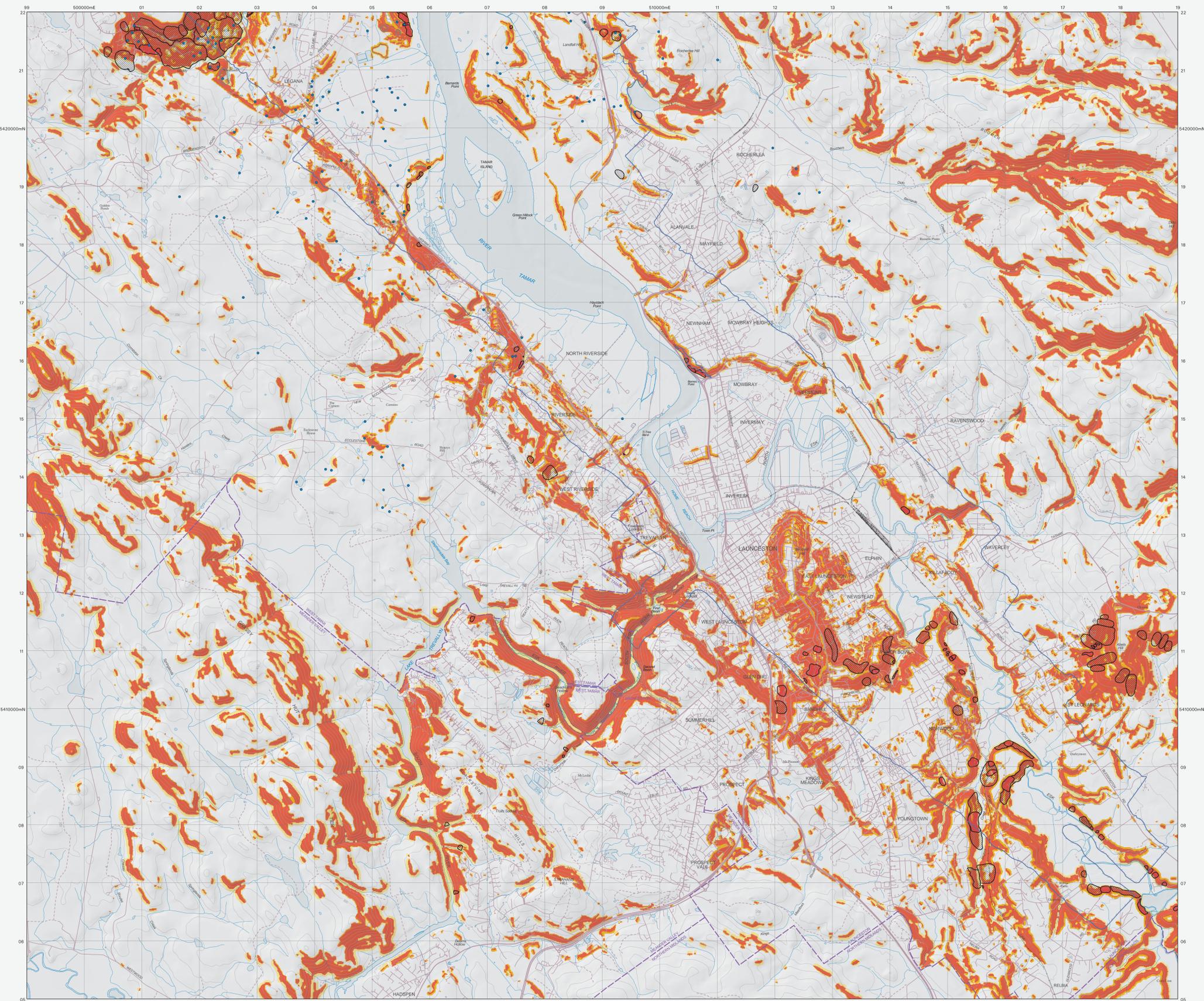


# TASMANIAN LANDSLIDE MAP SERIES LAUNCESTON - SLIDE SUSCEPTIBILITY MAP 5



### Landslide Map Series

#### Background, Aim and Purpose

This map is one of a set of thematic maps addressing regional landslide susceptibility and hazard for urban areas and surrounds in Tasmania. The project is undertaken by Mineral Resources Tasmania, in partnership with Local Government and sponsored by the Natural Disaster Mitigation Programme (involving Federal and State contributions). Large tracts of land throughout Tasmania are subject to slope instability and over 75 slides have been destroyed by landslides since the 1950s with many more significantly damaged. While only minimal loss of life has occurred such events are highly traumatic to those directly affected and the financial cost to individuals, corporations and the State runs into many millions of dollars. Recent disasters such as the Theobald Landslide in New South Wales, serve to demonstrate the potential for loss of life and property from relatively small landslides. Unfortunately landslide damage can be avoided where ground conditions are properly understood before construction proceeds and, in already developed areas, this understanding can be used to mitigate the hazard through various measures.

#### Method

A methodology has been specifically developed for this map series and is used for other areas of Tasmania. Refer to the document 'Tasmanian Landslide Map Series: User's Guide and Technical Methodology' for further information. The methodology that evolved since the earlier maps were published, in part due to the Australian Geomechanics Society publishing guidelines for landslide zoning (AGS 2007a,b), changes have been made to conform to these as much as possible.

#### The methodology used is based on:

- Recording observations of land instability in- and surrounding the study area (the landslide inventory).
- Analysis 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.

#### Caveats for use

- The information provided is for the public domain and anyone is free to use it provided they read and understand the purpose and limitations.
- The following caveats shall apply to the maps:
  - The hazard identified are based on important knowledge of ground conditions and models to represent our current understanding of the landslide process. As the knowledge improves and perceptions of the hazard and the direction of the map may also change.
  - These maps can be used as a guide for the need for specific assessment of potential hazard areas.
  - Planning decisions should not be made solely on the basis of the zones delineated on the maps.
  - The scale limitations of the data should be considered at all times as exceeding this limit could lead to inaccurate or misleading information.
  - Site 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 such assessments should read the map and associated documents to obtain a thorough understanding of the methodology and limitations of the maps.
  - Areas with low susceptibility to hazard shown on the maps will have issues with slope instability.
  - Anthropogenic influence 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 slope is such that they often cannot be included on the maps. The presence of such slopes should always be considered in site specific assessments.

### Slide Susceptibility

#### Background, Aim and Purpose

The landslides and their susceptibility zones shown on the map apply to several styles of landslides, both slides and flows, but excludes block slides as described in a separate map sheet. They include both deep-seated and shallow features. Deep-seated landslides are deep-seated failures along their underlying geological units. The depth of these features is thought to extend to the surface of the slide, or at least to the base of the slide. Shallow landslides are transitional into soil flows, and less commonly rock slides or block slides. Shallow failures usually involve movement of surficial deposits and include intratranslational slides and flows. Almost all of the landslides features shown on the map would be classed as large (>5000m<sup>2</sup>). The definition of these and other terms in this document are defined by the Australian Geomechanics Society Landslide Risk Management Guidelines (AGS 2007a).

#### Method

Some of the existing landslides have evidence of recent (European era) movement, the remainder are undated. The significant extent of damage to properties, roads and other structures by date (as recorded in the MRT landslide database) indicate that the landslides considered are expected to move in the future. The slide range and present a credible hazard to be addressed.

#### Method

The susceptibility modelling activity and/or deep-seated slope-type landslides that are difficult to model without identifying unreasonable large areas. Such features are expected to be the most or extreme. Late mapping operations only cover hazard to structures. This map superimposes earlier mapping by MRT including the pre 2001 Tamar Valley - Advisory Landslide Zoning and the Launceston map by Mazengarb 2006 which were developed with the current map. Some of the susceptibility areas identified are already developed or are under development.

#### Method

Geomorphological analysis of the various forms of landslides suggests that many have occurred under recent conditions although the effects require inquiry, such as disintegration and development of steeply eroding slopes. The presence of steeply eroding slopes (particularly steep) and a range of geomorphic processes. Landslides identified by a landowner group, contain about 80% of the landslides in the study area. Of the remaining geological units, landslides are much less common in part because they occur in areas that are already more resistant to slide-warding. Delineate: There are only two deep-seated landslides in Jurassic strata, one of which is a new discovery north of the Barton Bridge where the debris appears to have deep weathering zones along its base. This is a predictor of susceptibility over the whole area. Current: Several landslides have been discovered within the city area, that occur on different types of geological units. These landslides have not been consistently mapped over the study area. The identification of these units is a prerequisite for the identification of the underlying geological materials. Summary: A small number of landslides are recognised within this unit and an overall surface unit.

#### Method

Susceptibility zones have been defined in a simplified manner by identifying coarse areas, above normalised slope thresholds for the various geological units mapped. These thresholds were used to identify areas of potential hazard. In addition, a distance limit was used to identify areas of potential hazard. Details of the modelling methodology is contained within the data source. The data source is a vector file that contains the data used to identify the underlying geological materials. The confidence in the data is high. For the other units, where there is much less data, the values chosen are largely based on consistency with other mapping areas in the region.

#### Method

Setback (regression) and runoff areas are assigned to allow the modelling method to identify the uphill and downhill extent respectively to which a potential failure could occur. An inset contour provides an indication of the modelling process. In addition, a distance limit was used to identify areas of potential hazard. Details of the modelling methodology is contained within the data source. The data source is a vector file that contains the data used to identify the underlying geological materials. The confidence in the data is high. For the other units, where there is much less data, the values chosen are largely based on consistency with other mapping areas in the region.

The following table lists the modelling parameters employed in identifying susceptibility zones (all angles are in degrees). Where applicable each other the lowest value has been used.

Geological Unit	Source slope angle (°)	Regression angle (°)	Runout angle (°)
Colliery	7	7	8
Launceston Group sediments	7	7	8
Launceston Group conglomerate	12	12	12
Genesee basin*	10	14	12
Jurassic basalt	15	18	12
Extremely weathered Jurassic basalt*	12	18	12
Lower Permian Group*	18	18	12

\*Values are modified after southern Tasmanian mountain debris flow parameters (modified after New Coast susceptibility mapping 2009)

\*All values in degrees

#### Conclusions

This map identifies significant areas that may be susceptible to landslide movement of some form and based on available damage records there is a credible hazard to be addressed. The map identifies both past landslides that are potentially susceptible to reactivation and areas that are susceptible to first time failure. The susceptibility areas in general are not necessarily variable in their present condition, but it cannot be assumed that they are suitable for development without some form of geotechnical investigation, such as that outlined in the Practice Note Guidelines for Landslide Risk Management (AGS 2007a). The best description of property, if any, of loss of life should be estimated on a site by site basis within the identified landslide and landslide susceptible areas. While there is sufficient information to calculate bedrock, the map can be used to support planning decisions, emergency management and for general community information.

#### References

- AGS 2007a, Guidelines for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning, Australian Geomechanics, 42, 13-28
- AGS 2007b, Commentary on Guidelines for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning, Australian Geomechanics, 42, 37-56
- AGS 2007c, Practice note guidelines for landslide risk management, Australian Geomechanics, 42(1), 1-14
- AGS 2007d, Commentary on practice note guidelines for landslide risk management, Australian Geomechanics, 42(1), 15-16
- Mazengarb, C. 2006, Launceston map 5 - potential landslide hazard, Tasmanian Landslide Hazard Series (1:25,000), Mineral Resources Tasmania.
- Mazengarb, C., Stevenson, A.D. 2010, Tasmanian Landslide Map Series: user guide and technical methodology, Tasmanian Geological Survey Record 2010/01, Mineral Resources Tasmania, 44p.

#### Further Information

**IMPORTANT: This map should be used in conjunction with an understanding of the 'Tasmanian Landslide Map Series: User's Guide and Technical Methodology' by Mazengarb & Stevenson 2010 (see above).** This document, and other information on this map series or Tasmanian landslides in general can be obtained from the MRT web site at: [www.mrt.tas.gov.au](http://www.mrt.tas.gov.au) or by contacting the agency directly. Copies of the map series (PDF format) are freely available from the MRT website. GIS layers, developed by MRT, and shown on the map are applied to each Council in the area and are available for purchase at a minimal cost of \$495.

Summary information from the MRT landslide database and map images from the Tasmanian Landslide Map Series can be viewed with the MRT online web map viewer (choose Map: Landslides).

### Susceptibility Zones for First Time Failure



Regression area: An area up-slope of a source area that could fail following a landslide movement (in a retrogression of air back area).

Source area: An area of slope with the potential to form a slope path, identified largely on the basis of slope angle and geology.

Runout area: An area down-slope of a source area where the morphology, debris or rock use potentially prevent.

### Susceptibility Zones for Landslide Reactivation



Landslide, recent or active

Landslide, active/unknown

Possible landslide, active/unknown

### Data Sources

The sources for the digital elevation model (DEM) used in the susceptibility modelling are shown as follows:

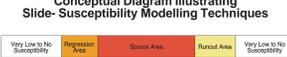
Boundaries between Airphoto Laser Scanning (ALS) and 1:25,000 topographic contours, and 1:50,000 contours.

### Miscellaneous



Slides commonly transition into earth flows in the Tamar Valley, forming a 'complex earth slide-earth flow'.

### Conceptual Diagram Illustrating Slide-Susceptibility Modelling Techniques



Slide showing pre-failure and post failure profiles. Runout and regression lines for a hypothetical landslide are defined with their relationship to the modelled susceptibility zones for the pre-failure landscape.

### Examples of Landslides Depicted on the Map



Slides commonly transition into earth flows in the Tamar Valley, forming a 'complex earth slide-earth flow'.

Scale: 1:25 000



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Copyright: © 2014 Launceston map 5 - Slide Susceptibility, Tasmanian Landslide Map Series, Mineral Resources Tasmania, Department of Infrastructure Energy and Resources, Hobart.

Note: This map superimposes Mazengarb, C. 2006, Launceston, map 5 - Potential landslide hazard.

#### Acknowledgements:

Contributors to the map from M. Stevenson, R. Sims, J. Stevenson and A. Mayne. Base data from the Land Information System of Tasmania (LIS). Copyright State of Tasmania.

Sources for digital terrain model: airborne laser data derived from Geospatial Futures for Tasmania (GDF) between 2008 - 2010. Contours from 1:25,000 topographic contours supplied by Geospatial Tasmania (Institute of Marine and Antarctic Studies, 2006), and 1:50,000 contours, including the Tamar River Hydrographic Survey (2005).

Map produced by the Geospatial Information Branch of Mineral Resources Tasmania using GIS software.

#### Disclaimer:

While every care has been taken in the preparation of this data, no warranty is given as to the accuracy of the information contained herein. It is intended for general information only and should not be used as a basis for any major construction works. Readers should consult professional advisers. The State of Tasmania and its agencies, contractors and agents expressly disclaim all liability (including all liability from or attributable to any negligence or wrongful act) and any responsibility to any person who relies on or is in part upon any of the material in this data.

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#### LOCATION DIAGRAM



#### LANDSLIDE MAP SERIES

Data correct & plotfile generated: 14-MAR-2014