3 Coastal hazards

At the time of producing this manual a number of key Tasmanian government initiatives were still underway and are expected to be achieved over the course of 2011:

- Development of a new Tasmanian Framework for Action on Climate Change
- Finalisation of the state's Regional Planning Initiative
- Development of a state Framework for Mitigating the Impact of Natural Hazards through Land Use Planning
- Consideration of a new State Coastal Policy for Tasmania.

As with all topics addressed by the Manual, chapters will be regularly updated online as these initiatives are finalised and new information is released.

Tab photo: Wave erosion has resulted in potentially unstable and unsafe foreshore at Conningham in southern Tasmania. © Kevin Phillips.

This chapter details common coastal hazards and incidents and strategies to reduce risks and manage these incidents when they occur. A hazard can be defined as a potential source of harm, injury or difficulty. The classes of hazard considered in this chapter include both the consequences of natural physical coastal events, such as storms and erosion, and those hazards created by the transport and storage of oil and chemicals. All these have the potential to cause harm to people, property and the environment.

Sudden, hazardous events such as floods, erosion, storm surges, king tides and tsunamis are a possibility for Tasmania's coastline, while soft, sandy coastlines are especially prone to landslips and serious erosion. Climate change and sea level rise will also exacerbate the risk of coastal hazards, and storm frequency and severity are likely to increase over time.

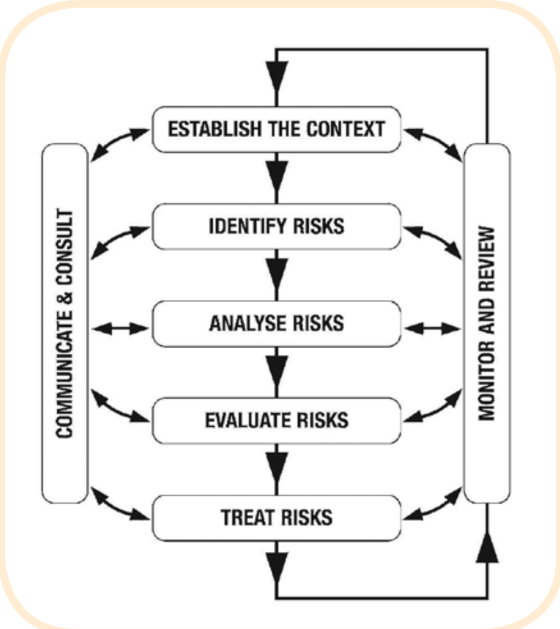
It is important that appropriate mitigation techniques are used to minimise the damage from hazardous events. Planning for emergencies can make responses more timely and effective. For places with sensitive values, such as cultural heritage sites and threatened species habitats, developing and correctly implementing an emergency response plan can minimise the impact of an event.

3.1 Planning for hazard management

This section provides information on planning for hazard management and minimising risk. Coastal hazards are a physical process or event on the coastline that could potentially be harmful to a person's life, health, property, or the environment (Tarbuck & Lutgens 1987).

The risk posed by a coastal hazard can be determined by looking at the likelihood of it occurring, the level of vulnerability to that hazard and the consequences of the event happening. The Australian Standard *AS/NZS ISO 31000:2009 Risk management* provides a framework for identifying risk and this has been used throughout Australia, adopted by Emergency Management Australia, the Tasmanian State Disaster Committee and the Tasmanian Climate Change and Coastal Risk Assessment Project.

Figure 3.1 The risk management process. Source: Australian Government, Emergency Management in Australia: Concepts and Principles, (Emergency Management Australia 2004). © Commonwealth of Australia. Reproduced by permission.



Assessing risk of coastal hazards in Tasmania requires consideration of regional and local factors, including coastal processes, land use, modification of the shoreline and the types of coastal landforms. For example, a soft, sandy coastal embayment is more vulnerable to coastal hazards than a rocky headland or a cobbled beach. Landforms such as spits, coastal estuaries and lagoons are among the most mobile and dynamically changing environments on earth (Sharples 2006).

Mapping the vulnerability of the coastline is a good foundation for planning and management of coastal hazards (Sharples 2006). Most planning and regulatory standards use an emergency response plan based on good technical advice which:

- identifies risks
- sets out clear procedures and responsibilities
- complies with government regulations, policies and strategies.

A risk assessment to identify, analyse and evaluate existing and emerging risks is a critical first step in developing a good risk management plan. The Australian Standard *AS/NZS ISO 31000:2009 Risk management* provides a generic framework for identifying, analysing and communicating risk. This standard has been adopted throughout Australia.

To identify risks and vulnerable sites, advice may be required from a coastal engineer, coastal geomorphologist (a specialist in coastal soils and landforms), Aboriginal Heritage Tasmania, botanists or wildlife biologists.

For sources of information, see ***section 3.5 Tools and resources***.

3.2 Storm surges, erosion and other coastal hazards

Storms and Flood Emergency

Contact State Emergency Service 132 500

http://www.ses.tas.gov.au/

Climate change is projected to have an impact on the frequency and intensity of extreme weather events such as storms, bushfires, drought and heatwaves. In particular, coastal storms, with flooding and storm surges, will create extreme sea level events resulting in coastal inundation and erosion. Therefore, sea level rise will exacerbate the existing problems of erosion or inundation of coastal land caused by high tides, storm surges and low-pressure systems.

In future we can expect physical changes to shorelines as they adapt to changing sea levels, especially on vulnerable areas such as soft sandy, muddy, clayey and gravelly shores and low-lying coastal areas (Sharples 2006).

3.2.1 Hazardous erosion

Sand dunes can develop hazardous erosion scarps that are prone to toppling, and in some areas may pose a risk to the public. These may be formed by severe erosion during high-magnitude storms or when several low-magnitude storms in quick succession

Figure 3.2 Recent erosion scarp exposing old soils at North Beach on Perkins Island. © Chris Sharples

Figure 3.3 Evidence of flood tide levels on the banks of the Leven River in north-west Tasmania. © Haylee Alderson

make it difficult for the coastline to recover. There may be insufficient time between storm events for normal swell waves to push sediment back on shore.

Erosion of sandy environments occurs seasonally, mostly during the winter months when storms generate waves that can erode the front of foredunes. In the summer months gentler swell waves push the sediment back to the shoreline and rebuild the foredune. This process can take up to a few years to repair severe storm damage, aided by dune vegetation that can trap and bind sand.

Erosion of rocky shorelines may create hazardous cliff areas. Softer rocky shorelines, such as semi-consolidated sediments, cannot be replenished by sand and sediment. Erosion of these shorelines leads to coastal recession. The retreat of the shoreline may threaten coastal infrastructure and make access hazardous for the public.

Refer to section 3.3.1 Dune reshaping after storms (in this chapter), Chapter 6 Coastal landscape management and Chapter 15 Shoreline modification.

3.2.2 Storm surges and extreme storm events

Over 20% of Tasmania's coastline will be vulnerable to sea level rise and more severe storm surges associated with climate change (Sharples 2006).

A storm surge is an area of heightened sea level at the coast caused by a low-pressure system and strong winds from offshore storms and high tides (DPIW 2009). For every hectopascal fall in barometric pressure, the sea level will rise about 10mm. However, the strong winds are the most significant factor as they push water against the coast and, if combined with significant rainfall and a high tide, there may be flooding along the coastline (DPIW 2008).

Planners, managers and developers need to know the probability of an event happening during the expected life of a development; it is no longer appropriate to use the traditional approach of designing for storm-surge events recurring every 100 years (Hunter 2008). For many locations in Tasmania, a sea level rise of 50cm will mean that these events will occur every year, or even more frequently, by 2100 (Church et al. 2008).

This new focus is important for risk management, where development and management regimes can be adapted to reduce the risks to acceptable levels. For a brief explanation of the most recent climate change and sea level rise assessment tools ***refer to section 2.3.4 in Chapter 2 and sections 3.2.8 and 3.5 in this chapter.***

3.2.3 Storms and floods

Storms and floods, like drought, are a normal and inevitable part of climate variability. Controlling the effects of storms and floods is very difficult, however, land managers must seek to minimise risks to public health and safety, property and infrastructure.

Flash floods usually happen on the coast when a large amount of rain falls in a localised area over a very short period of time, in combination with a high or spring tide. These localised storms would generally be within the capacity of the stormwater drainage system, but in a spring tide high water levels may prevent the rainwater draining away. The excess water may build rapidly and flood roads, gardens and buildings. In these situations with low-lying areas full of water, it can be impossible to pump water away until the tide recedes.

A flood risk plan should be developed, to provide a clear process for reviewing flood risks and procedures for monitoring the effect of flood risk management measures over time. As well as assessing safety and economic factors, a flood risk plan will include the social impacts of floods, such as stress and disruption.

The flood risk plan should set out a method for developing a flood risk matrix, which will identify 'intolerable' flood risks that should be reduced or eliminated. Further information can be found on the Melbourne Water website.

Figure 3.4 Excavator cleaning up flood debris in the Leven River in Ulverstone in north-west Tasmania. © Phil Barker

3.2.4 King tides

When associated with low pressures and/or storm events, the highest tides of each season, known as **king tides**, can lead to localised inundation and flooding. This will be exacerbated by sea level rise.

Key impacts of spring or king tides:

- localised tidal inundation penetrating through stormwater systems and affecting private property, public reserves and local road networks
- limited clearance between the peak water level and the top of seawalls currently protecting waterfront properties, commercial precincts, public reserves and significant public infrastructure
- widespread submergence of gravity stormwater drainage systems, fixed jetties and wharf infrastructure, as well as public walkways, boardwalks, bicycle paths and car parks situated around intertidal foreshores
- substantial narrowing of useable beach widths
- overtopping of beach berm barriers in areas where intermittently open and closed lakes and lagoons are currently closed to the sea
- increased tidal currents within estuaries and larger rip systems on open-coast beaches
- inundation and destruction of nesting in roosting sites of endangered birds (such as little terns)
- immediate threats to Aboriginal cultural heritage sites such as middens close to intertidal margins
- breaching sewage pump stations and associated sewage infrastructure
- flooding commercial premises and dwellings within 50cm of the king tide level
- wave action submerging and overtopping public ocean baths and similar facilities.

Figure 3.5 Coastal inundation event associated with king tide in NSW in January 2009. Tidal waters of Coffs Creek penetrating back up through stormwater system. Source: A snapshot of future sea levels: Photographing the king tide (Watson and Frazer 2009). © Mel Bradbury. Department of Environment, Climate Change and Water, NSW.

3.2.5 Landslides

Landslides are a natural hazard that can be studied in order to understand their distribution, frequency of movement, triggering conditions and likely effects. By properly understanding them it is often possible to minimise the effects on engineered structures (e.g. houses and roads) and the community.

For example, landslide susceptibility maps produced by Mineral Resources Tasmania can be used by town planners to avoid unstable areas when new subdivisions are being proposed. The Mineral Resources website has maps of landslide susceptibility and of legislated landslip areas (declared areas), a database of landslide information and events in Tasmania, and monitoring and investigation of some Tasmanian landslips.

Other information on coastal rock falls, collapse, slumping and retreat of hard rock coastal cliffs and progressive erosion, retreat and/or slumping of soft (typically clayey-gravelly) bedrock or colluvial (loose rock) shores has been mapped as part of the Coastal vulnerability mapping project (Smartline). This data is available on the LIST website.

3.2.6 Tsunami

A tsunami is a series of ocean waves with very long wavelengths (typically hundreds of kilometres) caused by large-scale disturbances of the ocean, such as:

- earthquakes
- landslide
- volcanic eruptions
- explosions
- meteorites

These disturbances can either be from below (e.g. underwater earthquakes with large vertical displacements, submarine landslides) or from above (e.g. meteorite impacts).

The English translation of the Japanese word '*tsunami*' is 'harbour wave'. The previously used terms, tidal waves and seismic sea waves are misleading, as tsunamis are unrelated to the tides and can be caused by non-seismic events such as landslides.

A landslide on the steep underwater slope about 50km off the Australian coastline could generate a local tsunami. This might be triggered by a small earthquake or the landslide might feel like an earthquake at the coast. It would take less than 30 minutes for the tsunami to reach the coast. Tsunamis are also often confused with storm surges, even though they are quite different phenomena.

Call 1300 TSUNAMI (1300 878 6264) for the latest warning information.

For emergency assistance, call your local emergency authority on 132 500.

The east coast of Australia is recognised as being vulnerable to mega-tsunamis, like the one that devastated coastlines around the Indian Ocean on 26 December 2004. Australian civil authorities are now preparing tsunami action plans to deal with this low-probability but high-consequence event.

3.2.7 Assessing inundation and erosion risks

A risk assessment for inundation and erosion should be considered for sites on low-lying coastal land and erodible landforms where there is a risk to public or private infrastructure, public safety or important plant and animal communities.

It should not be assumed that 'sheltered' shores (e.g. in estuaries or tidal lagoons) are at less risk; indeed such places experience as much flooding and erosion as open coasts.

For a particular work site, check whether there has been a previous risk assessment. Some information sources are suggested in the Tasmanian coastal risk management project template (see Table 3.1).

Assessing the risk

The major risks from rising sea levels and extreme events are coastal inundation, erosion and recession. In Tasmania severe storms, floods, shoreline erosion and other hazards already affect coastal areas, causing damage to property and infrastructure and risking loss of life.

A rising sea level and potentially greater storm activity will produce an ever-growing risk of inundation and erosion in low-lying coastal areas. Events will occur increasingly more often in the future.

The severity of the risks in a given location will be affected by a range of factors related to climate, oceanography, geomorphology, geology and the way low-lying areas have been modified by construction or drainage.

Table 3.1 Example of a component of the risk assessment template in the Coastal risk management plan (DPIW 2009)

Level of existing Risk Assessment	Yes/No
Location has been highlighted as at risk by simply looking at topographical maps or digital elevation models	
Area has been highlighted by a previous report (e.g. Sharples 2006)	
Risk has been determined by site visit	
Calculations of still-water sea levels are available	
Assessment of extreme tide events is available	
Detailed storm surge and wind wave calculations are available	

As the sea level rises, storm events reach higher levels on the shore, so appear to increase in magnitude and frequency resulting in severe flooding events becoming more frequent. This will put vulnerable coastal locations and infrastructure at increasing risk of inundation or erosion. It is important to assess the risk of an extreme event occurring during the lifetime of any existing or new infrastructure and then plan accordingly.

Assessing this risk as accurately as possible will allow for prioritisation of climate change risks, and subsequent adaptive responses. A thorough assessment will also include consideration of these management responses in light of other risks (including impacts on natural and cultural values), resource availability and cost of works faced by the land manager.

3.2.8 Risk assessment tools

Assessing the erosion and inundation risk in a given coastal location can be a complex task and requires good data, and the skills and experience to analyse it. A number of tools have been produced to assist in this exercise, which can provide a degree of reliability that, for some activities and locations, may be adequate. For more critical areas and projects, it is important to seek specialist advice.

For example, experience suggests that applying the Tasmanian coastal risk assessment tool (Tool # 1 in Table 3.2) to an area might require up to two weeks' work and a budget of approximately $10 000.

Figure 3.6 It may be useful to understand the history of a site by looking at a time sequence of aerial photos. Most of Tasmania has coverage of aerial photography dating back to the 1950s (post–Second World War). This aerial photo of Ringarooma River mouth in northern Tasmania clearly shows landward movement of the coastal dune system © DPIPWE

Table 3.2 Risk assessment tools currently available

	Tool	Description	Project	Organisation and web address
1	Climate Change and Coastal Risk Assessment Tool - Template, Guidelines and Case Study	A method and template for producing a coastal risk management plan for a coastal area or asset.	Climate Change and Coastal Risk Assessment Project	Tasmanian Department of Primary Industries, Parks, Water and Environment www.dpipwe.tas.gov.au/climatechange
2	ACE CRC Web Tool	An internet-based decision-support tool that estimates the probability that a given asset will be flooded by the sea during its lifetime, under different climate projections.	Tasmanian Coastal Vulnerability Project	Antarctic Climate & Ecosystems CRC www.sealevelrise.info/
3	High resolution (LiDAR-based) Coastal inundation modelling for selected sea level rise and storm scenarios. ***Refer to Chapter 2.***	Spatial maps accurate to 25cm modelling the extent of coastal inundation under various sea level rise projections and storm surge events. LiDAR data exist for the most populated parts of the Tasmania coast.	This project is in progress, and will provide inundation modelling for those areas of the state's coastline covered by LiDAR.	Tasmanian Planning Commission www.planning.tas.gov.au/ Available on the LIST under Topographic Information – Relief – Climate Future LiDAR coverage.
4	New Zealand Coastal Hazards Manual and related factsheets	Understanding and managing coastal hazard and related climate change risks.	Coastal hazards and climate change: a Guidance Manual for local government in New Zealand (Ministry for the Environment 2008)	Ministry for Environment, NZ www.mfe.govt.nz/

3.3 Remediation after storm events

This section deals with managing hazardous shorelines and landforms after extreme storm events. Rehabilitation of coastal landforms and shorelines is sometimes required, to protect public safety, to restore wildlife habitat or to stabilise the damaged area.

Public safety is the most important factor in remediating hazardous sites, but you should minimise damage to the natural environment and cultural sites, wherever possible.

After storms or landslides, where unstable foredunes or cliffs are hazardous, erect warning signs or temporary exclusion fences. Obtain specialist advice from a coastal geomorphologist about the risk to the public and any remediation work.

Before attempting remediation, obtain specialist advice to assess the situation and consider a range of options for managing the issue and site. ***Refer to Chapter 6 Coastal landscape management.***

3.3.1 Dune reshaping after storms

The steep faces of foredunes carved by severe and prolonged storms are unstable and can be hazardous to beach users. Eventually the dune face will slump to a more stable shape, but until this happens it may be necessary for land managers to erect warning signs or temporary fences or to undertake dune reshaping. If in doubt, obtain specialist advice about the risk to the public.

As the erosion effects of sea level rise on sandy shores become more common, some beaches will begin to exhibit almost permanently scarped and slumping dune fronts. This has already been the case for several decades on high energy south-west Tasmanian beaches which are receding earliest in response to sea level rise.

If public risk is particularly high, machinery can be cautiously used to slump the seaward face of the dune to create a more stable dune profile. Do not undertake this type of work without specialist advice from a coastal geomorphologist and permission from the land manager.

Minimise damage to vegetation during works, as plant roots help bind and stabilise sand, and other plant roots and stems that drape down the dune face will trap wind-blown sand and help to repair the damaged foredune.

Consult Aboriginal Heritage Tasmania well before works, and notify them if you believe an Aboriginal heritage site or relic has been uncovered. ***Refer to Chapter 6 Coastal landscape management, for more information on dune stabilisation.***

3.3.2 Monitoring remediation works

All erosion control structures require regular maintenance to make sure they remain serviceable. Inspections and maintenance are very important during and after stormy periods to check that structures are in place, are working as intended and are in good condition. Structures can be quickly damaged or destroyed by waves and winds, and become a hazard to the public. Prepare an inspection and maintenance plan, which includes inspections on a regular basis and after major storm events. ***Refer to Chapter 6 Coastal landscape management, for more information on monitoring landform remediation works.***

3.4

3.4 Oil and chemical spills on the coast

To report a chemical or oil spill

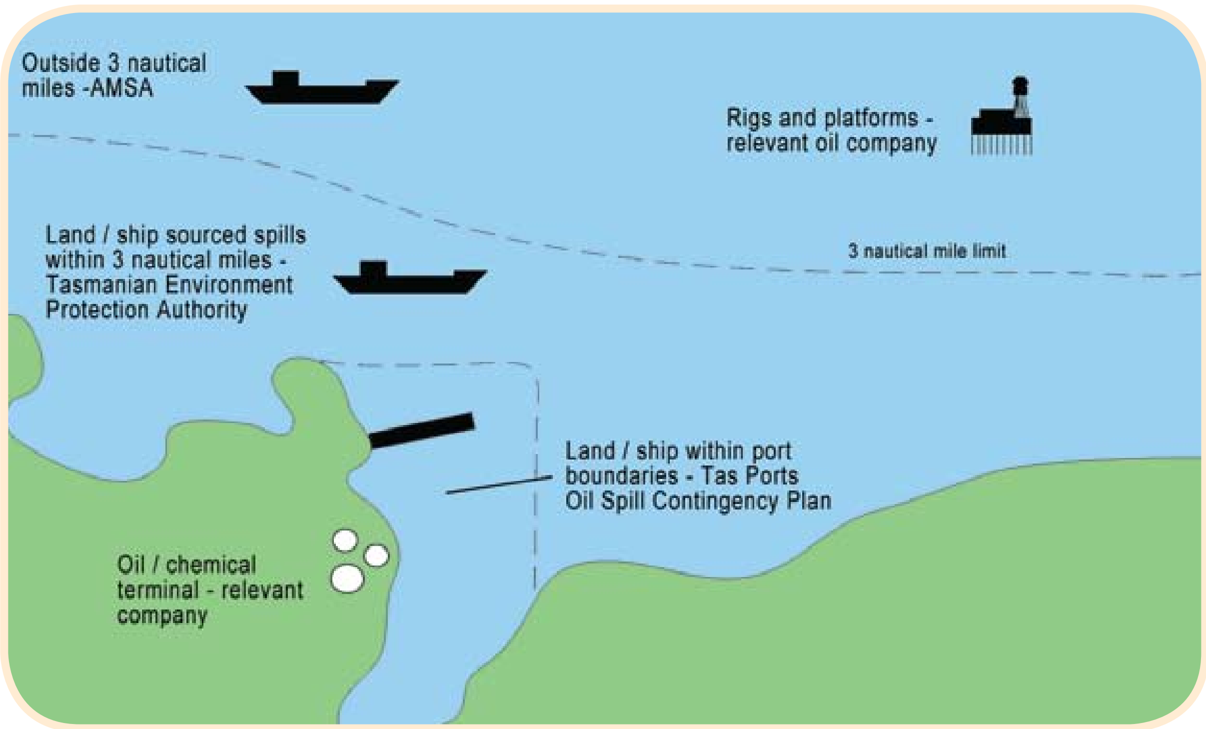
Contact the Environment Protection Authority's 24-hour Pollution Incidents and Complaints Hotline: 1800 005 171

Oil spills in the marine environment can range from small levels of contamination from recreational boats to large-scale spills from commercial operations. All oil spills can impact on wildlife, fisheries, coastal and marine habitats, and human health, as well as the commercial and recreational resources of coastal communities. In the case of large-scale events, these impacts can be widespread and long term.

Procedures for combating oil spill pollution are contained within the *Tasmanian marine oil pollution contingency plan (TASPLAN)* (DPIWE & SES 2001). Tas Ports oil spill contingency plans are localised plans for specific ports where a spill occurs within port boundaries.

The Australian Maritime Safety Authority (AMSA) is responsible for oil spill responses outside of 3 nautical miles.

Figure 3.7 Agencies responsible for oil and chemical spills in Tasmania.



Initial reports of a marine oil spill should be made to the State Oil Pollution Control Officer on the 24-hour response number. The officer will advise the chair of the State Marine Pollution committee (where relevant), and other relevant agencies and personnel. A response appropriate to the spill type is then undertaken. An initial assessment will be carried out by trained personnel, which could include people from Tas Ports and the Department of Primary Industry, Parks, Water and Environment (DPIPWE).

In the oil spill response incident control system, roles and responsibilities are assigned to people in the areas of logistics, operations, finance, administration and planning. The Incident Control Officer is in charge of these sections, forming an incident control team that is responsible to the Tasmanian Marine Pollution Controller.

Local governments participate in the incident control team in several key ways:

- representing the Local Government Association on the State Marine Pollution Committee
- cleaning up shorelines
- providing local advice on areas threatened by pollution
- assisting with liaison between the State Marine Pollution Committee, the incident controller and local communities
- assisting in clean-up operations within areas under their control, in larger operations.

CS 3.1

Figure 3.8 The sunken vessel in the Tamar River in Launceston – note small patch of black coloured oil behind vertical fender. © Duane Richardson

Case Study 3.1: Recreational boat sinking at Seaport, Launceston, in January 2010

A minor oil spill from a wooden yacht that sank in the Tamar River at Launceston's Seaport Marina was reported to the Environmental Protection Authority's (EPA) Environmental Complaints and Incidents 1800 005 171 Hotline by Tasmania Police on 25 January 2010.

The EPA's State Oil Pollution Control Officer (SOPCO) based in Hobart responded to the report.

SOPCO then contacted Tas Ports, who advised that, if required, they would send responders and oil-spill-absorbent materials to Seaport from Bell Bay.

An officer from the EPA in Launceston was sent to Seaport to do an initial inspection. The notes and photographs he took were forwarded (via email) to the SOPCO in Hobart, who examined this material and decided that the deployment of oil-absorbent booms was not necessary in this instance.

Another SOPCO from the EPA Ulverstone office was in Launceston at the time and took over the investigation. When contacted, the owner of the vessel reported, that at the time of sinking, the vessel had very little fuel onboard and approx 5L of lube oil in the engine. He arranged for enough water to be pumped out of the vessel's hull at low tide to make it sufficiently buoyant to be towed to a nearby slip. The next day the hull was examined but no leaks or sprung planks were found.

The only explanation offered for the sinking was that the vessel became stuck fast in the silt/mud at low tide and as the tide rose again the hull filled with water. Apparently other vessels have sunk in similar incidents in the Tamar River around the marina.

On this occasion it was fortunate that the vessel had little fuel and oil onboard and a significant spill of hydrocarbons into the river was avoided.

3.5 Tools and resources

Complete details of all printed publications listed here are provided in a reference list at the end of the Manual. Other tools and resources including websites are collated in ***Appendix 5***.

Australian Standard

AS/NZS ISO 31000:2009 Risk management

Bureau of Meteorology

Current Tasmanian weather warnings

www.bom.gov.au/weather/tas/

Climate change impacts & risk management: A guide for business and government (Australian Greenhouse Office, Department of the Environment and Heritage 2006)

A guide to integrating climate change impacts into risk management and other strategic planning activities in Australian public and private sector organisations to assist Australian businesses and organisations to adapt to climate change.

http://www.climatechange.gov.au/what-you-can-do/community/local-government/~/media/publications/local-govt/risk-management.ashx

Floodplain mapping, flood data and flood timelines in Tasmania

www.dpiw.tas.gov.au/ Go to Water > Tasmania's water resources > Floods

Geodata Services

Aerial photographs and mapping products.

geodata.clientservices@dpipwe.tas.gov.au

Guidelines for responding to the effects of climate change in coastal and ocean engineering. (National Committee on Coastal and Ocean Engineering 2004)

Indicative mapping of Tasmanian coastal vulnerability to climate change and sea level rise (Sharples 2006)

Melbourne Water

Flood management information.

http://www.melbournewater.com.au/content/drainage_and_stormwater/flood_management

Mineral Resources Tasmania

Landslide susceptibility maps

http://www.mrt.tas.gov.au

Sea-level change around Tasmania: Information paper (Department of Primary Industries Water and Environment 2004c)

Smartline or coastal vulnerability maps

Maps of coastal landform types and their vulnerability to sea level rise can be found under 'Climate Change' layers on the LIST and the OzCoasts website. The data is presented as a 'smart line' following the coastline, with information on the geology of the coast readily interpreted for particular coastal areas.

www.thelist.tas.gov.au

www.ozcoasts.org.au

Tasmanian Flood Warning Centre, Bureau of Meteorology

Issues flood warnings

www.bom.gov.au/hydro/flood/tas/

Hazard management planning

The following agencies and resources will be useful in preparing for hazardous events and remediation works.

Climate change and coastal risk assessment project.

A suite of tools and documents including:

- *Coastal risk management plan: Template and guidelines (DPIW 2009)*
- *Coastal hazards in Tasmania: General information paper (DPIW 2008c)*
- *Climate change and coastal asset vulnerability: An audit of Tasmania's coastal assets potentially vulnerable to flooding and sea-level rise (DPIW 2008b)*
- *Sea-level extremes in Tasmania: Summary and practical guide for planners and managers (DPIW 2008e)*
- *Historical and projected sea-level extremes for Hobart and Burnie, Tasmania (Hunter 2008)*
- *Background report: Coastal flooding - Review of the use of exceedence statistics in Tasmania (DPIW 2008a)*

www.dpiw.tas.gov.au/climatechange

Management Australia (EMA)

Australian Emergency Manual Series

• Manual 1	Emergency management concepts and principles
• Manual 2	Australian emergency management arrangements
• Manual 7	Planning safer communities—land use planning for natural hazards
• Manual 14	Post disaster survey and assessment
• Manual 17	Multi-agency incident management
• Manual 19	Managing the floodplain
• Manual 20	Flood preparedness
• Manual 22	Flood response
• Manual 24	Reducing the community impact of landslides
• Manual 43	Emergency planning

EMA highlighted the potential benefits of its 'Critical Infrastructure Protection Modelling and Analysis' (CIPMA) program for disaster management in the coastal zone in their submission to the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts report Managing our coastal zone in a changing climate (House of Reps. SCCWEA 2009).

www.ema.gov.au

State Emergency Service, Department of Police and Public Safety

Tasmanian Emergency Risk Management Project (CD-ROM) conducted risk assessments of natural and technological hazards and proposed risk treatment strategies for the three Tasmanian regions.

Hazardous material emergency manual (SES 2001)

State summary: The Tasmanian emergency risk management project - a community perspective includes GIS maps of flooding, storms, wildfire, severe weather and earthquake/landslip risks

Tasmanian hazardous materials emergency plan (SES 2005)

www.ses.tas.gov.au

Tasmanian Fire Service

6230 8600 or 1800 000 699

www.fire.tas.gov.au

Tasmania Police, Department of Police and Public Safety

www.police.tas.gov.au

Oil spills

Australian Marine Oil Spill Centre (AMOSC)

www.aip.com.au/amosc/

Australian Maritime Safety Authority (AMSA)

Has recently undertaken a series of initiatives involving new technological developments to assist in larger-scale oil and chemical pollution response in the marine environment. Details are in *Oil Spills in the Australian Marine Environment: Environmental Consequences and Response Technologies* (Gilbert 1999).

National Guideline for the Development of Oiled Wildlife Response Contingency Plans (AMSA 2002)

Safety First in Oiled Wildlife Response (Video). (AMSA 2002)

National Marine Oil Spill Contingency Plan: Australia's National Plan to Combat Pollution of the Sea by Oil and Other Noxious and Hazardous Substances (AMSA 2005)

http://www.amsa.gov.au

National Oil Spill Response Atlas (OSRA)

The National Oil Spill Response Atlas for Australia is a computerised Geographic Information System (GIS) that authorities can use to identify priorities for protection and to manage clean ups.

The OSRA program identifies marine and shoreline ecosystems and biological resources, and provides information on response options (e.g. chemical dispersant use, shoreline clean-up techniques and disposal sites for wastes).

National OSRA datasets include:

- biological, environmental, wildlife and man-made resources
- geomorphological mapping and shoreline sensitivity to oil spills
- human-use resource considerations
- logistical and infrastructure information to support a spill response

OSRA data is available through the List www.thelist.tas.gov.au/ or phone 1300 135 5130.

State special plan for environmental pollution emergencies (in prep).

The state special plan is a strategic document listing roles and responsibilities in the case of an environmental emergency. The State Emergency Service and the Environmental Protection Authority are the contact points for this document.

Tasmanian marine chemical spill contingency plan (TASCHEMPLAN). (DPIWE 2003)

Tasmanian marine oil pollution contingency plan (TASPLAN). (DPIWE & SES 2001)