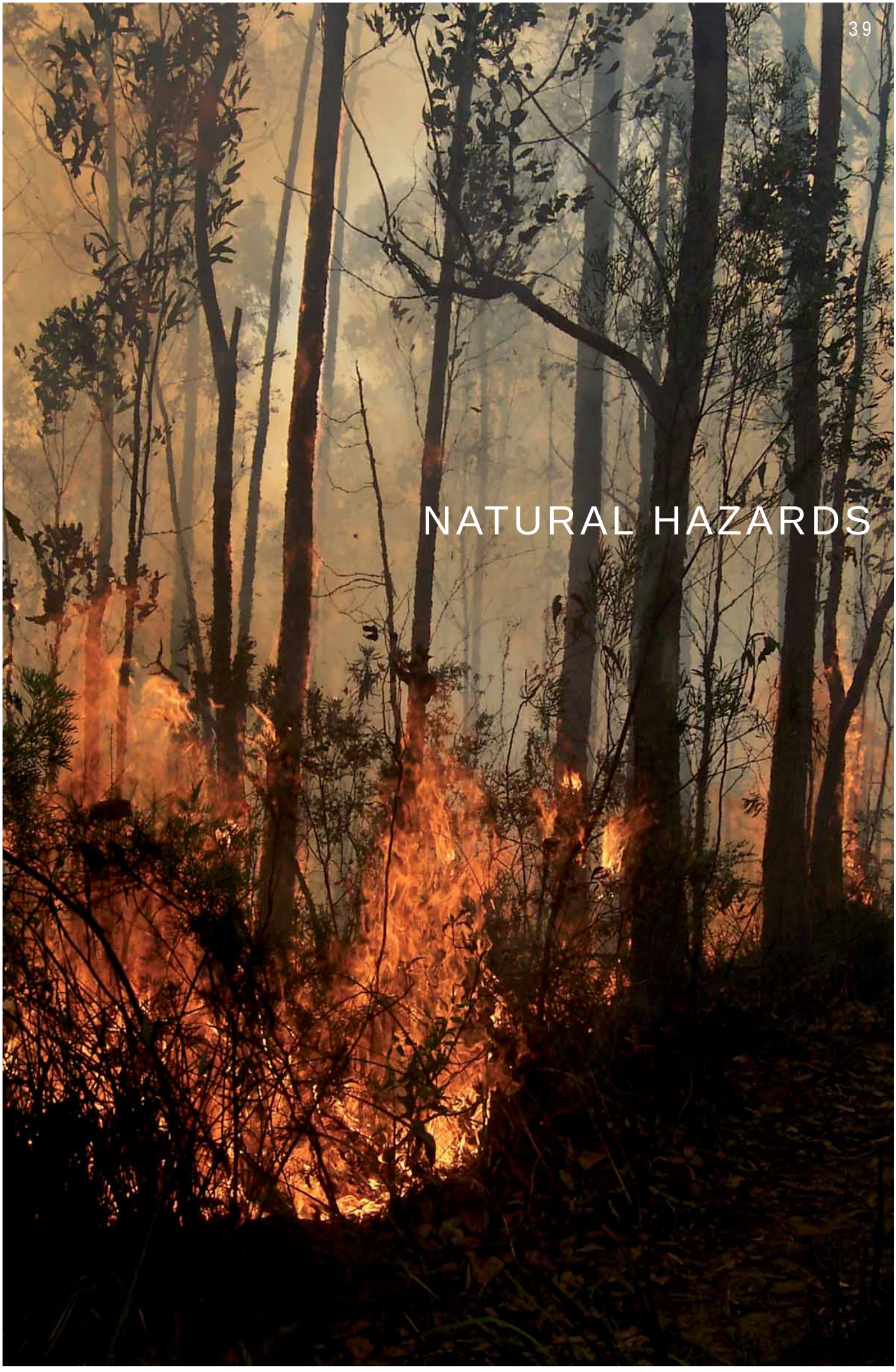

NATURAL HAZARDS

Introduction

Natural hazards pose varying degrees of risk to human safety and property throughout the Huon Valley, with bushfire events posing a particular risk to human life. The use of non-urban land for residential development opportunities has significantly increased the level of risk from natural hazards. The large number of small vacant lots in areas prone to natural hazard, combined with the ongoing demand for rural living opportunities suggests that the degree of risk from natural hazards has the potential to increase over time.

The availability of appropriate technical information is critical to the assessment of potential natural hazards. Information (such as the future impact of sea level rise) is, in many cases, not available and planning decisions will need to adopt a precautionary approach.

This precautionary approach should ensure that the hazard risk be mitigated through structural or siting methods to avoid property loss or damage, lives being placed at risk or public health concerns being generated. It will be necessary to restrict the type of development that can occur in vulnerable areas.

While it is true that implementing the stringent requirements for development applications will almost certainly raise the cost of developments in many instances, it should be considered a form of insurance to property owners, developers and the council. This is especially poignant given that no insurance companies in Australia provide cover for landslide related damage (with the possible exception of debris flows) and the public cannot expect *ex gratia* payments from the State to landslide affected properties.

Soil-related hazards

The main soil-related hazards in the municipal area include landslip and tunnel erosion.

Landslip Hazard

Much of the municipal area is steeply sloping and is potentially susceptible to landslip. Factors that may promote the development of landslip include clearing of vegetation, alteration of drainage conditions, excavation around slopes and excessive loading of slopes. Tertiary sediments are quite prone to landslip where they are clay rich and associated with sloping land and where Jurassic dolerite overlies Parmeener sediments on steeper slopes. These occur at specific sites such as at Pelverata, Glen Huon, Ranelagh and Huonville, but can also occur at many other sites due to the inherent nature of many of the soil types.

There are eight land systems in the Huon Valley municipal area that have a geology of Jurassic dolerite. The extent of these land systems is shown in **Appendix C**. The Table below outlines the strategic directions and guiding principles for soil related hazards.

Tunnel Erosion Hazard

Tunnelling is an insidious form of sub-surface erosion, resulting in considerable damage even before surface manifestations are evident. Tunnel erosion is caused by the movement of excess water through a dispersive (usually sodic) subsoil. Once concentrated in the subsoil the runoff causes the sodic clays to disperse and form a suspension or slurry. Provided there is sufficient gradient, the slurry is able to flow beneath the soil surface. If the subsoil is exposed through erosion or construction work, the slurry is able to rapidly flow onto the surface. Once formed, tunnels continue to enlarge during subsequent wet periods. Eventually tunnels reach a point where the roof collapses resulting in potholes and formation of erosion gullies. Subsequent erosion in such areas is termed gully erosion.

Tunnel erosion is usually associated with sodic soils derived from Triassic sandstone, Permian mudstones and re-deposition of these sediments in Quaternary deposits. There are eight land systems in the Huon Valley municipal area that have such geology. The extent of these land systems is shown in **Appendix D**. The following table outlines the strategic directions and guiding principles for soil related hazards.

Other soil related hazards

Other soil related hazards include wind erosion and sheet erosion, which can potentially occur whereever surface soil is exposed to winds and rains. Given the limited extent of cropping practices in the municipal area, such surface erosion hazards are insignificant - compared to landslip and tunnel erosion.

Streambank erosion can occur as a result of the loss of native vegetation cover through clearing and invasion of woody weeds such as willow. As for wind and sheet erosion, streambank erosion is a relatively minor, in terms of extent and severity.

This strategy strongly encourages the consideration of land stability in the determination of zones and utilisation of development controls and/or overlays. Specifically, land use zones and controls should identify where:

- The hazard is so low that no development controls are necessary;
- Some prescriptive controls, such as limits to the heights of cuts and fills are necessary;
- Detailed geotechnical assessment of the hazard and risk is required before development can be approved; and
- Where the hazard is so high no development is possible.

It is also important to ensure that community infrastructure is located away from risk areas, and is designed to function effectively during an emergency event. Other uses that should be located away from risk areas, include schools and critical infrastructure.

LANDSLIP AND TUNNEL EROSION HAZARD	
Strategic Directions	**Guiding Principles**
Minimise loss of property and life and avoid economic impacts by ensuring use and development avoids or manages the risks associated with landslip or soil erosion hazard.	*Factor inherent landslip and tunnel erosion risk in determination of land use zones.* *Ensure appropriate assessments (in accordance with AS1726-1993) are made before the approval of any use and development in areas that may be at risk of landslip or tunnel erosion.* *Identify appropriate prescriptive controls (using recognised stndards AS/NZS 4360:1990 & Australian Geomechanics Society Guidelines for Development on Hillsides) to manage use and development within areas potentially at risk.* *Ensure planning assessments appropriately considered landslip and tunnel erosion as a relevant matter under the Planning Scheme.* *Utilise mapping data that indicates typical environments where hazards are more likely to occur as a tool for planning assessment*.* *Ensure use and development complies with the standards for site investigations (AS1726-1993), risk management (AS/NZS 4360:1999), and Australian Geomechanics Society guidelines for development on hillsides (AGS 2000).* *Assess the potential for off-site impacts resulting from a development; for example, potential impacts of a proposed development to create or exacerbate an erosion risk outside the area of the DA.* *Identify the options and methods for treating a hazard risk. The relative costs and benefits of the options needs to be considered so that the most cost effective solutions, consistent with the overall needs of the client, owner and regulator, can be identified.* *Ensure community facilities and critical infrastructure is not located in areas of high risk.*

*DPIW has advised that errors in interpretation will occur if the information is used at a scale less than 1:100 000. However, for the purpose of identifying the approximate extent of each hazard in the Huon Valley, the data was considered to provide a useful generalisations at a scale of 1:10 000.

Bushfire Hazard

The physical and environmental setting of the municipal area makes the area particularly susceptible to bushfire hazard. Rainfall is sufficient to support *Eucalyptus* forest trees, which have high contents of volatile oils. Extreme periods of low humidity and strong gusty winds from the northwest can provide ideal bushfire conditions. Topographically, much of the Huon Valley is steep allowing for the preheating and ignition of vegetation. This has the result of increasing bushfire speed.

The level of risk to existing development from bushfire may also be increased through any shift toward plantation forestry on former grazing land. Conversely, the clearing of native vegetation has the potential to reduce bushfire risk, although it is important to stress that the retention of important natural values should always take priority over development that requires the clearance of important native vegetation to minimise its bushfire risk.

The Huon Valley has a history of major bushfires and the risk from bushfire is particularly high

in certain areas. This has increased in recent years due to the influx of new residents into rural areas. Often located within or adjacent to standing vegetation, many lots have little bushfire protection, are difficult to access and do not have adequate water supplies for fire suppression. Development control is an important component in reducing the risk of bushfire damage.

Accordingly, a new development would need to establish the underlying bushfire hazard potential of the area (how bushfire prone it is) and then propose the appropriate response based on defendable space, road access, water supplies and building siting, design and construction. Good design is not on its own sufficient to provide safety in the long term. Bushfire Hazard Minimisation Plans can assist with informing both current and future owners about the best practices for the ongoing management of the bushfire hazard. The issue of retrofitting existing development to take into account the better current knowledge of bushfire hazards is an ongoing issue. This can probably be best dealt with by education and providing residents with choices as to the options available to improve personal safety.

In recent years, Council has been very committed to ensuring that subdivision and building approvals have fully accommodated the most appropriate standards for minimising the hazards associated with bushfires.

The Tasmania Fire Service (TFS) prepared a revised document 'Guidelines for Development in Bushfire Prone areas for Tasmania' in 2005. This strategy encourages bushfire hazard to be managed in accordance with that document or any TFS approved substitued document to achieve the following planning outcomes:

- Avoidance of development in areas of high risk;
- The avoidance of development in areas where natural values would be compromised in achieving satisfactory protection from bushfire risk;
- The avoidance of risk to public safety and the environment through the storage of hazardous materials within bushfire prone areas.

The table below outlines the strategic directions and guiding principles for managing bushfire hazard.

BUSHFIRE HAZARD

Strategic Directions	Guiding Principles
Recognise the management of bushfire hazard as an important land use considerations in order to protect lives, property and natural values of the Huon Valley as well as avoid unnecessary cost to the community.	*Ensure land use zones considered the extent of bushfire risk of land and the necessary measures to control that risk (i.e. clearance of large tracts of vegetation)* *Identify appropriate prescriptive controls within the Planning Scheme (using TFS recognised standards) to manage the location and design of use and development within bushfire prone areas .* *Ensure an adequate and protected water supply is always available to defend habitable buildings from fire.* *Ensure community facilities and critical infrastructure is not located in areas of high risk.*

Flooding Hazard

The muncipal area has a long history of flood events, with certain areas subject to regular inundation. Areas subject to hydrological hazard generally comprise the riparian zone that encompasses the active creek bed and immediate flood-zone and recharge basins. Flash floods can occur with the last large one occurring in 1996, resulting in inundation of large areas of Huonville and Geeveston. In this event flood water covered part of Huonville to the town centre roundabout and caused major disruptions to road accessibility, sewerage treatment and domestic water supplies. Tidal influences are also particularly significant for the municipal area and were an evident factor in the recent August 2007 floods.

Little mapping of flood events in the Huon Valley has been carried out, with only the one-in-a-hundred year flood levels for the Huon River and Mountain River around Huonville having been mapped. Significant portions of the commercial area of Huonville are covered by the 1:100 year flood risk boundary and in some locations a 1:50 and 1:20 flood risk. Flood mapping is also available for the Kermandie River at Geeveston. Such maps, as well as local knowledge in other areas, are used to assess the potential impact of local floods on development proposals. It is noted that the flood mapping for the Huon River at Huonville is currently under review and the updated maps will be available for use with the new planning scheme.

FLOODING HAZARD	
Strategic Directions	**Guiding Principles**
Ensure that flood risk is a key land use consideration and the use and development is located and designed with due regard to hazard associated with flooding.	*Consider inherent flood risk of land in determination of land use zones by avoiding residential zones within 1:100 flood risk areas.* *Ensure that habitable buildings are not located within areas at risk of 1:100 year floods.* *Require that development within flood prone areas have floor level designed in response to the flood risk.* *Ensure community facilities and critical infrastructure is not located in areas of high risk.*

Climate Change

There is much debate surrounding climate change and why it is occurring (ie anthropogenic or natural cycles), but there is general consensus from most climate scientists regarding the following three conclusions (as stated by CSIRO scientists at: http://www.csiro.au/news/ps398.html):

- The concentration of carbon dioxide and other greenhouse gases are increasinly rapidly, mainly due to human activities;
- These increases will lead to global warming, rainfall changes, sea-level rises, and damange to ecosystems and human populations;
- The risks posed by unchecked climate change are so great that emissions of greenhouse gases, particularly CO2 have to be at least halved over the coming decades.

The State of the Environment Report for Tasmania (RPDC, 2004) identified the likely hazards associated with climate change within the Tasmanian context. These include a higher sea level, more frequent and more severe storm events and low-pressure systems, changes in short term climatic cycles and an increased number of high rainfall events.

Councils should seriously consider the possible effects of sea level rise and coastal retreat when

developing a long term planning scheme. The Intergovernmental Panel on Climate Change (IPCC, 2001) estimates a rise in sea level of between 0.09 and 0.88 metres by 2100 relative to 1990, or 0.8 to 8.0 millimetres per year (http://www.csiro.au/resources/pfbg.html). The largest source of sea-level rise is due to the expansion of the oceans as they warm. Contributions can also be expected from the melting of glaciers and ice sheets. Local sea level rise can also be influenced by coastal subsidence or uplift (http://www.csiro.au/news/ps398.html).

As sea level rises, material on sandy shorelines are eroded from the upper beach and deposited on the near-shore ocean bottom. Consequently the ocean moves landwards or, in other words, the shoreline recedes. It is generally accepted that the coastline will retreat horizontally 50 to 100 times the vertical sea level rise (http://www.csiro.au/news/ps398.html). Therefore, the predicted global sea-level rise would cause a coastal recession of sandy beaches of 4.5 to 88 metres by 2100 (http://www.csiro.au/news/ps398.html).

Hobart data (obtained from the last 25 years) indicates a trend of increasing sea level averaging 1.41 millimetres per year. This compares with an overall mean trend across Australia of 0.7 millimetres per year. Some scientists have also warned that the increasing global temperatures may result in certain environmental thresholds being breached and this may trigger even more dramatic and unexpected changes.

The Intergovernmental Panel on Climate Change (IPCC, 1997) have undertaken an assessment of the vulnerability of different regions to the impacts of climate change. Based on this, the likely impacts (relating to the coastal foreshore) in the municipal area include a sea level rise, erosion of coastal dunes, increased erosion of soft rock cliffs, incursions into low-lying shack areas, more intense storms and increased flooding.

Some preliminary mapping of the hazard zones that relate to these impacts has been undertaken by Sharples in ‘Indicative Mapping of Tasmanian Coastal Vulnerability to Climate Change and Sea Level Rise: Explanatory Report’ (2004). The purpose of the report was to provide a very much ‘indicative’ or ‘first pass’ identification of the areas of the Tasmanian coast most likely to experience coastal flooding, both at present sea levels and in the future. In terms of coastal recession, while the data is generalised the conclusion is that sandy shorelines within the municipal area are likely to recede during future years and this recession must be accounted for within the planning scheme. The extent of coastal recession, at a given site, will depend upon:

- The actual degree of sea level rise and the nature of the climate change;
- The actual storm patterns and exposure at each site;
- Seabed and shoreline topography at each site;
- Height and mass of dunes; and
- Existing coastal protection structures.

It will therefore be necessary to examine the particular site in question and relate that to the specific features of the proposed use or development under the Planning Scheme. The Coastal Values of Southern Tasmania Interpretation Manual 2007 (DTAE, 2007) provides a set of decision support tools to assist Council to examine areas of the coast that may be at risk from the effects of climate change. These tools will be used to assist in allocating the appropriate zone for coastal areas. In addition, the research from CSIRO suggests that planning schemes should allow for a maximum coastal retreat of 1.05 metres per year. Taking into account the 5 to 15 year life of a long term planning scheme, land occurring within 15.75 meters of the coastline should be zoned accordingly, to embrace a precautionary approach

Inundation of coastal areas through tidal influences and storm surge is an infrequent hazard within the municipal area due to the small variations in tide levels and the sheltered nature of most of the waterways. This level of risk from storm surge will increase wherever there are areas of low-lying land adjacent to the coast, such as beaches. Development in such areas has the potential to increase the hazard risk. Property damaged by storm surge events has been recorded at Kingfish Beach, Southport. The most significant of these was in 1954, when a large storm (combined with a high tide) resulted in the loss of a number of shacks located on the beachfront (Peacock, Darcey & Anderson Pty Ltd 1999).

The Tasmanian government has produced an Information Paper on Sea level Change Around Tasmania (DPIWE, 2004). It noted the uncertainties that relate to greenhouse gas emissions, global warming and the subsequent behaviour of natural processes. Sea levels are however rising and other climatic impacts are being detected. The future scenarios that relate to climate change are important factors in assessing prospective developments – particularly in regard to sea level rise. A rise in sea level will increase water depths and wave energies, with higher storm waves penetrating further towards the shore.

In addition to the economic and property effects of climate change, hazards arising from storm surge, sea-level rise and coastal erosion also create risk to human life. Therefore, in addition, the strategy recognises that there are specific uses and developments that should be located well away from areas potentially at risk. These include, residential dwellings, schools, critical infrastructure, community facilities (that could be used of emergency shelters), and uses storing hazardous materials. The table below outlines the strategic directions and guiding principles for managing such hazards.

The table below outlines the strategic directions and guiding principles for managing such hazards.

STORM SURGE AND SEA LEVEL RISE HAZARD

Strategic Directions	Guiding principles
Ensure that use and development is located and designed with due regard to hazards associated with sea level rise and storm surge.	*Only allow appropriate non-habitable development within areas identified to be susceptible to sea level rise and storm surge.* *Protect actively mobile landforms such as beach and sand dune systems and unstable cliffs from vegetation removal.* *Prevent the construction of habitable buildings within areas at risk from storm surge and sea level rise.* *Ensure community facilities and critical infrastructure is not located in areas of high risk.*

Poor air quality

The limitations of the land use planning system to control potential air pollutants is recognised. Forestry activities are outside of the scope of LUPAA and therefore regeneration burns are not a matter relevant to Council in their role as a Planning Authority.

While there has been no extensive monitoring of air quality in the municipal area, anecdotally the principal source of pollutants relates to the burning of wood primarily from hazard reduction and forestry regeneration burns and domestic wood heaters. Other potential sources of particulate emissions include the burning of waste either in incinerators or the open air. Sources of gaseous emissions from human activities include carbon monoxide, hydrocarbons (unburnt fuel), lead

(from leaded petrol) and organic particulates (from diesel engines). Due to the topography of the municipal area, when cool calm conditions prevail these pollutants, particularly from wood heaters, become 'trapped' in a temperature inversion characterised by the presence of fog and haze particularly around the Huonville, Judbury and Geeveston area. This is one area where Council may wish to examine regulatory controls similar to that operating within the Launceston and Tamar Valley areas. Accordingly new use or development that minimises emissions should be encouraged. This could be achieved by using alternative energy sources or minimising its use of the transport system.

The table below outlines the strategic directions and guiding principles for managing poor air quality hazard.

POOR AIR QUALITY HAZARD	
Strategic Directions	**Guiding Principles**
Potential sources of particulate emissions appropriately manage and minimise particulate emissions.	*Use and development with potential for particulate emission will be required to meet the accepted standards under the Environmental Management Policy (Air Quality) 2004 or any approved substituted policy.*