- Universal access for people with disabilities, the elderly, people with pushchairs and bicycles is not adequately provided for in recent apartment developments. This is exacerbated by a lack of signs or identification for lifts, reception areas and parking areas, a lack of wet-weather access, small and few lifts, and a lack of dedicated service lifts or loading docks. Consideration should be given to providing minimum widths of common circulation corridors and corridor/lobby spaces immediately adjacent to the lifts.
- Universal design based on ergonomic considerations is a good idea in sheltered housing/state housing and residential care units. However, universal design is the enemy of creativity, innovation and progress in the wider sphere. Care is needed not to stifle creativity.
- Cold and hot water taps should always be on the same side.
- There should be at least one toilet, one bathroom, one entrance accessible, and an outdoor/indoor living area in every dwelling.
- Only the functional elements of residences (including holiday and rental ones) need to be wheelchair accessible, thermally efficient, of durable construction, and with good indoor air health.
- This could be achieved with performance criteria for the height of electrical, sanitary and joinery fittings in all new buildings, including residential and household units.
- By forcing the constraints of a minority onto a majority, this disenfranchises the majority. Under no circumstances, except with bulk housing developers, should accessibility or universal design be forced upon the private homeowner.
- More information should be provided to the wider public about the benefits of universal design, so that people will come to expect it from their buildings. Resources should be provided about ways that this can happen. It is difficult to get universal design for all residences, but it can be encouraged for new and redeveloped buildings.
- Buildings should be designed for people, not specific groups. Developers will always want to build the cheapest and smallest property. Standards should be set so that they are suitable for all.
- With rating schemes for residential buildings in New Zealand, the application of universal design could be a factor that improves the value of a property. That way, the market would soon determine whether the concept had merit.
- Light switches and door handles should be aligned; power sockets should be at around 1 m above the ground, but also out of reach of toddlers unlike in their current 'inaccessible' position.

- Over-regulation should be avoided at all costs.
- Simple measures should be taken, such as having a minimum door width of 810 mm, eliminating tight corners and providing adequate passage width. These can be achieved with minimal cost. This would also be beneficial if, for example, someone had to be moved on a stretcher.
- Guidance documentation should be produced in conjunction with relevant government departments.

**Question 52: How important do you think it is for the Building Code to make provision for public buildings to be provided with features that assist people with visual disability?**

Many of those who replied to this question thought it was important for the Building Code to provide for public buildings to have features that assist people with visual disability. The following comments reflect the range of views.

- It is very important for the Building Code to provide for public buildings to have features that assist with visual disability. According to the New Zealand Disability Survey 2001, people with visual disabilities (blind or visually impaired) are one of the largest groups of people with disabilities and should have the same access to all parts of public buildings as other people.
- Most reduced vision is within the older population. With people living increasingly into late age, reduced vision will be a major issue. Designing appropriately improves safety, accessibility and wellbeing for everyone, not just those with vision impairments.
- It is considered very important for the Code to provide for features to assist people with visual impairments. NZS 4121 contains requirements for signs and way-finding scattered throughout it. These form part of the Code. These requirements should be included in the Code in a sequence that is similar to the arrangement of NZS 4121.
- These features, such as bigger signs and colour contrasting, also assist people without vision impairments. People with visual impairment also want to access a range of buildings and facilities and should be able to do so.
- A more comprehensive recognition of different impairments would be better aligned to the broad definition of disability, both within the Building Act and the New Zealand Bill of Rights. Otherwise, this would constitute discrimination.
- As all public buildings are already required to have an accessible route through the building, it follows that the same route should also be designed to accommodate the needs of visually impaired people, as well as ambulant disabilities.
- Colour and textural changes should be explained in the Code and guidelines promulgated.

Other comments were as follows.

- The requirements for people with visual, intellectual, hearing or physical disabilities should be included in a single category. The current requirements in the Building Code cover these issues well.
- Making these provisions would be a cost beyond society's means. They are relevant on critical buildings only.

- There is disagreement that all buildings except detached dwellings should have to comply with such a requirement. In many cases, the features would just be an added cost that would potentially reap no or few benefits. It would not be practical to have workplaces on a farm, such as a woolshed or milking shed, required to have these features.
- It is better to provide individual assistance.
- This issue is difficult to comment on without some understanding of the likely costs and benefits.

**Question 53: Do you have any suggestions on ways to address the issue of public buildings being provided with features that assist people with visual disability?**

The following comments reflect the range of views on ways to address the issue of public buildings being provided with features that assist people with visual disability.

- There needs to be much clearer signage design including audible signage.
- Signage needs to be consistent with NZS 4211, but some performance standard suggestions include:
  - greater use of tactile indicators at changes in level, for example, top and bottom of stairs and ramps
  - strong colour contrast on the treads of steps/stairs, both internal and external
  - greater visibility of glass walls and doors (the current 20 mm minimum opaque band is not effective)
  - colour contrast of doors with the walls so they are readily identifiable
  - signage that contrasts with the wall surrounds and typeface that contrasts with the signage board (font size should also be considered)
  - lighting should be even without sudden changes in intensity within a building
  - there should be a minimum lux level of lighting, for example, 300 lux.
- If requirements are included in the Building Code, the upgrading triggers of sections 112 and 115 (Building Act 2004) would ensure buildings are upgraded over time.
- There should be non-slip floors, larger switches and easy back-up emergency phones.
- Attention to the location of starting and finishing points of handrails on stairs would be of immediate benefit to sight-impaired users.
- There should be textured paving and floor coverings to guide along a route. No pillars or posts should be placed along access ways.
- Things like notices, floor numbers and room numbers must be clear and in large font, unlike some existing ones. This is not expensive and would be useful to all, including people with less than 20/20 vision. Generally finding one's way about most public buildings is confusing, inconsistent and sometimes virtually impossible. A new New Zealand Standard would be useful.
- UK Regulations Section M provides better glazing manifestation requirements. Other measures include full-tile yellow TGSIs (tactile ground surface indicators), extensive Braille signage and raised rather than engraved letters on lift panels.

- There should be Braille on lifts as well as auditory sensors and tactile pads at all doorways.
- Colour and contrast requirements seem obvious, but the way that the building is laid out can have a dramatic effect. Therefore, everyone would benefit if the reasons behind the requirements were explained.

**Question 54: How important do you think it is for the Building Code to make provision for public buildings to be provided with features that assist people with intellectual disability?**

The majority of submitters who responded to this question thought that it was important for public buildings to be provided with features that assist people with intellectual disability. The following comments reflect the range of views.

- While people with intellectual disabilities are not as large a group as people with physical or sensory disabilities, most have high support needs (see New Zealand Disability Survey 2001). A significant number were at one time institutionalised. They have now been resettled into the community, and there are strong moves to ensure that all members of this often-stigmatised group are able to live an ordinary life in normal homes in the community, and to access all part of community life, including going to the normal range of public buildings.
- Good clear signage, written or pictorial, would be beneficial for any member of the community.
- Clear visual signage would assist all people to identify facilities and accessible routes to and within buildings, not just those with intellectual disability.
- The Building Code should have features that assist people with different impairments. A more comprehensive recognition of different impairments would be better aligned to the broad definition of disability, both within the Building Act and the New Zealand Bill of Rights.
- People with intellectual disability also want to access a range of buildings and facilities and should have the right to do so.
- This category of specialist users is similar to the use by unaccompanied minors. Any provisions that apply for unaccompanied minors will cover people with intellectual disabilities.
- Recent publicity revealed that one in five of the population have learning difficulties, such as dyslexia and other reading disabilities.

Other comments were as follows.

- No buildings, except detached dwellings, should have to comply with such a requirement. In many instances, it would be impractical and the benefit would not justify the cost. Some buildings definitely merit having features to assist people with intellectual disabilities, but the way it is worded in the Code at present is far too general and wide-sweeping.
- This is a matter of personal care and provision of care.
- Some people with disabilities require assistance and intellectual support. That cannot be replaced by building features.
- Expenditure on this aspect comes back to economics.

- The needs of people with intellectual disabilities differ across the spectrum. This is not a ‘one-size-fits-all’ issue.
- Public buildings should be required to have way-finding features that assist those with intellectual disabilities, but, beyond that, features may be difficult to provide and may not be cost-effective.
- If a person with an intellectual disability is capable of negotiating an accessible route through a public building, then that should be adequate. If, however, the person’s disability renders him or her unable to cope with an accessible route, then that person would require a full-time caregiver in attendance.

**Question 55: Do you have any suggestions on ways to address the issue of public buildings being provided with features that assist people with intellectual disability?**

The following comments reflect the range of views on ways to address the issue of public buildings being provided with features that assist people with intellectual disability.

- Controls for lifts, handrails and automatic doors could be standardised in public buildings.
- The classification of IHC-type buildings requires better definition in the documents.
- There should be simple-to-follow building maps on walls and arrows on corridor floors that guide occupants to the nearest emergency exit. Arrows with backlighting would be best.
- Compliance with the Building Act may be achieved through compliance with either NZS 4121 or with the proposed Wellbeing features 1.1.1-1.1.7. It is recommended that in addition to the proposed accessibility features under the Wellbeing features 1.1.1-1.1.7, NZS 4121 should be reviewed to ensure it more fully covers people with different impairments. It is suggested that the Building Code requires a proportion of residences that are for the public (for example, local body housing) to be provided with features that assist people with a visual disability and intellectual disability.
- Signage is frequently difficult to read and understand for many people with an intellectual disability. This also affects those with learning disabilities, such as dyslexia, and many who do not speak English as a first language.
- It is common for people with intellectual disabilities to also have physical disabilities, and sight and hearing impairment. Further, people with intellectual disabilities are, on average, less physically mobile than the general population. Therefore, arrangements that provide for accessibility by people with physical, visual and hearing disabilities are also very important to many people with intellectual disabilities. Perhaps the only unique requirements for intellectual disability are easy-to-understand signs (pictorial) and easy-to-use fixtures – it could be argued that these are features that are also beneficial to everyone else.
- Toilets should be big enough for carers to be able to help people with disabilities. There should also be education of staff in workplaces to help these clients. It would be helpful to keep signs in simple language, to use colour coding, and to provide picture signs, for example, for toilets, food premises, exits and stairs.
- Intellectual disabilities are too diverse to be comprehensively covered by the Building Code. People with severe intellectual disability should normally be accompanied. Therefore, coverage is more relevant in the area of people with learning difficulties, or those from other

cultures. There should be better way-finding via full implementation of international graphic signage for various amenities and restrictions. For example, there should be standardised signage so that people with intellectual disabilities can locate a help desk if required.

### **Question 56: Is there anything else about accessibility you think the Building Code should make provision for?**

Other comments about accessibility that have not already been reported are as follows.

- Among the priorities for action between 2005 and 2010, as set out in the New Zealand Action Plan for Human Rights: *Mana ki te Tangata*, is a review of the New Zealand Standard NZS 4121: 2001 every 5 to 10 years to reflect developments in building accessibility.
- There should be greater consideration of the needs of deaf and hearing-impaired people. As with vision impairment, the level of hearing impairment increases with age. Public meeting rooms should be fitted with hearing assistive devices and all public buildings should have both visible and audible alarm systems, not just in buildings where disabled people are employed, as is the case at present. It was remarked that strobe lighting is not acceptable because it can trigger epileptic seizures.
- The provisions in the current Building Code regarding listening systems for people with hearing loss are inadequate and ambiguous.
- There should be guidance on safe surface finishes that would prevent trips, slips and falls.
- The Building Code must provide clarity in establishing minimum requirements with adequate prescribed detail to ensure consistency in interpretation and comprehensive implementation. This would enable people with disabilities to identify their basic guaranteed entitlements, so that they can use buildings with confidence.
- Accessible routes from the street are not always achievable due to the localised topography.
- The universal design concept for housing and other buildings would align the Building Code with the Government's guiding document on disability, the New Zealand Disability Strategy.
- The Code should provide for exemptions where public buildings are located in inaccessible environments that cannot be reached by people with disabilities (for example, most tramping huts, and buildings with unprotected sea and beach access).
- The design and construction of access pathways is often in practice limited to the building. There should be regulation that clearly identifies the car park area, including accessible kerbing, so that users can get from the road surface to the pathway and then to the building threshold.
- Public buildings do not sufficiently take into account the needs of people with mobility impairments. For example, new libraries are built with a narrow width between shelves or there may be slippery stairs, poor signage and no nearby accessible parking. There should be more designing to NZS 4121: 2001. In addition, reception counters are problematic, badly designed and often have no chairs available.
- There is a tendency for society to have limited expectations of the range of activities in which people with disabilities participate, particularly regarding employment. For example, there is no reason a person who uses a wheelchair cannot work in an aircraft control tower, other than the absence of a lift, or act in a play, other than an inaccessible stage.

- The range of buildings that are presently required to have accessible toilets should be reassessed. There are projects that would have very considerable public benefits, but they cannot proceed because of this ‘overbearing’ requirement. The Code should be rolled back to recognise that there are workplaces where the job requires people to be ambulant.
- The current Acceptable Solution for external moisture requires that external paved surfaces be at least 100 mm lower than floor levels. Presumably, this is intended to ensure no surface water ingress, but creates major problems with wheelchair access to doors. It was recommended that, at doorways, paving be permitted to be at a level that is at or close to floor level, and that the water ingress risk is managed by requiring a minimum slope on the paving to ensure water drains away from the building. It would make sense to require minimal level difference at doorways in the interests of universal design.
- There should be a requirement for sliding or automatic opening doors in public buildings.
- Current accessible washrooms are for self-propelled wheelchair users (to fit paraplegics) and do not adequately address the needs of tetra- or quadriplegic users requiring lifting assistance and equipment. The Acceptable Solutions need to provide solutions for this, especially for residential scenarios – large bathrooms of at least 12 m<sup>2</sup> will be required.
- New Zealand Standard NZS 4121 should be made mandatory. There is a need to review Standards on a regular basis due to rapidly changing technology and equipment. The need for accessible buildings is reinforced by the changes in health care.
- Any discussions about accessibility must mention the need for access control for security. Without considering the two simultaneously, the present situation will be sustained, where prevailing accessibility solutions create security problems and put occupants (with or without disabilities) and property at risk from security threats because ‘security solutions’ are not permissible.
- There currently exist good standards in the Building Code, which do not appear to be uniformly applied throughout the country.
- Those involved in consent processes, such as building inspectors, need to be trained in barrier-free issues and encouraged to apply the accessibility requirements of the Building Code.
- Given increasing body sizes, minimum access widths may need to be reviewed.
- There should be wider stairways and doorways, and increased width of corridors, passageways and driveways. This would address the needs of both disabled/limited access persons [sic] into properties as well as the trend towards larger furniture and appliances that require adequate space to manoeuvre. The size of attic manholes should be increased and access to under-house services and meter boxes made easier, as society gets larger.

### **Question 57: Do you agree with the proposed objectives for noise?**

The proposed objectives for protection from noise covered exposure to noise originating from a source within the building and exposure originating from a source outside the building.

Almost all of the submitters who answered this question agreed with the proposed objectives for noise. The following comments cover the range of themes discussed.

- Increasing urban density means that residential dwellings should be built in a way that insulates the occupant from external noise.
- The addition to the Code of ‘the exposure to noise outside the building’ would be beneficial, but there is also some responsibility on the part of transport planners and others to control noise sources.

Other comments were as follows.

- While noise is located in the Wellbeing section, there is evidence that high levels of noise can have long-term physiological effects on the cardiovascular system, noise could be better defined as a health issue.
- Inter-tenancy sound has taken the bulk of research, with very little attention given to exterior noise sources.
- Inter-tenancy walls need to be continuous in their entirety, for example, back-to-back bathrooms or kitchens.
- Alternative suggestion for the objective: An objective of this Building Code is to ensure that the design and construction of the building does not expose a person in or adjacent to the building to an unacceptable quality of occupancy due to noise.
- The complete building interior should be soundproofed from adjoining tenancies. This should not just be restricted to habitable rooms. The requirements should be expanded to cover other building categories, such as motels, which are currently exempt.
- This is a joint Resource Management Act/Building Code issue. There is a need to look at noise between apartments or houses close together. The noise issue is wider than just apartments.
- Sound insulation from neighbours and adjoining areas has not been well applied and contributing factors, such as hard wood floors, can mean that occupants are subject to noise nuisance.
- It was asked why this section should be limited to residential buildings.
- All buildings in close proximity to airports should require minimum sound insulation, depending on the type of airport (international, domestic or club), the specific types of aircraft and their hours of operation.
- External noise from outside the building is a district plan issue. The Code can only refer to management of noise in terms of construction of a building and achievement of performance standards.

### **Question 58: Do you agree with the proposed features to address noise?**

Almost all of the submitters who responded to this question agreed with the proposed features to address noise. A number of submissions addressed the issue of where responsibility should lie for noise generated by external activities.

Responses are summarised in the comments below.

- The features are reasonable given the increase in complaints from inner-city residents and those in close proximity to industrial areas.

- There is support for widened scope of the Building Code to include noise generated externally to the building. Noise-sensitive premises (for example, residential and learning institutions) should be insulated against external noise rather than other existing noisy activities reducing their noise levels to accommodate new noise-sensitive uses.
- The Building Code is the most appropriate place to set out requirements for noise insulation (rather than the District plan). It was necessary to change the District plan in Wellington to control what emerged as a significant resource management issue. Ideally, such matters are more suited to the Building Code.

Other comments were as follows.

- It was questioned why this should be limited to residential buildings.
- Not allowing dwellings or apartments to be sited beside busy roads where ambient noise levels are high should be considered.
- District plans currently have requirements for building close to high noise sources. The question is to what extent it would be necessary to upgrade buildings when alterations occur.
- This is a difficult area for the relationship between the Building Act 2004 and the Resource Management Act 1991 and there is an increasing need to resolve where the regulatory emphasis should be. In theory, external noise sources or emissions are controlled by territorial authorities under the Resource Management Act. However, with the intensity of residential development in mixed-use areas increasing, ensuring that external noise stays within levels that are acceptable to residential occupancies is becoming an issue. This is especially so for apartments in town centres, where reverse sensitivity claims can be reasonably expected.
- There appears to have been an assumption made that all territorial authorities have identified noise zones (for controls on noise-sensitive land uses) in their respective District plans, promulgated under the Resource Management Act 1991. This is not the case for all 73 territorial authorities. The Environment and Transport Ministries are currently investigating how land-use controls could be used to prevent unprotected noise sensitive activities being established in areas affected by land transport noise. If a National Environmental Standard (NES) under the Resource Management Act 1991 is to be developed, further work will be required to investigate if an NES will be able to control sensitive activities (residences, schools) in existing areas affected by land transport noise. It is important to note that this type of control would be a reversal of the polluter-pays principle in that it would impose a cost on the owner of the land to mitigate the environmental effects (noise) of the road. This approach is taken by a number of district plans (and upheld by the Environment Court) to control building in noisy areas surrounding ports and airports. However, it has not been done by regulation before.
- Submitters agreed that the Building Code should address 'Exposure to noise originating from a source within the building'. However, some submitters thought 'Exposure to noise originating from a source within the building' should be dealt with by the Resource Management Act or local body requirements for noise, and not the Building Code, unless the external noise originates from a building service provision (for example, ventilation fans and plumbing pipes). The exterior envelope design should be made to assume a certain level of outside noise and to provide sufficient noise abatement for this level.

- The proposal is acceptable as far as performance criteria for indoor airborne, structure-borne noise and external noise are concerned, but there are no objectives for other sources, such as plumbing and mechanical noise, which could be more intrusive. Some guidelines on this would be helpful.
- The proposal does not specifically mention external noise, such as traffic. Double-glazing is helpful, but is seldom seen in New Zealand.

**Question 59: How important do you think it is for the Building Code to make provision for protection from high noise level sources external to the building?**

A large majority of submitters who replied to this question considered that it was important for the Building Code to provide for protection from high noise level sources external to the building. The following comments summarise the issues raised.

- As population density increases, the likely exposure to noise from many external sources increases. It is important that buildings be designed in such a way that occupants can choose to limit exposure to noise during use.
- According to community noise guidelines published in 1999 by the World Health Organization, for a good night's sleep, background sound levels should not exceed 30 dB. It is important that people within a building are protected from high noise sources that are external to the building and that the review needs to align with initiatives to address external noise sources, such as the current work being undertaken by the Ministry for the Environment and Ministry of Transport on land transport noise, as noted above.
- The Building Code should make provision for controlling high levels of external noise. Mandatory protective measures may be best limited to residential, education and public buildings. There could be zones in industrial areas or around airports that require specific measures to be taken. Guidelines for acceptable internal noise levels from external sources may be useful for all building types. Sleeping accommodation requires a higher level of protective measures than most other uses.
- It is important to deal with the issue of noise from external sources in apartment and residential buildings, in particular, for sleep and rest. With the current move towards inner-city housing and apartment dwellings, there are opportunities for noise issues to arise, including reverse sensitivity and incompatibilities between land uses. A situation is planned for Dunedin in which a harbour-side development will include upstairs residential accommodation, and backs onto a current industrial area. The land use must change, the area should be rezoned or bought out for reserve, or a reverse sensitivity situation could result unless noise insulation is provided.

Some submitters expressed qualified support.

- If external noise originates from a building service provision (for example, ventilation fans and plumbing pipes), this is somewhat important. External noise can be a health issue and it is important that the Building Code provide information for builders and developers to help control the problem.
- If the noise source was present before the building was built or its use was changed to residential, then the producer of the noise should not be expected to change their activities.

Rather, when the residential units are built they should be capable of buffering any expected noise.

- This is currently covered by district plans created under the Resource Management Act 1991. Currently, there are conflicts in some local council areas between the Resource Management Act noise requirements and Building Code natural ventilation requirements. If this is to be included in the Building Code, it should not result in a requirement for achieving ventilation without opening windows near busy roads, therefore forcing people into air-conditioning.
- Very important but high noise level zones need to be established in district plans.
- It was asked whether the cause or the effect should be treated.
- This should only happen where privacy is an issue, such as in multi-unit dwellings, or otherwise where there are environmental noise issues, such as airports.
- The building fabric must be adequate to reduce indoor noise levels to acceptable standards. Provisions must also consider the need for ventilation via open windows in habitable spaces.
- The proposal is acceptable, but, as written, would apply to all residential dwellings (not just multi-unit) and learning institutions. This is acceptable as long as the performance criteria are reasonable. It may be appropriate to have guidelines on this aspect instead of performance criteria.
- Sound can have implications for safety or amenity, such as warning calls, distress calls, awareness of the outside environment and weather.

A view was also expressed that the current Code was adequate.

### **Question 60: Do you have any suggestions on ways to address the issue of protection from high noise level sources external to the building?**

Suggestions on ways to address the issue of protection from high noise level sources external to the building are summarised in the following comments.

- Living areas should be kept below noise-source level by screening with trees and soft landscaping, high-mass fabric to reflect noise, supported with air-tight construction, and insulation to reduce noise levels transmitting to the inside.
- Further suggestions are landscaping, hedges, concrete block walls, raised earth, trees, less glass, and double- or triple-glazing. There could also be better placement of opening windows.
- To a certain extent, the property owner has little control over the activities of neighbours other than the provisions to object under the Resource Management Act. Therefore, any building, irrespective of the current use of neighbouring properties, should possess passive noise reduction inherent in the construction. The building envelope should provide a prescriptive decibel reduction down to ambient levels.
- Building noise suppression requirements should be linked with a standard classification system used for zones in district plans under the Resource Management Act. Permitted ambient noise levels within property boundaries should be categorised, as specified in District plans.

- If the Building Code is to require acoustic insulation in high noise potential environments, it is imperative that Acceptable Solutions do not result in the loss of low energy or natural/passive ventilation options as priority solutions. With increasing pressure being placed on the need to achieve sustainable design, construction and use outcomes for commercial and public buildings, noise versus natural ventilation issues will need to be addressed to establish acceptable performance criteria for the intended activities.
- Buildings could be classified according to their distance from neighbouring properties, streets and flight paths. The closer those buildings are to any of these, the higher the need for protection.
- Air-tightness and acoustic mitigation of claddings, linings and glazing should be specified.
- WO2.2 should be managed through the Building Code only and not through District plans, and needs to be set at 45 dB. This is only applicable to all occupied buildings in a noise zone imposed under the district plan, and whether a building will be able to perform to 45 dB will depend on the external noise environment.
- Any form of protection against external or internal high noise levels is imperative for many people with disabilities. People with visual impairment have a heightened sense of hearing, and loud noise will block out their ability to hear instead of visualise.
- The sound attenuation in the external envelope of the building (dwelling) should be improved.
- Use should be made of the acceptable, better, best model, possibly with the introduction of a rating scheme.
- Use should be made of building materials that insulate noise from sources external to the apartment building. Many such ideas were presented in submissions on the proposal to amend the current Building Code Clause G6.
- Different acoustic standards should be imposed for different ambient noise areas (ie, noisy, mixed-use areas, normal suburban areas), as tested and assessed by local councils.
- This would be best done by specifying reasonable acoustic performance of the façade, rather than compliance with internal noise level criteria, as external noise levels fluctuate with time, noise produced by particular vehicles, and so on. The construction required to achieve the internal noise criteria may be impractical, ugly or have adverse effects on outlook. Alternatively, if using internal noise criteria, the performance standards could be guideline limits only.
- Heavier weights of laminated glass are cost-effective in improving sound insulation, but there is a conflict with ventilation requirements in naturally ventilated buildings, which make high levels of sound insulation difficult to achieve.
- Acoustic consultants should be involved in high noise level areas.
- New buildings are dealt with in the current Code. The difficulty appears to be with city apartment developments. The Code should be adjusted to require alterations to existing apartments to comply with the noise provisions. The requirements should not be limited to the establishment of new residential units.
- There should be better wall cladding systems designed to limit external noise and better use of insulation products. Double-glazing in windows is desirable. The Code should consider requiring heavier framing in houses that provide bigger wall spaces for installing adequate soundproofing.

- If the energy clauses were followed, heavy insulation would be a good practice for energy efficiency and would help eliminate the need for additional requirements under the wellbeing area.
- Sound barrier walls should be put in place adjacent to all busy motorways and building construction detailing to prevent sound transmission into buildings or within them.
- Noise from the activities of car enthusiasts would be less of a problem in neighbourhoods with good construction features, such as earth houses and window double-glazing.

**Question 61: How important do you think it is for the Building Code to make provision to prevent noise between habitable spaces and other parts of the building?**

A large majority of those who answered this question considered that it was important for the Building Code to prevent noise between habitable spaces and other parts of the building. Their views are summarised in the following comments.

- Transmission of noise through buildings is very apparent and needs stronger criteria in place within the Code to ensure the protection of wellbeing and health.
- Common spaces such as stairwells and lift wells are primary sources of unwanted noise.
- This is important not only for apartment dwellers, but also for the noise management of other residential and commercial buildings.

Some submitters expressed qualified agreement.

- This depends on the type of structure. In multi-tenant buildings or attached apartment buildings, this is very important (as the other spaces are external to individual space owners).
- It is not important to prevent noise transferring from habitable spaces to other spaces. If the intended use of the building requires low noise, the designer should achieve this as per the client's brief and contract. Noise is important when it transfers from non-habitable space to habitable space, for example, from common spaces in multi-units.
- This issue is very important if the habitable space is equivalent to a fire cell, but not at all if habitable space is within a fire cell.
- This is dependent on the level of noise control by the occupants. If occupants are unable to control the noise level being emitted (for example, essential building services or noise from a different tenancy), this is extremely important to control via the Code, especially for plumbing noise and inter-tenancy noise.
- Any guidelines need to be balanced against cost. Flexibility for individual choice is needed.

**Question 62: Do you have any suggestions on ways to address the issue of preventing noise between habitable spaces and other parts of the building?**

Suggestions on ways to address the issue of preventing noise between habitable spaces and other parts of the building are summarised in the comments below.

- Noise levels can be specified to be ideally attained in the habitable spaces. In cases when the source level is uncertain, a sound reduction requirement between spaces can be specified.

Measuring sound levels can be expensive (especially if there are many areas or rooms to consider), so a continually updated reference of proven layouts and designs may be useful. Designs and layouts can be improved so that living spaces and wet areas in adjacent units are next to each other (it is unwise to have wet areas adjacent to living quarters and bedrooms in inter-tenancy units). Garaging facilities in multi-unit blocks should be placed away from living spaces. There should be increased performance of inter-tenancy building systems to reduce noise.

- There should be more use of wet-wall construction combined with sound deadening material. An ambient sound level of 32 dB should be the target.
- The Code should require heavier wall linings, thicker walls between units, heavier roofs, and floor structures using soundproof materials. Barriers should be used around doors. Decibel limits should be set and performance of building systems tested to ensure they meet minimum performance standards.
- Noise attenuation measures should apply to the whole residential unit to minimise inter-tenancy noise. Acoustic engineers should be brought in to reduce noise in stairwells (treads/walls) and to reduce noise emissions through the structure into other parts of building.
- Traditionally, architects and builders have used two methods to reduce sound transmission through walls, floors and ceilings. The first is to install materials with air pockets (for example, insulation, double-glazing) that trap sound waves; the second is to increase wall thickness. These approaches may work for new construction, but they are difficult and costly to implement in existing buildings, where walls must be gutted and rebuilt. However, in recent times, there have been developments in the ability of building material to reduce sound transmission. Recently, a California-based manufacturer of soundproofing materials introduced a product line that can easily be added to new or existing walls to achieve remarkable reductions in sound transmission.
- Changes of use within a building that result in a much noisier environment than previously existed should be required to retrofit insulation to the portion of the building they occupy (for example, when a ground floor of an apartment building is converted from an office space to an entertainment venue). Retrofitting of insulation is considerably more difficult and expensive than having adequate insulation from the start, but it should be necessary if the noise generated would be worse than the existing situation.
- More use should be made of concrete floors and walls, carpets and double walls.
- Inline duct silencers or acoustic sound trap-type boxes should be fitted in all heating and ventilating ducting. Acoustic wall linings should be used on all bathrooms, toilets, living and bedroom areas. There should be full height concrete walls between adjacent dwelling units.
- Data needs to be provided on performance of noise-limiting materials and methods of application.
- Accessibility of information is a problem. It was suggested requiring developers and designers of new housing to issue a document, in the form of a handbook, which describes the construction features, the wall ratings and the extract system plans of each unit. This handbook would be an essential part of the purchase transaction.
- Building mass internal walls not only stops noise most effectively, but also smoothes out temperature fluctuations, storing surplus daytime heat for the night.

- In multiple units, ‘stacking’ vertically and horizontally should be required, for example, kitchens above kitchens, bathrooms above bathrooms, living rooms abutting living rooms.

**Question 63: How important do you think it is for the Building Code to make provision for the acoustic environment within particular types of buildings such as learning institutions (eg, schools, kindergartens, tertiary institutions, wānanga)?**

A majority of those who replied to this question thought that it was very important for the Building Code to provide for the acoustic environment within particular types of building, such as schools, kindergartens, tertiary institutions and wānanga.

- It is very important that the Building Code provides for the acoustic environment within the particular types of building listed above. Children in particular are sensitive to loud noise, which can disrupt learning, while excessive noise can result in hearing loss. However, in adults a feeling of displeasure or bother can also be evoked by noise. The establishment of early childhoods centres in residential areas has been a cause of annoyance to some people living in proximity to them.
- Distraction from noise in learning institutions is very apparent. Developing higher acoustic ratings within buildings would provide a better environment, and wellbeing and health for their users.
- There should be controls related specifically to noise-sensitive spaces within buildings, not only classrooms from external environmental sources, but also other internal spaces, such as corridors and other classrooms.
- These types of buildings tend to be designed to users’ requirements.
- The Ministry of Education’s acoustic requirements are greater than the Building Code and need to be adhered to if doing any work on Ministry of Education property anyway.
- It is important to provide a good acoustic environment, especially where the occupants of building are compelled to be there, such as in schools. However, where there is a market choice for people in using a building, then the criteria should not be mandatory.
- Acceptable noise levels should be clearly stipulated in the Building Code.

Other suggestions were as follows.

- The need to provide for the acoustic environment in visitor accommodation and hotels in particular should be considered as the line between temporary and permanent accommodation has blurred. Providing for sound insulation makes a building more adaptable (under the sustainable development objective). Conversion from apartments to hotel buildings to other uses (serviced apartments) is relatively common.
- This is similarly important in aged care facilities. Hearing-impaired people in learning institutions are also affected by noise.
- Hospitals also require a high level of noise protection.
- Many enclosed public swimming pools are almost aurally damaging to visit due to their echo-prone nature.

- Schools should not be sited next to highways. There are no guidelines or rules on this and it would be helpful if the Code had recommendations on appropriate background noise levels where new schools are built.
- The acoustic environment for hearing-impaired people in all types of public building should be considered, and hard surfaces and long reverberation times reduced.

Some submitters disagreed.

- There should be design requirements/guidelines for the acoustic environment within particular building types, but these should be outside of the Building Code.
- The current Code is adequate.

**Question 64: Do you have any suggestions on ways to address the issue of the acoustic environment within particular types of buildings such as learning institutions (eg, schools, kindergartens, tertiary institutions, wānanga)?**

Suggestions on ways to address the issue of the acoustic environment within particular types of buildings such as learning institutions, are summarised in the comments below.

- This could be provided by requiring suitable performance criteria for the management of the travel of sound through building elements from both internal and external sources.
- Acceptable international standards should be maintained and check mechanisms should be provided in the building warrant of fitness process.
- For learning rooms, such as classrooms and lecture theatres, a range of ideal reverberation times by volume and use could be set.
- Acceptable outside noise levels in classrooms should be specified. Outside includes neighbouring classrooms, and there should be a sound reduction requirement between classrooms. Maximum reverberation times in classrooms should be specified to reduce noise levels from within the classroom. Systems that reduce echoing should be specified.
- There should be guidelines on appropriate background noise levels to be achieved in outdoor play areas and inside teaching spaces.
- Where high environmental noise is likely to occur, a report will need to be obtained from a suitably qualified person before occupation. These areas would include high traffic zones or buildings where reverse sensibility occurs, such as racetracks and industry.
- There should be minimum STC (sound transmission coefficient) ratings for walls and ceilings.
- The acoustic reverberation cycle should be stopped by using resilient linings.
- High-mass exterior walls (concrete or block/brick ones), double-glazing and acoustic barriers should be used between adjacent rooms. Acoustic ceiling tiles should be fitted and 'soft' fabric used to cover wall linings and carpet on the floors.
- Certain types of wall lining give a better acoustic result. It would be sensible to install hearing loops and to design so that the required sound flows, but 'noise' is not sharp or intrusive.

### **Question 65: Is there anything else about noise you think the Building Code should make provision for?**

There were a number of other suggestions about noise and these are summarised in the comments below.

- The advent of heat pumps may become an issue, as they can cause a nuisance when situated next to living and bedroom areas of adjacent properties. One way to control this would be to limit the sales of this equipment to those with lower noise emission levels.
- There is an inevitable trade-off between noise and natural ventilation, especially in apartments, commercial and institutional buildings.
- Noise from inter-tenancy plumbing and services should be covered in the Code, as this is a significant source of concern for building users, and one that is hard to identify before purchase/occupancy, and difficult to remedy once the service has been commissioned.
- The provision to allow individual local authorities to set their own standards is too open to interpretation and differences across boundaries. There should be minimum standards set at Building Code level.
- Noise is commonly transmitted from decks/balconies to adjoining apartments.
- It was suggested to retain the integrity of sound insulation by monitoring how services are installed.
- It is also important for occupants to be able to be alerted to warnings of hazards that are sometimes notified by public address systems and other audible methods.
- An energy-efficient ventilation system enables windows to be kept shut and effectively isolates the indoor environment from outside.
- There should be guidelines on plumbing and mechanical noise. The Code should clarify the relationship between internal noise limits and providing thermal and ventilation environment.
- Given the state of development of acoustic engineering and science, which is not as mature as, for example, structural engineering, the Code should take a practical approach and give due regard to the examples of other countries' noise codes.
- Residential buildings in or near industrial zones (or other high noise sources) should have more stringent requirements. Apartment developments should also require a high degree of acoustic (and other) privacy.

### **Question 66: Do you agree with the proposed objectives for the indoor environment?**

The proposed objectives for the indoor environment covered the hazards caused by poor structural performance (vibrations), poor indoor air quality, lack of awareness of the outdoors, lack of lighting and unwanted entry.

Of those who replied to this question, a large majority agreed with the proposed objectives.

- This objective is important due to the purposes and principles of the Building Act 2004.
- People can spend nearly two-thirds of their lifetime in their homes. The aesthetic and amenity values of housing have a significant impact on mental health, identity, sense of safety

and security, as well as social contact with other people (WHO, 2004). It is important that the Building Code ensure that adequate amenity values are achieved in all new housing.

- People should not be exposed to an unacceptable loss of amenity due to indoor air quality, lack of lighting or security risk. Indeed, people with various impairments can be more at risk when there is poor indoor air quality, lighting, etc. For example, some people with visual impairments cannot cope with poor lighting; hence, they will benefit most from protection.

Some submitters disagreed with the proposed objectives.

- The new scope indicated would result in the Building Code trying to control how people live and how they use their property. Any performance objectives would be hard to measure, due to human interaction with their built environment.
- This is very much a personal choice.

Other comments were as follows.

- The definition of amenity in the current Building Code is very vague, including all aspects of wellbeing, except those that are associated with disease or a specific illness.
- Alternative suggestion for the objective: An objective of this Building Code is to ensure that the design and construction of the building does not expose a person in or adjacent to the building to an unacceptable quality of occupancy due to an inappropriate indoor environment.
- Another wording suggestion: An objective of this Building Code is to reduce the risk that a person can be exposed to an unacceptable loss of amenity resulting from that building's design, construction, use or demolition.
- There is substantial crossover between WO3.2 and HO2.1. Most, if not all, of the poor indoor-air quality section probably belongs under the health section, rather than wellbeing, and a suggestion was made to consider either transferring the poor indoor air quality section back to HO2 and renaming that section Indoor Environment, or encapsulating all of the Indoor conditions section within WO3.
- The contribution of the heating mechanisms is a critical factor. Inadequate indoor temperature will only be partly mitigated by the design and construction of the building. An example of this is Housing New Zealand Corporation housing, which has had insulation upgrades, but is still very cold and damp to live in because the heating mechanisms are insufficient. The lack of winter curtains and floor coverings also detract from any positive benefits of design and construction. More thought needs to go into the contribution of heating mechanisms in the dwelling.

### **Question 67: Do you agree with the proposed features to address the indoor environment for wellbeing?**

Proposed features for the indoor environment cover poor structural performance, poor indoor-air quality, lack of awareness of the outdoors, lack of lighting and unwanted entry. A large majority of submitters who responded to this question agreed with the proposed features. The following comments reflect their views.

- There needs to be more specific guidance on reducing toxins from products such as paints, carpets, varnishes, etc.

- WO3.2 is mostly repeated from Indoor Conditions. This Wellbeing section could all be merged under the Indoor Conditions heading.
- There is a danger of this being too restrictive, too difficult, and too expensive.
- The proposed features are not specific enough.
- Noticeable floor vibration should not be transmitted between common stairs and corridors, and living areas.
- Outlook needs careful handling so it does not outlaw courtyard housing where the outlook is inwards to plants and perhaps a water feature growing outdoors, but in the heart of the house. Conventional houses with 1 m wide strips between the outer walls and the neighbour waste a lot of space and are a hangover from the country house with a view out over its lawns that no longer makes sense on a 400 m<sup>2</sup> urban section. For sustainability, there is a need for denser urban living (therefore, more viable public transport and less valuable farmland built over), and this means house walls touching the neighbour's and an internal courtyard view.
- Objective for Unwanted Entry might be better replaced by one for Personal Security. Even then, it could be debated whether this is an essential part of the Code as risks vary markedly depending on location and vulnerability of the occupant, and it might be best left to consumer choice.
- Security is a personal choice issue. If homeowners are concerned about security, they need to take direct steps, such as locking doors.
- A suitable airflow should be maintained through natural means, which results in healthier house and occupants.
- It was questioned what 'stuffiness' meant. It seems that specifying a requirement for an appropriate number of air changes per hour would greatly simplify the need for some of these features.
- Requirement for outlook is suggested in the commentary as being a visual awareness of the outside environment. This could mean the sky, a neighbouring building, a road, etc. This will need to be thought through very carefully particularly in the context of urban densification.

**Question 68: How important do you think it is for the Building Code to make provision for natural ventilation in buildings when windows are closed?**

A large majority of submitters who responded to this question considered that it was important for the Building Code to provide for natural ventilation in buildings when windows are closed. Their views are summarised in the comments below.

- It can be a simple and cost-effective means of improving internal spaces.
- This is very important, as modern buildings, especially those with aluminium joinery, are prone to be too air-tight and 'stuffy'.
- Passive ventilation needs to be specified.
- Natural ventilation should be maintained by suitable means, even if windows are closed. Homes could be designed with skylights included.
- Natural ventilation reduces the energy use from fans and air-conditioners.

- Providing natural ventilation in buildings when the windows are closed is important for mitigating the effects of internally generated moisture, which can cause mould and fungi growth that is damaging to building users.
- Sufficient natural ventilation should be provided to ensure the effective replacement of smoke-laden air with fresh air. In this respect, the Ministry of Health's policy on open and internal areas and its model for ensuring sufficient rates of natural ventilation in those areas of commercial premises, where smoking is to be permitted, should be factored into the regulations governing building design.
- It is important that there be provision for natural ventilation in buildings when the windows are closed. There should be a provision for this to be controlled to a minimum level. Odours from sanitation facilities and cooking need adequate ventilation adjacent to their source.
- This is particularly important in terms of air circulation in each room and moisture control in wet areas.
- Some new houses are too air-tight, which can create air quality and moisture problems. There should be provision for some natural passive ventilation at all times.

The views of those who disagreed are summarised below.

- Natural ventilation is uncontrolled and counters energy efficiency principles. It is important to design for the optimum number of air changes per hour, but with minimal loss of internal air temperature.
- The opening of windows is a personal decision.
- It is important to be wary of imposing unnecessary costs on building owners.
- Because natural ventilation is uncontrolled, it wastes energy. Its performance is affected by winds, which, in New Zealand, are variable.
- Ventilation should not be regulated to a level that reduces the temperature below WHO-recommended levels, or that allows external pollutants/irritants to enter indoors, or that produces drafty and damp living conditions.

Other comments were as follows.

- Sliding doors, which also give access onto outdoor spaces, are being designed as the only natural ventilation into habitable spaces. In areas of high rainfall, this is resulting in moisture damage to flooring and furnishings when there is a sudden rainstorm. It also raises issues of security, especially for hearing-impaired users who cannot have both ventilation and intruder prevention at the same time.
- New houses often have inadequate ventilation due to many sliding doors with tiny awning windows up top. These are often too high for people to bother opening.
- The requirements should be re-worded to read 'for sufficient and natural ventilation'. The reference to windows should be removed, as they are not the only means of providing natural ventilation. Passive ventilation often does not provide sufficient ventilation.
- The requirements must apply to all occupied buildings.
- This question could be addressed by air purity rather than natural ventilation provisions.

- This issue is important, but any regulations need to weigh up the potential adverse effects in severe weather events.

**Question 69: Do you have any suggestions on ways to address the issue of natural ventilation in buildings when windows are closed?**

Suggestions on ways to address the issue of natural ventilation in buildings when windows are closed are summarised in the comments below.

- This is largely a matter of public education.
- It is likely that these will include a mixture of passive and active approaches. Building ventilation is well enough established now to simply adapt the different approaches used in other countries.
- On the market, there are products that allow passive ventilation even when the window is closed. These products do not affect the watertightness of the building and would help foster a healthier indoor environment.
- If a building is very airtight, then mechanical ventilation is necessary, preferably with a heat exchanger. Partial window opening is the cheapest option.
- It is possible to break large windows up into smaller ones at the top of the frame (less than 300 mm high, and therefore secure), which can be left in any stage of openness. Windows that open in the upper part of the room (height from floor) are excellent at keeping rooms cool, as they skim off the warm top layer of air. Rooms should be designed to cross-ventilate, as this is the essential requirement for moving air.
- Almost all aluminium windows can be partially opened on their two-position wedge fastener handles that allow trickle ventilation. The Code could specify some form of secure (thief-resistant) trickle ventilation to bedrooms, living rooms, kitchens and bathrooms.
- The roof cavity also needs to be ventilated.
- Install an energy efficient mechanical ventilation system and eliminate natural ventilation systems.
- There should be more use of passive ventilation systems, such as those based on the natural stack effect, windows with in-built ventilation slots, or solar powered (photovoltaic) ventilators.
- It is possible to arrange for a fan inlet/outlet to be left open.
- Passive trickle ventilators are an option. They would need to be draught-resistant to avoid being blocked off by the occupants.
- The current Clause G4 Acceptable Solution covers this issue.
- Ventilators should be opened at the occupiers' discretion. The Code should allow market forces to shape building performance.

## **Question 70: How important do you think it is for the Building Code to make provision for a comfortable rather than a minimum indoor air temperature in housing or any other occupied buildings?**

Opinion was divided on whether the Building Code should provide for a comfortable rather than a minimum indoor air temperature in housing or any other occupied buildings, but there were slightly more in favour than against. Their views are summarised in the statements below.

- New Zealand has a culture of ‘winter denial’ and that results in minimum insulation standards, which are just too low. People have dwellings where the heat loss far exceeds the occupiers’ heat generation. By raising the minimum indoor air temperature, the Code would increase the wellbeing of those occupiers.
- It is very important for the Code to provide for achieving a comfortable rather than a minimum indoor air temperature. Many sedentary activities at home or at work require comfort rather than minimum temperatures in order for people to maintain health, achieve full productivity and reduce the risk of injury. This is particularly true for older people and the very young.
- Most people in residential situations will endeavour to heat their environment to a level that they personally consider comfortable. However, energy costs and other constraints can result in some occupants being subjected to unnecessarily low indoor temperatures. Therefore, both minimum and recommended temperatures are needed in the Building Code to ensure clear guidelines.
- Optimal thermal comfort, rather than minimum thermal comfort, should be the primary goal of the Code.
- The requirements should be region-specific.

Comments by those who did not agree.

- It is important that provision be made for a minimum indoor temperature, rather than a comfortable one, as the latter term is too subjective. It is also more important that a minimum indoor air temperature be decided to ensure clarity for other government agencies, such as the Ministry of Social Development, when setting their income support policies on adequate heating.
- This should not be part of the Building Code; it is a lifestyle choice.
- Comfort is hard to define and measure. This will vary with occupants and their ability to pay for it. It is not sensible to control comfort, except in early childhood or elderly care facilities.
- The prime consideration should be for health – a minimum temperature of 18 degrees Celsius. Beyond that should be a consumer choice.
- There is a need to be consistent and measurable; therefore, regulation should be limited only to setting a minimum.
- The Building Code should deal only with healthy and safe temperatures, not comfortable ones. Comfortable to a developer is lowest price. Comfortable is never measurable.
- Occupants can set their own temperature, as long as the dwelling has a method system to regulate air temperature.

**Question 71: Do you have any suggestions on ways to address the issue of a comfortable rather than a minimum indoor air temperature in housing or any other occupied buildings?**

Suggestions on ways to address the issue of a comfortable rather than a minimum indoor air temperature in housing or any other occupied buildings are summarised in the comments below.

- There should be compulsory double-glazing, with thermally efficient window frames. Much higher minimum R-values are needed for walls, ceilings and floors. No more houses should be built without an energy consumption certificate and provisions for heating.
- It is possible to feel quite comfortable if the overall environment in a house is at a constant temperature throughout. Many homes only heat a part of the house and so, by keeping doors closed, there is a greater temperature differential.
- The Building Code needs to link with the National Energy Efficiency and Conservation Strategy, and its target to achieve best-practice energy performance in new residential and commercial buildings.
- Many building design variables contribute to comfort. Some of these could be addressed by energy-efficiency targets broadened to limit overheating. Extended summertime overheating is predicted to become an increasing problem for cities, especially Auckland and Christchurch. This could result in the use of heat pumps and could create a positive feedback loop for climate change.
- It would be wise to place an emphasis on passive solar design and providing an environment where heating requirements are low. The Beacon Auckland NOW Home has been designed to require no additional heating in winter (or cooling in summer). Where climate means that heating is unavoidable in winter, the focus should be on directing users to safe, low-cost forms of heating, such as pellet burners and low-emission wood burners, rather than higher cost (to the consumer and the country) reticulated heating systems.
- Passive solar-designed buildings, promoted by Code performance requirements and informed by energy modelling tools, can maintain comfortable temperatures, without a significant need for heating and cooling.
- All buildings that are used for housing or occupation must have sufficient insulation, thermal mass and natural lighting (and sunshine in the winter months) to stay naturally warm, due to the effects of solar heat gain and the 'thermal battery' effect.
- The Code should incorporate a Warm Homes Standard. Buildings should be designed so that the main living area can be heated to 18 degrees Celsius in an affordable manner. The Code should make it mandatory for all newly built homes to achieve a minimum agreed HERS rating.
- This issue could be addressed by mechanical means (fitted extractors) or by air conditioning.
- The Code should focus on a well-insulated building envelope, so that house occupants can sustainably and affordably manage the desired temperature.
- The Code should have a standard ambient temperature range (say 18-25 degrees Celsius) that a building can achieve using a standard acceptable level of energy input per housing unit area to heat or cool. The Code should not advocate any particular heating or cooling systems (for example, solar heaters over heat pumps), but should rather allow any design that can meet

ambient temperature requirements using acceptable maximum levels of energy input, including zero energy input.

- The use of the subjective term ‘comfortable’ should be replaced to reflect the ability of a building to maintain the desired temperature with minimal energy input. This then allows the building users to control temperature to suit their requirements.
- Thermostatic control of an adequate heating source is the best way of providing a comfortable room temperature. It also saves waste.
- World Health Organization standards must be the target temperatures when designing a house. This can be done with software like BRANZ’s ALF.
- Maximum/minimum and comfortable indoor air temperature becomes confusing when discussed in both the Health Objectives Section and this section. If possible, the Code should cover all the issues in one section, whichever is considered more appropriate. The Code should concentrate requirements on insulation levels that ensure comfortable indoor temperatures can be quickly attained and easily maintained with minimum energy consumption from the heating method selected by the occupant.
- This issue should be determined by the market. The Building Code should not attempt this level of control.
- There are other mechanisms by which central government can encourage desired behaviours, such as subsidies or suspensory loans for the installation of insulation, heat pumps, etc.
- The Code should focus on those factors that are both measurable and controllable.
- Non-Code mechanisms may be more suitable for addressing indoor temperatures. In the commercial sector, for example, occupational safety and health guidelines are applied.

**Question 72: How important do you think it is for the Building Code to make provision for natural light and awareness of the outdoors in living areas and bedrooms in residential buildings?**

A large majority of submitters who responded to this question considered that it was important for the Building Code to provide for natural light and awareness of the outdoors in living areas and bedrooms in residential buildings. A few disagreed. Views are summarised in the following comments.

- It is very important that the Building Code provide for natural light and awareness of the outdoors in living areas and bedrooms in residential buildings. Evidence that daylight is desirable can be found in research, as well as in observations of human behaviour and the arrangement of office space.
- Natural daylight can be a major and effective substitute for a large portion of energy currently consumed by artificial lighting. Several studies have shown that outdoor views have a significant positive effect on emotional wellbeing and blood pressure (see LEED green building standard).
- Aside from the mental health benefits, the considered use of glazing in passive solar design can offset the expense of artificial lighting and purchased heating energy, and can provide the high natural light levels required for some tasks.

- All residences should have an awareness of outdoors from the main living space. Bedrooms do not necessarily need an outlook, but do need natural light and ventilation.
- This provision would have both wellbeing and sustainable development benefits.
- This is an important aspect, which the existing Code poorly addresses.
- Bedrooms should have outdoor vision and it should not be a brick wall 2 m away.

Other comments were as follows.

- This provision is more important in factory environments, offices, shops and educational facilities, which need natural lighting and outdoor views. It is not necessary that every home has a view. However, it is important to have access to outdoor facilities, such as nearby parks and reserves, if there is no surrounding natural environment. However, this is an issue of optimal siting of the building, and therefore a design or architectural issue, rather than one of building performance.
- This should also include aged care facilities and apartments in retirement villages.
- Having adequate light and awareness of the outdoors is both a resource management issue (and therefore able to be dealt with under the Resource Management Act and District plans), but also a Building Code issue in terms of wellness and sustainability. The main area of concern for large metropolitan councils is the lack of adequate natural light and awareness of the outdoors in inner city apartments. In Wellington, for instance, landowners can build out to their property boundaries and up to the height limit, if they so desire. Research into inner-city apartments in Wellington found that the many buildings containing residential uses had the potential to be built out by other buildings, potentially resulting in a future lack of natural light and limited awareness of the outdoors. This issue could be addressed, in part, by amending the District plan, but there are aspects of the Building Code that should also be reviewed, such as requiring minimum window sizes for living areas as a proportion of the size of the exterior wall.
- This requirement should not preclude courtyard housing where there is awareness of the outdoors by overlooking an outdoor courtyard with planting in it.
- The Building Code already addresses this to an extent.
- This issue should be determined by the market. The Building Code should not contemplate this level of control.
- This is a matter of individual opinion; some people rate it highly, others do not care.
- Within reason, people have a responsibility for their own wellbeing. This issue should be left to people's choices. Awareness of the outdoors is probably not fully obtainable in many urban environments.
- Outlook is a Resource Management Act issue.

**Question 73: Do you have any suggestions on ways to address the issue of natural light and awareness of the outdoors in living areas and bedrooms in residential buildings?**

Suggestions on ways to address the issue of natural light and awareness of the outdoors in living areas and bedrooms in residential buildings are summarised in the comments below.

- There should be a minimum level of natural light in living areas.
- This can be done through the provision of windows, glass doors, skylights (not sky domes), conservatory-type roofs etc.
- There should be minimum window to floor area ratio and minimum distance from window to any obstruction (for example, apartment block, perimeter wall).
- Roof glazing can provide both natural light and awareness of the outside.
- There should be standards that require both quantity (minimum window size for type and size of room) and quality (windows that include ventilation/noise/moisture/insulation).
- Provision should be in terms of performance for various room functions (percentage net daylight). There should be a Verification Method (full formula) and an Acceptable Solution (window sizes for various room configurations that generally exceed daylight requirements, possibly in table format).
- The Code should provide minimum reasonable requirements for windows onto soft landscaped areas and views.
- One of the biggest challenges faced by councils is that building officers (in approving a development for a code compliance certificate) are not able to take into account what is able to be developed on an adjacent site (under the District plan), particularly for natural light and awareness of the outdoors. Because District plan rules can change over time, there can be no certainty about potential future development. The only way to achieve compliance for the life of the building is for all buildings to provide for natural light and awareness of the outside from within their own site. This is a problem that needs to be covered by the district plan, but also in the Building Code.
- Current requirements are adequate. The Code should not introduce requirements that conflict with District plans and Resource Management Act.
- The Code could set minimum natural lighting requirements for living areas and bedrooms in residential buildings. A natural lighting Acceptable Solution could require minimum and/or maximum glazing to be installed to ensure effective natural light, while minimising the risk of overheating and excessive heat loss. The poor thermal performance of glazing systems would need to be considered for the Code energy requirements.
- Incentives should be considered such as trading off outdoor living court requirements against natural lighting enhancements.
- For apartments, consideration should be given to:
  - requiring minimum areas of (clear-glazed) windows in exterior walls for living rooms and living/dining rooms, bedrooms, entrance halls, kitchens, dining rooms, bathrooms, toilets and laundries
  - requiring setback from the boundary for external wall windows that are relied upon to provide daylight access. Setback requirements may differ for windows in living rooms and bedrooms versus windows in kitchens, bathrooms or laundry areas.
  - requiring that living rooms and private open spaces (balconies, decks and ground-level courtyard gardens) be the primary recipients of sunlight
  - allowing light wells and internal courtyards to be used as a source of daylight and ventilation, sun access and outlook for an apartment, but with minimum conditions that ensure they are not relied on too much.

- The current performance criteria could be increased to take into account the effects of natural light being blocked by a neighbouring property.
- Residential buildings should be of an open-plan living construction, with a window in every room to allow for ventilation and as much natural lighting as possible. ‘Open planning’ also makes homes easier and cheaper to keep warm.
- Publish best-practice guides for windows, heating, double-glazing and sun-path.
- This issue is already covered with light angles and opening sizes (10 percent). This is believed to be adequate.
- The Code should stipulate percentages of glazing to floor area, particularly north-facing glazing.
- The Code should encourage buildings to include windows and reflective light shelves that illuminate the ceilings deep into interior spaces. It should encourage light wells, interior courtyards and skylights in large buildings. The Code should aim to maximise views to the outside and interior landscapes and vegetation. It should include vegetation and water features in interior spaces and courtyards. All these measures would increase tenant emotional wellbeing, health and productivity, as well as reducing lighting energy and tenant health care costs. The Code should encourage tenant-accessible green roofs, green terraces and balconies, and interior and exterior green walls to bring views and experience of natural landscape into buildings and urban settings.
- It is important that optimal use of the site is made when designing a building aimed at ensuring good access to daylight. The Housing Improvement Regulations 1947 stipulate that every habitable room shall be provided with one or more windows to ensure that adequate light is admitted (section 10 of the Housing Improvement Regulations 1947).
- The Code should require the usual range of vents, skylights, light shafts, doors and windows.
- It should require minimum window areas for square meterage of floor space.
- There should be boundary limits on single dwellings. Different parameters should be set for multiple dwellings by planners.
- The light envelopes of buildings should be maintained and maximum possible natural light and visual awareness should be required in all residential buildings, including apartments.
- The existing Acceptable Solutions are all right as a minimum. However, with the increase of residential apartment building development, these standards are often difficult to achieve, especially in the case of single aspect units. It may be necessary to have higher compliance standards and different Acceptable Solutions for apartments. Consideration will need to be given to whether these would be better regulated with other design issues through apartment rules, assessment criteria and design guidance provided in district plans. Awareness of the outdoors would be more appropriately regulated through the district plan as it is related to other district plan issues, such as building envelope spacing and orientation.

**Question 74: How important do you think it is for the Building Code to make provision for security against unwanted entry?**

Opinion was divided amongst submitters who answered whether the Building Code should provide for security against unwanted entry. However, the majority considered that it should.

The following comments reflect the views presented.

- It is very important that the Building Code provide for security against unwanted entry. Many people with disabilities, including older women, live alone and due to their impairments and age feel unsafe, hence they too would benefit from safer doors and windows.
- Provision of burglar-proof windows and doors that allow natural ventilation are an important feature of residential property. Minimum levels of security should be determined in the Building Code.
- There is a need for the Building Code to have a more extensive and more helpful role in ensuring reasonable levels of basic security. Not only should entry doors be dealt with under the 'Unwanted entry' feature, but also such things as sliding doors/windows; skylights, vision panels/windows in fire doors, and associated security hardware.
- The Code must cover building types other than residential; many industrial buildings are highly vulnerable to burglary because they use residential-quality doors, windows and locks, instead of industrial quality doors, security locks and alarms.
- This issue is more important in some locations than others.
- Security issues arise on shared entrances.
- This issue is very important as criminal activity is widespread and burglary is an unwanted home invasion that can have a severe impact on people's wellbeing.

Comments from those who did not agree that the Building Code should provide for security against unwanted entry were as follows.

- Security systems cannot distinguish between breaking into a building for unlawful purposes and breaking in for lawful purposes such as fighting a fire. The Building Code should not permit installation of security features that could cause intentional or unintentional injury to any building occupant or a firefighter. The Building Code should encourage building security by means of good environmental design. New requirements should include that security systems must not hamper emergency egress or firefighter entry.
- This issue is up to owners. This is not to say that security is unimportant, but it is not a matter for the New Zealand Building Code.
- This personal choice should be made by individual occupiers depending on their level of comfort, area they live in and their desired level of security. This is a personal issue or at most an architectural design issue and dependent on the locality and use of the building.
- Provisions of this type will simply lead to an escalation of techniques for gaining entry.

Other comments were as follows.

- The Building Code would be better to focus on the design of buildings so that visitors can be safely observed and that this does not provide hiding places for potential assailants adjacent to main entries.
- It is possible to require some measures to allow occupants to call for help. It does not appear economically feasible to attempt to fully secure all buildings. Some security measures can also conflict with egress principles.
- Access for emergency services must be considered.

- Security is a cause of concern for elderly people and people with disabilities, as they are less able to protect themselves. However, the difficulty that these people have in getting out of a building in an emergency also needs to be considered when providing for security against unwanted entry, so that the resident's emergency egress is not compromised.
- Making houses/apartments secure against unwanted entry needs to be weighed against egress in emergencies. If someone wants to break in, that person will. Considering burglar alarm systems is an option, but cost is an issue.
- All buildings should be of sound construction, with security a natural outcome of that.

**Question 75: Do you have any suggestions on ways to address the issue of security against unwanted entry?**

Suggestions on ways to address the issue of security against unwanted entry are summarised in the comments below.

- The Code should prohibit the use of substandard hardware commonly used in New Zealand for joinery. There should be promotion of European Standard multipoint locks and window hardware.
- Installation of security alarm systems, dead locks and security screens on entry doors are all options that can be fitted by occupants if there is a perceived risk.
- The Code should create minimum standards for doors and windows.
- There is an extensive body of literature on crime prevention through design. This could be referenced at the time the specific details of the new Building Code are designed.
- Security latches could be an option in houses for the elderly and possibly tenanted buildings.
- There is a built environment issue, for example, providing a secure built environment by reducing the incidence of blank walls, unlit streets, and narrow and tight confinements and locations.
- Wiring for security systems should be a universal provision. The introduction of security speaker/phone systems at the entrance of apartment buildings, residential homes and some high-risk office buildings would reduce security risks and the incidence of unwanted entry.
- The Code should incorporate Crime Prevention through Environmental Design (CPTED) features, such as locks on external doors.
- This is not a building issue, but rather a societal problem.
- The Code should require all windows to have security stays and to be lockable. All outside doors should have deadlocks fitted and laminated glazing. There should be mandatory security lights on all house sides.
- Residential buildings need to be designed so that the layout has no external recesses and adjacent front entries in which an intruder could hide. In addition, main entries should have means for the resident to safely observe a visitor before granting entry.
- There should also be a distinction between residential private dwellings, rental housing, industrial buildings and public buildings, which have different risk profiles. Other considerations should be lighting for safety and security; preventing buildings from being

climbed (up fenestration, rainwater down-pipes, and construction joints in wall panels) to access upper level balconies, windows, doors and skylights.

- Door chains should be recommended.
- Security features should not prevent adequate airflow.
- External doors could be required to have robust construction, such that a hard impact the size of a fist does not penetrate, and accordingly appropriately robust hinges and locksets. Windows adjacent to doors would need to be restricted in width or have security glazing.
- There should be requirements for window locks and intercom systems - elderly people cannot always get to the doors in time and so leave them open.
- Doors should be free to exit, but should not have adjacent glass. Glass should not be able to be removed from its frame from the outside. External claddings and inter-tenancy walls should be robust.

### **Question 76: Is there anything else about indoor environment for wellbeing you think the Building Code should make provision for?**

Other suggestions about the indoor environment for wellbeing are summarised in the comments below.

- There should be promotion of internal wall lining materials, which help to regulate moisture in the room.
- The Code should aim to increase public awareness of key items that create a healthy indoor environment.
- There should be more emphasis on mould, fungi and insect infestation. These are new problems for many New Zealanders.
- Indoor air quality, natural lighting and outlook should not be restricted to residential buildings.
- A submitter who advises on housing modifications for children with autism or intellectual disabilities (who tend to escape from their homes) felt it was important that the Building Code continues to provide for this and that it does not prevent such measures because of the need for emergency egress.
- The internal environment should follow more closely that of the outside.
- Windows should be able to open, while still providing security.

### **Question 77: Do you agree with the proposed objectives for services?**

The majority of submitters who answered this question agreed with the proposed objectives for services. Some disagreed or expressed only qualified agreement. The following comments reflect the range of views expressed.

- Submitters agree with the proposed objectives for services and note that they are similar to the current Building Code.

- All houses/apartments should be designed with adequate water and power. This Resource Management Act issue is linked to district plans.
- Adequate water supplies, electrical services and waste disposal are essential in all homes. The need to consider the number and location of socket outlets and the ability of apartments to store waste for recycling and disposal has been noted as an issue for residents.
- Submitters do not agree with compulsory height ranges for power switches.
- There is a need for tasteless water, with better control on the amount of chlorine used.
- Alternative suggestion for the objective: An objective of this Building Code is to ensure that the design and construction of the building does not expose a person in or adjacent to the building to an unacceptable quality of occupancy due to an inappropriate provision of services.
- The challenge for this objective will be in defining ‘unacceptable loss of amenity’ and ‘inappropriate provision of services’.
- People with disabilities should be provided for.
- Levels of services and amenity required should be commensurate with user expectations, for example, expectation would be lower for a tramping hut.
- As with accessibility, these objectives are necessary in all public buildings, but not necessarily in residential dwellings. As with all aspects of accessibility, services need to comply with this standard only if the dwelling is fully accessible.

**Question 78: Do you agree with the proposed features to address services for wellbeing?**

The majority of submitters who answered this question agreed with the proposed features for services. However, comments expressed only qualified agreement and showed divided opinions.

- This issue is critical to the effective functioning of a building.
- There is a need to ensure water temperature standards are consistent across all objectives of the Code.
- The ‘inadequate waste disposal’ feature should apply to all occupied buildings.
- Submitters support the need for tasteless water with better control on the amount of chlorine used.
- The ‘Taste of water at facilities’ feature is excessive and works against self-collection and use. Potability should be the test.
- Water quality is a local council matter.
- Users can improve taste through filters and other similar devices.
- Taste is subjective and depends on the source. Where the source is a town supply, there are other mechanisms for influence by the public.
- Electrical services (switches/powerpoints) should be accessible to all.
- Location of electrical sockets and switches is restrictive and unnecessary.
- The number and location of socket outlets and light switches is a matter for personal choice.

- People should not be forced to have any socket outlets in their homes. There are a number of people who are concerned about their wellbeing from electric fields – they should not be forced to have them in their houses. Others just want to live simply. This is supposed to be a performance-based Code, so the stipulation of a number of socket outlets and light switches to achieve certain wellbeing has no place in it. This requirement may also affect house affordability.
- It should not be mandatory to have electricity, particularly as some buildings cannot access the grid. Services relevant to health and safety, such as heating, cooking, hot water and lighting, could also be gas-run. Electricity for other appliances is a consumer issue, not one for the Code.
- The number of socket outlets required is subjective. This is a matter for the market.
- Alternative wording was suggested for the ‘Facility for household refuse storage and removal’ feature as follows: ‘Facility for refuse, recyclable and putrescible waste storage and removal and should include all occupied buildings’.

**Question 79: How important do you think it is for the Building Code to extend the requirement for hot water for personal hygiene to include workplaces that contain personal hygiene facilities?**

A large majority of submitters who responded to this question thought it was important for the Building Code to extend the requirement for hot water for personal hygiene to include workplaces that contain personal hygiene facilities.

- The provision of hot water in workplaces that contain personal hygiene should be extended to include facilities for adequate hand drying.
- This is because hand hygiene (washing with soap and effective drying) is the most effective measure for interrupting the transmission of micro-organisms that cause infection both in the community and in the health care setting. Recognition of the importance of hand hygiene in the control of the spread of infectious diseases is reflected in the increased number of publications in the medical literature during the last few years, including major articles on hand hygiene in prominent medical journals.
- Personal wellbeing and health promotion at the workplace is beneficial for everyone. Having a shower facility at work should be required where more than four workers are employed.
- Hot water should be included in workplaces. This overlaps with plans to encourage non-car movements, as provision of showers encourages cycling, walking or running.
- If there are personal hygiene facilities provided in a workplace, then there should be provision of hot water (at a safe temperature and clean).
- This is essential and desirable, given the rapidly increasing numbers of ‘communicable’ diseases at present.
- This should be extended to other public facilities, including public toilets.
- It should not be retrospective.
- The requirement should include schools.

Qualified agreement was given as follows.

- The measure would be appropriate for shower facilities. It should not be mandatory for hand basins.
- The requirements should not extend too widely, such as to showers on a beach. Any area that is used as a workplace will likely have access to power, and so hot water should be supplied for personal hygiene reasons.

Those who disagreed commented as follows.

- Having hot water in the workplace may sometimes be ridiculous, such as having every farm shed have hot water.
- Studies have shown cold washing with soap to be just as effective as warm washing with soap.
- The additional energy demand may be problematic.
- Water temperature cannot be considered a benefit in isolation of the cleanliness of the facility and the opportunity for drying the water from the washed parts of the body. These are outside the scope of the Code.
- Hot water may be completely impractical at some sites, such as a new building project with a hired toilet.

**Question 80: Do you have any suggestions on ways to address the issue of hot water for personal hygiene in workplaces that contain personal hygiene facilities?**

Suggestions on ways to address the issue of hot water for personal hygiene in workplaces that contain personal hygiene facilities are summarised in the comments below.

- The protection from Legionella and from scalding in workplaces is important. Hygiene facilities supplied from tempered hot water supplies should be mandatory.
- The Code should require the provision of a minimum number of facilities based on building use, plus minimum and maximum water temperatures and flow rates.
- If a workplace has personal hygiene facilities, a hot water tap/fitting should be provided to supply water for washing, showering or bathing. In a workplace, there may be opportunities for heating the water through alternative means (other than electric hot water cylinders), such as waste heat recovery units or solar technology.
- Acceptable Solutions and Compliance Documents need to provide a range of options for delivering hot water.
- Instantaneous electric hot water heater units only heat what is needed for use.
- Hand-drying facilities are more important than access to hot water.
- Wherever mains power is available, for example, if the toilets have lights, they should have hot water.
- In industrial and workshop facilities, many people would not even wait for the hot water to run through. Even if there is hot water, it is not possible to force people to wash their hands. Washing hands in cold water with soap is adequate. It should be the building user's decision.

- Building Code Clause G1 should be amended to include these requirements.
- The existing Acceptable Solution should be extended.
- This is a health issue, not one for the Building Code.
- Cold-water soap or detergent should be provided.

**Question 81: How important do you think it is for the Building Code to make provision for colour, odour or taste of potable water?**

The majority of submitters who answered this question considered that it was important for the Building Code to provide for colour, odour or taste of potable water. However, many also disagreed.

The following comments reflect the views of those who agreed.

- Taste and odour tend to be an aesthetic objective, not a health-related objective for drinking water. The World Health Organization Drinking Water Quality Guidelines (2004) indicate that the taste and odour of drinking water should not be offensive to the consumer, but no health-based guideline value is proposed. However, because of the link the mind makes between the aesthetic properties of the water and its safety, the appearance, taste and smell of water are very important to consumers. Most complaints are made because of the aesthetic properties of water, not because trace levels of chemical contaminants have been noticed. Water will most closely meet consumer expectations when it is clear, colourless, odourless and tasteless.
- From a nutritional point of view, this is important if the consumption of water is to be encouraged and promoted above alternatives such as soft drinks that are high in sugars.
- Chlorinated water supply has a poor taste to those accustomed to country tank water.
- It is important to ensure that materials used in the potable water system do not have a detrimental effect on water quality.
- It is important for this feature to be considered, especially where there is no network utility operator for the supply of the potable water. In addition, people tend to associate undesirable colour, odour and taste of potable water with impurity.
- This needs to be covered in the Code because New Zealand's water sources are likely to degrade and become less potable in the future due to climate change and intensive farming runoff.
- In a civilised society, it is reasonable to expect clean, clear and odourless water in all urban situations. Where water is drawn from private sources, the Building Code needs to set guidelines on what is an acceptable minimum standard for water supplies.

The comments below reflect the views of those who disagreed.

- Provision of potable water is all that is required.
- This should only be an issue if the colour, odour or taste will result in a health or safety problem. There is a risk that any Building Code provisions on colour, odour or taste will limit the use of non-mains supply for drinking, and so frustrate water efficiency and conservation measures (as provided for elsewhere in the Code). People who use non-mains drinking water

will accept variations in colour, taste and odour as part of the system. These do not necessarily mean the water is unsafe to drink.

- This should not be used as a mechanism to push people towards greater reticulation of water or a barrier to establishing rainwater use in urban situations.
- Safety is the primary issue to be covered by the Building Code. It is debatable whether the Building Code should cover colour, odour and taste. New Zealand must adhere to minimum WHO standards for drinking water. Non-utility supply systems (for example, tanks and bore water) must be capable of being controlled to prevent the growth of Legionella bacteria.
- It is not possible to supply all areas reticulated water. Water quality should not be set by the Building Code.
- This issue is covered by town supply regulations. If other water sources are chosen, it is the owner's responsibility. Problems from tank water are rare.
- This matter should be resolved only by regulating materials used to convey and collect water, and not by testing water quality.
- The proposal would be difficult to police, given that many people use tank water.
- Water supply aesthetics should be addressed at the same time that quality is scrutinised. Private supplies should have ground water assessed for salts, hardness, manganese, iron or any other contaminants of concern. Treatment should be provided accordingly.
- This requirement should apply to the provision of reticulated water from an authority. For private water schemes in non-commercial dwellings, the requirement should be lower.
- Taste and odour are subjective. It is difficult to know what a 'good' taste is, as people are used to local water flavour and tend to dislike other regional flavours. Water purity/potability should be the primary concern, rather than colour, taste or odour. There should not be legislation for or against additives, such as fluoride or chlorine, due to divided public opinion over this issue. There is also a risk that such a provision will restrict the use of rainwater tank collection, reduce the acceptability of rural and bore water for drinking, and increase the costs of reticulated water schemes.
- Minimum drinking water standards are not dealt with under the Building Act 2004.
- It is the responsibility of local authorities, and not the Building Code, to ensure the supply of safe and potable water. Water conservation should be covered by the Code.
- This responsibility belongs with other regulatory bodies.
- The Health (Drinking Water) Amendment Bill, which is currently before the Health Select Committee, will require compliance with the Drinking-Water Standards for New Zealand (2005). The Bill defines potable water as that which meets the Maximum Acceptable Values (MAVs) of the Drinking Water Standards.

**Question 82: Do you have any suggestions on ways to address the issue of colour odour or taste of potable water?**

Suggestions on ways to address the issue of colour, odour or taste of potable water are summarised in the comments below.

- The Wellbeing objectives and features ‘Inadequate water supplies’ should address potable water supplies from a non-reticulated source. There is a need to cross-reference to the Health and Sustainable Development objectives and features (under the ‘Consumption of contaminated water’ feature for Health and ‘Water conservation and efficiency’ for Sustainable Development). There is always the option to install filters, but, ideally, water should be acceptable from the source. Monitoring the water quality of every on-site water supply tank is probably not possible.
- Because, in many cases, roof tanks contain a lot of silt, and discharging water from the tanker into them stirs up the contents (producing very muddy water that is probably not potable), this could be overcome by fitting first flush diverters and leaf screens to the downpipe from the roof supplemented by the use of a silt removal device.
- There should be a maintenance provision for spouting and tank water supplies.
- Occupants can use bottled water or water filters.
- There could be a requirement for regular cleaning as well as filtration devices. This is not necessarily a Building Code matter.
- The Building Code should only address this issue if variations in colour, odour or taste could result in health and safety problems.
- The use of zinc or copper should be avoided on roofs to minimise zinc run-off into potable storage systems and stormwater.
- The Code should encourage every residential dwelling to have water filters that remove chlorine and filter out any dirt contamination. It should provide for good potable water at the treatment station.
- Treatment should be required for all supplies based on a water sample submitted during the consenting stage, or supplied during inspection to obtain a code compliance certificate.
- The Building Code should highlight the aesthetics issues (taste, colour and odour) from different plumbing materials and provide for preventing health issues (such as water sitting in pipes too long).
- All new dwellings that are provided with their own drinking water supply (for example, on rural properties) should have a five-micron filter in the supply line.
- Inadequately processed potable water from wells, rainwater catchment, storage tanks or antiquated municipal systems may have significant colour, odour or taste problems. These need to be remedied, particularly if they cause problems for people with health conditions that may be exacerbated by the contaminated water. On the other hand, the Code must allow water from greywater or blackwater systems to be used for non-body contact or ingestion uses if it can be shown that it meets or exceeds objective performance standards for such uses. Non-performance based barriers to reuse and recycling of greywater and blackwater should be removed, and such uses should be encouraged over the use of increasingly valuable and scarce natural freshwater supplies.
- Rainwater tanks with adequate safeguards should be encouraged.
- Materials used in these systems should comply with international standards.

### **Question 83: How important do you think it is for the Building Code to make provision for the location and number of socket outlets and light switches in residential buildings?**

The majority of submitters who answered this question considered that the Building Code should provide for the location and number of socket outlets and light switches in residential buildings. However, a number disagreed.

The following comments reflect the views of those who agreed.

- Insufficient socket outlets in homes encourages the use of multi-boards or multi-plug adaptors. These figure prominently in statistics on electrical fires. Homes should be fitted with adequate electrical outlets.
- With an ageing population and more severely disabled and wheelchair bound people, it is vital that all power and light switches and outlets be readily accessible.
- In the modern age, there need to be numerous sockets in each room to save having cords or multi-boxes around. Light switches need to be inside the entrance to every room for safety.
- WO4.2.1 and WO4.2.2 need to refer to all occupied buildings and the accessibility standard NZS 4121 should be a minimum standard. Location should be a height suitable for wheelchair as well as standing users.
- The location of sockets and light switches is the important amenity issue, not their number. There should be a minimum specification for hot point numbers and location.
- Sockets must be accessible in both public buildings and private dwellings. They should be horizontally in line with door handles at 900 cm or 1200 cm (NZS 4121: 2001: 4114). These need to be supplied in all new and renovated buildings.
- Long leads are a hazard. Sockets should be located so that leads never need to cross doorways.
- There is also a safety issue with inadequate light switches, especially if these are not located near the entrance to a room. Light switches in cupboard spaces are also very useful. This is an important aspect for adaptable buildings and flexibility of living.
- The Code should set minimums based on floor areas.
- This issue should be covered by electrical regulations, as this is a registered trade.

The following comments reflect the views of those who disagreed.

- This is too prescriptive.
- This is a matter of personal choice; there should be no such requirements in private dwellings, only in specialist facilities for older people and those with disabilities.
- In timber frame construction, which is predominant in the residential market, it is relatively easy to retrofit electrical wiring. New technologies include sensor control and wireless connections, which could make conventional wiring optional in the future.
- People should not be forced to have any socket outlets in their homes. There are a number of people who are concerned about their wellbeing from electric fields – they should not be forced to have them in their houses. Others just want to live simply. This is supposed to be a performance-based Code, so the stipulation of a number of socket outlets and light switches to

achieve certain wellbeing has no place in it. This requirement may also affect house affordability.

Qualified agreement was as follows.

- Adaptable rather than universal design principles should apply in this area.
- In the United Kingdom, plugs are now required above 400 mm from the floor, which many people find visually poor. This results in lots of trailing wires. This is not necessary in all housing. However, if minimum numbers are not stated, developers will put in the least amount possible which will then be expensive to correct. Regulation in this area should assist not only wheelchair users, but people with other disability and general users, for example, through high visibility design.
- This is largely a matter of consumer preference, but, if inadequate, can lead to money wasted on retrofitting and a possible overloading of circuits.
- Minimum numbers of electrical outlets and location could be defined in the Building Code for group residential use, such as apartments or rest homes, but there should be a guidance document only for standalone housing. The Code needs to protect the ability to build alternative sustainable housing, and, in doing so, look at how that can be achieved without infringing on individual rights.
- The most important requirement is to be able to easily switch off lights when not in use. The number of socket outlets is a personal choice.

**Question 84: Do you have any suggestions on ways to address the issue of location and number of socket outlets and light switches in residential buildings?**

Suggestions on ways to address the issue of location and number of socket outlets and light switches in residential buildings are summarised in the comments below.

- The Code should set a performance standard rather than a number.
- Light switches have to be placed correctly at the time of installation. Power outlets are notoriously difficult to locate in the place most needed. The Code should require the installation of a minimum number of power points, the laying of cables around most walls with a good loop between the studs, and the fitting the power points after occupation where they will be used.
- Requiring both light switches and socket outlets (and door handles) to be within a maximum and minimum height above floor level to meet accepted criteria for universal design would benefit the elderly and those with disabilities, and would have no added cost at time of construction. There would be no inconvenience to other occupants.
- Location of switches and sockets needs to consider many accessibility and safety issues: access for a variety of disabilities (heights/sizes), ergonomics (switches by doors), protection from natural disasters (fittings located above ground floor levels in the case of floods), and the ability to smart-wire a home to enable further sockets/switches to be easily added.
- There should be a minimum standard for artificial lighting for habitable rooms based on good design.
- The Code should provide accordingly, as long as there is access to fit more socket outlets.

- There should be light switches at each door if there is more than one door into a room, so that the elderly can have lights on until they reach the door.
- This is a design decision.
- This requirement should apply to apartment-type buildings only.
- The requirements could be as per NZS 4121.
- The International Residential Code has a requirement that outlets be spaced at 3.7 m maximum around the walls of a bedroom and 1.2 m maximum around the bench of a kitchen.
- The issue would depend on the size and use of a room.
- With a performance-based Code, the wellbeing of users is determined by factors broader than the number of sockets.
- Switches and socket outlets should be located 450-1200 mm from the floor, especially in buildings designed for residential care/retirement villages/council housing/Housing New Zealand housing. People with disabilities often need many electrical disability-related appliances and therefore require many electrical sockets, such as for recharging batteries for electric wheelchairs and electric patient hoists, electric hospital beds, oxygen/respirator equipment, and alternating air mattresses that operate on electricity.
- These should be required at every entrance/exit as a minimum.
- There should be a minimum number of fittings per square metre.
- There should be guidance only on the number and location of light switches.

**Question 85: Is there anything else about services you think the Building Code should make provision for?**

A number of comments were made about services submitters thought the Building Code should provide for.

- There are currently too many down lights used in domestic dwelling, which is an inefficient use of electricity and allows too much heat loss through holes in the ceiling.
- There should be subsidies for the micro-generation of electricity, solar water heating, rainwater collection and storage for existing buildings and a requirement for these, especially in rural areas.
- The Code should have telecommunications provisions. As a standard for housing, there should be at least one telephone socket, TV aerial and cable socket as standard chattels. In offices and commercial facilities, greater telecommunication socket provisions may be required.
- The Code could look at extending the provision of Residual Current Devices and further improving the safety of standard electrical outlets.
- There is no loss of amenity or significant increase in construction cost related to water conservation benefits achieved through the installation and use of low flow rate fixtures/appliances. This is another area where higher performance standards could be achieved by requiring, for example, low flow rate taps and showers, and dual flush toilets.
- Issues related to reticulated gas as an energy source should be considered.

- The objectives on minimum flow and temperature should align with the sustainability aims of the Building Act in that they do not lead to water wastage or unnecessary heating of water.
- The current health barriers to composting toilets and urban rainwater collection and use should be removed.
- As far as wellbeing is concerned, the big issues of water quality and supply, insulation, energy-efficiency, and ease of access are all very important. Because of the need for energy efficiency and the need to use less non-renewable resources, there could be a grading on houses so that buyers know how energy efficient a home is when considering buying it.
- The obligation of the network utility operator to supply water may not meet the flow rate necessary to comply with the Code.
- The standards should take into account rural areas where water supply is by roof rainwater collection or bore supply. The Code could also consider water supply augmentation by use of water collection tanks and dual plumbing.
- In some public buildings, fans with revolving blades come as low as 2 m from the finished floor level. This seems too low, as it is quite normal for people to be taller than 1.8 m. The fan blades are invariably of a 'blending in' colour.
- The number of telephone outlets is an issue (especially with rising importance of the internet).
- The Code should consider the effects of electromagnetic radiation from home electrical appliances, fittings and wiring.

### **Question 86: Do you agree with the proposed objectives for facilities?**

The proposed objectives for facilities cover lack of space for personal activities and lack of facilities for personal needs. The majority of submitters who replied to this question agreed with the proposed objectives. The following comments summarise their views.

- All people, regardless of race or cultural backgrounds, need personal space. It must be the responsibility of the Building Code to set minimum standards. However, a performance rather prescriptive approach gives more freedom for specific needs to be met.
- The lack of facilities and space for personal activities is an important objective that should be addressed.
- Spaces in houses or apartments should be comfortable to live in. Rooms, especially bedrooms, should be designed with room for space around furniture.
- There should be minimum size requirements, but they should not be too prescriptive because of different lifestyle requirements. The Housing Improvement Regulations and Chapter 4 of NZS 1900 (Model Building Bylaw) provide some guidance on this issue.

Some submitters disagreed.

- If the Code sets requirements for space that make dwellings unaffordable, then it is detrimental to the long-term living standards of citizens. Dwellings need to suit the requirements of the occupants.
- This is an economic problem.
- This is not a Building Code issue.

Other comments were as follows.

- The ‘Laundering and cleaning facilities’ and ‘Food preparation and storage facilities’ features may not be necessary in multi-unit dwellings as long as there is free access to these facilities, for instance, a communal kitchen, laundry or bathroom may be more desirable than having these facilities in the occupied unit space. Detached dwellings would need personal hygiene and privacy facilities, but food preparation and laundering facilities may be shared or freely accessible nearby.
- Space requirements are only an issue for some multi-unit residential buildings and the objectives should not apply to detached dwellings. The cost of demonstrating and checking for compliance with requirements that are not an issue is not justified. The trend has been for increasing dwelling size in recent years.
- Alternative suggestion for the objective: An objective of this Building Code is to ensure that the design and construction of the building does not expose a person in or adjacent to the building to an unacceptable quality of occupancy due to an inappropriate provision of facilities.
- The objective should be reframed to say: An objective of this Building Code is to reduce the risk that a person is exposed to an unacceptable loss of amenity due to inappropriate provision of facilities resulting from that building’s design, construction or demolition.
- There needs to be a reference to existing buildings.

### **Question 87: Do you agree with the proposed features to address facilities for wellbeing?**

The majority of submitters who replied to this question agreed with the proposed features to address facilities for wellbeing. Most of those who commented made suggestions, summarised below.

- Buildings should also have adequate access to recreational facilities within a short walking distance (parks, play areas etc). This is more of a local council zoning issue than a Building Code issue; however, the provision of outdoor facilities is a necessary dwelling requirement.
- In public buildings, stairwells should be designed for regular use as opposed to only emergency use to encourage more stair use. Staircases can be prominent features or their availability signed as a prominent option for movement between floors.
- There is a lack of female toilet facilities provided in many areas. Of most concern is the lack of provision in restaurants and pubs, but also in areas with high peak time use, such as bus stations and ski fields. Such inadequate provision results in an unacceptable loss of amenity. This lack of facilities can result in women being forced to use male toilets, which is a significant safety concern.
- There is a need to require adequate storage space for appropriately sized receptacles in kitchens for refuse, recyclables and putrescible waste. There needs to be adequate provision for waste collection vehicles to access the site.
- The ‘Lack of space for personal activities’ feature needs to set a minimum standard for private personal space and communal personal space. This objective needs to be reworded and should relate to all residential buildings.

- The ‘Lack of facilities for personal needs’ appears to be addressing a lack of facilities whereas the issue is not that such facilities are lacking but they do not meet the needs of people with disabilities. Physical independence is a clear purpose of the Building Act under section 3(b), yet that purpose is not expressed within these wellbeing objectives or any other objectives.
- WO5.1 needs to set a minimum standard for space for personal needs that is adequate for wheelchair use.
- Living, sleeping, food preparation, laundry and personal hygiene facilities are essential.

Some disagreed as follows.

- WO5.1.2 (space in residential buildings) appears to be primarily an issue for the market and planners. WO5.2.3 (food preparation and storage facilities) appears to be already addressed appropriately at HO1.3.3 (food preparation facilities). WO5.2.5 (storage facilities for personal effects) should be left to the market. Clever space design is a skill that should be encouraged.
- This issue is better controlled through district plans.
- This is not a Building Code issue.
- Facilities in apartments/houses should be designed for all age groups.

**Question 88: How important do you think it is for the Building Code to make provision for habitable spaces in all residential buildings to have sufficient space for activity, furniture and personal needs?**

The majority of submitters who responded to this question considered that the Building Code should provide for habitable spaces in all residential buildings to have sufficient space for activity, furniture and personal needs. A number of those who disagreed commented. Views are summarised below.

- This should be clearly and specifically defined in the Code to ensure that health and wellbeing of the user is provided in all buildings.
- This is very important, as there should be minimum living standards for all residential buildings. Otherwise, there is a risk that New Zealand will have a large supply of very small living accommodation.
- The Building Code should provide for adequate space in multi-unit residential buildings. The Building Act 2004 is the most appropriate way of regulating adequate space in residential buildings, rather than in district plans.
- There ought to be a minimum amount of space for very small units, such as for students.
- The basic principle for minimum floor area for each household element needs to be reintroduced. This will avoid tiny, ghetto-like living conditions.
- Minimum space requirements should be introduced that are in agreement with any criteria in the Housing Improvement Regulations.
- The small size of many apartments being built in the Auckland Region, in particular the CBD, has been of concern to councils and was covered widely in the media. Apartments as small as

12 m<sup>2</sup> have been permitted in Auckland's CBD. Having sufficient space for normal activities, furniture and personal needs is an important part of liveability and wellbeing.

Those who disagreed said the following.

- This is an occupier's right to decide.
- The market will dictate a minimum size.
- What constitutes sufficient space is subjective.
- This is unlikely to become an issue in New Zealand in the near future.

Other comments were as follows.

- Residential apartment buildings should also cater for people with disabilities by being accessible both to and within apartments. This is especially important as such buildings frequently change their use to become visitor accommodation shortly after they are completed.
- This is essential for residential but not for temporary accommodation facilities.
- The requirement should apply to apartments only.
- The Code should provide for space alongside beds to allow caregivers to operate patient hoists; space in bathrooms and alongside toilets for caregivers to assist with showering and personal hygiene after toileting.
- The Code should provide for recreational spaces for aged care facilities and for accessible storage for personal effects in residential buildings.
- Minimum floor area relates to issues such as mental and physical wellbeing, but it should be up to the individual occupiers to ascertain their needs as to living activity and storage space.
- There should be adequate non-glazed wall space for furniture. Siting of larger furniture (such as entertainment units or lounge suites) is difficult in some homes with inadequate non-glazed wall space.

**Question 89: Do you have any suggestions on ways to address the issue of habitable spaces in all residential buildings having sufficient space for activity, furniture and personal needs?**

Suggestions on ways to address the issue of habitable spaces in all residential buildings having sufficient space for activity, furniture and personal needs are summarised in the comments below.

- There could be a minimum size for bedrooms, toilet and bathrooms, and a minimum size for apartments.
- While the concept of minimum space for living functions is a good one, it overlooks the provision of common living spaces in community living. All homes should provide adequate personal living spaces, unless communal space exists that can successfully supplement any deficits of the private spaces.
- The Code could provide for m<sup>2</sup> per person, but one universal rule may be difficult, for example, a bach compared to a main house.

- An apartment that is multi-levelled should have sufficient staircase space that allows furniture to be moved in and out and minimises the risk of injury.
- Nearly all the issues being considered under this section of the Building Code review's proposed objectives have been notified for proposed changes to the Waitakere City Council district plan. At the next stage of the review, it will be necessary to debate whether all issues related to requirements for space and facilities in residential developments are: better regulated by the Building Code as national design standards; should remain as District plan issues under the Resource Management Act or; should be split between the objectives of the two Acts under criteria considered appropriate to each. If the latter were to be the case, the interdependencies between the two Acts will need to be very clear so that any potential inconsistencies between them are resolved.
- These objectives are especially important for apartment size. Minimum unit size cannot be addressed in District plans, as there is no adverse environmental effect in terms of the Resource Management Act.
- WO5 2.3 needs to refer to all occupied buildings. Food storage facilities links back to storage for household wastes/recycling/composting.
- WO5.2.5 The materials likely to be stored need to be considered when setting the standards.
- It is not desirable for the Code to be prescriptive. It would instead be useful for the Code to provide guidance on what is considered adequate space for activities such as food preparation, personal hygiene and laundering.
- Units should be designed for an occupancy level.
- The only way to have adequate control over the adequacy of habitable space size is for the Building Code to prescribe minimum space requirements. This is particularly a problem for inner city apartments, but will be equally important in the future for medium-density housing occurring in residential infill areas.
- For apartments and multi-unit dwellings consideration should be given to:
  - requiring minimum total floor areas and dimensions for the individual space components for different apartment types
  - requiring minimum floor areas for balconies
  - requiring minimum space to accommodate living activities in the following areas.
    - Internal entry areas, for example, allowing for space to store shoes or coats at point of entry, allowing groceries to be carried to the kitchen as directly as possible, and providing for waste to be removed as directly as possible.
    - Living areas, for example, providing space for reading, watching television, conversing, cooking and dining in the same space.
    - Kitchen areas, for example, providing for food storage, preparation, cooking, serving and allowing for circulation around and between fixtures and furniture.
    - Eating areas, for example, providing space for eating, working, studying while seated at a table, and allowing for circulation around and between fixtures and furniture.
    - Bedrooms, for example, requiring these to be double bedrooms, capable of accommodating a queen-sized bed and wardrobe, and large enough for circulation around and between fixtures and furniture.

- Study/home office, for example, adequate space for a desk and chair for reading, writing and working on a computer safely and conveniently.
  - Bathroom, for example, adequate space to carry out personal ablutions in a shower, WC or hand basin, and storage of healthcare products, and to allow for circulation sufficient for two people.
  - Laundry, for example, space for the washing and drying of clothes hygienically, safely and conveniently, space for a washer and drier, and circulation for one person to carry out the activities.
- There is not enough storage space in small units.
  - There is no room for a guest to sleep over.
  - Sometimes a kitchen table has to be moved to get access to the cylinder cupboard for linen supplies.
  - Toilet cubicles have to be altered, making them larger in pension units. These should have been designed correctly to keep people in their home for longer.
  - All residential buildings should have at least two bedrooms with built-in wardrobes (both big enough for one double or two single beds), one wet area shower and toilet room, one kitchen with cooking areas, storage and sink, a laundry area, a living room at least big enough for a couch, two lounge chairs and an entertainment centre (TV, video player, DVD player and stereo), and one large built-in storage cupboard elsewhere in the building (for storage of linen towels and miscellaneous items). The laundry area/appliances can be incorporated in a bath or shower-type room. Living areas should have at least 8 m<sup>2</sup> of free (unfurnished) floor area for recreation purposes. This should be no less than 2 metres wide.
  - Performance criteria should be based on a suitable area for the designed occupancy of the space.
  - The Housing Improvement Regulations give good guidelines in this regard. They should be adopted in the new Building Code.
  - The International Residential Code specifies minimums for room sizes for kitchens, bedrooms etc.
  - There should be appropriate design after consulting with the building users on what their needs and preferences are, wherever possible.
  - The needs of parents, children, education at home and entertainment should be given more prominence.
  - A standard similar to the UK Parker Morris Standard should be used.
  - The application of anthropometric principles should be closely considered by the engagement of interior designers, psychologists, architects and ergonomics specialists at the second stage of the review to establish minimum standards for the residential environment.
  - There should be minimum ceiling heights. The Code should require minimum storage sizes. This is increasingly important as densities increase, house and apartment sizes fall and the number of apartments increase.
  - Minimum areas should not be enforced for occasional accommodation, such as baches, mountain huts, barracks, and for alternative housing, such as co-housing, cultural facilities

(for example, maraes), and communal housing. The test should be one of buyer expectation. There should be a continuum or consistency between all types of shelter.

- The minimum total living space should take into account the provision of external decks, private outdoor space at ground level and outdoor covered space.
- This matter should be a personal choice. The Code should provide recommendations but there should be no compulsion.

### **Question 90: How important do you think it is for the Building Code to make provision for storage facilities for personal effects in all residential buildings?**

Opinion was divided amongst submitters who replied to whether the Building Code should provide for storage facilities for personal effects in all residential buildings, with a slight majority in favour.

- There is tension between architects and developers in this respect – architects often seek to include storage space in their designs, while developers are more interested in the number of bedrooms.
- Adequate storage needs to be incorporated at the design stage.
- The Building Code should provide a performance requirement for adequate storage within residential accommodation. Provision for general storage should be contained within a housing design standard, but should not be codified for other buildings. Generally requiring buildings to be designed by an LQP (licensed qualified practitioner) [sic] should solve the inadequate storage issue. Requirements for storage vary with culture.
- This requirement should apply to multi-dwelling buildings.
- This issue is of paramount importance. Clutter due to a lack of storage can have profoundly negative impact on a person's wellbeing, even in an otherwise healthy residential environment.
- People with disabilities often require more storage space than able-bodied people to store equipment, such as wheelchairs (they sometimes have more than one wheelchair), shower chairs, toileting chairs, large boxes of incontinence supplies, patient hoists, etc.
- Even a detached dwelling with a two-car garage should have at least a 4 m<sup>2</sup> storage room.

Those who disagreed stated the following.

- This should be a personal choice. If a resident has few personal effects, the space given to storage might be better used for living activities.
- Providing for additional storage requirements in a residential building should be a matter of best practice rather than prescription. While additional storage space will be an important feature that some occupiers will value and make considerable use of, others will not. This is a non-essential feature of apartment buildings. Requiring a certain amount of storage space per apartment is excessive regulation, and would make the building more expensive.
- Individual requirements vary enormously.

Qualified agreement was expressed as follows. This provision is not needed, as occupants can provide portable storage facilities. However, minimum total building areas need to consider

sufficient space for storage.

### **Question 91: Do you have suggestions on ways to address the issue of storage facilities for personal effects in all residential buildings?**

Other suggestions on ways to address the issue of storage facilities for personal effects in all residential buildings are summarised in the comments below.

- Lack of storage facilities has been identified as an amenity issue in several research projects looking at apartment living. There is also a need to consider a requirement for space in a kitchen and/or easily accessed appropriate alternative space (such as a garage) for storage of refuse, recyclables and putrescible waste.
- Wood fibreboard enables floor-to-ceiling storage to be readily built into homes during construction.
- This is a matter of personal choice, including non-building solutions. It is now common for ancillary spaces such as car parking and storage to be traded as options.
- This issue is about good building design at the planning stage.
- Minimum standards should be directly proportional to the size of the apartment, but should leave flexibility as to how it is provided. They should require that all apartments have a secure storage space or locker elsewhere in the building as a minimum standard (or that this space is provided within the apartment, or there is access to additional communal space should the occupant wish to lease it or to secure bicycle racks).
- The Code should look to provide more ‘built-in’ suggestions. Property storage elements need to be used more.
- The Code should refer to the Parker Morris Standard.
- Facilities should be included within units or in basements. Minimum sizes should be required, perhaps 10-15 m<sup>3</sup> per a certain number bedrooms.

### **Question 92: Is there anything else about facilities you think the Building Code should make provision for?**

Other suggestions about facilities that the Building Code should provide for are summarised below.

- There should be adequate provision of communal outdoor amenities (balconies, decking, courtyards, rooftop, green space, etc) in multi-unit apartments.
- While a range of building types are recognised with differing levels and types of occupancy, there is a need to recognise a number of situations that can occur in Regional Parks where the strict application of the Code may not be practicable or desirable. For example, the Auckland Regional Parks contain a number of recreational buildings that are accessible to the public, but are not occupied for long periods. Many of these, such as tramping huts or shelters, are also in remote locations and are used only by members of the public who have skills and levels of fitness that the public may not. They are also often surrounded by native bush. Standard levels of visibility accessibility (for example, for people with limited mobility), fire protection or similar measures may not be appropriate in such locations.

- There should be shared facilities in multi-tenancy buildings, such as laundries, bike storage areas, etc. This could be achieved through better District plan design criteria.
- The entrance porchway should be secure with level floor. This could be tied in with extra storage, perhaps for small units only. There should be wind breaks and rain shelter for disabled occupants.
- There should be a minimum size of outdoor decks on apartments. 1 to 2 m wide is useless, except for exterior maintenance.
- All buildings should have appropriate areas for the hygienic storage of rubbish and recycling bins. At the very minimum, there should be storage for two pushbikes and a lawn mower, as well as garden tools, if required for ground maintenance.
- Storage facilities need to be vented and not located under pipes that have the potential to leak and damage the goods stored.

### **Question 93: Do you agree with the proposed objectives for durability?**

The majority of submitters somewhat or strongly agree with the proposed objectives for durability.

Several submitters commented that 50 years is too short a design life for a building and that building material, applicable to the intended use of the building, should be long-lasting. One hundred years was suggested as a more suitable design life. This was thought likely to result in the use of better materials to build houses and therefore fewer ‘low quality’ houses.

The relationship between durability and maintenance was a common theme raised. It was suggested that this section should include provision for maintenance. Several submitters commented that if a building element cannot be maintained, then the durability is compromised. They noted that not all building materials are durable enough to last for extended periods, and most will need maintenance at some time.

Affordability was also mentioned. Submitters suggested that, in order to achieve greater durability and lifespan, more investment would be required. Highly durable material may not be affordable. One submitter noted that, while affordability must be considered, upfront costs are often less than those for ongoing maintenance.

Another common area raised was the link between durability and other high-level outcomes in the Code, namely safety, health and wellbeing. Submitters commented that, while durability is linked to sustainability, it is also equally applicable to the other three objectives.

There were submitters who did not agree with the proposed objectives that maintenance and/or replacement of building elements may be required to achieve durability. Some felt that all building elements should have a lifespan of 50 years. A submitter suggested that owners should be able to build cheaper houses as a matter of choice, knowing that such houses would have shorter life spans.

There was not wide support for construction material being appropriate for future adaptation and providing for features for universal design. Submitters commented that it was not appropriate for the Building Code to try to guess future trends.

### **Question 94: Do you agree with the proposed features to address durability?**

The majority of submitters agreed somewhat or strongly with the proposed features to address durability.

Many felt this was a complex issue that needed better research information and practical solutions than existed at present. It was noted that New Zealand should be cautious about implementing radical changes, given that most countries are still ‘feeling their way’ in this area. A definition of durability was suggested.

One submitter noted that it is difficult to determine sustainable development in terms of durability or vice versa. They feared that standards for durability would mean that, in order to comply with durability performance criteria, the Code would deliver an unsustainable outcome. It was suggested that there should be a clear hierarchy that favours the promotion of sustainable development.

Other suggestions made include ensuring durable building design incorporates an assessment of the likelihood of premature loss of the building and its contents due to fire. It was pointed out that care must be taken not to disadvantage those wanting to build in non-standard or alternative construction methods and materials, and that standards must be specific to all construction techniques and materials.

Again links between durability and maintenance were made. It was suggested that programmed maintenance of all buildings is required to ensure the intended economic life of a building is achieved.

One respondent suggested that the Code should allow for reduced requirements for durability for occasional dwellings, such as baches or for cultural facilities under special classification.

A number of responses to this question did not support universal design as part of durability. Other submitters commented that the lack of detail made it hard to know what they were or were not supporting. A comment was made that the proposed features were intrusive on individuals and their property rights. In addition, it was suggested that the durability clauses in the current Code be retained.

### **Question 95: How important do you think it is for the Building Code to make provision for a maintenance plan?**

This question provoked a wide range of views ranging from supportive of the provision for maintenance plans in the Building Code to advocating personal choice in terms of building maintenance.

Those in favour of maintenance plans suggested that, in order to achieve the planned life of the building, it is vital that maintenance be carried out at regular intervals. The outcome should be to make maintenance easier.

Many submitters were concerned about how maintenance plans would be enforced. Several suggestions were made, including the following.

- Having a maintenance manual for all buildings with an electronic copy lodged with the building consent authority. This would be updated when buildings are altered. It would record material suppliers, inspection requirements, maintenance requirements, suppliers guarantees and installers/contractors for current and future owners.
- Details of suppliers, inspection requirements, maintenance requirements, suppliers guarantees and installers/contractors for current and future owners.
- A maintenance plan supported by a warrant of fitness regime. The designer, builder, or existing owner could provide a maintenance manual for the original as-built home.
- A maintenance plan could be used as basis to accept or reject a building proposal and attached as a condition to a building consent.

Education was also regularly mentioned as a way to improve homeowners' understanding of maintenance requirements. One submitter said he would like a homeowner education programme so that minimum maintenance requirements can be understood. He suggested that banks could promote this as part of the mortgage process, or that it could be part of an Acceptable Solution. Another suggested that information on maintaining a home should be readily available on websites and during the consent process.

Other alternative suggestions to a maintenance plan were to use high-quality or low-maintenance materials that prevent problems occurring. Other submitters commented unfavourably about New Zealand homeowner behaviour, saying that most owners and occupants of residential dwellings would read the maintenance plan once and then forget about it. Some would comply with the recommendations and others would wait until some building element failed and needed replacing.

Comments from those who did not support the provision of a maintenance plan in the Building Code included the following.

- The owners of buildings should be responsible for their own maintenance.
- Building owners should be aware of their responsibility to undertake maintenance if their building is to remain durable. Regulation is not a substitute for people taking responsibility for their choices. The building consent process does not guarantee ongoing building compliance without appropriate maintenance.
- The identification of future maintenance requirements will be difficult because there are so many possibilities. This could lead to an increasingly litigious environment and, as a result, increasing risk aversion, leading to excessive conservatism in materials, design and construction, with increased costs.
- The Building Code can require a Maintenance Manual as a source of information about the building and how it should be maintained, but it should not be seen as a Compliance Document; it is not mandatory to follow the maintenance recommendations.

### **Question 96: Do you have any suggestions on ways to address the issue of a maintenance plan?**

A number of suggestions were made offering ways to address the issue of a maintenance plan. These ranged from using low-maintenance, durable material to setting up a building warrant of

fitness regime that applies to all buildings.

A common theme raised was that homes should have a maintenance manual and that future maintenance requirements should be considered at the design stage. It was suggested that the Code should require the builder or developer to provide a detailed maintenance plan, which includes warranties for all materials and fittings used on the project. There could be document handovers between designers, builders and owners. This could become a legal document to be transferred with the property on purchase.

It was also suggested that the maintenance plan should be attached as part of the code compliance certificate to be handed on to each new owner of the dwelling. All houses and buildings should have a maintenance guide available, which is made up from guides for each of the materials by the designer or builder and this should be sighted for a code compliance certificate to be granted.

Another suggestion was for a 5-yearly building warrant of fitness, which spells out what must be achieved within 5 years, and what is recommended. This could become part of the sales process alongside land information memoranda and building inspection reports. This would therefore make it difficult to sell a property if outstanding warrant of fitness maintenance items are uncompleted.

Other submitters focused on better education for homeowners so that they understand the lifespan and maintenance requirements of some products. They suggested that a maintenance manual could be published and given to homeowners. Another idea was to set up a website that provided maintenance recommendations and frequency from manufacturers.

A number of submitters commented on the difficulty of enforcement. Some felt that it would be necessary to set up a completely new regime in order to ensure compliance.

At the other end of the spectrum, several submitters felt that there should be a voluntary compliance schedule for homeowners. This could be supported by a recommended maintenance manual. Owners could voluntarily submit to a compliance schedule to provide their own verification of ongoing compliance and to record for future owners the work done.

### **Question 97: Is there anything else about durability you think the Building Code should make provision for?**

Responses to this question provoked a wide range of responses from those who advocate personal choice to those who would like to see this area highly regulated.

One submitter commented that ‘durability is an issue because of the aesthetic choices of the building owner being highly influenced by fashion trends and demanding frequent unnecessary renovation’. Several comments were made about this, including:

- emphasis should be on using materials that are fit for purpose and able to be maintained and repaired
- the materials should be suitable for the conditions that are likely to be present under normal use
- consideration should be given to the type and quality of materials being used in New Zealand

- design needs to pay particular attention to New Zealand conditions to ensure buildings are durable and sustainable
- consideration should be given to climate change and the potential for extreme weather conditions to affect the current and future housing stock.

Several submitters linked durability to maintenance and advocated not allowing the use of cheap, unreliable building systems that require frequent maintenance. Some felt that the target should be to increase the number of years between maintenance cycles and that products need to be easy to maintain and not require expensive maintenance systems. Comments included that properly maintained elements will last indefinitely and the current 'specified year' basis is ambiguous. Other submitters provided a definite expectation about the lifetime of a home – 'the basic framework of a house should be constructed to a standard so it can be expected to last at least 80-100 years'.

Other submissions advocated keeping durability requirements same as the status quo – 50 years, 15 years and 5 years, and emphasising adaptable design principles. They felt that the Building Code should not include anything new for durability.

Several submissions disagreed with providing for universal design in this section, but none gave substantial reasons for this.

### **Question 98: Do you agree with the proposed objectives for energy?**

The majority of submitters to this question supported the proposed objectives for energy. Several commented on the link between energy, and health and wellbeing. Energy use relates to many areas of building occupancy, including health, wellbeing and national sustainability of energy supply. One submission stated that it is critical to ensure occupants attain healthy living temperatures and can afford to do so without putting unreasonable strain on the national energy supply.

The links with health and wellbeing can be clearly defined and, as one respondent stated, 'buildings that are easier to heat (and cool) reduce energy consumption and are thus healthier directly (through lack of health effects of inappropriate temperature/dampness) and indirectly (through freeing up money for other purposes, such as medical care, leisure and exercise, and improved nutrition)'.

Many of the submitters were supportive of the drive for energy efficiency, but concerned with the cost of compliance. They were also concerned about the insufficient expertise available to carry out the ensuing design and checking work that these new objectives imply. Other submitters suggested that there may be more effective ways of achieving the desired outcomes, such as developing a range of Acceptable Solutions for energy-efficient generator installation. They would like the objectives to make it clear that conservation and efficiency apply to all energy regardless of source (not just non-renewable energy sources), because all energy sources have costs and supply constraints.

Specific energy saving suggestion made were:

- establishing target savings as part of an annual warrant of fitness regime
- making solar water heating mandatory (where climate is suitable)

- providing incentives for micro-generation of power
- making high thermal mass building materials standard
- encouraging passive solar design
- introducing energy star ratings for buildings and recording them on the land information memorandum
- making double-glazing mandatory.

Some felt that energy efficiency is more appropriately addressed by other regulations, in particular the Resource Management Act.

Two submissions also suggested that another objective for energy should be ‘Sustainable development through the conservation and efficiency of energy used for construction, maintenance and demolition will be promoted by design and construction meeting performance criteria for: The consumption of energy from non-renewable energy sources used for construction, maintenance and demolition of buildings.’

A few submitters did not support the proposed objectives for energy for several reasons, including:

- they are not up to modern standards
- energy consumption is a building issue, not a Building Code issue
- the proposal is for all energy drawn from the national grid to be considered as non-renewable energy; however, major energy suppliers generate 60 to 70 percent of their electricity from hydropower, which is a renewable source.

### **Question 99: Do you agree with the proposed features to address energy?**

The majority of submitters agreed (somewhat or strongly) with the proposed features to address energy. Submitters noted that it is important to minimise the amount of energy wasted through space conditioning, and lighting and water heating, as these are the main users of energy in buildings.

Some submitters suggested a target reduction in energy use in houses. There was concern expressed that the definition of electricity as a non-renewable source would mean a duplication of energy sources for a building, with a resultant increase in cost. And it was highlighted that there would be a need to look at the resource consent process to allow wind generator structures.

Some submitters felt that the proposed energy features did not go far enough. They would like an objective for conservation and efficiency of embodied energy in selection of construction materials, and the consumption of energy from the production and transportation of materials used in the construction of buildings. They would also like an objective for promoting the use of renewable energy sources (including solid wood) for the purpose of heating hot water and space conditioning. It was also recommended that no performance standard be used to limit the use of solid wood as a source of renewable energy. It was commented that air-quality standards can and should be enforced by territorial authorities.

Incentives were also suggested as a way to encourage energy efficient design. It was stated that

current construction practice does not encourage energy-efficient design, and a developer or builder does not gain anything from installing more expensive, energy-efficient designs.

Some submitters did not support the proposed features. Some felt that the Code should encourage good design to facilitate passive energy use (such as heating and cooking), but that these should not be mandatory.

### **Question 100: Do you have any suggestions about how the Building Code can minimise energy consumption?**

Responses to this question provided a wide range of suggestions as to how the Building Code could minimise energy consumption. These included:

- higher minimum R-values for floors, walls and ceilings
- compulsory double-glazing and thermally efficient window frames
- compulsory insulation of hot water pipes
- higher minimum insulation for hot water cylinders
- mandatory solar hot water systems
- passive and active solar design
- use of natural energy sources, such as sun or wind
- low-wattage florescent lighting
- low-flow water systems
- automatic switching-off of unneeded appliances
- maximum energy consumption per square metre of building
- development of a home energy rating scheme, which encourages people to build and maintain efficient houses
- extending daylight saving
- differential electricity pricing to encourage off-peak use
- the Code should consider the energy input into materials and construction (lifecycle assessment)
- the Code should favour low-energy footprint material (bio-based or recycled)
- that education is important
- the Code should introduce a more sophisticated regulation system for evaluating/calculating both heat loss/heat gain and energy consumption of buildings, including water heating, space conditioning and lighting
- the Code should set targets for energy consumption that all new buildings and existing buildings that are refurbished need to achieve
- people building commercial buildings should provide an energy plan at the consent stage.

The most commonly mentioned suggestions were to increase R-values for insulation, mandate double-glazing and encourage passive solar design.

Cautionary comments were also received about ensuring the cost of any new systems does not outweigh their benefits.

### **Question 101: Do you have any suggestions about how the Building Code could promote the use of renewable energy?**

Responses to this question provided a wide range of suggestions as to how the Building Code could promote the use of renewable energy. These included specific solutions, such as mandating solar water heating using passive solar design, introducing a home energy-rating scheme, and allowing the market to influence the uptake of renewable energy.

Some submitters suggested that promoting and using renewable energy may be achieved by including Acceptable Solutions and performance criteria for solar, wind and photovoltaic energy-driven systems in the Building Code. Some felt that greater emphasis must be placed on solar and wind power to provide energy needs, and that each building could be made self-sufficient in energy production much of the time, removing the need to build more power stations and lines of large pylons.

Another suggestion was that the Code could promote the use of renewable energy by setting explicit, cost-effective energy performance requirements that make the use of renewable energy attractive or necessary by:

- establishing Acceptable Solutions for renewable energy technologies (for example, solar or heat pump water heating)
- providing better and best methods of compliance in Acceptable Solutions that include renewable energy technologies
- ensuring that the Code creates no inadvertent technical barriers to increased use of renewable energy.

One submitter commented that good urban planning is vital so that we do not have buildings that have an adverse effect on the environment through depletion of natural resources.

Incentives or tax breaks were also suggested, although submitters noted that this was most probably outside the Building Code. Along that theme, a number of submitters thought that the Building Code was not the best place to mandate the promotion of renewable energy. They suggested that the Building Code has a part to play in educating building users and designers on the types of renewable technologies available, and on making them easy to incorporate into buildings.

### **Question 102: Is there anything else about energy you think the Building Code should make provision for?**

This question evoked a wide range of responses and suggestions. A common theme to emerge was the need to find alternative sources of energy.

Some of the other suggestions made were as follows.

- There should be compulsory certificates of energy consumption for new buildings. Buildings should be designed with accessible cable trenches and other systems to provide for convenient upgrading of power, communication, water, waste and other systems, as new technology provides. Future proofing should be considered, including as much flexibility for future usage as possible.
- Smart meters that allow time-of-use billing should be installed.
- Taxes should be imposed on high-energy footprint materials.
- There should be measures to ensure a certain percentage of energy comes from renewable resources.
- Large developments should use energy from renewable resources.
- Information should be available on the benefits of thermal mass.
- Buildings should have as much natural ventilation, heating and lighting as is practical and achievable, given the buildings' intended end use.
- Life cycle approaches that address the full cradle-to-grave impacts of a building system should be implemented.
- It should be possible for building owners to easily transfer excess electricity into the grid.
- It would also be useful for emergencies to require houses to have the ability to easily and safely connect external sources of electricity, such as from a portable generator.
- The Building Code should provide for ensuring an electricity supply. It is important for some buildings to have a power supply to maintain sanitary conditions.
- There should be a system that sets targets but allows choice about the measures.

In addition to the suggestions above, a number of cautionary comments were made. These include the following.

- There is difficulty in regulating effective design solutions for reducing energy consumption in buildings, such as passive ventilation and solar heating and provision of natural light through the orientation and siting of buildings.
- Ensure that any new requirements of the Building Code do not create a barrier to the innovation and use of alternative energy saving equipment and building design features that may be developed in the future.
- It is important to ensure that the Code does not legislate for any one kind of energy system over another. What is important is to legislate for an energy performance level for buildings, rather than a prescriptive renewable energy type to be installed in facilities.
- This section requires more consultation and debate if it is going to significantly influence Government policy.

### **Question 103: Do you agree with the proposed objectives for water?**

The majority of submitters agreed (somewhat or strongly) with the proposed objectives for water. Views ranged from those that water conservation should apply in all instances regardless of the location or type of building, to those that the market is the best mechanism to decide the efficient use of water.

Comments were made about wasting water in both residential and commercial properties. This need to be dealt with at both the design stage and throughout the life of buildings. And it was suggested that target savings could be established as part of an annual warrant of fitness scheme, or alternative solutions that support efficient use of water could be encouraged.

Submitters noted that water is becoming an increasingly scarce resource. There is an environmental cost to its use and disposal, which is exacerbated by inefficient use. Energy, as it is required to supply potable water and to treat waste water, is wasted if water is used inefficiently. One submitter noted that water efficiency and conservation are important sustainable development issues for New Zealand and the built environment can make a significant positive contribution to this.

A number of suggestions on ways to save water were made, including:

- water-saving systems should be installed in houses, such as dual flush toilets and rain water storage
- there should be sprinkler systems in buildings to reduce the need for fire-fighting water.

The health aspect of water conservation was raised. One submitter noted that the high failure rate of many primary on-site treatment systems discharging into poor soils means that householders can come into contact with poorly treated or untreated effluent. The submitter also advised against the use of recycled water domestically with dual supplies. This is because of the risks of cross-connection with potable water supplies. Concern was also expressed for waste water re-use on gardens unless it can be ensured that children and pets cannot get access to irrigated areas. This was also a concern for any use on vegetables.

Comments from those who did not agree with the proposed objectives for water included those in rural areas who are not part of a water supply network. These people pay for their own water supply.

#### **Question 104: Do you agree with the proposed features to address water?**

The majority of submitters agreed (somewhat or strongly) with the proposed features to address water.

Many submitters felt that while they supported the concept, the actual detail was unclear. There was concern that the requirements for rain tanks and waste water re-use (in light of health requirements) will be too onerous and costly compared to conventional infrastructure.

One submitter wanted to see a cost-benefit analysis of introducing these features. They stated that water collection should be encouraged but not mandated by the Building Code.

Other submitters noted the need to promote standards for collecting rainwater for potable and non-potable use, and re-using grey water for gardens and flushing. Some submissions suggested introducing financial incentives for recycling some waste water rather than disposing of it all.

Another submitter suggested that the title be amended to reflect the inclusion of rainwater re-use. They wanted to see consistent terminology (rainwater/stormwater) within the Building Code and between other statutory and non-statutory documents. They suggested changing the heading for

this section to Stormwater Management to better reflect the recognition of stormwater as a resource and not just a by-product of development for disposal. This would also provide greater scope in this section for stormwater management options.

**Question 105: How important do you think it is for the Building Code to make provision for water efficiency in areas where there are no water shortages?**

Two-thirds of submitters who responded to this question felt it was somewhat or very important for the Building Code to provide for water efficiency in areas where there are now water shortages.

Many submitters commented on the need to promote water conservation everywhere, even where there are no water shortages. Comments supporting this view included the following.

- The availability of water may change with environmental changes and potential growth in water use. Just as important as water conservation is the need to reduce the amount of waste water going back to a central point for processing, as this is more expensive and uses energy.
- It is good policy to use water efficiently in all areas.
- Decreasing reliance on large-scale infrastructure is always desirable.
- Water is an essential resource and there is a high probability that mass shortages in other places of the world will lead to environmental refugees who will flock to the areas where there are no water shortages.
- Water is a limited and costly resource everywhere.
- Water is a valuable resource. Although there are areas that currently have no water shortage, this may change in the future. Rural areas, for example, are largely self-sufficient, but stormwater disposal and liquid waste disposal is still important in every area.
- It is very important to provide for water efficiency in areas where there are no water shortages. Water is becoming a scarcer resource over time and this is likely to impact on its availability and cost.
- The Building Code is an important instrument for promoting water efficiency in areas where there are no water shortages because sustainable development is a key theme of the Building Code and resource efficiency is an important aspect of sustainable development.
- Another key aspect of sustainable development is providing for future generations, and even while there may not currently be a water shortage in an area, there may be at some stage in future. Promoting water efficiency practices would contribute to the future-proofing of buildings and providing for future users and generations.

Several submitters also made links between energy use and water efficiency. Submitters commented that the efficient use of water would also generate energy and economic savings in reduced hot water use in buildings. Even if there is adequate water, there is considerable energy use for all users and in the disposal and treatment of waste water. All buildings, some submitters stated, should be designed to conserve water.

Submitters also commented on the health risks of recycling water. There are risks associated with recycling waste water, so any provisions for water efficiency should not exacerbate these risks unnecessarily.

One submitter suggested considering having geographic or regional performance criteria in the Building Code based on geographical water resources.

**Question 106: Do you have any suggestions on ways to address the issue of water efficiency in areas where there are no water shortages?**

The most frequently suggested ways to address the issue of water efficiency in areas where there are no water shortages were mandating for:

- recycling water, using grey water on gardens, for washing cars, etc
- low-pressure showerheads, dual plumbing and dual flush toilets
- rainwater collection tanks
- water meters.

Other suggestions include:

- reducing the amount of waste water going back to a central point for processing, as this is more expensive and uses energy
- encouraging building design that implements cost-effective systems, policies and practices that save money and protect the environment
- educating the public to effect behavioural change
- limiting levels of impervious surfaces to restrict stormwater run-off
- establishing water performance requirements for water services allowing for trade-offs, if appropriate (for example, between a rainwater collection tank and low-pressure water system). An Acceptable Solution could simply require a combination of features to be installed, such as low flush toilets and/or energy-efficient shower heads.

Other submitters made a link between water efficiency and energy conservation. One stated that ‘all water use requires a pumped water supply and an associated source of energy to supply water to its many users. Water conservation practice is also energy conservation practice.’

Other submitters felt that areas with large water resources should not be disadvantaged because other areas are less fortunate. They would like to zone areas within New Zealand that have water shortages or less access to good-quality water, such as coastal areas. The provisions for water efficiency need to be site-specific, not countrywide.

**Question 107: How important do you think it is for the Building Code to make provision for minimising the consumption of water from network utility operators in areas of water shortage?**

Three quarters of submitters who responded to this question thought it was somewhat or very important for the Building Code to provide for minimising the consumption of water from network utility operators in areas of water shortage.

Comments from submitters in favour of minimising the consumption of water from network utility operators in areas of water shortage included the following.

- The efficient use of water resources will become increasingly important. Provisions should be made now to ensure a sustainable water supply. The source of the water should not be a consideration. Consumption should be minimised at all locations.
- Sustainable water use means reducing both input and output of water. Reducing consumption of mains water supply is a key feature of achieving this.
- Water tanks to store water (rainwater) for non-potable use should be mandatory. Mains water back-up supply can be used to ensure supply at all times.
- It is important that the Building Code allow some provision to increase the requirements for water efficiency in areas of water shortage. If the principles of sustainable development are going to be followed, design and construction needs to respond to the risks and restrictions associated with the local environment, such as flooding and water shortage.
- Increasing the efficiency of water use extends the life of existing water utility infrastructure, delaying the need for new investment. While water supply utility operators are incentivised to economically price the utility, they are unable to affect the key determinant of water consumption – the water-using devices within buildings. Therefore, the Code has a key role to play in minimising water wastage. Water conservation and efficiency of water end use also reduce the direct costs of waste water disposal and water treatment.

Other submitters felt that any minimisation of consumption of water from network utility operators should be done on a case-by-case basis. They said that local authorities and network operators already manage the minimisation of water consumption in areas where there is a water shortage. The performance criteria for water conservation should be used for the design of buildings. However, as the Building Act and Code do not include the management of people, this should be left to the network utility to manage as required.

Other submitters said that the proposed charges from councils for water use will become self-regulating and avoid any need for the Building Code to mandate.

**Question 108: Do you have any suggestions on ways to address the issue of minimising the consumption of water from network utility operators in areas of water shortage?**

A wide range of suggestions were made to minimise the consumption of water from network utility operators in areas of water shortage. The most frequently mentioned ones were:

- installing rainwater tanks
- recycling water
- using grey water, for example, in toilets
- putting low-flow fittings on taps and showers
- installing dual plumbing
- mandating water meters
- providing public education.

Other submitters noted that there may be health issues with using recycled water. One submitter noted that roof water in many cities is not suitable for drinking because of atmospheric pollution

and may not be allowed by the public health authority. Any restrictions on water flow should provide an adequate flow for personal hygiene.

Another submitter noted that the objective set out in the proposed Building Code should help to influence building infrastructure. There are other means of influencing the efficiency of water use by consumers. These include ways of influencing behavioural changes, such as conservation, pricing mechanisms and educational programmes. However, these other approaches may not be directly relevant to the Building Code.

Other suggestions, outside the Building Code, were to require network water utility operators to begin recycling waste water and stormwater for non-potable uses in their service areas. The recycling of waste water requirement will encourage them to promote end-user conservation of potable water. It would be more efficient if stormwater was directed into network drainage systems and this was collected and returned into the supply system for re-use.

### **Question 109: Is there anything else about water you think the Building Code should make provision for?**

A wide range of responses were received to this question. Some submitters suggested solutions, such as installing rainwater collection tanks, introducing water meters and charging for consumption, limiting the impervious surface areas allowable for landscaping urban properties and introducing larger guttering and downpipes in heavy rainfall areas, as more frequent and heavier storms are expected.

Other submitters felt it should be made easier to collect and re-use rain and grey water in buildings. There should be Acceptable Solutions developed to make it easier to obtain consents. Another submitter linked water consumption to energy use. Some submitters commented that the requirements need to be flexible enough to support new technologies and innovative practices.

Other submitters noted that data on water quality achievable from rainwater collection and storage is required. Until this is done, they felt that there are questions about the techniques to be adopted to ensure good-quality water from rain collection systems. They suggested provision be made in the Building Code for people who wish to collect rainwater instead of connecting to the network utility.

One submitter noted that considerable research and design has been done in the area of low-impact design for stormwater management. A number of organisations (including regional and local authorities) already provide guidance documents that set out standards, design solutions and verification methods. They would like a discussion as to how low-impact design solutions recommended or provided for under other codes of practice relate to proposed requirements for water management under the Building Code, and whether low-impact design should be incorporated into design solutions and verification methods in the Code.

### **Question 110: Do you agree with the proposed objectives for materials?**

The majority of submitters agreed with the proposed objectives for materials. However, the comments about the question were wide-ranging. Several submitters felt that objectives were

too vague and needed more information. Others felt that, while they supported the objectives in principle, they would be difficult to implement.

Submitters commented that materials should be fit for purpose and meet performance criteria. Others suggested that better, more efficient design of available materials is needed, and that emphasis should be on promoting the more renewable, less toxic and more energy-efficient materials, such as timber.

Other submitters did not believe the answers lie in the Building Code and stated that the 'Building Code is not the tool for encouraging adoption of sustainably produced building materials. Alternatives to the Building Code, including education of building officers and the public in sustainable materials and building practices, as well as incentive schemes, should be considered.'

One submitter commented that the question of balance between these aspects and the issue of affordability has not been considered in the proposed material objectives. A balanced approach is essential to getting a useful working outcome.

#### **Question 111: Do you agree with the proposed features to address materials?**

The majority of submitters who responded to this question supported the intent of the proposed features to address materials, but thought it would be very hard to administer through the Building Code. Many thought that it was a very complex subject that needed more information and research. Submitters thought the proposed features were reliant on information that New Zealand has not built up yet, or would be extremely complex to administer or very restrictive to designers.

One submitter noted that the proposed features would provide a holistic approach, but that the whole-of-chain environmental impacts would be too difficult to manage through the building process and would need to be managed through other agencies. They thought the Building Code was not the tool for encouraging adoption of sustainably produced building materials. Tariffs and other legislative tools should be used.

Another submitter stated that there should be a focus on life cycle analysis within the materials area. This could be a stair-cased feature whereby, over time, all materials would be required to have undertaken such an analysis.

#### **Question 112: How important do you think it is for the Building Code to make provision for banning the use of some non-sustainable materials (eg certain timbers)?**

Several submitters questioned whether the Building Code was the right regulation to address this issue. Some felt that if materials were non-sustainable and considered undesirable, then there should be a ban on imports. They suggested this issue may be better dealt with via the Ministry of Agriculture and Forestry promoting sustainable harvesting practices, or through the conservation regulations for New Zealand materials, and through import controls on overseas items. Rather than bans, financial deterrents, such as tariffs or taxes, could be put in place not only to deter, but also to recover some cost to society. They felt this may be reasonable, but the

banning of some timbers would be difficult and could negate the re-use of recycled timber.

Other submitters questioned how this would be managed in the Building Code. They felt that any decisions in this area should be backed by established, proven scientific evidence, rather than a reflection of green policy or perception. By definition then, very few materials should fall in to this category. Affordability and a balanced view should again be key requirements along with retaining a performance-based Code.

Other views were that illegally logged timbers should be banned and that timbers from sustainably managed forests should be used in preference to those with no chain-of-custody documentation. Submitters noted that the Forest Council have a system that could be used to identify sustainably managed forests. Submitters also thought the use of chemically treated timber should be evaluated using an environmental impact assessment.

Some submitters stated that the Building Code should allow for the use of recycled non-sustainable materials. Materials may be unsustainable from some sources, but sustainable from others. Another view was that material for cultural use must be allowed.

**Question 113: Do you have any suggestions on ways to address the issue of banning the use of some non-sustainable materials (eg, certain timbers)?**

Suggestions made in response to this question included the following.

- All timber suppliers and importers should be audited and all timber traced back to source.
- There should be ongoing auditing of sustainability claims. For timber, the easiest way would be to require a forest management plan, which has been audited by an independent party.
- The Code should require proof that materials are sustainably sourced. Now, it is very difficult for a consumer or specifier to ascertain how unsustainable a product is.
- There should be a Green Building Code.
- Government could impose a minimum price for using non-sustainable materials. Policy should encourage a product-rating programme to educate the public on more appropriate products.
- The Code should develop a lifecycle (or whole-of-life) footprint scorecard for building design that measures sustainability through:
  - embodied energy and resource depletion
  - external pollution (air, water and soil impacts, including waste generation)
  - internal pollution and damage to health
  - energy use during the building's life.
- Non-sustainable timbers are a very small problem in building in New Zealand. Steel and concrete are less sustainable.
- There should be Code incentives for the use of sustainable materials, such as the international Forest Stewardship Council certified woods and materials with good whole-of-chain environmental impacts.
- It would be wise to establish an Environmentally Preferable Products database that lists preferred products and their suppliers, as well as banned or discouraged products.

- New building materials should be tested thoroughly before use and builders trained to use new materials correctly.
- There should be improved building inspection services to maintain standards.
- Building Product Certification regulations could be used to address the assessment and subsequent banning of non-sustainable materials.

Some submitters felt that the Resource Management Act and other options, rather than the Building Code, seemed to be more appropriate. These provisions in the Act, and potentially in the Building Code, could provide artificial trade barriers.

Other submitters suggested that banning would be too tough, but that dedicated energy taxes on high-energy materials would help. They said no particular timber should be banned. Rather, it should be mandated that all timbers should be from sustainably managed sources. Moreover, it should be included that regulatory authorities give preference to naturally durable timbers over toxic-treated ones.

**Question 114: How important do you think it is for the Building Code to make provision for minimising waste generation during construction and demolition through a waste management plan?**

A number of submitters noted that the Building Code was not the right mechanism for minimising construction and demolition waste through the use of a maintenance plan. Some submitters thought that market forces should dictate waste management. It was noted that waste is money and that competent practitioners will voluntarily seek to reduce waste of any resources.

A few submitters questioned who would enforce the use of waste management plans.

Some submitters thought that building consent authorities would be able to enforce the use of maintenance plans through the consent process, while others thought that it was not feasible for building consent authorities to do this.

One submitter asked that any requirements for waste minimisation consider how the building consent authority would be able to establish whether a building consent application meets the requirements. Similarly, consideration should be given to the process of issuing code compliance certificates at the completion of the project.

Some submitters were concerned that implementing a waste management plan will add additional bureaucracy to building activities and others were concerned that waste management plans will increase construction costs. One submitter suggested that a cost-benefit analysis should be conducted to determine the suitability of the proposal.

Many submitters said that a waste management plan is not enough, but that it should be part of a broader approach to using sustainable materials and processes. One submitter suggested that waste minimisation must start with a brief that includes the principles of sustainability in the design and specification of buildings and that provision of a waste management plan before construction starts would be a means of assessing to what extent waste minimisation could be achieved.

One submitter felt that Building Code provisions should be aligned with the New Zealand Waste Management Strategy.

The need to consider future demolition in design and building technologies was also noted, particularly the way building systems are connected, which has a large impact on future disassembly and re-use.

The point was made that a waste management plan would be appropriate, but there would need to be wider consideration about the type of material and its impact on the environment. A few people asked that a waste management plan consider waste generated over the entire life of a product, including during manufacture and disposal/re-use, as well as construction and demolition. Lifecycle assessment was mentioned as being an important step.

A number of people said that for waste management plans to be effective, there would need to be an effective infrastructure to support recycling and re-use. One submitter suggested that there should be a recycling centre in every city to facilitate proper disposal. In addition, it was suggested that there should be building consent procedures for using recycled materials. One submitter noted that waste is a regional issue and does not fit in a nationwide Building Code.

Several submitters suggested that requiring recycling bins on construction sites was an important factor, but one submitter thought that lack of space on construction sites for recycling bins was a barrier to recycling construction waste.

Some thought that education would be a more effective method for minimising construction and demolition waste. It was suggested that waste minimisation education may be included as part of the training for licensed building practitioners. The Resource Efficiency in Building and Related Industries (REBRI) guidelines for minimising, reusing and recycling materials was suggested as a useful resource.

Other suggestions for dealing with construction and demolition waste suggested were:

- district plans
- the resource consent process
- local by-laws
- increasing fees for waste disposal
- waste minimisation legislation (one submitter pointed out that the Government is already considering waste minimisation legislation and this should therefore not be covered in the Building Code review).

**Question 115: Do you have any suggestions on ways to address the issue of minimising waste generation during construction and demolition?**

A few submitters said that waste minimisation should not be part of the Building Code, but that it should be administered under district plans or other legislation. However, several people reinforced that a waste management plan should be part of a building consent application, and it was suggested that failure to manage the site in accordance with the plan should result in building inspections being withheld. One submitter felt that any Building Code requirements should be in line with the New Zealand Waste Management Strategy.

Several submitters suggested that there should be a better and more convenient infrastructure in place for recycling materials, so that recycling and re-use take place. It was noted that easier access to recycling facilities would be needed. One submitter suggested that high-volume waste materials, particularly those containing contaminants and preservatives, should be targeted. A few other submitters suggested that on-site recycling should be mandatory.

Many submitters suggested that incentives to recycle must be developed. In particular, materials that are not currently economical to recycle were identified as being a problem area. Many people said that introducing waste levies at landfills would encourage waste minimisation. It was also noted that new industries for building waste products should be supported so that a market exists for recycled material. In addition, the issue of building consent authorities having difficulty approving recycled materials was highlighted.

Many submitters acknowledged modular design and efficient manufacturing processes as being areas where waste minimisation should be addressed. It was suggested that waste minimisation starts with the use of sustainability principles at the design stage to minimise waste. In particular, many submitters said that prefabrication of building elements and off-site manufacture should be encouraged, as these processes result in less waste on site. It was also suggested that designers write sections on recycling and waste minimisation in the 'preliminary and general' sections of the job specification.

Some submitters identified educating key sectors of the building industry as being the best way to encourage minimisation of construction and demolition waste. Manufacturers, building consent authorities and builders were suggested as target audiences. The licensed building practitioners regime was suggested as being a mechanism for training those involved in the building process.

One submitter suggested that waste minimisation should be part of local councils' ongoing waste management protocols under their by-laws, and that it should be part of the councils' function through the Waste Minimisation (Solids) Bill. It was also suggested that requirements in other legislation could be incorporated in a similar way to how management of site safety is currently handled.

Other suggestions on ways to address waste minimisation were:

- banning the dumping of recyclable materials
- introducing a 'waste rating' for building products and systems
- promoting the use of naturally durable timber in place of timber using preservative treatment
- requiring developments to adhere to the Resource Efficiency in Building and Related Industries (REBRI) guidelines on waste minimisation.

### **Question 116: Is there anything else about materials you think the Building Code should make provision for?**

Suggestions made for this question included the following.

- There should be a list of typical construction materials, their maintenance costs and their lifespan for different maintenance periods. This would allow buyers or clients to make better decisions.

- The use of treated timber should be phased out because it creates problems with disposal and it should not be burnt.
- Unflued gas heaters should be banned.
- The use of recycled building materials should be addressed.
- Recycled material use should not occur where they create or perpetuate a risk to health, such as the re-use of asbestos, lead painted materials and inferior materials that reduce building safety.
- The Code should focus on encouraging bio-sourced renewable materials and recycled materials.
- There is a need to include life-cycle analysis and embodied energy in the assessment of the suitability of materials.
- The public should be educated on materials.
- The Code should encourage New Zealand-made products and materials.
- The Code should promote construction methods that do not require chemical timber treatment.
- Making the Code require building components to last longer would reduce wastage.
- All demolition and building construction site wastes that contain or may contain hazardous substances should be safely disposed of.
- There should be provision for materials that meet sustainability objectives, such as materials that are locally available, durable and able to be reused or recycled.
- The submission and implementation of a waste management plan should be a requirement in the Building Code for construction, renovation and demolition activities.

Other comments included the need to be careful not to disadvantage any alternative construction methods and to ensure there are building standards in place for all alternative materials and construction methods, as well as allowing flexibility in the Code for future materials and construction methods.

### **Question 117: Do you agree with the proposed objectives for protection of other property?**

Submitters were generally supportive of the proposed objectives for protection of other property. Submitters noted that people should have the assurance that their property will not be damaged by surface water, fire, construction and demolition waste, and failed utility networks. Promotion of sustainable development should include protecting property, processes and economic entities.

A submitter who strongly supported the proposed objectives suggested that the protection of other property should be incorporated into structural safety and safety in use sections due to the socioeconomic importance of protecting all structures, not just individual structures.

Another submitter advocated a separate section for protection of other property within the Building Code. They stated that this area of the Building Code is currently presented under a variety of headings and the whole area of property protection should be developed as a separate

and distinct section within the Building Code that can be easily identified.

One submitter noted that buildings should limit the possibility of damage to other buildings, including proper firewalls between apartments and units. The Code also needs to refer to protecting natural light, amenity value and visual awareness, although these may be covered under the Resource Management Act.

Other comments include that this section is similar to clauses and requirements in the current Building Code and that it interfaces with other regulatory requirements, such as the Resource Management Act. One submitter noted that this is not an appropriate role of the Building Act regime, other than the single issue of firewall requirements.

### **Question 118: Do you agree with the proposed features to address protection of other property?**

A few people made suggestions for the structure of the Building Code. It was suggested that the protection of other property ‘features’ be located alongside the building ‘features’ they relate to. For example, it was suggested grouping protection of other property from fire with features addressing fire spread.

A few people thought that the scope of protection of other property should be expanded to include issues such as post-earthquake fire, amenity value and damage from flooding events or sea level rise. A few people suggested that the issue of new construction blocking sunlight and views of other property needed to be covered.

Some submitters paid attention to the issue of earthworks and site-work affecting other property. A few submitters were concerned with contaminated run-off water from construction sites.

Other issues that affect land stability, environment and network utility operator infrastructure include:

- modifications to the area of soil available for infiltration of water
- speed of stormwater delivery to waterways
- monitoring of erosion and sediment control (as covered by the existing Building Code Clause for surface water (E1)).

A submitter suggested that the definition of other property should include ‘public places’ and ‘environmental impacts’.

One submitter recommended that the proposed feature ‘prevention of water entering other household units’ should be changed to ‘prevention of water entering other buildings’.

Another submitter considered that containment of fire when active fire systems have failed to be of concern. The respondent suggested that using robust materials would be a sustainable way of achieving this.

**Question 119: How important do you think it is for the Building Code to make provision for any other areas relating to the protection of other property (aside from those included in the current Code)?**

In broad terms, several submitters felt that buildings and occupants should be protected from the actions of their neighbours. Two submitters said the Building Code should protect people and not property.

A few submitters felt that access to sunlight and views should be included under protection of other property in the Building Code. It was noted that newer developments may impact on adjacent property by blocking views and shading. If the adjacent building is designed to use sunlight for lighting and heating, the passive design performance may be affected. The removal of views by an adjacent development may also affect the occupants' visual awareness of the outside.

One submitter felt that properties should be protected from noise (for example, heat exchangers and noise generated by machinery associated with waste water and waste facilities).

These issues are currently covered in district plans, and one submitter commented on this system. The submitter noted that district plans could be overruled or replaced, leaving consumers insufficiently protected. However, dealing with these features in the Building Code relies on the building consent authority to get it right.

Some submitters suggested that other issues to do with protection of other property are already covered adequately by the Resource Management Act. It was noted that items that are covered in the Building Code, as well as in other legislation, need to be complimentary.

One submitter identified that utility services should come under the definition of 'other property' and also be protected.

Another submitter felt that, as there has been a significant investment to ensure that network infrastructure has a significant life span in line with current standards, any changes to the performance criteria would have far-reaching financial and practical impacts.

A few submitters suggested that site works and landscaping also need to be dealt with.

One submitter said that there are currently no design requirements for retaining walls on a boundary to protect the ability of the adjoining property to be developed fully. In addition, fill placed on land could divert overland flow paths and cause a nuisance to adjoining property. Another submitter suggested that adjacent property should be protected from rock-falls, landslides and excessive run-off caused by development.

One submitter said that earthworks and landscaping should be designed not to affect neighbouring property.

**Question 120: Do you have any suggestions on ways to address other areas relating to the protection of other property (aside from those included in the current Code)?**

A few submitters asked that the Building Code be compatible with the Resource Management Act and the District plan, and it was suggested that there be clearer definitions of risk and responsibility where property is not protected or damaged.

Two submitters suggested that overland flood paths should be defined so that building work and landscaping can be designed to avoid damage and to avoid blocking the flood path. For the issue of fill and excavation at site boundaries generated from development of a site, it was stated that such projects should be designed so that they are stable and will not affect a neighbouring property in the future. One solution suggested was that there be minimum surcharge loads for retaining walls within their own height from the boundary.

Other suggestions were that the Building Code cover:

- the issue of removing vegetation and the provision of impervious ground cover and the impact this may have on flooding
- evaluation of ground water levels and pressures to enable appropriate drainage and stabilisation of building sites
- strong wind (such as tornados)
- control of exhaust odours and fumes
- potential flooding from bridge construction
- treatment of contaminated water run-off from building sites before disposal
- the issue of unsightly and dangerous powerlines running through people's property.

**Question 121: Is there anything else about protection of other property you think the Building Code should make provision for?**

One submitter proposed that construction processes be regulated so they do not compromise the security of other property. In particular, avoiding situations where security arrangements could be temporarily compromised while work is in progress. A similar issue of maintaining fire protection while work is in progress was also mentioned.

It was suggested that solutions for the protection of other property from the effects of stormwater consider sustainable stormwater management rather than simply discharging into the network utility.

One submitter pointed out that flooding and tsunami could result in debris damaging bridges and other structures. It was suggested that structures in tsunami and flood-prone areas should be designed to withstand a certain size of event or be designed to break into smaller pieces.

Issues about protection from development on adjacent property include:

- impairment of solar and wind potential
- encroaching trees.

**Question 122: How important do you think it is for the Building Code to treat buildings with cultural, historical or heritage value differently from similar buildings without that value?**

Many submitters agreed that buildings with cultural, historical or heritage value need to be preserved. It was also suggested that there should be no disincentives for re-using historic or heritage buildings.

A few submitters saw a clear distinction between heritage or historic buildings and new buildings that have a cultural purpose. The feeling was that new buildings with cultural significance should have no concessions for Building Code requirements. One submitter expanded on this by saying that cultural buildings should not receive special treatment because all people have the same needs.

Another submitter noted that the Building Code sets minimum levels, and as such there is no justification for compromising that level.

However, many submitters thought that existing buildings with historic or heritage value must comply with the Building Code only if reasonably practicable. Many submitters felt that these buildings must be treated on a case-by-case basis. Submitters said that concessions must be made to allow these buildings to retain their value, while complying with Building Code requirements as much as possible. Safety was commonly regarded as the bottom line and sanitary provisions were also mentioned. It was noted that dispensations and waivers were the appropriate mechanism for dealing with this.

Some submitters noted that issues that require flexibility are:

- seismic upgrades
- handrails
- disabled access
- fire egress
- stair geometry

To address historic, cultural or heritage value, a clear hierarchy must be established to ensure considerations such as safety are not compromised.

A few submitters identified that the current processes for dealing with cultural, historic or heritage buildings result in the value of the buildings being compromised by strict application of Building Code requirements. It was noted that conflicts arise when people with no financial interest in a building impose regulations. It was also noted that the cost of bringing buildings up to Building Code compliance levels is a disincentive to their use.

One submitter stated that the Code should not be concerned with the preservation of buildings, but that it should only be about health and safety of users. Another respondent asked that there be further requirements for protection of buildings with historic or heritage value because these buildings derive their importance from continuing existence.

Another submitter felt that the Resource Management Act is the appropriate mechanism for dealing with these buildings. The submitter was concerned that if two different Acts covered the

same situation, interface issues could arise.

It was pointed out that the difficulty in regulating for cultural, historical or heritage buildings is defining them, and one submitter provided a list of buildings that should be considered:

- Buildings scheduled in district plans
- Buildings on the New Zealand Historic Places Trust Register
- Buildings identified by the Ranges Heritage Bill
- Buildings subject to a heritage covenant under the Historic Places Act 1993
- Buildings subject to a Heritage Order under the Resource Management Act.

Two submitters suggested that any approach to dealing with cultural, historic or heritage buildings needed to follow that of earthquake-prone, dangerous and insanitary building policies.

### **Question 123: Do you have any suggestions on ways to address the issue of buildings with cultural, historical or heritage value?**

Some submitters felt that the Building Code is not the appropriate mechanism for dealing with the specific requirements of these buildings. It was noted that the Historic Places Act, Resource Management Act and district plans also cover this area.

A few submitters found that current processes are working well in this regard and one submitter drew attention to sections 112 and 115 of the Building Act, which allow building consent authorities to consider cultural, historical or heritage value when deciding whether work complies with the Building Code. Other submitters thought that existing Building Code requirements made upgrading and using these buildings unnecessarily difficult, and one submitter suggested that the local authority should be responsible for any funding issues.

Many submitters said that the buildings needed to be treated on a case-by-case basis to evaluate the value. Many submitters said that building consent authorities needed access to dispensations or waivers and a high level understanding of building conservation for this to work.

It was also noted that the community must also be involved in the decision-making process in some way.

Many submitters felt that cultural, historical and heritage buildings should have different requirements for structure, insulation and accessibility. One submitter thought that dispensations could be made, provided the safety of building users and the protection of their property not compromised. Two submitters warned that solid 'policies and rules' must be in place for this to work. Another submitter felt that the 'trigger' for the requirement to upgrade existing parts of heritage buildings needed to be reconsidered.

A few submitters suggested that cultural, historical and heritage buildings need to be specifically covered in Acceptable Solutions, rather than relying on the current method of granting waivers or modifications. Several submitters thought that a good option was to write a separate Building Code, or part thereof, with different performance criteria for heritage buildings. One submitter suggested that this would mean defining heritage buildings as a separate building type for performance requirements under the Building Code. Two submitters mentioned the California

Historical Building Code as a possible model.

A few submitters questioned why an existing heritage building should be brought up to Building Code requirements in any respect because part of the heritage is that it reflects the way people used to do things. One submitter suggested that newly-constructed buildings should comply with the Building Code whatever their cultural value or significance.

It was suggested to make the New Zealand Historic Places Trust a building consent authority for listed and registered heritage buildings.

**Question 124: How important do you think it is for the Building Code to treat buildings with special traditional and cultural aspects of the intended use differently from similar buildings?**

Approximately half of submitters who responded to this question thought it was important (somewhat or very) for the Building Code to treat buildings with special traditional and cultural aspects of the intended use differently from similar buildings.

Several submitters made the comment that they supported the intent of this area and agreed that these buildings could enhance wellbeing. However, they wanted to ensure that the health and safety of occupants was not compromised. Submitters felt aspects of the Code that relate specifically to ensuring occupant health and safety and measures to prevent death during a disaster should relate to all building types. However, buildings with traditional and cultural aspects may require special provision for amenity values.

Submitters commented that there could be a set of minimum standards. The only exclusion should be on historical existing structures, but there should be no compromise on safety.

One submitter noted that ‘the Building Code/heritage situation may be seen in the same light to that of a classic car. No one expects it to meet the requirements of modern car design and safety, and yet it is still deemed to be roadworthy.’

Other comments included the need for flexibility for buildings with special traditional and cultural aspects, such as wharenui, churches, Buddhist temples, mosques, and so on.

One submitter noted that traditional Māori buildings, such as wharenui, wharekai, pataka and pouhaki, are significant historical and cultural places and are of unique and special value to New Zealand. The protection of traditional Māori buildings should be considered as a matter of national importance and as a part of providing for the sustainable development of heritage buildings. The status of all traditional Māori buildings should be recognised and safeguarded from regulation that may lead to the demolition or removal of heritage fabric.

**Question 125: Do you have any suggestions on ways to address the issue of buildings with special traditional and cultural aspects of the intended use?**

A wide range of suggestions were received in response to this question. Several submitters commented that one size does not fit all buildings and that some buildings should be allowed dispensation from some Building Code requirements if any of the performance criteria are in

conflict with the intended end use or special requirements arising from any traditional or cultural needs. While a range of building types are recognised, with differing levels and types of occupancy, submitters noted there is a need to recognise a number of other situations that can occur where the strict application of the Code may not be practicable or desirable. There needs to be provision for the wider variety of cultural beliefs and value systems in our society. They thought the Building Code should be inclusive and not impose one value system on others with a different value system.

Comments about the changing demographics of New Zealand communities were also received. Submitters noted that population numbers, family structures and ethnic groupings are all having an impact on the traditional form and use of New Zealand towns, neighbourhoods, rural areas and buildings. They requested that the Building Code should not inhibit the design and form of the wide range of buildings necessary to accommodate the needs of an increasing range of occupant ages, numbers and cultural living traditions. This is not to suggest that any building typologies should not have to comply with the proposed four main objectives, but the Code will need to be flexible enough to enable innovative building design solutions that meet the increasing diversity of occupant needs.

Others commented that the existing provisions in the Act worked well. One submitter noted that there should be a strong measure of consistency between the Building Code, the Historic Places Act and the Resource Management Act on this issue.

Fire and access were raised as important safety issues for heritage buildings. A respondent noted that any regulation for fire safety and access should be carefully designed and should follow international best practice, while also considering the special cultural design issues of these buildings.

### **Question 126: Do you have any comments about how the proposed Building Code objectives are aligned with the purposes of the Building Act?**

Generally, submitters felt the Building Code should clearly reflect the purposes of the Building Act, which include safety, wellbeing and sustainability. It was suggested that these Code objectives needed to be clearly communicated to its users in a common-sense way so that the objectives, and their associated performance criteria, allow for innovation by providing as many ways as possible to meet them.

The need of users to have a practical, functional and easy-to-use Building Code was highlighted. It was felt the Code should be structured practically for the user rather than in line with the purposes of the Act.

It was noted that the Building Code should balance property rights and the right of people to choose their own living environment with measures that protect building users and public safety. This followed concern expressed about the proposed structure not being user-friendly compared with the current regime.

It was felt that the proposed sustainable development objectives should encourage the adoption of more efficient construction standards than exist at present. Many submitters believed energy efficiency and sustainability should be priorities for the 21<sup>st</sup> century.

One submitter supported the ‘future-proofing’ of the Building Code. The submitter expressed a concern that the Building Act was more advanced in its thinking than the Code and this situation needed rectifying.

**Question 127: Do you agree the Building Code should be structured in the same way?**

Numerous proposals were made about the proposed structure of the Building Code. It was suggested that the Code needs to be a working document that is easily understood by designers and builders. Submitters believed the Code needs to make clear what is required when a building is constructed, what needs to be achieved broadly, why and how. As far as the Code user is concerned, some submitters felt that alignment with the Building Act 2004 was not a requirement.

Contrary to the view portrayed above, another group of submitters felt the Code should be structured in a format similar to the proposed objectives and features as this would provide clarity of the features and items to the main purposes and principles of the Building Act 2004.

Some submitters voiced concerns about the language of the objectives, particularly the use of ‘promote’ and ‘probability’, which suggest that an unacceptable risk or situation will or is likely to occur. It was felt that the wording of the objectives over-emphasises the risk of unacceptable design and construction practice in the building industry and should instead be framed positively.

One submitter felt it might be appropriate to stick to the existing Building Code structure for all of the objectives and to have Acceptable Solutions for, for example, houses, apartments, office buildings and industrial buildings.

It was suggested that a further justification for following the proposed approach was that the Interjurisdictional Regulatory Collaboration Committee (IRCC) tier system will give much more structure and rigour to the Code, while still having performance rather than prescriptive standards.

Appropriate education was viewed a necessary co-requisite for successfully implementing the proposed Code changes.

**Question 128: Do you have any comments about the 'what', 'how much', 'where' model for performance criteria?**

The majority of submitters considered the model to be an effective solution for addressing performance uncertainty in the Code. It was felt that the ‘what’, ‘how much’ and ‘where’ model would provide the additional quantification required to make Code performance requirements more certain, but that the model needs to maintain sufficient scope for alternative design solutions.

Some submitters proposed slight changes to the structure of the proposed framework. One submitter agreed with the proposed model but felt that ‘why’ should precede the ‘what’, ‘how much’ and ‘where’. It was also suggested that the ‘where’ requirement be replaced with

‘building classification’ and ‘geographic location’.

Some concern was expressed that the proposed ‘what’, ‘how much’ and ‘where’ model would lead to a prescriptive rather than a performance-based Code. It was felt the proposed model would adopt a prescriptive approach in the performance section of the Code when this should only happen in the optional Verification Method and Acceptable Solution. For many sections of the Code, terms such as ‘adequate’ and ‘appropriate’ were considered sufficient for defining both the objective and the performance requirement.

Negative feedback was also received about this model. It was submitted that the IRCC model is unnecessarily complicated and provides no perceived benefit to the final outcome of a building that is safe, maintains public health, supports access for people with disabilities and promotes sustainability. Another submitter felt that the ‘what’, ‘how much’ and ‘where’ model for performance criteria should not be part of a performance Code. Instead it was felt it should be included in the prescriptive non-mandatory Compliance Documents.

Finally, the lack of a full range of Verification Methods and clear statements of required functionality, interdependencies and minimum performance(s) was deemed a significant hurdle to progress this model. The submitter felt the Department of Building and Housing must actively work with international counterparts to minimise the risks associated with this.

### **Question 129: Do you have any suggestions about general overarching principles that should be incorporated into the Building Code?**

The overwhelming issue for submitters was that the Code be simple to understand, practical and easy to use. It was felt that a performance-based approach is a good method of achieving this, rather than prescriptive requirements.

Education and training were deemed necessary components of the Building Code review process if the proposed Code changes were to be implemented successfully.

It was felt a range of Acceptable Solutions should be provided. A process could be established for incorporating approved alternative solutions into Acceptable Solutions.

Many submitters believed synergy between complementary legislative tools such as the Building Act, the Building Code and the Resource Management Act needs to be considered.

It was felt that the Code should examine the durability of buildings. The current expected lifetime of a building of not less than 50 years was considered too short. Instead buildings should be designed to last at least 100 years.

One submitter would like to see the principles of low-impact design incorporated into the Code and a greater emphasis placed on the environmental impacts of design and construction, and not just the direct impacts on the community and individuals.

A number of comments were made about the language used in the proposed Code objectives. It was suggested the language needs to be easier to understand and that better definition of such terms as ‘wellbeing’ and ‘sustainability’ is required.

It was felt building innovation should also be encouraged in the Code. This should occur within a robust framework for demonstrating new products and systems to ensure they are reliable before being incorporated into everyday construction.

A number of submitters felt it was important that the Code emphasises all its objectives contribute to the wider imperatives for sustainable development.

It was proposed that the Code incorporate best-practice guidelines as well as minimum standards.

It was argued that the Code objectives should be supported by an evidence base.

Affordability of proposals was highlighted as a major concern. It was submitted that rigorous cost–benefit analysis should underpin all regulations to ensure their practicality.

### **Question 130: Do you have any comments about the general principles for performance criteria?**

All submitters favoured a performance-based over a prescriptive approach. Emphasis was placed on ensuring that performance criteria are well supported by evidence, stated with clarity and well communicated to users.

It was suggested that criteria for differing types of building be set out in a simple form so that it is easy to see what standards cover what building types and uses. It was also felt that the Code review should consider increasing the number of Acceptable Solutions and the level of performance required from the minimum standard to better or best practice.

The concept of risk was deemed to be an important part of performance-based criteria. It was felt the acceptable level of risk needs to be communicated to the end users of buildings and direct users of the Code to help achieve Code objectives.

Submitters suggested that performance criteria need to be quantified to allow the assessment of compliance through Verification Methods, to support the production of further Acceptable Solutions and to aid the development of alternative solutions.

One submitter expressed the view that a performance-based Code requires comprehensive Verification Methods and standards, which New Zealand lacks. The submitter felt that while other codes, such as the International Code Council code in the United States, are well developed in this area, the approach is extremely prescriptive and relies heavily on a wide range and number of product standards that New Zealand does not have in place.

One submitter suggested that the concept of wellbeing should be excluded from performance criteria. It was felt that only those attributes supporting the safe and convenient use of buildings, the protection of other property and the environment and the ability to escape from the building in safety in an emergency should be included.

### **Question 131: Do you have any comments on the possible 'staircasing' of performance criteria?**

The concept of 'staircasing' received a mixed response. Several submitters thought that major Code changes should be introduced gradually and that staircasing would help to achieve this. To help implement the staircasing concept, it was suggested that illustration by way of example, as used in NZS 4218, would be very useful. Submitters also felt that it was important to stage increases in performance standards over time, rather than to require higher performance immediately.

A perceived benefit was that staircasing could signal to stakeholders that performance requirements are to change, thereby giving stakeholders adequate time to prepare for that change. In fact, submitters felt strongly that any intent to adopt higher standards would need to be clearly communicated with sufficient education and time to adjust.

A further reason put forward favouring staircasing was that it would help to manage issues of affordability around increasing performance standards.

It was felt that if staircasing were to be introduced, it should not be used to set the bottom 'step' lower than would otherwise occur.

On the other hand, some submitters believed the Code should be kept as simple as possible to ensure functionality. The concept of staircasing was considered difficult for the end user to understand and therefore difficult to implement. Some submitters thought it would be better to implement amendments and new Acceptable Solutions over time.

Some submitters questioned whether staircasing was the best method to implement higher Code standards. They felt that if the Code is aiming to achieve higher standards, then they should be implemented immediately.

It was felt that a cost–benefit analysis should justify the implementation of higher standards before any further additional requirements are implemented.

Some submitters believed that continual improvement over an extended period would be unfeasible and cost-prohibitive. It was submitted that if staircasing was to be introduced, then it should be to achieve a certain target.

### **Question 132: Do you have any comments about the proposal for a Housing Acceptable Solution?**

The concept of one comprehensive Acceptable Solution for housing was widely supported. Many submitters felt this was an excellent method to ensure greater clarity for users of the Code, and that it would provide the building industry with appropriate guidance to construct Code-compliant houses.

In order to make this proposal workable, a number of submitters felt it would require additional training for building consent authorities.

It was suggested that there might also be a need to have separate Acceptable Solutions for

different kinds of residential housing such as apartments, multi-unit dwellings and detached dwellings. Submitters felt that a ‘one-size-fits-all’ approach to all kinds of residential housing may not be appropriate.

Many submitters were concerned that, without appropriate training for building consent authorities, the proposed Housing Acceptable Solution would become a de facto prescriptive requirement. It was felt this would be to the detriment of alternative design solutions and potentially stifle innovation.

One submitter believed this proposal would help to alleviate confusion between residential and commercial sectors. It was also suggested that a Housing Acceptable Solution would be a useful tool for designers.

Some submitters considered this proposal unworkable. It was thought that the wide array of options on offer would make the document complex and unworkable. An alternative suggestion was to categorise the Acceptable Solution by profession or building component.

Some submitters preferred the current Code regime to the proposed approach. It was noted that the current system, whereby individual performance requirements are able to be complied with via an acceptable or specific design solution, allows more flexibility.

The potential cost of compliance was a concern to some submitters, who wished to stress the importance of this issue.

### **Question 133: Do you have any comments on the possible incorporation of 'acceptable', 'better' and 'best' methods of compliance in the Acceptable Solutions?**

Views were divided on the possible incorporation of ‘acceptable’, ‘better’ and ‘best’ methods of compliance in the Acceptable Solutions, but the majority of submitters agreed with the concept. Views are summarised in the comments below.

- People prefer a range of prescriptive solutions.
- This concept could be seen as a simple rating tool, which could test the willingness of the industry and building owners to take up the concept.
- If this proposal is to succeed, there will need to be an incentive provided to the building developer and/or owner. One possibility could be to encourage or require that elements and products incorporated into the construction of a building, that are to a higher standard than the minimum required, be recorded on the certificate of compliance and land information memoranda issued by the consenting territorial authority. It would be unrealistic to include every element and product, but a limited list could be prepared for those that provide the most benefit under each of the four proposed objective platforms.
- There is support for this model. By detailing the best method, its use may increase.
- The extra detail may add to the size of the Code.
- It is acceptable if it allows more freedom in design.
- There is currently a Standard for insulation that operates in this manner.

- The problem with Acceptable Solutions is that they become the default even though they were created as the ‘minimum pass’ scenario. By creating the tiered approach, it allows a greater level of education for those in the industry who do not know better.
- Another possible way to achieve higher construction quality may be to integrate the staircasing and acceptable, better, best concepts. All building elements and materials would be tiered according to their priority, with those of greatest importance being placed above the minimum permitted performance standard.
- An Acceptable Solution must have only one solution. To promote various levels of acceptability will introduce uncertainty and confusion among building users. An Acceptable Solution to specific performance criteria is simply that. Better and best are subjective and, in the current building environment, likely to be changing rapidly and are therefore impractical to be included in the Code.
- Some submitters were opposed to this concept because building consent authorities are not able to grade houses. This would only lead to increased liability. Apart from the liability, it was suggested to be impracticable. The Building Code should be restricted to minimum standards.
- Other submitters questioned the intended purpose. These are often simply higher performance targets and may not be suitable or necessary for every building situation. Most of the time the lower levels will be what is specified anyway unless the designer or client specifically wants a better-than-Code level. It may be better to publish these as a set of guidebooks, rather than as Acceptable Solutions.
- Providing information on acceptable, better and best is a fine idea to provide owners an understanding of where they wish to go.
- A question was asked whether the owner was at risk of negligence if better practice is readily available and is not chosen.

### **Question 134: Do you have any other comments about this document?**

Other comments about the document are summarised below.

- It would make sense to have pointers to other relevant Code objectives in the Building Code or even a table at the front that lists which objectives are relevant to an aspect of the design. In a similar vein, a map from the current Code to the new would assist in the transition.
- Relying on some of the minimum requirements in NZS 4121 does not encourage people to look beyond these at ways of improving access and using this as a selling feature and it does not necessarily mean it is going to cost more to have better access.
- Detailed consumer education and information must be a part of the revised Building Code through information documents.
- The work being done in this review will certainly take the building industry into the 21<sup>st</sup> century in a much more positive way and will go a long way in helping restore public confidence in the industry’s ability to be professionally competent and driven.

# Other consultation

## Focus groups

In August 2006, the Department held a series of 11 focus groups around New Zealand.

The purpose of the focus groups was to invite community feedback on the discussion document. In doing so, the Department sought to:

- understand what consumers from within the community want from their built environment and the Building Code
- ascertain what priorities people set for the Building Code when balancing conflicting items, such as energy-efficient features against affordability
- encourage participants to use their networks to promote responses to the discussion document.

The focus groups sought to reflect the diverse cultural, economic and social needs of building occupants. This was achieved by inviting participants from a range of local and national community groups and varying ethnicities, and by holding the focus groups in a mixture of metropolitan, provincial and rural locations.

The focus group discussion centred on the issues of sustainable development and wellbeing aspects of buildings, which are considerations required under the Building Act 2004, to help us appreciate the level of societal expectation in these areas.

Participants were asked to come up with a range of sustainable development and energy efficiency initiatives and to consider whether they were matters that should be regulated under the Code or left up to personal choice. Participants also discussed a comprehensive list of building wellbeing features and were asked to prioritise rankings based on their own views and those of the people they represented.

There was a high standard of dialogue and some of the consistent themes that arose included:

- government taking a leadership role to encourage the wider use of sustainable development building practices
- ensuring that New Zealand buildings, particularly homes, are healthy for their occupants
- improving the sustainability of homes through the installation of energy-efficient appliances, more efficient use of water systems and recycling of household and building waste
- better using sustainable energy sources at the domestic level, such as the installation of solar water heating systems
- using universal design practices where possible to enable the physical independence of users
- maintaining performance-based standards so that building owners may exercise personal choice to achieve Code requirements
- considering region-specific climate conditions and avoiding a ‘one-size-fits-all’ approach
- considering an increase in the design life of buildings.

The key issues varied across the focus groups, highlighting region-specific considerations. Desire for measures to ensure more sustainable homes and building practices was particularly strong in Nelson and Christchurch. In Westport, the substantial effects of coastal erosion were a major issue, and participants in Gore requested better education and information about sustainable energy practices. Affordability of housing was a primary concern in both Kaikohe and Gisborne, while the Kapiti Coast focused on sustainable water practices. In Auckland, cultural considerations were raised, given the large ethnic population, and accessibility issues were prominent in both Auckland and Tauranga.

## **Workshops with submitters**

As part of the ongoing engagement with stakeholders for the development of the Building Code review, the review team held three stakeholder workshops. Individuals and organisations that made submissions on the discussion document were invited to attend. The workshops were held in late October and early November in Auckland, Wellington and Christchurch and feedback from these has been incorporated into this report.

The primary objective for the workshops was to allow the stakeholders to re-visit their comments in the light of other submissions, and to suggest how the submissions overall could be interpreted.

The key themes to emerge from the workshops were as follows.

### **Code structure and performance criteria**

- There was general support for a performance-based Code.
- There were mixed views on whether the Code should be structured by outcome or by building element.
- Attendees would like the Code to be structured in an easy, user-friendly format.
- People commented that any new provisions would need to be affordable for homeowners.

### **Sustainable development**

- Attendees noted that sustainable development is a good concept, but hard to include in the Building Code.
- There was support for including energy and water efficiency and conservation in the Building Code.
- Submitters would like the Department to do more work in the area of environmental impacts of materials. They commented that regulations about this would be hard to enforce given the limited detailed knowledge about this at present.
- There were mixed views on maintenance – some were in favour of regulation, while others wanted a voluntary, information-based system.

## **Safety**

- A number of comments were made on the cost of regulation compliance versus the possible risk.
- There were mixed views on whether escape routes should be acceptable for people with disabilities.
- It was noted that most deaths and injuries from fire occur in residential properties and attendees suggested that we need better regulations in this area.
- It was also noted that consistency is needed between the Building Code, Resource Management Act and the rules governing the Fire Service.

## **Health**

- Submitters felt that consideration should be given to combining health and wellbeing proposals.
- They stated that the ability to heat and cool homes to a minimum or maximum air temperature is important for good health.
- Submitters saw a need to ensure homes have access to ‘fresh air’ because this was good for health, ventilation and preventing moisture build-up.

## **Wellbeing**

- There were differing views on whether wellbeing should be part of the Building Code and people noted that many of the wellbeing issues overlap with the health provisions.
- There were mixed views on provisions for universal and adaptable design. Some supported these being mandatory, while others thought they should be guidelines only.
- There was uncertainty about whether provisions for ensuring natural light (to ensure light is not obscured by neighbouring buildings) should be a Building Code issue or a planning issue under the Resource Management Act.

## Appendix 1: Index of discussion document questions

Note: All questions allowed free comment responses. In addition, some questions (those identified below with a \*) invited a ‘multiple choice’ response by agreeing ‘strongly’, ‘somewhat’, ‘not really’, ‘definitely not’ or ‘no opinion’.

Question 1*: Do you agree with the proposed objectives for structural safety?	17
Question 2*: Do you agree with the proposed features to address structural safety?	18
Question 3*: How important do you think it is for the Building Code to make provision for buildings at risk of tsunami?	18
Question 4: Do you have any suggestions on ways to address the issue of buildings at risk of tsunami?	19
Question 5*: How important do you think it is for the Building Code to make provision for buildings at risk of flooding?	20
Question 6: Do you have any suggestions on ways to address the issue of buildings at risk of flooding?	20
Question 7*: How important do you think it is for the Building Code to make provision for buildings at risk of coastal erosion?	22
Question 8: Do you have any suggestions on ways to address the issue of buildings at risk of coastal erosion?	22
Question 9*: How important do you think it is for the Building Code to make provision for buildings at risk of landslides?	23
Question 10: Do you have any suggestions on ways to address the issue of buildings at risk of landslides?	24
Question 11*: How important do you think it is for the Building Code to make provision for buildings at risk of volcanic activity?	25
Question 12: Do you have any suggestions on ways to address the issue of buildings at risk of volcanic activity?	25
Question 13*: How important do you think it is for the Building Code to make provision for buildings at risk of wildfire?	26
Question 14: Do you have any suggestions on ways to address the issue of buildings at risk of wildfire?	27
Question 15: Is there anything else about structural safety you think the Building Code should make provision for?	28

Question 16*: Do you agree with the proposed objectives for fire and other emergency safety?	29
Question 17*: Do you agree with the proposed features to address fire and other emergency safety?	29
Question 18*: How important do you think it is for the Building Code to make provision for fire safety measures in houses?	30
Question 19: Do you have any suggestions on ways to address the issue of fire safety measures in houses?	31
Question 20*: How important do you think it is for the Building Code to explicitly require a means of emergency egress from buildings that is accessible to people with disabilities?	31
Question 21: Do you have any suggestions on ways to address the issue of emergency egress from buildings for people with disabilities?	32
Question 22: Is there anything else about fire and other emergency safety you would like the Building Code to make provision for?	33
Question 23*: Do you agree with the proposed objectives for safety in use?	33
Question 24*: Do you agree with the proposed features to address safety in use?	33
Question 25*: How important do you think it is for the Building Code to make provision for protection of people from noise emitted by fire alarms?	34
Question 26: Do you have any suggestions on ways to address the issue of protection of people from noise emitted by fire alarms?	35
Question 27*: How important do you think it is for the Building Code to make provision for protection of people from hot and cold surfaces?	35
Question 28: Do you have any suggestions on ways to address the issue of protection of people from hot and cold surfaces?	36
Question 29: Is there anything else about safety in use you would like the Building Code to make provision for?	37
Question 30*: Do you agree with the proposed objectives for sanitation?	37
Question 31*: Do you agree with the proposed features to address sanitation?	38
Question 32*: How important do you think it is for the Building Code to make provision for storage space for waste and cleaning equipment?	39
Question 33: Do you have any suggestions on ways to address the issue of storage space for waste and cleaning equipment?	39
Question 34: Is there anything else about sanitation you think the Building Code should make provision for?	40

Question 35*: Do you agree with the proposed objectives for indoor conditions?	41
Question 36*: Do you agree with the proposed features to address indoor conditions for health?	42
Question 37*: How important do you think it is for the Building Code to make provision for controlling moisture generated by the use of fixtures and appliances (eg, showers, cooking facilities, gas stoves, clothes dryers and unflued gas heaters)?	42
Question 38: Do you have any suggestions on ways to address the issue of controlling moisture generated by the use of fixtures and appliances (eg, showers, cooking facilities, gas stoves, clothes dryers and unflued gas heaters)?	43
Question 39*: How important do you think it is for the Building Code to extend the provision for a minimum indoor temperature beyond aged care facilities and early childhood centres to housing or other occupied buildings?	45
Question 40: Do you have any suggestions on ways to address the issue of minimum indoor temperature?	46
Question 41*: How important do you think it is for the Building Code to provide for a maximum indoor temperature?	48
Question 42*: How important do you think it is for any provision for maximum indoor temperature to apply beyond aged care facilities and early childhood centres to housing or other occupied buildings?	49
Question 43: Is there anything else about indoor conditions for health you think the Building Code should make provision for?	50
Question 44*: Do you agree with the proposed objectives for accessibility?	52
Question 45*: Do you agree with the proposed features to address accessibility?	53
Question 46*: How important do you think it is for the Building Code to make provision for the front door of every residential unit (including apartments) to meet accessibility requirements?	54
Question 47: Do you have any suggestions on ways to address the issue of accessibility to the front door of residential units (including apartments)?	56
Question 48*: How important do you think it is for the Building Code to make provision for residences to be easily adapted to provide accessibility in the future?	57
Question 49: Do you have any suggestions on ways to address the issue of residences being easily adapted to provide accessibility in the future?	59
Question 50*: How important do you think it is for the Building Code to make provision for universal design for all residences?	60
Question 51: Do you have any suggestions on ways to address the issue of universal design for all residences?	62

Question 52*: How important do you think it is for the Building Code to make provision for public buildings to be provided with features that assist people with visual disability?	64
Question 53: Do you have any suggestions on ways to address the issue of public buildings being provided with features that assist people with visual disability?	65
Question 54*: How important do you think it is for the Building Code to make provision for public buildings to be provided with features that assist people with intellectual disability?	66
Question 55: Do you have any suggestions on ways to address the issue of public buildings being provided with features that assist people with intellectual disability?	67
Question 56: Is there anything else about accessibility you think the Building Code should make provision for?	68
Question 57*: Do you agree with the proposed objectives for noise?	69
Question 58*: Do you agree with the proposed features to address noise?	70
Question 59*: How important do you think it is for the Building Code to make provision for protection from high noise level sources external to the building?	72
Question 60: Do you have any suggestions on ways to address the issue of protection from high noise level sources external to the building?	73
Question 61*: How important do you think it is for the Building Code to make provision to prevent noise between habitable spaces and other parts of the building?	75
Question 62: Do you have any suggestions on ways to address the issue of preventing noise between habitable spaces and other parts of the building?	75
Question 63: How important do you think it is for the Building Code to make provision for the acoustic environment within particular types of buildings such as learning institutions (for example, schools, kindergartens, tertiary institutions, wānanga)?	77
Question 64: Do you have any suggestions on ways to address the issue of the acoustic environment within particular types of buildings such as learning institutions (for example schools kindergartens tertiary institutions wananga)?	78
Question 65: Is there anything else about noise you think the Building Code should make provision for?	79
Question 66*: Do you agree with the proposed objectives for the indoor environment?	79
Question 67*: Do you agree with the proposed features to address the indoor environment for wellbeing?	80
Question 68*: How important do you think it is for the Building Code to make provision for natural ventilation in buildings when windows are closed?	81

Question 69: Do you have any suggestions on ways to address the issue of natural ventilation in buildings when windows are closed?	83
Question 70*: How important do you think it is for the Building Code to make provision for a comfortable rather than a minimum indoor air temperature in housing or any other occupied buildings?	84
Question 71: Do you have any suggestions on ways to address the issue of a comfortable rather than a minimum indoor air temperature in housing or any other occupied buildings?	85
Question 72*: How important do you think it is for the Building Code to make provision for natural light and awareness of the outdoors in living areas and bedrooms in residential buildings?	86
Question 73: Do you have any suggestions on ways to address the issue of natural light and awareness of the outdoors in living areas and bedrooms in residential buildings?	87
Question 74*: How important do you think it is for the Building Code to make provision for security against unwanted entry?	89
Question 75: Do you have any suggestions on ways to address the issue of security against unwanted entry?	91
Question 76: Is there anything else about indoor environment for wellbeing you think the Building Code should make provision for?	92
Question 77*: Do you agree with the proposed objectives for services?	92
Question 78*: Do you agree with the proposed features to address services for wellbeing?	93
Question 79*: How important do you think it is for the Building Code to extend the requirement for hot water for personal hygiene to include workplaces that contain personal hygiene facilities?	94
Question 80: Do you have any suggestions on ways to address the issue of hot water for personal hygiene in workplaces that contain personal hygiene facilities?	95
Question 81*: How important do you think it is for the Building Code to make provision for colour, odour or taste of potable water?	96
Question 82: Do you have any suggestions on ways to address the issue of colour odour or taste of potable water?	97
Question 83*: How important do you think it is for the Building Code to make provision for the location and number of socket outlets and light switches in residential buildings?	99
Question 84: Do you have any suggestions on ways to address the issue of location and number of socket outlets and light switches in residential buildings?	100

Question 85: Is there anything else about services you think the Building Code should make provision for?	101
Question 86*: Do you agree with the proposed objectives for facilities?	102
Question 87*: Do you agree with the proposed features to address facilities for wellbeing?	103
Question 88*: How important do you think it is for the Building Code to make provision for habitable spaces in all residential buildings to have sufficient space for activity, furniture and personal needs?	104
Question 89: Do you have any suggestions on ways to address the issue of habitable spaces in all residential buildings having sufficient space for activity, furniture and personal needs?	105
Question 90*: How important do you think it is for the Building Code to make provision for storage facilities for personal effects in all residential buildings?	108
Question 91: Do you have suggestions on ways to address the issue of storage facilities for personal effects in all residential buildings?	109
Question 92: Is there anything else about facilities you think the Building Code should make provision for?	109
Question 93*: Do you agree with the proposed objectives for durability?	110
Question 94*: Do you agree with the proposed features to address durability?	111
Question 95*: How important do you think it is for the Building Code to make provision for a maintenance plan?	111
Question 96: Do you have any suggestions on ways to address the issue of a maintenance plan?	112
Question 97: Is there anything else about durability you think the Building Code should make provision for?	113
Question 98*: Do you agree with the proposed objectives for energy?	114
Question 99*: Do you agree with the proposed features to address energy?	115
Question 100: Do you have any suggestions about how the Building Code can minimise energy consumption?	116
Question 101: Do you have any suggestions about how the Building Code could promote the use of renewable energy?	117
Question 102: Is there anything else about energy you think the Building Code should make provision for?	117
Question 103*: Do you agree with the proposed objectives for water?	118

Question 104*: Do you agree with the proposed features to address water?	119
Question 105*: How important do you think it is for the Building Code to make provision for water efficiency in areas where there are no water shortages?	120
Question 106: Do you have any suggestions on ways to address the issue of water efficiency in areas where there are no water shortages?	121
Question 107*: How important do you think it is for the Building Code to make provision for minimising the consumption of water from network utility operators in areas of water shortage?	121
Question 108: Do you have any suggestions on ways to address the issue of minimising the consumption of water from network utility operators in areas of water shortage?	122
Question 109: Is there anything else about water you think the Building Code should make provision for?	123
Question 110*: Do you agree with the proposed objectives for materials?	123
Question 111*: Do you agree with the proposed features to address materials?	124
Question 112*: How important do you think it is for the Building Code to make provision for banning the use of some non-sustainable materials (eg certain timbers)?	124
Question 113: Do you have any suggestions on ways to address the issue of banning the use of some non-sustainable materials (eg, certain timbers)?	125
Question 114*: How important do you think it is for the Building Code to make provision for minimising waste generation during construction and demolition through a waste management plan?	126
Question 115: Do you have any suggestions on ways to address the issue of minimising waste generation during construction and demolition?	127
Question 116: Is there anything else about materials you think the Building Code should make provision for?	128
Question 117*: Do you agree with the proposed objectives for protection of other property?	129
Question 118*: Do you agree with the proposed features to address protection of other property?	130
Question 119*: How important do you think it is for the Building Code to make provision for any other areas relating to the protection of other property (aside from those included in the current Code)?	131
Question 120: Do you have any suggestions on ways to address other areas relating to the protection of other property (aside from those included in the current Code)?	132

Question 121: Is there anything else about protection of other property you think the Building Code should make provision for?	132
Question 122*: How important do you think it is for the Building Code to treat buildings with cultural, historical or heritage value differently from similar buildings without that value?	133
Question 123: Do you have any suggestions on ways to address the issue of buildings with cultural, historical or heritage value?	134
Question 124*: How important do you think it is for the Building Code to treat buildings with special traditional and cultural aspects of the intended use differently from similar buildings?	135
Question 125: Do you have any suggestions on ways to address the issue of buildings with special traditional and cultural aspects of the intended use?	135
Question 126: Do you have any comments about how the proposed Building Code objectives are aligned with the purposes of the Building Act?	136
Question 127*: Do you agree the Building Code should be structured in the same way?	137
Question 128: Do you have any comments about the 'what', 'how much', 'where' model for performance criteria?	137
Question 129: Do you have any suggestions about general overarching principles that should be incorporated into the Building Code?	138
Question 130: Do you have any comments about the general principles for performance criteria?	139
Question 131: Do you have any comments on the possible 'staircasing' of performance criteria?	140
Question 132: Do you have any comments about the proposal for a Housing Acceptable Solution?	140
Question 133: Do you have any comments on the possible incorporation of 'acceptable', 'better' and 'best' methods of compliance in the Acceptable Solutions?	141
Question 134: Do you have any other comments about this document?	142