

COMMENTARY ON PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

C8.2 TOLERABLE RISK CRITERIA

a) Loss of Life criteria

As discussed in Section C3.5, the regulator is the appropriate authority to set standards for tolerable risk which may relate not only to perceived safety in relation to other risks, but also to government policy. Implementation of a tolerable risk level has implications to the community at large, both in terms of relative risks or safety, but also in terms of economic impact.

Table C9: Individual Loss of Life Risk Criteria. (Leroi *et al.*, 2005)

Organisation	Industry	Description	Risk/annum	Reference
Health and Safety Executive, United Kingdom	Land use planning around industries	Broadly acceptable risk. Tolerable limit	10^{-6} /annum, public and workers 10^{-4} /annum public ⁽¹⁾ 10^{-3} /annum workers	HSE (2001)
Netherlands Ministry of Housing	Land use planning for industries	Tolerable limit ⁽²⁾	10^{-5} /annum, existing installation 10^{-6} /annum, proposed installation	Netherlands Ministry of housing (1989), Ale (2001), Vrijling <i>et al.</i> (1998)
Department of Urban Affairs and Planning, NSW, Australia	Land use planning for hazardous industries	“acceptable” (tolerable) limits ⁽²⁾	5×10^{-7} /annum hospitals, schools, childcare facilities, old age housing 10^{-6} /annum residential, hotels, motels 5×10^{-6} /annum commercial developments 10^{-5} /annum sporting complexes	
Australian National Committee on Large Dams	Dams	Tolerable limit	10^{-4} /annum existing dam, public most at risk subject to ALARP 10^{-5} /annum new dam or major augmentation, public most at risk, subject to ALARP.	ANCOLD (2003)
Australian Geomechanics Society guidelines for landslide risk management	Landslides (from engineered and natural slopes)	Suggested tolerable limit	10^{-4} /annum public most at risk, existing slope 10^{-5} /annum, public most at risk, new slope	AGS (2000)
Hong Kong Special Administrative Region Government	Landslides from natural slopes	Tolerable limit	10^{-4} /annum public most at risk, existing slope. 10^{-5} /annum public most at risk, new slope	Ho <i>et al.</i> (2000), ERM (1998), Reeves <i>et al.</i> (1999)
Iceland ministry for the environment hazard zoning	Avalanches and landslides	“acceptable” (tolerable) limit	3×10^{-5} /annum residential, schools, day care centres, hospitals, community centres. 10^{-4} /annum commercial buildings 5×10^{-5} recreational homes ⁽³⁾	Iceland Ministry for the environment (2000), Arnalds <i>et al.</i> (2002)
Roads and Traffic Authority, NSW Australia	Highway landslide risk	Implied tolerable risk	10^{-3} /annum ⁽⁴⁾	Stewart <i>et al.</i> (2002), RTA (2001)

Notes:

- (1) But for new developments HSE (2004) “advises against giving planning permission where individual risks are $> 10^{-5}$ /annum”.
- (2) Based on a temporal spatial probability of 1.0.
- (3) Assumes temporal spatial probability of 0.75 for residential, 0.4 commercial, 0.05 recreational.
- (4) Best estimate of societal risk for one person killed, top risk ranking. If slope ranks in this range action is taken to reduce risks within a short period. For the second ranking, societal risk is 10^{-4} /annum, and slope is put on priority remediation list.

Table C9 summarises published individual loss of life risk criteria. An overview of the issues in relation to Loss of Life criteria are discussed in Leroi *et al.* (2005).

It is important to distinguish between “acceptable risks” and “tolerable risks”.

Tolerable Risks are risks within a range that society can live with so as to secure certain benefits. It is a range of risk regarded as non-negligible and needing to be kept under review and reduced further if possible.

Acceptable Risks are risks which everyone affected is prepared to accept. Action to further reduce such risk is usually not required unless reasonably practicable measures are available at low cost in terms of money, time and effort.

Most organisations listed in Table C9 have adopted Tolerable Risk as the measure to gauge risk. This is because there is a trade-off between the benefits and cost of risk mitigation, and the costs to achieve acceptable risk levels are often high. The Australian National Committee on Large Dams (ANCOLD) has adopted tolerable risk criteria for assessing risks posed by dams. This decision was reached after extensive consultation locally and internationally and after seeking legal opinion.