



**MINISTRY OF BUSINESS,  
INNOVATION & EMPLOYMENT**  
HIKINA WHAKATUTUKI

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# Update on Building Regulatory Matters of Interest to Infrastructure Providers

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**National Lifelines Forum**

6 November 2014



# Session Overview

- What is and isn't a *Building*?
- Update of the Building Code clause on Structure
- Building Importance Levels and proposed changes
- Assessing the seismic performance of existing buildings
- **Your questions**



# What is and isn't a *Building*?

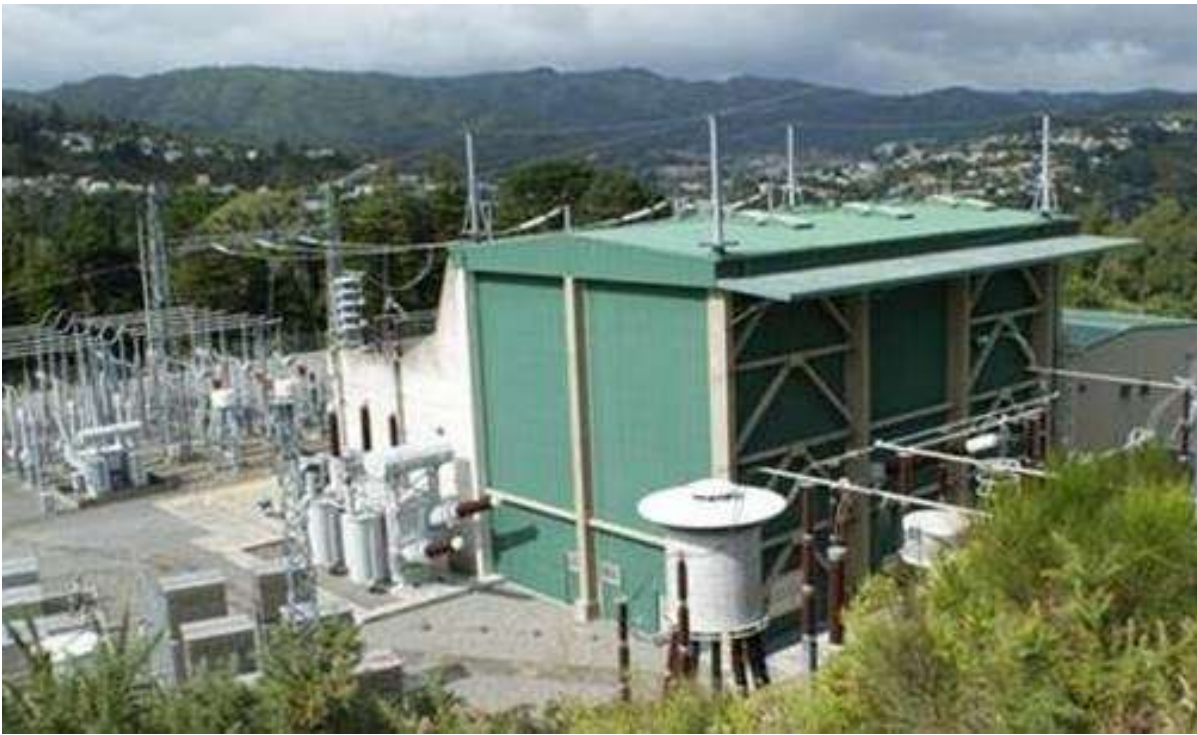
Scope of the Building Act in relation to Lifeline Utilities:

- 'Buildings' **includes**
  - Bridges
  - Wharves
  - Tunnels
  - Storage tanks/ reservoirs
  - Dams
- 'Buildings' **excludes**
  - Parts of systems operated by Network Utility Operators ('NUO systems') that are separate to buildings

# Scope of Network Utility Operators

- Network systems that provide
  - Distribution or transmission of gas, petroleum etc
  - Telecommunications or radiocommunications
  - Electricity line function services
  - Distribution of water for supply
  - Drainage or sewerage system





## Examples of Structures that are not Buildings

- Transmission and communications towers
- Aerials
- Ancillary buildings
- Underground pumping stations





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# Review of the Building Code Structural Provisions

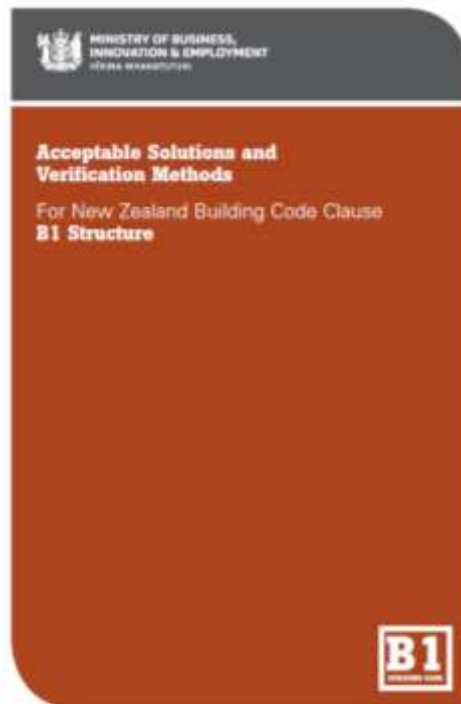
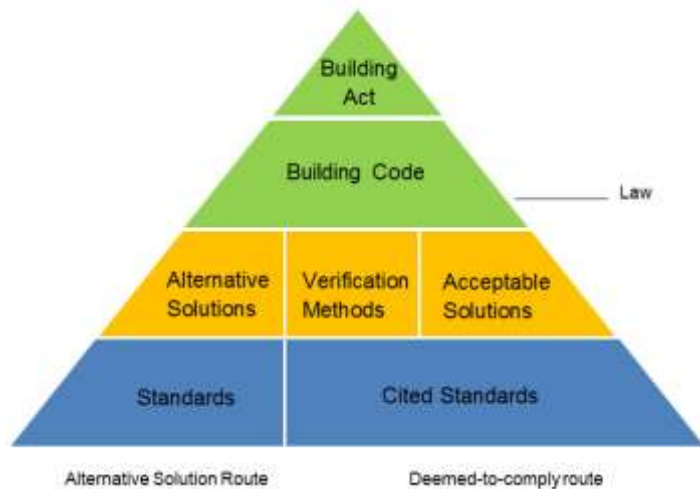
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# New Zealand Building Code

- Building law in New Zealand is the Building Act 2004
- Building work is controlled by the building code which is the first schedule of the building regulations 1992
- There are 40 Clauses in the building code or Schedule 1 of the regulations
- This review is concerned with Clause B1 structure

# Current New Zealand Building Code Clause B1 Structure



16	<i>Building Regulations 1992</i>	1992/150
FIRST SCHEDULE—continued		
<b>Clause B1—STRUCTURE</b>		
Provisions	Limits on application	
<b>OBJECTIVE</b>		
B1.1 The objective of this provision is to:		
<ul style="list-style-type: none"> <li>(a) Safeguard people from injury caused by structural failure,</li> <li>(b) Safeguard people from loss of amenity caused by structural behaviour, and</li> <li>(c) Protect other property from physical damage caused by structural failure.</li> </ul>		
<b>FUNCTIONAL REQUIREMENT</b>		
B1.2 Buildings, building elements and sitework shall withstand the combination of loads that they are likely to experience during construction or alteration and throughout their lives.		
<b>PERFORMANCE</b>		
B1.3.1 Buildings, building elements and sitework shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction or alteration and throughout their lives.		
B1.3.2 Buildings, building elements and sitework shall have a low probability of causing loss of amenity through undue deformation, vibratory response,		



# Why Clause B1 Structure needs to be amended

- Performance level requirements are not clear.
- The requirements are not specific. What are the impacts expected?
- There are no code requirements for increasing levels of natural hazard.
- There is no mandate for the design performance levels set.

# Why Clause B1 Structure needs to be amended

- Confusion for requirements for repair and strengthening of existing buildings.
- Geotechnical issues are not addressed by the code
- Building importance classification for structural design is not in the code.



# Proposed Amendment

- Introduce a Building performance or risk matrix
- Match the size of natural hazard event to tolerable impacts
- Clarify clauses to align objectives with functional and performance requirements,
- Include provisions to cover repair and strengthening of existing buildings and geotechnical aspects.
- Elevate the importance level table for structural design from the Standard to the code by amending Clause A3 of the building code to have a combined Fire and Structures Importance Level table.



# Tolerable Impact Levels (TILs)

- High level descriptors of Tolerable levels of damage and effects on people.
- This is the key way we are proposing to introduce specificity to the structural performance requirements.
- There are four Levels - no effects to the collapse avoidance.
  - TIL1 operational state
  - TIL2 immediate occupancy
  - TIL3 life safety
  - TIL4 collapse avoidance



# Building Importance Levels and probability data for hazard design currently in AS/NZS 1170 Part 0.



BIL1



BIL2



BIL3



BIL4



BIL5

Relative likelihood of occurrence	<i>Annual Probabilities of Exceedance (APE) to be used for natural hazard effects</i>		Tolerable Impact Levels (TILs)				
			Building Importance Levels (BILs)				
	Temporary works	New Buildings	BIL1	BIL2	BIL3	BIL4	BIL5
<b>Maximum Considered Events: For each Design Working Life, use probabilities less than those corresponding to 'Extremely rare' for BIL 4 and BIL 5 buildings to achieve or attain TIL4.</b>						TIL4	TIL4
Extremely rare	1/1000(1/250)	1/5000(1/1000)			TIL4		TIL3
Exceptionally unlikely	1/500(1/250)	1/2500(1/500)		TIL4		TIL3	
Extremely unlikely	1/250(1/100)	1/1000(1/250)			TIL3		TIL2
Very unlikely	1/100(1/50)	1/500(1/150)	TIL4	TIL3		TIL2	
Unlikely	1/50	1/250			TIL2		TIL1
Quite likely	1/25(1/25)	1/100(1/50)	TIL3	TIL2		TIL1	
Likely	1/10	1/50			TIL1		
Very likely	1/5	1/25	TIL2	TIL1			



# Natural hazards

- Building Code requires account taken of all likely loads within the design life.
- Use the Building Performance or risk Matrix for earthquake shaking, wind and snow and for other natural hazards.
- All relevant physical conditions are to be designed for but the code gives a list of included ones to increase awareness.
- Propose to add tsunami to this list but qualify for protection and escape structures.
- Do not propose to add volcanic eruption as an included physical condition. Probability of ash loads > roof LL is low.

# “Other Buildings”

- Proposal is focussed on conventional buildings.
- Building Act covers all buildings.
- Working with reference groups to explore how it might be related to “Other Buildings”
- Bridges are controlled by NZTA through the Bridge design manual.
- Dams are to be controlled by the dam safety regulations.
- Retaining wall, geotechnical structures, tunnels etc are also specialist activities controlled by specific engineering design





# Where to from here

- Public consultation 2015.
- Continue to work with engineering reference groups to frame proposals.
- Engage with other stakeholders.
- Feedback sought particularly on the main aspects:
  - Keeping performance levels the same
  - Performance (risk) matrix in the building code
  - Combined Importance Level Table for fire and structure.

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# Building Importance Levels - Recap

Clause A3 of the NZ Building Code (April 2012) for Fire Purposes  
AS1170 Part 0 for Structure

<b>1</b>	<b>Buildings posing a low risk to human life or the environment</b>	<b>Ancillary buildings not for human habitation</b>
<b>2</b>	<b>Buildings posing a normal risk to human life, the environment or a normal economic cost should the bldg fail</b>	<b>Houses, office buildings, car parking buildings</b>
<b>3</b>	<b>Buildings of a higher level of societal benefit, or with higher levels of risk-significant factors to occupants (large numbers of people; vulnerable populations)</b>	<b>Areas of assembly or congregation; health care facilities (not surgery or emergency treatment)</b>
<b>4</b>	<b>Buildings essential to post-disaster recovery or associated with hazardous facilities</b>	<b><i>Essential facilities with post-disaster functions</i></b>

# Proposed Changes to Building Importance Levels

- Revision to Clause A3 of the Building Code
  - to encompass Structure and Fire
- IL1 and IL2 – essentially no change
- IL3 and IL4 – clarifying which Health, CDEM and Lifeline Utility facilities fit into each level

# Proposed Health, Lifeline Utility and CDEM Wording – IL3

- Health care facilities with a capacity of 50 or more residents but not having surgery or emergency treatment facilities
- *Public transport terminals, stations and interchanges with a capacity greater than 300 people*
- *Buildings for power generating, transmission and key distribution facilities, water treatment for potable water, wastewater treatment facilities, telecommunications and other non-transportation lifeline utility facilities*



# Proposed Health, Lifeline Utility and CDEM Wording – IL4

- Hospitals and other health care facilities having surgery or emergency treatment facilities
- *Buildings or facilities required by Lifeline Utilities (as defined in Schedule 1 of the CDEM Act) to enable them to continue to be able to function during and following an emergency*
- *Buildings designated via CDEM Group Plans or Health Emergency Plans as Emergency Operations Centres or Emergency Co-ordination Centres*



# Structural Requirements for Importance Level 4

- ULS: Building designed for 1/2500 year return period shaking
  - Earthquake design forces 80% greater than for 'ordinary' IL2 building
- SLS: Essential components to remain *operational* under 1/500 year return period shaking
  - Only nominal damage to structure, non-struct. elements and contents; all services within the building functioning



# Consideration of Non-structural Elements



# Resilience and Importance Level 4 Buildings

- Seismic capacity is only part of the story....

## Emergency Power

- extent of coverage

## Structural Performance

- Life safety in extreme events
- Continue to be operational in major events

## Water Storage

- potable water and wastewater holding

## Access to the Building

- neighbouring buildings
- reliability of road access





# Implementation – Key Intentions

1. Criteria/ descriptors for lifeline utilities to be developed at national sector level (telco, electricity, gas, petroleum, water, transportation)
2. Reviewed by MCDEM and MBIE
3. Developed into a guidance document issued by MBIE and referred to by MCDEM
4. Subject to periodic review



# Implications for Existing Buildings

- No building regulatory requirement to upgrade to meet new building requirements (s112)
  - Unless earthquake-prone at IL3/ IL4\*
  - Or a change of use
- But the expectations of the CDEM Act for Lifeline Utilities and other responding agencies won't be met if a low %NBS rating is maintained for decades...

*\* Editorial comment – 34%NBS for an IL4 building is an oxymoron....*

# Assessing the Seismic Capacity of Existing Buildings:

## Updating the 2006 NZSEE Guidelines



New Zealand Society  
for Earthquake  
Engineering

Assessment and Improvement  
of the Structural Performance  
of Buildings in Earthquakes

Prioritisation  
Initial Evaluation  
Detailed Assessment  
Improvement Measures

*Recommendations of a NZSEE Study Group on  
Earthquake Risk Buildings  
June 2006  
Including Corrigendum N°s 1, 2 & 3*



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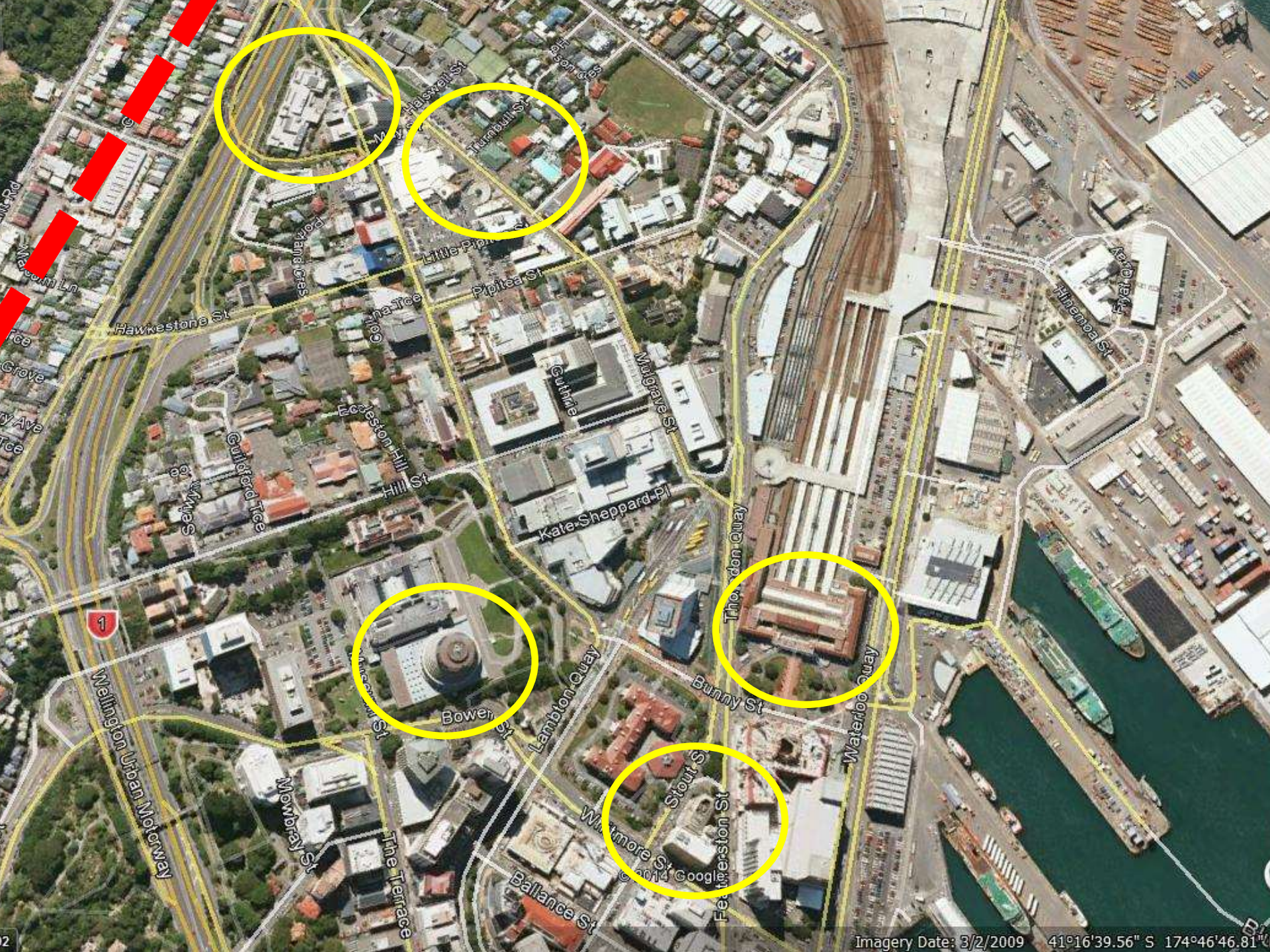
**EQC**

EARTHQUAKE COMMISSION

# Updating the Assessment Guidelines: Time Frames

- Release of the current section on Initial Seismic Assessments – [October 2014](#)
- Release of the updated section on Unreinforced Masonry Buildings – [December 2014](#)
- Release of draft version of fully revised *Detailed Seismic Assessment* – [July 2015](#)
- Release of fully revised *Improvement of Seismic Performance* – [December 2015](#)
  
- [Aiming to release some technical sections progressively where practical](#)







# Your Questions?

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