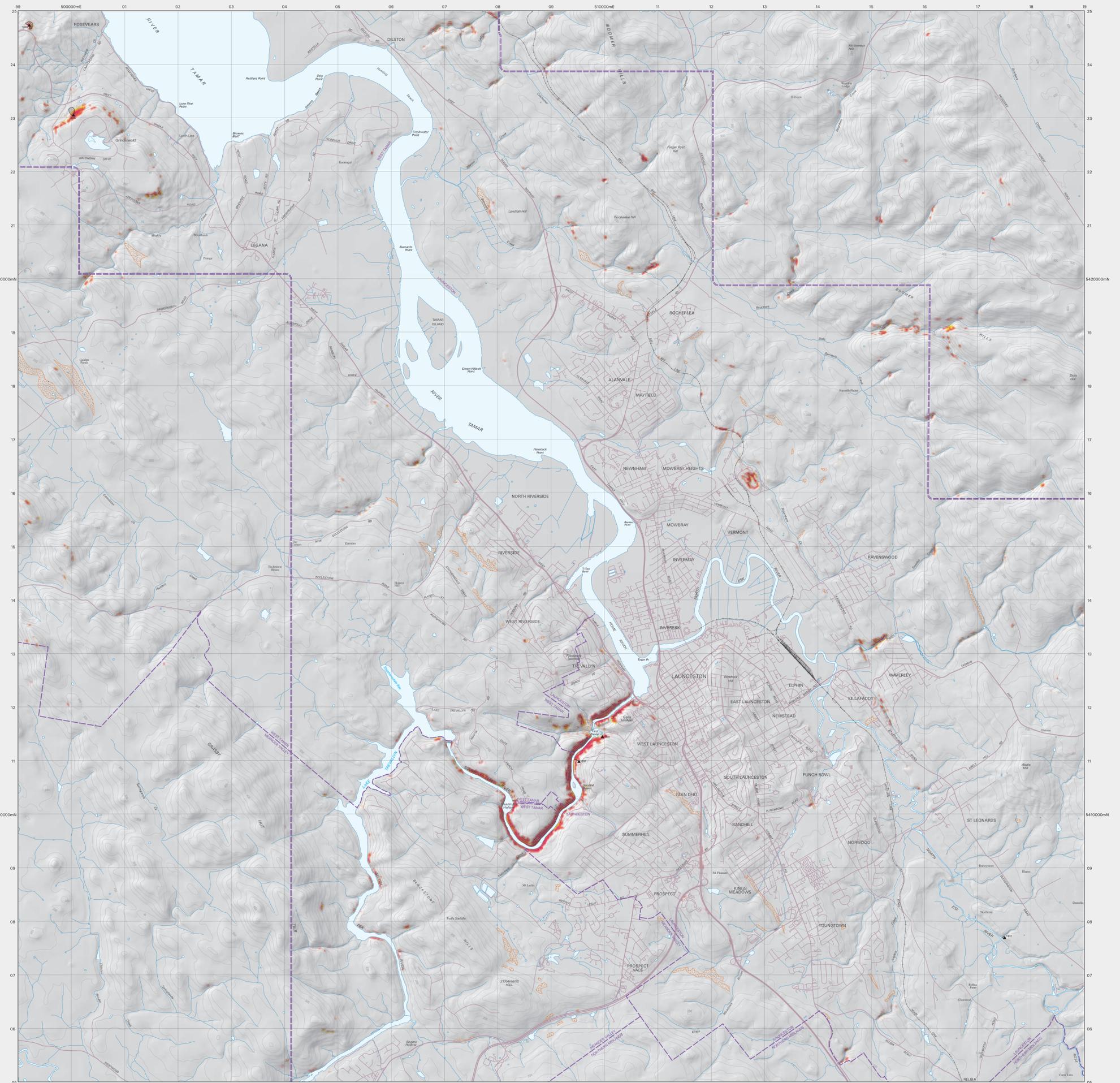


TASMANIAN LANDSLIDE HAZARD SERIES

LAUNCESTON – POTENTIAL ROCKFALL HAZARD

MAP 4 OF 5



Rockfall Hazard

Background, Aim and Purpose

Large areas of land throughout Tasmania are subject to slope instability and about 60 hazards have been identified to date since the 1970s. The majority of these hazards are located in the Launceston area and are a direct result of the extensive mining operations in the area. The hazard assessment process is a multi-stage process that involves the identification of potential hazards, the assessment of the risk posed by these hazards, and the development of mitigation measures to reduce the risk. The hazard assessment process is a multi-stage process that involves the identification of potential hazards, the assessment of the risk posed by these hazards, and the development of mitigation measures to reduce the risk.

Hazard and Risk

According to the joint Australian-New Zealand Standard (AS/NZS 3200:1999) risk is defined as the chance of something happening that will impact upon objectives. It is measured in terms of consequences and likelihood.

The definition of risk is often expressed by the following equation:

$$RISK = Hazard \times Vulnerability \times Elements at Risk$$

A hazard is defined as a source of potential harm or a situation with a potential to cause loss. A hazard, such as a landslide, can be measured in terms of location, volume (or area), type, velocity and likelihood with time. Vulnerability refers to the susceptibility and resilience of structures, commonly and the environment to the hazard. The elements at risk refers to the number of those structures, people, etc. exposed to the hazard.

A hazard map attempts to portray the processes operating in an area, conveying all or some of the hazard parameters, generally in a qualitative to semi-quantitative manner. Because of the uncertainties involved, the translation of regional hazard maps into risk maps is challenging and involves a process. An indication of the likely risk level is provided for each hazard at a regional scale. This will vary in detail. However, provided the limitations of the maps are understood, hazard maps can be used for many purposes in order to achieve the overall goal of safe and resilient communities.

Caution for Use

The following cautions apply to the maps:

- The hazards identified are based on imperfect knowledge of ground conditions and models to represent our current understanding of the landslide process. As this knowledge improves our perception of the hazard and the depiction of the hazard on the map may also change.
- These maps can be used as a guide (or flag) to the need for specific assessment in potential hazard areas.
- Planning decisions should not be made solely on the basis of the hazard zones depicted on the map.

The scale limitations of the data should be considered at all times as exceeding this limit could lead to inaccurate decisions about the hazard.

Specific assessment of landslide hazard and risk should be undertaken by suitably qualified and experienced practitioners in the fields of engineering geology and geotechnical engineering.

Practitioners undertaking specific assessments should read the text and appendices attached to the maps and obtain a thorough understanding of the methodology and limitations of the maps.

Areas where no hazard is shown can still have issues with slope instability.

Anthropogenic influences on slopes cannot be predicted and the occurrence of slope instability resulting from the influence of human actions is specifically excluded from these maps.

The identification and performance of cut and filled slopes have not been specifically considered in map production and their scale is such that they often cannot be resolved on the maps. The presence of such slopes should always be considered in specific assessments.

Method

A methodology has been specifically developed for these maps and will be used for other urban areas of Tasmania. It can be downloaded from the MRT website.

The methodology used is based on:

- Recording observations of land instability in- and surrounding the study area (the landslide inventory).
- Classification of the processes that control each landslide type.
- Computer assisted modelling that simulates each of the landslide processes to predict areas that could be affected by future landslides.

Rockfall source areas were predicted by selecting slopes greater than or equal to 42 degrees. The identification of potential rockfall source areas is constrained by the resolution and quality of the topographic data. In a few instances, hazard areas identified by the model were modified where field observations have shown them to be unrealistic. The choice of angle is based on the angle of repose for debris talus as defined in the published literature (e.g., Collins 1962) and from engineering field observations. It is recognised that the choice of angle is a conservative estimate of the angle of repose, but this is considered to be generally of lower probability. Areas of talus shown on the map are generally much less than 42 degrees and runoff modelling is not performed.

Runoff paths were modelled from each source cell, travelling in the direction of maximum slope to the nearest water body. This is a simplistic technique that represents the most likely path of rockfall debris. In reality the actual path of material may deviate from this simple model. The effect of such deviations has been taken into account in the hazard assessment by using two values, 34 and 30 degrees, representing decreasing travel angle method with two values, 34 and 30 degrees, representing decreasing

probability respectively (see conceptual diagram). These values are based on field studies of debris flow run slope angles in Tasmania. It is possible for rockfalls to run further than that shown in these conditions but the likelihood is considered to be much less. For rockfalls occurring in weaker rock units, the travel angle values chosen may, in many instances, be too low and that overestimates the hazard distance.

Conclusions

The map identifies a number of places that could be affected by rockfall events in the urban Launceston area and surrounds.

The main rockfall areas are associated with topographic features of debris columns in the Coleridge and Carr Linn Gorges but they also occur on other natural slopes such as valley walls. Rockfalls will also occur on artificial slopes such as quarry faces and road-cuttings that are spread throughout the study area.

In the most common situation, the consequences of rockfalls (involving debris boulders) will cause serious injury or death to unprotected persons. Structures would also receive significant damage from typical sized boulders.

The frequency of rockfall events in the Launceston area is difficult to quantify and needs further work for site specific responses to be able to calculate risk. Runways, access ways, foot hoovers and human activities are all potential triggers for these events. Seismic shaking (earthquakes) is another potential trigger, but the frequency of the study area is low and the probability of strong ground shaking is considered to be minimal.

Further Information

For further information on these maps or Tasmanian landslides in general can be obtained from the MRT website at www.mrt.tas.gov.au or by contacting the agency directly.

References

Clain, N., 1963. The mountains of Northern Tasmania. Rotterdam, A.A. Balkema, 200 p.

Modelled Rockfall Hazard Zones



Other Potential Hazard Zones



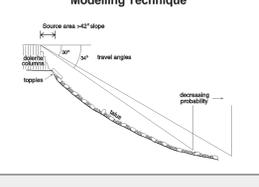
Landslide Polygons and Points



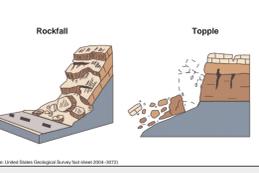
Note: Not all landslide points have an associated polygon. Landslide points with no polygon are GEOPAZAR2 (landslide database).



Conceptual Diagram Illustrating Rockfall Modelling Technique



Examples of Slope Failure Depicted on Map



Citation: Macgregor, C. 2004. Map 4. Launceston - Potential Rockfall Hazard. Geospatial Information System, Mineral Resources Tasmania, Department of Energy and Resources, Hobart.

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Disclaimer: While every care has been taken in the preparation of this map, no warranty is given as to the completeness or the accuracy of the information contained herein. The user should not rely on the map as the basis of any material or financial decisions. The user should also be aware that the map is a generalisation of the actual situation and should not be used as the basis for any material or financial decisions. Further information on the map and its use should be obtained from the agency that produced it. The user should also be aware that the map is a generalisation of the actual situation and should not be used as the basis for any material or financial decisions.

LOCATION DIAGRAM



LANDSLIDE HAZARD SERIES