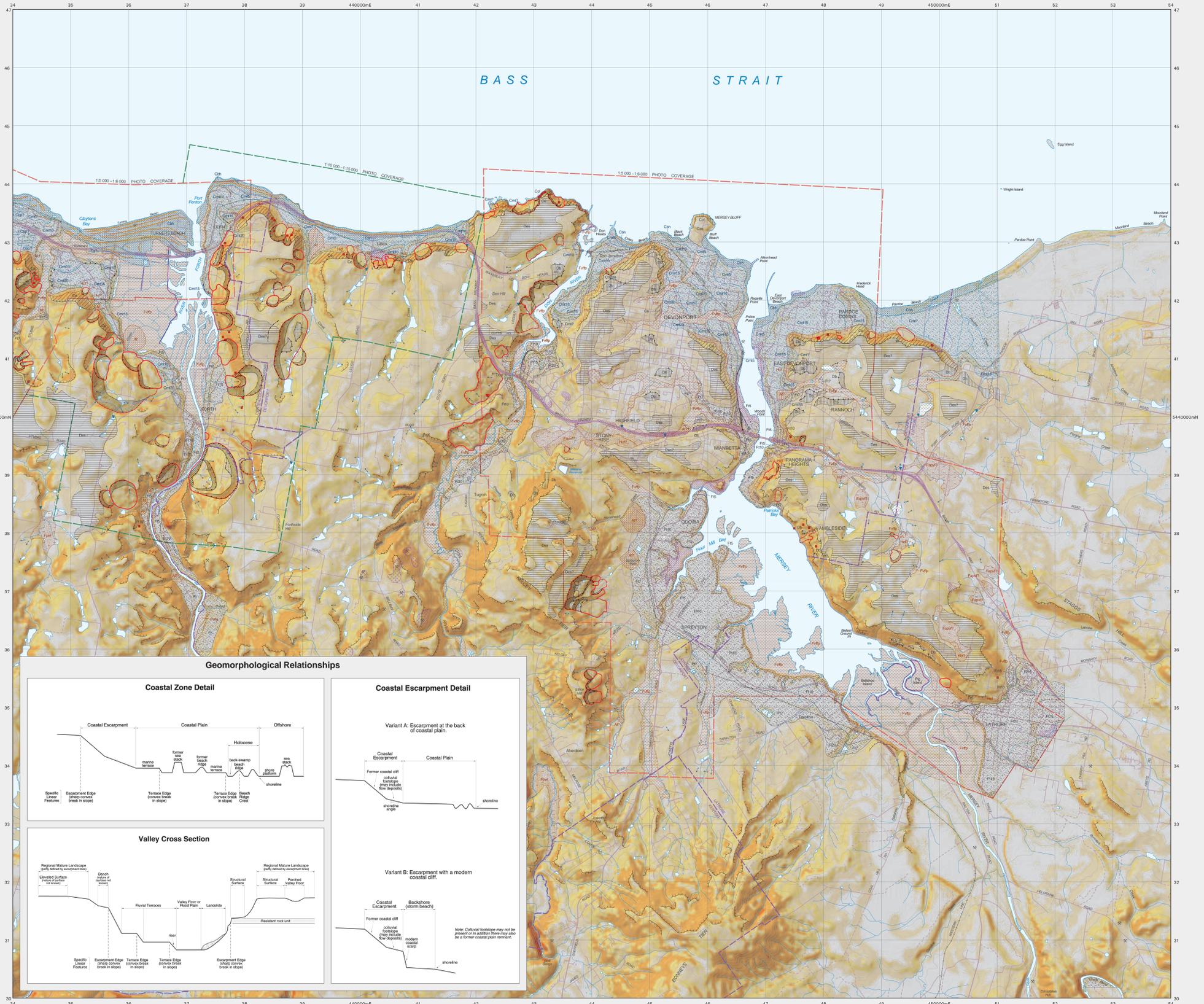
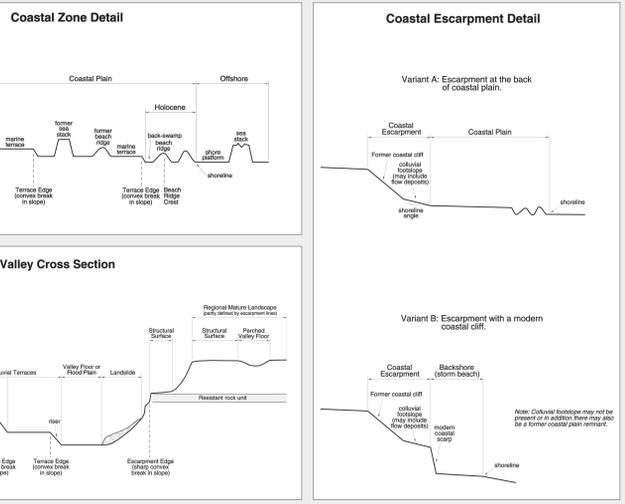


TASMANIAN LANDSLIDE MAP SERIES
DEVONPORT – GEOMORPHOLOGY
MAP 2



Geomorphological Relationships



Landslide Map Series

Background, Aim and Purpose
The 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 60 localities have been identified by the 1990s with many more significant areas identified. While only minimal loss of life has occurred such events are highly disruptive. Recent disasters such as the Thredbo Landslide in New South Wales, serve to remind us of the potential for loss even from relatively small landslides. In addition, 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 developed for this map series and is used for other areas of Tasmania. It can be downloaded from the MRT website although minor changes in application have been made since the first maps were completed. Furthermore, the Australian Geomechanics Society have published guidelines for landslide zoning (AGS 2007a) and changes have been made to conform to these as possible.

The methodology used is based on:
- Recording observations of land instability in and surrounding the study area (the landslide inventory).
- The use of the processes that control each landslide type.
- Correlating landslide mobility that identifies each of the landslide processes to predict areas that could be affected by future landslides.

Caveats for Use
The information provided in the public domain and anyone is free to use it provided they understand the purpose and limitations.
The following caveats apply to the maps:
- The landslide features and zones identified are based on imperfect knowledge of ground conditions and models that represent current understanding of the landslide process. As this knowledge improves the depiction on the maps may also change.
- These maps can be used as a guide (or flag) to the need for site specific assessment and engineering.
- Planning decisions should not be made solely on the basis of the zones delineated on the maps.
- The identification of the areas should be considered as a first step in the assessment process. Further investigations should be undertaken to determine the potential for landslides.
- 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 site specific assessments should read the map text and associated documents to obtain a thorough understanding of the methodology and its limitations.
- Areas where the susceptibility or hazard may possibly still have issues with interpretation.
- 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 scale is such that they often cannot be resolved on the maps. The presence of such slopes should always be considered in site specific assessments.

Geomorphology

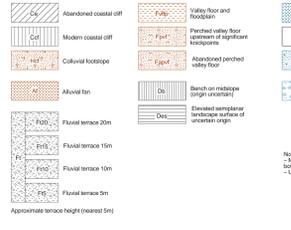
This map shows selected geomorphological features of the Devonport area. These features represent both individual geomorphological units and structural aspects of the landscape that assist in understanding its development and its potential land instability.
The base layer of the map is a hillshade digital terrain model that emphasises landscape relief. Superimposed on this is a slope classification based on Demuth (1972) and stability thresholds determined by reference to the local underlying geology.
Manually mapped units are depicted as lines, polygons and points to represent a range of natural and artificial features whose relationships are included in the associated diagrams. The process of mapping units is a continuous one, with units being refined and their representation was often modified to a real-world precision better than 2m in many cases. Other areas have the advantage of allowing the identification of features such as other geomorphological units, rock outcrops or other geological features that are not represented on the map. Limited field checking accompanied the mapping and the accuracy of the units recognised is reflected in the classification contained in the legend.
Natural features mapped include landforms and their internal features where discernible, as a special category of importance, in addition to fluvial and coastal landforms. Emphasis has been placed on mapping various surface features such as fluvial and marine terraces that have significance. This information is used to constrain the age of the landscape and in particular the landforms. Such information is also used for the estimation of bedrock depth of occurrence.
Artificial features mapped include quarries, major road cuts, notably along the Bass Highway, and areas of landfill and reclamation. It should be noted that equivalent units in the accompanying geology map may not always align and be generally less accurate due to different mapping approaches and constraints.
A fuller explanation of the mapped features is contained with the digital dataset associated with these maps.

Geomorphological Setting
There are a range of geomorphological features in the area, many of which reflect the underlying geological structure. The Tertiary basins (and minor associated sedimentary basins) are the most prominent regional landforms. When they were eroded, the rocks infilled pre-existing valleys and low-lands creating extensive subaerial landforms. In between these areas are the remnants of the Tertiary landscape, which are generally represented as knickpoints. In general the older rock sequences are harder and more erosion resistant to weathering, and so it has become deeply weathered with time.
Lift of the landscape since Tertiary times is believed to have triggered significant rejuvenation of the landscape to have a substantially dissected. The uplift caused streams to lower their base levels, with incision occurring progressively in a headward fashion. Thus the many remnants of the Tertiary landscape with their knickpoints and knickpoints. There are also knickpoints associated with some springs.
Other, more direct evidence for uplift is expressed in the form of marine and fluvial terraces whose elevation cannot be explained solely by natural sea-level fluctuations in the Pleistocene. There is an extensive coastal escarpment representing an abandoned coastline, which is a remnant of the Tertiary landscape. A broad coastal plain comprising marine terraces through mass wasting flows and debris resulting in the formation of a colluvial deposit, which is a remnant of the Tertiary landscape. A broad coastal plain comprising marine terraces through mass wasting flows and debris resulting in the formation of a colluvial deposit, which is a remnant of the Tertiary landscape. The Devonport coast is generally formed by Holocene deposits, either a narrow beach or a series of beach ridges and dunes, possibly with a backbeach landform.
Incised valleys and the coastal escarpment formed in basalt are particularly prone to slope failure whenever the parent rock has been largely or completely weathered to clay. In these situations the valley walls are steepened through oversteering and valley widening and the coastal escarpment steepened by coastal erosion, leading to vertical collapse. The same is also true for Permian mudstones, where they are deeply weathered and slopes are steeper due to a capping of more resistant geology (e.g. dolerite).

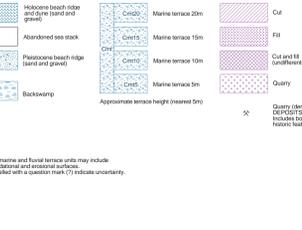
In many instances springs are associated with local land instability, highlighting the importance of groundwater in lowering material strength as clay becomes saturated. Considerable effort has been made to identify the Tertiary landscape features that are associated with local land instability. These features include former basalt lava flows and along sediment filled former gullies that existed on top of individual basalt lava flows – all of which were later covered by further Tertiary basalt lava flows. These sediments probably have a significant influence on landslide susceptibility. However, recognizing these features in the landscape is made difficult by the substantial deep weathering of the basalt.
Modern Holocene coastal processes include eroding headlands, along which landforms of various forms (rock falls, flows and slides) occur. Extensive rocky shore platforms are common along with occasional sea stacks and islands further offshore. The remnants of former sea stacks can also be found on the emergent marine terraces of the coastal plain. Beaches vary between sandy, gravelly and rocky (in situ bedrock) in composition depending on local circumstances such as proximity to sediment sources like major rivers. Beaches of similar height to the marine terraces are locally extensive such as the banks of the Mersfield. Depending on their source their sediments can range from gravels to silts. Both the Fort and Mersfield Rivers flow into confined estuaries which have delta fans and extensive flood plains.
At least four distinct terrace levels have been observed along the Northwest coast of Tasmania, all of which are thought to be Late Pleistocene or younger in age (Murray-Wallace and Goode 1996). These terraces comprise both aggradation (downward) and erosion (upward) surfaces. In general the older rock sequences are harder and more erosion resistant to weathering, and so it has become deeply weathered with time.
References
Demuth, J. 1972. Manual of Detailed Geomorphological Mapping. International Geographical Union Commission on Geomorphological Survey and Mapping.
Murray-Wallace, C. V. and Goode, A. 1996. Annotated Geomorphological and Elevation Data Resource Delineation of Quaternary Coastal Neotectonics in Tasmania and the Bass Strait Islands. Australian Journal of Earth Sciences, 42:1-47.
AGS (2007a). Guidelines for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning. Australian Geomechanics, 42:73-96.
AGS (2007b). Commentary on Guidelines for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning. Australian Geomechanics, 42:37-58.

Important Information
This map should be used in conjunction with an understanding of the information contained within the document 'Tasmanian Landslide Map Series: User Guide and Technical Methodology'.
This document, and other information on this map series or Tasmanian landslides in general can be obtained from the MRT web site or you can contact us for 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 supplied to each Council in the area. Available for purchase at a minimal cost of supply.

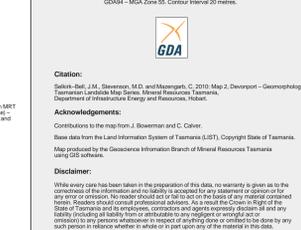
Hill Country Units



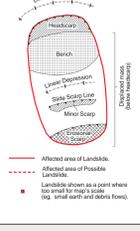
Coastal Units



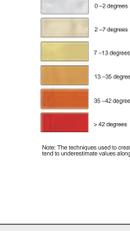
Artificial Units



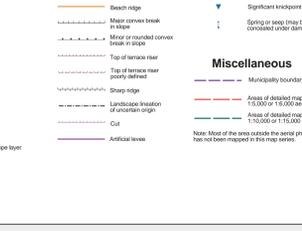
Landslide Components



Slope Categories



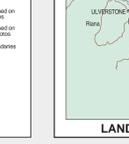
Linear Geomorphic Features



Point Geomorphic Features



Miscellaneous



Scale: 1:25,000
0 500 1000 2000 2500m
GDA94 - MGA Zone 55. Contour Interval 20 metres.

Citation:
Squire, J.M., Bowden, M.D. and McLaughlin, C. 2010. Map 2. Devonport - Geomorphology. Tasmanian Landslide Map Series, Mineral Resources Tasmania, Department of Infrastructure Energy and Resources, Hobart.
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Base data from the Land Information System of Tasmania (LIS). Copyright State of Tasmania.
Map prepared by the Geoscience Information Branch of Mineral Resources Tasmania using GIS software.
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