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Changes to the New Zealand Building Code (NZBC) for dealing with liquefaction-prone land come into effect 29 November 2021. The following information details the requirements to have specifically designed foundations for buildings on ground identified as liquefaction-prone ground after this date. building.govt.nz: Ensuring new buildings can withstand liquefaction effects If you have any questions about the information on this page please; talk to a geotechnical professional or contact Building Services on 03 211 1777 or email building@icc.govt.nz. Background Liquefaction is a natural process where earthquake shaking increases the water pressure in the ground in some types of soil, leading to temporary loss of soil strength. It can cause significant damage to land, buildings, infrastructure and the environment, as well as economic and social disruption. The NZBC definition of 'good ground' as defined by New Zealand Standard NZS3604:2011 has now been amended to exclude 'liquefaction'. The rationale for the change is to support safer and more resilient housing foundations for buildings on liquefaction-prone land. This change has been made as a result of the experience of the Canterbury earthquakes, which generated widespread liquefaction, and subsequent recommendations made by the Royal Commission of Inquiry. These regulations are already in place in the Canterbury region, and will now be extended to all New Zealand. Liquefaction risk factors The three key factors which influence whether liquefaction occurs and how severe the ground damage will be are: soil condition (material type and density), groundwater depth, and earthquake shaking (duration and intensity). Figure 1. Soil liquefaction process Risk of an earthquake occurring in Invercargill (Seismic risk) After assessing earthquake risk the Ministry of Business, Innovation and Employment (MBIE) has divided New Zealand into three seismic risk areas – high, medium and low. Invercargill sits in a low seismic risk area. The New Zealand Building Code (NZBC) B1.3.1 of the NZBC requires buildings, building elements and sitework to have a low probability of rupturing, becoming unstable, losing equilibrium or collapsing. B1.3.2 of the NZBC requires buildings, building elements and sitework to have a low probability of causing loss of amenity through undue deformation. Designers should review the regional seismicity to determine whether liquefaction is likely to be a governing consideration in foundation design for the site. For residential timber framed buildings constructed to NZS3604 on flat sites, amenity is likely to be the governing consideration for the design and specification of foundations. B1.3.3 of the NZBC requires anyone doing building work to take account of all physical conditions likely to affect the stability of buildings, building elements and sitework, including water, earthquake, differential movement, removal of support and many others. What does this mean for my building work? People applying for building consent post 29 November 2021 will need specifically designed foundations for buildings on ground identified as liquefaction-prone ground. Current 'deemed to comply' acceptable solutions, such as NZS3604 for foundations, are unlikely to be able to be used. Liquefaction Vulnerability Categories MBIE has indicated the technical category foundations used in Christchurch are likely to provide a simple compliance pathway. MBIE recommends designers consider the three technical categories for foundation design options outlined in the Canterbury Guidance: Very Low and Low Liquefaction Vulnerability Technical Category 1 (TC1) Medium Liquefaction Vulnerability Technical Category 2 (TC2) High Liquefaction Vulnerability Technical Category 3 (TC3) These TC categories were developed from observation of actual earthquake affects in the Canterbury region and don't directly correlate to Domain A, B and C as described by the ICC's mapping. This is an issue common to most regions of New Zealand and MBIE has provided guidance to address this – www.building.govt.nz – Changes to foundation design (external link, new window). Designers Designers must specify foundations to a level of resilience which reflects the importance of the structure and addresses the liquefaction hazard present. Defining the development scenario is the first step in this process. Higher importance building work will demand a higher level of rigour and confidence in the design process. The methodology outlined is intended to inform the assessment of liquefaction hazard to support foundation design. It does not replace the need for site-specific geotechnical testing, review and interpretation by a suitably experienced engineering practitioner to establish the shallow ground conditions present and other hazards which may need to be addressed. Geological Assessment A geological assessment has been completed for our city showing areas that could be susceptible to liquefaction given an earthquake of sufficient type and magnitude. Tonkin & Taylor Ltd have completed a "liquefaction study of the city". Download the report here: [Tonkin and Taylor Liquefaction Vulnerability Report Invercargill \[PDF\]](#) Liquefaction hazard map Download this map for printing: [Invercargill liquefaction hazard map \[PDF\]](#) Buildings will withstand likely loads, including wind, earthquake, live and dead loads (people and building contents). This clause sets requirements around the combination of loads that buildings, building elements and sitework are likely to experience during construction, alteration and throughout their lives. The performance requirements outline how buildings should be stable, not degrade and withstand physical conditions to protect lives and other property. It makes due allowance for the intended use of a building, the consequence of failure and other limitations. Record of amendments is a record of changes to the Acceptable Solutions, Verification Methods and handbooks. Changes from the November 2019 Building Code Update have revised B1/AS1 to ensure new buildings are built safe and strong enough to withstand liquefaction effects. This information assists authorities adapt to this requirement. Read more about liquefaction effects All content related to B1 Structure General Building Officials News Updates This information is published by the Ministry of Business, Innovation and Employment's Chief Executive. It is a general guide only and, if used, does not relieve any person of the obligation to consider any matter to which the information relates according to the circumstances of the particular case. Expert advice may be required in specific circumstances. Where this information relates to assisting people: with compliance with the Building Act, it is published under section 175 of the Building Act with a Weathertight Services claim, it is published under section 12 of the Weathertight Homes Resolution Services Act 2006.

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