Appendix F: Assessing disaster hazards

Understanding what hazards are present is fundamental in taking resilience to natural disasters into account when making infrastructure investment decisions. This understanding is achieved by conducting hazard assessments.

A hazard assessment is a technical tool to assess the probability of a natural disaster event and the consequences for existing and proposed infrastructure. A hazard assessment should happen during the initial planning phase of any significant new infrastructure strategy or investment. The hazard assessment will identify the nature and extent of natural disaster risks present in a given location. For example, a hazard assessment may identify that the path for a new electricity transmission line is likely to be affected by bushfire once every five years or affected by major storms once a year.

A thorough hazard assessment should take into account all characteristics of the hazard including timing, intensity, duration and frequency. For example, a hazard assessment for a proposed road may identify that the area is at high risk of flood. The hazard assessment should then identify how often flooding has historically occurred, how often flooding is expected to occur, the expected flood depth and velocity, and how long the area may remain flooded. These items should consider averages and distribution. For example, an area may flood to a depth of 1.5 metres on average, but the flood will exceed two metres once every five years, and three metres once every 15 years – and so on.

This data is analysed and mapped to define a probability set for hazard events of each type, frequency and intensity. The data can then be applied to profile options for infrastructure in a way that minimises exposure and vulnerability, such as shifting the location or physical attributes of the asset to mitigate the potential for damage.

The results of the assessment should also be used to inform the design of infrastructure. For example, the assessment might identify that a development area is at risk of coastal inundation during an extreme storm event. The design of essential infrastructure in the area such as sewers and drains could be adjusted to take into account this hazard.

A hazard assessment is also required as input to measure resilience benefits within a CBA framework (see chapter five). A hazard assessment will allow the analyst undertaking the CBA to estimate average annual costs due to natural disasters, and the benefits associated with more resilient infrastructure design. This will inform the selection of infrastructure that takes into account natural disaster risks and the benefits of incorporating resilience.

Geoscience Australia has a comprehensive methodology for hazard assessment, for the purpose of managing and responding to natural disaster events.

The required data for analysing hazards is specific to each major hazard type:

- Tropical cyclone
- Flood
- Severe storm
- Bushfire
- Landslide
- Tsunami.

The methodology emphasises that analysing the likelihood of a hazard typically requires a wide set of data and modelling capabilities. This means that assessments are best undertaken by organisations with specific capabilities, not by the project owner.

Relevant data and models are held by various government departments as well as the private sector. This data includes historical records of disaster events, understanding the physical processes leading to an event, and/or ongoing monitoring data of natural phenomenon. For example, Geoscience Australia is developing a national flood risk information portal, and the CSIRO has developed national models of flooding and bushfire events. The Intelligent Disaster Decision Support System also plans to use geospatial data to offer hazard perception and vulnerability maps. Using this data, it is possible to estimate the approximate frequency of hazard events and the probability of an event that exceeds certain intensity levels.

Practitioners undertaking a hazard assessment should acknowledge the limitations of the analysis due to the complexity of hazard risks, poor data availability and the potential interaction of hazard events or impacts, including between infrastructure assets. Uncertainty about the effects of climate change can also limit the extent to which modelling based on historical data will predict future events.